Of every 10 Mack trucks built ten years ago—7 are still doing duty! Here Peter Helck sketches a "baby Mack" at dock-side.

ITS MIDDLE NAME IS . . . WORK!

Today's Mack trucks range in size from tough little one-tonners to the biggest Prime Mover in Uncle Sam's Army. But big or little—if its last name is Mack, its middle name is *work!*

For 43 years, the world has watched the way Mack trucks wade into the toughest jobs in trucking. That is why the phrase "Built like a Mack truck" is a part of our language.

Mack International Motor Truck Corporation, Los Angeles . . Sacramento . . Fresno . . San Francisco . . Seattle . . Portland

Factories at Allentown, Pa.; New Brunswick, N. J.; Plainfield, N. J.
Factory branches and dealers in all principal cities for service and parts.

Mack

TRUCKS
FOR EVERY PURPOSE
ONE TON TO FORTY-FIVE TONS

BUY U. S. WAR BONDS

IF YOU'VE GOT A MACK, YOU'RE LUCKY . . . IF YOU PLAN TO GET ONE, YOU'RE WISE!

pave. Stringham Ave. betw. Fifth E. and Sixth E., subject to WPB approval—Salt Lake City Commission. 4-1

Washington

CLARK CO.—**A. J. Goerig Construction Co.,** 4508 E. 38th St., Seattle—$293,214, for a sewer system from Bagley Downs, Burton Homes and Ogden Meadows housing projects to the Columbia River—by Housing Authority, Vancouver. 4-5

KING CO.—**M. Moschetto,** 550 - 13th Ave. S., Seattle—$87,429, for a trunk sewer in Shattuck St. and Shattuck St. North, and intercepting sewers on Fourth Ave., Morris St., Fifth Ave. and Second Ave., in the city of Renton—By City Clerk, Renton. 4-12

PROPOSED PROJECTS

California

NAPA CO.—Plans are being prepared, by the City Engineer, Napa, and a district will be formed shortly by City Council, for sewer work in the Agriculture Park District, Napa. The city will pay one-third of the cost and the newly formed district will pay the other two-thirds. 4-16

Colorado

DENVER CO.—Plans are being prepared for an extension to a sewage treatm. plant, to cost over $50,000—by U. S. Engineer Office, Denver. 4-15

OTERO CO.—Plans are being prepared for an outfall sewer line from an airbase to the Arkansas River, to cost over $50,000—by U. S. Engineer Office, Denver. 4-15

Waterway Improvement . . .

CONTRACTS AWARDED

California

LOS ANGELES CO.—**Muncey-Pendleton,** 1004 Ocean Bldg., Long Beach—for timber wharf on the southeast side of Channel No. 2, Long Beach inner harbor—by Golden State Sea Food Co., Long Beach. 4-27

LOS ANGELES CO.—**Standard Dredging Corp.,** Berth 207, San Pedro—for dredging portions of West Basin to a depth of 24 ft., in Los Angeles Inner Harbor—by Consolidated Steel Corp., Wilmington. 4-27

PROPOSED PROJECTS

Mexico

The Director General of Free Ports is planning the imp. of the princ. ports of the Isthmus of Techuantepec, on the Gulf of Mexico, and Salina Cruz, on the Pacific. To cost approx. $3,150,000, will include dredg., rebuild. of wharves, breakwaters, and warehouses. 3-31

Dam . . .

PROPOSED PROJECTS

California

LOS ANGELES CO.—Plans are being prepared for the Rubio Canyon flood control dam just below Camp Huntington, Altadena. It will be a compacted earth and rock fill struct. containing 150,000 cu. yd. material, to cost approx. $350,000—Los Angeles Co. Flood Control District. 4-9

Irrigation . . .

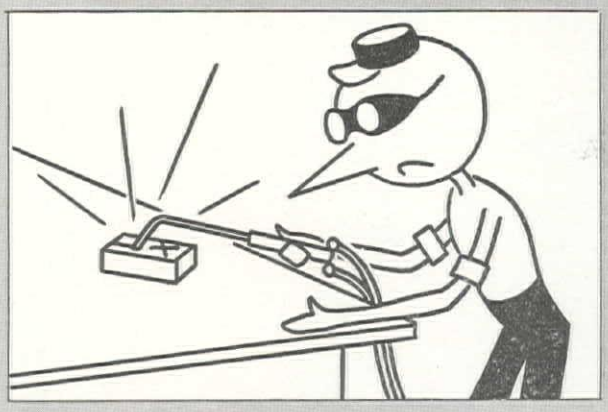
CONTRACTS AWARDED

California

STANISLAUS CO.—**McMillen & Norseen,** 427 Mill St., Turlock—$1,344 for instal. conc. piping in the Krahn branch of the McPherson ditch—by Turlock Irrigation Dist., Turlock. 4-28

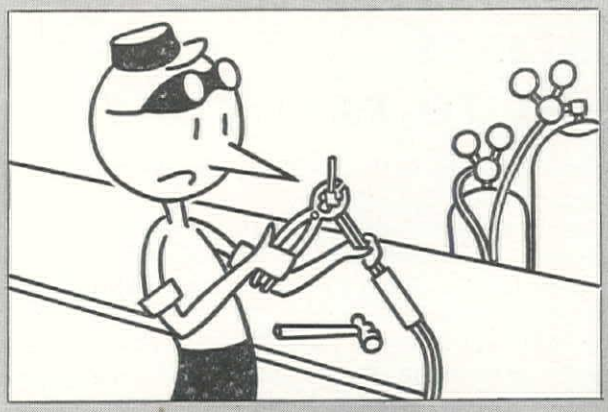
WELDER SPARE THAT TORCH!

1 Don't use your torch as a hammer. It isn't built to stand such abuse. Even the best cutting torch makes a very poor hammer.



2 Don't rub your torch tip on the work or rough surface to clean it. It's liable to damage the orifices and impair the efficiency of the torch.

3 Don't pry metal plates or sheets apart with your welding torch. A bar or chisel does a much better job, and eliminates danger of damage to the torch.



4 Don't use gas pliers on torch or regulator connections. Use your regular torch wrench and prevent damage to brass parts.

Take Good Care of Your Welding Equipment

Common-sense tells you that good care will mean longer service from your torches, tips, and regulators. That's important today because welding and cutting equipment is hard to replace.

Make it your duty to keep your welding apparatus in the best working condition by avoiding needless abuse and mishandling. In that way you'll be helping to fight waste and speed war production.

Air Reduction

General Offices: **60 EAST 42nd ST., NEW YORK, N. Y.**

IN TEXAS:

MAGNOLIA-AIRCO GAS PRODUCTS CO.

General Offices: HOUSTON, TEXAS

OFFICES IN ALL PRINCIPAL CITIES

AIRCO

WILSON

IDLE CYLINDERS ARE PRODUCTION SLACKERS: *Keep 'em rolling for victory!*

WESTERN OFFICES: SAN FRANCISCO, CALIF. • EMERYVILLE, CALIF. • PORTLAND, OREGON • LOS ANGELES, CALIF. • SEATTLE, WASHINGTON

STANISLAUS CO.—**McMillen & Norseen,** 427 Mill St., Turlock—$2,223, for instal. conc. piping in the Falk branch of the Colorado Ave. ditch—by Turlock Irrigation District. 4-22

Oregon

BENTON CO.—**Salem Concrete Pipe Co.,** Salem—$2,926, for furnish. and instal. at the Oregon State College, Corvallis, 2,475 ft. of 12-in. and 950 ft. of 8-in. conc. irrig. pipe—by State Board of Control, Salem. 4-22

Buildings . . .

CONTRACTS AWARDED

Arizona

MARICOPA CO.—**E. W. Duhame,** 3719 N. Central Ave., Phoenix—$85,000, for addts. to the southside distr. hosp., Mesa—by City Clerk, Mesa. 4-27

MARICOPA Co.—**Del E. Webb Construction Co.,** 302 S. 3rd Ave., Phoenix—$361,444 for 200 family dwell. units near Phoenix, using masonry construction—by Housing Authority of Phoenix. 4-6

PIMA CO.—**Paul E. Griffin,** 7219 Sepulveda Blvd., Van Nuys, Calif.—for tech. bldgs. at an airfield—by U. S. Engineer Office, Phoenix. 4-1

PIMA CO.—**Summerbell Roof Structures,** 754 E. 29th St., Los Angeles, Calif.—over $100,000, for instal. wood roof trusses, truss bracings, columns & beams for 3 hangars, 3 warehouses, and one mill bldg. at a modification center—by U. S. Engineer Office, Los Angeles, Calif. 4-6

PIMA CO.—**M. M. Sundt Construction Co.,** 440 S. Park Ave., Tucson—over $50,000, for warehouse and storage bldg. at modifications center—by U. S. Engineer Office, Phoenix. 4-22

PIMA AND MARICOPA COS.—**Tifal, King & McKee,** 1724 Grand Ave., Phoenix—over $50,000, for civilian war housing at two gunnery bases—by U. S. Engineer Office, Phoenix. 4-14

California

ALAMEDA CO.—**K. E. Parker Co.,** 135 South Park St., San Francisco—$2,122,000, for addtl. facil. at Navy Hospital, Oakland, and Naval Air Station, Alameda—by Bureau of Yards & Docks, Washington, D. C. 3-30

CONTRA COSTA CO.—**E. A. Kaiser & Associates,** 8825 Olympic Blvd., Beverly Hills—for 15 dorm. bldgs. and a recr. bldg. on the access road to Yard No. 3, Richmond Shipbuilding Co., Richmond—by U. S. Maritime Commission, Oakland. 4-1

LOS ANGELES CO.—**W. C. Beggs,** 610 S. Broadway, Los Angeles—over $100,000, for addtl. hosp. expansion at an A. C. ferrying command—by U. S. Engineer Office, Los Angeles. 4-13

LOS ANGELES CO.—**Rand Construction Co.,** 6239 Wilshire Blvd., Los Angeles—$183,800 for 59 five and six-room dwell. in Long Beach—by Construction Co., Inglewood. 4-9

LOS ANGELES CO.—**P. J. Walker Co.,** 3900 Whiteside Ave., Los Angeles—$2,250,000 (approx.), for wood prefab. temp. bldgs. at the naval hospital, Long Beach—by Bureau of Yards & Docks, Washington, D. C. 4-7

LOS ANGELES CO.—**Zoss Construction Co.,** 1037 N. Cole Ave., Los Angeles—over $1,000,000, for bldgs. and facils. at a supply depot—by U. S. Engineer Office, Los Angeles. 4-19

MONTEREY CO.—**W. C. Akard,** 225 Cervantes Blvd., San Francisco—over $50,000, for temp. housing—by U. S. Engineer Office, San Francisco. 3-31

MONTEREY CO.—**Pacific Builders,** 312 E. Alisal St., Salinas—for housing in the Salinas area—by U. S. Engineer Office, San Francisco. 4-14

ORANGE CO.—**John C. Blystone,** Box 7, Garden Grove—over $100,000, for WAAC bldgs. at an army air force training center—by U. S. Engineer Office, Riverside. 4-16

ORANGE CO.—**Robert E. Millsap,** 210 West 7th St., Los Angeles—over $100,000, for alter. and addts. to officers mess bldg. at an army air base—by U. S. Engineer Office, Riverside. 4-12

RIVERSIDE CO.—**Brunzell Construction Co.** and **V. O. Brunzell,** 3104 Greenfield Ave., West Los Angeles—over $50,000, for

housing facil. and util. for WAAC and celest. navig. trainer bldgs. and util. at an army air base—by U. S. Engineer Office, Kingman, Arizona. 4-15

RIVERSIDE CO.—**O. L. Carpenter,** El Cajon Blvd. and 54th, San Diego—$61,972, for 150 dormitories at Palm Springs—by Housing Authority, Riverside. 4-8

RIVERSIDE CO.—**Central Building Co.,** 804 Loew's State Bldg., Los Angeles—over $50,000, for a school bldg., a warehouse, and a repair shop at an airfield—by U. S. Engineer Office, Riverside. 4-16

RIVERSIDE CO.—**W. J. Hunter,** 660 Heliotrope Dr., Los Angeles—over $100,000, for expan. of hospital facil. at a camp—by U. S. Engineer Office, Riverside. 4-22

RIVERSIDE CO.—**William Simpson Construction Co.,** 816 W. 5th St., Los Angeles—$3,850,000, for approx. 40 prefab. wood frame bldgs. providing 1,000 addtl. beds at the U. S. Naval Hospital, Norco—by Bureau of Yards & Docks, Washington, D. C. 4-5

SACRAMENTO CO.—**Lawrence Construction Co.,** 3511 East Curtis Park Drive, Sacramento—$56,565, for McClelland School, No. Sacramento—by Federal Works Agency, Los Angeles. 4-16

SAN BERNARDINO CO.—**M. J. Brock & Son,** 107 North Larchmont Blvd., Los Angeles—$68,745, for 34 temp. dwell. units and 95 dorm. units at Twenty-Nine Palms—by Housing Authority, San Bernardino. 4-1

SAN DIEGO CO.—**Myers Bros.,** 3407 San Fernando, Los Angeles—$264,607, for a comm. center bldg. in San Diego—by Federal Public Housing Authority, San Diego. 4-28

SAN DIEGO CO.—**Stanton-Reed Co.,** and **J. W. Breedlove Corp.,** near Foot of Lowell St., San Diego—$370,000 for bldgs. for WAVE officers and enlisted personnel at Coronado—U. S. Navy Public Works Office, San Diego. 4-6

SAN FRANCISCO CO.—**MacDonald & Kahn, Inc.,** 200 Financial Center Bldg., San Francisco—$281,182 for a housing project of 504 dorm. units and two bldgs. at Hunters Point—by Housing Authority, San Francisco. 4-28

SAN FRANCISCO CO.—**G. W. Williams Co.,** 10 California Drive, Burlingame—$275,777 for 496 dorm. units and two addtn. bldgs. —by HousingAuthority, San Francisco. 4-26

SAN MATEO CO.—**James A. Arnott,** 633 Taraval St., San Francisco—$81,000 for 27 one-story frame houses—by Sun Valley Bldg. Co., San Francisco. 4-2

SAN MATEO CO.—**Standard Building Co.,** 1500 Judah St., San Francisco—$884,440, for 724 temp. dwelling units in South San Francisco—by Federal Public Housing Authority, San Francisco. 3-31

SANTA BARBARA CO.—**H. Gorelnik,** 3145 W. 8th St., Los Angeles—over $100,000, for a 303-bed hospital expansion at a camp—by U. S. Engineer Office, Santa Maria. 3-30

SANTA BARBARA CO.—**Martin & Graham,** 112 East Sala St., Santa Barbara—$249,586, for 160 temp. dwell. units, incl. site & dwell., at Lompoc—by Housing Authority, Lompoc. 4-21

SANTA BARBARA CO.—**Baruch Corp.,** 625 S. Olive St., Los Angeles—over $100,000, for prefab. mess hall and lav. at an air base—by U. S. Engineer Office, Santa Maria. 4-6

SANTA CLARA CO.—**George Renz,** 555 Fifth St., Gilroy—approx. $100,000 for addtns. to a dehydration plant in Gilroy—by Food Distribution Administration, Washington, D. C. 4-9

SOLANO CO.—**Barrett & Hilp,** 918 Harrison St., San Francisco—$1,027,300, for a community hosp. and nurses' home in Vallejo—by Federal Works Agency, Washington, D. C. 3-31

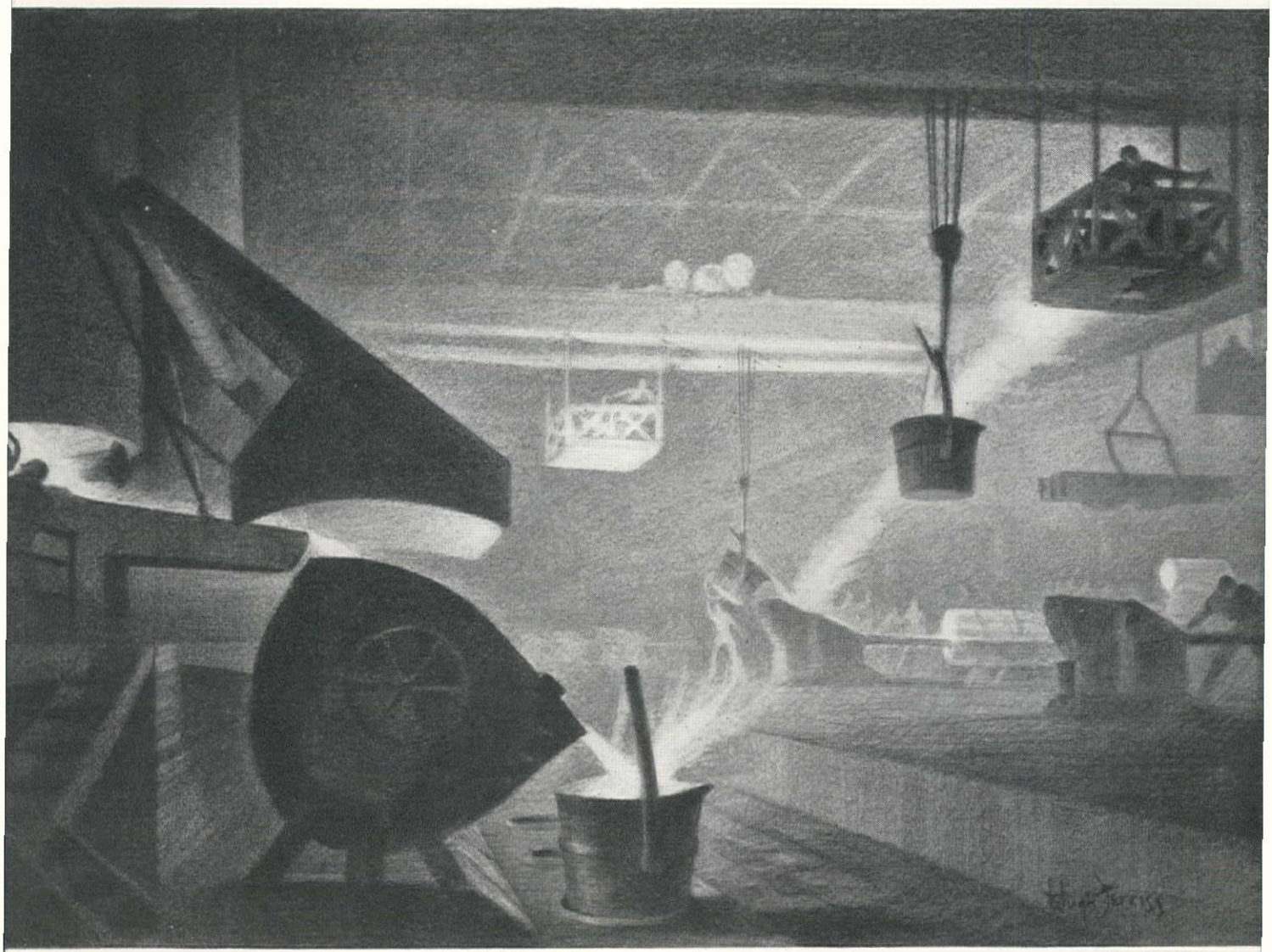
SOLANO CO.—**M. J. King, Inc.,** 231 Franklin St., San Francisco—$287,444, for a junior high school bldg. in Vallejo—by Federal Building Administration, Washington, D. C. 4-2

STANISLAUS CO.—**Trewhitt-Shields & Fisher,** Pacific Southwest Bldg., Fresno—over $100,000, for hospital bldgs.—by U. S. Engineer Office, Sacramento. 4-13

YUBA CO.—**Lawrence Construction Co.,** 3511 E. Curtis Park Drive, Sacramento—$141,734 for a housing project of 60 family dwell. units and 40 accom. for couples in Marysville—by Marysville City Housing Authority. 3-30

UNANNOUNCED CO.—**J. C. Monk & Son** and **Morrison W. Reese,** 45 Tait Ave., Los Gatos—for bldgs. in the San Francisco bay area—by U. S. Engineer Office, San Francisco. 4-14

The Forehearth



A forehearth in one of our foundries — drawn by Hugh Ferriss.

Molten iron is pouring from the forehearth into a ladle which will be picked up by a crane hook and carried to a Super-de Lavaud centrifugal casting machine. All raw materials in the melt have been inspected and laboratory-checked. The analysis, predetermined. Then, as a further precaution, to insure uniformity of both analysis and temperatures in cupola operation, the molten metal is accumulated and mixed in 12-ton reservoirs called *forehearths*. Variations in speed of melting, iron composition and temperature are thereby reduced to a minimum. This is one of a series of controls in operation at each of our plants, beginning with inspection and analysis of raw materials and ending with tests of the finished cast iron pipe.

UNITED STATES PIPE & FOUNDRY CO.

General Offices: Burlington, New Jersey. *Plants and Sales Offices throughout the U. S. A.*

Colorado

JACKSON CO.—**Western Knapp Engineering Co.,** 760 Folsom St., San Francisco, Calif.—approx. $90,000, for a mill for treating fluospar—by Western Fluospar Co., Walden. 4-6

MESA CO.—**Stearns-Rogers Co.,** Denver—for a vanadium processing plant—by Metals Reserve Corp., Grand Junction. 3-25

Idaho

ELMORE CO.—**Mountain Home Builders,** Portland, Ore.—over $50,000 for temp. frame bldgs.—by U. S. Engineer Office, Portland, Ore. 4-7

Nebraska

ADAMS CO.—**R. E. Rippe,** Lamar, Colo., and 2409 Fletcher Ave., South Pasadena, Calif.—$1,159,000, for 682 dwell. units at Hastings—by Federal Public Housing Authority, Kansas City, Mo. 4-7

BUFFALO CO.—**Kiewit-Big Horn Construction Co.,** Omaha—over $100,000, for hospital facil. and various bldgs. and util.—by U. S. Engineer Office, Omaha. 4-22

Nevada

CLARK CO.—**R. J. Daum,** 6803 West Blvd., Inglewood, Calif.—$587,445, for 200 temp. dwel. units and 320 dormitory units at Las Vegas—by Federal Public Housing Authority, San Francisco, Calif. 4-21

CLARK CO.—**General Construction Co.,** and **J. Walter Johnson,** 5205 Hollywood Blvd., Los Angeles, Calif.—over $50,000 for civilian war housing—by U. S. Engineer Office, Kingman, Ariz. 3-31

New Mexico

OTERO CO.—**B. I. Barfield,** Amarillo, Texas—over $100,000, for addtl. hospital facil.—by U. S. Engineer Office, Albuquerque. 4-20

SAN JUAN CO.—**Hudson Construction Co.**—A processing plant for a helium gas project, and 40 bungalows in Shiprock—by U. S. Bureau of Mines, Washington, D. C. 3-19

SANTA FE CO.—**A. O. Peabody,** Santa Fe—over $100,000, for addtl. bldgs. at an airfield—by U. S. Engineer Office, Albuquerque. 4-1

Oregon

CLATSOP CO.—**Lee Hoffman,** Rt. 5, Box 801, Portland—$129,989, for 60 housing units at Astoria—by Federal Public Housing Authority, Portland. 4-16

JACKSON CO.—**Viesko & Hannaman,** 1440 S. 13th St., Salem—approx. $350,000 for bldgs. and appurt.—by U. S. Engineer Office, Portland. 4-15

MULTNOMAH CO.—**Knott, Rogers and Dunbar,** 2046 NE Union Ave., Portland—$94,940, for 110 dorm. type housing units near Portland air base—by Housing Authority, Portland. 4-8

MULTNOMAH CO.—**Pacific Chain & Manufacturing Co.,** 1901 N. W. Wilson, Portland—$200,000 for a new factory bldg. adjacent to the present plant—by Defense Plant Corporation, Washington, D. C. 4-7

MULTNOMAH CO.—**Tri-State Construction Co.,** 4112 NE Sandy Blvd., Portland—$616,399, for 325 housing units at Portland—by Federal Housing Authority, Portland. 4-28

MULTNOMAH CO.—**Wegman & Son,** Board of Trade Bldg., Portland—$85,000, for a personnel bldg. at the shipyards—by Oregon Shipbuilding Corp., Portland. 4-19

Texas

BASTROP CO.—**Rex D. Kitchens Construction Co.,** Austin—over $100,000, for addtl. housing—by U. S. Engineer Office, San Antonio. 4-20

BEXAR CO.—**G. W. Mitchell,** San Antonio—over $50,000, for aux. storage facil.—by U. S. Engineer office, San Antonio. 4-20

BROWN CO.—**Yarbrough Construction Co.,** Austin—over $100,000, for hosp. facil.—by U. S. Engineer office, San Antonio. 3-29

BUILDING TOMORROW'S ROADS TODAY

With WOOLDRIDGE SCRAPERS

The war-born roads of today, stretching from Alaska to the Tropics will become the peacetime Highways of Tomorrow. On these projects, and many others, the world over you'll find Wooldridge Terra-Clipper Scrapers handling more than their share of the loads. Faster loading and dumping of larger heaping yardages enables them to make more trips per hour, handling more dirt per day. In blazing the way through rugged wilderness, parched deserts and rank jungles, Wooldridge Scrapers are expediting the movement of our armed forces and vitally needed supplies. For equipment that outlasts the job always specify Wooldridge when you buy.

AVAILABLE IN SIZES RANGING FROM 9 TO 30 CUBIC YARD CAPACITIES WOOLDRIDGE SCRAPERS ARE SUPPLIED TO THE U. S. GOVERNMENT FOR TWO LINE OPERATION, PERMITTING TWO DRUM POWER UNITS TO BE USED. WOOLDRIDGE SCRAPERS OPERATE ON THE PIVOT-TILT FORCED LOAD EJECTION PRINCIPLE.

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MANUFACTURING COMPANY • SUNNYVALE, CALIFORNIA

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BOILING BOWL TERRA CLIPPER PRINCIPLE

SCRAPERS

BROWN CO. — **Yarbrough Construction Co.,** Austin—over $50,000, for housing—by U. S. Engineer Office, San Antonio. 4-9

DALLAS CO.—**A. J. Rife Construction Co.,** Dallas — over $500,000, for general housing—by U. S. Engineer Office, Denison. 4-15

PRESIDIO CO. — **Lembke Construction Co.,** Albuquerque, New Mex.—over $100,000, for housing facil.—by U. S. Engineer Office, Albuquerque, N. Mex. 4-23

Utah

SALT LAKE CO.—**Mark B. Garff,** 2256 Oneida St., Salt Lake City—approx. $55,000, for bldgs. for a hi-octane gasoline plant —by Utah Oil Refining Co., Salt Lake City. 4-22

SALT LAKE CO.—**H. E. Schraven,** 317 Dooley Bldg., Salt Lake City—for 5 arsenic kitchens for a smelter—by American Smelting and Refining Co., Midvale. 3-25

UTAH CO.—**Taylor & Wheeler Construction Co.,** Los Angeles, Calif.—over $1,500,000 for 200 apt. units and 139 dwell. units in Provo—by Federal Public Housing Authority, Salt Lake City. 4-1

WEBER CO.—**Intermountain Construction Co.,** 325 Atlas Bldg., Salt Lake City—less than $375,000, for storage bldgs. at an air depot—by U. S. Engineer Office, Salt Lake City. 4-27

WEBER CO.—**Ford J. Twaits Co.,** 451 S. Boylston, Los Angeles, Calif.—less than $375,000, for bldgs.—by U. S. Engineer Office, Salt Lake City. 4-23

Washington

BENTON CO.—**Ford J. Twaits Co.,** 451 S. Boylston Ave., Los Angeles, Calif., and **Morrison-Knudsen Co., Inc.,** Boise, Ida.—$1,000,000 (approx.), for 500 housing units at Richland—by E. I. du Pont de Nemours Co., Richland. 4-23

FRANKLIN CO. — **Anderson Building Co., Inc.,** East 4409 Sprague Ave., Spokane —$52,518, for 25 housing units at Pasco—by Pasco Housing Authority, Spokane. 4-12

FRANKLIN CO.—**Ford J. Twaits Co.,** 451 S. Boylston, Los Angeles, Calif., and **Morrison - Knudsen Co.,** 319 Broadway, Boise, Ida.—for 250 duplex homes twelve miles north of Pasco—by Federal Public Housing Authority. 4-28

FRANKLIN CO. — **Halvorson Construction Co.,** 3818 N. E. Sandy Blvd., Portland, Ore.—$207,565, for 100 emer. housing units at Pasco—by Housing Authority, Pasco. 4-7

GRANT CO.—**Frank Lohse,** 1110 - 8th Ave., Seattle—$276,000 for 130 temp. family dwell. units at Moses Lake—by Federal Public Housing Authority, Seattle. 4-28

GRANT CO.—**Clyde M. Ludberg Co.,** W. 326 First Ave., Spokane—over $1,000,000, for misc. bldgs.—by U. S. Engineer Office, Seattle. 4-8

GRANT CO. — **Morrison-Knudsen Co., Inc.,** 319 Broadway, Boise, Ida.—$255,900, for a 275-unit dorm. project at Moses Lake —by Federal Public Housing Authority, Seattle. 4-28

KING CO.—**The Austin Co.,** Dexter Horton Bldg., Seattle—$1,088,000, for bldgs. at the Sand Point naval air station—by Public Works Officer, Sand Point Naval Air Station. 4-2

KING CO.—**A. F. Mowat Construction Co.,** 708-1331 Third Ave. Bldg., Seattle—over $50,000, for bldgs.—by U. S. Engineer Office, Seattle. 4-13

KITSAP CO.—**C. F. Davidson,** 2910 So. 9th St., Tacoma—$920,000 for 500 temp. fam. dwell. units at Bremerton—by Bremerton Housing Authority. 4-23

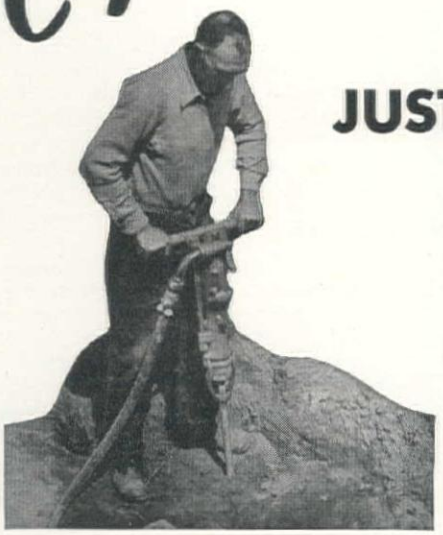
PIERCE CO.—**N. S. Nelson & Son,** Tacoma—$65,300, for the Salishan School and Gault Annex—by School Board, Tacoma. 4-8

SPOKANE CO.—**Clyde M. Ludberg Co.,** W. 326 1st Ave., Spokane—over $1,000,000, for hospital and other bldgs.—by U. S. Engineer Office, Spokane. 4-23

SPOKANE CO.—**Sound Construction & Engineering Co.,** Northern Life Tower, Seattle, and **Ford J. Twaits Co.,** 451 South Boylston Ave., Los Angeles, Calif.—over $1,000,000, for a warehouse, shed and storage facil.—by U. S. Engineer Office, Seattle. 4-6

WALLA WALLA CO. — **W. C. Smith Co.,** Board of Trade Bldg., Portland, **L. H. Hoffman,** 715 S. W. Columbia, Portland, Oreg., and **Howard S. Wright & Co.,** 407 Yale Ave., Seattle — over $100,000, for bldgs. and appurt.—by U. S. Engineer Office, Portland, Ore. 4-14

CP Sinkers Can take it—

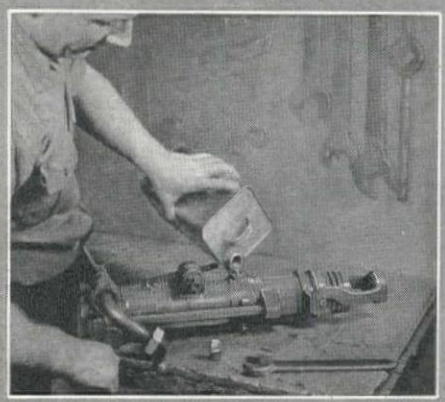


JUST GIVE THEM ORDINARY CARE

FEW hand-held drills are as well designed, as ruggedly built as CP Sinker Drills. You don't have to handle them with kid gloves or baby them on the job. But, you do have to give them reasonable care, and a few simple suggestions — like the four illustrated on this page — will help you to get maximum service from your CP-32, CP-42 and CP-10 Sinker Drills. Additional suggestions for the better maintenance of CP Sinker Drills will appear in future advertisements. Watch for them.

HOW TO GET MAXIMUM SERVICE FROM YOUR CP SINKER DRILLS

1 Remove, clean air inlet screen every two weeks —more frequently if hose is old. Drill will lose power, if the air inlet screenbecomesclogged.



2 Fill reservoir with good grade of oil of proper viscosity for weather conditions. If machine is used constantly, fill the reservoir every hour.

3 Before putting sinker drill in service, always connect the air hose and make sure oil is coming through the machine and out of the exhaust.

4 Blow air hose, connect to machine, turn on air and examine drill shank to see whether oil is going through working parts of the machine.

★★★★★★★★
PNEUMATIC TOOLS
ELECTRIC TOOLS
(Hicycle...Universal)
ROCK DRILLS

CHICAGO PNEUMATIC
TOOL CP COMPANY
General Offices: 8 East 44th Street, New York, N. Y.

★★★★★★★★
AIR COMPRESSORS
VACUUM PUMPS
DIESEL ENGINES
AVIATION ACCESSORIES

Canada

ALBERTA—**Bechtel, Price, & Callahan,** Mills Tower Bldg., San Francisco—$925,000, for remodeling and new bldgs. at the old Jesuit College site at Edmonton—by U. S. Engineers. 4-28

BRITISH COLUMBIA — **Dominion Construction Co., Ltd.,** 150 West 1st Ave., Vancouver—$275,000, for a new naval station in Vancouver—by Department of Munitions & Supply, Ottawa.

BRITISH COLUMBIA—The Naramata Co-Operative Growers' Exchange is replacing at a cost of $94,000 a packing and cold storage plant that was recently destroyed by fire.

BRITISH COLUMBIA—**Overseas Wood Products Co.,** Vancouver — $70,000, for a sawmill to replace the structure recently burned.

BRITISH COLUMBIA—**Dominion Construction Co., Ltd.,** 150 West First Ave., Vancouver—$240,000, for bldgs. and util. at H. M. C. S. "Discovery" at Vancouver —by Department of Munitions & Supply, Ottawa.

BRITISH COLUMBIA — **Carter-Halls-Aldinger Co., Ltd.,** 670 Taylor St., Vancouver—$250,000 for accom. and $300,000 for bldgs. at an R. C. A. F. station—by Department of Munitions & Supply, Ottawa.

PROPOSED PROJECTS

Arizona

MARICOPA CO. — The Federal Public Housing Authority, Washington, D. C., has authorized two housing projects for a total of 650 family units for Phoenix.

UNANNOUNCED CO.—Plans are being prepared for a government-financed electrolytic copper refinery and concentrator, to cost approx. $46,500,000—by Defense Plant Corporation.

California

ALAMEDA CO. — Approval has been granted for 2,000 family dwell. units in Alameda and 1,250 dorm. units in Oakland, to cost $4,000,000—by National Housing Agency, Washington, D. C. 4-14

LOS ANGELES CO.—A $750,000 ferrous and alloy metal tube plant will be built in Los Angeles, financed by the Defense Plant Corporation, Washington, D. C. 4-28

LOS ANGELES CO.—A housing project of nearly 100 homes is being planned by the Union Development Co. in Bellflower at 14th St. and Woodruff Ave.

LOS ANGELES CO. — Canoga Investment Co., Los Angeles, is planning to build 36 four-room frame and stucco dwell. in the Gardena Dist., Los Angeles Co. territory—to cost $94,000. 4-23

LOS ANGELES CO.—Plans are being prepared for a housing project of 48 three and four-family units, and 278 single residences in the Mayfair district, south of Bellflower—by Montana Land Co. 3-19

SAN BERNARDINO CO. — Plans are being prepared for an 80-unit housing project in the southeast section of Ontario, to cost approx. $150,000—by San Bernardino Housing Authority. 4-14

SANTA BARBARA CO. — Assignment has been given to the Federal Public Housing Authority, San Francisco, to develop 190 dormitory units in Santa Maria. 4-14

SANTA CLARA CO. — Approval of a 1,550-bed hosp. to cost over $3,000,000 has

been granted by the War Department, Washington, D. C.

SOLANO CO.—Approval has been given for addtn. to a commun. service bldg. at the naval ammunition depot at Mare Island, to cost $140,000—by Bureau of Yards & Docks, Washington, D. C. 4-7

The Federal Public Housing Authority, Washington, D. C., has authorized the following housing projects: Daggett, San Bernardino Co.—350 dorm. units, 60 family units; Lancaster, Los Angeles Co.—72 dorm. units, 72 family units; Oxnard, Ventura Co.—275 dorm. units; Richmond, Contra Costa Co.—4,000 dorm. units; San Diego, San Diego Co.—1,240 family units; San Bernardino, San Bernardino Co.—980 family units. 4-23

Colorado

JEFFERSON CO.—Plans are being prepared for remodeling bldgs. for the Colorado School of Mines at Golden, to cost approx. $60,000. 4-28

Idaho

BANNOCK CO.—The National Housing Agency, Washington, D. C., has approved a housing project of 50 privately financed family units and conv. exist. struct. through public financing for 120 addtl. accom., at Pocatello.

KOOTENAI CO.—The National Housing Authority, Washington, D. C., has authorized 100 housing units at Bayview. 3-31

Nevada

The Union Pacific Railroad is contemplating extension of their line south from the Goldfield terminus of the Tonopah and Goldfield road to connect with the U. P. R. R., to cost approx. $9,000,000. The project is awaiting the decision of the U. S. Engineers Office as to its strategic wartime value.

WASHOE CO.—Plans are being prepared for a 2-story reinf. conc. admin. bldg. to replace the present city hall at Reno. 4-1

Oregon

CLATSOP CO.—Plans calling for a 200-bed naval hospital in the vicinity of Astoria have been approved by the Navy Department, Washington, D. C. 4-12

MARION CO.—Approval has been granted for a flax plant to cost $125,000 at Jefferson—by Defense Plant Corporation, Washington, D. C.

VARIOUS COS.—Salem has been approved as a site for two dehydration plants, and one each at Lebanon, Dundee, Corvallis, Eugene, Dallas, and Freewater—by Food Distribution Administration, Washington, D. C. 4-7

The following housing projects have been approved by the Federal Public Housing Authority: Madras, Jefferson Co.—22 family units; Corvallis, Benton Co.—144 dorm. units; Hermiston, Umatilla Co.—83 family units. 4-23

Utah

DUCHESNE CO.—Priorities were recently granted for a potato dehydration plant at Roosevelt—by Food Distribution Administration, Washington, D. C. 3-19

Washington

KING CO.—The National Housing Authority, Washington, D. C., has authorized 800 new family units at Seattle. 4-2

SKAGIT CO.—The National Housing

Agency has approved a program for converting exist. facil. into housing units for 50 families. 4-13

SNOHOMISH CO.—The Federal Public Housing Authority has approved a housing project of 540 family units for Everett. 4-23

SPOKANE CO.—The Manito Development Company, Spokane, is planning 90 housing units in Spokane for this year, to cost approx. $400,000. 4-6

THURSTON CO.—The War Production Board has approved the St. Peters Hospital at Olympia, to cost $129,000. 4-16

WALLA WALLA CO.—Plans are being made for a 500-bed addtn. to the present hospital—by U. S. Engineer Office, Spokane. 4-26

The Federal Public Housing Authority, Washington, D. C., has authorized the following housing projects: Bremerton, Kitsap Co.—4400 family units; Seattle, King Co.—500 dorm. units; Tacoma, Pierce Co.—180 family units, 220 dorm. units; Wilkeson, Pierce Co.—30 family units.

Miscellaneous . . .

CONTRACTS AWARDED

Arizona

MARICOPA CO.—**Tanner Construction Co.,** 731 N. 19th Ave., Phoenix—over $100,000, for range facil. at an airfield—by U. S. Engineer Office, Phoenix. 4-1

California

ALAMEDA CO.—**Dinwiddie Construction Co., Inc.,** 210 Crocker Bldg., San Francisco—$1,540,700, for addtl. facil. at Naval air station, Oakland—by Bureau of Yards & Docks, Washington, D. C. 4-15

ALAMEDA CO.—**McNeil Construction Co.,** 5860 Avalon Blvd., Los Angeles—$11,972,524, for addtl. facil. at Pleasanton—by Bureau of Yards & Docks, Washington, D. C. 4-15

FRESNO CO.—**J. E. Haddock,** 538 E. Foothill Blvd., Pasadena—over $50,000 for utilities—by U. S. Engineer Office, Sacramento. 4-6

KERN CO.—**Hodges & Karn,** 4816 W. Pico Blvd., Los Angeles—$1,886,340, for facil. at Marine air station, Mojave—by Navy Department, Washington, D. C. 4-27

LOS ANGELES CO.—**J. S. Barrett,** 412 First Nat'l Bank Bldg., Santa Ana—over $50,000 for util. for a fighter squadron at a flight strip—by U. S. Engineer Office, Santa Maria. 4-7

LOS ANGELES CO.—**Clifford C. Bong & Co.,** 6 North 1st Ave., Arcadia—over $100,000, for site grade. and railroad at a classification yard—by U. S. Engineer Office, Los Angeles. 4-20

LOS ANGELES CO.—**California Shipbuilding Corp.,** Wilmington—received a contract for 20 Liberty ships and 84 Victory ships—by U. S. Maritime Commission, Washington, D. C. 4-23

LOS ANGELES CO.—**H. B. Nicholson,** 438 Chamber of Commerce Bldg., Los Angeles—over $100,000, for grading and railroad trackage—by U. S. Engineer Office, Los Angeles. 4-13

MARIN CO. — **Marinship Corporation,** Sausalito, received an award for 36 tankers—by U. S. Maritime Commission, Washington, D. C. 4-23

RIVERSIDE CO.—**Bressi & Bevanda,** 208 W. 8th St., Los Angeles—over $50,000, for dust control by mulching and gravel method at an air support command base—by U. S. Engineer Office, Kingman, Arizona. 4-20

SAN BERNARDINO CO.—**Robert E. Millsap,** 210 W. 7th St., Los Angeles—over $100,000, for addtl. improv. at an army air base—by U. S. Engineer Office, Riverside. 3-30

SAN BERNARDINO CO.—**Shannahan Bros., Inc.,** 6193 Maywood Ave., Huntington Park—over $100,000, for site grading and railroad—by U. S. Engineer Office, Los Angeles. 4-20

SAN FRANCISCO CO.—**Charles L. Harney,** 625 Market St., San Francisco—$296,187, for grading at a housing project at Hunters Point—by Housing Authority, San Francisco. 4-28

SANTA CLARA CO.—**Pittsburg - Des Moines Steel Co.,** Rialto Bldg., San Francisco—approx. $3,500,000, for a new high-pressure wind tunnel at the Ames Aeronautical Lab. at Moffett Field, near Sunnyvale. 4-7

UNANNOUNCED CO. — **Macco Construction Co.,** 815 Paramount Blvd., Clearwater—for dry fill in the San Francisco Bay area—by U. S. Engineer Office, San Francisco. 4-1

Idaho

GEM CO.—**Morrison-Knudsen Co., Inc.,** P. O. Box 1518, Boise—for a 110-mi., 66,000-volt power line betw. Emmett & Stibnite—by Idaho Power Co., Boise. 4-26

Nebraska

BROWN CO.—**J. A. Terteling & Sons,** Box 1406, Boise, Idaho—over $100,000, for unclass. excav., conc. pave., elect. service outlet conn., water lines, exten. of lighting

and drain. facil.—by U. S. Engineer Office, Omaha. 4-13

HALL CO. — **Geer-Maurer Construction Co.,** Grand Island — over $100,000, for bldgs., roads, walks, parking areas, outside util., sprinkler and fire alarm system—by U. S. Engineer Office, Omaha. 4-13

New Mexico

EDDY CO.—**Ernest Loyd,** Fort Worth, Texas—over $50,000, for addtl. dust palliative treatmt. at an airfield—by U. S. Engineer Office, Albuquerque. 4-13

LEA CO. — **Skousen Brothers,** Springer Bldg., Albuquerque—over $50,000 for dust pall. treatmt. at an airfield—by U. S. Engineer Office, Albuquerque. 4-15

Oregon

BENTON CO.—**Halvorson Construction Co.,** 3813 NE Sandy Blvd., Salem—$200,000 (approx.), for misc. bldgs., util. and appurt.—by U. S. Engineer Office, Portland. 4-12

BENTON CO.—**Natt McDougall Co.,** 552 Sherlock Bldg., Portland—over $50,000, for drainage facil. and appurt.—by U. S. Engineer Office, Portland. 3-29

MULTNOMAH CO.—**Kaiser Co.,** Swan Island, Portland—a contract for 47 tankers —by U. S. Maritime Commission, Washington, D. C. 4-23

MULTNOMAH CO.—**Oregon Shipbuilding Corporation,** Portland—contract for 17 Liberty ships and 105 Victory ships—by U. S. Maritime Commission, Washington, D. C. 4-23

Texas

BEXAR CO.—**H. B. Kilstofte,** San Antonio —over $100,000, for addtl. tech. facil.—by U. S. Engineer Office, San Antonio. 4-3

BEXAR CO.—**Walsh & Burney,** San Antonio—over $100,000, for storage facil.—by U. S. Engineer Office, San Antonio. 4-22

CAMERON CO.—**H. B. Swedlund & Son,** Harlingen—over $100,000, for addtl. work —by U. S. Engineer Office, Galveston. 4-9

SMITH CO.—**L. J. Miles Construction Co.,** and **R. B. Butler,** Bryan—over $100,000, for const. of training aids—by U. S. Engineer Office, Denison. 3-25

Utah

TOOELE CO. — **Ford J. Twaits,** Box 3159, Terminal Annex, Los Angeles, Calif. —over $100,000, for a firing range—by U. S. Engineer Office, Salt Lake City.

Washington

CLARK CO.—**Kaiser Co.,** Vancouver—contract for 48 tankers—by U. S. Maritime Commission, Washington, D. C. 4-23

KING CO.—**Argentieri & Colarossi,** 1819 Willer St., Seattle—$111,112, for removal of street car tracks and resurf. on Third Ave., Seattle—by Board of Public Works, Seattle. 4-12

KITSAP CO.—**Austin Co.,** Dexter Horton Bldg., Seattle — $4,814,420, for instal. of shore facil. on Puget Sound—by Bureau of Yards & Docks, Washington, D. C. 4-19

Canada

BRITISH COLUMBIA—**North Western Dredging Co., Ltd.,** 736 Granville St., Vancouver—$188,964, for conc. wall replac. at derrick landing wharf at Esquimalt—by Federal Public Works Department, Ottawa. 4-7

BRITISH COLUMBIA — **Victoria Pile Driving Co.,** Victoria—$118,773 for an oil wharf at Esquimalt — by Federal Public Works Dept., Ottawa. 4-7

PROPOSED PROJECTS

California

CONTRA COSTA CO. — Authorization has been granted for addtn. to a commun. service bldg. at the naval magazine at Port Chicago—to cost $85,000—by Bureau of Yards & Docks, Washington, D. C. 4-7

SAN FRANCISCO CO. — Authorization has been granted for addtl. bldgs. and facil. at the naval dry docks at Hunters Point, to cost $180,000 — by Bureau of Yards & Docks, Washington, D. C. 4-7

SAN DIEGO CO.—The Bureau of Yards & Docks, Washington, D. C., has authorized the following projects: $280,000 for addtl. barracks and a fuel oil stor. tank at Camp Kearny; $94,500 for bldgs. and util. at Fallbrook naval ammun. depot; $200,000 for roads through Camp Pendleton.

SOLANO CO.—Approval has been given for addtl. dredg. and bldgs. for the new ammunition loading pier at the naval ammun. depot at Mare Island—to cost $565,000—By Bureau of Yards & Docks, Washington, D. C. 4-7

Canada

ALBERTA—An appropriation of $500,000 has been made by the Dominion Government for an oil plant to take oil from the Alberta tar sands—by Department of Munitions & Supply, Ottawa. 4-28

TRADE WINDS

News of Men Who Sell to the Construction West

CALIFORNIA

Reynolds Spring Co., Jackson, Mich., has purchased the *Fabriform Steel Products Co.* of Bell, Calif., and will start immediate production in the newly acquired plant.

* * * *

The Los Angeles plant of the *West Coast Pipe & Steel Co.* has been purchased by the *Essick Manufacturing Co.*, also of Los Angeles. The new acquisition will add 26,500 sq. ft. of working space to the Essick plant.

* * * *

A recent California incorporation is that of the *Heil Equipment Co. of Northern California*, which has established its place of business in San Francisco, listing **A. R.** and **Evelyn T. Smith**, and **W. U. Walsh** as directors.

* * * *

Beverly G. Brown, formerly superintendent of maintenance and construction for the Sales Division of *Tide Water Associated Oil Co.*, has been promoted from the rank of captain to that of major in the U. S. Army Corps of Engineers.

EMPLOYEES of the Eureka, Calif. yard of Chicago Bridge and Iron Co., group themselves proudly around the Army-Navy "E" pennant recently awarded them for outstanding war production performance.

Bert Deleray, since 1937 Los Angeles manager for the Lamp Division of the *Westinghouse Company*, has been named district manager of the San Francisco office of the *Tri State Supply Corporation.*

* * * *

J. M. Etienne has been made a member of WPB's Crane & Hoist Industry Advisory Committee. He is president of the *Cyclops Iron Works*, San Francisco.

PACIFIC NORTHWEST

Granville M. Read has been made assistant chief engineer of *E. I. du Pont de Nemours & Co., Inc.*, to succeed **R. D. Moore** who has been commissioned lieutenant commander in the U. S. Naval Reserve, stationed at Norfolk, Va.

* * * *

AMONG THE MANUFACTURERS

Paul B. Cochran has been appointed general manager of the *Buckeye Traction Ditcher Co.*, Findlay, Ohio, and at the same time was elected to the board of directors. For the past several years he has been sales manager for the firm.

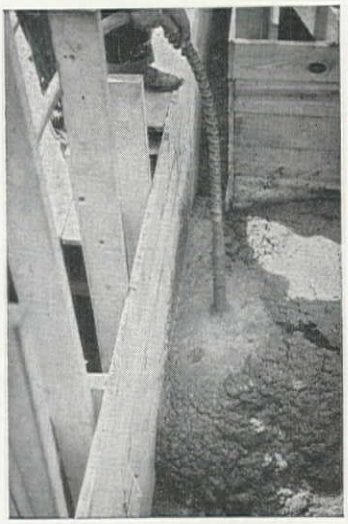
* * * *

Recent changes in the application engineering staff of *Lincoln Electric Co.*, Cleveland, Ohio, include: *H. H. Stahl* who has been transferred from Philadelphia to Boston to serve as district manager in that area; **R. J. Shepherd** will move from Toledo to Philadelphia; **C. M. Richardson**, formerly at Moline, Ill., who becomes district manager and application engineer at the Toledo office; and **W. J. Barrett** who has been transferred from the Moline office to Detroit.

* * * *

The *Cooper Bessemer Corporation*, Mt. Vernon, Ohio, recently won special citation as having one of the two highest safety records in the heavy machine manufacturing industry. This citation came from a survey made during the accident rate contest sponsored by the National Safety Council.

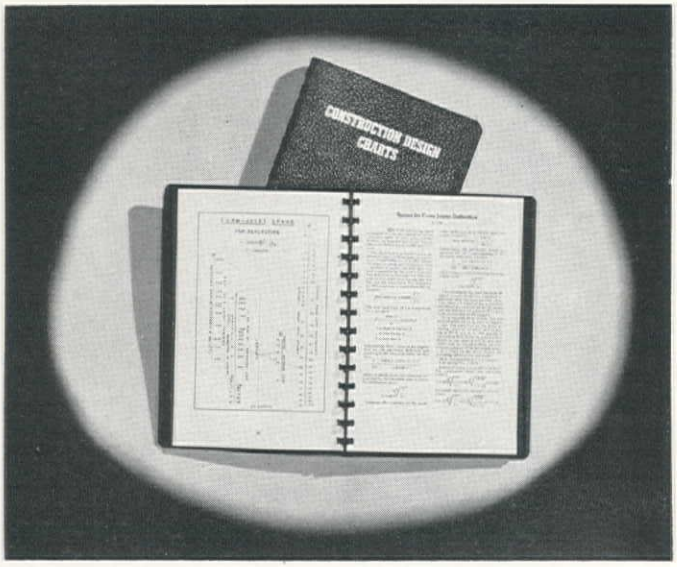
The 1942 report of this corporation reveals that the volume of business was $33,-



ENGINEERS — CARPENTERS — CONCRETE MEN — FOREMEN — SUPERINTENDENTS:

SOLVE ENGINEERING PROBLEMS . . . . . at a Glance!

There is no time to waste these days on tedious figuring of routine problems! The new, revised edition of CONSTRUCTION DESIGN CHARTS, by Professor James R. Griffith, gives countless engineering shortcuts—gives the answers to engineering and preliminary design problems in a flash! Engineers—carpenters—concrete men—foremen—superintendents—there's a whale of a value in this book for every man engaged in construction today!



The new, revised edition of CONSTRUCTION DESIGN CHARTS contains 72 charts instead of the 48 published in the original book. Now 159 pages—all filled with valuable information that will help you. Covered in sturdy black fabrikoid, stamped in gold, the book has a special metal binding that allows each page to lie flat for easy reference.

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164,000, four times greater than 1940. Unfilled orders on January 1 of this year amounted to $52,000,000 as compared with $25,000,000 for the preceding year.

* * * *

Edward B. Morrow has been elected by the Board of Directors of *Hercules Powder Co.*, Wilmington, Dela., to the position of vice president, and **Francis J. Kennerley** will succeed him as treasurer of the company. Morrow has been with the company since 1916, and Kennerley since 1912. **Leslie W. Mason** will succeed to Kennerley's former position of assistant treasurer, and **William S. Harkins** will become comptroller. **Edward C. Hastings** will be assistant to the comptroller.

Neil C. Hurley, Jr. has been elected executive vice president of the *Independent Pneumatic Tool Co.*, Chicago, Ill. He has been vice president and director for the past four years. **John A. McGuire** was elected secretary at the same time and **E. R. Wyler** was named vice president for the New York City area. The company's 1942 net earnings amounted to $4.29 per share.

* * * *

Michael Malachi Carmody has recently been appointed sales manager of the paint division of *Aluminum Industries, Inc.*, Cincinnati, Ohio, where he will have charge of the sales of ready mixed aluminum paints and industrial finishes. He has been in the company's paint department since 1923.

RALPH HANES has been appointed manager of sales promotion in the mechanical goods division of U. S. Rubber Co. He has been 15 years with the firm.

The *Thomas Loughlin Co.* has received a joint Army-Navy production award for outstanding production of wire rope and chain fittings which are vitally needed for navy and merchant marine ships. The award was made by Rear Admiral Wat T. Cluverius and was accepted by **Donald S. Loughlin**, president of the company, who pledged continued increased production.

* * * *

Dr. Robert V. Yohe, technical superintendent of the chemical division of *B. F. Goodrich Co.*, Akron, Ohio, has been named plant manager for the synthetic rubber plant to be operated by the company in Kentucky. He succeeds **J. W. Frasche** who has been named plant manager at another synthetic plant in Texas, also to be operated by Goodrich.

THE ARMY - NAVY "E" burgee flies over the plant of the LaPlant-Choate Manufacturing Co., Cedar Rapids, Iowa. The presentation was made by Brig. Gen. Stuart C. Godfrey, U. S. A., and Capt. David C. Hanrahan, U. S. N. All earthmoving equipment produced in the plant is going into war uses.

NEW EQUIPMENT

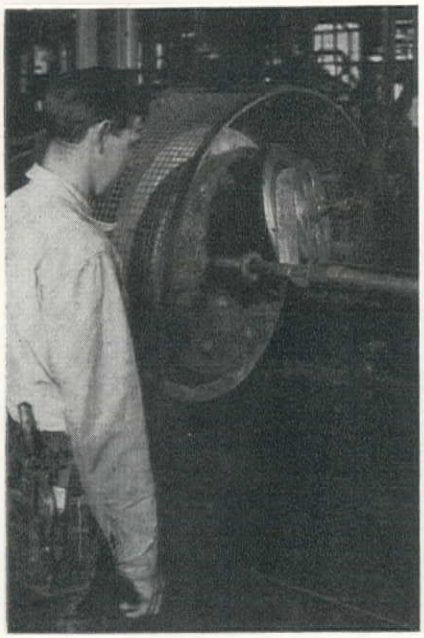
MORE COMPLETE information on any of the new products or equipment briefly described on these pages may be had by sending your request to the Advertising Manager, *Western Construction News*, 503 Market Street, San Francisco, California.

Rubber Conductor

Manufacturer: American Steel & Wire Co., Cleveland, Ohio.

Equipment: Rubber for high voltage cable "shielding."

Features claimed: To reduce the injurious effect on rubber insulation by the slight electrical energy discharge occurring along high voltage cables, some method of carrying off



this static electricity is necessary. A rubber compound with an additional amount of carbon was found to suit the purpose exactly, it acts as a "shielding" agent and at the same time retains its typical rubber-like physical properties.

Tractor-Tire Tube Solution

Manufacturer: Goodyear Tire & Rubber Co., Akron, Ohio.

Equipment: Solution "100" for filling tractor-tire tubes.

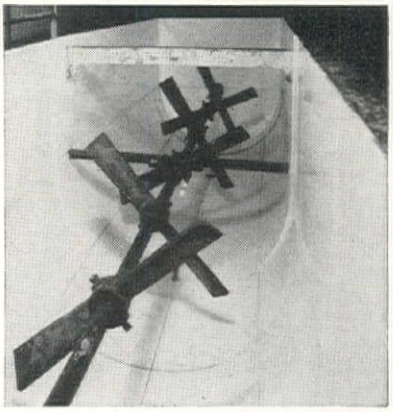
Features claimed: By filling tractor-tire tubes up to 100 per cent of capacity with water or calcium chloride solution, a great increase in traction is made, there is longer tread life, and increased drawbar pull is realized. It is cautioned however that the method is adapted exclusively to tires which use inner tubes and to tires used only at low speeds. With the company's solution "100" method, the added weight introduced is about equivalent to one extra wheel, and the draw-bar pull of a tractor is increased one pound for each two pounds of weight added to the rear axle.

Glass Tanks

Manufacturer: Pittsburgh Plate Glass Co., Pittsburgh, Pa.

Equipment: Non-corrosive glass tanks.

Features claimed: For industrial or commercial applications requiring a non-corrosive, shock-resisting material, a new line of glass tanks has been developed. The physical strength is four to five times greater than ordinary glass, and resistance to thermal shock is very high. Use is made of a new joining material, and all joints are accurately ground. A wooden framework filled with a compound usually surrounds the tank.



Dust Respirator Filler

Manufacturer: American Optical Co., Southbridge, Mass.

Equipment: Respirator filter cartridge.

Features claimed: A new type of cartridge for use in the company's R-1000 respirator, to protect the lungs against a combination of all types of dusts, including toxic, pneumoconiosis-producing and nuisance dusts. This is the seventh type of cartridge made for the respirator, the others being designed for specific dusts and gases.

Earthmover Tires

Manufacturer: Firestone Tire & Rubber Co., Akron, Ohio.

Equipment: Newly-designed earthmover and excavating tire.

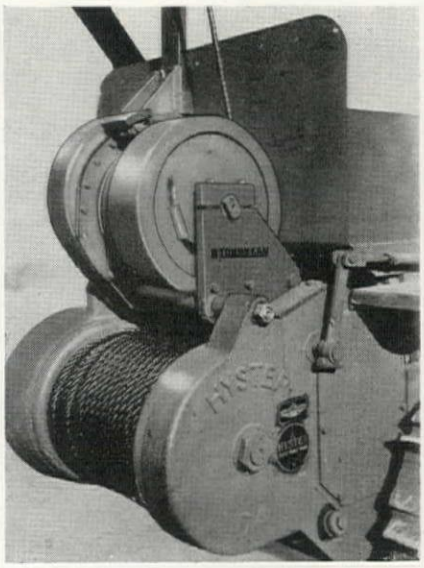
Features claimed: Tire developed to increase tire life, conserve rubber, and speed up earthmoving operations. This was achieved by several new design features, providing 98 per cent greater resistance to body breaks, without reducing the flexibility. Full potential of tread life is secured because of greater body strength.

Power Control Unit

Manufacturer: Willamette Hyster Co. and R. G. LeTourneau, Inc., Peoria, Ill.

Equipment: Power control unit.

Features claimed: This development for the Combat Engineers, makes possible the combination installation of a bulldozer and towing winch on the same tractor. The LeTourneau drum has a speed of 308 feet per minute on bare drum, the Hyster winch has a line pull of 15,400 pounds and its line speed is 91 feet per minute on the bare drum. While built for military use, this unit has obvious advantages for loggers, contractors, utilities and other tractor users.



New Bulldozer

Manufacturer: The Huber Manufacturing Co., Marion, Ohio.

Equipment: Bulldozer.

Features claimed: This small bulldozer was built for emergency situations when bombs have left craters on much needed airports or on military roads. This machine is smooth in operation, fast in action, levels off the broken surfaces promptly with a minimum of cost and for a small initial investment. The moldboard is ⅜-in. thick and 6 ft. long, is hydraulically controlled from operator's station. The moldboard and blade are pivoted to push pole and retaining arms to provide a cleaning action to the moldboard as it is raised. Approximate weight is 600 lbs.

Non-Critical Drain Pipe

Manufacturer: The Fibre Conduit Co., Orangeburg, N. Y.

Equipment: Non-metallic drain pipe.

Features claimed: Saving of critical war materials, yet the pipe is resistant to moisture, tuberculation, corrosion, and most dilute inorganic acids and alkalies. It is durable, light and easy to handle, and can easily be cut to desired lengths with an ordinary wood-working saw. Couplings maintain pipe lengths in line and provide tight joints. Two types are available, perforated and non-perforated. The pipe has been extensively used in oilfields to dispose of salt water.

Conductive Rubber Containers

Manufacturer: U. S. Rubber Co., New York City.

Equipment: Conductive rubber containers.

Features claimed: These containers made of synthetic rubber are used to handle explosives in munitions plants without danger of either

static or mechanical sparks. The conductive rubber dissipates the electric charge of static electricity, and an additional safety feature is the absence of danger of mechanical shock from the rubber container.

Self-Polishing Wax

Manufacturer: E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

Equipment: Self-polishing type floor wax.

Features claimed: A slip-retardant and water-resistant compound of a high percentage of natural carnauba wax combined with a special emulsifying agent gives unusual wearability and resistance to water. It is easily applied and dries quickly. Gives a durable, protective glossy coating for linoleum, asphalt tile, rubber, finished and unfinished wooden floors in homes, offices and institutions.

Nylon Brush Bristles

Manufacturer: E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

Equipment: Tapered nylon bristles.

Features claimed: Tapered nylon bristles are replacing Asiatic hog bristles for paint brushes, wear at least three times longer. They are not affected by solvents used in brush cleaners, and are not attacked by moths or rats, and have great strength and inertness to paint ingredients.

Protective Turban

Manufacturer: American Optical Co., Southbridge, Mass.

Equipment: New protective turban for women welders.

Features claimed: Practical, comfortable to wear, this turban provides protection against flying sparks and holds the hair snugly in place. Offered in leather, or cassimere, it is easily cleaned and long wearing.

Portable Generator

Manufacturer: Hunter-Hartman Corp., St. Louis, Missouri.

Equipment: Portable gasoline driven generator.

Features claimed: This rapid battery charging unit is designed to charge 6, 12, or 24-volt batteries at 10 to 300 amperes, and is driven by a 6 hp. single cylinder, air cooled, gasoline engine. The equipment is proving unusually valuable in airplane factories, and around airports for starting motors as well as charging batteries. It may also be used as a direct current lighting plant with output range from 1,000 to 3,000 watts. This equipment is available only on a AA5 priority or better.

Portable Gasoline Engine Driven Generator

New V-12 Engine

Manufacturer: Cramer-Krasselt Co., Milwaukee, Wis.

Equipment: New high speed gas engine.

Features claimed: With a normal speed range of 600 to 1200 r.p.m. and a brake horsepower of 435, this new engine is suitable for rock or oil drilling, operating large pumps and compressors, driving mining and construction machinery, and as an electric power generator. Features are a wide fuel range, economical dual carburetion, dependable dual ignition, perfect turbulence, high capacity cooling system, and infrequent and low cost maintenance.

Plastic-Housed Drills

Manufacturer: Black & Decker, Towson, Md.

Equipment: Drills with plastic housings.

Features claimed: New plastic housings have been designed for the ¼-in. and ⅜-in. drills which give a high impact resistance. Made with a shredded cotton duck base, the plastic is heat resistant and a perfect insulator against dielectric shock. Housings are smooth and easy to handle. In addition to saving critical aluminum, there is a marked reduction in weight of the complete unit.

LITERATURE . . .

Copies of the bulletins and catalogs mentioned in this column may be had by addressing a request to the Advertising Manager, *Western Construction News*, 503 Market Street, San Francisco, California.

International Nickel Co., Inc., New York, N. Y.—Four different methods for renewing worn metal parts such as pump rods and shafts are described in a new booklet recently published. Step-by-step procedures for reconditioning the shaft are explained; by machining and refinishing the worn section, by building up and refinishing the section by welding, by metal spraying, and by heavy and hard electrode position.

Chicago Pneumatic Tool Co., New York, N. Y.—Catalog No. 600 gives a complete list of construction and mining equipment manufactured by the company, in a concise, readable form. Included in the description are compressors, diesel engines, rock drills, wagon drills, demolition tools, electric tools, etc.

Littleford Brothers, Inc., Cincinnati, Ohio—Pamphlet describes three units of black top road maintenance equipment, a tar and asphalt kettle, a portable motorized roller capable of being towed behind a truck at any speed, and a utility spray tank.

Air Reduction Co., New York, N. Y.—A new chart for oxyacetylene flame adjustments shows in natural color photographs the five fundamental adjustments. Prepared particularly for guidance of new welders, it is being welcomed even by "old hands."

Buckeye Traction Ditcher Company, Findlay, Ohio—Bulletin SP-200 describes performance, construction, and specifications of spreaders manufactured by the company. Every part and feature of these spreaders has been designed with the purpose of providing the most accurate and economical method of spreading that is possible. Consequently it can meet virtually all demands with a minimum of attention and repair.

Michigan Clamp Co., Jackson, Mich.—Bulletin 43 describes pressure units and C-clamps, and holding devices of special design into which these units can be built. The new pressure unit eliminates the slow time consuming full threaded feature of holding and positioning tools.

Reliance Devices Co., Inc., New York, N. Y.—Catalog No. 102 describes the worklite units of swivel construction. Adjustable at any angle, unaffected by machine vibration, these units have no screws or wing nuts to adjust. Units are available for attachment to machines, walls, ceilings, work benches, drafting boards, assembly tables, etc.

Diamond Iron Works, Inc., and the **Mahr Manufacturing Co. Division,** Minneapolis, Minn. — Equipment Bulletin D43D gives full details, illustrations and sizes of all of the jaw crushers manufactured by the company. Practical pointers are given in determining the proper size for the particular job.

Sullivan Machinery Co., Michigan City, Ind.—Bulletin 76-Y, in two colors, describes the complete line of scraper haulers built by the company. These units, which have pioneered in their field, include two drum and three drum models with flange motors or foot motors, portable and heavy duty sizes, and short length and "Lohite" types, all with standard remote or automatic controls. Available in a variety of types and sizes, many models can be equipped with electric motors, or gasoline or diesel engine driven.

Eclipse Air Brush Co., Inc., Newark, N. J.—A 32-page booklet entitled "Eclipse Spray Equipment on the Job" shows actual spray operations in all types of industry, even baking, where grease is sprayed on bread pans. Comments from users of such equipment are also given.

The Fibre Conduit Co., Orangeburg, N. Y.—Booklet describes and gives illustrations of several types of fibre conduits, including electrical, underfloor ducts, drain and sewer pipes, and appurtenant fittings. A short description of the general properties of Orangeburg conduits is also given.

Pacific Flush-Tank Co., Chicago, Ill.—A series of four Bulletins, 140-143 incl., covering a new line of atomizing type aerators and supernatant selectors for various municipal and commercial purposes. The subjects covered include pre-aeration of sewage and grease removal, pretreatment of laundry and related trade wastes, supernatant selectors for digestion tanks, and supernatant treatment.

Opportunity Section

This widely-read column can help you to sell your used machinery and other used equipment. For rates, write to the Opportunity Section, *Western Construction News*, 503 Market Street, San Francisco, California.

WANTED—CONTRACTORS WHO have used construction equipment which they want to convert into ready cash immediately!

FOR SALE—Advertising space in the "Opportunity Section" of WESTERN CONSTRUCTION NEWS—your surest, fastest and most economical way of selling equipment! Rates are only $5 per column inch. Send in your list of equipment today. Our Copy Department will prepare an ad which will be read by over 8,000 heavy buying construction men.

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503 Market Street San Francisco, Calif.

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Lorain 75-B crane equipped as clamshell or dragline with 40' boom.

Will trade for truck crane or smaller machine comparable to Lorain "40"

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Three Models — 2 to 15 horsepower, for ripping up to six inch lumber. All welded steel construction, ball and Roller Bearings, swinging arbor, V belt drive. Band Saw, jointer attachments. For out on the job or in the shop work.

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Milwaukee, Wis.

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1—LIMA #601 1½ cu. yd. Special Combination Shovel and Dragline. 60-ft. Boom. Perfect Condition—Guaranteed.
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5—KOEHRING DUMPTORS—Model 55W.
1—15 x 24 UNIVERSAL CRUSHER with Cedar Rapids Portable Crushing Plant.
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1—BUDA DIESEL POWER UNIT—120 H.P.
1—6-yd. SAUERMAN Drag Scraper, with 200 H.P. 2-Drum Thomas Hoist.
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2—36" Ga. 8-Ton PLYMOUTH Gasoline Locomotives.
1—15-yd. BLAW-KNOX Batching Plant—2 Compartment Bin.
5—LEROY POWER UNITS—15 to 50 H.P.
2—PORTABLE INGERSOLL-RAND Air Compressors.

THE GORDON CONSTRUCTION COMPANY
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FOR RENT

2—D8 Cat. Tractors with U-12 LeTourneau Scrapers.
2—D7 Cat. Tractors with 8.3 cu. yd. LeTourneaus.
1—RD8 Cat. Tractor with Euclid Bulldozer.
1—D6 Cat. Tractor with LeTourneau Angledozer.
1—International TD 40 Tractor.
1—RD8 Cat. Tractor.
1—48" Austin-Western Elev. Grader, 3-Wheel.
3—Caterpillar No. 12 Diesel Motor Graders.
4—Sets Dual Sheepsfoot Rollers.
2—9-Wheel Pneumatic Rollers.
1—Farmall Tractor.
1—3-Wheel 7-10 Ton Gasoline Roller.
1—Austin-Western Giant Hydraulic Ripper.
3—12 ft. Blade Graders.
1—For Truck, Light Plant & High-Pressure Alemite.
1—Barber-Greene Ditching Machine, Cuts 5' 6" x 21".

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CADDOA, COLO.

2—No. 10125 American Revolver Whirleys
2—Northwest 80-D Combinations
1—Northwest 80-D Shovel
14—Euclid Bottom Dump Trucks, 13 C.Y.
6—Euclid Bottom Dump Trucks, 8 C.Y.
2—Chevrolet Dump Trucks, 3 C. Y.
1—Emsco Ripper
1—Adams UD-14 Motor Grader
Lot—Miscellaneous Jackhammers, Wagon Drills and Busters
1—Caterpillar Elevating Grader
2—International 3000 Gal. Water Trucks
1—Whipp-Band Saw No. WW
1—DeWalt Cut-off Saw No. GEJV
1—Frick Cooling System
2—Davenport 12-Ton Dinkey Locomotives
1—Milwaukee 12-Ton Dinkey Locomotive
1—Whitcomb 8-Ton Dinky Locomotive
7—2-CY Garbro Concrete Buckets
3—2-CY Blaw-Knox Concrete Buckets
8—4-CY Insley Concrete Buckets
2—4-CY Blaw-Knox Concrete Buckets
12—CP-419 Chicago Pneumatic Vibrators
12—CP-519 Chicago Pneumatic Vibrators
1—No. 76 Barber-Greene Concrete Conveyor
2—GPU-4 Jackson Puddlers
1—5CA-2 Vibratory Hand Screed
1—E111 Sullivan Chain Hoist
2—300 Amp Hobart Electric Welders
1—300 Amp Wilson Electric Welder
1—200 Amp Hobart Electric Welder
1—400 Amp. Hobart Electric Welder
Lot—Miscellaneous Gasoline and Electric Operated Pumping Equipment
2—5000 W. Master Generators
2—1500 W. Kohler Generators
Lot—Miscellaneous Machine Shop Equipment
Lot—Miscellaneous Electrical Equipment
1—10x8 Ingersoll Rand Compressor
1—HM10 Sullivan Wagon Drill
5—4-Wheel Drive Rock Dump Trucks
531—Tons Structural Bridge Steel

TUNNEL EQUIPMENT
FOR SALE

1—24" gauge, model No. 30 Conway Mucker driven by 40 HP, 440 volt, AC motor through Herringbone gears.
1—Conway Mucker, same as above except driven by 50 HP motor.
1—36" gauge, 15-ton Westinghouse Trolley Locomotive, driven by two 55 HP, 250 volt, DC motors.
13—4 CY, 24" gauge Bottom Dump Muck Cars, all equipped with outboard roller bearing trucks, and link and pin couplers.
1—Complete Concrete Tunnel Lining Mixing and Placing Plant consisting of the following:
1—28 S Special Ransome Tunnel Mixer, Shop No. 10188, equipped with Pacific Gear Reduction, 15 HP, 125 RPM; Neptune Trident 2" meter with timer; mounted on Flat Car, 24" gauge.
1—30" belt conveyor, 33' 6" long overall, for charging mixer from bottom dump batch cars; equipped with 15 HP, General Electric induction motor, 220/440 volt, 3 phase, 60 cycle, motor equipped with Pacific motorized speed reducer, 15 HP, 190 RPM. Mounted on conveyor is a 7½ HP Sullivan electric tugger.
1—CY Hackley Pneumatic Placer, mounted on trucks, and direct connected to mixer.
14—Three-compartment, 24" gauge bottom dump batch cars, capacity each compartment—1 CY; equipped with outboard bearings—roller type—with link and pin couplers.

— CALL —

DIXON-BENT & JOHNSON

609 SOUTH GRAND AVE.
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INDEX TO ADVERTISERS
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WESTERN CONSTRUCTION NEWS

WITH WHICH IS CONSOLIDATED
WESTERN HIGHWAYS BUILDER

PUBLISHED MONTHLY
VOLUME XVIII, No. 6

JUNE • 1943

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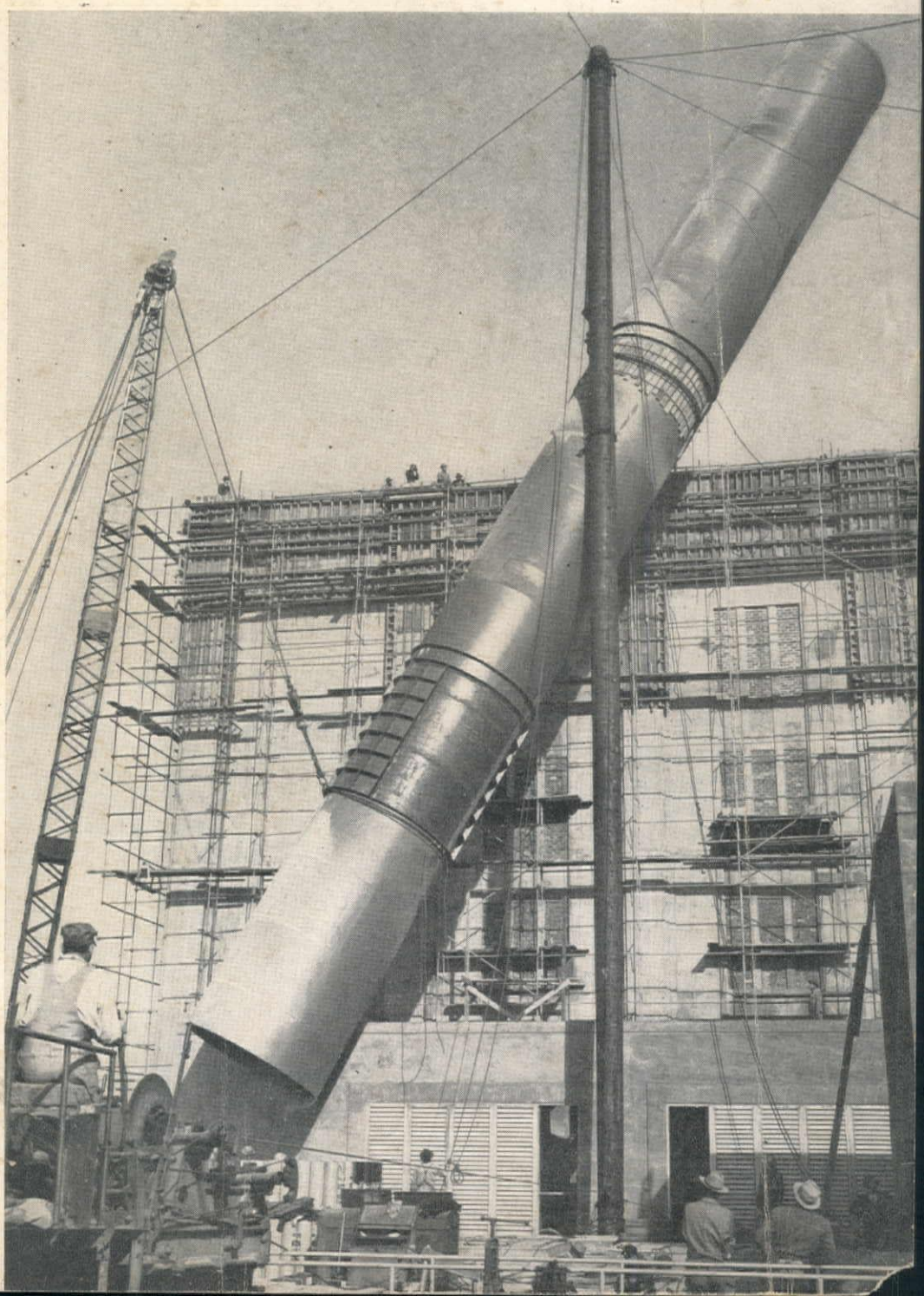
IN THIS ISSUE



ERECTION of a 35-ton stack at the Harbor steam plant of the Los Angeles Municipal Power Department. It rests on the louvered building wing in the foreground. Erection was by Pacific Crane & Rigging Co.

LANDING TOMORROW

THIS "Cat" and "Carrimor" rig is rushing work on a 1,500,000 cu. yd. job of clearing, filling, leveling virgin acreage for the use of flying personnel for our Armed Forces. This job is typical of the many kinds of war construction work being performed with speed and skill by modern earth-moving equipment.

To assure long life and a minimum of service interruptions not only of "Cats" and "Carrimors," but of trucks, shovels, bulldozers, and other equipment, contractors everywhere are lubricating the bearings of this equipment with *Texaco Marfak.*

Texaco Marfak provides a tough, adhesive-cohesive film that clings to metal, resisting the severest rain and road splash.

The reason behind *Marfak's* longer-lasting protection is this – while it liquefies inside a bearing, providing liquid film lubrication, it maintains its original consistency at the outer edges, thus sealing itself in while sealing out dirt, grit, water.

For wheel bearings, use *Texaco Marfak Heavy Duty.* It stays in the bearings – off the brakes – winter and summer.

So effective have Texaco Lubricants proved that they are definitely preferred in many other important fields, a few of which are listed in the panel.

A Texaco Lubrication Engineer will gladly cooperate in the selection of the most suitable lubricants for your equipment. Just phone the nearest of more than 2300 Texaco distributing points in the 48 States or write to:

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The Texas Company, 135 East 42nd Street, New York, N. Y.

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★ More stationary Diesel horsepower in the U. S. is lubricated with Texaco than with any other brand.

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★ More locomotives and railroad cars in the U. S. are lubricated with Texaco than with any other brand.

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TEXACO

REG. T. M.

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TUNE IN FRED ALLEN EVERY SUNDAY NIGHT – CBS ★ HELP WIN THE WAR BY RETURNING EMPTY DRUMS PROMPTLY

Notes for TOMORROW

Simple Design makes upkeep easy- A good machine to meet postwar competition.

Ask about Northwest Shovels, Cranes and Draglines as soon as one is available.!

194?

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HELP *for* "GREEN HANDS"

● The shortage of experienced maintenance men may mean more idle equipment time unless your "green hands" are given adequate instruction. Improper lubrication and the lack of regular servicing not only shortens the operating life of equipment, but results in breakdowns and loss of productive capacity that could be avoided.

If your lubrication men have not been provided with the information they need to properly care for Rear-Dump or Bottom-Dump EUCLIDS, write our Service Department for Lubrication Charts and Schedules. For Model F Rear-Dump EUCLIDS request Form INS-165; Bottom-Dump Euclid lubrication data is contained in Forms INS-162 and INS-172.

The EUCLID ROAD MACHINERY Co.
CLEVELAND **OHIO**

The loading view at the top of the page shows a Rear-Dump EUCLID on a Naval Training Base job. Other views down the page show a Euclid dumping iron ore into a hopper; part of a large fleet of Bottom-Dump EUCLIDS being loaded by an elevating grader at a southern air base; and grading work on a large air training field.

THE EUCLID ROAD MACHINERY CO.
3710 SAN PABLO AVENUE — PIEDMONT 8046 — EMERYVILLE, CALIFORNIA
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In thousands of communities throughout the country and in hundreds of our military camps and bases throughout the world, J-M Transite Pipe today is providing efficient, economical water transportation. Available today to supply military and essential civilian needs, Transite Pipe offers a combination of advantages not found in any other pipe material. For complete information on this basic advance in water-line engineering and this modern, asbestos-cement water pipe, write for the Transite Pipe book TR-11A.

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BOOM OPERATION PLUS HOISTING WHILE SWINGING *Saves Time...*

It's no joking matter this idea of getting the scrap in the scrap. It's a must for '43. Even the boys on the battlefield have special salvage units which lug the scrap metal away from the combat areas. And the war isn't held up while they do it . . . bombs fly . . . bullets whiz by . . . shells burst in air . . . as they hurry the scrap back to the mills to make a new fighting unit. Our soldiers know how vital this scrap is in attaining VICTORY. So let's all get our scrap into the scrap today. Casualties will be cut in two . . . scrap piles will swell . . . and Koehring Cranes will help speed up a victory with its boom operation plus hoisting while swinging.

KOEHRING COMPANY • *Milwaukee, Wisconsin*

KOEHRING HEAVY DUTY

HEAVY-DUTY CONSTRUCTION EQUIPMENT

HARRON, RICKARD & McCONE CO., San Francisco-Los Angeles • PACIFIC HOIST & DERRICK CO., Seattle, Wash. • WESTERN CONSTRUCTION EQUIPMENT CO., Billings • CONTRACTORS EQUIPMENT CORP., Portland • LUND MACHINERY CO., Salt Lake City • NEIL B. McGINNIS CO., Phoenix, Ariz. HARRY CORNELIUS CO., Albuquerque, New Mexico.

A Business Man's Prayer—

for the Times After Victory

WITH ALL the stops of the industrial organ pulled out American war production has crescendoed into the mightiest roar in history. Bombers, ships, tanks—bullets, guns, munitions are spewing forth at an unprecedented volume. In the Construction Industry, if we could have thrown the vast array of speedily-built war plants, cantonments, and war facilities at Hitler, the War would have been over by now. America's war production has shown what this country can do when production men are turned loose without being hampered or limited by "sales." Shouldn't our future thinking be along these lines? As Stuart Chase has put it, if we can produce 125,000 bombers in war surely we can produce 1,500,000 needed homes in peace. If it takes a war to create prosperity, boom cities, widespread spending and higher standards of living, then aren't we *thinking* animals enough to figure out some way to create an economy of abundance after wanton destruction has ceased? It is our prayer that we may be able to continue America's expanded production and increased agriculture to the end that more of the good things of life be distributed to all of the people. Keep at Capacity, America—*Always!*

Perhaps you, too, have been thinking about the future. If you have, you should read "The Story of Ziebarth Construction," a booklet which outlines some of the interesting, big-scale projects completed by this organization. It may be helpful to you in your Post-War Planning. Write and say: "Mail Booklet" and it will go forward to you with our compliments.

ZIEBARTH CONSTRUCTION

FRITZ ZIEBARTH • 828 West Esther Street, Long Beach, California

MORE POWER FOR TANKS TODAY—
CHEAPER POWER FOR AMERICA TOMORROW!

AMERICA'S tanks pack a powerful push as well as a powerful punch. And more times than most people know, this push comes from a General Motors Diesel engine.

What's more, you'll also find these rugged, hard-working power plants in landing barges, patrol vessels, military trucks, construction tractors and many other wartime jobs where sturdy dependability is required.

They burn cheaper fuel and use less of it—operate with a minimum of attention.

Of course the needs of war are taking every engine that even our expanded production can make, but when peace comes America will profit —through low-cost power for many new applications.

So while now GM Diesels are adding strength to America's fighting arm, they will be one of the important contributions to better days after victory is ours.

New eras of railroading follow in the footsteps of war. Another new era of railroading is assured in the wake of this war. General Motors Diesel locomotives already are establishing new standards of transportation.

GM
GENERAL MOTORS
DIESEL POWER

ENGINES.....15 to 250 H.P.....DETROIT DIESEL ENGINE DIVISION, Detroit, Mich.

ENGINES..150 to 2000 H.P...CLEVELAND DIESEL ENGINE DIVISION, Cleveland, Ohio

LOCOMOTIVES.....ELECTRO-MOTIVE DIVISION, La Grange, Ill.

YOUR "CATERPILLAR" DEALER IS HERE TO STAY

WHEREVER a free flag flies, the "Caterpillar" dealer organization forms a solid network of service and distribution. The fact that this widespread organization came through the depression years with added strength and efficiency — and that it will come through the present trying period the same way — means much to you as a "Caterpillar" Diesel owner. You know your "Caterpillar" dealer is going to be there when you need him — today, tomorrow or next year.

Your "Caterpillar" dealer is a substantial member of the community. He had to have capital, ability and integrity to start in business. And he will stay in it because he believes that the outstanding record of "Caterpillar" Diesel equipment on the war fronts will build a still greater demand for these machines for the heavy jobs of reconstruction and peace.

He has a real and personal interest in the power users in his territory. Today his showroom may be empty of new machines, but you'll find his service department is busier and doing better work than ever.

He is making a real contribution to the war effort. Not only do the owners of "Caterpillar" Diesel equipment depend on him for genuine parts and service, but the Government uses his facilities to keep machines in fighting trim. His modern shop practice enables him to save time and money for owners and to conserve the tons of war-needed metal.

Don't hesitate a minute to call on your "Caterpillar" dealer for advice. If you need a new machine for war-essential work, he will help you apply for it. And if you can't obtain a new machine, he will do his utmost to keep your old equipment running.

ARMY E NAVY

CATERPILLAR DIESEL

REG. U.S. PAT. OFF.

CATERPILLAR TRACTOR CO. • SAN LEANDRO, CALIF. • PEORIA, ILL.

TO WIN THE WAR: WORK—FIGHT—BUY U. S. WAR BONDS!

Old friend arrives . . . Thanks to you

When you're halfway around the world, trying to finish an important job, it's mighty pleasant to greet an old and very helpful friend you used to work with.

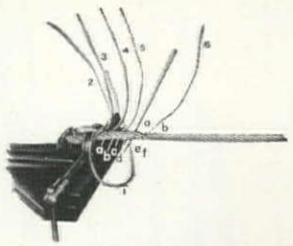
Back home, in scores of industries, the men now on palm-fringed shores learned an affectionate respect for the dependability of Wickwire Rope. Now when stout wire rope is more than ever a matter of life and death, the sight of a reel of *Wickwire* Rope brings double cheers.

These buddies of ours know that *you* need Wickwire Rope, too—to help in your speeded-up *production* of lots of things for them. So they're grateful when you make each length you now have last longer, so that more Wickwire Rope can be used to equip the Liberty Ships, and to send overseas.

But when you do need more of this friendly Wickwire Rope to help maintain your war-production pace, won't you please order it *without* reels, if lengths will permit, so that handier reels can be spared for the boys out there? Wickwire Spencer Steel Company, 500 Fifth Avenue, New York.

• • •

Wickwire Spencer was the first manufacturer in all New England to be awarded the Maritime M and Victory Fleet Flag for outstanding production accomplishments!



DO YOUR MEN KNOW HOW?

Our free book "Know Your Ropes" pictures the best ways to splice, attach sockets, etc. Also shows the right and wrong ways to use wire rope. In the hands of new men (and even old-timers) it can help you make your present wire rope last longer. Send for a free copy.

SEND YOUR WIRE ROPE QUESTIONS TO WICKWIRE SPENCER

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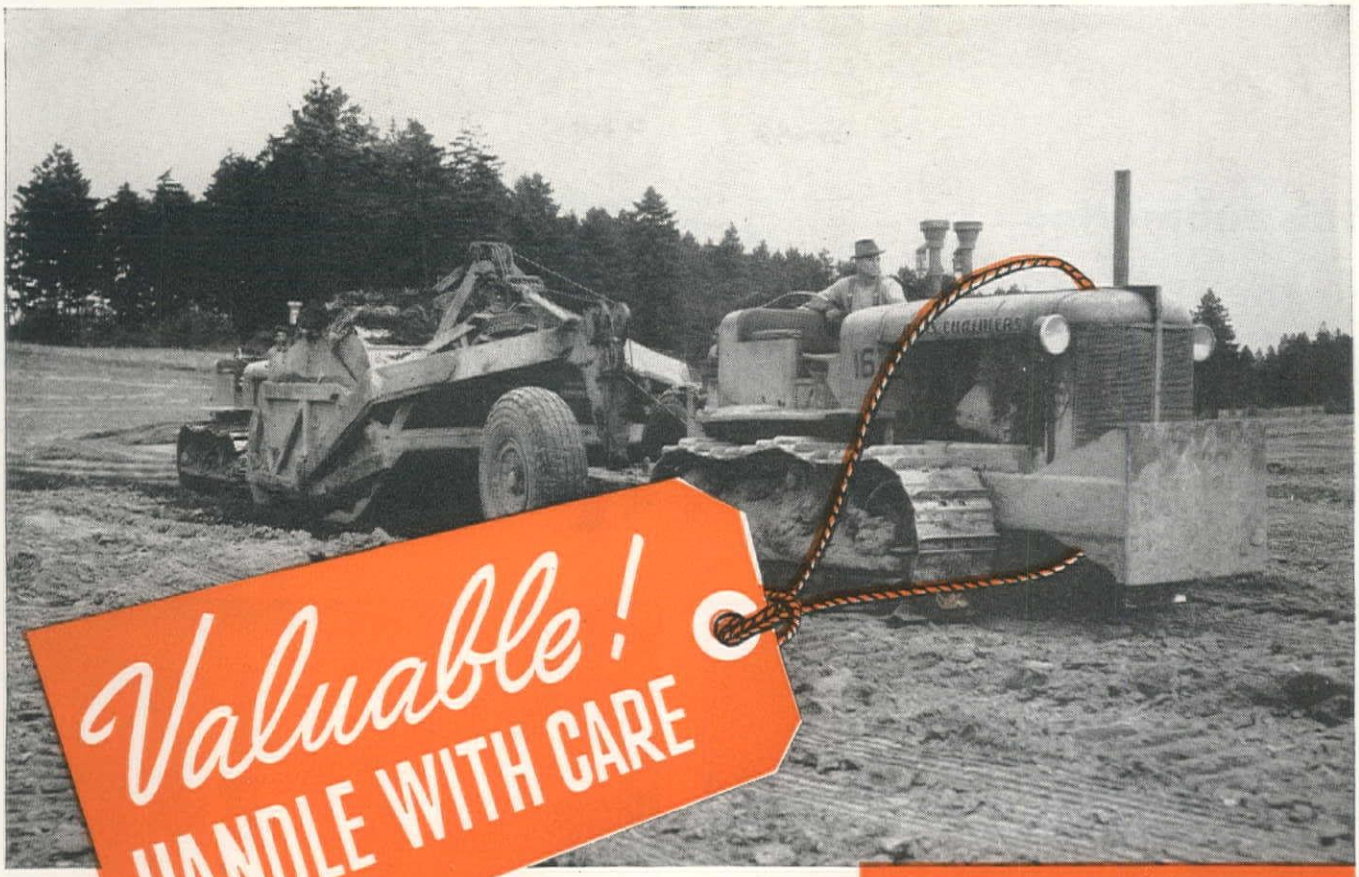
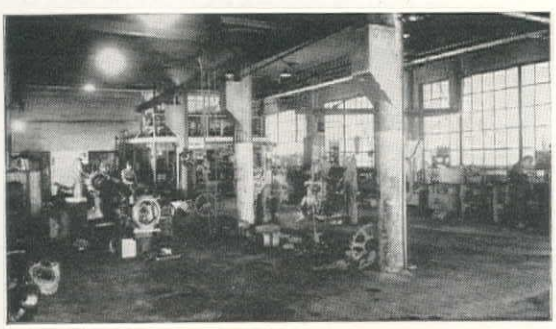
WISSCO PRODUCTS



. . . SAVE YOUR HARD-TO-REPLACE EQUIPMENT

Your tractors are built to stand up for long periods of time on the toughest kind of work without babying and constant attention . . . but when wear shows up, as it will with abuse, time and use . . . don't neglect it! You can save a whole chain of expensive trouble by building-up a worn part, shifting it to a new wearing surface or replacing it. Catch a worn bearing before it ruins the shaft which turns in it . . . or a worn gear before it wrecks your entire transmission . . . or a worn track roller before it causes excess track wear! Best way to do this is to have your Allis-Chalmers dealer inspect your outfits at regular intervals — then follow his Preventive Maintenance suggestions. You will add many extra working hours to the life of your equipment. Make your inspection and servicing arrangements with him now. Save your hard-to-replace machines!



Call the highly-skilled, factory-trained mechanics of your Allis-Chalmers dealer to the rescue . . . the very day your equipment needs attention. A day late might mean a major overhaul!

ARMY E NAVY

ALLIS-CHALMERS
TRACTOR DIVISION, MILWAUKEE, WIS., U. S. A.

WARTIME SERVICE FROM YOUR ALLIS-CHALMERS DEALER

1. PARTS ASSISTANCE — Information on availability of parts and how to obtain them.
2. PRIORITY ASSISTANCE — Who can get new equipment and how! Up-to-date information on latest regulations.
3. LIMITATION ORDERS — Interpretation of latest government limitation orders affecting construction equipment.
4. SUBCONTRACT INFORMATION — Frequently dealers possess information on subcontract opportunities.
5. REBUILDING FACILITIES — Enlarged, modern shop facilities to handle rebuilding with speed and efficiency.
6. SERVICE EDUCATION — Instructions on how to operate and service equipment correctly. Provides service school instructors.
7. REPAIRS AND MAINTENANCE — Quick, efficient repairing by skilled, factory-trained mechanics, using the right tools and genuine parts.
8. USED EQUIPMENT — In some instances, good rebuilt construction equipment may be available.
9. RENTALS — Good used equipment may be available for temporary emergencies.
10. EQUIPMENT EXCHANGE — Information center on used equipment available in territory.

BURYING THE EMPIRE STATE

Over 3,000,000

Two of the Cedarapids Morok Plants producing base material for airports for the Contractors Service Corporation.

Distributors: Howard-Cooper Corp., Seattle, Spokane, Wash., and Portland, Ore., Hall-Perry Machy. Corp., Butte, Mont.; Intermountain Equip. Co., Boise, Idaho; Wortham Machy. Co., Cheyenne, Wyo.; Lund Machy. Co., Salt Lake City, Utah; Brown-Bevis Machy. Co., Los Angeles, Calif.; H. W. Moore Equipment Co., Denver, Colo.; Edward F. Hale Co., San Francisco, Calif.

BUILDING *with* Cedarapids MOROK PLANTS

Built by IOWA

TONS for VITAL DEFENSE JOBS

all produced by

CONTRACTORS SERVICE CORPORATION

Camp Hill, Pa.

THREE million, two hundred ninety two thousand, two hundred and seventy six tons of aggregate! Think that over! That's the output of the Cedarapids Morok plants of the Contractors Service Corporation of Camp Hill, Pa. Here's enough aggregate to bury the 1250 ft. height of the Empire State Building. All of this tremendous output went into seventeen vital defense projects including such jobs as Chambersburg, Pa., which alone involved over a million tons. The output was accomplished in two seasons despite the sixteen moves that the many projects involved—over a million tons the first season—over two million tons the second season!

It is figures like this that we want you to remember about Cedarapids. Such tonnage as this isn't secured with transportation delays, erection difficulties or "down time" on the job. In output figures of this kind, lies your assurance of the proved design of Cedarapids equipment.

There is a full range of Cedarapids plants for every output or material problem. No matter what you are considering if it has to do with aggregate reduction and preparation, call Iowa first. Come to Headquarters for Aggregate producing equipment.

IOWA MANUFACTURING COMPANY, Cedar Rapids, Iowa

LONGER ELECTRODES

...MEAN *FEWER* STUBS

STUBS can be held to a minimum by using longer and larger diameter electrodes. In that way you not only leave fewer discarded stubs for a given length of weld, but you also save time by reducing the number of electrode changes necessary. In addition, you can increase welding speeds 25–50%, because larger diameter electrodes provide much faster metal deposition.

This is only one of many ways by which you can stretch your own supply of welding electrodes. See that all your welders join in the war against waste by observing this precaution as well as those shown at the right.

WELDING ELECTRODES ARE SCARCE *DON'T WASTE THEM*

Use electrodes down to a 2"stub.

Don't bend electrodes unless absolutely necessary.

Make sure that joints are fitted properly before welding.

Make legs of fillet welds equal; face of fillet welds flat.

Be sure to save all your stubs.

Air Reduction

General Offices: 60 EAST 42nd ST., NEW YORK, N. Y.

Western Offices: Emeryville, Calif. • San Francisco, Calif. • Los Angeles, Calif. • Seattle, Washington • Portland, Oregon

AIRCO

WILSON

IDLE CYLINDERS ARE PRODUCTION SLACKERS: *Keep 'em rolling for victory!*

Teaming Tractors and Tournapulls

for More Effective Production . . .

Big capacity Carryall Scrapers pouring material on the fill of this Northwest Airbase. Big tires help compact the material as it is spread in thin layers by the Carryalls.

LeTourneau Fleet Owners Use Tractors for Pusher-Loading, Short Hauls and Rooting . . . Gain Time and Money on Long Hauls with Tournapulls

To move 6,500,000 cu. yds. on a Northwest Airbase, Johnson, Inc., Minnis & Moody, alert Western contractors, have skillfully combined "Caterpillar" tractors, big capacity Carryalls and Tournapulls to get maximum efficiency from tractor power and Tournapull speed.

Pusher Loaded

"Caterpillar" D8 tractors, equipped with LeTourneau Dozers, pusher load all Carryall Scrapers—both Tournapull and tractor-drawn—to speed loading. Between loads these same pusher tractors doze dirt on the very short hauls; two of them also pull Rooters to break up hard gravel for faster Carryall loading.

Big-Capacity Carryalls

Large Carryall Scrapers (23 and 30-yards heaped) are matched with the big power of "Caterpillar" D8 tractors on hauls around 1000 feet one way. Studies by our Field Engineers show these big-yardage Carryalls pusher loaded on same hauls, increase Tractor Yardage 20 to 30%, compared with ordinary 12 to 15-yard scrapers not pusher loaded.

Tournapulls on Long Hauls

On longer hauls of 3500 feet and beyond from a different borrow pit, Tournapulls combine 11 to 15 yards heaped capacity with speeds up to 14.3 m.p.h. One-man operated, these Tournapulls eliminate need for extra loading and spreading tools, thus save time, manpower and equipment investment.

Like these successful LeTourneau fleet owners, you can gain time and increase yardage with Tournapulls and big-capacity Carryall Scrapers.

What About Deliveries?

Like most other equipment manufacturers, the Army, Navy and Marines have first call on what we build. A few LeTourneau units, though, are available for release through WPB. See your LeTourneau-"Caterpillar" dealer for priorities required.

Johnson, Inc., Minnis and Moody's Tournapulls move loads like this on hauls of over a mile at speeds up to 14. m.p.h.

Loading is laid out so loaded Tournapull gets a downhill start, thus reaches top speed quicker.

Use 34 LeTourneau Units

Johnson, Inc., Minnis & Moody believe in standardizing on LeTourneau, have the following units on this airbase:

- 8 Super C Tournapulls with 15-yard Carryalls
- 5 Std. C Tournapulls with 11-yard Carryalls
- 9 30-yard Carryall Scrapers tractor-drawn
- 4 23-yard Carryall Scrapers tractor-drawn
- 6 Dozers
- 2 Rooters

ARMY NAVY

LETOURNEAU

PEORIA, ILLINOIS • STOCKTON, CALIFORNIA

Manufacturers of DOZERS, CARRYALL* SCRAPERS, POWER CONTROL UNITS, ROOTERS*, SHEEP'S FOOT ROLLERS, TOURNAPULLS*, TOURNAROPE*, TOURNATRAILERS*, TOURNAWELD*, TRACTOR CRANES.

*Name Reg. U. S. Pat. Off

SPEEDING UP U. S. NAVY AIRPORT CONSTRUCTION

HERE one mile equals fifteen. This Normal Duty Barber-Greene Mixer is mixing sand asphalt for runways over 300 feet wide and 6" thick. There's a big job to be done, and the Barber-Greene is doing it with speed, economy, and perfection. Rated at 1¼ to 1¾ yards per minute in the B-G Catalog, this Normal Duty Model 848 is consistently mixing 3 cubic yards per minute of loose material on this job, not only speeding up construction, but meeting rigid Navy inspection.

Its ability to handle any bituminous or stabilizing job, in either Travel or Central Plant operation, its portability, high capacity, and thoroughly earned reputation for accurate proportioning and thorough mixing deserve your investigation. The B-G Mixer Book explains and illustrates its many outstanding features. Write for your copy. There is no obligation.

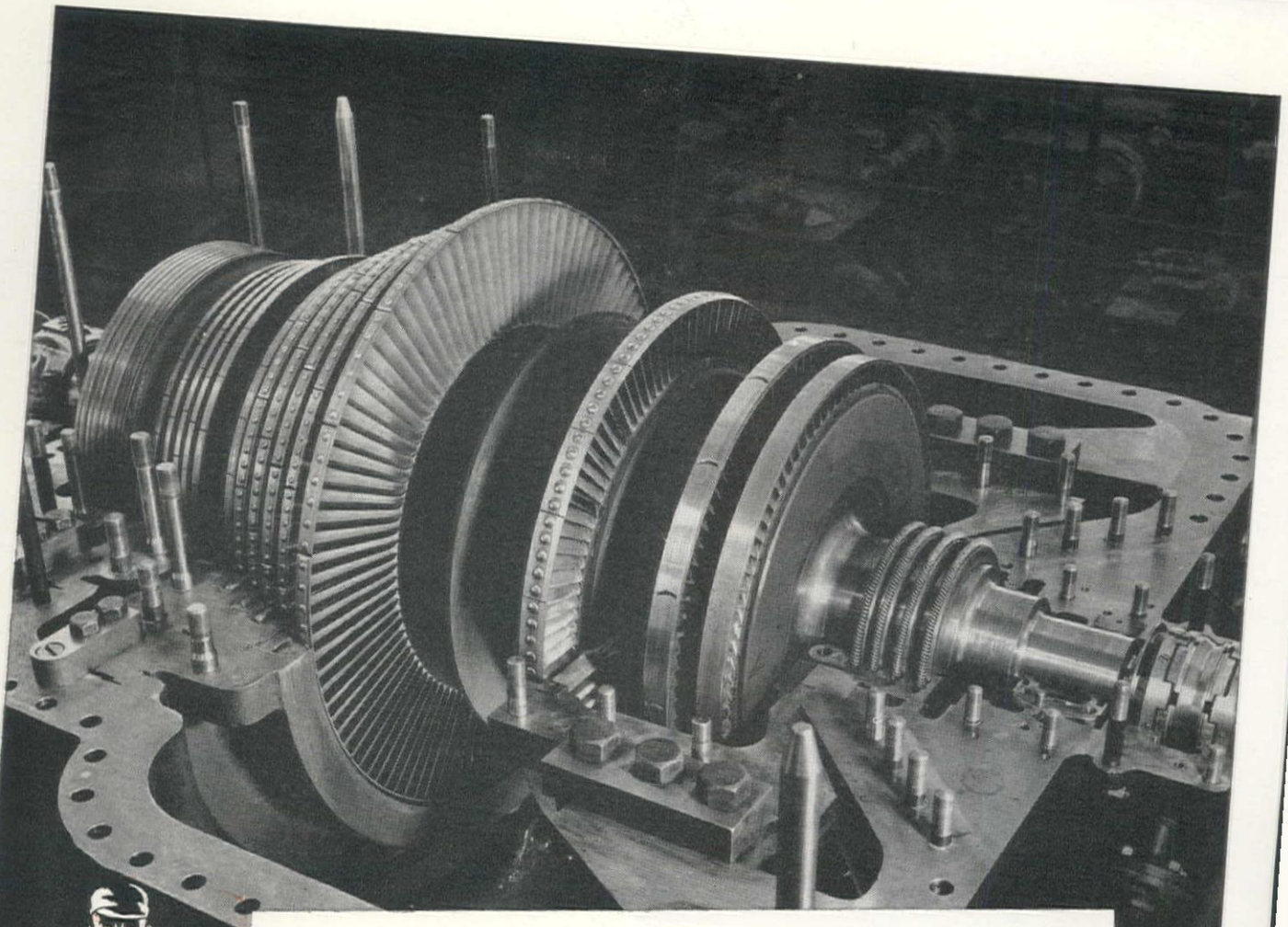
40-14

BARBER GREENE

STANDARDIZED MATERIAL HANDLING MACHINES

AURORA ILLINOIS

Brown-Bevis Equip. Co., Los Angeles, Phoenix; Columbia Equip. Co., Portland, Spokane, Seattle, Boise; Contractors Equip. & Supply Co., Albuquerque; Jennison Machinery Co., San Francisco; Lund Machinery Co., Salt Lake City; Western Construction Equip. Co., Billings; Ray Corson Machinery Co., Denver.



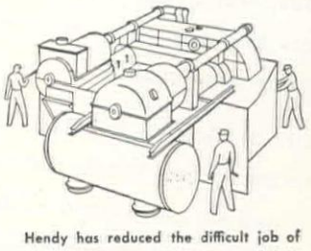
The Iron Man of Hendy...a symbol of the iron will and determination with which the thousands of men and women in the Hendy organization are working to provide "Power for the Bridge of Ships."

THE TURBINE IS THE HEART

Deep in the hulls of the big cargo ships are humming hearts of steel... bearing the Hendy name-plate. These turbines, developing thousands of horse-power, speed the guns, ammunition and supplies, on dependable schedules, to our multiple battle front.

To build these intricate power plants requires not only vast plant facilities, precise material control, precision tools and fabrication methods, but in addition, a group of highly skilled engineers, master craftsmen and production strategists.

Like the huge 2500 hp Hendy engines, which now power one-third of all Liberty ships, Hendy turbines are the heart of a vital military transport system that some day will be used to reconstruct a war-torn world.



Hendy has reduced the difficult job of building marine steam turbines and their reduction gears to a simple, straight-line production method which assures accuracy and economy with dependable delivery schedules.

Hendy has been awarded the Maritime M and the Army-Navy E...each with an extra Star for continued outstanding production.

JOSHUA HENDY IRON WORKS

ESTABLISHED 1856

SUNNYVALE • CALIFORNIA

Divisions: POMONA PUMP COMPANY
CROCKER-WHEELER ELECTRIC MFG. CO.

Manufacturing Plants: SUNNYVALE, LONG BEACH, POMONA and TORRANCE in CALIFORNIA • AMPERE, N. J. • ST. LOUIS, MO.
Branch Offices: NEW YORK • WASHINGTON • PHILADELPHIA PITTSBURGH • CHICAGO • ST. LOUIS • SAN FRANCISCO • LOS ANGELES

Cletracs

. . . . MOVE TONS OF EARTH FOR AN ALL-OCEAN NAVY

Even a deepwater Navy must have land bases for repairs and construction, storing supplies, and training of personnel.

The ability of Cletracs to stand rough treatment when the going gets tough, their rugged power and ease of control—due to controlled differential steering—are being used to speed naval construction. The building of roads, air fields, and training stations, as well as the handling of materials and munitions, is expedited daily by the efficiency and economy of the controlled power of Cletrac tractors.

Now that equipment is difficult to replace—owners appreciate that Cletrac dependability and enduring quality must be protected and prolonged by regular and proper service even more than in peacetime.

Your Cletrac dealer is prepared to help you get the best out of all your equipment. His service facilities and trained, experienced mechanics will help you make the most of your Cletrac power—to speed construction for Victory.

NO PRIORITIES ON WAR BONDS

Next to the Stars and Stripes, Cletrac is proud to be flying the Minute Man flag. Over 95 per cent of Cletrac employees are purchasing War Bonds by pay roll deduction.

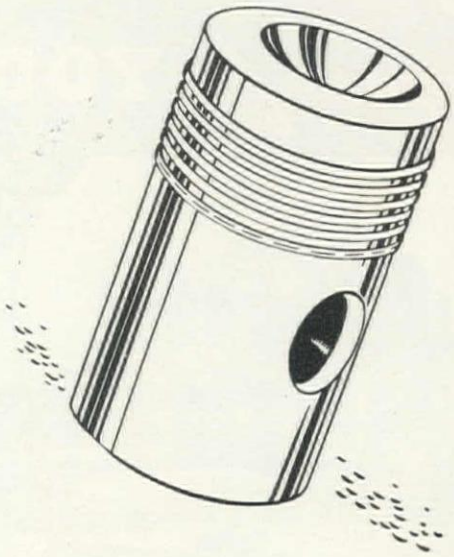
THE CLEVELAND TRACTOR COMPANY • CLEVELAND, OHIO

Cletrac Crawler Tractors

GASOLINE AND DIESEL

FOR VICTORY BUY UNITED STATES WAR BONDS AND STAMPS

You can buy a new shirt in 10 minutes . . .



but it may take weeks to replace a scored piston

The answer is Preventive Maintenance now with Shell Diesel Lubricants

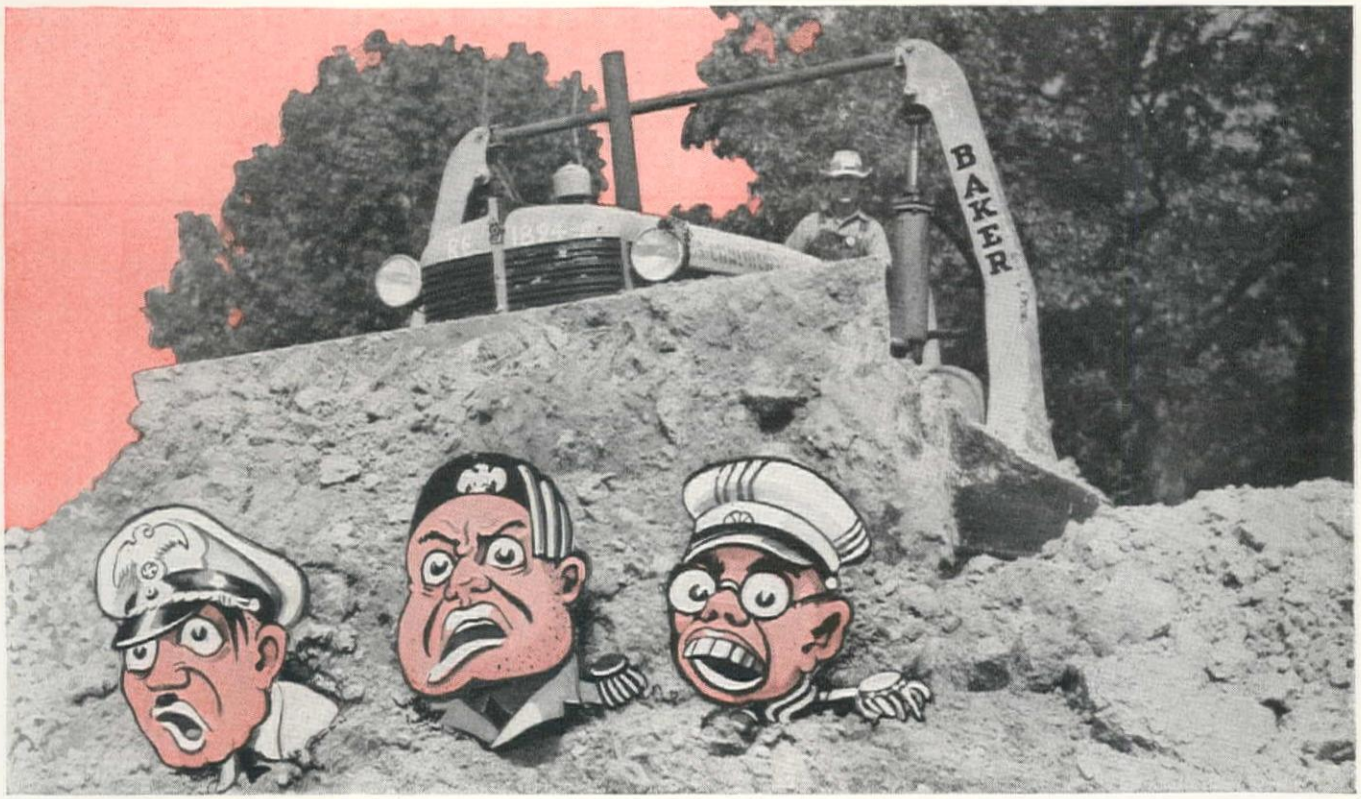
SHELL

When a high-speed Diesel overheats and "seizes" you've got trouble on your hands, with a long "time out" while you wait for parts to arrive and repairs to be made. Such delays are bothersome, costly.

Under today's extreme operating conditions, more than usual care should be taken to make sure your Diesels are properly lubricated. This means periodic check-ups made at more frequent intervals. They may take time, yes. But the few minutes they do take will be well spent when you compare them with costly delays such check-ups can save you.

Don't you wait for trouble to remind you that it's time to lubricate. Call in the Shell man now. Let him help you plan your Preventive Maintenance.

SHELL DIESEL LUBRICANTS
AND SHELL "DIESELINE"



Direct Down-Pressure on the Axis!

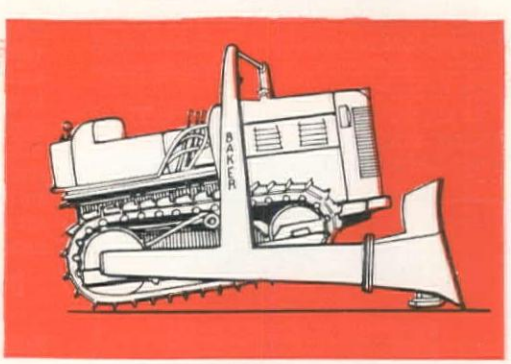
The exclusive direct lift and down-pressure of the blade on Baker Hydraulic Bulldozers and Grade-builders is a pain in the neck to Axis chest thumpers.

This simple, positive method of control permits the entire weight of the tractor front end to be exerted on the blade—the blade does not depend on its weight alone to force it into the ground. That's why Bakers get out bigger loads faster, every trip, all through each shift.

Their ruggedness and simplicity cuts maintenance costs to the bone. Their design makes the tractor engine more accessible. And they have all of the other features—moldboard level on rough ground, quick interchangeability of moldboards, tractor back end available for winch, etc. that you want in a bulldozer.

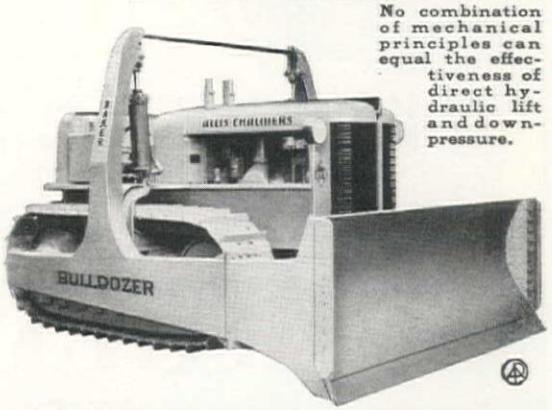
Beside rushing camps, landing fields and war plant sites to completion, Bakers are making landing strips in dense jungles and on desert sands, clearing debris from bombed cities, extending military roads in the frozen North and bringing direct down-pressure to bear on foes of democracy in other ways.

THE BAKER MANUFACTURING CO.
542 Stanford Avenue Springfield, Illinois



Baker Hydraulic Bulldozers *really* bear down!

No combination of mechanical principles can equal the effectiveness of direct hydraulic lift and down-pressure.



BAKER *The Modern Tractor Equipment Line for*
EARTH MOVING
LEVELING AND GRADE BUILDING
SNOW REMOVAL
ROAD MAINTENANCE

Shock Loads Sabotage Wire Rope

{This is Number 15 in a series of informative articles on the conservation of wire rope. The previous article, Number 14, discussed the "Breaking-In Period" of wire rope. The present article endeavors to show how wire rope will last longer if shock loads are avoided after proper breaking in.}

* * *

LET'S AVOID SHOCK LOADS

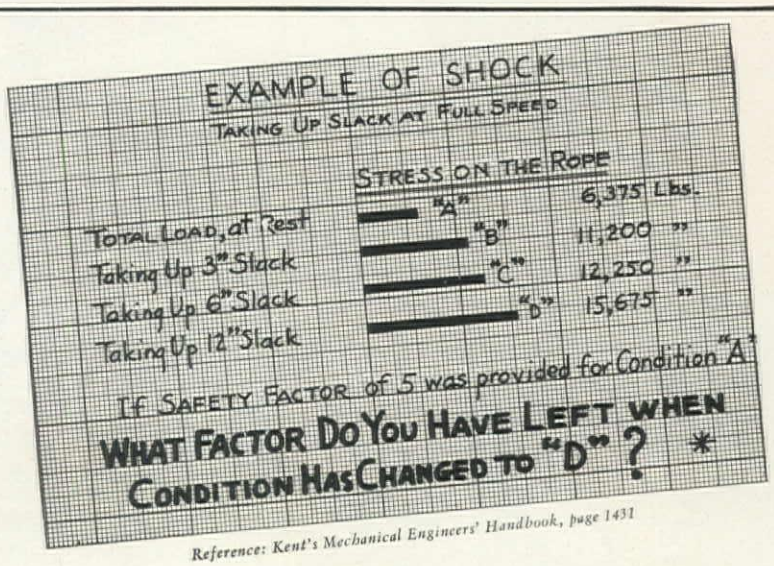
How simple things would be if there were no "ups and downs" in life. Take wire rope as an example. If operating conditions for your rope were always "peaches and cream"... if you didn't have to accelerate or speed up to meet performance expectations... if nothing went wrong to throw unexpected stresses on wire rope... if there weren't any "ifs," what a lot of unexplained things that now happen to wire rope we would never see.

But wire rope will continue to meet unexpected and unforeseen stresses. Knowing that, let's avoid *shock* loads that obviously overstress the rope.

WHAT ARE SHOCK LOADS?

Wire ropes are made to a specified catalog breaking strength. All hoisting equipment is designed with a predetermined line pull or load at drum for loads the equipment is made to handle. *Any load above the normal working load can develop a shock load.* And shock loads today are very definitely saboteurs of the war program.

Look, for example, at the chart. There you see what happens when a given load is applied suddenly to a slack rope. The given load (in this case 6,375 lbs.) remains the same BUT the sudden impact to the rope the second that slack is taken up creates a shock load that may exceed the rope's elastic limit. The result may not be an immediate break, but, because the rope is overstressed, it often fails on another operating shift, with another operator, who does not know about the overstressed condition of the rope. When the slack to be taken up is 12", for instance, the stress on the rope *at impact* is 15,675 lbs.... or more than twice the total load at rest.



Reference: Kent's Mechanical Engineers' Handbook, page 1431

ANSWER: *6,375 x 5 = 31,875 lbs. B. S.
31,875 ÷ 15,675 = 2.03 Factor of Safety

DOESN'T SAFETY FACTOR ABSORB SHOCK LOADS?

Safety factors for wire ropes vary with the type of equipment and use, as explained in article Number 4 of this series. Safety factors are based upon standard normal operations and cannot absorb the excessive shock loads, because these are beyond the normal working loads upon which the safety factor is figured.

HOW CAN YOU AVOID SHOCK LOADS?

1. Make sure there is no slack and no jerking of the rope at the start of loading.
2. Watch carefully the loads hoisted to see that they are not beyond the rope's proper working load.
3. Do not allow rope to become fouled or jammed either on the drum or by jumping a sheave.
4. Start load carefully — too fast acceleration overloads the rope. Watch how the rope "takes it" on the pick-up. Apply power smoothly and steadily.

OPERATOR ALL IMPORTANT!

Provided the equipment is in good condition and the correct rope is properly installed, the responsibility lies squarely on the operator to avoid shock loads. A good operator is a good rope's best friend, and when this friendship ceases, the rope might just as well be cut up with a torch or emery wheel. An operator can "make or break" a wire rope. There is no substitute for experience in handling rope and a desire to get the most out of it.

ALL 15 ARTICLES AVAILABLE ON REQUEST

For the benefit of those who want helpful information on how to conserve their wire rope, Macwhyte Company, its distributors, or mill depots will gladly send a set of all articles when requested on your letterhead.

Rely on your REX DISTRIBUTOR: These days he may not always have the new machines you want. But he's the man to see for Repairs, Rentals or Rebuilding of used machines. You'll always find him willing and ready to help you locate new and used equipment.

I've got a new mixer four years old!

Last winter, while I was down South on that housing project, I told my boys back home they could rent out any of my equipment for any jobs that came along.

When I went to get my 5-S Rex out of the shed this spring, I mighty near threw a fit. It looked as if it had fallen off a 12-story building. Seems like Herb had a little smash-up and hadn't told me about it before he left for the Navy.

Well, I dragged it out and hauled it over to my Rex Distributor. "Jim," I said, "what can you do to fix this up? It's over four years old. Do you have any repair parts in the place that will fit?" Jim just smiled. "Leave it with me for a few days," he said. "My men will fix it up so you'll think you have a new mixer."

Did they do a job? Well, take a look for yourself. I want to tell you that you can't beat Rex Mixers or Rex Distributors for giving real service.

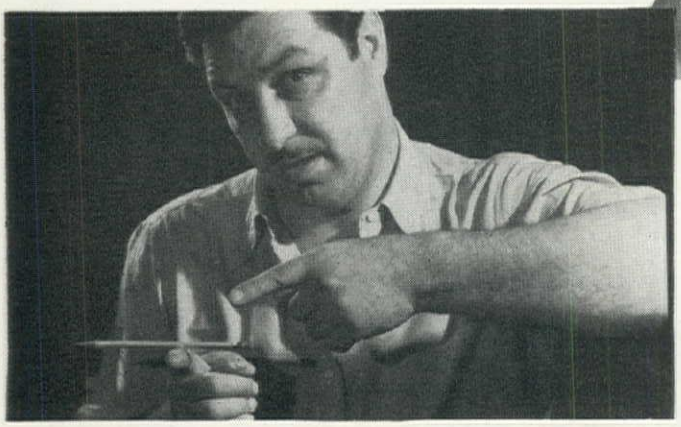
CHAIN BELT COMPANY OF MILWAUKEE

MIXERS • PUMPS • PAVERS • MOTO-MIXERS • PUMPCRETE

See your REX Distributor *first* for Rentals, Repairs, Rebuilding

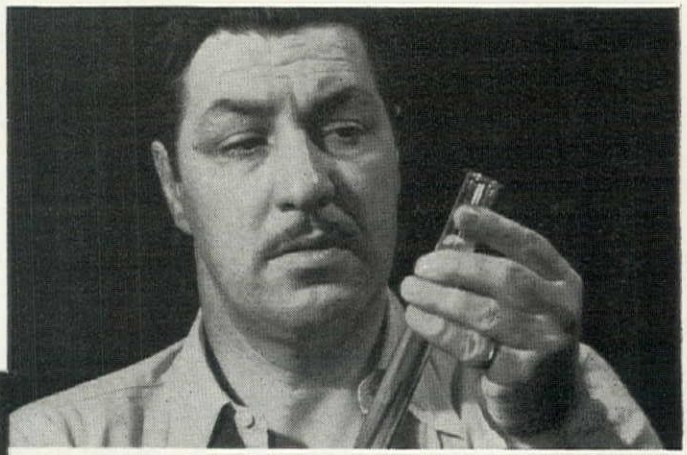
Arnold Machinery Co., Salt Lake City, Utah; Brown-Bevis Equipment Co., Los Angeles, California; Brown-Bevis Equipment Co., Phoenix, Arizona; Construction Equipment Co., Spokane, Washington; Contractors Equipment and Supply Co., Albuquerque, New Mexico; Corson Machinery Co., Ray—Denver, Colorado; Hall-Perry Machinery Co., Butte, Montana; Intermountain Equipment Co., Boise, Idaho; Loggers & Contractors Machinery Co., Portland, Oregon; Star Machinery Co., Seattle, Washington.

How to pick a GOOD GASOLINE



1 Sometimes a gasoline will fool you. It gives good performance on the road, your motor runs quietly and you are pretty happy. But when you really begin to check up on it, you find you are getting poor mileage, or you haven't much power on the hills, or your motor is harder to start than it should be.

2 Well, in that case, the gasoline you are using isn't properly *balanced.* A balanced gasoline gives you everything. Like 76 for instance. It's a balanced blend of three gasoline stocks, each with a specific job to do. One gives easy starting and smooth acceleration. Another gives even, powerful performance on the road. The third gives high efficiency and long mileage.



3 And the important part of the story is this—*all these stocks are blended in exactly the right amounts so that every quality is brought out to its fullest extent.* In other words, 76 does *all* the jobs you expect a gasoline to do. And in these days, a product like that is well worth looking into.

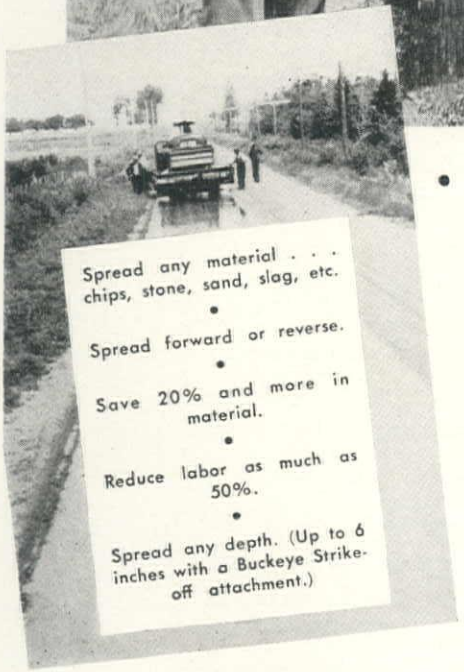
4 So before you get busy on something else, give your Union Oil Resident Manager a ring. Have him deliver a supply of 76 tomorrow. You can depend on 76.

TAKE THIS TIP! When you buy petroleum products, buy enough to last. It will protect you against transportation tie-ups and it will insure you of an adequate supply of the products you need.

76 **UNION OIL COMPANY**

OIL IS AMMUNITION • USE IT WISELY

A Familiar Sight!



Spread any material . . . chips, stone, sand, slag, etc.

•

Spread forward or reverse.

•

Save 20% and more in material.

•

Reduce labor as much as 50%.

•

Spread any depth. (Up to 6 inches with a Buckeye Strike-off attachment.)

. . . where good roads are the order!

THIS is the time of year when Buckeye Spreaders are a familiar sight on the highways and byways of the 48 states. By the hundreds these fast, accurate machines are surfacing thousands of miles of roads — repairing the damage wrought by Winter's snow and ice, by Spring's thaws and rains. They are the machines that are taking the praying part out of America's "patch and pray" program insofar as roads are concerned. For Buckeye Spreader accuracy and even distribution of material assures better, longer-lasting surfaces with a saving in material and labor.

Leading choice of state and county highway departments and contractors everywhere, Buckeye Spreaders are available in 8, 9, 10, 11, 12 and 13 foot widths to handle your road and airport construction and maintenance work. Write for new bulletin.

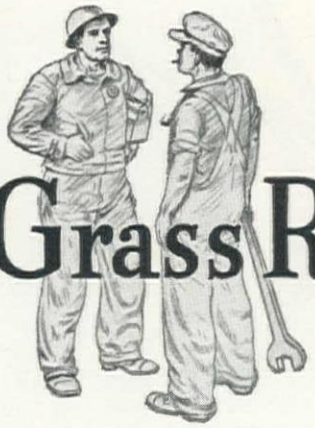
BUCKEYE TRACTION DITCHER COMPANY, Findlay, Ohio

Built by Buckeye

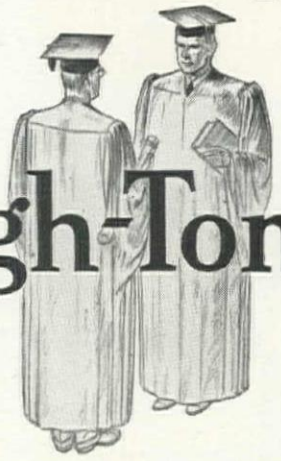
Convertible Shovels | Trenchers | Tractor Equipment | R-B Finegraders | Road Wideners | Spreaders





A "Grass Roots" Description of a High-Toned Word



THE word is Synergism—an old-timer in the dictionary, but new to the industrial vocabulary. In the business sense, synergism means minds "clicking" together so that the net result is an idea far greater than the sum of the thoughts expressed.

Synergistic thinking has worked the industrial wonders of war production. It has been accomplished by individuals, by groups, by companies. It has been responsible for new materials and improved methods to get better results.

In the construction field, Atlas has done some real synergistic thinking with its customers. One outcome has been the development of a series of bulletins that we call Atlas Contractors' Division Letters—temporarily modified by the necessities of censorship.

They are designed to offer, in down-to-earth fashion, ideas that will stimulate the solution of contractors' blasting problems. They give straight dope on local rock conditions, on transportation, water and power, based on intimate knowledge of the site.

With useful information and technical experience as a background, Atlas stands ready to think synergistically with any contractor. We think our minds will click with yours to solve your problems more effectively and more economically.

Offices in Principal Cities

ATLAS EXPLOSIVES

"Everything for Blasting"

CHEMICALS ATLAS EXPLOSIVES

SAN FRANCISCO, CAL. ATLAS POWDER COMPANY SEATTLE, WASH.

ROAD-MIX CUT TIME ON THIS JOB BY 1/3

Seal Coating A Wood Roadmixer Job

Native and local materials lying *at or near the job* were used. Saving equipment and labor

"Build it good and build it quick." That's how your paving contract reads today; that's why more and more paving jobs are designed for Road-mix. Road-mix methods of pavement construction use native and local materials, which cuts material hauling costs to a minimum. Road-mix uses the mix-in-place or traveling plant method of mixing, which eliminates the central plant and additional hauling. The result is a faster job with less manpower, less equipment and with savings as much as 1/3 in costs. Road-mix methods of pavement construction, either emulsion, road oils or soil-cement, can be used anywhere paving can be laid. Hundreds of miles of roads, streets and highways, and millions of square yards of landing fields and runways offer highest testimony to the top-quality paving produced by Road-mix methods. Before you design your next job, get all the facts on Road-mix—the modern, money-saving, time-saving method of pavement construction.

WOOD ROADMIXER

A COMPLETE TRAVELING MIXING PLANT

Compactly designed, ruggedly constructed, easy to operate. Requires only a standard crawler tractor and a supply truck. Two men can handle the entire unit. As the pioneer and leading traveling plant method of pavement construction, the Wood Roadmixer is the lowest in price, lowest in operating cost and lowest in maintenance cost of all proven mix-in-place methods. Working on compacted base or with loose windrows, using emulsion, road oils or soil-cement, the Wood Roadmixer delivers higher production than any other method of pavement construction. Highest quality paving is assured by accurate volume control of aggregate and binder, and carefully regulated mixing action to meet conditions of every job. Easily hauled or towed from job to job. Own a Wood Roadmixer—and you can design, bid and build Road-mix.

➡ ➡ ➡ DESIGN FOR ROAD-MIX

Write for detailed and illustrated Wood Roadmixer bulletin, "The Fastest Method of Low-Cost Paving."

WOOD ROADMIXER

Wood Manufacturing Co. • 816 West 5th St., Los Angeles, California

Big Jobs to do...

Calling for Mobility and Stamina . .

Construction—earth moving—trenching—loading; these and countless other tasks are labeled, "NOW"! United Nations' engineers are winning lasting fame for "doing-the-impossible"—and along with other equipment the mighty MICHIGAN Dual Tandem-drive Crane is playing its part. Today, military battles are won by highly MOBILE units with STAMINA to give them staying power—the same two factors that have long been featured in MICHIGAN Shovels and Cranes. Fighters now, these MICHIGANS will be equally important in the vast peace-time construction program after V-day.

Write for Bulletin W-63 and specifications.

AIR CONTROLLED

MICHIGAN

POWER SHOVEL CO.

BENTON HARBOR, MICHIGAN

Here's your FREE Manual on ATHEY EQUIPMENT MAINTENANCE

Just published — a booklet giving wartime maintenance information for owners of Athey Forged-Trak Trailers and Logging Cruiser Wheels — to help you get longer service from your present equipment. It explains ways to make emergency repairs that save time and vital war-needed materials — suggests steps to follow in the operation of your machines which insure longer life, lower upkeep. Illustrated with pictures and sketches, this booklet contains condensed, helpful facts that Athey owners and operators can put into immediate use. Get your copy of this booklet right away. Ask your Athey-"Caterpillar" Dealer, or mail the coupon at the right direct to Athey Truss Wheel Co., 5631 W. 65th St., Chicago, Illinois.

Send for your Copy Today

ATHEY

Forged-Trak Trailers

Logging Cruiser Wheels

ATHEY TRUSS WHEEL CO., WCN
5631 W. 65th Street,
CHICAGO, ILLINOIS

Please send me a copy of "Athey Care and Repair Tips," at no cost or obligation. (Print name and address carefully.)

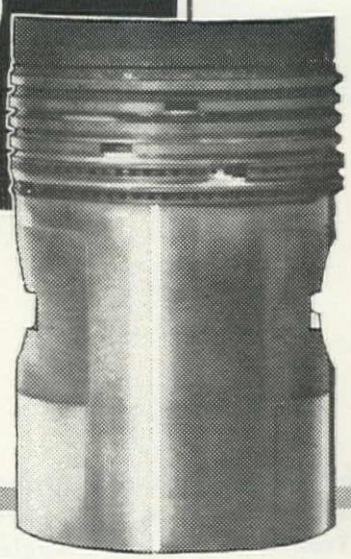
Name_____

Address_____

City_____

HOW TO PROTECT YOUR DIESELS

AND KEEP THEM ON THEIR WARTIME JOB



Those fighting Diesels have got to last, and it's up to you to help them with the finest lubrication you can get. CADEL—the oil that's specially balanced to do all jobs well—protects bearings, pistons, walls and rings in four outstanding ways:

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to smooth metal surfaces with extra film strength imparted by special chemical additives.

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as it lubricates, eliminating impurities through the action of another special chemical.

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with a supreme oiliness that keeps rings moving free in the heaviest, hottest going.

4. CADEL *SEALS*
the power in, lessening blow-by and increasing power and fuel economy.

Ask your Associated representative today for the full story of how Cadel N.C. Diesel Engine Lubricant and Associated Motor Diesel Fuel are helping industry do its wartime job.

TIDE WATER ASSOCIATED OIL COMPANY

CADEL N.C.
DIESEL LUBRICANT

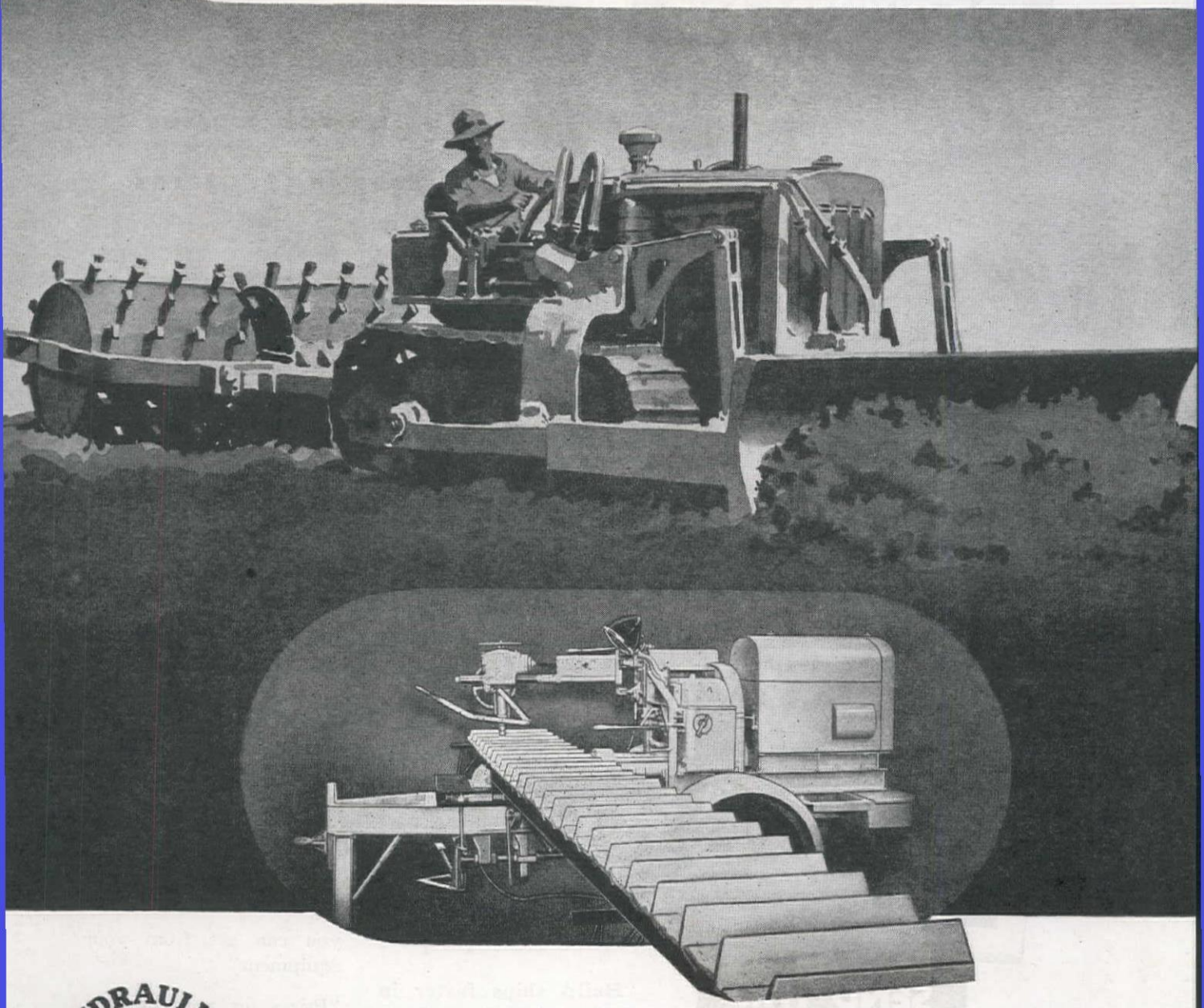
Free **TRUCK AND TRACTOR LUBRICATION CHARTS**

Charts showing where, when and what type of lubricants to apply to your trucking equipment, both gasoline and diesel, according to manufacturers' recommendations. Free of cost or obligation, from your nearest Associated agent.

LET'S GET ASSOCIATED **Veedol and Tydol Motor Oils • Veedol Extreme Pressure Lubricant • Veedol Hi-Pressure Lubricant • Veedol U.W. Medium Veedol Water Pump Grease • Cadel N.C. Diesel Engine Lubricant • Associated Motor Diesel Fuel • Flying A Gasoline • Associated Aviation Ethyl Gasoline**

Oil is Ammunition—Use it wisely!

To Construct Better Roads!



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TO CONSTRUCT BETTER ROADS and to help take care of your present crawler type tractors, Rodgers Hydraulic Track Press Equipment with the "Retractable Jaw" is available to contractors having essential work to do. ★ Shown in the illustration above is a Rodgers Trailer Track Press equipped with four-cylinder Hydraulic Pump powered by a four-cylinder Gas Engine. Note convenient position of controls and ample working space for operator. ★ Rodgers Track Press Equipment is recommended and approved by the Engineering and Service Departments of every crawler tractor manufacturing company. ★ Following the tractor manufacturer's recommendations is the purchaser's assurance that he will have the finest equipment available for this service. ***If it's a Rodgers, it's the best in Hydraulics.*** Rodgers Hydraulic Inc., St. Louis Park, Minneapolis, Minnesota.

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FOR OWNERS AND OPERATORS OF SHOVELS-DRAGLINES-CRANES

- *Helpful Hints on Maintenance*
- *On-The-Job Stories*
- *Interesting Features*


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Devoted to Applications of Shovels, Draglines, and Cranes for Efficient, Low-Cost Handling of Materials in the Excavating, Construction, and Road Building Fields

OVER 300,000,000 CU. FT. OF SILICA SAND IN 43 YEARS

Seafaring Tankers from Inland Waters

Illinois Silica Sand Serves Our War Effort in Many Ways

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Steam for Manhattan's High Buildings Piped from Huge Generating Plants on River

ANOTHER SHARE-THE-RIDE IDEA

1468

LINK-BELT SPEEDER NEWS . . . . like every Link-Belt Speeder machine—is doing an important war job today. Each issue contains a down-to-earth article on some phase of servicing for better operation, greater output, longer life; together with stories and features of particular interest to men who own, operate and maintain contractors' and industrial equipment. Always a refreshing stimulant to old-timers, this monthly paper now also is a source of "quick experience" for men who are new on the job. Use coupon if you are not on the mailing list.

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Here are a few of the interesting articles which recently appeared in the LINK-BELT SPEEDER NEWS

"Build ships faster in 'bathtubs' at South Portland, Me."

"Triple-duty machine works as crane, shovel, clamshell on California housing project"

"Alert teamwork adds much to the service that you can get from your equipment"

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"A routine of daily inspection will enable your equipment to do more and last much longer"

"How to keep clutches at top efficiency"

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BUILDERS OF THE MOST COMPLETE LINE OF SHOVELS—CRANES—DRAGLINES

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(A DIVISION OF LINK-BELT COMPANY)

MARION'S FIRST INTEREST IS TO WIN THIS WAR . . .

What the Bill of Rights means to our fighting men is summed up in recent victories in every theatre of war. What it means to Marion is reflected in the continuous stream of Marion machines rolling off the assemby lines . . . the ever-increasing production schedules . . . the extra speed, stamina and dependability Marion engineers are building into these machines . . . the remarkable records of performance wherever they are employed. This is Marion's answer to those who would destroy our Bill of Rights . . . Marion's way of helping to win the war as quickly as possible.

THE MARION STEAM SHOVEL CO., Marion, Ohio.

MARION

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"Survival of

Blitzed London Building shows the superiority of steel-frame construction. The bomb exploded right at the corner of this building. Although two of the main steel columns were sheared off, the structure did not collapse. Here is proof of the remarkable strength and resilience of steel-frame construction and how it resists the wholly unpredictable stresses resulting from bomb blasts—even under direct hits.

THESE DEEP ROOTS OF STEEL defy flash floods and scour. On this Missouri Pacific Railroad bridge, Pueblo, Colo., sturdy bridge piers of U·S·S Steel Sheet Piling, built in twin cylinders of 16 piles each and driven through 25 feet of sand and gravel, provide an economical, substantial foundation, where the hazards of washouts frequently overwhelmed the former wooden trestle. This unique application of U·S·S Steel Sheet Piling for bridge pier substructure is typical of the unusual applications constantly being developed for this versatile product.

UNITED STATES STEEL

USS

the fittest"

WAR... the world's toughest testing laboratory—has emphasized three important advantages of steel:—its versatility, its high resistance to destructive forces far beyond ordinary calculation, and its ability to speed up construction that is needed in a hurry.

IT is hard to realize that structural steel as we know it today had its advent less than sixty years ago.

The first structural sections were rolled in our mills in 1884. Wide-flange Carnegie Beam sections (now widely known as CB's) followed some years later.

The first steel sheet piling rolled in America was produced by this Company. U·S·S I-Beam-Lok pioneered the field in lighter, stronger and longer-lasting bridge flooring and decking.

It is because no other structural material even approaches steel in its high modulus of elasticity — because steel construction offers superior strength, stiffness, durability and permanence, with economy as well—that steel has become the very basis of modern engineering construction.

For these reasons we remind you to include in your plans for the future the engineering steels and steel products that today are confined to essential war construction.

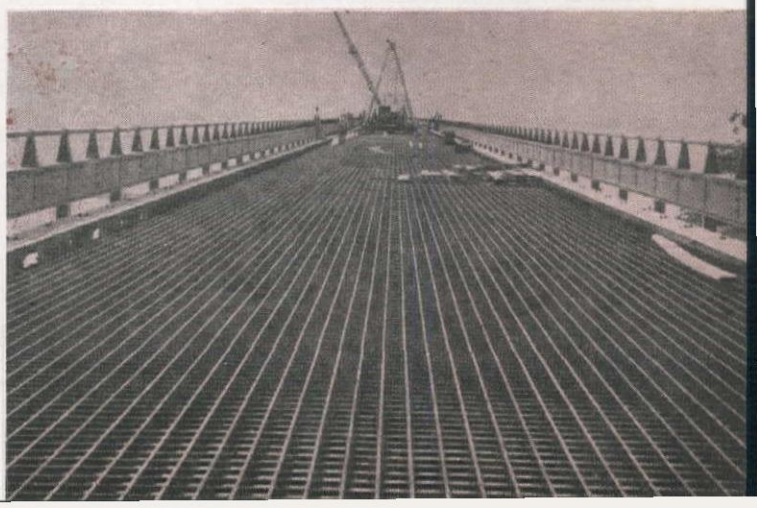
Then, U·S·S Steel Sheet Piling, Steel Bearing Piles, I-Beam-Lok Steel Flooring, Steel Culverts, Reinforcing Bars and other U·S·S steel engineering specialties will be fully available—improved by their war-time service—ready to serve you better than ever before.

COLUMBIA STEEL COMPANY, *San Francisco*
CARNEGIE-ILLINOIS STEEL CORPORATION, *Pittsburgh and Chicago*

United States Steel Export Company, New York

U·S·S STEEL BEARING PILES, 85 feet long, support 370 ft. high brick chimney. To support a stack as tall as a 34-story building, designed to safely withstand a wind velocity of 100 miles an hour, 308 U·S·S Steel Bearing Piles were set radially as shown. They were driven in unspliced lengths to a penetration of 84 feet through soft gray clay and marsh clay, interspersed with water-bearing sand layers overlying fine sand and gravel. U·S·S Steel Bearing Piles were selected not only for their excellent bearing value, but also because their untapered, straight-sided shape provides great resistance to uplift or withdrawal.

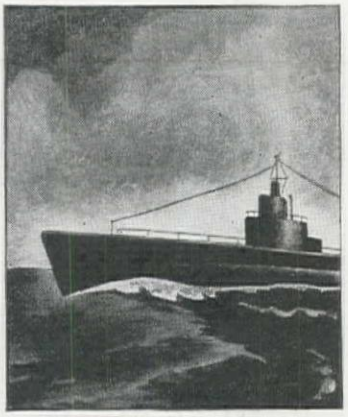
HERE U·S·S I-BEAM-LOK reduces floor deadload 4,545,000 lbs. On this 24 ft. roadway of the Potomac River Bridge, the concrete-filled I-Beam-Lok Floor, weighing only 55.5 lb. per sq. ft., saves 720 lbs. per lineal foot as compared to ordinary reinforced concrete slabs of equivalent strength. The deadload saved by this floor has resulted in appreciable reduction in number of piles, sizes of piers, and weight of superstructure, which was reflected in large savings in the cost of the entire structure. Plan to use this modern bridge flooring, where light weight, strength, permanence and safety under high-speed traffic are desired.



WIRE ROPE FIGHTS AT SEA

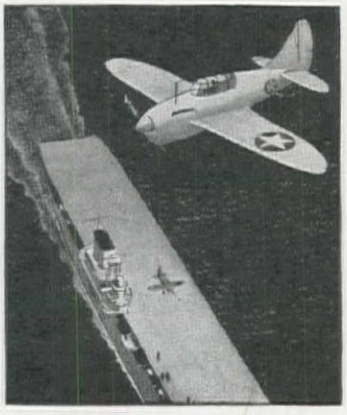
TRAPPING U-BOATS

When a Nazi U-boat sneaked into Scapa Flow and blasted Britain's big carrier *Royal Oak* to the bottom, the loss underlined the fact that to block U-boats out of a harbor, you've got to lock it up tight—not just with mines but with elaborate nets made of strand. Keeping harbors closed to undersea marauders is one of Bethlehem's war-time jobs. Our wire-rope mill has been turning out large quantities of harbor-defense strand—a high-strength strand of special construction, and with the famous bethanized electrolytic zinc coating.



TOSSING FIGHTERS INTO ACTION

An aircraft carrier, as everybody knows, houses its fighter planes and bombers on the hangar deck, which is directly beneath the flight deck. When an attack alarm comes in, those planes must get from hangar deck to flight deck and into the air in almost less time than it takes to tell about it. Special Bethlehem wire rope is used in the high-speed plane lifts of some of America's biggest carriers.



TOWING DAMAGED FREIGHTERS

Every cargo vessel in a convoy is now equipped with two husky towing hawsers, installed in such a way that they can be rushed into action at a moment's notice. If a vessel is struck and crippled by a torpedo, one of the emergency towing hawsers is attached to a sister ship and the damaged vessel is brought safely into port. Bethlehem has had a lot of peacetime experience in building strong, corrosion-resistant towing hawsers. United Nations' convoys are benefitting from that experience now.

★ ★ ★

In hundreds of jobs on sea and on land—ships' rigging, aircraft-control cord, minesweeping cable, mine-anchor cable, and naval dredge rope, to name a few—Bethlehem Wire Rope is helping to win the war. There are also pressing needs for Bethlehem Wire Rope on the home front—in war factories, mines, timber lands, construction jobs, and oil fields. We are doing our level best to keep everybody adequately supplied. The job is enormous. If you have to wait to get delivery on your rope, we hope you'll keep that in mind, and bear with us.

Bethlehem Manufactures Wire Rope for all Purposes

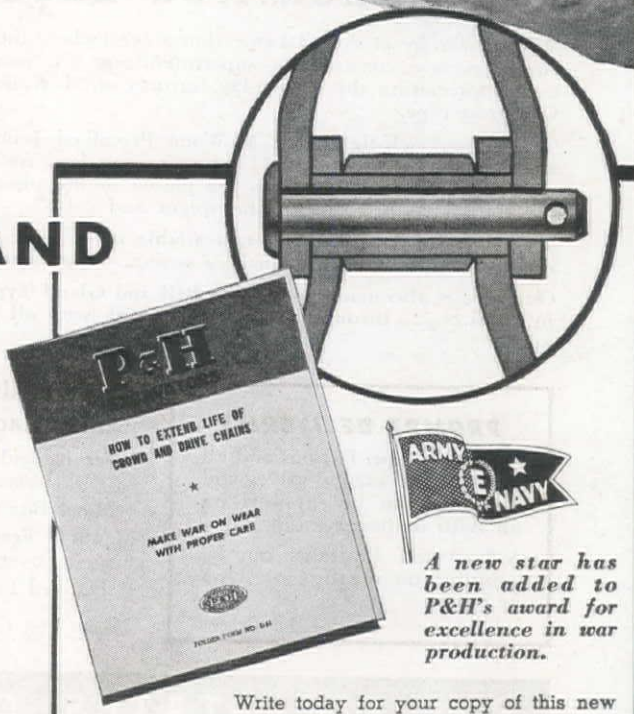
P&H

EXTEND THE LIFE

OF YOUR CROWD AND DRIVE CHAINS

You can add years to the life of your crowd and drive chains by guarding against uneven wear in pins and bushings.

This newest P&H Wartime Service Bulletin shows you how to test for wear—how to reverse pins and bushings the simplest, easiest way. It'll save you money — prevent delays on the job — save time in replacements — and help conserve critical materials.



A new star has been added to P&H's award for excellence in war production.

MAKE WAR ON WEAR WITH PROPER CARE

To reduce maintenance to an absolute minimum, P&H provides *all welded construction of rolled alloy steels, true tractor-type crawlers, hydraulic control* and many other outstanding advantages.

Write today for your copy of this new Bulletin. Ask for folder No. D-51.

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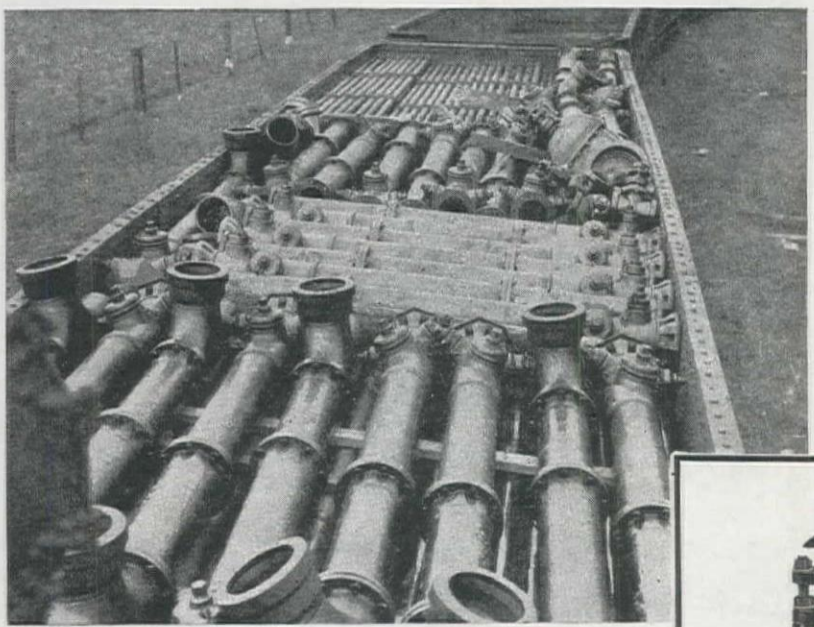
McWANE - PACIFIC CAST IRON PIPE



A carload of 2-inch cast iron pipe, fire hydrants and gate valves leaving the foundry.

LOWEST COST PER YEAR OF SERVICE

Far-sighted municipalities and industries specify corrosion-resisting cast iron pipe—the pipe of PROVED long-time dependability!

It Can Be Laid Fast By Unskilled Labor

With a scarcity of skilled labor almost everywhere these days, engineers and construction superintendents are more than ever appreciating the easy-to-lay features of McWane-Pacific Cast Iron Pipe.

The famous self-tightening McWane Precalked Joint, available on sizes 2" through 12", requires no lead melting or pouring. All joint materials are placed in the pipe bell at the foundry. Just "socket the spigot and calk."

The Oversize Threaded Joint, available on 2" and 3" sizes, requires only a wrench to make a strong, water-tight joint.

Our pipe is also made with Open Bell and Gland Type joints in all sizes, 2" through 12". Fittings, too, with all types of joint.

PROMPT DELIVERIES

Cast Iron Pipe, Fittings and all other items, except valves and hydrants, can be supplied on an A-10 or better rating.

Valves and Hydrants can be supplied on a rating of AA-5 or better.

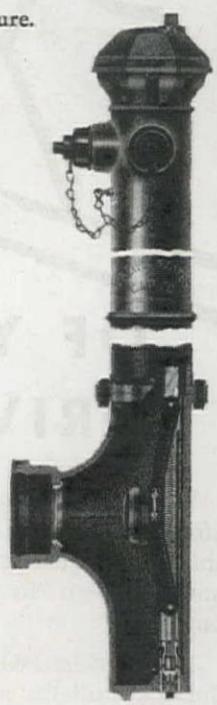
We Also Manufacture

Service and Valve Boxes
Meter Box Covers
Manhole Frames and Covers
Flanged Fittings

Send for Catalog

Pacific States *GATE VALVES*

Remarkable ease of operation, due to special design that prevents all binding action. Meet all standard specifications. Each valve tested to double the rated working pressure.



Pacific States *FIRE HYDRANTS*

Designed for easy, positive operation — easy removal of all working parts — accident proof — frost proof — minimized possibility of water hammer. Conform to Federal specification WW-V-76 and the new AWWA specification.

PACIFIC STATES CAST IRON PIPE COMPANY

GENERAL OFFICES: PROVO, UTAH

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IT BETTER BE *NEW*— AND *NEWS*

This is new. And it's NEWS for every post-war planner. World's largest fractionating tower. It's all-welded. Sets a NEW high in fit-up tolerances and fractionating efficiency—a NEW low in oil refining cost.

ALTER EGO: Yes—and a NEW high in construction savings. Tower shell costs 30.7% less, weighs 15% less. Trays cost 30% less, weigh 54% less—because of arc welded construction.

That's the post-war pattern! The NEW product must be a better product at less cost. Be it vacuum tower or vacuum cleaner the NEW product must obsolete the old models. Otherwise it's a sales dud.

ALTER EGO: Right! To build metal products that will win post-war sales we've got to think about how WELDING is now building the ADVANCED fighting equipment for winning the war.

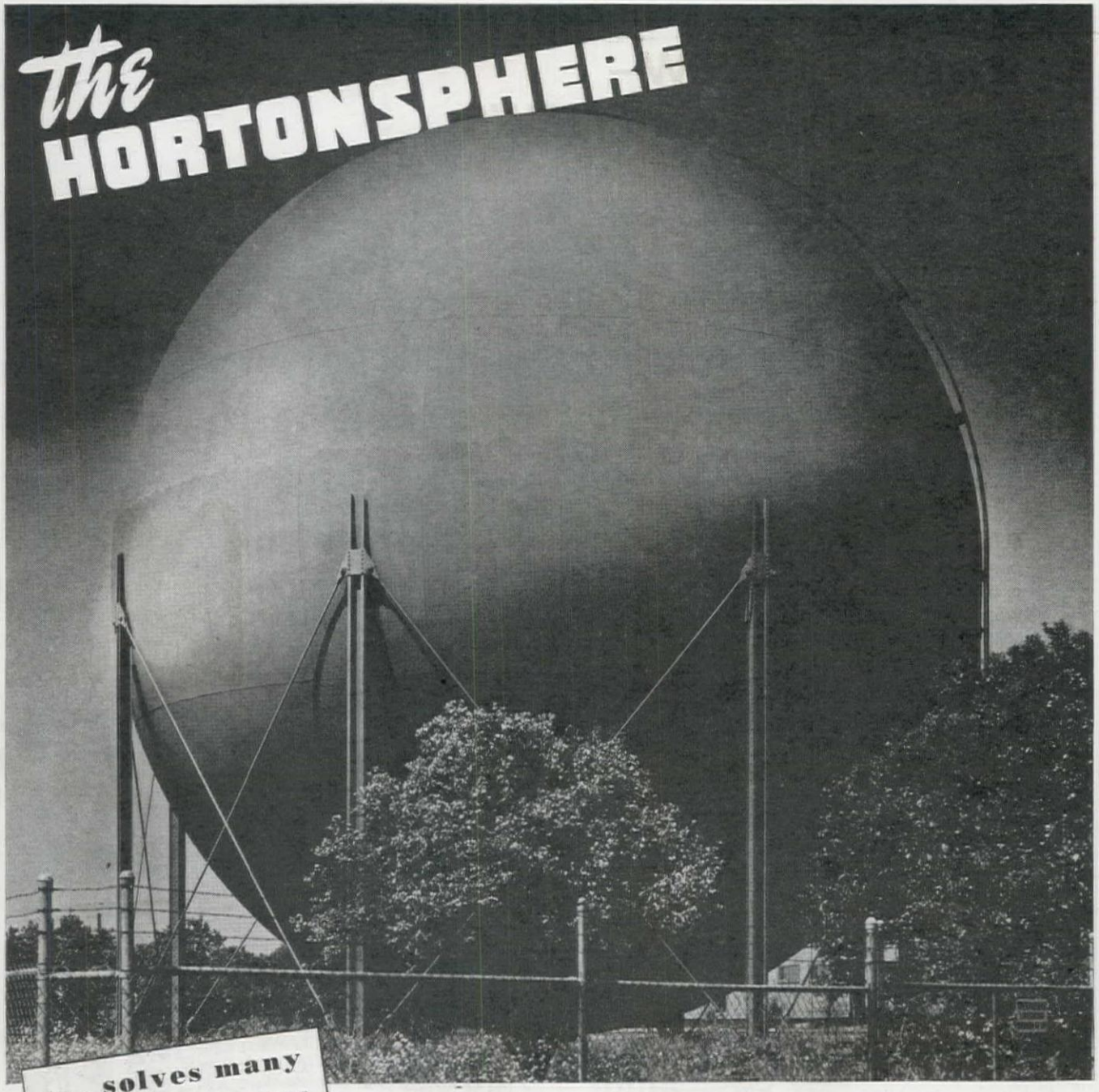
That IS something to start this post-war thought: Since we will have to fight WITH or AGAINST new models, let's plan the NEW by finding out from Lincoln what's NEW in arc welding—and how to apply it.

Ask your inner self whether old models will SELL after the war.

THE LINCOLN ELECTRIC COMPANY
CLEVELAND, OHIO

then I said to myself—

WELDING IS THE TOWER IN POST-WAR DESIGNS



. . . solves many GAS STORAGE problems . . .

PEAK production capacity in industry has emphasized the need and importance for efficient storage of both gases and liquids. Now, more than ever before conservation is of utmost importance. Hortonspheres are the logical answer to *economical* storage of gases as well as providing adequate protection against volumetric loss and product deterioration of volatile liquids.

The Hortonsphere is a closed container and has no moving parts . . . thereby eliminating constant supervision. Spheres provide a maximum of storage capacity in a minimum of ground area.

Some manufacturers utilize Hortonspheres to assure a gas supply of uniform gravity and composition. Other users rely on these spheres to provide sufficient storage capacity for uninterrupted operation. The Hortonsphere shown is used for gas storage at a west coast utility. It is 63 ft. 6 in. in diam., holds 500,000 cu. ft. and is designed for 65 lb. per sq. in. pressure.

CHICAGO BRIDGE & IRON COMPANY

CHICAGO • HOUSTON • TULSA
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WESTERN CONSTRUCTION NEWS
with which is consolidated WESTERN HIGHWAYS BUILDER

June, 1943 Vol. 18, No. 6

J. M. SERVER, JR. . . . . Editor
A. H. GRAHAM . . . . . Field Editor
ARNOLD KRUCKMAN . Washington Editor

Reclamation Credit

IT HAS JUST been announced that work will be resumed on Keswick dam, the Madera canal and Friant dam, of the Central Valley Reclamation Project, in addition to numerous other Western projects. This is good news to the construction fraternity, who have never ceased to realize the war necessity of these projects, supplying as they will additional power and food producing land so vitally needed in the war effort.

Western Construction News feels that it is good to give credit to those persons to whom credit is due for presenting these matters to the War Production Board in such effective form that that agency has revoked its stop-work order. First, to Senator Carl Hayden of Arizona and Representative J. Will Robinson of Utah, who organized the Western congressional members to press for such a program. Next, to Chester C. Davis, War Food Administrator, a westerner, who knows the soundness and necessity of the program. Next, to Mr. N. E. Dodd, an Oregon irrigation farmer and director of the Western Division of the Agricultural Adjustment Agency, who realized that the demand for additional growing of food in the West meant additional irrigation. Far from least, also, credit must go to Commissioner John C. Page of the Bureau of Reclamation for a clear, concise presentation of the projects, their costs and their values, and to the National Reclamation Association, which has been unfailing in its demands for additional irrigation.

Changes in Make-up

READERS of *Western Construction News* have doubtless noted several changes in the make-up of the magazine in recent months. Starting with the March issue the border trim size was reduced. In April the weight of paper used was slightly reduced, and this month is marked by the combination of the Table of Contents and Editorial pages on to one sheet. In subsequent months other condensations are contemplated.

These changes are being consummated in an effort to co-operate in the prosecution of the war to final victory. Shortages of manpower have brought about a reduction in the quantity of paper available and the War Production Board has requested that a ten per cent or greater saving be made in paper use by all publications. Readers need not fear any reduction in editorial matter. In fact, it is expected that the number of articles will be increased in future issues, and that news and personal coverage will continue to be thorough.

Table of Contents

ABC

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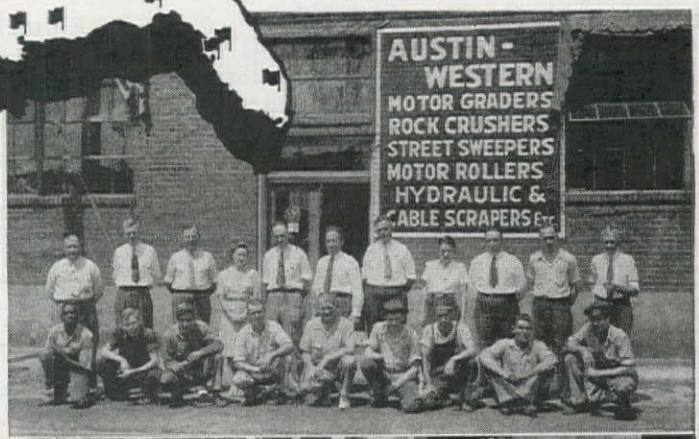
"THEY ALSO SERVE"

who keep Construction Machinery in *"Fighting Trim"*



● Not until the whole story of the outstanding job done by construction machinery in speeding the war effort in this Country can finally be told, will the importance of the part played by the Equipment Distributor be fully realized.

Faced with shortages of men and material, the Distributor and his staff, in shop and field, have done the impossible, time after time, in keeping equipment working.

Much of the job of construction for military purposes is finished; but much remains to be done—and with machines which have already served one life of usefulness.

Your nearby Austin-Western Distributor, with his skilled mechanics and adequate shop facilities, stands ready to help you finish this truly epic job of home front construction for war. THE AUSTIN-WESTERN ROAD MACHINERY CO., Aurora, Illinois.

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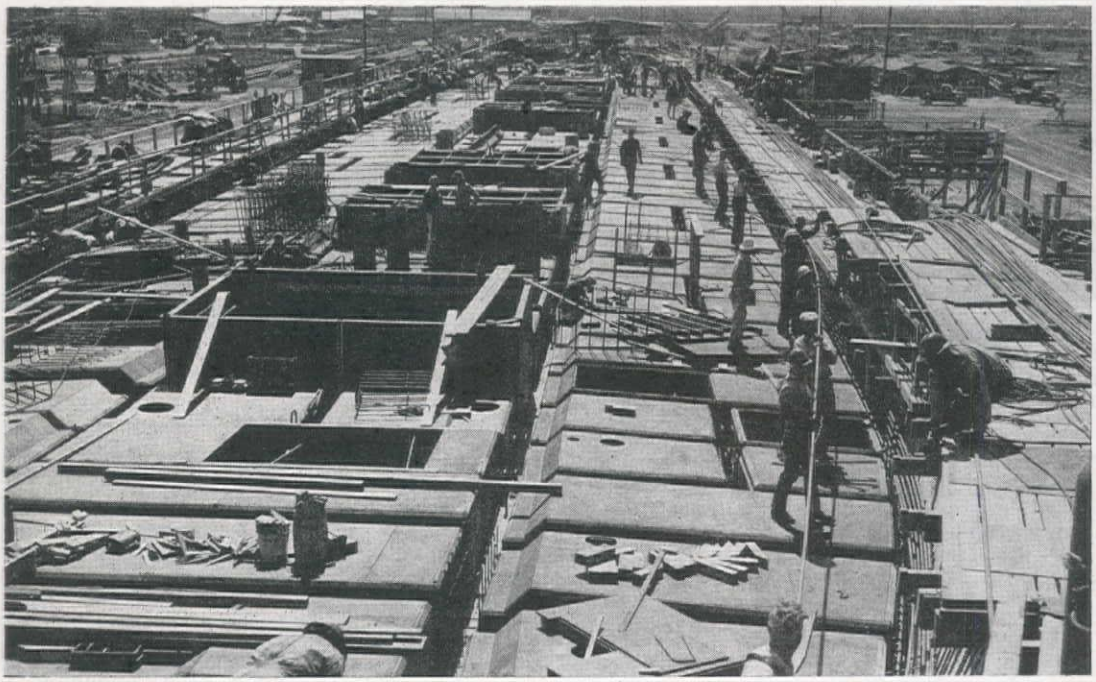
WESTERN CONSTRUCTION NEWS
JUNE • 1943

Concrete Ship Construction



DECK FORMS in place for the third and final pour on a concrete ship at Belair yard, South San Francisco, Calif. Workmen are placing one of the 350-ft. reinforcing bars for the gunwales of the vessel.

Engineering and contracting firms make use of the techniques acquired in years of construction experience to build 26 concrete barges to be used for coastwise transportation of dry cargo, freeing ships for other vital transportation needs

By STANLEY C. KING
Partner—Ellison & King, Consulting Engineers
San Francisco, Calif.

J. F. BARRETT
Partner—Barrett & Hilp, Contractors
San Francisco, Calif.

MAKING USE of construction techniques and efficiency acquired through years of experience in the building and heavy construction field, Barrett & Hilp, of San Francisco, Calif., are engaged in producing ship-shaped concrete barges to assist in alleviating the shipping shortage brought on by the war. Contract for 26 of the vessels, which are designed to transport dry ore, was awarded by the Maritime Commission to the construction firm in May, 1942.

The vessels have an over-all length of 366 ft. 4 in., a beam of 54 ft., and a depth midship of 35 ft. Their total displacement is 10,950 long tons with a draft of 26 ft. 3 in., and their cargo capacity about 6,300 tons.

The first concrete was poured on March 26, 1943. Six hulls are presently under construction. The first hull is expected to be launched in June.

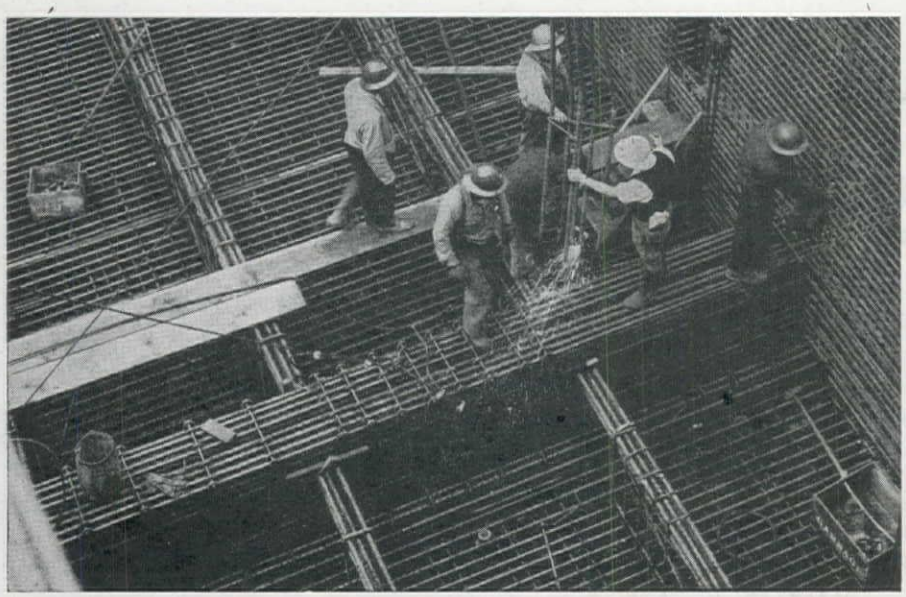
The initial problem facing Barrett & Hilp when they received the contract for the barges was a suitable location for the shipyard. Suitable sites from which side launching could be accomplished were first investigated, but a consideration of the difficulties involved in such a program, and the tremendous amount of work required for above-the-ground building of ships led to the decision to build the hulls in basins. A very fine site was available at what is known as Belair Island on the Bayshore Highway just south of South San Francisco, near the San Francisco Municipal Airport. Here was found a tract of land of about 100 ac. with a ground formation that lent itself admirably to the requirements for this particular type of yard; the island being of a serpentine formation, terminating in an impervious clay, which itself rapidly disappears below the marsh lands. It was found that by excavating a channel approximately 200 ft. in width and with 12 ft. of water at low tide, for a distance of 9,000 ft., a turning basin, approximately 600x1500 ft. could be excavated in the marsh land immediately adjacent to the impervious clay and serpentine. Facing this basin six dry graving docks were constructed, 400 ft. in length, 84 ft. in width and 21 ft. in depth.

Finger wharfs to accommodate four barges were constructed at one end of the basin for outfitting. The basin adjacent to the finger wharfs is dredged to a depth of 15 ft.

A hill at one side of the site was removed and the waste material used as fill to bring the site to the elevation desired. While the surface of the site was swamp land, the underlying serpentine rock furnished a good foundation for the bottom of the docks which support the weight of the barges during construction.

Graving docks

A 12-in. reinforced concrete slab was placed over the entire area of the dock. Ten-inch timbering was used as the side bulkhead around all docks without any interior supporting bracings — tierods being run from bulkhead to bulkhead across the area between the docks. At the water end of the dock, concrete but-



REINFORCING STEEL in the bottom of a concrete barge hull. At the right is the steel for a bulkhead wall, while running across the picture is the keelson, showing the concentration of steel, which is so heavy that a tee is built out at the bottom to accommodate it. Practically all steel is 1¼ in. round, and is welded in place.

tress walls were constructed and steel sheet piling was driven into the clay formation, thus giving docks that are absolutely dry of all seepage. Between the concrete buttress walls were constructed floating concrete gates, 64 ft. in length, 22 ft. in depth and 15 ft. in width. Since permanent forms were built for the bottom of all ships, it was necessary to imbed in the 12-in. concrete slab, 6x6-in. redwood bevelled sleepers 2 ft. on centers, running across the width of each dock. To these sleepers were attached 2x6-in. timbers on 12-in. centers running longitudinally and on these was placed ⅝-in. waterproof plywood. This entire lower construction was so arranged as to fit the bottom curve of the ship and remain permanently in place up to the 12-in. water line.

The yard is laid out to give the highest efficiency of operation. Forms are assembled outside the hull on specially designed jigs, and are placed by cranes as units. Wherever possible, reinforcing steel is pre-fabricated into large units in the yard and placed in the hull by cranes. This method is used for frames, bulkheads, side shell reinforcing, and numerous other items. The longitudinal bars at the deck and bottom of the hull are continuous, without splices for their full length. These bars, 1¼ in. round, are delivered to the yard in 64-ft. lengths and are flash-welded before placing into lengths up to 350 ft. These bars feed in a straight line operation from the welding machine to a storage pile behind each dock. From this storage they are pulled through a 12-in. pipe into the hull when needed. A mold loft, equipment and tool sheds, reinforcing and form jigs, mixing plant and storage areas are placed so as to give a maximum ease of access to the work, with a minimum of material handling.

The barges have been designed as dry cargo carriers by the San Francisco Engineering Firm of Ellison & King, and Joslyn & Ryan, Naval Architects. Charles E. Andrew is Consulting Engineer for the project. All design features and construction progress are carefully checked and inspected by both the American Bureau of Shipping and the U. S. Maritime Commission.

Design problems

The designer of steel or wood ships has the accumulated knowledge of years of ship building to guide him in his work, whereas the designer of a concrete hull must attack his problem as a pioneer. The hull as a whole is considered as a beam supported on waves. Simultaneous with this action each particular member such as the slabs, frames, and beams must resist the local hydrostatic pressure of the water against the hull. In the design of the midship portion of the vessel four conditions were considered for the hull as a whole and five conditions of local loading, along with various combinations of the conditions.

Hull Loading Requirements

H-1 Loaded ship supported on a wave at each end of ship

H-2 Loaded ship supported on a wave at center of ship

H-3 Unloaded ship supported on a wave at center of ship

H-4 Loaded ship in still water

Local Loading Requirements

A. A deck load of 416 lb. per sq. ft.
This loading was combined with "H-1" and "H-2" above.

B. An external hydrostatic head of 2 ft. above the deck (this results in a pressure of 2,368 lb. per sq. ft. on the bottom of the ship)
This loading was combined with "H-2" and "H-4" above.

C. An internal hydrostatic head of 20 ft. in combination with an external head of 10 ft.
This loading was combined with "H-1" above.

D. An external hydrostatic head of 18 ft.
This loading was combined with "H-1" and "H-3" above.

E. An external hydrostatic head of 27 ft.
This loading was combined with "H-1" above.

The various combinations of loading are intended to include any possible conditions which might be met by vessel in service.

Running the entire length of the ship is a 24x52-in. keelson, being the largest single structural unit of the entire hull. In the upper portion of this unit are forty 1¼-in. round bars 350 ft. in length and in the lower portion of the unit are sixty-eight 1¼-in. round bars. The concentrations of bars in the lower section is so great that they cannot all be contained in the 24-in. width of the keelson and tee extensions are added to each side at the bottom slab.

At the gunwale eighteen 1¼-in. round bars run continuously around the ship. Additional full length bars are used in the two 14x40-in. longitudinal deck girders placed each side of the hatch openings.

In each deck girder there are ten 1-in. and thirty-seven 1¼-in. bars for top reinforcing and sixteen 1¼-in. bars at the bottom of the beam. As in the case of the keelson, the cross section is inadequate to accommodate all of the upper bars and a tee is extended on the side away from the hatches to accommodate the reinforcement.

The bulkheads separating the cargo holds are spaced 32 ft. center to center. The bulkhead slab varies from 7 in. at the bottom to 4½ in. at the top and it is stiffened with five equally spaced vertical stiffeners.

The 32 ft. between bulkheads is divided into five spaces of 6.4 ft. each by transverse frames. The slabs in conjunction with the frames, bulkheads, deck girders and keelson constitute the primary elements of the framing system.

The bottom slab of the ship is 7 in. thick, reinforced with two layers of 1¼-in. round longitudinal bars, 4 in. on centers and two layers of 1-in. round transverse bars spaced at 4½ in. and 9 in.

The deck varies in thickness from 5 in. to 6¼ in. and the side shell slab is 6 in. thick. The reinforcing in the deck and side shell is somewhat lighter than at the bottom of the ship.

A ⅞-in. concrete coverage is allowed over steel at the outside from the bottom and sides, and ¾ in. at deck. The concrete coverage on the inside of the hull is limited to ½ in.

The cargo space is floored with 6-in. planks supported on the concrete frames. On top of the planking, 3/16-in. steel plate is laid, and under the hatches the plating is increased to ⅜ in. in thickness.

Form work

The form work for the exterior wall of the vessels is constructed to the full height of the exterior hull, 35 ft. in the

mid-section and 30 ft. in length, so that after pouring of all concrete, the exterior forms above the 12-in. water line may be rolled back against the bulkhead, allowing a 5-ft. clearance between the form and the finished concrete hull.

A novel method has been followed in the building of all interior forms so that 12-in. layers of concrete will raise continually in all holds. As each 12-in. pour is accomplished, another 12-in. panel is dropped into place. The result of the 12-in. depth of pouring has been the entire elimination of voids in the finished concrete. Practically all interior forms are removable, and may be used several times over. A racheted elevating pouring platform is attached to the frame forms to facilitate concrete placing operations.

Concrete

The lightweight concrete used for the hulls is made with "Haydite," an aggregate manufactured at McNear's Point, near San Rafael, and delivered to the yard on barges. The concrete specifications call for a compressive strength of 5,000 lbs. per sq. in. at the age of 28 days. The cement content of the mix is 6 sk. per yd. and the resulting concrete weighs approximately 118 lbs. per cu. ft. Natural sands are being held to a minimum to the mix in order to accomplish this light weight.

Cement is delivered directly from the mill in tank trucks and is raised by mechanical conveying equipment to hoppers above the batching plant, which is located adjacent to Dock No. 1 so that the hauling of concrete is held to a minimum. All docks are within 1,000 ft. of the batching plant where two 2-yd. tilting mixers have been installed. Four 4-yd. agitating trucks are used for the delivery of all concrete to hoppers at deck level of the several hulls. It is then chuted to stages halfway down the hull side, from which point concrete buggies carry it to secondary chutes with flexible tube extensions to carry it to the point of placement. In pouring the keelson and deck girders, with their heavy concentration of reinforcing bars, all concrete for the lower section is poured into the side of the form near the center of the beam, where no steel is carried. After the level of concrete reaches that point, the opening in the form is closed and the remainder is worked through the interstices of the upper steel.

The concrete is placed in three separate pours, each of which is continuous until completed. The first includes the bottom slab and bilges and shell to a height of 8 ft. 2 in. The second pour completes the shell, frames, and bulkheads to below the deck level, while the third pour completes the girders, deck, and miscellaneous items of the superstructure.

Electric vibrators of a small enough diameter to pass between reinforcing bars, are used constantly by all pouring crews. This has contributed in a large measure to the excellent type of poured concrete that is being obtained.

Launching

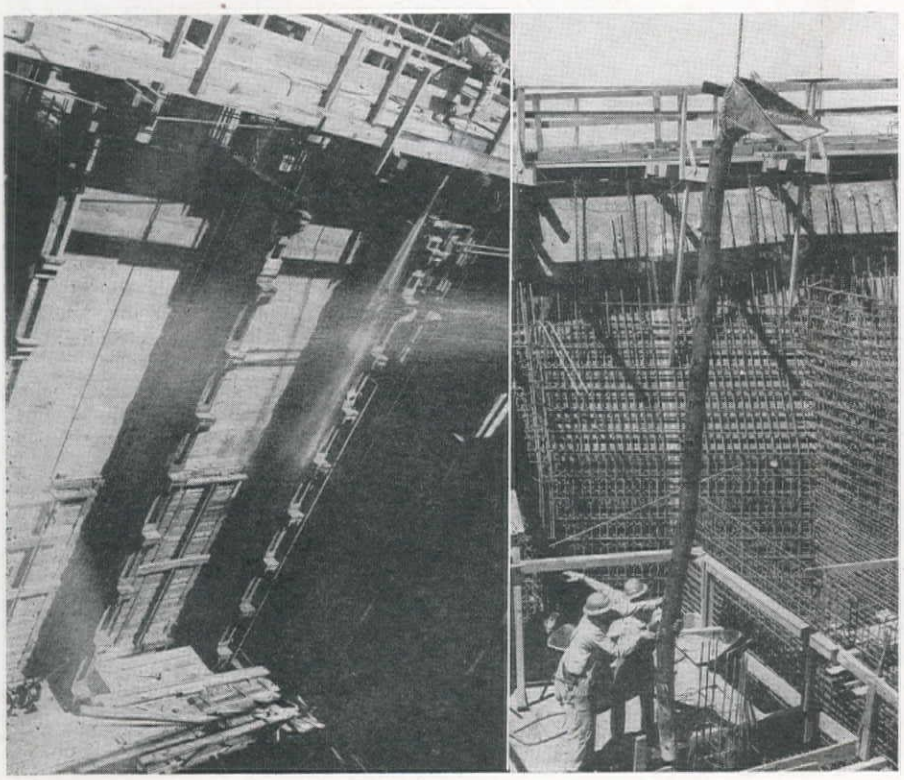
Launching is accomplished by opening 18-in. valves in the gates, allowing the sea water to flow into the construction basin. When the basin is filled to the same level as the outside water, the gate is floated to one side, a tug is attached to the hull and it is pulled into the turning basin. It is then brought to the painting dock which has been excavated to a depth five feet greater than the construction docks and in which have been placed 12x12-in. timbers properly supported at the same elevation as the construction dock floor slab, to allow 5-ft. clearance for inspection and repairs to the bottom of the hull, which will be exposed for observation for the first time.

This dock will be available not only for whatever patching may be required, but all exterior painting of the hull will also be performed in this dock. The ship will then be re-floated and moored at a fitting-up wharf constructed at the end of the turning basin.

At the South San Francisco yard, William Lawson is project manager for Barret & Hilp, George McKeever is general superintendent, and Fred Crocker is project engineer. Raymond C. Anderson is resident engineer for the Maritime Commission.

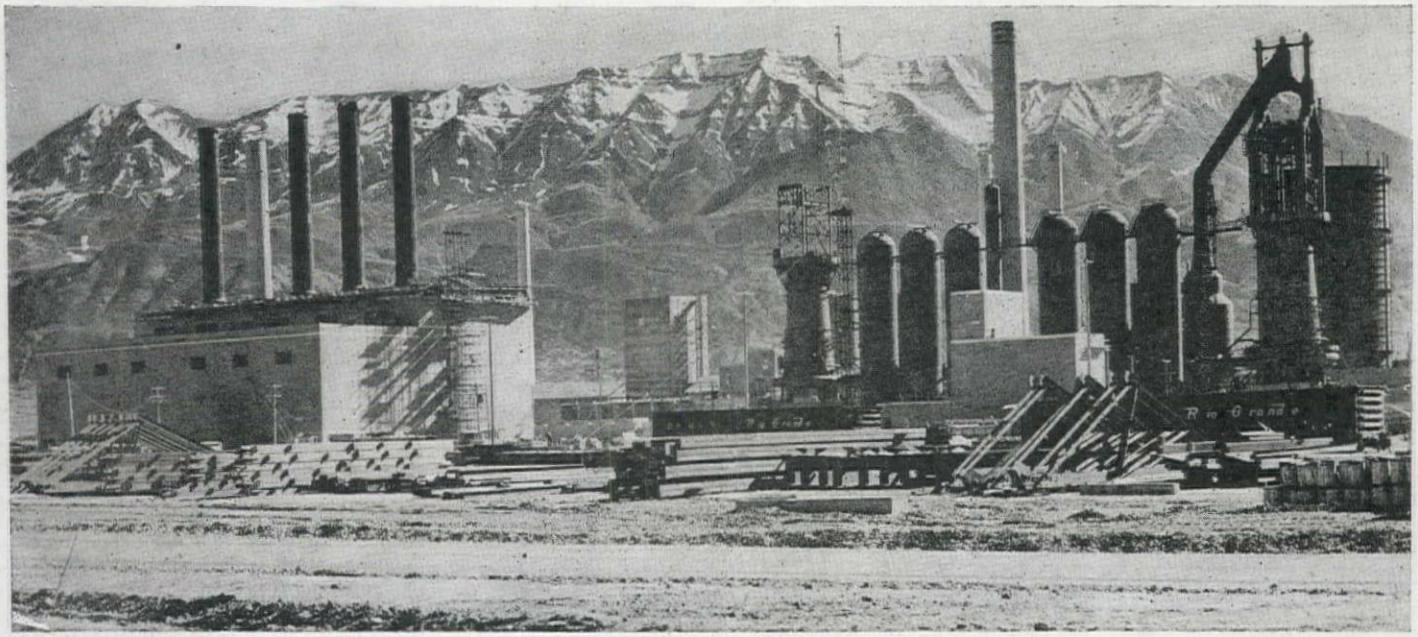
DETAILS of construction of concrete ships is explained to PROF. BERT WELLS, Stanford University, president of the Structural Engineers Association, left, and M. C. POULSEN, vice-president, right, by WILLIS McBETH, steel engineer, when the association made an inspection trip to Belair yard recently.

CONCRETE WORK on the barges. At the left, streams of water from above and across sprinkle concrete as it cures. On the frames may be seen the steps upon which the elevating pouring platform is placed. Forms are partly removed, but some of the 12-in. panels are still in place. Right, a flexible pour tube is removed by crane.

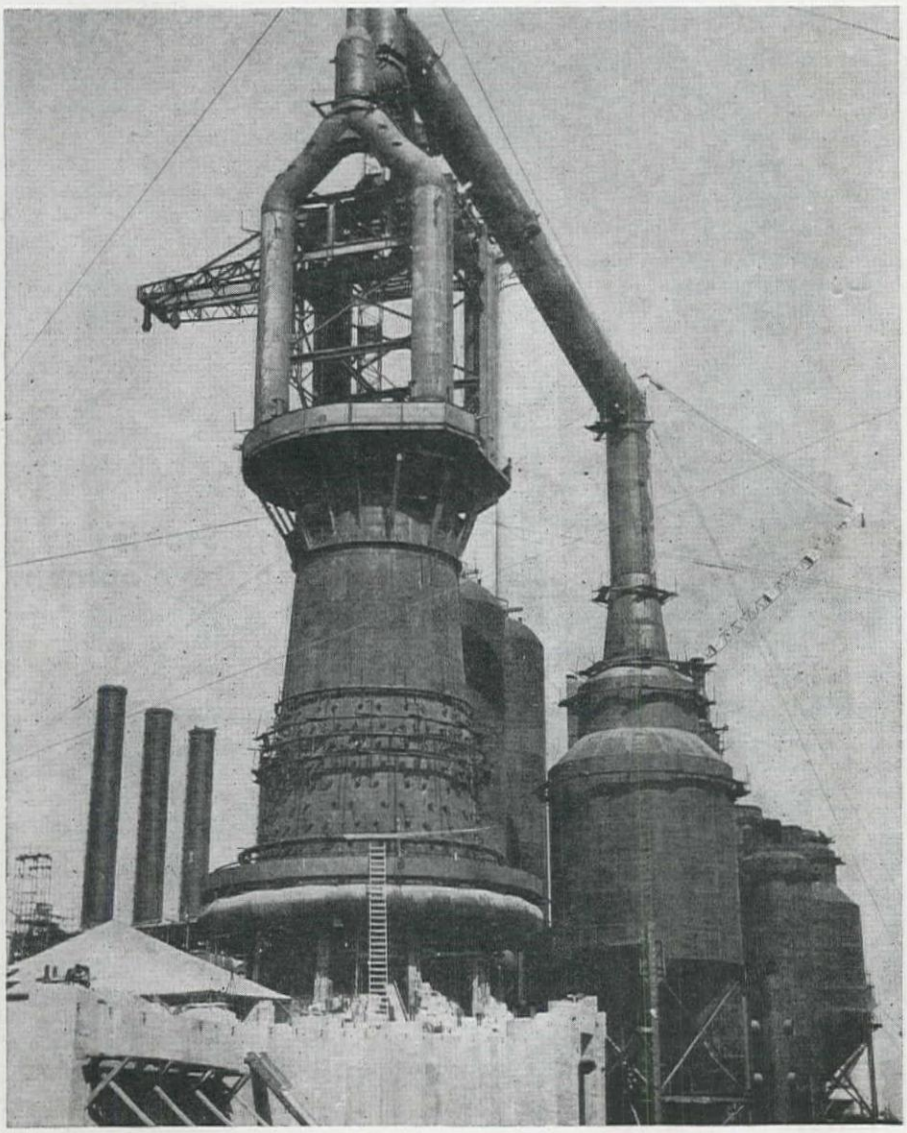


Park Service Studies Alcan Area Development

THE NATIONAL PARK SERVICE has been ordered to conduct a survey to assure orderly development along the Canadian-Alaskan highway when that thoroughfare has completed its wartime uses. The Canadian government will conduct a similar survey along the Canadian section of the road. When the project was authorized for military use, public lands in the Alaskan section of the route were withdrawn from settlement or private use for 20 mi. on either side of the route. Purpose of the new survey is to assure the proper development of the newly opened land and to prevent unsightly projects. Another value will be a cushioning of post-war unemployment. Allyn P. Bursley, a planning engineer of the National Park service, is now in Alaska, and will be in charge of the survey.



Utah Steel Mill Near Opening



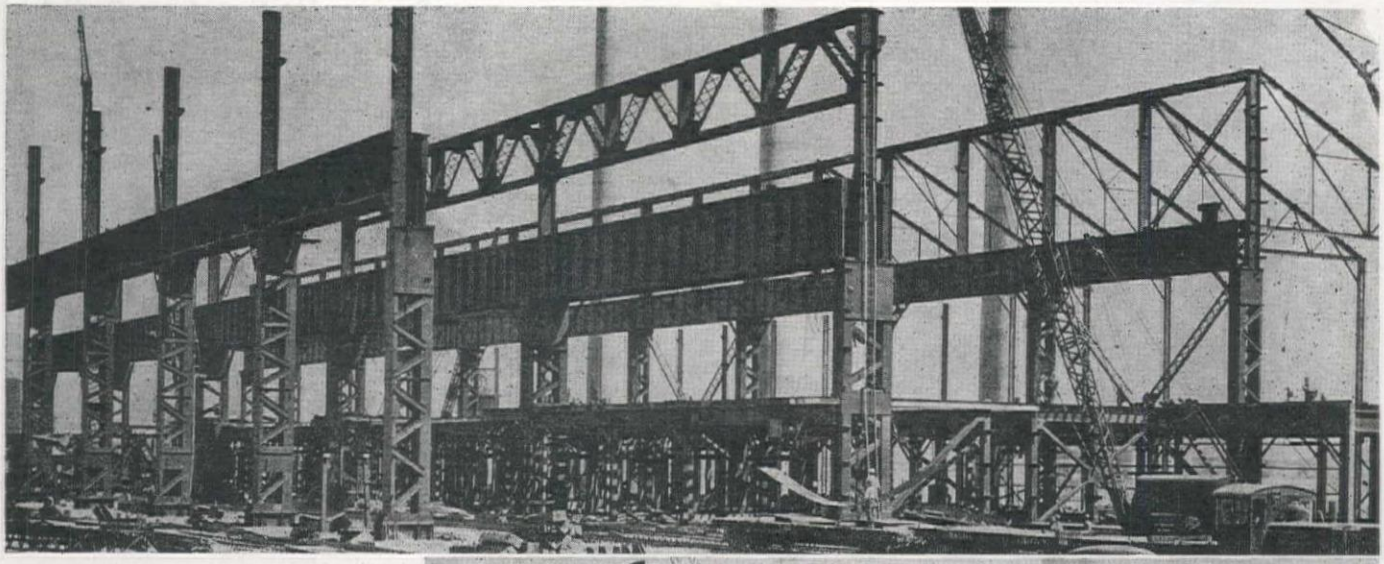
Largest industrial plant in the west expected to pour first pig iron by August of this year. Construction behind schedule because of slow equipment delivery

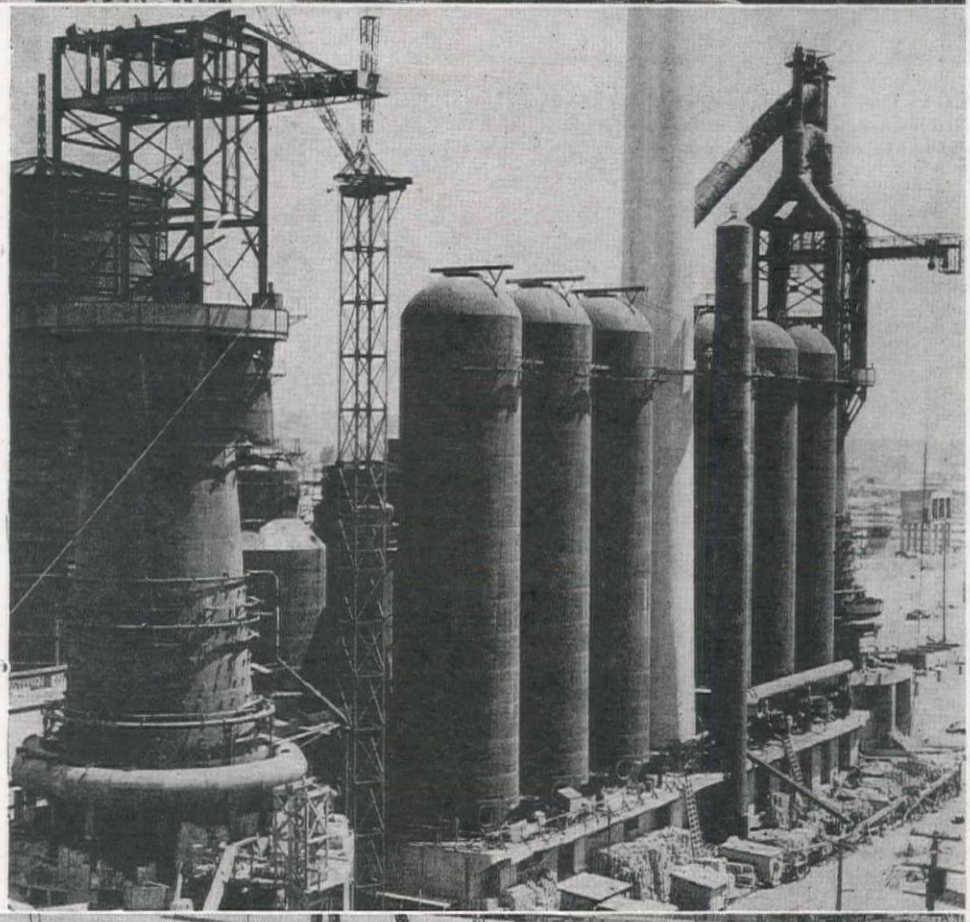
GENEVA WORKS, the huge steel mill now being built for the Government near Provo, Utah, is rapidly becoming a "bastion of steel" in spite of delays occasioned by inability to obtain priorities of sufficiently high rate to secure contemplated early deliveries of essential items of equipment.

The plant will be the largest integrated steel mill west of the Mississippi River, entirely of the most modern design, and costing over $150,000,000. It is being erected by Columbia Steel Co., a subsidiary of United States Steel Corporation, for the Defense Plant Corporation. The development was especially ordered by the Government to provide steel for shipbuilding needs on the Pacific Coast.

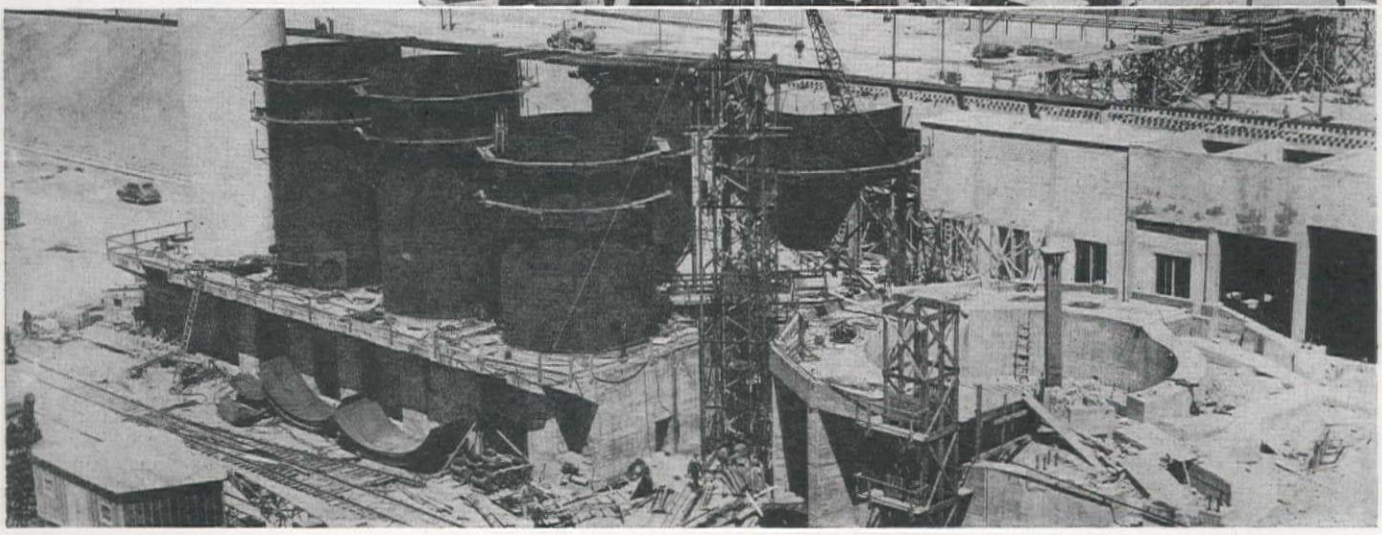
While some units of the plant are ahead of the original schedule, other phases of construction are behind time. This is due primarily to the difficulty of obtaining equipment when desired. This priority situation, however, has recently been improved and construction is rapidly proceeding. A further factor in slowing up completion of the plant has been a shortage of labor. In spite of these obstacles however, it is anticipated that the Geneva plant will be completed and ready for operation by the end of this year.

The Geneva mill will have four batteries of by-product coke ovens, each battery containing 63 ovens. Work on





CONSTRUCTION SCENES from the Geneva Works plant of Columbia Steel Co., near Provo, Utah. TOP, steel erection work on the open hearth furnace building which will house 9 such furnaces and produce 2,200 tons of steel daily. CENTER, No. 2 blast furnace is nearly complete. Three blast furnaces will each supply 1,200 tons of pig iron daily. BOTTOM, construction operations on blast furnace No. 3. To service mill facilities in the 1,600-ac. site required 65 mi. of railroad and 16 mi. of roadway. Total cost of the project will be approximately $150,000,000. On the opposite page, TOP, powerhouse (left) and blast furnaces in the shadow of the Wasatch Range. The power house is a combination electric power, blast furnace blowing and water pumping station to service the three blast furnaces, nine open hearths, plate and structural mills and other installations. BOTTOM, close-up of No. 1 blast furnace, which is nearly ready for operation. Excavation, concrete masonry, steel, and timber specialists are required in an erection problem of such size.



A GAS HOLDER (right) for by-product gases at the Geneva Works plant, and a partial view of the coke manufacturing plant, with coal charging structure in the center and banks of coke ovens extending in each direction and quenching tower at the end.

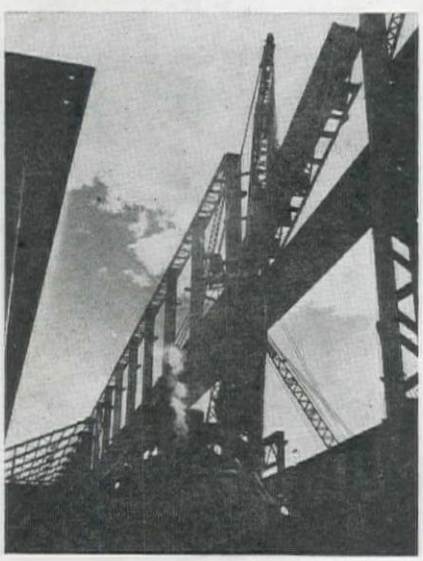
this phase is presently about 70 per cent completed. Of the three blast furnaces to be erected, one is nearly complete and will be ready for operation if needed in August. Each of these furnaces will have a capacity of 1,200 tons of pig iron per day.

The largest single building on the property is the continuous plate mill. When completed it will be 3,750 ft. long. At the present time the steel columns for this building have been erected, but it is less than 50 per cent complete. Nine open hearth furnaces will be included in the equipment of the mill. Each will have a steel capacity of 225 tons daily. Because of the wartime shortages of steel, concrete has been used as a substitute wherever feasible. Four hundred thousand cubic yards have already been poured for the various structures, and before the project is complete another 100,000 cu. yds. will be used. Conveyor ways, coal and ore storage bins, stacks and other construction features, which in all previous steel plants have been made of steel, are in this case utilizing concrete.

As a part of the same operation a railroad has been completed from Geneva Works to the Geneva coal mine and a highway from Columbia, Utah, to the mine has also been constructed. A blast furnace which had been standing idle at Joliet, Ill., has been dismantled and re-erected at Ironton, Utah, and a bee-hive coke oven plant has been constructed at Columbia to supply the coke for this latter installation. Iron mining facilities at Geneva mine have also been expanded.

E. M. Barber, Vice-President of Columbia Steel Co., is in general charge of all operations at the plant, and R. C. Talbot is resident engineer.

A CRANE raises a structural member into place during construction of the open hearth furnace building. Each of the nine furnaces will have a production capacity of 225 tons of steel daily.



Fast Elevators Serve Coulee Passenger and Freight Needs

FOUR HIGH SPEED elevators have been installed in the Grand Coulee dam and powerhouse by the Bureau of Reclamation. One of the new lifts is the largest passenger elevator in the United States, carrying easily thirty people, and traveling 500 ft. per min., the speed of an express train. It drops 362 ft. into the heart of the huge concrete structure, giving access to the outlets of the 8½ mi. of galleries inside the dam. It can also be geared to perform freight service, having a capacity of 44,000 lbs., and traveling 100 ft. per min.

The other elevators perform service in the powerhouse and can be operated automatically or manually, having electric-eyes in the doors, trip and mileage recorders and latest safety devices.

Scrap Utilized to Build Large Overhead Crane

A HEAVY DUTY, 20-ton overhead crane, built from scrapped and salvaged parts by the Oakland Maintenance division of General Metals Corporation, is now in operation in the company's Iron Plant division, Oakland, California. Its construction saved an 18 months' production delay threatened by the late delivery of a vitally needed crane.

Completed in three months, the unit, affectionately nicknamed "Big Scrappy," is a composite representation of salvaged and scrap parts gathered from all sections of the country. The states of California, Washington, Nevada and Utah, to name a few, contributed parts to this gigantic and unusual undertaking.

The overhead beams or girder were located some hundreds of miles out of Salt Lake City in an old power house that had been abandoned by the Utah Power and Light Company for many years.

A motor, salvaged from a deserted rock quarry in Nevada, was overhauled and repaired and now supplies the power for "Big Scrappy's" bridge.

Power for the hoist is furnished by a motor salvaged from a damaged crane at Shasta dam in northern California. Another motor was unearthed in a lumber mill in Washington state and now provides the power for the trolley drive of this new unit.

The hoist brake was salvaged from an old gold mine hoist in Angels Camp, California. Somewhere in southern California, an old welder was found that provided the limit switch contactor for the new crane.

When needed parts for "Big Scrappy" could not be located, maintenance crew members of General Metals set to work building them out of available materials in the plant. End trucks and hoist, as well as the control equipment were all designed, engineered and fabricated at the Oakland plant. This division also assembled the secondary resistors from salvaged parts found in the shop. Hoist drum, sheaves and gears were also designed, patterned and cast on the spot.

"Big Scrappy" is the second crane built by General Metals for their own use. A year ago "Scrappy Jr.", a 5-ton baby brother was built in the same plant under the same conditions. Instead of locating girder members for Jr., however, they were fabricated from H sections to speed construction.

* * *

PRINTED copies of Simplified Practice Recommendation R198-43 dealing with wire rope are now available. This Recommendation was developed by engineers of the rope industry as a wartime conservation measure and as a guide for postwar practice. A reduction in variety of wire rope from 973 to 643 is recommended. The publication may be obtained from the Superintendent of Documents, Washington, D. C. for 10 cents.

Pan American Road Progress

Construction of vital war highway link to Central America advancing rapidly under U.S.E.D. and P.R.A., despite difficulties of transportation, use of hand labor, shortages of many materials and large number of bridge structures required

By HAROLD E. SPICKARD
Major, Corps of Engineers
Executive Assistant, Pan American Highway
United States Engineer Office
Los Angeles, Calif.

AS STATED in a previous article in *Western Construction News*, Pan American Highway is being rushed to completion as a war measure. This highway is to be a pioneer road through Central America, connecting the Panama Canal with the end of the standard-gage railroad at the Mexico-Guatemala border. When the highway is completed, there will be an all-land route connecting the capitols of all Central American Republics with Mexico and the United States. Thus, the highway may be even more important for its promotion of continental solidarity than for its military value from a strategic standpoint.

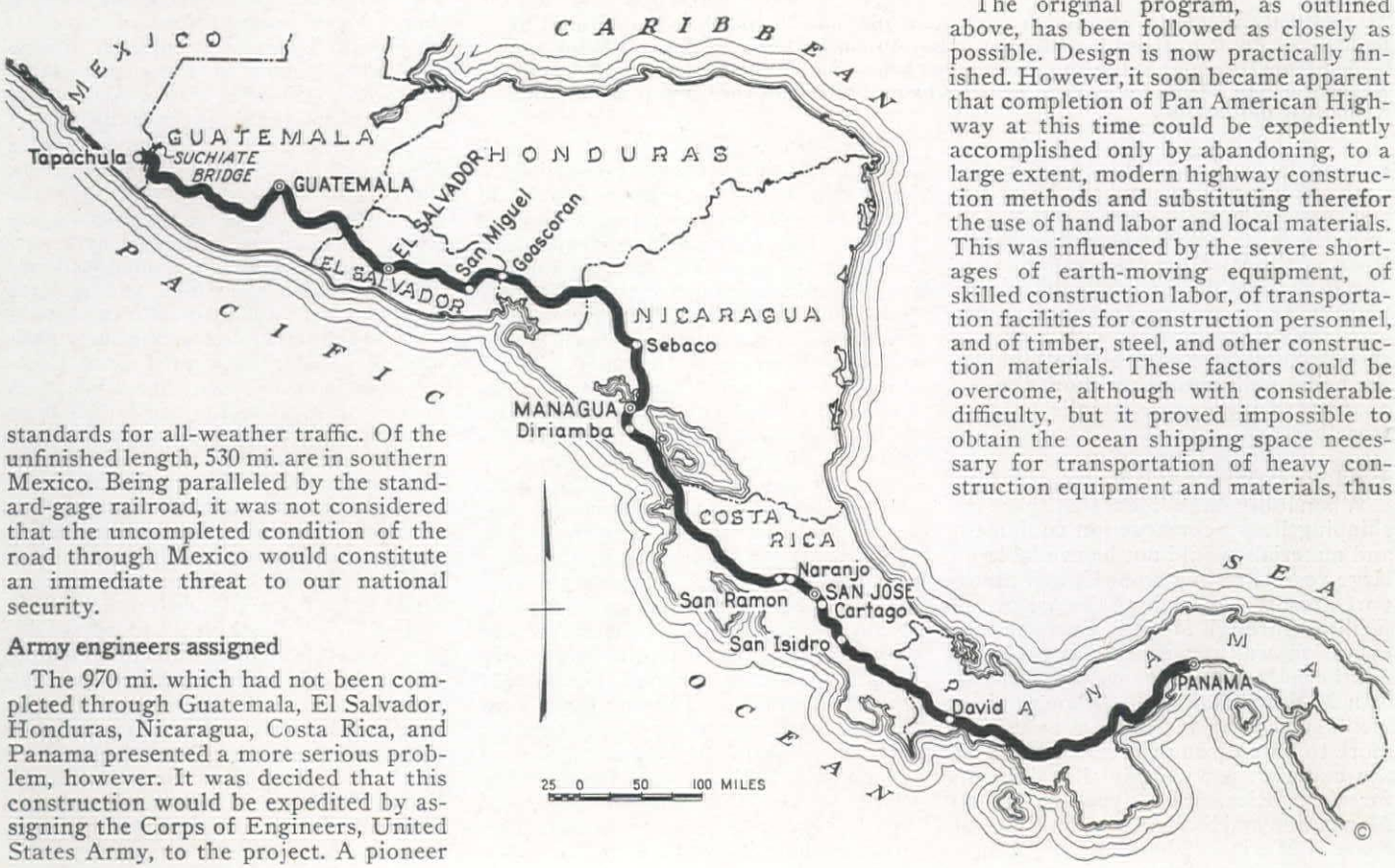
For some years, the Public Roads Administration has been engaged in the project of constructing the Inter-American Highway. As distinguished from the Pan American Highway, this long-range project will link all the Americas, both North, Central, and South. When Pearl Harbor was attacked, of the 3,250 mi. of the proposed Inter-American Highway between Laredo, Texas, and Panama City, there remained 1,500 mi. which had not been completed to convoy standards for all-weather traffic. Of the unfinished length, 530 mi. are in southern Mexico. Being paralleled by the standard-gage railroad, it was not considered that the uncompleted condition of the road through Mexico would constitute an immediate threat to our national security.

Army engineers assigned

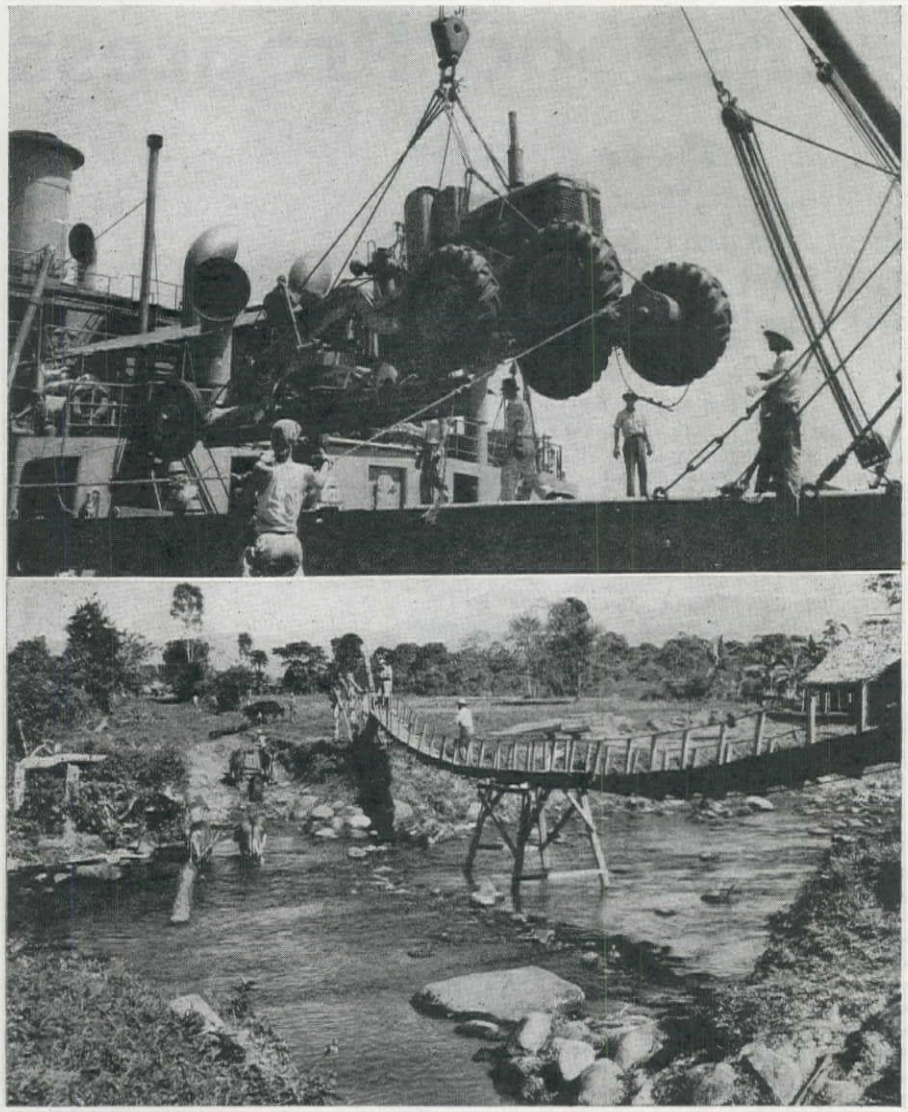
The 970 mi. which had not been completed through Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica, and Panama presented a more serious problem, however. It was decided that this construction would be expedited by assigning the Corps of Engineers, United States Army, to the project. A pioneer road through the uncompleted stretches of the route was to be constructed by War Department forces, except for 70 mi. between El Empalme and San Isidro del General, in southern Costa Rica, where the Public Roads Administration was to proceed with completion of their long-range project. The Public Roads Administration was also to construct a number of permanent bridges along the portion of the route assigned to Corps of Engineers. There was to be an interchange of funds, with the Army furnishing financial assistance to compensate for the additional cost of constructing the stretch from El Empalme to San Isidro in face of present high prices, while the Public Roads Administration agreed to reimburse the Engineer Department for permanent structures which can be utilized by the Inter-American Highway as well as by the pioneer road. It was agreed that the pioneer road would follow the route proposed for the Inter-American Highway, except where considerations of time, money, or critical materials made alternate locations more expedient. To distinguish it from the long-range program, the name "Pan American Highway" was given to the continuous route from Laredo to Panama, including the pioneer road under construction and the parts of the Inter-American Highway which are completed or under construction.

Colonel Edwin C. Kelton, Corps of Engineers, was assigned as Director of Pan American Highway. Under his supervision, surveys were rushed to completion during the rainy season of 1942. In order to conserve engineering personnel for other critical projects, only sufficient design work was undertaken to permit the starting of construction in December, 1942, the beginning of the dry season. It was planned to proceed with design at a rate sufficient to keep staking parties ahead of the construction crews.

The original program, as outlined above, has been followed as closely as possible. Design is now practically finished. However, it soon became apparent that completion of Pan American Highway at this time could be expediently accomplished only by abandoning, to a large extent, modern highway construction methods and substituting therefor the use of hand labor and local materials. This was influenced by the severe shortages of earth-moving equipment, of skilled construction labor, of transportation facilities for construction personnel, and of timber, steel, and other construction materials. These factors could be overcome, although with considerable difficulty, but it proved impossible to obtain the ocean shipping space necessary for transportation of heavy construction equipment and materials, thus



ROUTE of the Pan American Highway thru the Central American countries. A total of 530 mi. of new highway was required in the following links: San Miguel-Honduras border; entire distance across Honduras; Honduras border-Sebaco; Diriamba-Costa Rica border; Costa Rica border-San Ramon; Cartago-San Isidro; San Isidro-Panama border; Costa Rica border-David. In addition, most of the rest of the route is being rebuilt or resurfaced for use of heavy military traffic.



TRANSPORTATION of equipment was one of the most serious handicaps faced by builders of the Pan American Highway. Above, road building equipment being unloaded from transport at Corinto, Nicaragua; below, native footbridge over Mermoso River near San Isidro, Costa Rica, vehicles being obliged to ford. Oxen are hauling timber for new bridge.

forcing the Corps of Engineers to resort to the widespread use of hand labor and local materials. As the result, Pan American Highway has become the Burma Road of the Western Hemisphere, with 21,000 persons being employed at the present. These are mostly Central American nationals, working with pick and shovel. Some stretches of the highway are being built entirely without the use of any machinery more complicated than wheelbarrows.

Shipping serious problem

When it became evident that space for shipping heavy construction equipment and materials would not be available on large vessels sailing from United States ports, resort was made to the use of rail facilities through Mexico. Excellent cooperation was received from both the Southern Pacific of Mexico and the Mexican National Railways, although shipments generally required a month or more to pass through Mexico. Much of the material, particularly that destined for Costa Rica, was shipped by rail to Manzanillo and Salina Cruz, on the west coast of Mexico. From these ports, supplies and equipment were forwarded on small ships of foreign registry which had been chartered for this purpose. Several of these ships were used, each capable of handling between 300 and 500 tons of cargo. Full advantage of these facilities could not be realized, however, due to the limited capacities of both ships' cranes and those at the ports. Direct shipment of limited amounts of materials and equipment were made from Salina Cruz and Manzanillo to Corinto and San Juan del Sur, Nicaragua, to Punta Arenas and Golfito, Costa Rica, and to Puerto Armuellos, Panama. Materials destined for minor ports on the Golfo de Nicoya required trans-shipment to launches or small barges at Punta Arenas. In order to reach points in the vicinity of San Isidro del General, it was necessary to trans-ship to flat-bottomed barges at Punta Arenas, Golfito, or Puerto Armuellas. These barges were then beached in the surf at Dominical.

In November, 1942, construction of the railroad bridge across the Suchiate River, between Suchiate, Mexico, and Ayutla, Guatemala, was completed. This structure permits trains from the standard-gage Mexican lines to move into Ayutla, where cargoes can be transferred directly to the cars of the narrow-gage International Railway of Central America. This railroad, owned by United Fruit Company, runs through Guatemala City to Puerto Barrios on the east coast, with another line branching off to the south across Guatemala and El Salvador. This line runs through San Salvador and San Miguel to the terminus at La Union and Cutuco, ports on the Golfo de Fonseca. The International Railway also rendered excellent service. Equipment and materials not too large for the narrow-gage cars were handled with dispatch. The routing through Ayutla was used not only for materials and equipment destined for Guatemala and El Salvador, but also for through shipments to La Union and Cutuco. After the pilot road was pushed through, some equipment was unloaded from the railroad at San Miguel and taken by truck or under its own power to Honduras and northern Nicaragua. The through shipments to La Union and Cutuco included some of those destined for Honduras and northern Nicaragua. These were forwarded by barge across the Golfo de Fonseca to San Lorenzo. Also, the greater part of the material for Corinto and even a considerable tonnage of that for Costa Rican and Panamanian ports was sent by rail to La Union and Cutuco. From the rail termini to their destinations, these shipments were handled by the 300- to 500-ton ships of foreign registry, and by sea-going barges.

A small amount of construction equipment and materials were obtained from or through Panama, but this was principally equipment which had been working in the canal zone, and materials which had been left over from projects there. A few hundred tons of materials also moved by water from New Orleans to Puerto Limon, on the east coast of Costa Rica. From there, it was moved to San Jose via the Northern Railroad.

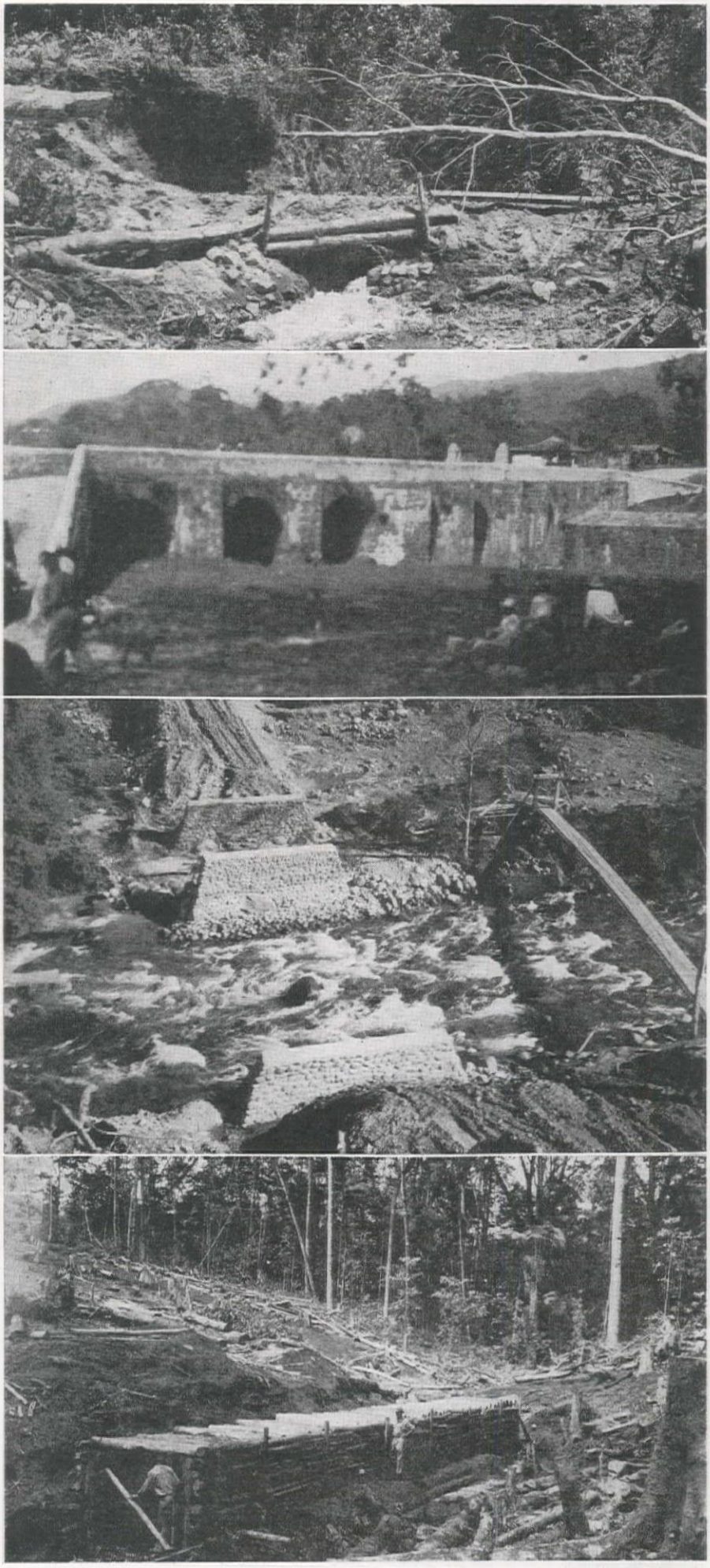
The port of Corinto is connected to Managua, the capitol, by the Pacific Railroad of Nicaragua. From San Juan del Sur to the route of the highway at Rivas, access is also afforded by a narrow-gage railroad. The Pacific Railroad of Costa Rica, electrified and government owned, connects Punta Arenas with San Jose, while the Southern Railway, owned by the United Fruit Company, runs from Golfito to Palmar. A branch line 8 mi. in length has been constructed from this railway, as a part of the access route to the line of the highway near the Costa Rica-Panama border. From the end of the branch line, 22 miles of road were built, providing access to one of the most remote parts of the highway. In Panama, both Concepcion and David are connected to Puerto Armuellas by rail. Overland access from the canal zone to David is afforded by the completed section of the Inter-American Highway. Access roads have also been completed from Dominical to San Isidro del General, 25 mi., in southern Costa Rica; from Chomes to Guacimal, 18 mi., from Bebedero to Las Canas, 9 mi., and from Soley to La Cruz, 5 mi., all in northern Costa Rica.

Much hand labor employed

For some phases of the construction operations, the reversion to hand-labor methods was not extremely disadvantageous. For instance, much of the clearing would have been done by hand even had plenty of shipping space for heavy equipment been available, as the route is largely through dense jungle where clearing requires the cutting and disposal of trees six feet and more in diameter. Where the vegetation was smaller, clearing with equipment would have been more expedient but no great disadvantages resulted from the substitution of hand-labor. Of course, grubbing operations were more difficult, when sufficient bulldozers were not available, but local labor was readily adapted to this work. Neither was it difficult to dispense with machinery in connection with structural work.

The shortage of equipment produced more severe effects upon grading and surfacing operations, and upon transportation in connection therewith. Therefore, most of the limited shipping facilities which could be obtained were utilized for grading and excavating equipment and for trucks. Nevertheless, it has been necessary to handle a considerable portion of the excavation and grading by hand, utilizing shovel, pick, and wheelbarrow. Although oxen to serve as draft animals were plentiful, they were rarely if ever used for grading, as neither scrapers nor wagons could be obtained. The two-wheeled oxcarts were frequently used for transportation of supplies, but not for hauling excavated materials. The shortage of compressors and air-tools often made it necessary to hand-drill for shooting. A number of rock crushers were obtained and used for production of surfacing materials, but in some cases it was necessary to utilize concrete aggregate and even road metals broken by hand. Some small sawmills were already in operation in Central America, and several portable mills were obtained, but hand-hewn timbers were used to a far greater extent than sawed timber. This was partly due to the difficulty of handling large timbers in the small mills, and partly because a yoke of oxen could often handle a timber hewn where it fell, but could not have snaked the unhewn log to the mill.

As mentioned in the April issue of *Western Construction News*, work being done on Pan American Highway under supervision of the Corps of Engineers includes sizeable contracts with two contracting firms from the United States



BRIDGE TYPES in use on the Pan American Highway. Top, a hollow log is used as a culvert near San Isidro, Costa Rica; second, an old Spanish bridge across Rio Esclaros, Guatemala, built in 16th century, and illustrates the permanence of the masonry; third, suspension foot bridge and substructure of highway structure across Rio Chiriqui Viejo, near El Volcan, Panama. Main span is 65 ft. long, stringers made of 42-in. native logs; below, culvert being constructed of native logs to go under fill near San Isidro, Costa Rica. Large timber spans were fabricated in U. S.

and with the governments of Guatemala, El Salvador, and Nicaragua, besides the hired-labor job in northern Costa Rica and a small contract with the Costa Rican government. In general, the substitution of hand-labor methods for modern construction procedure has been more satisfactory under the contracts with the Central American governments than where work was being carried on under direct supervision of North Americans. This undoubtedly was due to the way our construction men have come to depend on machinery.

As a result of all these factors, progress in Costa Rica has been delayed more than in the other countries. To reach Costa Rica with heavy construction equipment, a sea-voyage of considerable length is required, even from La Union, Cutuco, Salina Cruz, or Manzanillo, while it is possible although difficult to reach the other countries by overland routes. Consequently, shipments of equipment to Costa Rica were fewer and slower than to other countries. Also, the route through southern Costa Rica is the least adaptable to hand-labor methods for several reasons. It requires the heaviest grading. It must be constructed more rapidly than other sections, both because of having the shortest dry season and because of being the least accessible, thus allowing the fewest headings from which to carry on the work. Also, nearly all construction here is being done under direct supervision of North Americans, and not under contract with the local government.

Drainage structures

In connection with construction of nearly a thousand miles of highway, drainage structures become a very important item, particularly in Central America, where annual precipitation may reach several hundred inches. In order to conserve critical materials, log culverts were often used under low fills where timber was readily available. It was expected that this type of construction would last for only a few years, and its use was therefore confined, as far as possible, to stretches of road which will be relocated when the final Inter-American Highway is built. A limited amount of corrugated metal pipe became available, in spite of the steel shortage. It was used wherever possible, of course. About a hundred tons of reinforcing steel rerolled from salvaged railroad rails were obtained. These were used principally for dowels and other miscellaneous purposes, but a few reinforced concrete box culverts were built. Cement is produced locally only in Guatemala but the mill there is small, with an output which is greatly exceeded by the demand. This and the stortage of shipping facilities thus restricted the use of concrete structures. A few culverts, however, were built of plain or reinforced concrete pipe, and some bridge abutments were constructed of concrete, but much of the limited cement supply was more advantageously used in mortar for rubble masonry. This latter is a field where native labor excels. Due to local shortages of other types of materials during past centuries, these people have had much experience with this type of construction. By taking advantage of this experience and the low cost of native labor, the widespread use of rubble masonry in place of concrete effected a considerable saving in cement requirements. Culverts under high fills were frequently built as masonry arches. Under lower fills, a number of bridge-type culverts were used. These consisted of cut-stone masonry abutments and flooring, with short-span timber stringers set tightly against each other. Cut-stone masonry was frequently used for bridge piers and abutments, although many bridge substructures were built of concrete. Cyclopean concrete was used wherever possible, to save both cement and aggregate. As mentioned before, the production of aggregate sometimes required stones broken by hand.

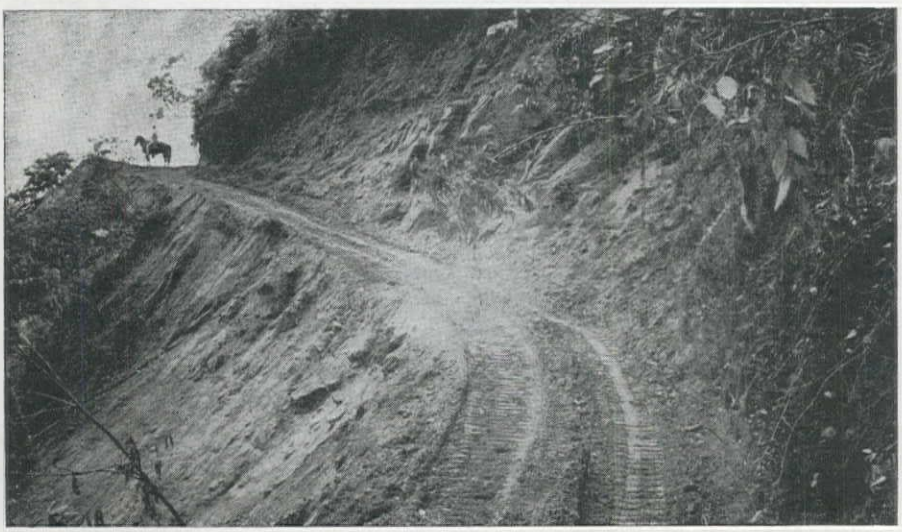
Stringer bridges were used for spans up to 35 ft. As previously mentioned, most of this material was hewn by hand. For stringer bridges, several of the native timbers have excellent characteristics, both structural and rot and insect-resisting. In a few cases, unhewn logs have been used as stringers for spans greater than 35 ft. The 65-ft. structure across Rio Chiriqui Viejo in western Panama, utilizes four log stringers, each with a minimum diameter of 42 in.

Timber trusses

Most streams requiring spans between 35 and 125 ft. were bridged with timber truss structures. For these, native timbers were considered generally unsatisfactory, although several were built in Guatemala and southern Costa Rica. When green, the native timbers contain a great deal of moisture, which causes excessive warping, shrinking, and checking during seasoning. As native timber already seasoned is difficult to obtain, and if obtainable, would be very difficult to work, it was decided to fabricate nearly all timber truss bridges from creosoted douglas fir. A total of 93 of these structures were fabricated in the United States and shipped to Central America for erection. These followed standardized designs and were fabricated on mass production bases by Summerbell Roof Structures and Arch Rib Roof Trusses of Los Angeles, Calif., and by Timber Structures, Inc., of Portland, Ore. Forty of these bridges are 50 ft. long, 18 are 70 ft., 6 are 75 ft., 23 are 90 ft., and 6 are 100 ft. in length.

A number of streams required spans longer than could be built economically of timber. It was possible to obtain new steel to bridge 17 of these, including the Brus, Brujo, Platanares, Convento, Union, Penas Blancas, Hermosa, General, General Number 2, and Barranca Rivers in Costa Rica, the Ochomogo, Grande, Calabasas, and Agua Catasta Rivers in Nicaragua, the Guacirope and Grande Rivers in Honduras, and the Goascoran River on the Honduras-El Salvador border. These bridges are being built under supervision of the Public Roads Administration as permanent structures on the Inter-American Highway. Several other streams, including a number in Guatemala, most important of which is the Naranjo River, and the Tempisque, Ahogados, Corobici, Abangares, Lagartos, and Aranjuez Rivers in Costa Rica, and the Mula and Chico Rivers in Panama, require long spans, but new steel was not available for them. Eight abandoned bridges, mostly old railroad structures, were located in this country by the Corps of Engineers. These were purchased, and under contracts, they were dismantled and repaired. They are now in or enroute to Central America for re-erection in the necessary locations in Costa Rica and Panama. Although they are to be re-erected by the Corps of Engineers, they will be permanent structures on the Inter-American Highway. In Guatemala, the government-owned, broad-gage electric railroad previously running from Retalhuleu to Quetzaltenango has been abandoned. A number of steel bridges have been salvaged and are now being erected on the Pan American Highway route by the Guatemalan government. Many of these are short plate-girder spans, but several, including the 400-ft. bridge across the Naranjo River, are trusses.

MOUNTAINOUS terrain covered by the portion of the road being built by the Public Roads Administration between Cartago and San Isidro del General in Costa Rica.



INDENTICAL VIEWS of the beach at Santa Monica Canyon, California, taken in 1875 and 1940, showing little change, since no man-made structures here influence sand travel.

Beach Protection—
Erosion, Pollution Mar Shores

Recreational areas can be ruined by oil and sewage pollution, and breakwaters and other man-made devices can destroy shore values by interrupting the natural course of sand movement along the littoral

By A. G. JOHNSON
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Beach Protection and Development
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THE REGIONS ALONG the line of contact between land and ocean, because of their scenery, their climatic conditions and the great variety of enjoyments to which they are adapted, constitute one of the great scenic and recreational resources of the State of California, drawing people in constantly increasing numbers, not only from the more populous areas adjacent to the coast, but also from the prosperous but less agreeable large interior areas.

The beaches and shoreline also constitute a great economic asset to the communities along the coastal areas. Sixty-four per cent of the population of California is concentrated in the fifteen coastal counties. Therefore it is evident that the proper development of the shoreline will favorably affect the economy of the whole state. Conversely, neglect or haphazard development will have an unfavorable effect.

The New Jersey coast is a good illustration of the potential economic value which can be developed by the full utilization of recreational and scenic resources. A report of the New Jersey Board of Commerce and Navigation in 1930, on the erosion and protection of the beaches of New Jersey, stated that the assessed valuation of the coastal resort communities of that state had increased from $57,000,000 to $600,000,000 in the 30-year period between 1899 and 1929. The coast of New Jersey is 125 mi. in length, only a few miles more than the combined length of the shoreline of Los Angeles and Orange counties. The report further states that the advance in wealth and population of the communities fronting on the ocean has been far greater than the advance in wealth and population of the state as a whole.

These changes have come about because, paralleling the growth in wealth and population of the country as a whole, there has been a greatly increased demand for leisure and recreation. It is therefore natural that with the increased facilities for travel provided by constant improvements in the automobile and more and better highways, people have responded at a greatly accelerated rate to the appeal of the ocean shoreline and beaches.

These facts are cited to emphasize that the full utilization of the coastal recreational resources is not only desirable but essential. In the past there has been, and without proper planning there will continue to be, great waste through careless subdivision and occupation of the shoreline areas.

The most difficult problem in shoreline planning is that of beach erosion, largely caused by haphazard and ill-advised developments by local coastal communities. Control of pollution by oil and sewage are also very troublesome. The need for a much greater extent of publicly-owned ocean frontage has been recognized for years, and is largely a matter of financing. Development and improvement of public ocean frontage is also largely a matter of financing, plus proper planning. Each of these problems merits a complete discussion, but the limitations of space prevent anything except a brief outline of most of them herein.

Acquisition of beaches

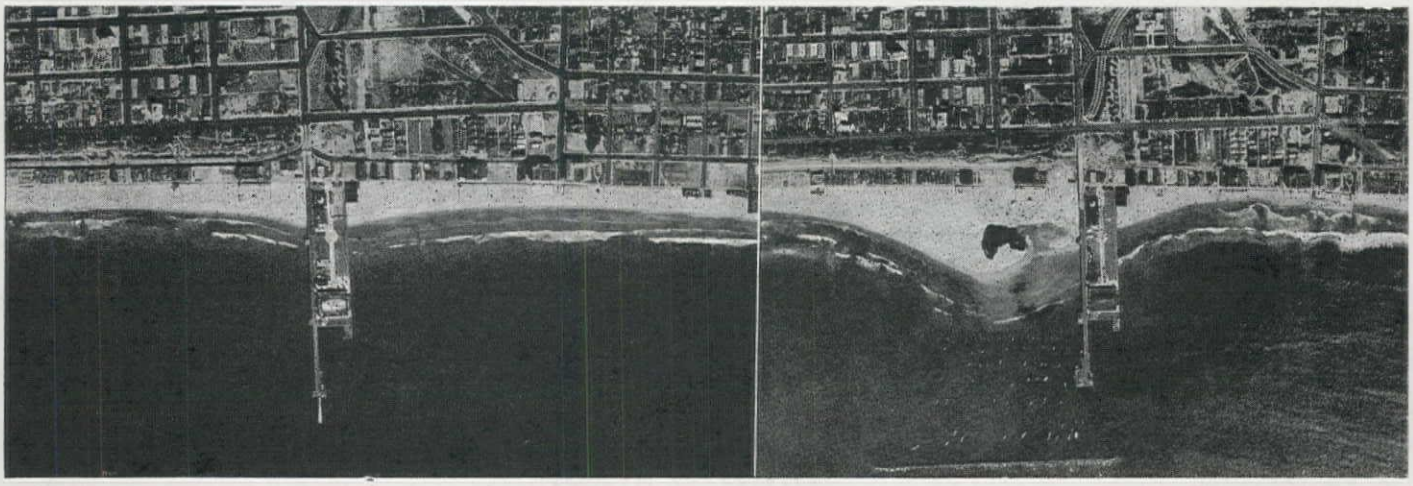
The ocean shoreline of California is approximately 1,000 mi. in length. This does not include the land-locked bays at San Francisco and San Diego, and Humboldt Bay. The records show that of this 1,000 mi. of ocean frontage 180 mi. or 18 per cent, is publicly-owned. Of the 180 mi. of publicly-owned frontage, some 40 mi. are owned by the Federal government, most of it recently acquired for military purposes. This leaves 140 mi., or 14 per cent, available for public recreational use. The state owns 60 mi., about half of which is located north of San Francisco. Counties and municipalities own or control a total of 80 mi. The portion owned by the state has been acquired, for the most part, on the basis of the state paying one-half of the cost, with the remaining cost being contributed by local agencies, either in money or in beach frontage of equal value. Thus the state itself, during the 93 years since California was admitted into the Union, has paid for the acquisition of 3 per cent of the total ocean frontage acquired for public recreational use. Cities and counties have acquired by purchase or dedication another 8 per cent, and have paid for the purchase of another 3 per cent, title to which is vested in the state.

Of the 15 coastal counties, 12 have adopted a Master Plan of Shoreline Development. These plans indicate the additional portions of ocean frontage that should be acquired and the order of such acquisition, the use to which each portion of the shoreline is to be put, and in some cases tentative plans of development and improvement.

Beach improvement and development

Very little has been done to improve the existing public beaches in California. This is true of both state-owned beaches and those owned by counties and municipalities. In most cases lifeguard service and maintenance only are provided. On many public beaches no sanitary facilities are available. Automobile parking space is universally inadequate and in many cases non-existent, except for incidental roadside parking in the vicinity. Thus in some cases a public beach is occupied to less than its full capacity because its accessibility is limited by the lack of parking space within a reasonable distance.

Much study and planning needs to be done to provide for needed recreational facilities, access roads and adequate space for automobile parking. Experi-



AIR VIEWS of the beach at Santa Monica, in 1933 and 1940, before and after building of breakwater. A large sand thumb is built up where breakers are stopped from moving material, but beach is badly eroded to the east, as breakers again begin action.

ence has shown that such developments on the Atlantic coast are great assets and that the cost of operation and maintenance can be met through small fees. The cost of maintaining such developments is thus borne by the people who use them, instead of being allocated from general tax funds.

Oil pollution

Oil pollution is a problem not encountered to any extent on the beaches of the Atlantic Coast, but which has proved very troublesome on the beaches of Southern California.

Possible sources of the oil and tar found on the beaches are the oil fields along the shoreline and in some cases on the adjoining tidelands, the points on the open coast where oil is transferred to and from tankers, and natural oil seepages which are known to exist offshore at several points along the coast. Another possible source is the pumping of the bilges of tankers and other ships passing along the coast. This practice is prohibited by state and Federal laws, but enforcement is very difficult.

The first two sources can be largely eliminated by strict supervision and regulation, which will prevent loose oil escaping to the water, whence it is spread about by waves and currents and finally cast up on the shore. There does not seem to be any way of controlling the oil seepages. Their existence has been known for a long time. There are two in Santa Monica bay, one 2 mi. off Redondo Beach and the other 4½ mi. off Manhattan Beach. Another is located a short distance off San Miguel Island in the Santa Barbara Channel. There may be others. Some evidence has been accumulated which indicates that a large part of the oil and tar found on the beaches originates from the natural ocean seepages.

The matter of permitting oil drilling on tidelands and along the shoreline has been the subject of much discussion and controversy. The Shoreline Planning Association of California, Inc., has recommended the establishment of a setback line approximately one-half mile from the mean high tide line, seaward of which no oil drilling would be permitted except under very stringent regulations. The thought behind the recommendation was that any oil pools along the shoreline could be recovered by whipstock drilling without endangering the recreational value of the shore area.

Sewage pollution

Discharge of sewage into the ocean by coastal communities has caused serious pollution of waters along the shoreline in some places.

The most extensive condition of this nature in California is probably at Los Angeles. The main outfall sewer discharges screened sewage into the ocean a mile offshore at Hyperion on Santa Monica Bay. This outfall sewer serves most of the city of Los Angeles and a number of adjoining cities, the total population served being 1,800,000. Pollution here has progressed to the point where the State Board of Health has quarantined a 10-mi. stretch of beach extending from the Hermosa Beach pier nearly to Santa Monica.

This beach quarantine has been given much publicity in the daily papers, and many people have assumed that Los Angeles is the only offender. This is far from being the case. All the communities along the California shoreline discharge sewage into the ocean or the bays. Some communities treat the sewage to a considerable extent, others very little. The small communities which discharge their sewage a considerable distance offshore after some treatment cause little or no pollution because of the small amount of the discharge. However, bad pollution is known to exist at Eureka and Arcata, on Humboldt Bay, and around Oakland and Alameda. San Francisco has treatment plants for only a portion of its sewage. Pollution also exists at Long Beach and San Diego.

The remedy for sewage pollution of the beaches is, of course, the construction of treatment plants. Proper treatment of the raw sewage will render the effluent harmless after it is diffused in the ocean waters. Such plants are costly, and financing the cost is the main difficulty.

A bill was introduced at the 1943 session of the State Legislature requiring that municipalities, counties, or districts discharging raw sewage into the ocean begin construction of treatment plants within 2 years after the end of the war and complete construction within 5 years. The bill passed the Assembly but failed to pass in the Senate.

Beach erosion

The subject of beach erosion is highly specialized. Perhaps it can be accurately said that this field of engineering has not reached the stage of development that marks other branches. It can also be said just as accurately, that the field is much more difficult. The natural conditions encountered are not static, as in the case of bridges and roads and most other land construction. The total amount of coast protection work that has been performed in recent times is negligible in comparison with any other field of engineering construction.

Another difficulty is the small appropriations made available for this field of work. The general public and officials have learned that the building of adequate highways and bridges takes vast sums of money, but it seems difficult to convince them that adequate funds are just as essential for the far more difficult problem of controlling coastal erosion. As a result, there are usually insufficient funds and time available for adequate engineering study and for construction purposes. The inevitable failures, under such conditions, engender the pessimistic viewpoint that it is impossible to cope with the natural forces involved.

Natural processes

In the following discussion on beach erosion, it should be understood that it is confined exclusively to the beaches of California. These beaches are nearly all headland beaches, that is, an accumulation of sand at the base of a shoreline bluff of varying height. On the East coast the beaches are mostly barrier beaches, a sand bar separated from the mainland by a lagoon.

The sand deposits along the shoreline are products of erosion of upland areas, in transit between the land and the ocean. Rain, wind and frost are the forces which gradually disintegrate the rock and soil of the land surface and wash the detritus into the valleys and canyons whence it is carried by floods to the

ocean shore in the form of silt, sand and gravel. Here the ocean waves and currents work on it, moving it offshore, onshore, and along the shore, with a grinding action which reduces the size of the particles. The finer particles gradually move into deep water and are permanently lost. Additional detritus is brought to the shoreline by each major and minor flood. The sand collects in indentations along the shoreline and on the upcoast side of projections from the shoreline.

Near the mouths of rivers draining large areas, beaches extend for miles along the coast, even where there are no large projections or indentations. The waves beat against headlands and other exposed portions of the shore. At times of exceptional storms all the sand may be cut away from a beach and the waves attack the foot of the slope behind the beach. This is the endless process of erosion of the land mass. In the course of long periods of geologic time, the land surface is changed materially and the ocean gradually encroaches on the land.

Seasonal and cyclical changes

During the heavier seas of the winter season large quantities of sand are cut away from the beach and moved a short distance offshore. The calmer seas of summer gradually move most of this sand back to the beach. Some of the finer portions of the sand are carried into water of such depth that they are permanently lost. This loss must be replaced by new material from the upland areas, else there is a diminished beach width.

There is another change in beach width, caused by natural conditions, which may be termed a cyclical change. Since the new supplies of sand and other detritus are brought to the coast by floods, it follows that the amount brought down will vary with the magnitude and frequency of the floods. The runoff from a single large drainage area in a major flood will deposit millions of cubic yards of detritus along the shoreline. This is beyond the capacity of the waves and currents to remove in a short interval of time, so wider beaches are the result. That cycles of light and heavy rainfall occur in California is well known. The beaches react very quickly to these changing cycles. During a cycle of below normal rainfall, if insufficient detritus is deposited to tax the transporting capacity of the waves and currents, erosion will occur, resulting in narrower beaches. Knowledge of these seasonal and cyclical changes in beach width is very important in the planning of shoreline developments.

Effect of shoreline structures

The rate of erosion along the California shoreline due to natural conditions alone, is for the most part very slow, because of the rocky and rugged character of most of the coast. During the span of a human lifetime very little recession would be noted in the average position of the shoreline, other than the periodic changes already mentioned.

Structures erected along the shore can, and have, changed this condition in many places, often with disastrous results. These structures are breakwaters, jetties and groins, which interfere with the natural regimen of the movement of sand along the shore.

Breakwaters are massive walls, usually of rock, constructed to create a harbor. The breakwater is placed offshore at varying distances, dependent on the size of harbor desired. Sometimes the breakwater is a detached structure, with no connection to the shore, or it may be connected to the shore at one or both ends, leaving an opening for the passage of ships. The breakwater at Santa Monica is an example of the detached type, and that at Santa Barbara an example of the type connected to the shore at one end.

The top of a breakwater for harbor purposes must be well above the level of highest tide. Therefore a detached breakwater acts as a barrier to the waves, creating quiet water on the landward side. Since the waves furnish the principal motive power for moving sand along shore, it follows that when the moving sand enters the quiet water behind the breakwater, it will come to rest and gradually accumulate.

On the beaches immediately down coast from the harbor, the waves and currents will continue to move sand along the shore and since the normal source of replenishment has been cut off by the breakwater, progressive erosion of the down coast beaches will occur.

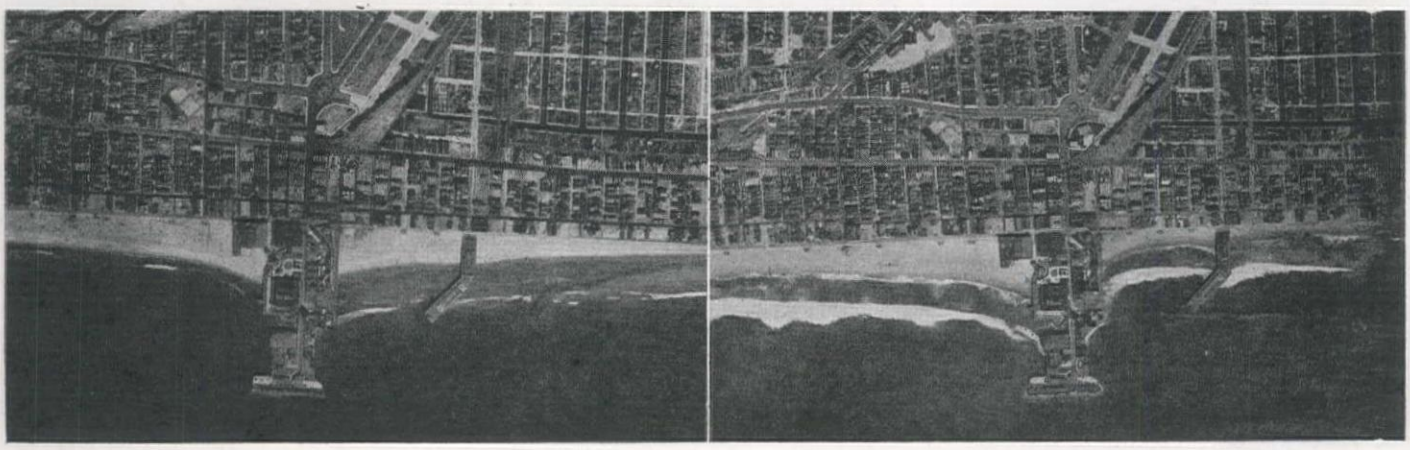
Examples of breakwaters

The breakwater at the Santa Monica Yacht Harbor is an excellent illustration of the action just described. Since it was completed in 1934, over 900,000 cu. yd. of sand had accumulated behind the breakwater up to November 1941, and an additional 350,000 cu. yd. along the beach for a distance of 7,000 ft. upcoast from the breakwater. These figures show that a daily average of about 500 cu. yds. of sand have been moving along shore during the seven-year period, and have been trapped by the breakwater. Down coast or southeast, progressive erosion of the beaches, mostly public, has occurred for a distance of 3 mi. and has become so serious that some damage to structures has occurred and many buildings are seriously menaced. The accompanying aerial photographs, taken in 1940, clearly show the action that has taken place, and conditions are continually growing worse.

This breakwater was constructed by the City of Santa Monica to provide an anchorage for pleasure yachts, being financed by a bond issue of $590,000. Loss of public and private beach and property damage amounts probably to several hundred thousand dollars, besides depreciation in property values along the eroded beaches. A fund of $325,000 has been set up by the state, the county, and the cities of Santa Monica and Los Angeles for dredging the harbor and using the sand to repair the beaches, plus construction of some groins. The yacht harbor thus becomes quite an expensive development.

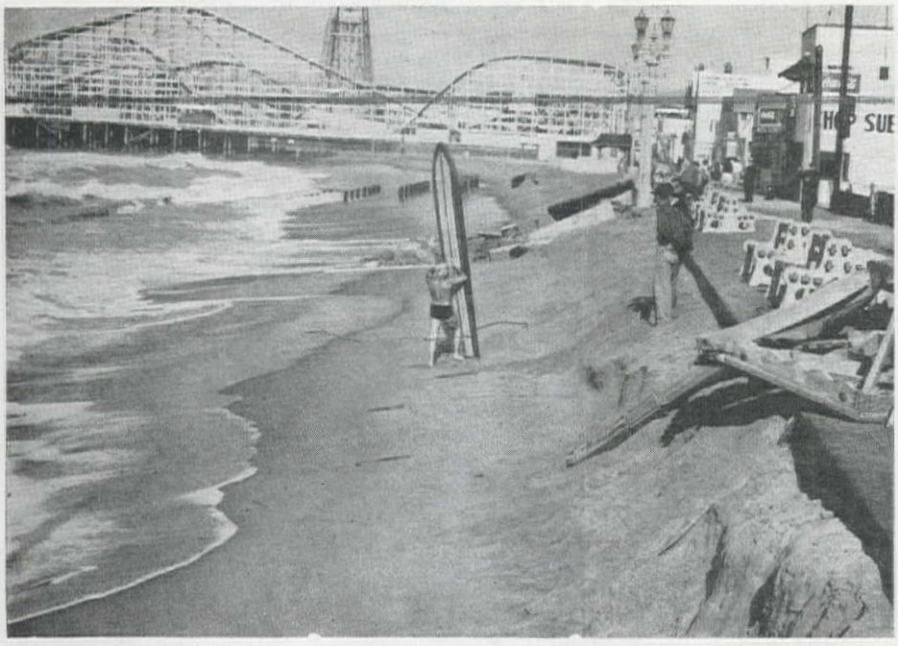
In 1929 the City of Santa Barbara constructed a breakwater to provide an anchorage for pleasure yachts. At first this was the detached type of breakwater, but sand began to accumulate behind it at such a rapid rate that to prevent further filling, a connection was made to the shore from the upcoast end of the breakwater. Since that time a huge accumulation of sand, totaling over 2,000,000 cu. yd. has been deposited on the west, or upcoast side of the shore connection. The sand filled in on the seaward side of the breakwater, finally working its way around the easterly end and shoaling the harbor. The latter by now would have been rendered useless as an anchorage had not the United States Engineer Corps dredged it three times during recent years.

The customary action took place along



THE BEACH at Venice, Calif., in 1933 and 1940. This beach is influenced by cessation of sand flow due to construction of Santa Monica breakwater, 5 mi. to the west.

—All air photos by Fairchield Aerial Surveys, Inc.



SERIOUS UNDERCUTTING of beach at Venice, Calif., following building of breakwater at Santa Monica, interrupting normal flow of sand in eastward-flowing current.

the downcoast beaches. By 1940 the shoreline for several miles to the east had been almost completely denuded of sand because of progressive erosion, and considerable damage to buildings and other improvements had occurred.

The construction of a breakwater at Redondo Beach in 1939 met with similar and equally disastrous results. In 2 years most of the adjoining public beach was lost through erosion and about a dozen buildings destroyed.

Jetties and groins

Jetties and groins are structures which extend from shoreward of extreme high tide to some point offshore. They are usually perpendicular, or nearly so, to the shoreline, experience having shown that this location gives the best results.

Jetties are used at harbor entrances to aid in maintaining a navigable channel and at the mouths of rivers and flood control channels to keep the outlet open. They are usually massive structures and extend a considerable distance into the water. They are essential structures for the purposes mentioned, but have a pronounced effect on adjoining beaches.

Groins are shorter and lower structures of much lighter construction and are used to protect existing beaches or to build up new ones.

The effect of both types of structures on the beaches is the same, except as to the extent of change they may cause. They act as a barrier to the alongshore movement of sand caused by the waves and currents. The result is an accumulation of sand on one side of the structure, the side opposite to the predominant direction of drift. The extent of the sand accumulation depends upon the height and length of the structure. A long high jetty can impound all the moving sand for a long time, until it builds out to the end of the structure and passes around it to the shore below. If a jetty extends into water of such depth that the waves and currents cannot move the sand to the leeward shore, it will be lost permanently in deep water. A short, low type of groin will impound only a portion of the moving sand, the remainder moving on to the leeward shoreline.

If a jetty or groin impounds all the moving sand for a considerable period of time, erosion of the downcoast beaches will occur, just as in the case of a breakwater. The waves and currents will move sand away from the existing downcoast beaches until such time as the normal replenishment is resumed by the sand passing over or around the structure.

Groins should be so designed that they will impound only enough sand to maintain the existing beach. If they are made too high and long, they always cause some erosion.

One example of such a structure, which was apparently built for the purpose of protecting an existing beach, is at the city of Seal Beach in Orange County. A long, high, massive rock structure was built on the northwest side of a natural inlet at Anaheim Landing. The inlet is not used for navigation purposes, nor is it a flood channel outlet. A wide beach was built out on the upcoast side, and extensive erosion took place on the beaches to the southeast.

Flood and soil erosion control

The source of material for maintaining the beaches is the detritus which originates in upland areas, often quite remote from the ocean shore. Therefore any factor which prevents the movement of the detritus to the ocean will affect the beaches adversely. More and more flood control dams and debris basins are being constructed and proposed, and measures are being taken for the prevention of soil erosion. Ultimately these activities will seriously affect the beaches, unless some method is devised for counteracting their effect. Not much information is now available on this phase of the problem of beach erosion control, but immediate measures should be taken to assemble and study pertinent data.

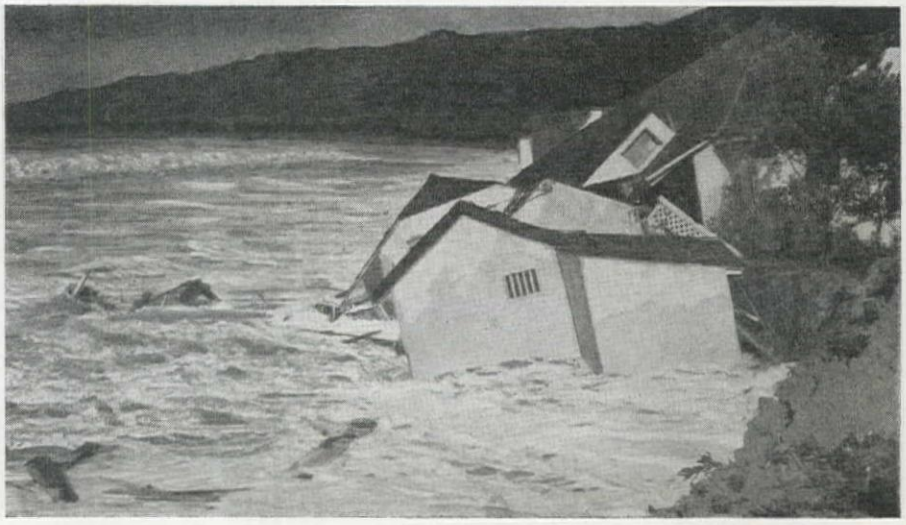
Past experience

The disastrous results of the breakwater construction described herein were no doubt not foreseen by the sponsors of the projects. Nevertheless these results could have been foreseen, and in the case of Santa Monica and Redondo Beach, were predicted by the writer.

Construction of breakwaters on sandy coasts has been a problem for a great many years. Many of them have been constructed and the results observed and recorded. A notable example was at Ceara on the northeast coast of Brazil. In 1875 a breakwater was designed to provide an anchorage for ships. It was connected to the shore by an open viaduct. By 1890 the harbor had nearly filled with sand and was abandoned. Extensive erosion of the leeward beaches occurred. About 1877 breakwaters were built to form a harbor at Madras, India, in this case connected to the shore at both ends, with an entrance for shipping. The familiar results took place, accretion on

(Continued on page 279)

BEACH COTTAGES undermined at Sandyland, Calif., as a result of beach erosion attributable to building of breakwater at Santa Barbara 9 mi. west, and stopping of sand flow.



Planning Is Engineering Field

Technical training of engineers should be used in preparation of post-war plans, to arrive at most constructive and valuable solution of the many problems involved—Planning should begin now, that projects may be ready when peace comes

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IT IS MOST ENCOURAGING to observe that planning for the coming post-war period is now rapidly growing, as indicated by the thought and action of great numbers of engineers, legislators, business and industrial leaders, and important civic and governmental organizations throughout the country. This is as it should be, in order that a conscious, sound, over-all economic policy may be in effect when peace returns to the world, for we must then be in a position to set in motion promptly the forces which will prevent such a catastrophic depression as followed the rapid business expansion and inflation after World War I. Now, in the midst of the greatest war of all time, these many divergent groups are engaged in an effort to gain an understanding of the coming post-war period and to plan in various and sundry ways to meet the tremendous problems of that period in a sane and wise manner.

Every person, in accordance with his background and immediate problems, gives to the word "planning" a different meaning. To some, planning means assumption by a Central Government of the major responsibility for production, employment, prices, and income, with probable continuance of the main controls which had been set up during the war; to others, it means a basic reconstruction of society such that the Government, besides assuming responsibility for control of economic activity, will also actually own and operate the system. Others think planning means that the Government, through public works, urban, and total river system developments will add to the historic and successful economic system of our country a new sort of state-enterprise system. On the other hand, some consider planning as a mere taking of inventory of our problems in order to determine our needs. Another large group, composed largely of business and industrial leaders trained in the free enterprise school, sees planning as an appraisal of the maladjustments which hampered business before the war, with the idea of using this appraisal of maladjustments to correct the conditions which then existed and which may again stand in the way of a continuing high level of production in the post-war period.

Balance needed

It is not intended in this paper to discuss the comparative merits and faults of the five views of planning just mentioned, but it may be remarked that extreme care must be taken in appraising the programs now being, or about to be considered by those who constitute the groups named above. A proper balance must be maintained between those projects which can be best undertaken by the Federal Government or by the State Governments and those which have always been most satisfactorily installed and operated by private enterprise. It should be recognized that National or State Governments can most satisfactorily handle certain construction projects of an interstate or interregional character and are perhaps in the best position to successfully solve the many difficult labor and social problems related to such projects. On the other hand, the remarkable achievements of business and industry, operating under the free enterprise system and creating conditions which have made it possible for this country to serve as the "arsenal of the United Nations," must be given full weight.

Government regulation of private business became necessary years ago and seems generally to have been acceptable. Social reforms were necessary to some degree and have been applied rapidly during recent years by Governments. In addition to these, many and strict controls were demanded by our entrance into the war. The extent to which such regulation, reform, and war controls should be continued in the post-war period, however, is a matter of grave concern to every person in the country. Business and industry, although they have developed the country's natural resources, have vastly improved the technological processes, have created employment, and have been responsible for the highest standards of living known anywhere, yet too often have adopted monopolistic and other unfair practices and have often neglected the field of social relations. Regulation and control by public agencies has been the natural result of these abuses.

The whole subject of post-war planning and of economic readjustment must be given the most thorough consideration, and the regrettable conflict of interests of many government agencies and civilian groups now planning, or about to plan for the future, looms large among items for coordinated, serious thinking of the American type. Public works construction will doubtless be the key activity for early reemployment of those first released from the military services and the war industries, but, to meet satisfactorily the expected unprecedented emergency immediately following the war no planning will be adequate unless private business and industrial activities are permitted and encouraged to supplement the public works programs. Even a resumption of the normal pre-war program dictates such a policy, but the coming greatly intensified domestic and global requirements and competition demand a sanely-balanced team of public and private interests to meet the situation.

Engineers best equipped

Engineers, on account of their technical training and because of their experience in many other phases of our economic system, are not only probably better equipped than the average intelligent citizen to contribute constructive thought and action in the present stage of planning, but they are most definitely necessary to the active prosecution of examinations, surveys, reports, designs, and estimates, and finally, the preparation of detailed drawings and specifications, and the supervision of construction of both public and private projects. In the past a considerable number of leading engineers in private, public, and corporation practice have contributed in great measure to the deliberations of business and governmental executives, as well as those of lawyers, administrators, and high-type politicians, helping to guide them into practical ways of thinking on general plans and detailed problems. Too often, however, the engineer has allowed himself to be regarded purely as a technician, and hence has stood aside and left the larger problems of policy to the legal and political gentlemen who too often have only muddled the situations. It must be admitted that too few engineers have developed the political, legal, and administrative sense to meet all these problems successfully, as they normally should be able to do.

The time has arrived, without question, when more and more engineers must devote some of their energy and much of their thinking to solution of the innumerable problems of both a broad and a detailed type which have formerly prevented many from making the most of the future. In view of the multiplicity of such problems which call for engineering talents, there should now be a wider recognition of the greater contribution which many of our profession can offer and a stronger cooperative effort should be put forth by engineers, legislators, administrators, and planners of every type who need each other's advice. The engineer must definitely take his part, and it should be

a major one, in developing the answers and thinking out the solutions for the post-war period.

Advance planning has always been a necessary function of successful business and industry, particularly for those units which are of national and international scope, since success demands that they be constantly prepared to meet strong competition from the steadily improving products of others. Due largely to this sound practice of continual research and comprehensive study aimed at higher quality, greater quantity, and lower prices, American business and industry have established themselves in such a strong position as to be able now to make our country the "Arsenal of Democracy."

Credit often withheld

Who can deny that American engineers have always taken leading positions in the inspiring contest to improve tools and machines; design and operate healthier, safer and more efficient manufacturing plants and business buildings; devise, construct and operate improved works for power generation and distribution; develop the world's best land and water transportation facilities, irrigation systems, communication utilities, and many other modern devices and improved processes contributing always to higher standards of living for all men? All too little credit has been given by the laymen to engineers for their creation of most of what are now called the necessities and luxuries of the American manner of living.

James J. Hill, the great railroad and empire builder, once remarked that the only way to succeed in the field of construction and general development is to "first plan the work, then work the plan." This excellent advice has been followed by business and industry, and by some of our governing bodies, but it should be even more intensely applied **now**, when planning for the post-war period is so absolutely vital. It is true that there are many who feel that the big problems of winning the war are so acute that planning for the future should be postponed until peace returns, but fortunately they are far outnumbered by those who recall the catastrophic depression of the '30s and are insistent that planning should begin now in order to prevent a recurrence of such conditions. To defer such planning till the end of the war will be too late. Worthwhile plans cannot be produced overnight.

One of the high officials of a great national industrial corporation recently stated that present opportunities are unlimited and that they surpass any which preceded this war, but that such opportunities will be useless unless we can estimate what they will be and provide for them. Appraising these opportunities should be an inspiration to any man and particularly so to the engineer, accustomed as he is to thorough study and exhaustive research, with the objectives of technological improvements and resultant higher standards of living. Leading engineers have always attempted to guide legislators and executives into practical ways of thinking on general problems, but more and better assistance is required from members of our profession now than ever before in a strong, cooperative effort to reach sound conclusions and prepare definite working plans to meet the emergencies which will surely arise. Following the adoption of wise policies, the passage of enabling legislation, and the provision of funds for planning, the engineer has his special work in the preparation of the final working plans and specifications and, with construction funds available, the supervision of active construction of works.

It is reassuring to consider that in recent years six-year advance planning programs for public works have been set up by the Federal and State Governments, and also by certain regional or local public agencies. The listing, analyzing, and approving of hundreds or thousands of worthwhile construction projects has been accomplished and many scores of the most urgent have been completely planned or built. The demands of war have forced many works to the forefront but unfortunately these war demands have also necessitated deferment of too many that are greatly needed. Funds were once provided in a Federal Public Works Reserve for active prosecution of planning aid to States and other public bodies, so that active construction might commence as soon as men return to normal, peace-time pursuits. Temporarily at least, Congress is withholding these funds.

Plans now being developed

About twenty-two states and some principal cities are continuing their planning programs, and approved projects probably bulk large as far as they go. Doubtless most State Highway Commissions have a backlog of new work to be done, particularly those which include metropolitan areas and many defense projects within their state boundaries. California, Washington, Ohio, New York, Pennsylvania, and North Carolina, among the States, and Los Angeles, Denver, Cincinnati, Detroit, and New York, among the cities, are preparing rapidly for the post-war period. The Public Roads Administration is assisting financially in the preparation of detailed plans and specifications for already approved projects through a $10,000,000 special fund authorized in the Defense Highway Act of 1941. The Commissioner of that Administration has recently stated that a program estimated to cost $500,000,000 is under way and would approximate two years of normal federal-aid highway construction.

Other encouraging instances of bold planning and definite action looking toward the economic security of the nation have recently appeared. The great need for broad, cooperative effort seems about to be met by the Committee for Economic Development, recently organized for this purpose and established in the Commerce Department Building in Washington, D. C. On April 14, 1943, leaders of industry met in a first public conference, consisting of executives of leading financial, industrial, and business corporations from all parts of the country. The organization of all business and industry throughout the twelve Reserve Districts will be undertaken by sixty-three district chairmen appointed at the meeting to represent 63,000,000 industrial workers of the country. The expression of approval of this program of free enterprisers which was voiced by Secretary of Commerce Jesse H. Jones, and who stressed its importance to the

ENGINEERS are best qualified group of U. S. citizens to "first plan the work, then work the plan." Many cities and other government agencies have already begun active post-war planning programs, using qualified experts such as the men shown here.

future of business and the economic security of the nation, offers great hope for concerted thinking, planning and action by government, industry and business. As stated recently by one of the country's leading economists in an outline for discussion by a group considering national planning, "the highest and most statesmanlike form of government planning was and is planning to turn people loose under freedom of opportunity. The people do the rest." If **reasonable** governmental regulation of that freedom is included, it would seem to be a statement to which all loyal and broad-minded citizens may subscribe and then assist in a program for its accomplishment.

A realistic approach to planning compels attention to "first things first." Some of those first things are a determination to enact or revise state laws so as to remove the existing serious obstacles to the creation of sufficient funds for extensive design work and to provide for the quicker acquisition of necessary rights-of-way for both public and private developments. Here is the opportunity and the need for engineers and constructors, who by the nature of their work see the problem most clearly, to work for the necessary legal reforms at each and every opportunity, since repeal or revision of hindering laws and enactment of enabling ones are often prerequisite to the providing of funds for land acquisition and construction. Money to pay for detailed plans and specifications is needed now; that required for construction of the works will follow in short order at the proper time, if the plans are well conceived. All engineers, whether in the public or corporation field or in private practice, are vitally concerned with these preliminary, necessary undertakings and should avail themselves of every opportunity to press for prompt, sane action looking toward clearing the atmosphere and getting down to work.

Engineering employment

A committee of past presidents of the American Society of Civil Engineers, reporting recently to the Board of Direction on prospective unemployment of civil engineers, stated that at about this time a large part of the membership hitherto on war construction projects will be either unemployed or absorbed into other lines of work. It recommended that the Society foster an active program to explore prospective fields of employment, mentioning particularly the armed forces, construction regiments, war industries, or post-war planning. In addition to this, some of the local sections of the American Society of Civil Engineers have already set up committees to examine into the matter of absorption of many engineers into the design of post-war construction projects and well-considered recommendations have already been prepared by them.

Subsequent to the report of the past presidents' committee above referred to, the president of the Society, at a meeting of members in Alabama, is reported to have stated that in his opinion civil engineers would find their best promise of occupation during the war to be in post-war planning, adding that, as the majority of about 20,000 registered civil engineers in the country are too old for service in the armed forces, and because industry wants more production, not more construction, the most advisable work for engineers at present is post-war planning. "It is the job of the civil engineer now," he said, "to convince the nation, the states, and the municipalities, that following the war there will be a great need for immediate construction of schools, highways, streets, sewerage systems and other similar projects."

Hundreds and perhaps thousands of engineers of all classifications should become available from now on, if the above prognostications of leading engineers are correct. Those men can and should at once begin to make concerted and also individual efforts toward securing enabling legislation with provision of funds for designing work and acquiring the lands, and should then follow through with a continuing program of "convincing the nation, etc." that even greater funds must be voted later by the people to complete the picture and provide employment for the millions who will be crying out for it after the war. The "convincing" will undoubtedly have to be carried to every home and office in the land, and this would seem to be the grand opening for every engineer to become a salesman in the interest of his nation, his neighbor and himself. Many have been the complaints by members of our profession that "we are not recognized, not given credit for the great part we have had in developing our unprecedented national high standard of living." Now, if ever, the engineer should grasp the opportunities spread before him for making his place in the broad and the detailed planning for the post-war period. We must not fail in this duty to our nation and to mankind.

Canadian Road System Expanding as New Links Are Connected to Alaska Highway

DWARFED BY the publicity given to the Alaska Highway is the new road system in the Canadian northwest which is actually a branch of the Alaska system stemming from the major Alaska Highway project.

Parallel airlines that began exploitation of a vast hinterland, limitlessly rich in mineral resources, have been and are being supplemented by construction of a complete road grid to bring overland transport into the picture in a bigger way.

What had been looked for as a post-war development already is taking place and the wealth of the Mackenzie River country is now being tapped by the Alaska Highway, and tributary roads.

The two airlines are roughly 400 mi. apart and to link them for land transport has required or will require construction of at least three lengthy minimum standard roadways. Present or immediately proposed construction is not of permanent or year-round character, excepting that being done by contractors on the Alaska Highway proper, but it is on a very large scale nonetheless. Early improvement of the subgrade, structures and surface on the new routes, and ultimate progressive development will provide a very large amount of work.

Mainstay of the parallel and linking grid system east of the Alaska Highway proper, is a route which originates at a place called Notikewin, northwest of the newly-thriving town of Peace River, on the river of that name, which proceeds northerly to Providence, North West Territories, on the headwaters of the Mackenzie at Great Slave Lake, and thence still northerly to Fort Norman, which lies 100 miles west of Great Bear Lake.

When it is realized that Providence is north of the 60th degree of latitude, and Norman but little south of the 65th and the Arctic Circle, something of the character and extent of current construction operations can be visualized.

The Notikewin-Providence-Norman route does not merely link the Peace River district of Alberta with the oil country of the Mackenzie, in the North West Territories, but by means of tributary roads it reaches westward to join the great new Alaska Highway proper on which work is proceeding concurrently.

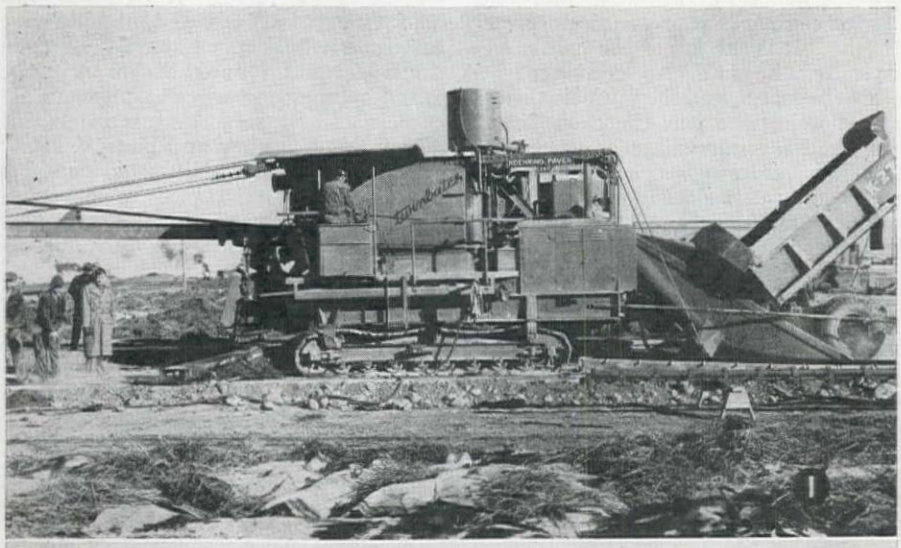
From Peace River westerly to Fort St. John, B. C., where the Alaska Highway proper has its origin, there is under construction and reconstruction well over 200 miles of road to provide a link with existing roads out of Edmonton, 350 air mi. to the south.

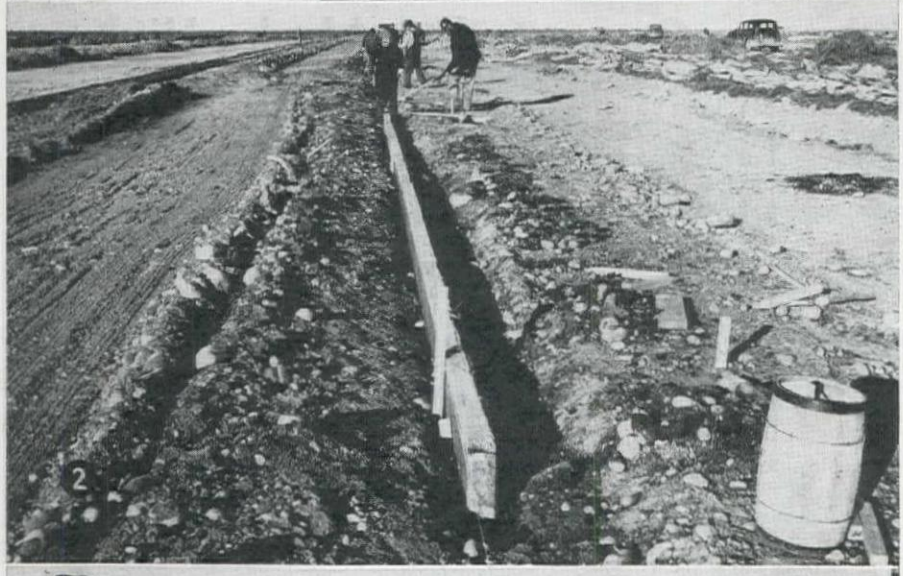
Division headquarters of the U. S. Army engineers at Edmonton recently announced that they had already completed construction on a new 200-mi. winter road from Fort Nelson northeasterly to Fort Simpson, N.W.T., on the Notikewin-Providence-Norman (Mackenzie River) highway.

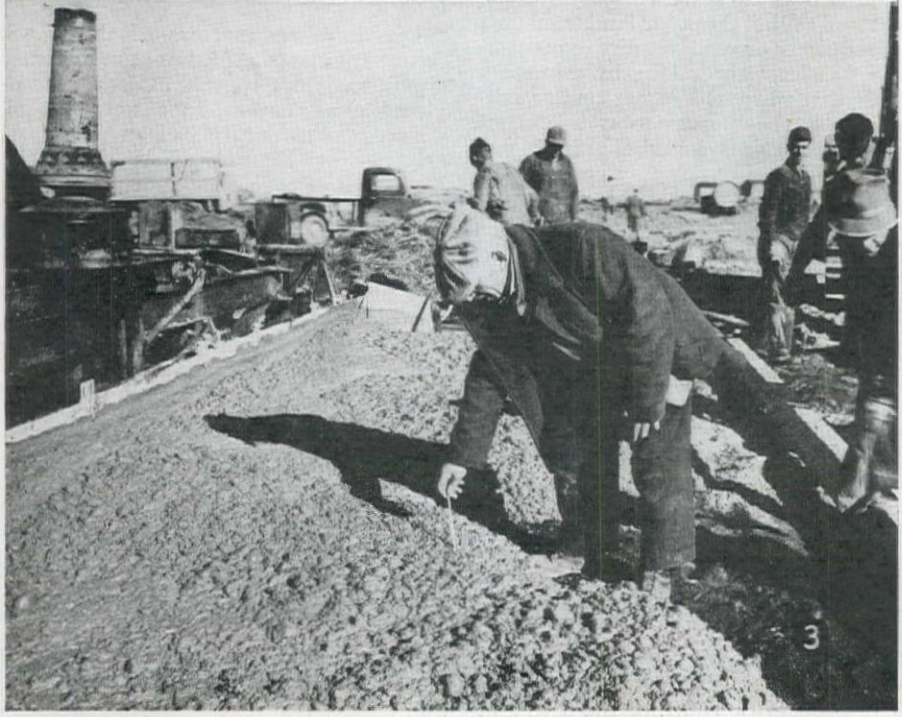
To revert by treaty to Canada after the war, the entire system like the Alaska Highway itself, from which it stems, is a project under the engineering direction of the U. S. Public Roads Administration, which is being built in its original or "pioneer" form by the Corps of Engineers of the U. S. Army, with the assistance, on the Alaska Highway proper, of contractors of both countries.

A great drama of construction has been unfolding over a rich and stark region thousands of square miles in extent, but until the enemy has been subdued, publication is forbidden of any comprehensive details on the progress and character of the operations involved, or the nature and amount of equipment and materials utilized.

Airport Paving in Winter—III







OFFICIAL U. S. Army Engineer photographs of further paving operations at the mammoth airbase "Somewhere in the Pacific Northwest," where construction in cold weather temperatures was successfully prosecuted by use of winter paving methods. With milder spring temperatures now, the winter methods are obviated, but due to cold weather precautions taken during winter months, the job is running exactly on schedule, the Seattle District, U. S. Army Engineers reports.

The project began on Dec. 1, and concrete was poured continuously through the cold winter months. Subgrade, aggregates, water and finished concrete all had to be given special warming treatment.

The completed job, which is to include two concrete runways with taxi-ways and apron, call for more than one and a half million square yards of concrete pavement. The runways are part of a large training installation which will be complete with cantonment facilities for the training groups on this Air Corps project. *Western Construction News* has been following up this construction job, unusual in Northwest paving annals, with pictures and accounts of progress on the airbase. These pictures will serve as a further report, pending the complete engineering analysis of methods, a report on winter paving being prepared for Army and contractor use on similar assignments in the future.

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1. Paver in operation on a parking apron; this piece of equipment was purchased especially for this project and was fitted with heating devices to aid in the winter paving work.

2. Paving was done in 25-ft. strips on this project. Here forms are being placed for a parking apron strip.

3. A government engineer takes the temperature reading of concrete for a parking apron, directly after being poured from the mixer.

4. General view of paving operations on the project, showing the 25-ft. paving lanes. Snow is no longer laying on the ground, but the temperature is well below normal.

5. Observation of the temperature of the concrete at four different depths, during the curing period under cold weather conditions. In addition to the Hunt process curing membrane, Sisalkraft paper and wheatstraw covered the green concrete.

6. A steel cap was placed over the expansion joints in the parking aprons. This was removed when paving was completed, and the joint was sealed with bituminous material.

7. Close-up of the concrete of a parking apron, after removal of forms.

8. A completed section of runway, after paving during the coldest winter weather, by methods described in *Western Construction News* for February and March, 1943.


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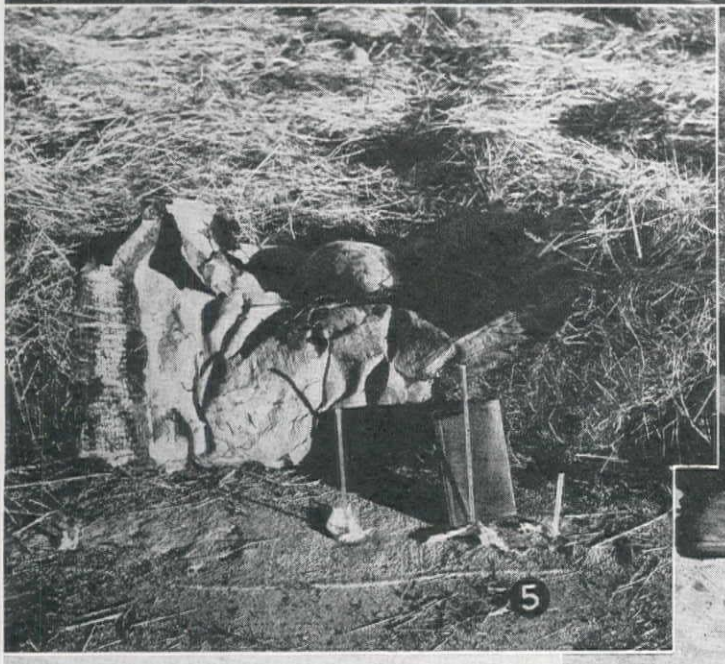
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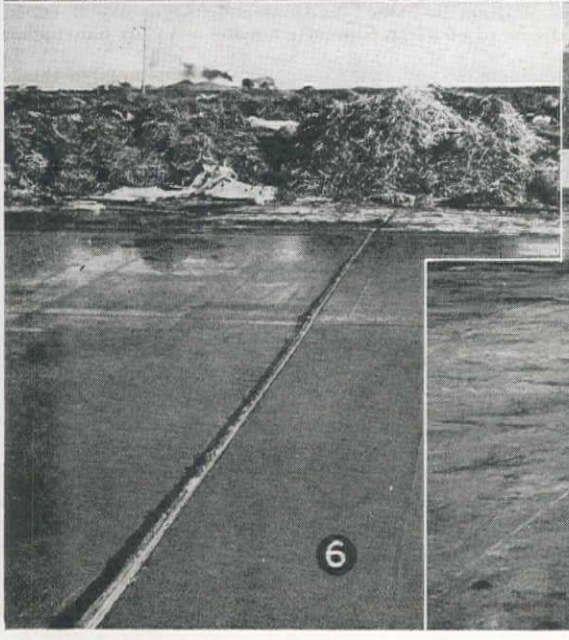
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Preliminary Design Chart . . . VIII

Selection of Wood Penstocks

WOOD STAVE PIPE to be used for conveying irrigation water, under construction. The pipe is built to follow the general shape of the ground by using long-radius vertical curves placed in the pipe by shaping and tapering of staves.
Photo by National Tank & Pipe Co., Portland, Ore.

Thickness of staves, band section areas, cost per foot, friction loss, velocity of flow, and limiting diameter of wood penstocks may be determined at a glance by reference to the chart—Variations due to cost changes are easily adjusted.

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WOOD STAVE PENSTOCKS or pipes are not only economical conductors of water for heads less than 200 ft., but in these days of metal scarcity may be the only obtainable conduit. Because steel is hard to get, it is extremely important that the most economical size of penstock be selected. Too large a diameter wastes vital steel contained in the bands around the pipe while a small diameter wastes power in frictional resistance against flow within the penstock. As a means of determining the correct diameter, the attached chart has been prepared that gives six additional facts about the selected water conveyor. These additional facts are: (1) thickness of wood staves, (2) cross sectional area of bands for one foot of pipe, (3) cost per foot of penstock, (4) limiting diameter in relation to head based upon present practice, (5) head lost through friction in 1,000 ft. of conduit, and (6) velocity of flow within the penstock.

Source of information

The principal source of data from which this chart has been derived is contained in the publications of the National Tank and Pipe Company of Portland, Oregon, the United States Dept. of Agriculture Bulletin No. 376 on *The Flow of Water in Wood Stave Pipe* by Fred C. Scobey, and from Creager and Justin's *Hydroelectric Handbook*. Cost per linear foot of pipe in place includes uncreosoted lumber, untreated cradles, erection labor, unloading, ordinary hauling and distributing, and freight in carload lots for approximately 700 mi. at $0.30 per cwt. Excavation and backfill are not included.

Construction cost indices for January, 1943, were used in converting published figures dated February, 1940. The choice of untreated lumber reflects the war conditions on the west coast, where creosoting plants are unable to handle work unless it has a high priority rating issued by the government. Since the staves are untreated and probably would contain some sapwood, the useful life of the pipe has been reduced to 15 years. The expression for the cost per linear foot of pipe in place, exclusive of excavation and backfill is:

$$C = .025\ D^{2.1}\ H^{.65} \qquad (1)$$

where C = cost in dollars per lin. ft. of erected pipe

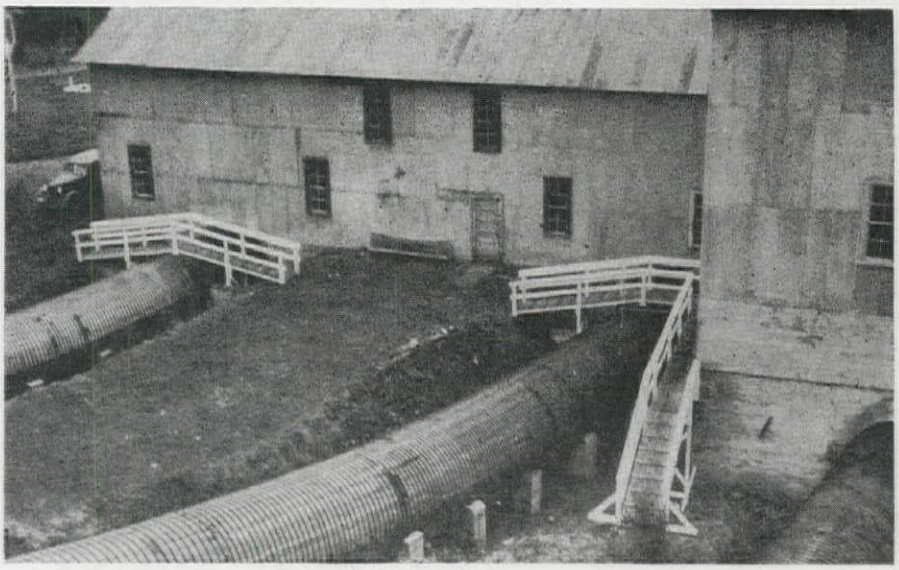
D = internal diameter in feet

H = average head in feet

This expression was obtained by logarithmic plotting of the cost per foot as abscissa against diameter as ordinates, for the cost values for heads ranging from 80 to 200 ft. Straight, nearly parallel lines, were thus obtained for diameters in excess of three and a half feet. The mathematical expression for these lines is given by equation (1).

If the cost per linear foot of pipe is desired for any other period either before or after January, 1943, it is only necessary to modify the constant of .025 in equation (1) to arrive at a current or historic figure that will be reasonably accurate. The modification of the constant is by a ratio depending upon the construction cost indices published periodically for the date desired and for January, 1943. As an example, suppose the cost per foot of wood stave pipe built in February, 1940, is desired where the operating head and diameter are known. The constant in equation (1) is multiplied by the ratio $\frac{115}{136}$, where the numerator is the index for February, 1940, and the denominator is the same index for January, 1943. The cost per foot of pipe in place depends upon a fluctuating market and varying labor rates so that for flexibility and easy adjustment the determination of this unit cost is given as an equation and not plotted as a graph. Because the exponents are not easy to handle without a slide rule the chart contains a table of values of diameters of 4 to 20 ft. raised to the 2.1 power. Also a tabulation of heads from 40 to 200 ft.

WOOD STAVE PENSTOCKS at Walterville, Ore., hydroelectric plant are 8 ft. in diameter and are subject to a static head of 37 ft. Concrete cradles support penstocks.



are shown raised to the fractional exponent of .65.

Annual expense for the pipe has been assumed at 7 per cent made up of fixed charges of interest, depreciation, taxes and maintenance. All financing is taken at 3 per cent interest and, as mentioned above, the useful life of the pipe is assumed as 15 years. Taxes, or payments in lieu thereof were rated at 1 per cent and the remainder, making a total of 7 per cent, was assumed as a maintenance charge.

The cost of power at the switchboard was taken at two mills per kw. hr. in making the chart. The value of power varies with location, character and magnitude of use, type of generation, and many other factors so that the two mill rate is purely arbitrary and influenced only by the author's experience in certain areas of the Pacific Northwest.

Economical penstock diameter

Annual cost of one linear foot of penstock is the construction cost multiplied by the annual expense plus the power lost through friction multiplied by the dollar value of one kw. hr. Equation (1) is the construction cost and 7 per cent is the annual expense. Lost power is obtained by the product of friction head and discharge converted by suitable constants into kilowatt hours for a particular plant efficiency. The overall efficiency from incoming water to outgoing wire has been taken as 80 per cent. Head lost through friction in 1,000 ft. of penstock is given by Scobey's formula for wood stave pipe as:

$$H_f = .419 \frac{V^{1.8}}{D^{1.17}} \quad \text{.....(2)}$$

where H_f = head lost in friction in ft.,

V = average velocity in ft. per sec.

D = internal diameter in ft.

The annual cost can thus be expressed in terms of H and D by use of equations (1) and (2). Taking the first derivative of the annual cost with respect to the diameter and setting it equal to zero yields a minimum cost for the best diameter penstock. The final expression is:

$$D = 1.69 \sqrt[6.87]{\frac{Q^{2.8}\, b}{H^{.65}\, i}} \quad \text{.....(3)}$$

where D = diameter in ft.,

Q = discharge in C.f.s.

b = value of power per kw. hr.

H = head in ft.

i = annual expense expressed as a decimal

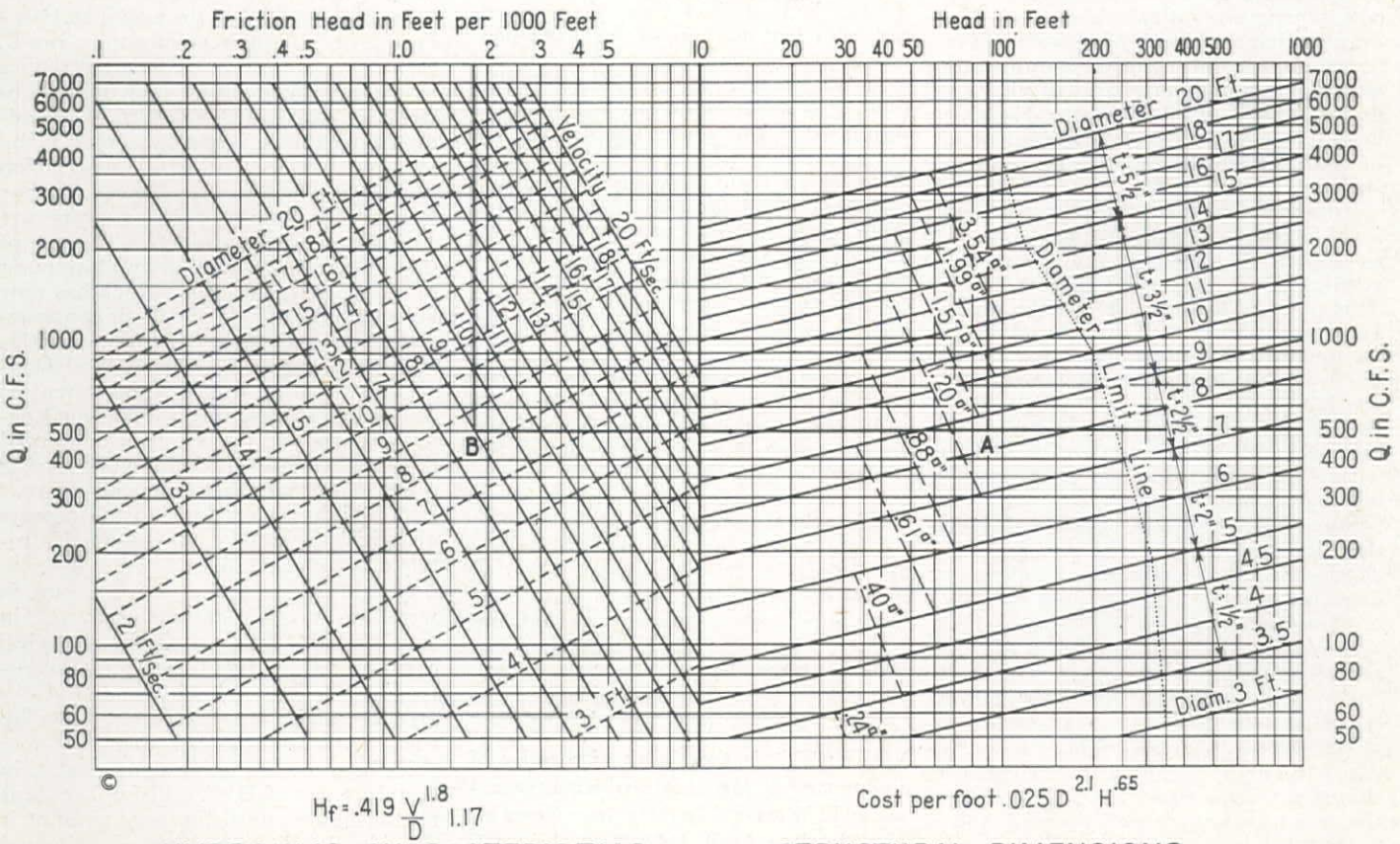
Structural dimensions

The right half of the chart has, in addition to the economical diameter, an indication of the wood stave thickness and the total cross sectional area of the steel bands for a 1-ft. length of pipe. The size of the bands and spacing will vary both with operating conditions and manufacturer's practice but generally the band size remains constant and the spacing is varied. The stave thickness is governed by practical considerations and is not based upon a stress analysis.

From a matter of strength to resist internal pressures it would be possible to considerably reduce the indicated stave thicknesses. As an example, the manufacturers have found that for pipes 9 ft. in diameter the lumber must be 3½ in. thick whether the head be 10 or 100 ft. The large diameter pipes require thicker staves. There are in existence at least two large diameter, horizontal wood tanks about 124 ft. long that can be considered as stave pipes as far as stresses and proportioning of their elements are concerned. These tanks are located at Port Angeles and at Longview, Washington, and are 20 ft. in diameter with 5½-in. wood staves. The tanks, of course, carry no head over the depth of liquid within them, but stress conditions have been found to be more critical when they were partly filled than for a full condition and a numerically greater head on the invert of the tank.

At the right end of the chart will be found dimension lines showing thicknesses of staves ranging from 1½ in. to 5½ in. These dimension lines are from entirely empirical and practical considerations based on the required thicknesses of wood staves for penstocks subject to internal pressure only. For large external loads on a pipe that may be

D	$D^{2.1}$	H	$H^{.65}$
4	18.4	40	11
5	29.4	50	12.7
6	43.1	60	14.4
7	59.7	70	15.9
8	78.5	80	17.3
9	100	90	18.6
10	126	100	20
12	184	125	23.1
15	295	150	26
18	431	175	28.6
20	540	200	31.3



empty at times these stave thicknesses are not applicable.

Certain other diagonal lines, having the same slope as the stave thickness dimension lines, are dashed in to show the cross sectional area of steel bands required per foot of pipe. As previously noted, the band size is chosen and used throughout the job and the spacing is varied to give proper tensile strength against bursting and watertightness at any particular point based upon operating head. The lines are made only long enough to cover the diameters of penstock to which they apply. For points on the chart that fall between these lines the cross sectional area of steel bands per foot can be interpolated. In any case, the maximum spacing of bands should not be more than 10 in. for watertightness and the minimum spacing can be as close as 1 in. for the ½-in. round band or 1¾ in. for a 1-in. band.

Stresses in the steel bands under full head are limited to 15,000 lb. per sq. in. Design bearing strength of wood across the grain is a maximum of 800 lb. per sq. in., while parallel to the grain, bearing is limited to 100 lb. per sq. in.

The broken line labeled "Diameter Limit Line" marks the maximum head for which a manufacturer will design a pipe having the diameter shown. Local conditions of support, exposure and possibly use, may make this limiting head too high for proper application. In any event, the head as used on the chart is the total internal pressure including proper allowance for surges and water hammer.

Example

As an illustration and example, suppose the chart be used to find the total cost, structural dimensions and hydraulic characteristics of a wood stave penstock one mile long on a uniformly sloping grade for a discharge of 500 c.f.s. under a head of 40 ft. Water hammer head has been previously determined to be 50 ft. making a total design head of 90 ft.

Enter the chart at the right vertical scale at 500 c.f.s. and pass horizontally to the left to the intersection with the vertical line representing a 90-ft. head. This point is marked "A" on the chart as a means of identification and illustration only. The economical diameter is 8½ ft. as given by the lines sloping downward to the left. The point "A" is well to the left of the diameter limit line so there is ample assurance that the pipe is within the realm of actual manufacturing experience.

Stave thickness will be 2½ in. since the dimension line at the right of the chart shows that pipes from 7 to 9 ft. in diameter require 2½ in. lumber. The cross sectional area of the bands is 1.57 sq. in. per ft. of pipe or equivalent to 1-in. rounds spaced at 6-in. centers. This size and spacing applies at the lower end of the pipe where the head is greatest. When the total head is reduced from 90 to 70 ft. the 1-in. round bands can be spaced at 7⅞ in. center to center. Where the owner of the penstock desires a more water tight job at little extra expense a ¾-in. round band spaced at 3⅜ in. center to center for the 90 ft. head could be used. As the head gradually decreases until it is 70 ft. the spacings of these smaller bands would be increased gradually to 4½ in. There is no more actual steel in these smaller bands but the greater number of shoes and nuts required would increase the total steel tonnage on the completed line about 3 per cent.

Cost per foot is obtained from equation (2) using heads of 70 and 90 ft. for respective applicable lengths of pipe. For convenience in estimating, when there are no logarithmic tables handy, a few values of slide rule accuracy have been tabulated and placed on the right of the chart for D, $D^{2.1}$, H, and $H^{.65}$.

In the problem the diameter was found to be 8.5 ft., which makes $D^{2.1}$ equal to 89. When $H = 90$, $H^{.65}$ is 18.6, and when $H = 70$, $H^{.65}$ is 15.9. The higher head is applicable to 2,640 ft. of pipe while the 70-ft. head applies to the remaining 2,640 ft., making a total length of one mile. Total cost is:

$$.025 \times 89 \times 18.6 \times 2640 = \$109,256$$

$$.025 \times 89 \times 15.6 \times 2640 = \quad 93,396$$

Total $202,652

Passing horizontally to the left on the chart at a Q of 500 c.f.s. to point "B" for a diameter of 8.5 ft. (according to the dotted diagonal lines) the average velocity is 9 ft. per sec. Going vertically upward to the top of the chart shows a friction head loss per 1,000 ft. of penstock of 1.8 ft. The total loss for one mile of pipe would be $1.8 \times 5.28 = 9.5$ ft.

Applicability of chart

The diagram gives most of the essential information about wood stave penstocks that a planning engineer would want to know at a decided saving of time. It is not intended to be a final design criteria and young engineers without the ability to exercise sound judgment based upon previous pipe design experience will do well to use it as a guide only in proportioning their conduit. All of the data on the chart are available in other publications but the combination in a graphical, convenient form is believed not to have been done heretofore.

While the chart is made for power penstocks flowing full where the value of power is 2 mills per kw. hr. and the annual expense is 7 per cent of the construction cost, nevertheless, certain parts may be used to obtain information about other conveyors of water. The cost per foot, structural dimensions and hydraulic characteristics apply also to domestic water supply lines and to wood stave pipe for irrigation water. Limiting diameter line and stave thickness applies to all wood pipe regardless of use.

NOTE: This is the eighth of a series of preliminary design charts which have appeared in *Western Construction News* bimonthly since April, 1942. Next chart will appear in the August, 1943, issue.—*Editor.*

Western Construction News **acknowledges an error in the preliminary design chart which appeared on pages 62 and 63 of the February issue on the subject of cross sections of draft tubes. Charts were published for estimating both entrance and exit area for elbow draft tubes, being drawn on logarithmic scales. The vertical rating of these scales was in error in that the positions noted as "40, 60, 80" should be "30, 50, 70." It is suggested that engineers who are putting this series of preliminary design charts in their reference library make pencil changes on their copies.**

British Columbia Sets Construction Record

CONSTRUCTION in British Columbia during the year 1942 amounted to approximately $30,000,000. Projects which were started around the closing days of the year and during the first four months of this year bring this up to an approximate total of $40,000,000. Exact details of the figures are impossible to determine and actually the $40,000,000 total is on the conservative side, as there are several very large jobs under way in certain sections of the province which cannot be revealed owing to wartime conditions.

The Dominion Bureau of Statistics reported that during 1942 construction in British Columbia totalled $9,837,104, based on returns received from seventeen municipalities in the province. However, a questionnaire sent out by the B. C. Journal of Commerce brought replies from 35 municipalities showing a construction total of $10,860,256.20. In addition to these figures, a great many other projects were undertaken for which no building permits were issued, as they were in unorganized territories or were national defense projects. Typical of these is the million dollar sulphite plant of the Powell River Co., which has now been completed and on which construction has been under way for 17 months. Projects awarded by the Federal Government, mainly by the Department of Munitions and Supply for national defense purposes, during 1942 amounted to a further $14,991,368.73, while during the first four months of the current year Federal jobs undertaken in various parts of British Columbia stepped up this total to $17,797,368.73.

In addition to these projects there is work on the system of highways in northern B. C. Some of this is being carried out by the Canadian Government, a smaller portion by the B. C. Government and a considerable amount by the United States Government.

Railway construction in progress in certain parts of B. C. still further steps up the figures until the total amount is considerably in excess of the estimated $40,000,000.

CONSTRUCTION OF one-half of the 2,620-unit housing project will be delayed for the duration, due to material and labor shortages, but roads and utilities will be laid in the entire project area. Photo shows the section which will not be completed.

Masonry Used in L. A. Housing

Permanent type apartment project built of reinforced brick and concrete will soon be ready for occupancy, but half of construction will be delayed until victory is won

By WM. A. DAVIS
Office Engineer
Starrett Bros. and Eken
Los Angeles, Calif.

CONSTRUCTION of a portion of a 2,620-apartment masonry housing project is being rushed to completion for the Metropolitan Life Insurance Co., owner, by a thousand workmen in Los Angeles to meet a critical demand for homes in that city. The project was begun in April, 1941, by Starrett Bros. and Eken, Inc., contractors of New York City, and the first unit was opened on June 1.

The housing development, one of four being constructed by the insurance company (the others are located in San Francisco, Calif., New York City, and Alexandria, Va.), is known as Park La Brea, and is located on a level 170-ac. tract bounded by Third St., Sixth St., Fairfax Ave. and Alta Vista Blvd. Preliminary estimates of the cost of the program were about $12,000,000.

The entire project consists of 2,620 apartments combined and grouped into 39 blocks of two-story buildings. Only 22 blocks, approximately one-half of the project, are to be completed at the present time because of a critical shortage of necessary materials and labor. The project when completed will house an average of ten thousand people. Five and one-half miles of streets wind through the area, and 14½ ac. in the center have been set aside as a recreation park with swimming pools, tennis courts and other facilities.

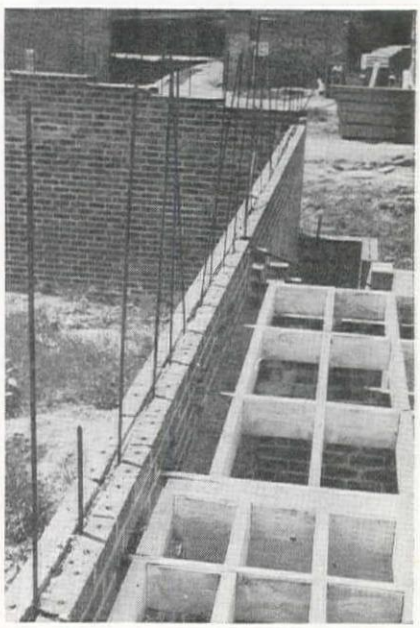
The blocks are of many sizes and shapes: rectangular, square, triangular, and some are the shape of a "pie cut." Although they vary greatly in size, the average block is divided into three patios and contains sixty-six apartments, one laundry, four storage houses, two garages of sufficient size to house one car from each apartment, and a small children's playground. The patios, or inner courts, are to be grassed and concrete walks will skirt the full circumference. Each apartment has large windows, opening on a patio, and a majority of the apartments face the street upon which the building entrance is located.

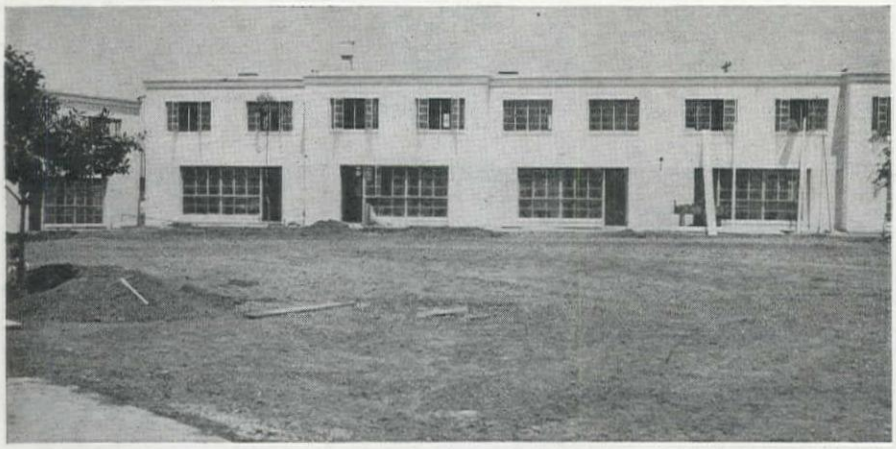
The apartments are designed with 3½, 4½, 5, and 6 rooms, with some variation in window arrangement and room location. The 3½-room units occupy one floor and contain a kitchen, bathroom, living room, dining alcove, and one bedroom. All other units take in two floors and have the bedrooms and bathrooms located on the second floor. The 4½ and 5-room units contain two bedrooms while the 6-room style includes three bedrooms and two bathrooms.

Design changed

The original structural design called for steel doors and window frames, and reinforced concrete throughout from foundations to roofs, making the buildings completely fireproof. Wood construction was limited to closet shelving and some kitchen cabinets. Construction proceeded along these lines for the first three months after the foundation work commenced. After some of the members had been poured, there came the threat of war, and with it a sudden shortage of certain vital materials. The 9,000 T. of steel required for reinforced concrete construction were out of the question; steel just couldn't be obtained. The steel window frames and bathroom and kitchen fixtures had been previously purchased. Then cement and lumber became difficult to buy. A decision had to be made whether to stop the work for the duration of the war or change the entire structural design and utilize less vital materials in place of the steel and cement. The latter course was taken, and immediately the extremely difficult task of changing plans during construction was commenced. Foundation work was continued on the original design, and by the time all the foundation walls were poured the plans and details of the remainder of the job had been revised to such an extent that construction work could proceed on schedule. Steel reinforced brick walls, coupled with wood framing in the second floors and on the roof, replaced reinforced concrete. Wood doors were substituted for steel doors throughout, and 95 per cent of the metal in the roof gutters was replaced by redwood. The construction aspect of the

BRICK WALLS in the project are reinforced with ½-in. steel bars, laid in grout in space between rows of brick.





ALL APARTMENTS look out on grassed patios through large steel-framed windows. Landscaping plans call for trees, flowers, walks, and a central recreational area.

entire job was changed almost overnight.

Construction details

The foundation walls, which represent the greatest portion of reinforced concrete on the job under the revised specifications, are 2 ft. 8 in. deep and either 10 in. or 12 in. wide, depending upon the thickness of the supported brick wall. These foundation walls do not rest on a continuous concrete footing, but are supported at intervals of approximately 10 ft. by 12-in. square reinforced concrete pedestals, or columns, which extend down to firm footing and are based on 6-ft. square reinforced concrete pads 12 in. thick. The height of the pedestal, measured between the top of the pads and the bottom of the wall, varies from zero to 12 ft., depending upon the bearing properties of the subsoil and the depth to firm material. Thus all foundation walls are continuous beams and are designed accordingly. The reason for this type of construction is that the area occupied by the project was formerly swampy. Part of the famous La Brea tar pits at one time extended into a portion of the area, and throughout the tract, foundation conditions are poor.

All walls are either 10 or 12 in. thick. They are constructed of brick and reinforced with steel bars to resist earthquake shock. The brick is standard size, 3¾ in. x 3¾ in. x 8 in., laid longitudinally, which, in a 10-in. wall, leaves 2½ in. in the center for grout and steel. The grout is composed of one part cement and three parts sand and is poured separately for each brick course. The vertical steel is held firmly in place before the brick work is started, while the horizontal steel is laid in the grout as the work progresses. The 12-in. walls have a 4½-in. space in the center of the wall for grout and steel. The interior of all brick walls which are to be plastered is first sprayed with "Plasterbond," a bituminous compound. The object is to provide a more perfect bond between plaster and brick and to prevent dampness coming through from the brick to spoil the plaster finish.

The first floors consist of a concrete slab poured on a water settled fill of decomposed granite. A layer of 3-ply 15-lb. dampproofing paper is laid under the slab to prevent the passage of any dampness through the floor. Hardwood flooring, laid in blocks, covers the entire first floor except for the kitchen, which has linoleum. Adherence is obtained by use of a plastic material spread on the concrete before the floor is laid. The second floors are made up of 2 x 12-in. wood joists, a 1-in. wood subfloor, and hardwood flooring.

All apartment interiors are plastered with scratch and brown coats and a hard white finish. There are two types of interior partitions—stud walls and 2-in. solid walls. The stud wall partitions are made up of 2 x 3-in. wood studs, spaced 16 in. on centers, lathed with ⅜-in. perforated plasterboard, and plastered. The 2-in. solid partitions are composed of a core of a single thickness of ⅜-in. plasterboard lath, plastered on both sides to a total thickness of two inches. The lath, 16 in. in width and ceiling height in length, is erected vertically and butted with joints open ⅛ in. It is anchored in a slot provided by 2-in. wood runners nailed to the floor and ceiling. Three clips, equally spaced, are inserted on the vertical edges of the lath, for the purpose of engaging the sections. The clips are formed of 26-ga. galvanized sheet steel. After erection of the lath, temporary bracing is placed on one side of the partition to hold the lath rigid for plastering. This temporary bracing remains in place until both sides have been scratched and browned.

The roofs are mainly flat; however, the monotony of continuous flat roofs is broken by numerous gable and hip roofs covered with tile shingles. Flat roofs are covered by 5-ply 15-lb. asphalt paper rolled on hot and gravelled at the rate of 4 lb. of gravel per sq. ft. of roof. Drains from the flat roofs are concealed within the brick walls and emerge at the street curb.

Difficulties of scheduling

The greatest problem on the job has been that of following a construction schedule under the hampering effect of the shortage of material and labor. The job is of sufficient size that during ordinary times a definite schedule could have been followed with ease—foundations, first-floor walls, second-floor framing, second-floor walls, roof framing, and so on to the final finish and painting. In the early stages of the work everything rolled along fine, brick laying and steel placement progressing at a record rate. After work had started on the second-floor framing, the flow of lumber into the job, always somewhat limited, became very uncertain, and the trouble commenced. With 250 carpenters cutting and placing the lumber as fast as it could be hauled in, there were many days when the work was seriously retarded by shortages. Another serious complication arose from intermittent rains during the past winter, which frequently converted the area into a morass trapping every piece of equipment that ventured off the paved roads.

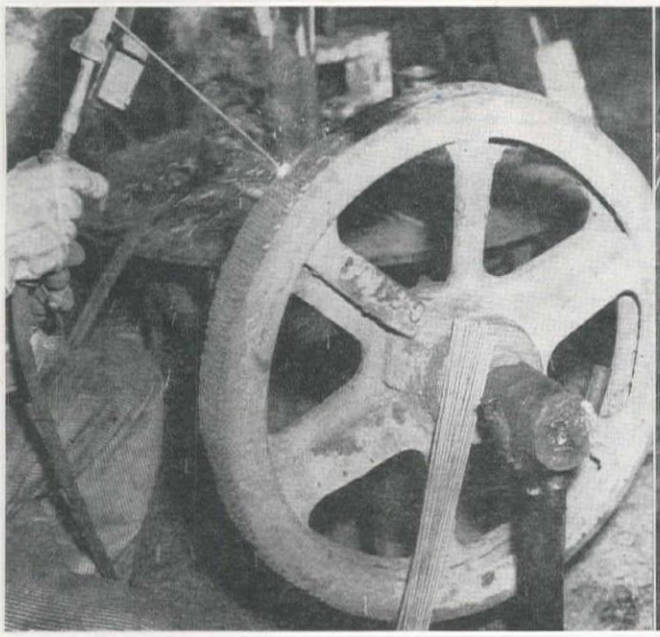
In spite of the difficulties and uncertainties, one block was completed and ready for occupancy by June 1, 1943. The remaining twenty-one blocks, in the half of the project under construction, will be completed by the end of September. Construction of the second half of the project will not commence until after the war, and reinforced concrete will probably be used as originally planned.

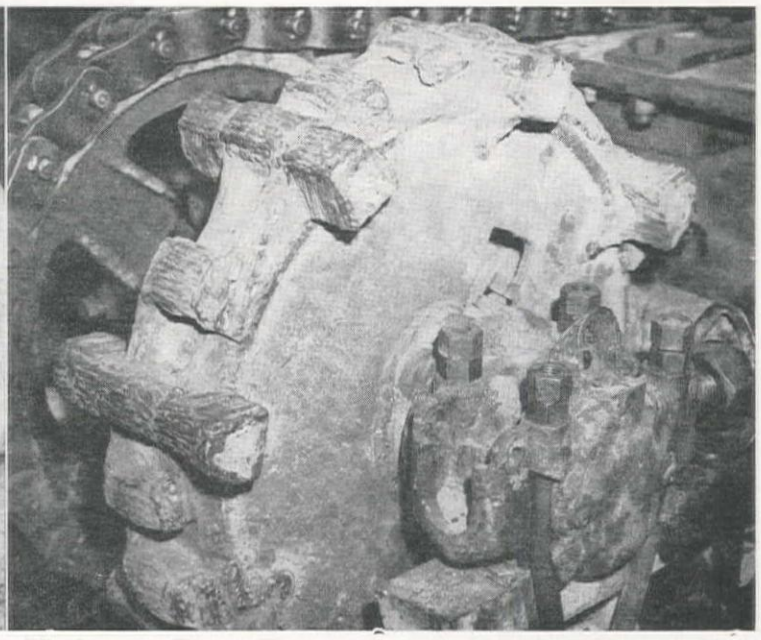
Key men on the job are W. T. Griffiths, general superintendent; Paul Benz, field superintendent; T. F. Gunn, project manager; Cy Briscoe, in charge of brick work; Don Marquis, in charge of reinforcing steel placement; Art Franzon and Frank Dowell, directing the carpenter work; and William Heddon, engineer.

THE MONOTONY of flat roofs is broken by gable and hip roofs covered with tile shingles. Columnar porches give a colonial effect to the architectural style of the homes.

HOW IT WAS DONE

JOB AND SHOP TIPS FROM THE FIELD EDITOR'S NOTEBOOK





Hard-Facing Shovel Drive Tumblers and Idler Wheels

WHEN the shovel track is taken off, it is usual practice to check the driving tumblers and idler wheels. In most cases where the pads are worn the driving tumblers and idler wheels will also be in need of repair. Worn areas should be rebuilt to within ⅛ in. of size with high carbon rod and all wearing parts should then be protected with a final overlay of 3/16 in. of self-hardening rod. Templets made from new parts will speed the operation.

Figures 1 and 2 in the sketch refer to carbon rod and self-hardening rod respectively.

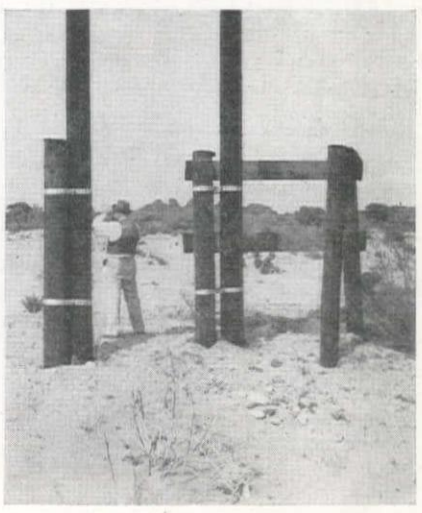
Twenty to 25 lb. of self-hardening rod are usually required to hard-face a driving tumbler from a 2½-yd. shovel. The amount of carbon rod needed depends on the extent of wear. An idler wheel from a 2½-yd. shovel will require approximately 10 to 15 lb. of self-hardening rod. Welding time for a driving tumbler averages 7 to 12 hours, and for a driving wheel averages 7 to 8 hours. Hard-facing will double the life of the part for ⅓ of the cost of a replacement.

This material was furnished by the Stoody Co., Whittier, Calif.

Transmission Line Poles Protected by Piling

FOR PROTECTION of electric power lines crossing stream beds against high water, timber guards are used around the power poles on the Salt River project in Arizona. The two poles extending to the top of the picture support the transmission line, while the other four poles are used as piling and have been driven to a depth of about 30 ft. On the upstream side, three of the piles are braced by two heavy timbers to form a rigid frame pointing upstream. This method has proved successful for protecting power lines against undermining and destruction by debris.

L. L. Lee, office engineer for the Salt River Valley Water Users Association, who devised this protection, is shown in this photo taken near Tempe in the channel of the Salt River.



NEWS OF WESTERN CONSTRUCTION

JUNE, 1943

Colorado Power Plant Placed In Operation by Bureau

THE BUREAU of Reclamation has placed its 30th power plant in war service.

The plant is located at Green Mountain Dam in western Colorado, and is a part of the Colorado-Big Thompson project, the primary purpose of which is to provide a supplemental irrigation water supply in northeastern Colorado. The power from the new plant will serve Denver and other areas where there are expanding war industries.

When the plant's first generator began commercial production, more than 10,000 Kw. of new war power became available, and a second unit, of equal size, is scheduled to turn within a few days. Ultimately six other power plants will bring the potential annual output of the Colorado-Big Thompson project to about 900,000,000 Kw. hr., equivalent to the 1941 output of all the generating capacity in the state of Colorado.

When completed, the Colorado-Big Thompson project will provide a supplemental supply of water to 600,000 ac. of highly productive land in an area where the annual crop losses have averaged as high as $5,000,000 due to water shortages. More than 175,000 people in the region are dependent almost entirely on the irrigated agriculture. Construction of the other features of the project has been halted by the diversion of materials to other war uses.

The irrigated lands of the Colorado-Big Thompson development are situated on the eastern slope of the Continental Divide. The needed supplemental water will be brought from the headwaters of the Colorado River on the western slope through the Continental Divide tunnel being bored through the Rocky Mountains.

Green Mountain reservoir was included in the project to protect water users in the Colorado River basin on the west side of the Rockies against loss of their supply by diversion through the trans-mountain tunnel. The dam, 274 ft. high and 1060 ft. long, is the second highest earth-fill dam in the United States.

All construction with the exception of the Green Mountain dam and power plant is at a standstill, having been halted last fall by an order of the War Production Board diverting critical materials to other war uses. The Bureau of Reclamation is prepared to resume construction of the partially-completed tunnel and other features as soon as authorization is given and men and materials are made available.

California Registration Fees Raised, Now Due

ANNUAL RENEWAL fees for registered civil engineers and licensed land surveyors in California have been increased by the State Legislature from $5.00 to $6.00 per year effective with the next fiscal year, which begins July 1.

According to Asa G. Proctor, president of the State Board of Registration for Civil Engineers, the necessity for increasing the annual renewal fee is due to the fact that approximately 20% of the licentiates have entered the military service, and under provisions of Section 114 of the Business and Professions Code, every registered civil engineer and licensed land surveyor serving in the Armed Forces of the United States may allow his certificate of license to expire for failure to pay the annual renewal fee and shall have the same restored to him, without examination and without the payment of fees for delinquency, providing he makes application therefor within 60 days from the date of his discharge. "It is," said Proctor, "just a question of those of us who remain in civil life financing the Board's activities while our fellow engineers are fighting our battles for survival; and this we are only too happy to do."

Gila Irrigation Project OKed for Further Construction by WPB

CONSTRUCTION of irrigation facilities on the Gila project of the Bureau of Reclamation in Arizona will be expedited to provide dust control for the Yuma Army Air Base and increased food supplies in the Pacific Southwest.

The Facility Review Committee of the War Production Board has removed a limitation which required 8,500 ac. of land to be irrigated primarily for guayule rubber planting. This action was taken as a result of the recently announced contraction of the guayule rubber program.

Work on the Gila project originally was cleared by the War Production Board to have the land ready for guayule if required by the Emergency Rubber Project. At the request of the Army authorities in the Southwest, consideration was given to assuring dust control in the vicinity of Yuma. With the announcement of a restricted guayule program, the tract to be irrigated by the Bureau was relocated to afford a maximum of dust control.

Under irrigation the desert mesa land on this project will be transformed into highly productive areas for livestock feeds. It also may be possible to produce castor beans for a domestic supply of castor-oil.

If rubber requirements later should necessitate use of the land for guayule, it will be available for that purpose. About half of the area is government owned land which will be put into production by the Bureau of Reclamation. The remainder is privately owned and irrigation water will be provided through Bureau facilities.

The Gila project, which is designed to irrigate ultimately more than 100,000 acres of desert mesa land in Arizona, was under construction when stop-work orders were issued last October against practically all irrigation construction in the West. On November 30, 1942, the order affecting the Gila project was modified to permit construction for the irrigation of 5,500 acres in connection with the development of guayule. On April 2, a further modification authorized the extension of irrigation of 3,000 additional acres for guayule and dust control.

Central Valley Work Approved

CONSTRUCTION will be resumed on several portions of the Central Valley, California, water control project sponsored by the Bureau of Reclamation of the Department of Interior, the War Production Board announced today.

Work has been authorized to the following extent:

1. Completion of Friant Dam by the installation of three valves required for the storage and release of water.

2. Completion of the Madera Canal leading from Friant Dam 38 mi. westward to the Chowchilla River area.

3. Continuation of concrete work on Keswick Dam.

These projects, together with other parts of the vast Central Valley development, were halted late in 1942 because of the stringency of critical materials. Remainder of the program, other than these three projects, will continue to be deferred.

While the situation as to critical materials has not changed substantially since these projects were halted, the additional work is being authorized to obtain the increased food production which Friant Dam and Madera Canal will make possible and to facilitate the ultimate completion of Keswick power plant if it should become necessary later.

Friant Dam, which is already more than 90 per cent complete, and Madera Canal which is partly finished can be completed with a relatively small amount of additional materials and equipment, most of which is already on hand or in distress stocks. They will provide important irrigation benefits commencing next year. Concrete work on Keswick can be continued with critical materials on hand at the project or in distress stocks.

Alcan Area Opened By Telephone Line

A 2,000-MI. Army Signal Corps telephone line from Edmonton, Alberta, to Fairbanks, Alaska, that will carry simultaneously three forms of messages, vocal, telegraphic and radio, is nearing completion, the War Department has announced.

This Alcan Telephone project, part of the Alaskan Communication system, will link the War Department in Washington directly with the Northwest Service Command and furnish communications in this region for all the United Nations.

The Alcan line will carry radio messages directly by a special transmitter. Low frequency waves go out over the wire rather than through the air as do high frequency waves. At the same time the wire will handle telegraphic messages and voice. More than one radio message and more than one telegraphic message may go over the wire at the same time and still not interfere with the vocal interchange. Known as a carrier-equipped system, it will be the longest of this kind in the world.

The system has just been completed to Whitehorse, in the Yukon Territory of Canada. Major General Dawson Olmstead, Chief Signal Officer of the Army, under whose direction the project is being pushed through by the Signal Corps, spoke the first words from Washington over the link. He talked with Lieutenant Colonel Dee Berry, Signal Officer of the Northwest Service Command and to Major Ora Roberts, officer in charge of the project.

The first project of the Alcan system, from Edmonton to Dawson Creek, British Columbia, was completed on December 1, 1942, a distance of 442 mi. The second section, from Dawson Creek to Whitehorse, is almost 900 mi. It is the longest single link in the system.

The 2,000-mi. line will provide communications facilities for the military needs of the United Nations through the use of seven talking channels and 14 teletype channels. Work on the last leg, from Whitehorse to Fairbanks, is going forward from both ends, Major Roberts told General Olmstead. Some 90 mi. of poles have already been placed north of Whitehorse. Crews are now moving into Fairbanks pushing to the south toward Whitehorse.

Dynamite dug the telephone pole holes in the frozen earth. Sometimes poles were erected in three to five feet of snow. The worst snowstorm in 40 years hit Edmonton during construction of the first section. When spring thaws came the problem was reversed.

Problems of supply and transportation of men have been tremendous. The line has been inched through a wilderness of alternating mud and snow, the latter attended with sub-zero temperatures.

Clearfield Contractors Cited for Good Record

BECAUSE of the exceptional record made by the combination firm of Winston Bros., C. F. Haglin & Sons, Missouri Valley Bridge & Iron Co. and Solitt Construction Co. in completing the Clearfield Naval Supply Depot in Ogden, Utah, in 3 mo. less time than originally anticipated and at a financial saving of approximately $8,500,000, the Army-Navy "E" was awarded to the firms on May 5. The project was completed before the ceremony of presentation could be arranged and the customary awarding of employee lapel pins was therefore dispensed with.

Included in the citation were the following sub-contractors: Ogden-Cache Electric Co., Henry F. Laub, superintendent; J. L. & J. W. McClenahan, San Francisco, Calif., mechanical contractors, J. S. Rumsey, job superintendent; Ashton, Evans & Hodgson, architects; Blanchard & Mahar and Clyde C. Kennedy, engineers.

Lieut. J. M. Babcock, naval officer in charge of construction, announced that actual construction cost amounted to $26,100,000, the original estimate being $35,000,000.

More than 14,000 workers were employed during the construction of the project, which began last June 22, and 5,600 was the largest payroll at a single time. An outstanding safety record was made, only $48,000 being paid in compensation claims, although over 9,000,000 man-hours were required on the project. Workers were housed in emergency Quonset huts, and were brought in from all parts of the country. The payroll averaged about $350,000 per wk.

C. J. Pankow was general manager for the construction company.

WESTINGHOUSE VETERAN DIRECTS ASSEMBLY OF COULEE GENERATOR

ASSEMBLY OF the giant rotor for unit L-6 in the Grand Coulee powerhouse, is proceeding rapidly under direction of EDWARD HARTMUSS (left), a veteran of 51 years service with Westinghouse Electric Co. Rotor is 30 ft. in diam., weighs 535 tons.

WASHINGTON NEWS

. . . for the Construction West

By ARNOLD KRUCKMAN

Washington, D. C.—Ever since the Roosevelt Government came into power we have had intimations that the New Deal would establish an over-all Federal Power Administration. Ickes attempted to set the pace by placing Abe Fortas at the head of an over-all power unit in the Department of the Interior. There seems a probability now that this long-discussed agency will come into existence. But apparently it will come despite the Roosevelt Government rather than by the efforts of the Administration. HR 2754 was introduced in the House late in May by Rep. Everett M. Dirksen, one of the most powerful Republicans in Congress, representing the 16th District of Illinois. His wisdom, force, and personality have potent influence on Democrats as well as upon Republicans. He is one of the few members of Congress who usually go through when they introduce bills. Most bills are introduced for an ephemeral publicity in the back-home papers.

Watch this bill. It will be opposed by the Department of the Interior, by the Federal Power Commission, by Jesse Jones and his brood of agencies under Reconstruction Finance Corporation; also by TVA, by the Bonneville Power Administration, by WPB, SEC, by all the numerous permanent and emergency agencies that have anything to do with power. Already Rep. John E. Rankin of Mississippi, champion of staking the country out in a series of Authorities like TVA, has begun to stir his associates to oppose this bill which imperils the plan to regionalize the nation in power, water, industrial and agricultural zones, based on power.

Dirksen has found that duplication in appropriations, in delegated powers, and in other benefits distributed to the administrative agencies, constitute a condition that is worse than a mess. Primarily the condition is rooted in ignorance, both on the Hill and in the so-called Low-Brow Hollow at the other end of Pennsylvania Avenue. But in the past ten or twelve years the Administrative agencies, the Bureaus, in the opinion of members of Congress such as Dirksen, have become so arrogant that their relations to their Boss, the Congress, has assumed the general status of the tail that is trying to wag the dog. Congressmen are considerably exercised by the manner in which many of the Administrative agencies and their officials come down on the Hill and presume to attempt to dictate to the Congress how it shall formulate policies for the nation's welfare. This Dirksen bill is a strong evidence that some members of Congress will attempt to change the general attitude of contempt towards the Congress, and will try to put the bureaucrats in their place.

The Dirksen bill would create an Office of Power Administration which would have ultimate control over all activities of Government which concern power. The Federal Power Commission would remain a regulatory body for rate-making; the Bonneville Power Administration would be an administrative body in its own area; the Bureau of Reclamation would be purely a reclamation agency and would turn over its power functions to the proposed new agency. The various segments of Reconstruction Finance Corporation responsible for power enterprises in any form would be subordinate to the new agency in any relation involving power. Obviously this program might materially interfere with the present tendency to decentralize the control now exercised from Washington, but it would reduce overlapping functions both in the various agencies and in the Congressional Committees. The present appropriations for power activities run far over $300,000,000 a year, and are estimated by Mr. Dirksen to be imminently on the way to costing billions yearly. He thinks concentration of control and simplification of management will enable Congress to make a deep cut in the appropriations.

Power miscellany

Abe Fortas, who was the first power administration in Interior, and now is Undersecretary of Interior, is 32 years old. He was eligible for the draft and offered his resignation, based on the thought that he might be drafted. Ickes submitted it to the President and the President told Fortas to stay on the job, that he was more necessary in the post than he would be elsewhere. Basil Manly, well known on the Coast, late in May was again appointed for five years as a member of the Federal Power Commission. Late in May Secretary Ickes received the report recommending that San Francisco be permitted to sell its Hetch Hetchy power, plus P. G. & E. power, to Mr. Jones' Defense Plant Corporation for use by the aluminum reduction plant near Riverbank, Calif. The Ickes decision had not been announced by the end of May. During the last week in May the President asked Congress to provide $16,400,000 to be spent during fiscal 1943-44, together with an unexpended carry-over of $14,000,000, to build the power plants, transmission lines, and to complete Shasta Dam. The May report of the Federal Power Commission reveals that the electric utility industry plans, during 1943, to spend on the West Slope for various expansions and improvements the sum of $164,780,282. It also reported the interesting fact that private electric utilities during the first quarter of 1943 paid in taxes $178,465,000, an increase of 8.7 per cent. Salaries and wages during the period increased 0.6 per cent, while dividends decreased 2.5 per cent. The highest increase in taxes was in the Federal bracket, 74.1 per cent.

Bureau of Reclamation announced operation of another power plant, located at Green Mountain Dam, part of the Colorado-Big Thompson project, in Western Colorado. The first generator brought in 10,000 Kw., another will be in operation by early June, and ultimately it is expected the annual output of the project will be 900,000 Kw-hr. In the correspondence with Rep. John M. Coffee of Washington over the Shipsaw power project in Canada, Donald Nelson stated that most of the 3,695,000 Kw. power to be installed during 1943-44 by private utilities will be made available in the Pacific West. In the Pacific Northwest alone he estimates more than 600,000 Kw. public power will be installed. Meanwhile, Congress is working on a bill to approve the agreement between South Dakota and Wyoming for the use of the waters of the Belle Fourche River basin. South Dakota is to have an allocation of 90 per cent and Wyoming 10 per cent.

Reclamation development urged

Also, late in May Sen. Carl Hayden, of Arizona, and Rep. J. W. Robinson, of Utah, met with Food Administrator Chester Davis and representatives of the Bureau of the Budget, Bureau of Reclamation, WPB, and the committee of specialists from the Department of Agriculture, to discuss the progress of the plan to bring into existence the 18 irrigation projects still frozen by WPB orders. Food Administrator Davis bluntly explained to the conferees that our domestic food supplies are now barely sufficient to give each person in the United States the equivalent of 3,100 or 3,200 calories daily; that the British under a rigid and highly organized uniform control live at a level of 3,000 calories daily per person. He pointed out that the present supply will quickly put us down to the British level, and that the nutritional authorities declare the absolute minimum required for sustenance is 2,800 calories. Mr. Davis told Mr. Nelson that in the British Isles, due to the compact geophysical integration, it was possible to maintain the level with reasonable uniformity. Mr. Davis pointed out, however, that such average level in this country, on account of its complex problems of geography, transportation, climate, and habits, meant that in some areas the people would not get enough to eat, even under minimum standards.

The Food Administrator made clear that in 1944 we must supply the armed forces at the very least from 10 to 15 per cent more food than they receive this year; and that Lend-lease requirements will step up materially. He said both the Russians and others will need more food, the Russians being alarmingly undernourished. As we occupy more countries

the drain on us for food will increase, according to Mr. Davis. He points out there are no stockpiles of food anywhere. He urged that any project which could be brought into production by 1947 be started immediately, and he especially emphasized that the expenditure of steel, manpower and transportation to build irrigation projects in the Western States was fully justified by any yardstick of need and sacrifice. Food products with calcium and riboflavin are now deficient, and he pointed out the Western irrigation areas are capable of growing these foods, and would materially aid in supplying the volume apparently required in 1944 and 1945. Davis stressed that after the war is won we will unquestionably drop production of war implements, but we must produce food at still higher levels for two years, at the very least. The Agricultural experts cautiously suggested that they were trying to determine whether new irrigation projects were entitled to steel rather than the farm machinery which now is in pressing demand by farmers in all parts of the country.

At a hearing of the subcommittee for the Interior, a part of the House Appropriations Committee, Assistant Secretary of the Interior Grover Hill testified that it was necessary to develop every acre of land in the West that might in any way be brought into cultivation. He said it was the opinion of the Department of Interior experts that not only the product of all potential irrigated lands was urgently necessary, but that even twice as much land as was under consideration in the negotiations with WPB would not be near enough to provide the supplies that might naturally be expected from the West. Further discussion about the swift development of Western irrigation projects is scheduled at the hearing on Interior appropriations before the full House Appropriations Committee in June. In and out of Congress there is constant pressure that WPB cancel the Orders that have stopped 23 irrigation projects in the West.

Sen. Burt Wheeler, of Montana, has introduced a Resolution to transfer the administration of irrigation projects on Indian reservations from the Bureau of Indian Affairs to the Bureau of Reclamation. The first steps in preparing to build the Snowflake Project in Arizona were taken by the Bureau of Reclamation in withdrawing public lands on the Shumway reservoir site. Various modifications of revocation orders issued by WPB were promulgated in regard to Keswick dam, Central Valley, and the John Martin dam in Colorado.

Colorado River contract

The tentative contract formulated by the Committee of 14 experts representing the 7 States of the Pacific Southwest was submitted to Ickes late in May. It provides for the delivery of 2,800,000 ac. ft. of water to Arizona from the main stream of the Colorado; half the surplus of the waters of the river, subject to the 1/25 allocated to Nevada for future use; and gives Arizona the power to divert her share of the water above Boulder Dam when further projects are built upstream and future legislation is enacted.

During May the first contingent of Mexican laborers arrived for employment on the Southern Pacific, the Santa Fe, and the Western Pacific Railroads. Workers will be brought across the line at the rate of 1,500 every fortnight. They will work under established labor agreements covering maintenance-of-way employees, and will be provided with suitable housing and with commissary facilities. They are guaranteed transportation to and from the United States. WPB also has cancelled the revocation which stopped the construction of that part of the New Mexico State Highway project designated as New Mexico SN-FAP 90-C (Q). Rep. J. W. Robinson, of Utah, introduced HR 2307 which authorized the Federal Works Administrator to pay out of Federal-aid road funds apportioned to each state a sum not to exceed 50 per cent of the cost of any toll bridge which is made free, and which is built or acquired by the State before January 1, 1944. In May, WPB stopped highway projects in Idaho, located on U. S. Route 30, westerly from Boise; in Montana, bridges near Chinook; in Nevada, on U. S. No. 40 between Winnemucca and Elko; in Oregon, on U. S. No. 101 between North Bend and Marshfield; in Colorado, on State Highway No. 62 toward Dallas. The Public Roads Administration reported that in Colorado it found that passenger cars, trucks, and busses exceeded the 35-mile speed limit by 2 to 4 mi. per hr. In New Mexico the speed limit customarily was exceeded by from 3 to 11 mi. an hr., in Utah by 4 mi. per hr., and in Nevada by from 10 to 15 mi. per hr.

Miscellaneous

Bureau of Mines has planned a 400-ton-a-day custom ore mill at Butte, Mont., to treat manganese ores. Funds will be supplied by Metals Reserve Company and by private sources. . . . Among the thirty-two young engineers who have come from China to study our techniques, one, Q. T. Chang, is on a two-year stint in hydro-electrics with the Bureau of Reclamation in the West. . . . WPB permitted work to go ahead on the Civil Aeronautics Administration airports at Willcox, Ariz.; at Nogales, Ariz.; and at Artesia, New Mexico. . . . WPB announced power cranes and shovels produced in 1943 will be absorbed by military orders. Certain sizes needed in mining and logging and similar civilian work are excepted. Used equipment is expected to take care of all other civilian needs. Military orders also are expected to absorb all production the first six months of 1944. . . . Late in May WPB announced the total cost of all construction projects halted since October 1942 totalled $1,349,685,528. . . . Kenneth C. Warner, formerly Northwest Regional Council Director at Portland, Ore., has been appointed director of personnel, OPA. . . . Edwin B. Dickinson, formerly Dean of the School of Jurisprudence at University of California, Berkeley, was appointed head of the American Mexican Mixed Claims Commission, with headquarters in Washington, D. C. The Commission has $40,000,000 to distribute to those who have claims against Mexico extending from 1868 to 1940, including lands, mines, confiscation, personal property, injuries, and similar denial of justice. Petroleum claims and default of certain Mexican bonds are not included.

Food Administrator Lists Irrigation Projects Held Essential to War

ON MAY 10, Chester C. Davis, the new War Food Administrator, requested the War Production Board to rescind the construction stop orders issued on November 16 last, and to grant high priority ratings for the necessary material, equipment and manpower required to complete the following irrigation projects in order to increase the food productive capacity of the West:

1. Roza unit (gravity section), Yakima project, Washington
2. Newton project, Utah
3. Anderson Ranch Dam, Idaho
4. Colorado-Big Thompson project, Colorado

On the same day, at the request of War Production Board, Food Administrator Davis submitted the following list of projects as a partial list of an overall irrigation war food program (to be added to later):

Friant Dam, Central Valley Project, California
Madera Canal, Central Valley Project, California
Roza unit (gravity section), Yakima Project, Washington
Newton Project, Utah
Anderson Ranch Dam, Idaho
Colorado-Big Thompson Project, Colorado
Klamath-Modoc Division, Klamath Project, Oregon
Mancos Project, Colorado
Riverton Project, Wyoming
Rapid Valley Project, South Dakota

The final over-all list of irrigation projects was to give the War Production Board a general idea of just how far the new War Food Administrator desires to go with such projects and about how much critical material would be required. Also, such of the projects as may be informally approved by War Production Board can be sent to the Bureau of the Budget with request that supplemental budget estimates to cover same be sent to the Senate Interior subcommittee on appropriations, and appropriations could be made available.

NEW BOOKS...

THEORETICAL SOIL MECHANICS—By Karl Terzaghi. Published by John Wiley & Sons, Inc., New York. 510 pages, 6x9¼. Price $5.00.

To bring up to date engineering knowledge on the subject of soil mechanics, the author has combined all of the latest findings and theory on the subject. He recognizes that in every field of applied mechanics the investigator operates with the ideal materials only, and not with materials as actually found in the field. With this in view he has limited the contents of the volume to theories which have stood the test of experience and which have been found applicable to permit solution of practical problems. He anticipates a future volume devoted especially to properties of real soils and the performance of such soils under field conditions. Examples used throughout the volume are those adopted by the American Society of Civil Engineers in 1941 (Manual of Engineering Practice No. 22). General headings in volume are, (a) General principles involved in the theory of soil mechanics, (b) Conditions for shear failure in ideal soils, (c) Mechanical interaction between solid and water in soils, and (d) Elasticity problems of soil mechanics. Each of these sections is divided into theoretical discussions and practical applications to various types of structures.

* * *

STREAM FLOW—By Nathan Clifford Grover, Chief Hydraulic Engineer (retired), U. S. Geological Survey, and Arthur William Harrington, District Engineer, U. S. Geological Survey. Published by John Wiley & Sons, Inc., New York. 363 pages, 6x9¼. Price $4.00.

Written by two men with long service in field and office work of the Geological Survey, the book treats primarily stream flow, records their collection, computation, publication and use. It discusses the various factors influencing stream flow not ordinarily considered in simple stream gaging. These factors include temperature, turbidity, viscosity, slope, depth and condition of channel, factors impossible of expression by mathematical formula. Equipment structures and methods used in accumulating flood data are discussed at length, and the use of river discharge records is properly evaluated.

* * *

POSTWAR PLANNING IN THE UNITED STATES—Published by The Twentieth Century Fund, New York. 87 pages, 6x9. Price $1.00.

A directory of organizations interested in the subject of postwar planning, giving the background activities and personnel of each agency. One hundred thirty-seven government and private agencies are listed as engaged in research or education on problems that will face the United States when the war ends.

MAGNETIC CIRCUITS AND TRANSFORMERS—Prepared by Members of the Staff of the Department of Electrical Engineering, Massachusetts Institute of Technology. Published by John Wiley & Sons, Inc., New York. 718 pages, 9¼x6¼. Price $6.50.

The second volume prepared by the Electrical Engineering Staff at M. I. T. on the principles of electrical engineering extends the circuit theory into another field. It discusses the computation of magnetic-circuit performance, the principles and concepts of interlinked electric and magnetic circuits and their application to the analysis of transformers. Being intended as a first basic course, the emphasis is placed on fundamental principles and both power and communication problems are considered. The text is divided into two principal parts, "Magnetic Circuits" and "Transformers," discussing the various theories concerning each subject and demonstrating mathematics involved in their operation.

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HIGH FREQUENCY THERMIONIC TUBES—By A. F. Harvey, B.Sc. (Eng.), Wales, Ph.D., A.M.I. E.E., Member of Jesus College, Oxford, and Trinity College, Cambridge. Published by John Wiley & Sons, Inc., New York. 235 pages, 5¾x8¾.

The volume is designed to extend the knowledge of electrical engineers in the field of thermionic tubes, which are of increasing importance in the fields of radio, communication, television, medicine and various specialized fields. It gives an account of the properties of these tubes and their relation to those of the associated electric circuits and devotes much space to the consideration of thermionic tubes designed for use at extremely high frequencies. Principal emphasis is on the electrical properties of the tubes themselves, but methods of measurement are also described.

The general practice and experimental results of the retarding field generator is described in a separate chapter and another section is devoted to a study of the magnetron.

* * *

DRILLER'S HANDBOOK—By E. L. Oldham, Mem. A. S. M. E. Published by The Cleveland Rock Drill Company, 3734 East 78th Street, Cleveland, Ohio. 156 pages, 4x6¾. Price $1.00.

A pocket-size manual compiling suggestions contributed by drill operators for safer and faster operation of rock drilling equipment. It contains drawings and photographs illustrating proper drilling methods in tunnels and open work. Various safety suggestions are discussed and illustrated, care of shanks and bits, hose couplings and valves is described. Tables and data are included and the last few pages are a blank repair cost record for drilling equipment.

OBITUARIES...

Ben Flint Phillips, 32, civil engineer and landscape supervisor at the Hill Field air base and air freight depot at Ogden, Utah, passed away on May 19 in Ogden from an attack of pneumonia. He was superintendent of construction and maintenance of C. C. C. camps in the Utah-Idaho area for eight years previous to his work at Hill Field.

* * *

Oscar A. Kuppler, 61, member of the construction firm of Chris Kuppler & Sons, Port Angeles, Wash., passed away last month after a two-year illness. The Kuppler firm became known during the building of two pulp and paper mills in Port Angeles and other mills at Hoquiam, Shelton and Port Townsend.

* * *

George G. Hinish, associate engineer in the U. S. Engineer Corps, died on April 26 in Portland, Oregon. Mr. Hinish had been in charge of maintenance of the Willamette river channel above Portland for more than 10 years. He was 59 at the time of his death.

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Walter G. Filer, widely known civil and mining engineer, died on April 4 in San Francisco, Calif., following a brief illness. During his career he built such utilities as the Manila Street railway and the dam at Twin Falls, Idaho. He was 70 years of age at the time of his death.

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Milton Winston Wilson, 46, an authority on the operation of airway beacons, died on March 29 at Sacramento, Calif., after a brief illness. Mr. Wilson was with Curtiss-Wright Corp. for 15 years before moving to Woodland, Calif., in 1941.

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Jesse B. Holly, city engineer of Hayward, Calif., from 1917 to 1932, died in that city on March 17. He had been in private practice since terminating the position with the city.

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Granville George Burroughs, an engineer with the Los Angeles County bridge maintenance department for the past 30 years, died recently at the age of 62.

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Robert Wyatt Anderson, retired engineer with the Los Angeles Department of Water and Power, died at his home in Los Angeles recently at the age of 76.

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William F. Bloecher, 70, engineer with the Los Angeles Paving Co., Los Angeles, Calif., died recently in that city.

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Eliot H. Downing, 51, executive of the Portland Cement Association, died recently at San Francisco, Calif.

Beach Protection

(Continued from page 262)

one side of the harbor and erosion on the other. Entire villages were cut away on the leeward coast for a distance of 5 mi. Another similar instance is that of St. Catharines Harbor on The Isle of Jersey, constructed in 1848. Still another instance is Ramsgate Harbor in England in 1750. There are still earlier records.

In 1908 the 11th International Navigation Congress, meeting in St. Petersburg, Russia, devoted a section of the meeting to the subject of "Construction of Ports on Sandy Shores." Papers were presented by experts from England, Russia, Belgium, Italy, Holland and the United States.

Remedial measures

Beach protective works cannot be properly designed without a detailed study of all the elements concerned. It is important to know what should not be done. This study should include detailed surveys of the beach and offshore bottom in the general vicinity, data on waves and currents, tides, winds, the natural source of supply of the sand, its direction of drift and any other possible sources of sand which might be utilized. Complete research should be made of any data showing past changes in the shoreline and offshore bottom and the history of past and present structures along the shoreline for a considerable distance. It is now a definite requirement that where the Federal Government undertakes construction of jetties or other works on a coastline, a study must be made of the shoreline for 10 mi. in either direction by the Corps of Engineers, U. S. Army.

As an illustration the surveys and studies which have been conducted by the Bureau of Engineering of the City of Los Angeles for many years may be cited. Many profiles of the beach and offshore bottom have been taken along the shore of Santa Monica Bay for some 25 mi. Wave and current data were taken, and sand samples collected. All available information on past changes in the beaches was collected. An automatic station was set up to collect wind data. All the data was carefully studied and comprehensive reports prepared. As a result of these studies definite plans are available for not only restoring the beaches which have been eroded because of the Santa Monica breakwater, but to widen the beaches far beyond their former width.

There are four possible sources of material for widening the beaches of Santa Monica Bay. The best one is the millions of cubic yards of sand on the dunes between Venice and El Segundo. Another is the material in the marsh lands at Playa del Rey, when the proposed Marina del Rey is dredged out. Another is the high bluffs at the south end of the bay in Torrance, where millions of cubic yards of material can be removed. North of Santa Monica Canyon the bluffs can be cut back in many places and the material used to build more beach area. The beaches in that area have already been widened to a large extent by such material, excavated during highway construction and dumped on the ocean side of the highway, whence it has been spread by wave action.

The ocean does not recognize political boundaries. Neither can beach erosion and protection studies. Therefore centralized control by the state is needed, so that individual communities and private owners cannot build structures along the shore which will cause destruction of their neighbors' beaches and improvements.

This was recognized by the State of New Jersey some 25 years ago, and control of the state's shoreline was placed under the state Board of Commerce and Navigation. This led indirectly to the formation of the American Shore and Beach Preservation Association, composed of representatives of the various coastal states. Through activities of this association, Congress created the Federal Beach Erosion Board, which is under the direction of the Chief of Engineers of the United States Army. This board has made many investigations and reports and collected much valuable data. It is authorized to assist local agencies in beach studies, on a cooperative basis.

In California, the Shoreline Planning Association of California, Inc., has done a great deal to arouse interest in beach problems and has sponsored legislation to effect a solution of those problems. This association includes the 15 coastal counties in its membership.

Graduate Engineers May Be Trained for Radar

GRADUATE RADIO and electrical engineers are urgently needed by the U. S. Navy to serve as radio officers and to operate radar stations. Because of the greatly increased demand for this type of duty and a decreased supply of qualified men from civilian life, the Navy has found it necessary to establish special training courses for engineers who possess degrees in other branches of engineering. These classes are particularly designed to provide instruction in radar for candidates holding a degree in an accredited college or university in any of the following engineering branches: agricultural, ceramics, chemical, industrial, metallurgical, mining, petroleum or general.

The candidate's training must have included a college course in calculus and physics, and his scholastic records must have been above average. He must be physically fit, have vision of not less than 15-20, and under 35 years of age. Such men will receive commissions in the U. S. Naval Reserve.

Additional information may be had from the office of Naval Officer Procurement, 703 Market St., San Francisco, Calif.

Pioneer Tunnel Drilled For Colorado Highway

COMPLETION of the pioneer bore of the Loveland Pass tunnel, which after the war will be enlarged to carry traffic on U. S. Highway 6 under the continental divide west of Denver, has been announced by the Colorado State highway department.

The bore, 7 feet high and 7 feet wide, is 5,418 ft. in length and was driven directly under the divide at an altitude of 11,310 ft. The cost of the initial project was $280,000 and was started on November 25, 1941. A description of the project appeared in *Western Construction News* for August, 1942.

Because of war-time restrictions on construction, enlargement of the bore to its planned width of 30 ft. will be delayed indefinitely. It is expected to be one of the first major projects of the State highway program after the war and will be included in the post-war system. The completed tunnel will have two 11-ft. lanes for motor travel and three-foot sidewalks with conventional type curbs on both sides. From the roadway to the top of the arched roof will be 20 ft.

The tunnel will shorten by four mi. the present highway which crosses the divide at an altitude of 11,992 ft. above sea level. The tunnel route will eliminate 682 ft. of elevation and total curvature will be reduced by 3.254 degrees.

Bridges to Be Built on Alaska Road This Year

MORE THAN 35 major bridges, of which 90 per cent will be of steel construction, are to be built on the Alaska highway this year, according to officials of the U. S. Public Roads Administration in Edmonton, Alberta. Some of these structures will be several hundred feet in length.

One of the big concerns which has a contract for bridge work is the Roebling Bridge Company of Trenton, New Jersey. Others include Bates & Rogers of Chicago and the U. S. Steel Export Company. A contract also is held by the Dominion Bridge Company of Canada.

Many smaller firms across the country are reported to be fabricating steel for the northern bridges, as this year will see the erecting of permanent structures.

Recently it was reported that some U. S. contracts for Alaska highway work had been suspended and the firms advised not to forward men and equipment from the U. S. Seven or eight contractors were involved. Officials later said that adjustments had been made and the contracts will be proceeded with, only one having been cancelled.

Every effort was made to get supplies and material north before the spring thaw and break-up, when construction may be hindered for as long as six weeks. Just as soon as conditions permit, the bridge building will start, as the objective is to complete the Alaska highway this summer.

The Editor's Mail...

Department of Commerce
CIVIL AERONAUTICS ADMINISTRATION
Santa Monica, Calif.

May 27, 1943

Dear Sir:

Reference is made to the article entitled *Plan Pacific Air Terminal* appearing on pages 201-3, and the companion editorial *Hail to the Dreamer*, in your May issue.

We feel that publication of material of this kind is most beneficial to the cause. It indicates that not only private engineering and industrial interests outside aviation are alive to the future possibilities, but that *Western Construction News* is maintaining its reputation in presenting up-to-the-minute issues.

While the site discussed and the layout itself may well be subjected to radical revision, and undoubtedly a few will be misled, the fact remains that there is much to be done in all metropolitan areas toward planning and actually building more airports. The problems are many, and they involve careful consideration of the three principal factors in site selection, planning, and construction: Aeronautical, Engineering, and Economic.

There are several groups engaged in conducting long range studies for the San Francisco Bay area and other large centers, most of them dwelling upon one particular project. This office is attempting to coordinate this activity with the view of bringing out one recognized plan for airports in each locality.

Because Section 303 of the Civil Aeronautics Act of 1938 states that no Federal funds "shall be expended, other than for military purposes (whether or not in cooperation with State or other local governmental agencies) for the acquisition, establishment, construction, alteration, repair, maintenance, or operation of any landing area," or for similar acts in connection with the "air navigation facilities thereon, except upon written recommendation and certification by the Administrator," we in the Civil Aeronautics Administration are vitally interested in any plan which anticipates Federal expenditures.

Even though Federal assistance is not contemplated, we are further considerably involved with operations and procedures in connection with airway and airport traffic control, aids to navigation, communications, and safety regulation, and must of necessity be consulted in these matters.

We have been engaged in a long uphill struggle to bring about sound planning of airports and to establish safe operating procedures in connection therewith. Because *Western Construction News* is widely read, we believe that you can be of even greater assistance by urging proper coordination of activities with groups and agencies concerned.

The Civil Aeronautics Administration exists solely to be of service. More than ninety per cent of our current activity in constructing airports and airways, operating airway and airport traffic control centers and towers, training, handling communications over a vast network of teletype and interphone circuits, and coordinating safety activities, is concerned with the immediate problem—winning the war. We shall, however, make every effort to hold up our end on post-war planning.

Very truly yours,

H. A. HOOK,
Regional Manager.

PERSONALLY SPEAKING

California engineers employed with Bechtel-Price-Callahan, San Francisco, Calif., on the Canol project in Canada include **Carl D. McCaughey, Ed Kane, Dan Boone, Julius Krauss,** and **Wayne Snapp.** These men are all located at Edmonton, Alberta. At Whitehorse, Yukon Terr., are **Carl E. Schmidt** and **Lawrence L. Bell. Edward R. Berges** is located at Fort Resolution, Northwest Terr.

* * *

Elgin J. Habertson, formerly a general contractor with the James I. Barnes Construction Co., Salt Lake City, Utah, and superintendent of all contractors who worked on construction at the Ogden Federal Arsenal, Ogden, is now a first class petty officer with the Navy Seabees. He is taking his preliminary training at Camp Perry at Williamsburg, Va.

* * *

Certificates to practice engineering in the state of Oregon have been issued to the following men: **G. W. Holcomb** and **C. J. Budelier,** Corvallis; **L. G. Slater,** Colville; **K. B. Wood,** Dallas; **R. G. Bassett,** Grants Pass; **P. D. Willard,** John Day; **W. M. Hector,** Klamath Falls; **W. E. Cadle,** Lacomb; **H. W. Freed,** Molalla; **W. M. Allen, F. A. Brainard, A. O. Bartell, J. H. Bonebrake, W. E. Enns, Frank Kochis, J. H. Ludwig, V. B. Mills, H. S. Mohr, F. O. McGrew, Jr., M. L. Nelson, James M. Orr, J. M. Roberts, J. A. Rutherglen, L. T. Shores,** and **James Warrack,** all of Portland.

Elton B. Sherwin, formerly vice-president and treasurer of the California Western States Life Insurance Co., Sacramento, Calif., has been appointed city manager of Sacramento. He succeeds **James S. Dean** who resigned in January to accept a post as Assistant State Director of Finance. In the interim **Fred J. Klaus,** city engineer, served as acting manager.

* * *

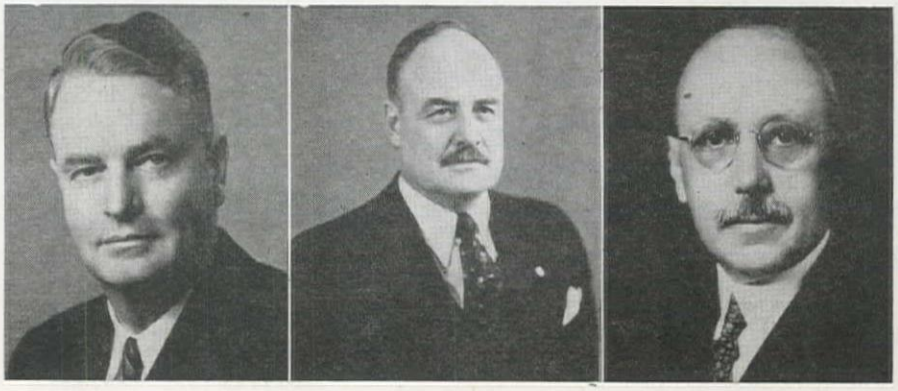
M. S. Eccles has been reelected chairman of the board of the Utah Construction Co., of Ogden, Utah, at the annual meeting of the stockholders. President and general manager is **L. S. Corey,** vice-president is **P. L. Wattis,** and secretary-treasurer and vice-president is **W. H. Harris.** Assistant secretary-treasurers are **B. L. Foulger** and **H. B. McCune.** The company, one of the largest contracting firms in the West, is engaged in work in many different states and in Alaska and the Hawaiian Islands.

* * *

L. R. Chandler, for the last four years resident construction engineer for the Oregon state highway department at Pendleton, has accepted a commission as lieutenant in the United States naval reserve and left recently for Virginia to report for active duty. **Earl Bickmore,**

AMERICAN WATER WORKS ASSOCIATION ELECTS NEW NATIONAL OFFICERS

SAMUEL B. MORRIS, left, dean of the School of Engineering at Leland Stanford University, Palo Alto, Calif., has been elected president of the A.W.W.A. at its convention in Chicago. SAMUEL F. NEWKIRK, JR., engineer and superintendent of the board of Water Commissioners of Elizabeth, N. J., was elected vice-president, and WILLIAM W. BRUSH, editor and former chief engineer of the New York Board of Water Supply, is treasurer.



veteran member of the highway department staff, will succeed Chandler.

* * *

George Gauntlett, head of the Grays Harbor Construction Co. of Aberdeen, Wash., has been appointed by the Mountain Pacific Chapter, Associated General Contractors of America, to represent the heavy construction industry for the Washington State post-war planning council.

* * *

Maj.-Gen. J. P. MacKenzie, D. S. O., who prior to the war was managing director of Hamilton Bridge Western Ltd., Vancouver, B. C., has been appointed inspector-general of the Canadian Army for Western Canada. He succeeds **Maj.-Gen. W. A. Griesbach** in this position.

* * *

Samuel B. Morris, dean of the college of engineering at Stanford University and consulting engineer, has been retained by the City of San Diego to take charge of a long-range survey to determine San Diego's future water needs. Morris will work with **Fred D. Pyle,** city hydraulic engineer.

* * *

Edmund P. Erwin, until 1940 a contractor and builder in Palo Alto, Calif., since then with the U. S. Engineers on construction of several army cantonments and airbases, has recently been transferred to the Federal Public Housing Authority at Port Orchard, Wash., as associate project manager.

* * *

Robert W. Millard, formerly liaison engineer, Rio Vista Area Operations Division, U. S. Engineer Office, Sacramento, Calif., is now working in the engineer section of fortifications for the Western Defense Command and 4th Army, stationed at the Presidio in San Francisco, Calif.

* * *

Clarence J. Shultz, a member of the staff of the Bureau of Engineering of the City of Los Angeles for 36 years, and for the last 21 years, head of the street design division, has retired from active service.

* * *

Captain A. D. Alexis (CEC), U. S. N., former Public Works Officer of the Thirteenth Naval District, has been detached and is now Director of Alaskan Division Bureau of Yards and Docks. His successor as District Public Works Officer is **Captain Edmund B. Keating** (CEC), U. S. N.

* * *

J. A. Mellen has been appointed assistant chief engineer for the Regional Planning Commission of the county of Los Angeles. He has been employed by the commission for nineteen years, during which time he has supervised the planning of many important projects.

JOHN C. PAGE, commissioner of the Bureau of Reclamation, is resting and recuperating from seven years of steady work at his important post. He suffered from nervous exhaustion, and as a result of his rest has already gained 10 pounds.

Capt. John H. Strange, formerly city engineer of Waco, Tex., and lately assistant post engineer at the William Beaumont General Hospital, El Paso, Tex., has been transferred to Jamors Field, Greenville, Tex., where he will occupy a similar position.

* * *

Maj. Ernest J. Riley has been named head of the newly-formed supply division of the Seattle, Wash., district office of the U. S. E. D. **Maj. Walter E. Church** is now chief of the repairs and utilities division, and labor relations are now under supervision of **Maj. C. C. Templeton.**

* * *

William P. Adair, formerly an engineer for Arizona Constructors, Phoenix, Ariz., is now in the Civil Engineer Corps of the U. S. Navy and is at present attached to the Officer Station Force at Camp Parks, Calif.

* * *

Lt. Walter B. Little, Corps of Engineers, has been recently promoted to the rank of captain. He is serving as assistant Wenatchee, Wash. area engineer for military construction projects in north central Washington.

* * *

Cpl. Clarence H. Packer, Jr., formerly of the Utah Public Roads Commission and junior engineer on the Alcan highway project, is now stationed in the office of plans and blueprints at Camp Callan, San Diego, Calif.

* * *

John Downing, engineer for the Charles T. Main Co. of Boston, Mass., has been sent to Tacoma, Wash., to help the present staff speed construction of the $17,000,000 second Nisqually power project.

Richard H. Smith, formerly city manager of Phoenix, Ariz., has been appointed city manager of Ventura, Calif. He succeeds **D. C. McMillan** who resigned to become city manager of Alameda, Calif.

* * *

Melvin Boulware has been appointed city engineer of Biggs, Calif., to succeed **G. P. Ross,** who is now at Shasta dam with the Bureau of Reclamation. Boulware was formerly assistant engineer.

* * *

Clayton W. Schierman, formerly inspector for the Whitman Co., Wash., road department, and since last June engaged in defense work, has been named assistant county engineer of Whitman Co.

* * *

Lowell Erickson, for the past year employed as a designer at the Rocky Mountain arsenal at Denver, Colo., is now associated with the Merrill Engineering Laboratories of the same city.

* * *

A. A. Kirkwood, locating engineer for the Oregon State Highway Commission, has been transferred to Hood River on the project of relocating the Columbia River Highway.

* * *

J. Wayne Courter is now employed by the Public Roads Administration as a Highway Bridge Engineer on the bridge design for the Inter-American Highway, with headquarters at San Jose, Costa Rica.

* * *

John M. Medearis, inspector on construction at the Basic Magnesium plant at Las Vegas, Nev., was injured March 15 at the plant, and will be hospitalized for several months.

* * *

Paul H. Meyer, formerly assistant city engineer of Walla Walla, Wash., is now manpower utilization consultant for the WMC in the Alaska area, stationed at Edmonton, Alberta, Canada.

* * *

Olaf T. Jorgenson, map draftsman for the New Mexico State highway department, has recently accepted a commission as first lieutenant in the U. S. Air Corps.

* * *

Robert B. Anderson, assistant city engineer of Lewiston, Ida., has resigned to become a sanitary engineer at the Farragut naval training station in Idaho.

* * *

J. C. Hines is now working on aircraft assembly for the Vega Aircraft Co. at their Fresno, Calif., plant.

* * *

Captain Clarence Buehner, stationed at Hill Field Air Base, Utah, has been advanced to the rank of Major.

SUPERVISING THE JOBS

Harold Goodland is the general superintendent for George H. Buckler, Portland, Ore., on the housing project between Portland and Vancouver, Wash. The community is called Vanport City and is the largest defense housing project in the U. S., as well as being the second largest city in Oregon. **A. A. Pierson** is the project manager for the Federal Public Housing Authority, and **Howard Perrin** is the resident engineer. **C. J. Gates** is superintendent; **Lee Brant** is carpenter foreman, **Art Knope** is a foreman, and **G. Brigge** is grading superintendent. Other key men are **Sam Arvit, Jack Broce, Bob Parrin,** and **Charlie Johnson** of Wegman & Son, Portland, who also had contracts on the housing project.

* * *

Joseph Muscolo, superintendent for Bressi & Bevanda Constructors, Inc., Los Angeles, Calif., on tunnels on the Conchas canal in New Mexico, is now directing work on the company's two separate contracts totalling over $100,000 for parking aprons, landing field expansion and dust control at the Blythe air base in Riverside County, Calif. Other key men on the job are **R. P. Downs,** project manager; **Charles E. Abbott,** engineer; **A. P. Babich,** office manager; **A. Posey,** carpenter superintendent; **O. F. Siler,** master mechanic; **David Nutting,** paymaster; and **David Shurtliff,** bookkeeper.

* * *

Lee Woods is general superintendent for Lease & Leigland, Seattle, Wash., on a large contract now nearing completion for erection of defense workers housing units at Guild Lake, near Portland, Ore. **S. O. Leigland** is assistant superintendent on the project. **Mike Thill** is in charge of installation of water and sewer systems. **H. B. Loomis** is the contractor's engineer. Foremen are **Otto Danstrom** and **Earl Hartley, Shannon O'Neil** is paymaster and **Carl Johnson** is draftsman. **V. E. Logan** is project manager for the F.H.A., contracting agency. **Irvin Martin** is in charge of sheet rock installations for Martin & Testerman, subcontractors for that type of work.

* * *

John Herle is project manager, **Howard Smith** is general superintendent, and **William Blakeslee** is foreman for Smith Brothers, Vancouver, Wash., who have contracts for several jobs in the Pacific Northwest. These include sewers in Renton, Wash.; a railroad job at Pasco, Wash.; sewers, water supply systems and roads in Vancouver, Wash.; and streets and roads in Portland, Ore.

C. H. Moore is the general superintendent for the Isbell Construction Co., Reno, Nev., on the contract valued at $313,800 for grading and surfacing 11.77 mi. of state highway in Humboldt Co., Nev. **Jack Parsin** is resident engineer; **Wilmer Isbell** is project manager; **John Coviello** is plant superintendent; **Carl Merkt** is truck superintendent; **Irwin Wolford** is master mechanic; **Al Thompson** is roller superintendent; **L. F. Walsh** is office manager; and **A. C. Newton,** who has been running a shovel for the company for 16 years, is the shovel superintendent.

* * *

Theodore K. Weir is the job superintendent for Rand Construction Co., Los Angeles, Calif., who were successful bidders on a housing project in Long Beach, Calif., of $183,000. **Harry Winters** is the treasurer, **Henry M. Ullman** is the president, and **H. R. Hees** is sales manager for the company.

* * *

John Johnston has been named the job superintendent for Sound Construction & Engineering Co., and Ford J. Twaits Co., Seattle, Wash., who were successful bidders on a project of over $1,000,000 for storage facilities at an army air forces installation in Spokane Co., Wash. **George Madingly** and **Al Brices** are carpenter superintendents, **Wally St. Jacques** is concrete plant manager, and **Cliff Vester** is office manager on the project.

* * *

H. W. ARNOLD, superintendent for J. R. Armstrong, contractor on grading, street work, etc., for a housing project in Richmond, Calif., for which the general contractor is Oliver M. Rousseau, San Francisco. It is a $6,000,000 job.

J. J. Miller is general superintendent for J. M. Sumsion, Springville, Utah, on a gravel plant project in Provo Canyon. Other key men on the project which is scheduled for completion about June 25 are **Bill Obye,** foreman, and **Glen Holt,** cat operator.

* * *

Lynn Walker has been named job superintendent for Fritz Ziebarth Co. of Long Beach, Calif., on a railroad yard project in San Mateo County, Calif. The contract was for over $100,000. **Ray Walker** is the consulting engineer and **E. C. Stratton** is office manager on the job.

* * *

Floyd Gaither has been named general superintendent and **Varin Ralphs** and **Karl Martineau** are foremen for Varsi & Goodman on a defense housing project in Wasatch Gardens, Provo, Utah. The project is being financed by the First Security Trust Co. and will be finished about the first of October.

* * *

W. M. Wellman is job superintendent for Howard S. Wright & Co., Seattle, Wash., W. C. Smith Co., Portland, Ore., and L. H. Hoffman, Portland, Ore., who have a joint contract at over $100,000 for buildings and appurtenances in Walla Walla Co., Wash.

* * *

Vic Lab is electrical superintendent and **Ben Rottman** is foreman for the Capitol Electric Co., San Diego, Calif., sub-contractors on the permanent electrical installations on the general contract held by Macco Construction Co., Clearwater, Calif., at the San Diego Destroyer Base.

* * *

Key men employed by the Utah Construction Co., Ogden, Utah, on a project for shop and yards at Garfield, Utah, are: **Paul Volpp,** master mechanic, **Frank Glick,** shop foreman, **M. G. Wilson** and **W. Glick,** rip track foremen, **Allen J. Keehn,** blacksmith, and **T. G. Richard,** office manager.

* * *

Al Parent is job superintendent, **Allen V. Moore** is estimator, and **F. G. Yungberg** is president and general manager for the Tri-State Construction Co., Portland, Ore., on a housing project of 325 units in Portland on a contract of $616,399.

* * *

David Peterson is the job superintendent and **George Howard** is chief clerk for Trewhitt-Shields & Fisher, Fresno, Calif., on the construction of hospital buildings in Stanislaus County, Calif., for over $100,000.

* * *

Ben Walton is the general superintendent for Axman & Miller, McMinnville, Ore., on a contract for clearing, grading, paving, etc., at the Lovelock, Nev., airport. **Fred Townsend** is the res-

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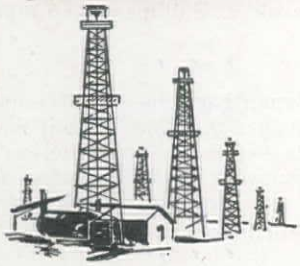
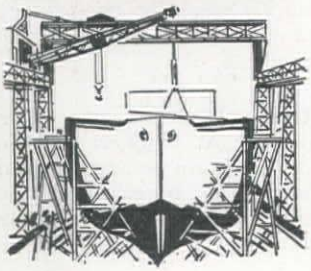


LOGGING

MANUFACTURING

SHIP BUILDING



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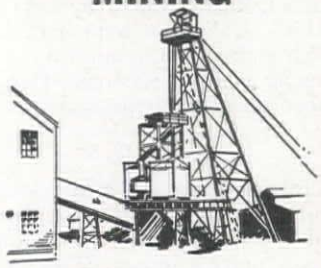
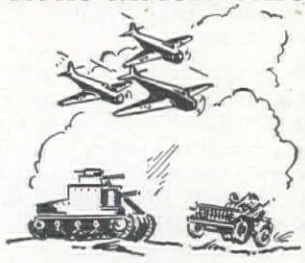
CONSTRUCTION

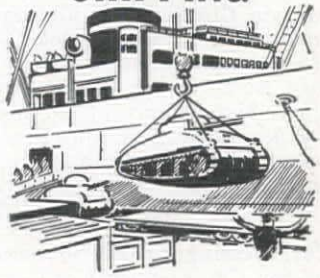
MINING



WAR MACHINES



SHIPPING



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ident engineer for the Civil Aeronautics Administration. **Don Turner** is the grading foreman for the contractor; **Arvid Wiik** is the plant foreman; **Otis Fox** is master mechanic; and **D. H. Skazes** is office manager on the project.

* * *

Presley Cleveland has been named job superintendent on a contract valued at over $50,000 for road, walk and parking areas in Grant County, Wash., for which McAtee & Heathe, Spokane, were successful bidders. **Howard Kirkpatrick** is the asphalt plant superintendent on the job.

* * *

Gus Kucharo is general superintendent for Kucharo & Union Construction Co., Fort Worth, Tex., who have a $340,000 contract for a 210-unit housing project in Pecos, Tex. **Glen Netcott** is mason superintendent on the project.

* * *

E. J. Jarvis is job superintendent for James I. Barnes Construction Co., Santa Monica, Calif., on a project valued at $451,000 for 240 temporary row type housing units at Astoria, Ore. **Walker Dobson** is office manager on the project.

* * *

Clifford Craig, superintendent for Nilson-Smith Construction Co., Great Falls, Mont., is directing the work on the company's highway contract of $309,789 for clearing, grading, draining, surfacing, and oiling on primary state highway No. 5 in Pierce County, Wash.

* * *

C. M. Bjoke is general superintendent for K. T. Henderson, contractor for a victory housing project at Guilds Lake, Portland, Ore., and foremen are **J. L. Meek, Harold Wiedman,** and **Andrew Westover. Charles Korten** is resident engineer on the project.

* * *

Marvin Covell is the job superintendent and **R. A. Westbrook** is general manager on the paving contract of $150,000 in Butte County, Calif., for which the combined firms of D. McDonald, M. J. Ruddy & Son, and R. A. Westbrook, Sacramento, Calif., were the contractors.

* * *

Carl Dessinger is the job superintendent for the Buckler Corp., Portland, Ore., on their contract of approximately $155,000 for an additional wing to the Northern Permanente Hospital at Vancouver, Wash. **Earl Rucker** is material clerk and timekeeper on the project.

* * *

A. P. Jensen is the job superintendent for Gaasland Construction Co., Bellingham, Wash., who were awarded a contract of over $100,000 for additional buildings in Kittitas County, Wash. **Ray G. Gaasland** is the office manager on the project.

A. B. NUSS is superintendent on an airport paving job in Scottsbluff Co., Nebr., for which the over $100,000 contract was awarded to Inland Constr. Co., Omaha.

T. Matt Hally, formerly director of the Highway Department of the state of Idaho, is the general superintendent for Henry L. Horn, Caldwell, Ida., who has the contract at $318,116 for a clover-leaf grade separation at the Denver Ave. junction of Hwy. 99 in Portland, Ore. **Ed. West, George Kenny,** and **Reidal Horn** are foremen on the project. Porter Yett, Portland, has the contract for paving on this job.

* * *

John R. Hassell and his brother **Walter R. Hassell,** both former employees of the Utah Construction Co., are now in the military service. John is an army private at Fort Benning, Ga., and Walter is an apprentice seaman at Farragut, Idaho.

* * *

WILLIAM C. CHRISTIAN, carpenter foreman for the Bureau of Reclamation, on construction of the Gila substation of the Parker power project, being built about 10 mi. east of Yuma, Ariz.

A. C. Miner is personally directing the work as superintendent for the firm of Miner Bros. Construction Co., Provo, Utah, on a contract for a railroad yard extension in Provo for the Denver & Rio Grande Railroad Co. **Eugene Miner** is foreman on the job and **Theo. Daybell** is master mechanic.

* * *

Robert D. Blake who was general manager of construction for the first housing unit project in Fontana, Calif., for the Fontana Housing Corp., will continue in that capacity for the second project. **Harold E. Phillips** will be superintendent.

* * *

I. W. Bruensbach has been named project manager for Peter Kiewit Sons' Co., Omaha, Nebr., on construction of concrete runways and taxiways and grading at the Quillayute Airdrome at Forks, Wash.

* * *

Fred Burrows has been named job superintendent by McDonald & Kahn, Inc., San Francisco, Calif., on the project of over $1,000,000 for a hospital at Auburn, Placer Co., Calif.

* * *

James Wardale has been named general superintendent for the Reynolds Construction Co., Springville, Utah, on a $98,000 contract for street paving in Weber Co., Utah. Completion date has been set for July 30.

* * *

Fred Jacobs has been named job superintendent by the Allied Contractors, Inc., Los Angeles, Calif., on their contract of $194,474 for 140 temporary dwellings in Arlington, Riverside County, California.

* * *

Otto Shultz is the general superintendent for the American Bridge Co., New York, N. Y., on the contract for steel erection at the new Provo, Utah, plant of the Columbia Steel Co. The project is scheduled for completion in December.

* * *

Martin Green, Jr., has been made superintendent for A. Teichert and Son, Sacramento, Calif., on construction of a runway and taxiway, together with necessary drainage, at Sutterville airport, near Sacramento.

* * *

S. B. Atherley is general superintendent for the firm of Atherley Bros., Eureka, Utah, on a housing project contract in Provo, Utah.

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UNIT BID SUMMARY

Bridge and Grade Separation . . .

Wyoming—Sweetwater County—State—Grade Separation

Woodward Construction Co., Rock Springs, at $79,932 was low bidder and was awarded the contract by the Wyoming Highway Department for an overhead cross. over the U.P. R.R. tracks near Baxter. The contract includes dism., rem. and re-erection of port. of exist. Ozone Viaduct, and grad., drain., base course surf., oil treatm. by the road mix method, and misc. work on 0.44 mi. of the Rock Springs Airport road. The following unit bids were submitted:

(1) Woodward Construction Co. $79,932
(2) E. E. Peterson 91,376
(3) H. W. Read 92,588
(4) Northwest Engineering Co. ..... $ 97,753
(5) Blanchard Brothers 121,098

		(1)	(2)	(3)	(4)	(5)
158,000	cu. yds. excavation	.14	.165	.20	.24	.40
57,000	cu. yds. mi. haul	.145	.20	.15	.16	.10
1,800	M. gal. watering (emb.)	1.25	2.50	3.00	2.40	2.75
1,050	hr. sheepsfoot roller operation	3.75	3.50	3.00	3.00	3.50
50	hr. pneumatic tired roller operation	4.50	6.00	4.00	5.00	6.00
110	cu. yds. excavation for pipe culverts	1.50	2.00	1.50	.75	1.00
276	lin. ft. 30-in. C.M.P. installed	1.00	1.00	1.00	.90	.65
95	hr. mechanical tamping	4.00	4.00	2.00	3.00	5.20
5	cu. yds. Class 1 riprap	6.00	6.00	5.00	4.00	6.50
10	cu. yds. grouted riprap	10.00	15.00	7.50	10.00	13.00
192	ea. guide posts	2.85	2.50	4.00	3.00	2.60
1	ea. timber project markers	15.00	15.00	10.00	15.00	13.00
3,100	T. pit run gravel base course (3-in. max.)	.90	1.15	1.05	.50	1.00
750	T. crushed gravel base course (1-in. max.)	1.20	1.46	1.93	1.50	1.25
1,100	T. crushed gravel surfacing (¾-in. max.)	1.20	1.46	1.93	1.50	1.50
95	T. stone chips	3.50	5.00	3.30	4.00	5.00
30	T. base treatment MC-1	22.00	30.00	22.50	24.00	25.00
18	T. seal coat RC-3	22.00	30.00	25.00	24.00	26.00
75	T. M.C. liquid asphalt dist. MC-3	22.00	30.00	22.50	22.00	25.00
8,900	sq. yds. processing roadway	.06	.07	.08	.08	.08
50	M. gal. watering (base)	1.25	2.50	3.00	2.50	2.75
30	hr. roller operation (base)	4.50	5.00	3.50	4.50	5.00
2,850	lin. ft. shaping and tamping curb	.075	.15	.05	.08	.40
60	lin. ft. shaping and tamping spillway	1.00	.40	2.00	.15	.60
10	cu. yds. structure excavation	1.50	2.00	1.50	1.50	2.00
2,180	lb. new structural steel	.20	.30	.30	.30	.50
40.329	M.B.M. new treated timber	200.00	185.00	180.00	175.00	193.00
381	lin. ft. 4-in. B.I. pipe railing	1.75	5.00	3.00	4.00	1.30
230	sq. ft. transite blast plates	2.00	1.50	1.40	2.00	1.65
324.7	cu. yds. Class A concrete	23.65	25.00	24.00	24.00	20.50
1,800	lb. reinforcing steel	.10	.10	.09	.10	.09
180	cu. yds. dry excavation for bridges	2.00	3.00	2.50	2.00	3.90
15.487	M.B.M. salvaged treated timber	50.00	50.00	55.00	48.00	42.00
Lump sum	Salvaged structural steel	$3,900	$2,000	$1,950	$2,600	$2,300
Lump sum	Removal of Ozone Viaduct	$3,400	$3,500	$4,200	$4,300	$4,600
2,724	lin. ft. treated timber piling	1.70	1.80	1.60	1.80	1.65
Lump sum	Removal of 3 timber bridges	$1,500	$1,200	$1,400	$2,000	650.00
400	lin. ft. straight curb (concrete)	1.25	1.25	1.10	.90	1.00

California—San Mateo County—State—Arch Culvert

California Paving Co., San Mateo, was low with a bid of $20,105 to the California Division of Highways, Sacramento, for a P.C.C. arch culvert and about 0.4-mi. grade. and bitum. surf. The following bids were submitted:

(1) California Paving Co. $20,105
(2) M. E. Whitney 20,370
(3) Peter Sorenson 20,819
(4) Frank George 21,540
(5) Louis Biasotti & Son $24,692
(6) Harms Brothers 26,019
(7) Dan Caputo 27,154
(8) F. Fredenburg 29,998

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Lump sum	Clearing and grubbing	250.00	750.00	$1,200	500.00	$1,000	$1,000	500.00	500.00
8,500	cu. yds. roadway excavation	.50	.53	.60	.60	.75	.60	.60	.80
650	cu. yds. structure excavation	2.00	2.50	3.50	2.50	4.00	3.00	4.00	3.00
50	cu. yds. ditch and channel excavation	6.00	3.00	5.00	1.00	2.00	3.00	4.00	2.00
4,000	cu. yds. imported borrow	1.10	.90	.70	1.50	1.30	2.10	2.25	2.50
22,000	sta. yds. overhaul	.01	.02	.01	.015	.02	.01	.01	.005
Lump sum	Developing water supply and furn. watering equipment	250.00	350.00	650.00	200.00	500.00	500.00	500.00	500.00
225	M. gals. applying water	3.00	2.00	2.50	2.00	2.00	1.50	1.50	2.50
19	sta. finishing roadway	10.00	13.00	8.00	10.00	15.00	10.00	10.00	20.00
4,700	sq. yds. prep. mix. and shap. surf. (B.S.T.)	.30	.27	.27	.30	.18	.15	.20	.20
30	T. liq. asph. MC-3 or 5 (B.S.T.)	30.00	35.00	25.00	40.00	30.00	30.00	30.00	50.00
10	T. liq. asph. MC-1 (prime coat)	30.00	35.00	25.00	40.00	40.00	30.00	30.00	70.00
8	T. liq. asph. MC-1 (pen. treatment)	30.00	40.00	30.00	40.00	50.00	30.00	40.00	70.00
4	T. asphaltic emulsion (seal coat)	40.00	50.00	35.00	40.00	60.00	40.00	40.00	100.00
40	T. screenings (seal coat)	8.00	6.50	5.00	6.00	5.00	6.00	6.50	5.00
110	cu. yds. Class "A" P.C.C. (structures)	40.00	39.00	38.00	27.00	38.00	45.00	45.00	40.00
9	ea. monuments	10.00	6.00	4.50	5.00	4.00	4.00	4.00	5.00
10	ea. culv. markers and guide posts	10.00	6.00	4.00	5.00	4.00	4.00	4.00	5.00
Lump sum	Removing existing bridge	350.00	400.00	500.00	300.00	500.00	600.00	600.00	300.00

Just 3 Words

PLEDGED
CONSTRUCTION
EQUIPMENT
CONSERVATION

— but what a whale of a lot they mean!

Photo courtesy of Broderick & Bascom Rope Co.

C-o-n-s-t-r-u-c-t-i-o-n
E-q-u-i-p-m-e-n-t
C-o-n-s-e-r-v-a-t-i-o-n

. . . that sums up a big part of today and tomorrow's job

- New construction equipment is hard to get—that means you'll have to take care of what you have.
- Time-consuming breakdowns must be avoided as much as possible; emergency repairs must be made quickly, and frequently without the usual type of critical materials and parts.

How About You?

Have you joined the ranks of the hundreds of owners and operators who are doing their darndest to do more with what they've got . . . to make their equipment last longer and work faster? You can tell these men by this 5" red, white and blue emblem on their trucks, tractors, bulldozers, shovels, cranes and scrapers. If you want to show others that you are conserving, write for one or more of these free emblems today.

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Lorain, Ohio

THEW CENTER DRIVE REG. U.S. PAT. OFF.

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THEW-LORAIN

CRANES • SHOVELS
DRAGLINES • MOTO-CRANES

Highway and Street...

California—Ventura County—State—Grade & Surf.

Basich Brothers, Torrance, at $175,260 bid low to the California Division of Highways, Sacramento, for 9.1 mi. of grading, untreat. rock base and plant-mix surf. to be placed over existing pavement and newly constructed untreated rock base, on roads and streets in the vicinity of Hueneme. The following bids were submitted:

(1) Basich Brothers $175,260
(2) Griffith Co. 197,796
(3) M. W. Sanfield 197,812
(4) Bressi & Bevanda Const. Co., Inc. 198,717
(5) Vido Kovacevich $202,671
(8) Guerin Brothers 227,484
(7) Oswald Brothers 233,596
(8) J. E. Haddock, Ltd. 235,815

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1,000	cu. yds. removing concrete	2.50	2.30	3.00	2.00	3.50	5.00	3.00	5.00
Lump sum	Clearing and grubbing	$1,500	$1,200	$1,800	$1,000	$4,200	$5,000	$1,000	$5,000
34,500	cu. yds. roadway excavation	.34	.55	.65	.55	.60	.78	.90	.72
30	cu. yds. structure excavation	2.00	2.50	1.70	2.00	2.50	4.00	2.00	2.50
23,000	cu. yds. imported borrow	.85	.83	1.05	1.35	.70	1.12	1.10	.75
Lump sum	d'v'l'p'g. wtr. sply. & furn. wtg. eq'p't.	1,000	$2,300	$1,700	$1,250	600.00	500.00	$1,000	$1,000
1,800	M. gals applying water	1.50	1.20	1.30	2.25	1.50	1.50	1.50	2.00
Lump sum	Finishing roadway	$4,800	$1,800	$1,700	$3,000	$2,000	$5,000	$3,000	$7,500
19,500	T. untreated rock base	1.70	1.95	1.95	1.75	2.00	1.88	2.20	2.40
53,200	sq. yds. prep'g, mxg. and shpg. surface	.10	.11	.06	.08	.10	.07	.12	.15
650	T. liq. asph., MC-2 (B.S.T.)	17.00	15.40	14.50	15.00	15.00	20.00	15.00	16.00
85	T. liq. asph., MC-2 (prime coat)	20.00	18.00	20.00	16.00	16.00	15.00	18.00	18.00
23,500	T. P.M.S.	3.00	3.64	3.40	3.35	3.75	3.85	4.00	4.00
64	T. asphaltic emulsion (pt. bdr. and sl. ct.)	25.00	23.00	21.00	24.00	27.00	30.00	60.00	35.00
10	cu. yds. concrete pipe encasement	15.00	12.00	10.00	20.00	19.00	20.00	12.00	20.00
420	cu. yds. Cl. "A" P.C.C. (sidewalks)	17.00	16.00	15.30	16.00	16.00	20.00	18.00	18.00
36	ea. culvert markers	3.00	3.25	4.00	5.00	3.00	5.00	3.00	4.00
84	lin. ft. 18-in. unreinf. conc. pipe (2000-D)	3.00	3.50	2.50	2.50	3.75	2.50	2.00	4.00
18	ea. adjusting manholes to grade	25.00	12.00	10.00	15.00	10.00	25.00	7.00	20.00

New Mexico—McKinley County—State—Surf.

R. C. Carrico, Albuquerque, submitted the low bid of $94,105 to the New Mexico State Highway Department for 4.66 mi. of surf. on U. S. Highway 66 betw. Gallup and Ft. Wingate. The low bid was slightly under the engineer's estimate. The unit bids were as follows:

(1) R. C. Carrico ..... $ 94,105
(2) Brown Brothers 113,989
(3) E. M. Silver 121,351
(4) Skousen Brothers $125,698
(5) Engineer's estimate 98,393

		(1)	(2)	(3)	(4)	(5)
Lump sum	Removal of old drainage structures	400.00	$1,000	800.00	$1,000	725.00
93	hr. rolling—steel tired roller	4.50	6.00	6.00	5.00	5.00
307	hr. rolling—sheepsfoot roller	5.00	6.00	5.00	3.00	4.00
18,500	T. base course surfacing—No. 1 aggregate	1.55	1.60	1.90	1.90	1.35
1,106	M. gal. watering	2.50	4.00	4.50	4.50	3.50
4.659	mi. obliterating old road	100.00	100.00	100.00	200.00	300.00
32,812	T. ballast	1.05	1.35	1.60	1.65	1.00
1,172	bbl. liquid asphaltic road oil, Type MC-3	5.60	6.00	5.70	5.00	6.00
2,232	T. cover material	5.00	6.00	4.00	6.00	6.50
1,120	bbl. asphalt	5.60	6.00	5.80	5.00	6.00
4.659	mi. preparation of base course	300.00	$1,000	700.00	700.00	$1,000

Arizona—Coconino County—State—Pave

Fisher Contracting Co., Phoenix, submitted a bid of $232,802 which was low to the Arizona Highway Department for a project approx. 2.8 mi. long of grade., drain., an aggr. base course, and conc. pave. on the Flagstaff-Winslow highway. The following bids were submitted:

(1) Fisher Contracting Co. $232,802
(2) Wallace & Wallace 234,341
(3) H. L. Royden $253,263

		(1)	(2)	(3)
49,015	cu. yds. roadway excavation (unclassified)	.91	.65	.90
898	cu. yds. drainage excavation (unclassified)	1.00	.50	.90
4,400	lin. ft. grader ditches	.06	.05	.10
775	cu. yds. structural excavation (unclassified)	2.00	2.00	2.00
32	cu. yds. removal of old concrete	17.00	11.00	14.00
41,521	sta. yds. station yard overhaul	.02	.02	.05
14,389	cu. yds. mi. haul	.40	.25	.30
3,409	T. imported borrow	.42	.55	.52
35,603	T. select material	.45	.55	.55
10,411	T. fine aggregate base course	.95	.90	.90
2,000	cu. yds. stripping pits	.25	.20	.18
2,935	M. gal. sprinkling	2.00	1.75	2.08
850	hr. rolling	4.30	4.25	4.25
36,356	sq. yds. concrete pavement	3.10	3.40	3.48
330	cu. yds. Class "A" concrete (including cement)	34.50	35.00	37.50
19	cu. yds. Class "B" concrete (including cement)	32.00	35.00	37.50
5,890	lb. reinforcing steel (bars)	.09	.10	.10
233	lin. ft. 21-in. plain concrete pipe (CIP except excavation)	3.50	3.75	4.00
50	lin. ft. resetting 24-in. C.M.P. (CIP incl. all mat'l and work)	3.45	1.25	2.50
2	ea. standard wire gates (Type 2)	20.00	10.00	14.00

(Continued on next page)

THERMOMETER HITS BOTTOM

-but Airports must be built!

THE miracle of modern machinery is a continuous thing. Time was when the laying of concrete slab at 8°F was one of those things that couldn't be done. But military necessity found a way and a new airport is being completed in spite of the guns of "Old Man Winter."

Man and machine take a real beating in weather like this. The tugging of the intense cold against the high temperatures of the heating equipment impose strains for which road machinery is not built.

But this is just one of the things that MultiFoote Pavers are doing that they never had to do before — one of the many things on which MultiFoote Pavers are proving their metal.

These are the things to remember after the "Duration." Then the smooth operation; the many MultiFoote advantages; the flexibility made possible by the use of elevated booms; the speed and ease of handling, will mean profitable post-war contracts. We will be glad to give you complete details to aid in planning for the future.

THE FOOTE COMPANY, INC., Nunda, New York

The World's Largest Exclusive Manufacturers of Concrete and Black Top Pavers.

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CONCRETE PAVERS

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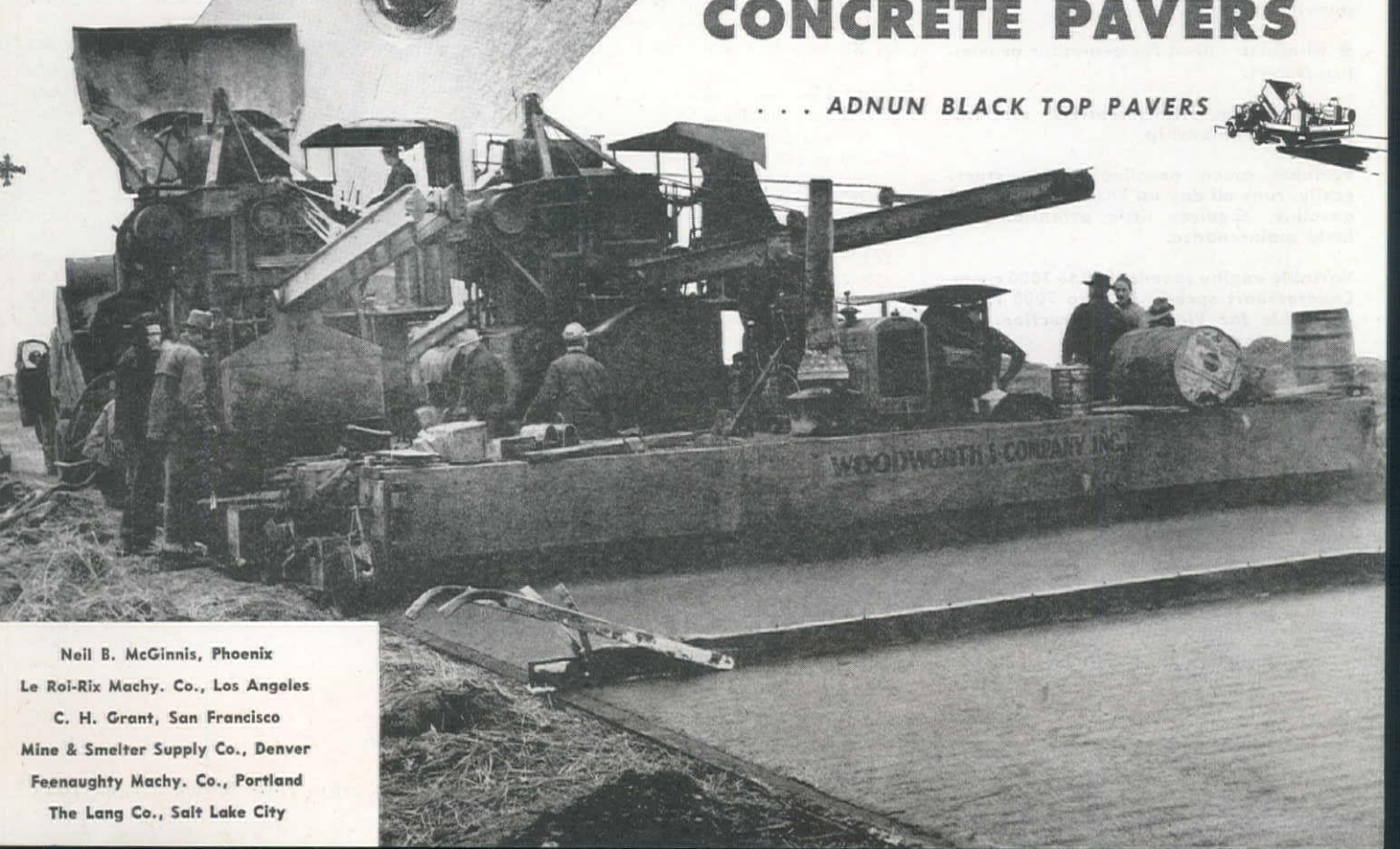


Neil B. McGinnis, Phoenix
Le Roi-Rix Machy. Co., Los Angeles
C. H. Grant, San Francisco
Mine & Smelter Supply Co., Denver
Feenaughty Machy. Co., Portland
The Lang Co., Salt Lake City

16,910	lin. ft. reconstructed fence (CIP except new posts)	.09	.07	.10
600	ea. line fence posts (for reconstructed fence only)	.90	.70	.50
182	ea. guide posts	3.00	3.25	3.75
39	ea. R/W markers (Type "B")	5.25	4.00	4.25
135	T. bituminous mix (CIP except liquid asphalt)	2.30	2.75	3.60
106	T. road oil (MC-2) (for oil mix & B.S.T.) (CIP on road)	25.70	27.00	34.00
44	T. road oil (MC-5) (for B.S.T. & seal coat) (CIP on rd.)	25.70	27.00	35.00
270	T. blotter mat'l (for B.S.T. & seal coat) (CIP on road)	3.50	4.00	6.00
2,400	lin. ft. resetting 2-in. water pipe	.80	1.25	.75
Lump sum	Removal of concrete structure (Rt. Sta. 45+80)	345.00	250.00	350.00
Lump sum	Removal of timber structures	175.00	300.00	250.00
3,800	T. salvaging, crushing and stockpiling bitum. pave. (CIP in stockpile)	1.15	1.75	1.30

California—Alameda County—State—Pave.

Heafey-Moore Co., Oakland, bid low at $96,414 to the California Division of Highways, Sacramento, for 0.8 mi. of grade., and pave., with asphaltic concrete on crusher run base on Atlantic Ave. in the city of Alameda betw. Main St. and Webster St. The following units bids were submitted:

(1) Heafey-Moore Co. ..... $ 96,414
(2) Louis Biasotti & Sons 96,678
(3) Stolte, Inc. 101,622
(4) Lee J. Immel $104,229
(5) Charles L. Harney 113,893
(6) Guerin Brothers 135,307

		(1)	(2)	(3)	(4)	(5)	(6)
40	cu. yds. removing concrete	6.00	5.00	5.00	5.00	5.80	12.00
15,500	cu. yds. roadway excavation	.72	.60	1.00	.60	.57	.70
950	cu. yds. structure excavation	3.30	2.00	4.00	2.00	4.00	3.00
18,000	T. imported borrow	1.30	1.40	1.25	1.50	1.96	2.75
Lump sum	Develop. wat. supply and furn. watering equip.	180.00	500.00	100.00	400.00	400.00	150.00
300	M. gals. applying water	1.80	1.50	1.75	1.50	2.00	2.50
43	sta. finishing roadway	9.60	12.00	10.00	10.00	10.00	10.00
6,700	T. crusher run base	2.60	2.65	2.50	3.00	2.60	3.50
80	T. screenings (armor coat)	5.40	4.50	3.50	5.00	4.00	5.00
19	T. liquid asphalt MC-1 (prime coat)	25.00	25.00	20.00	30.00	30.00	25.00
5	T. liquid asphalt MC-5 (armor coat)	24.50	30.00	25.00	30.00	35.00	25.00
6,100	T. asphalt concrete	5.40	5.50	5.60	6.00	6.50	6.50
8	ea. Redwood covers	14.40	25.00	7.00	10.00	15.00	10.00
2	M.B.M. Redwood timber	156.00	150.00	150.00	200.00	275.00	100.00
28	cu. yds. Class "A" P.C.C. (structures)	50.40	40.00	35.00	40.00	50.00	40.00
60	cu. yds. Class "B" P.C.C. (curbs, gutters and sidewalks)	26.40	25.00	30.00	30.00	30.00	30.00
8	ea. culvert markers	3.00	4.00	5.00	3.00	3.50	5.00
330	lin. ft. 10-in. vitrified clay pipe	1.32	2.00	3.20	2.50	1.00	2.00
128	lin. ft. 12-in. vitrified clay pipe	1.62	2.25	3.50	3.00	1.30	2.75
80	lin. ft. 18-in. vitrified clay pipe	2.76	3.50	4.50	4.00	2.75	4.00
100	lin. ft. salvaging pipe culverts	.72	1.00	1.00	1.00	1.30	2.00
20	ea. raised bars	15.60	5.00	2.50	3.00	5.00	5.00
15	ea. adjusting manholes to grade	12.00	50.00	10.00	20.00	40.00	15.00
200	lbs. bar reinforcing steel	.10	.10	.10	.10	.12	.10
432	lin. ft. 12-in. unreinf. conc. pipe (3000-D)	2.46	2.25	3.50	3.00	1.65	2.50

Washington—Pierce County—State—Grade & Surf.

Nilson-Smith Construction Company, Great Falls, Montana, submitted the low bid and was awarded the contract at $309,799 by the Washington Direcor of Highways, Olympia, for 3.22 mi. of grade. and surf. on the La Grande to Elbe portion of primary state highway No. 5. 200 days was set for the time of completion of the project. The unit bids were as follows:

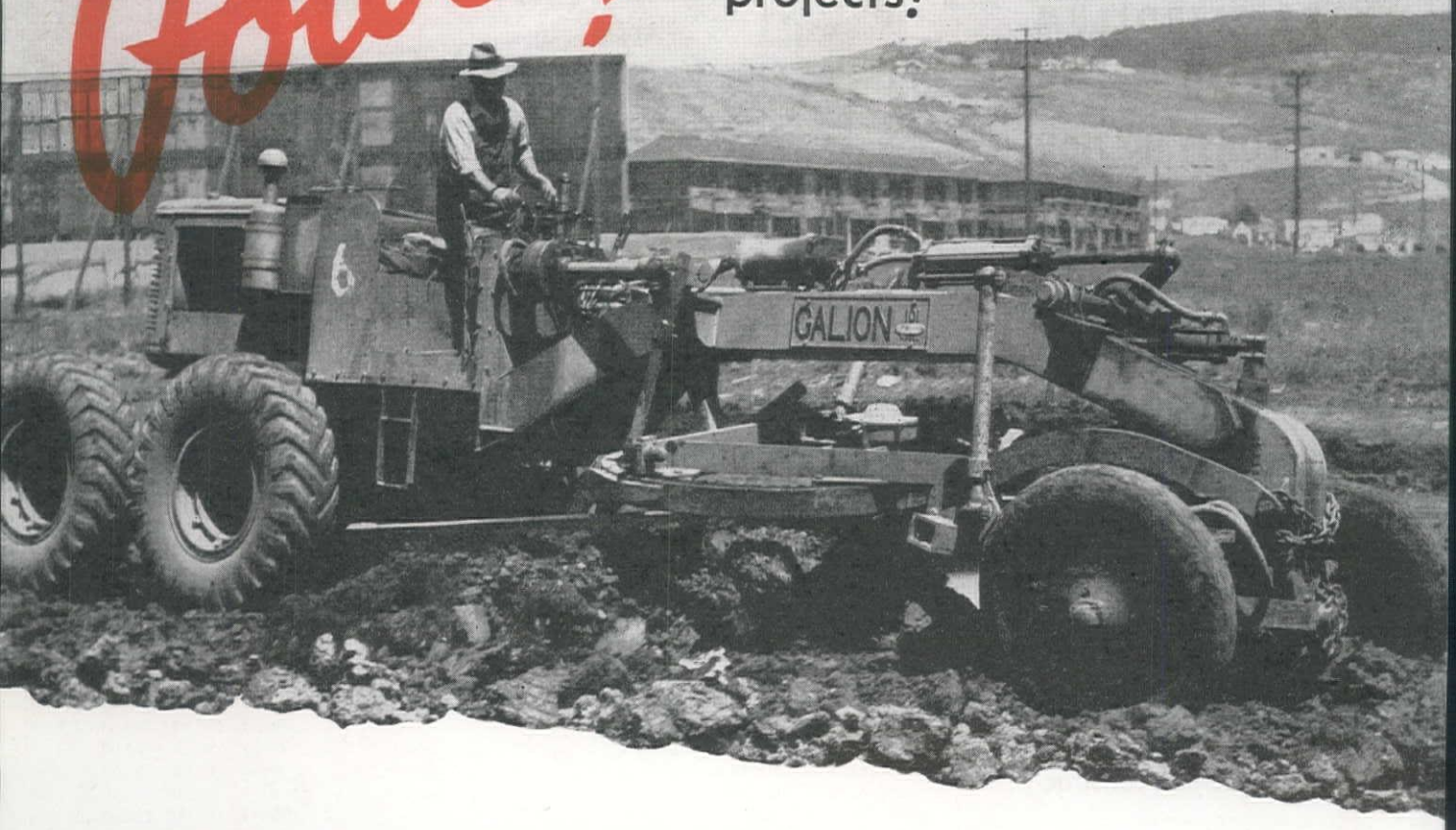
(1) Nilson-Smith Construction Co. $309,799
(2) Colonial Construction Co. $347,561

		(1)	(2)
1.7	acres special clearing	300.00	800.00
34.4	acres clearing	250.00	500.00
31.0	acres grubbing	300.00	500.00
181,290	cu. yds. unclassified excavation incl. haul of 600 ft.	.48	.72
440	cu. yds. common trench excavation incl. haul of 600 ft.	2.00	1.50
179,980	cu. yds. (sta.) overhaul on above materials	.02	.02
344.61	M. cu. yd. (sta.) overhaul on above materials	5.00	5.00
2,485	cu. yds. structure excavation	2.00	3.00
16,050	lin. ft. slope treatment	.12	.10
170.2	stas. finishing roadway	15.00	15.00
36,300	cu. yds. selected roadway borrow in place, incl. haul	1.25	1.00
130	cu. yds. gravel backfill in place	5.00	2.50
2,680	cu. yds. cr. stone surf. top course in place on roadway	3.50	2.25
7,610	cu. yds. cr. stone surf. base course in place on roadway	3.00	2.25
1,130	cu. yds. sand filler (incl. haul)	1.50	2.00
640	M. gal. water	2.50	3.00
	LIGHT BITUMINOUS SURFACE TREATMENT—METHOD "A"		
3.2	mi. preparing, construction and finishing	500.00	200.00
101.0	T. bituminous cement MC-2 in place on roadway	40.00	30.00
750	cu. yds. placing crushed cover stone	4.00	5.00
	NON-SKID SINGLE SEAL TREATMENT—SCHEDULE "A"		
59.5	T. bituminous cement RC-4 in place on roadway	40.00	30.00
690	cu. yds. mineral aggregate in place	5.00	5.00
	MINERAL AGGREGATE FOR NON-SKID SINGLE SEAL TREATMENT—SCHEDULE "A"		
590	cu. yds. coarse crushed screening ⅝-in. to ¼-in. in stockpile	4.00	2.00
180	cu. yds. fine crushed screenings ¼-in. to 0-in. in stockpile	3.00	2.00
	MISCELLANEOUS ITEMS		
650	cu. yds. crushed stone surfacing top course in stockpile	4.00	2.00

(Continued on next page)

Power!

. . . GALION power speeds work on many vital war construction projects!



CONTRACTORS ON IMPORTANT JOBS everywhere know that rugged GALION construction assures continuous work under toughest conditions . . . with minimum repairs on the machine.

Galion motor graders give "plus performance" on vital war-housing projects (see illustration) . . . on such jobs as the Alcan Highway and the Pan-American Highway where roads must be built often through jungle trails.

Galion power cuts the heaviest soil with ease . . . Galion maneuverability speeds work tremendously on these tough rush jobs. Like the Marines, Galion motor graders go places, do things . . . take a lot of punishment. They have what it takes.

SEE YOUR NEAREST DEALER WHEN REPAIRS ARE NEEDED

BROWN-BEVIS EQUIPMENT CO., Los Angeles, California and Phoenix, Arizona; F. RONSTADT HARDWARE CO., Tucson, Arizona; H. W. MOORE EQUIPMENT CO., Denver, Colorado; HALL PERRY MACHINERY CO., Butte, Montana; MORROW & CO., Albuquerque, New Mexico; ARNOLD MACHINERY CO., Salt Lake City, Utah; NELSON EQUIPMENT CO., Portland, Oregon, Seattle, Washington, and Twin Falls, Idaho; WESTERN TRACTION CO., San Francisco, California; ORMANDE C. BELL, Reno, Nevada.

GALION ROAD MACHINERY points to better roads

The GALION IRON WORKS & MFG. CO.
GALION . . . . . OHIO

820	cu. yds. crushed cover stone in stockpile	4.00	2.00
96	ea. concrete right-of-way markers in place	5.00	4.00
381.64	cu. yds. concrete Class "F" in place	30.00	37.00
20,940	cu. yds. loose riprap Class "A" complete in place	1.75	2.00
20	lin. ft. special open wood spillway in place	1.00	2.00
5,635	lin. ft. special wood gutter design No. 3 complete in place	1.00	1.20
186	lin. ft. special wood spillway in place	1.00	2.50
11,805	lin. ft. standard guard rail Type No. 5 in place	1.50	.90
3,563	sq. yds. removing existing concrete pavement	1.00	.50
7	ea. removing existing concrete pipe headers	10.00	10.00
1,387	lin. ft. removing existing guard rail	.30	.40
183	lin. ft. plain concrete or V.C. culvert pipe 12-in. diam. in place	2.00	2.00
1,320	lin. ft. plain concrete or V.C. culvert pipe 18-in. diam in place	3.00	3.00
464	lin. ft. plain concrete or V.C. culvert pipe 24-in. diam. in place	4.00	4.50
198	lin. ft. stand. reinf. concrete culvert pipe 30-in. diam. in place	8.00	6.00

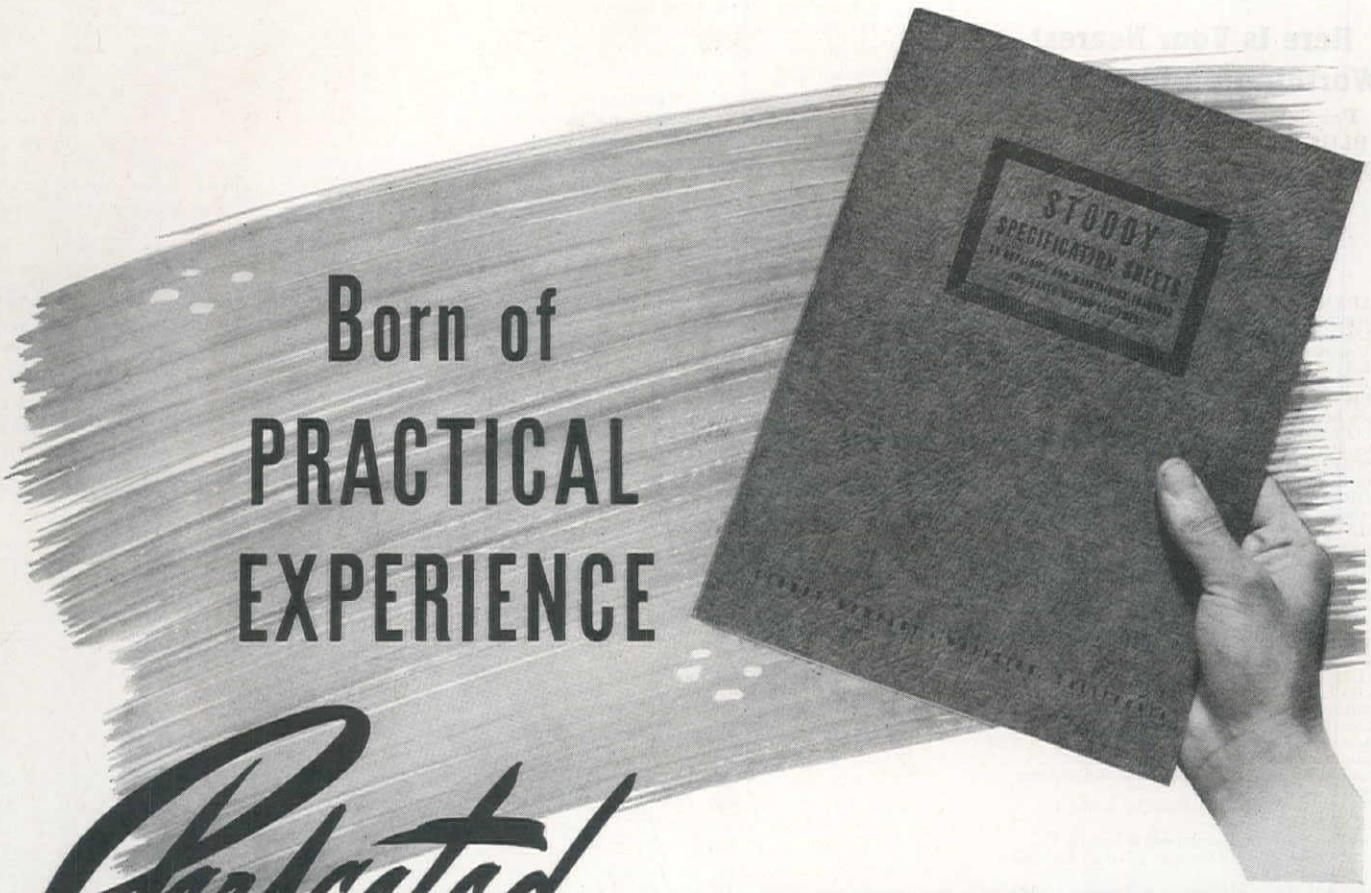
California—San Francisco County—City—Grading

Eaton & Smith, San Francisco, were low bidders at $521,166 and were awarded the contract by the Housing Authority of the City and County of San Francisco for grading work in connection with a housing project of 2000 temp. family units at Hunters Point. The following unit bids were submitted:

(1) Eaton & Smith.....$521,166
(2) Charles L. Harney..... 636,240
(3) MacDonald & Kahn Co., Ltd.....$643,788
(4) Fred J. Early, Jr..... 782,844

		(1)	(2)	(3)	(4)
Lump sum,	clearing site	$5,100	$4,400	$6,000	$2,000
210,000	cu. yds. excav.	.44	.38	.46	.77
900	hrs. rolling embankment	7.50	6.00	7.00	8.00
120,000	gal. water for sprinkling embankment	2.00	6.00	2.00	3.00
2,000	cu. yds. stockpiling top soil	.50	.20	2.25	1.50
2,200	lin. ft. 12-in. C.I. water pipe	2.95	4.60	5.25	4.98
1,480	lin. ft. 10-in. C.I. water pipe	2.44	3.85	4.25	4.20
6,320	lin. ft. 8-in. C.I. water pipe	1.89	3.10	3.40	3.30
8,360	lin. ft. 6-in. C.I. water pipe	1.50	2.47	2.65	2.78
42,000	lin. ft. 2-in. C.I. water pipe	.63	1.10	1.20	1.47
520	lin. ft. ¾-in. steel water pipe	.41	.85	.85	.85
2	ea. 12-in. gate valves	122.00	180.00	200.00	200.00
1	ea. 10-in. gate valve	96.00	130.00	110.00	150.00
9	ea. 8-in. gate valves	65.00	80.00	80.00	84.00
12	ea. 6-in. gate valves	45.00	60.00	50.00	55.00
90	ea. 2-in. plug valves	9.30	30.00	8.50	13.00
32	ea. fire hydrants	138.00	165.00	120.00	152.00
54,000	lbs. cast iron fittings	.095	.11	.17	.26
Lump sum,	sterilization of water lines	$1,000	275.00	400.00	500.00
730	lin. ft. 18-in. V.C.P.	4.30	5.90	4.00	4.72
170	lin. ft. 15-in. V.C.P.	3.85	4.60	3.50	4.20
920	lin. ft. 12-in. V.C.P.	3.40	3.50	3.00	3.25
9,420	lin. ft. 8-in. V.C.P.	2.64	2.55	2.10	2.75
37,870	lin. ft. 6-in. V.C.P.	1.25	1.85	1.85	2.07
4,000	lin. ft. 4-in. V.C.P.	1.40	1.70	1.20	1.37
82	ea. manholes with covers	150.00	140.00	170.00	180.00
250	ea. flush inlets with covers	15.00	25.00	11.50	11.00
120	lin. ft. 18-in. conc. storm sewer pipe	2.86	5.40	5.00	4.20
180	lin. ft. 15-in. conc. storm sewer pipe	4.00	4.50	3.50	3.65
3,800	lin. ft. 12-in. conc. storm sewer pipe	3.00	3.25	2.40	2.94
4,540	lin. ft. 10-in. conc. storm sewer pipe	2.70	3.00	2.20	2.68
10,400	lin. ft. 8-in. conc. storm sewer pipe	2.50	2.30	1.95	2.10
320	lin. ft. 8-in. welded steel gas pipe	1.48	2.10	3.70	3.67
2,000	lin. ft. 6-in. welded steel gas pipe	1.34	1.80	2.85	3.10
3,780	lin. ft. 4-in. welded steel gas pipe	1.14	1.55	1.70	2.36
2,140	lin. ft. 3-in. welded steel gas pipe	1.09	1.55	1.60	2.10
1,500	lin. ft. 2½-in. steel gas pipe	.61	1.40	1.40	1.84
3,600	lin. ft. 2-in. steel gas pipe	.52	1.10	1.15	1.80
2,780	lin. ft. 1½-in. steel gas pipe	.47	1.05	1.10	1.49
2,440	lin. ft. 1¼-in. steel gas pipe	.45	1.00	1.05	1.47
24,400	lin. ft. 1-in steel gas pipe	.42	.82	.85	1.42
5,020	lin. ft. ¾-in. steel gas pipe	.40	.80	.80	.95
2	ea. 4-in. lubricated plug valves	23.00	45.00	30.00	23.60
1	ea. 3-in. lubricated plug valves	18.00	40.00	25.00	17.00
4	ea. 2½-in. lubricated plug valves	16.00	35.00	20.00	14.00
9	ea. 2-in. lubricated plug valves	13.00	30.00	15.00	11.00
7	ea. 1½-in. lubricated plug valves	9.20	30.00	12.50	10.50
13	ea. 1¼-in. lubricated plug valves	9.20	25.00	12.00	10.25
104	ea. 1-in. lubricated plug valves	5.00	22.00	9.00	10.00
160	ea. ¾-in. lubricated plug valves	4.80	22.00	8.50	13.00
35	ea. ¾-in. blow-offs	8.70	55.00	14.00	12.00
260	ea. gas pressure regulators	13.00	27.50	7.50	13.00
1	ea. ¾-in. air release valve	19.00	35.00	15.00	52.00
2	ea. conc. gas meter platforms	109.00	275.00	170.00	80.00
2	ea. 8-in. dresser type couplings	5.10	8.00	5.00	11.00
10	ea. 6-in. dresser type couplings	4.30	7.50	4.00	10.00
9	ea. 4-in. dresser type couplings	3.20	6.00	3.50	9.00
7	ea. 3-in. dresser type couplings	2.80	5.50	3.50	8.00
4	ea. 2½-in. dresser type couplings	2.50	5.00	3.00	7.50
10	ea. 2-in. dresser type couplings	2.25	4.50	3.00	7.35
9	ea. 1½-in. dresser type couplings	1.50	4.00	2.00	7.00
10	ea. 1¼-in. dresser type couplings	1.40	3.50	1.70	6.50

(Continued on next page)



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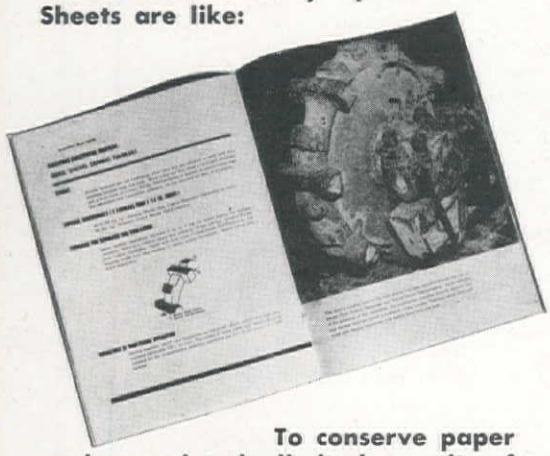
Perfected by ENGINEERING RESEARCH

Here's what Stoody Specification Sheets are like:



To conserve paper we have printed a limited quantity of these Specification Sheets. For this reason, copies are restricted to those concerns engaged on essential projects where wear is a major problem. If you feel that you qualify, write for your copy today.

INTENSIVE effort to complete projects on time has prevented proper maintenance of construction equipment. Spare parts shortage has further aggravated the condition. Development of methods for keeping equipment in operation were forced squarely upon the contractor. Today, Stoody Company offers a compilation of successful methods developed by maintenance welders for combating wear on twenty pieces of earth-working and crawler type equipment. Each method was further developed and perfected by our own engineers and can beyond all doubt be successfully applied to any of the equipment listed.

STOODY COMPANY

1136 WEST SLAUSON AVENUE, WHITTIER, CALIFORNIA

STOODY HARD-FACING ALLOYS

Stop wear . . . Eliminate Repair

5 ea. 1-in. dresser type couplings	1.30	3.50	1.40	6.25
350 lin. ft. 6-in. open tile drain	.88	2.50	1.60	2.10
330 cu. yds. structure excav.	5.00	8.00	3.50	3.00
64,500 sq. yds. subgrade	.08	.15	.05	.16
64,500 sq. yds. 4-in. compacted rock base course	.22	.35	.45	.39
3,600 sq. yds. 5-in. compacted rock parking area pave.	.24	.40	.50	.47
32,400 lin. ft. curbs adjoining conc. pave.	.52	.56	.70	.54
95 cu. yds. conc. catchbasin and headwalls	30.00	60.00	40.00	35.00
290 cu. yds. conc. walls, curbs and gutters in park. areas	30.00	40.00	40.00	25.00
57,600 sq. yds. conc. roadway pave.	1.85	1.91	1.90	2.25

Utah—Weber County—State—Pave. & Surf.

W. W. Clyde & Co., Springville, submitted a bid of $188,258 to the Utah State Road Commission which was low for the project between Roy and Riverdale of 1.56 mi. of dual portl. cem. concrete and bitum. surf. road. The roadway width is to be 48 ft. An alternate set of materials for asphalt and aggregate were submitted for bidding. The low bid was considerably below the engineer's estimate. The following unit bids were submitted.

	(a)	(b)		(a)	(b)
(1) W. W. Clyde & Co.	$188,258	$———	(5) Wheelwright Const. Co.	$235,898	$———
(2) Olaf Nelson Const. Co.	193,269	———	(6) A. O. Thorn & Sons Const. Co.	258,499	250,273
(3) J. B. & W. E. Walker, Inc.	201,013	204,360	(7) Engineer's estimate	232,637	230,293
(4) Gibbons & Reed Co.	215,605	———			

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(a) 5,640 T. plant mix bituminous surfacings	2.20	2.80	3.00	3.00	4.50	4.90	3.00
(b) 60,300 gal. bituminous mat'l, 200-300 penetr'n	.09	.10	.10	.10	.10	.11	.11
(c) 17,500 gal. bituminous mat'l, Type MC-1	.11	.12	.13	.11	.12	.11	.12
(d) 8,400 gal. bituminous mat'l, Type RC-3	.11	.12	.13	.11	.12	.12	.12
(e) 410 T. cover material	3.00	3.50	2.00	3.00	4.00	4.00	4.00
(f) 22,200 T. crushed rock or crushed gravel	.70	.58	.85	.90	.90	.80	.75
20,170 sq. yd. concrete pavement, surf. course	2.20	2.50	2.65	2.50	2.69	2.90	2.80
183,800 cu. yd. unclassified excavation	.25	.21	.173	.22	.22	.25	.30
785,000 st. yd. overhaul, Class "A"	.01	.01	.01	.015	.02	.02	.015
30,500 yd. mi. overhaul, Class "B"	.15	.15	.15	.15	.25	.20	.15
2,840 1000 gal. watering	1.25	1.50	1.75	2.00	2.00	1.50	1.50
2,560 hr. rolling	3.50	3.50	3.75	4.00	5.00	4.50	4.00
8,700 cu. yd. channel excavation	.40	.35	.50	.30	.60	1.00	.40
2,000 cu. yd. top soil	.75	1.00	.40	1.00	1.00	.50	1.00
250 lin. ft. 8-in. concrete pipe	.60	.90	.56	.60	.80	1.50	.75
1,002 lin. ft. 10-in. concrete pipe	.75	1.00	.68	.90	1.10	1.50	1.00
258 lin. ft. 15-in. concrete pipe	1.50	1.50	1.32	1.50	1.85	2.50	2.00
1,797 lin. ft. 18-in. concrete pipe	1.90	1.80	1.71	2.00	2.00	3.00	2.70
192 lin. ft. 18-in. concrete pipe (extra strength)	2.00	2.00	1.88	2.20	2.20	3.50	3.20
285 lin. ft. 24-in. concrete pipe	2.40	2.50	2.20	3.50	2.60	3.75	3.40
174 lin. ft. 30-in. concrete pipe	3.40	3.60	3.33	5.00	3.80	5.00	4.60
180 lin. ft. 18-in. concrete pipe syphons	2.25	2.20	1.83	2.20	2.70	4.00	3.20
2,300 lin. ft. 8-in. underdrains	.55	.60	.47	.60	.60	1.25	.60
2,250 lin. ft. 10-in. underdrains	.60	.80	.50	.90	.70	1.30	.70
520 lin. ft. 8-in. welded steel pipe	.80	1.00	.90	.95	1.00	1.50	1.00
132 lin. ft. 10-in. welded steel pipe	1.20	1.00	.90	1.00	1.50	2.00	1.20
4,325 cu. yd. excavation for structures	1.00	1.50	2.00	1.50	1.00	2.00	1.50
163 cu. yd. concrete, Class "A"	35.00	30.00	50.00	35.00	35.00	40.00	40.00
65 cu. yd. concrete, Class "B"	30.00	30.00	26.50	35.00	35.00	30.00	35.00
22,550 lb. reinforcing steel	.075	.07	.075	.09	.075	.10	.08
2,620 lin. ft. concrete curb, No. 1-C	1.00	1.40	1.50	1.20	1.25	1.50	1.50
Lump sum Clearing and grubbing	$1,000	$2,000	800.00	$5,000	$4,000	$3,000	$2,000
1,000 sq. yd. removal of existing pavement	.50	.50	.60	.60	.75	1.00	.75
0.5 MFBM lumber	150.00	100.00	2.75	150.00	100.00	300.00	150.00
1 ea. F.A.P. markers	20.00	15.00	15.00	15.00	15.00	25.00	10.00
12,050 lin. ft. right of way fence, Type "A"	.14	.12	.14	.18	.13	.20	.15
5,100 lin. ft. moving fence	.10	.10	.12	.15	.12	.20	.10
21 ea. 14-ft. gates	25.00	20.00	33.00	40.00	20.00	25.00	20.00
ALTERNATE BID OF ITEMS (A) TO (F) INCLUSIVE							
1,340 T. natural rock asphalt			14.25			14.50	12.00
40,400 gal. bituminous material, Type MC-2			.13			.11	.12
4,200 gal. bituminous material, Type RC-3			.13			.12	.12
1.803 mile scarifying and mixing			800.00			$1,500	700.00
0.627 mile scarifying and mixing (paved cut ditch 3-ft. wide)			$1,000			$1,000	500.00
0.492 mile scarifying and mixing (shoulder and embankment gutter 9.25 ft. wide)			$1,000			$1,000	600.00
45 T. cover material			5.00			5.00	4.00
25,500 T. cr. rock or cr. gravel surface cover			.85			.80	.75

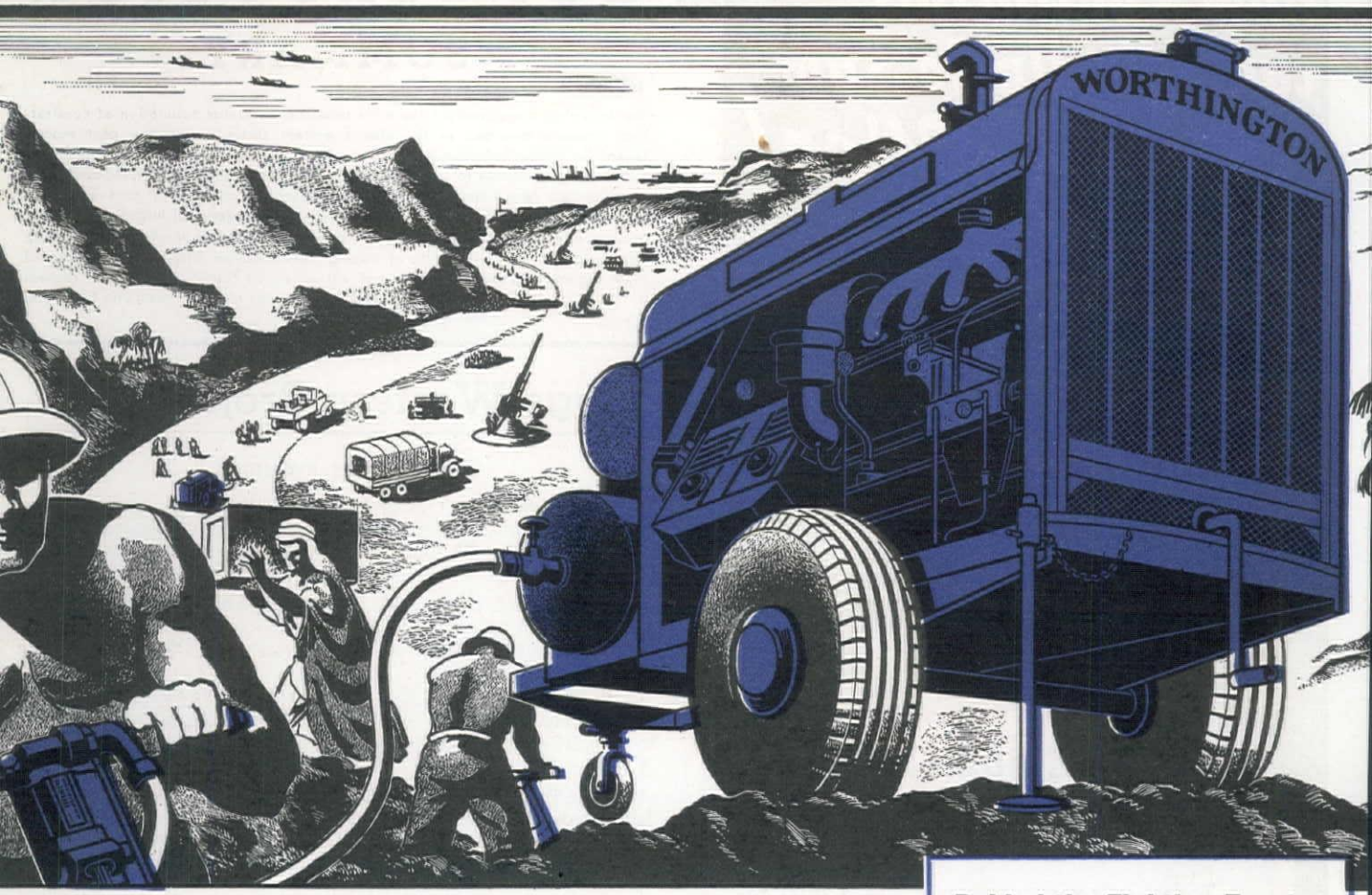
California—Mendocino County—State—Surf.

E. A. Forde, San Anselmo, was the low bidder to the California Division of Highways, Sacramento, at $41,465 for 6.7 mi. of armor coat surf. between Hopland and Crawford Ranch. The unit bids were as follows:

(1) E. A. Fords	$41,465	(4) Harold Smith	$49,480
(2) Clements & Co.	43,130	(5) Close Bldg. Supply	49,855
(3) Granite Construction Co.	47,893	(6) N. M. Ball Sons	52,700

	(1)	(2)	(3)	(4)	(5)	(6)
485 T. liquid asphalt MC-5 (armor coat)	19.00	18.00	22.50	24.00	23.00	20.00
8,600 T. screenings (armor coat)	3.75	4.00	4.30	4.40	4.50	5.00

LUNGS FOR THE 8TH ARMY



You'll find Blue Brutes are built to keep the job powered with air through hell and high water. Many Worthington 105 and 160 cubic foot compressors, diesel-driven, dressed in uniforms of olive drab‡, helped the British 8th Army keep Rommel on the run, even before the Yanks hit Casablanca.

Name your conditions! Blasting an Alcan highway through hardest rock of the frozen north or building fortifications under the scorching desert sun — Blue Brutes will power your air tools with steady, easy breathing!

Their Feather* Valves, strongest and simplest, keep their throats clear for maximum air power, so you save the precious time you're bound to lose when lesser breeds wheeze, cough, and whine for the tool-shed.

Take your pick. Portable or semi-portable — gasolene, diesel or electric driven, *all save air*, deliver more air for every power dollar you spend.

Use them with Worthington Rock Drills and Air Tools which *use less air* and give you surprising ease of handling for their size and power. Then you'll have an air-power team that spells "more WORTH from air with Worthington!"

*Reg. U. S. Pat. Off.
‡Blue Brute Compressors and Air Tools are painted olive drab for the Army and battleship gray for the Navy.

Behind the Fighting Fronts with

BLUE BRUTES

With the "Sea-Bees" and construction companies building bases in the Atlantic and Pacific, "Blue Brutes" in battleship gray‡ are working around the clock. Air power for thousands of industrial operations, as well as construction projects, is provided by Blue Brutes, at work today in hundreds of Army camps, Navy yards, air bases and ordnance plants throughout the country. Your nearest distributor is listed on page 294.

Get more WORTH from air with WORTHINGTON

BUY BLUE BRUTES

Compressors from 60 to 500 cu. ft. capacity in mountings to suit all jobs. Rock Drills and Air Tools that have always set the pace for easy operation — available in a wide range of weights and sizes.

WORTHINGTON

Worthington Pump and Machinery Corporation, Harrison, N. J. Holyoke Compressor and Air Tool Department, Holyoke, Massachusetts

CONSTRUCTION SUMMARY

The following pages contain the most complete available tabulation of construction contracts awarded in the eleven western states during the past month. Except for certain instances, contracts amounting to less than $10,000 are not listed. Space is not available to list more than a small proportion of the proposed projects. For your convenience, all items are prepared in an identical manner to provide the following information: County of job location (capital letters); name and address of contractor (bold face); bid price; brief description of work; awarding agency; and approximate date of award. More detailed information on many of these projects is often available, and will gladly be furnished upon your request to the Editor, WESTERN CONSTRUCTION NEWS, 503 Market Street, San Francisco.

Large Western Projects . . .

CONTRACTS AWARDED

Heafey-Moore Co., Oakland, Calif., $163,219 for 3.1 mi. to be graded and surf. with plantmix surf. on cr. run base, betw. state hwy. No. 74 near Flosden and state highway Rt. 7, in Solano Co., Calif., by California Division of Highways, Sacramento, Calif.

R. W. Briggs & Co. and **M. B. Killian,** San Antonio, Tex., over $1,000,000 for addtl. roads, storm drains and grade. at an army air forces instal. in Bexar Co., Tex., by U. S. Engineer Office, San Antonio, Tex.

V. C. Mendenhall Co., Springville, Utah, $213,555 for 19.06 mi. roadmix bitum. surf. betw. St. John Chemical Works and Stockton, in Tooele Co., Utah, by State Road Commission, Salt Lake City.

MacRae Bros., Seattle, Wash., $496,169 for steel, reinf. conc. and timber over-crossing struc. and appr. ramps and P.C.C. paving on Spokane St., in Seattle, by Director of Highways, Olympia.

United Concrete Pipe Corp. and **Arizona Sand & Rock Co.,** Phoenix, Ariz., over $500,000 for taxiways, apron exten. and motor park at a modif. center in Pima Co., Ariz., by U. S. Engineer Office, Phoenix.

Macco-Robertson Co., Clearwater, Calif., approx. $500,000 for 32 mi. of water supply line of 8, 10, and 12-in. welded steel pipe at an army air base at Wendover, Utah, by U. S. Engineer Office, Salt Lake City.

Gilpin Construction Co., Portland, Ore., $225,000 for a 700-ft. reinf. conc. dam across the west side of the east basin at Willamette Falls, near Oregon City, by General Electric Co., Portland.

Zoss Construction Co., Los Angeles, Calif., over $1,000,000 for temp. frame bldgs. at an army air force install. in Los Angeles Co., by U. S. Engineer Office, Los Angeles.

Guy F. Atkinson Co., San Francisco, and **George Pollock Co.,** Sacramento, Calif., $2,259,000 for marine barracks at naval operating base, San Pedro, and for swimming pool superstructure, Naval air station, Los Alamitos, by Navy Department, Washington, D. C.

MacDonald & Kahn, Inc., San Francisco, Calif., over $1,000,000 for bldgs. in Placer Co., Calif., by U. S. Engineer Office, Sacramento, Calif.

Ford J. Twaits Co., Los Angeles, Calif., over $1,000,000 for army air force supply depot in San Bernardino Co., Calif., by U. S. Engineer Office, San Bernardino.

Wm. C. Crowell Co., Pasadena, Calif., $1,100,000 for 70 temp. dwell. units in San Diego, by Federal Public Housing Authority, San Diego.

L. C. Dunn, San Francisco, Calif., $2,380,242 for 2,000 temp. family dwell. units, a management and maint. bldg., a cafeteria bldg., a child's serv. center and a comm. center at Hunters Point, Calif., by Housing Authority, San Francisco.

Standard Building Co., San Francisco, $1,094,925 for 944 temp. family dwell. units, a management and maint. bldg., a cafeteria bldg., child's service center and comm. center, at Hunters Point, by Housing Authority, San Francisco.

Cowen Construction Co., Shawnee, Okla., over $1,000,000 for an army general hosp. in Okmulgee Co., Okla., by U. S. Engineer Office, Tulsa.

A. P. Rheiner and Son, San Antonio, Tex., over $1,000,000 for addtl. stor. facil. at an army air force install. in Bexar Co., by U. S. Engineer Office, San Antonio.

Sound Construction & Engineering Co. and **Ford J. Twaits Co.,** Seattle, Wash., over $1,000,000 for stor. facil. at an army air forces install. in Spokane Co., Wash., by U. S. Engineer Office, Seattle.

Hodges & Kahn, Los Angeles, Calif., $1,886,340 for facil. for marine air station at Mojave, Calif., by Bureau of Yards & Docks, Washington, D. C.

J. A. Terteling & Sons, Boise, Ida., approx. $1,800,000 for a grain alcohol plant on the Columbia River highway betw. Pasco, Wash. and The Dalles, Ore., by Defense Plant Corp., Washington, D. C.

Everett Pacific Shipbuilding Co., Everett, Wash., $3,500,000 for an 18,000 ton drydock in Snohomish Co., by Bureau of Yards & Docks, Washington, D. C.

J. E. Haddock Co., Ltd., Pasadena, Calif., $1,380,000 for a 2,600-ton floating conc. drydock on the West Coast, by Bureau of Yards & Docks, Washington, D. C.

Highway and Street . . .

CONTRACTS AWARDED

California

ALAMEDA CO.—**Ransome Co.,** 4030 Hollis St., Emeryville—$12,188, for improv. Ashby Ave., from College Ave. to Piedmont Ave.—by City Clerk, Berkeley. 5-18

BUTTE CO.—**M. D. McDonald, M. J. Ruddy & Son,** and **R. A. Westbrook,** 204 23rd St., Sacramento—over $150,000 for instal. of paving—by U. S. Engineer Office, Sacramento. 5-6

IMPERIAL CO.—**Basich Bros.,** 20530 S. Normandie Ave., Torrance—$73,520, for approx. 11.8 mi. plantmix surf. betw. El Centro and Brawley—by California Division of Highways, Los Angeles. 5-14

INYO AND MONO COS.—**Phoenix Construction Co.,** Box 906, Bakersfield—$43,172, for 11.1 mi. repair. roadmix surf. over existing bitum. surf., betw. Laws Bridge and 1 mi. south of Benton Stn.—by California Division of Highways, Sacramento. 5-14

LOS ANGELES CO.—**Ansco Construction Co.,** 2725 Atlantic Blvd., Long Beach—less than $50,000, for addtl. streets and paved areas at a ferrying command—by U. S. Engineer Office, Los Angeles. 5-13

LOS ANGELES CO.—**Gogo & Rados,** San Gabriel—less than $50,000, for sewers, water and elec. distrib. systems and roads—by U. S. Engineer Office, Los Angeles. 5-11

MENDOCINO CO.—**Close Building Supply,** 721 "C" St., Hayward—$18,894, for portions about 4.4 mi. in length armor coat, betw. Old Sherwood Road and Rattlesnake Creek Crossing No. 3—by California Division of Highways, Sacramento. 5-19

MENDOCINO AND HUMBOLDT COS.—**Tom Hull,** 930 Carson St., Eureka—$12,250, for furn. and stockpiling screenings at various loc. betw. McCoy Creek and Benbow—by Calif. Division of Highways, Eureka. 5-20

MERCED CO.—**Calowell Construction Co.,** 1835 E. Wardlow Road, Long Beach—over $100,000 of instal. of paved facil.—by U. S. Engineer Office, Sacramento. 5-7

NAPA CO.—**P. S. Harless,** Box 594, San Rafael—$19,812, for conc. pave. and plantmix surf. on Jefferson St. betw. Elm and Oak Sts. in Napa—by City of Napa. 5-11

NEVADA AND SIERRA COS.—**Hemstreet & Bell,** Box 550, Marysville—$40,000, for 5.6 mi. plantmix surf. portions, betw. Truckee and Nevada State Line—by Division of Highways, Sacramento. 5-19

PLACER CO.—**Hemstreet & Bell,** Box 550, Marysville—$25,780, for 3 mi. plantmix surf. betw. Baxter and Airport—by Division of Highways, Sacramento. 5-19

RIVERSIDE CO.—**Brunzell Construction Co.,** V. O. Brunzell, 3104 Greenfield Ave., West Los Angeles—over $50,000, for temp. frame bldgs. and util.—by U. S. Engineer Office, Los Angeles. 5-11

SACRAMENTO CO.—**A Teichert & Co.,** Box 1113, Sacramento—over $100,000 for addtl. paving—by U. S. Engineer Office, Sacramento. 5-20

SANTA BARBARA CO.—**Arthur A. Johnson,** Laguna Beach—less than $50,000 for reconst. exist. roads, and for new roads—by U. S. Engineer Office, Los Angeles. 5-11

SANTA CRUZ CO.—**Leo Cardwell Construction Co.,** 530 Pacific Ave., Santa Cruz—$9,957, for conc. pav. on Front St., from the post office to Cooper St., Santa Cruz—by City Clerk, Santa Cruz. 4-29

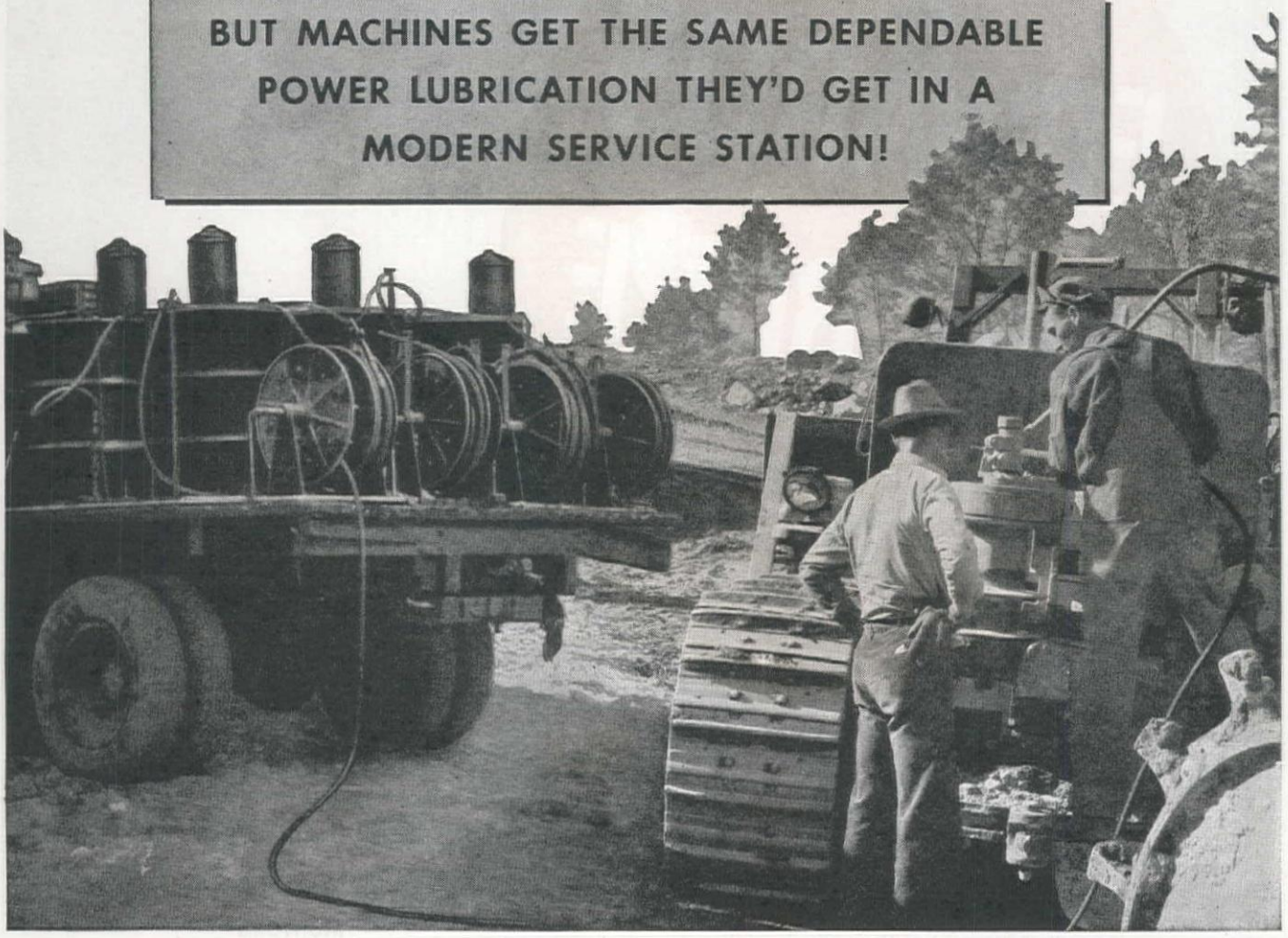
SOLANO CO.—**Heafey-Moore Co.,** 344 High St., Oakland—$163,219, for 3.1 mi. to be graded and surf. with plantmix surf. on cr. run base, betw. state hwy. No. 74, near Flosden and state highway Rt. 7—by California Division of Highways, Sacramento. 5-24

SOLANO CO.—**A. G. Raisch,** 2048 Market St., San Francisco—$20,273, for asph. conc. surf. on portions of Santa Clara, Capitol and Branciforte Sts. in Vallejo—by City Clerk, Vallejo. 5-11

SONOMA CO.—**Helwig Construction Co.,** Sebastopol—less than $50,000, for walks and roads—by U. S. Engineer Office, San Francisco. 4-30

"45 MILES FROM NOWHERE..."

BUT MACHINES GET THE SAME DEPENDABLE POWER LUBRICATION THEY'D GET IN A MODERN SERVICE STATION!



Alemite Portable Service Stations Go Anywhere, Provide Complete Service, Guard Bearings, Save Time!

NEW roads through remote areas—airports which must be built "45 miles from nowhere"—cause little concern to the contractors who use Alemite Portable Service Stations. These are complete lubrication departments on wheels. They can go anywhere. They include high and low pressure Alemite Barrel Pumps, Alemite Motor Oil Dispenser, hose reels, air compressor, and motor, ready to handle every lubrication need on every machine—speedily and dependably!

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Please send my FREE copy of your new catalog of Alemite Portable Service Stations.

Name .....

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YOLO CO.—**McGillivray Construction Co.,** Box 873, Sacramento—$16,128, for plantmix surf. port. about 2.4 mi. in length betw. irrig. ditch and recl. ditch—by California Division of Highways, Sacramento. 5-12

Colorado

PUEBLO CO.—**Driscoll Construction Co.,** 220 S. Main St., Pueblo—over $50,000, for grade, and surf.—by U. S. Engineer Office, Denver. 4-30

Idaho

BUTTE CO.—**Nick Burggraf,** Box 397, Idaho Falls—$41,035, for 1.05 mi. reconst. roadbed with a roadmix bitum. surf. on Lost River Hwy., betw. Big Lost River and Bingham county line—by Commissioner of Public Works, Boise. 5-12

CASSIA AND MINIDOKA COS.—**Hoops Construction Co.,** Box 431, Twin Falls—$67,350 for furn. gravel in stockpiles adj. to the Old Oregon Trail and Raft River Hwys.—by Commissioner of Public Works, Boise. 5-3

GOODING AND LINCOLN COS.—**Lobnitz Bros.,** Boise—$50,875, for furn. gravel in stockpiles adj. to the North Side. Roosevelt and Sawtooth Park Hwys.—by Commissioner of Public Works, Boise. 5-3

Kansas

FINNEY CO.—**Broce Construction Co.,** Anthony—$14,595, for 18.3 mi. single asph. surf. treat.—by State Hwy. Commission, Topeka. 4-19

FORD CO.—**Dan Scherrer Construction Co.,** Kansas City—$12,875, for 17.6 mi. single asph. surf. treat.—by State Highway Commission, Topeka. 4-19

GRAY CO.—**San Ore Construction Co.,** McPherson—$26,541, for 36.1 mi. single asph. surf. treat.—by State Highway Commission, Topeka. 4-19

HODGEMAN CO.—**Chas. Hulme,** Great Bend—$22,635, for 38.7 mi. single asph. surf. treat.—by State Highway Commission, Topeka. 4-19

LANE CO.—**Broce Construction Co.,** Anthony—$12,039, for 15.1 mi. single asph. surf. treat.—by State Highway Commission, Topeka. 4-19

MORTON CO.—**San Ore Construction Co.,** McPherson—$18,018, for 21.6 mi. single asph. surf. treat.—by State Highway Commission, Topeka. 4-19

Montana

CASCADE CO.—**Dudley-Anderson,** 900 - 25th St. N., Great Falls—less than $50,000 for addtl. roads and sidewalks—by U. S. Engineer Office, Great Falls. 5-7

CASCADE CO.—**J. L. McLaughlin,** Great Falls—less than $50,000 for roads and culv. pipes—by U. S. Engineer Office, Seattle. 5-24

New Mexico

McKINLEY CO.—**R. C. Carrico,** Albuquerque—$94,104, for approx. 4.66 mi. base surf. course and double bitum. surf. treatmt. on U. S. Hwy. Rt. No. 66, betw. Gallup and Fort Wingate—by State Highway Engineer, Santa Fe. 5-6

Oregon

KLAMATH, DOUGLAS AND JACKSON COS.—**M. C. Lininger & Sons,** Medford—$35,000, for approx. 10,000 cu. yd. cr. grav. in stockpiles, on the Tiller-Trail & Crater Lake Hwys.—by Oregon State Highway Commission, Portland. 5-14

JACKSON CO.—**M. C. Lininger & Sons,** Medford—$35,000, for furn. cr. gravel in stockpiles, on the Tiller-Trail and Crater Lake Hwys.—by State Highway Commission, Portland. 5-21

MULTNOMAH CO.—**Porter W. Yett,** 6500 N. E. Ainsworth, Portland—$18,815, for approx. 0.3 mi. grade and pave. on Vanport Junction sect. of Swift secondary hwy.—by State Highway Commission, Portland. 4-21

SHERMAN CO.—**E. C. Hall Co.,** First National Bank Bldg., Eugene—$48,635, for furn. approx. 16,500 cu. yd. cr. rock in stockpiles, Moro-Waco County Line, on the Sherman hwy.—by State Highway Commission, Portland.

Texas

BEXAR CO.—**R. W. Briggs & Co.** and **M. B. Killian,** San An-

When the Whistles Blow at War's END... will your Plans for Improvements be ready?

Preparedness for peace—complete, detailed plans for war-deferred water supply, gas and sewage works construction—is a practical and patriotic contribution to the Nation's post-war welfare.

* * *

War demands have made it impossible to carry on normal improvements and extensions to these vital services. In some instances where construction could not be deferred, materials have been used which would not ordinarily be considered for permanent construction. Authorities estimate that more than a billion dollars of such improvements, extensions and replacements, necessary to public health and safety, has been deferred.

* * *

This reservoir of accumulated public works represents millions of man-hours of employment for returning soldiers and jobless war workers.

* * *

The time to prepare working plans and specifications for improvements, for extensions, and for replacement of temporary construction with permanent materials, is NOW, when engineering departments and consulting engineers are not rushed with work. Plans in readiness will save months of delay at a time when the transition from wartime to peacetime economy will be the Nation's number-one problem.

* * *

Any of the members of this Association will furnish promptly information and advice in the preparation of specifications taking full advantage of the greater economy and efficiency of cast iron pipe made in accordance with the new A. S. A. Law of Design*—pipe scientifically designed for your specific service requirements.

* Developed under the auspices of the American Standards Association in cooperation with the American Gas Association, American Water Works Association, New England Water Works Association, American Society for Testing Materials and the members of Cast Iron Pipe Research Association.

CAST IRON PIPE RESEARCH ASSOCIATION, CHICAGO

tonio—over $1,000,000 for addtl. roads, storm drains and grade. at an army air forces instal.—by U. S. Engineer Office, San Antonio. 5-5

BROWN CO.—**Holland Page,** Box 971, Austin—less than $50,000, for road work—by U. S. Engineer Office, San Antonio. 4-30

Utah

JUAB CO.—**W. W. Clyde,** Springville—$33,433 for 5.23 mi. of 3-in. road-mix bitum. surf.—by Utah State Road Commission, Salt Lake City. 5-20

TOOELE CO.—**V. C. Mendenhall Co.,** Springville—$213,555, for 19.1 mi. roadmix surf. betw. St. John Chemical Works and Stockton—by State Road Commission, Salt Lake City. 5-24

WEBER CO.—**Ora Bundy,** W. 2nd St., Ogden—less than $50,000 for a road at an air depot—by U. S. Engineer Office, Salt Lake City. 5-21

WEBER CO.—**Reynolds-Ely Construction Co.,** Springville—over $50,000, for road work at an air depot—by U. S. Engineer Office, Salt Lake City. 4-20

Washington

BENTON AND WALLA WALLA COS.—**Materne Bros.,** 227 Longfellow St., Spokane—$23,325, for mfg. and stockpiling 4,500 cu. yd. cr. stone surf. and 4,800 cu. yd. mineral aggr.—by Director of Highways, Olympia. 5-21

CLALLAM CO.—**C. H. Wheeler,** 612 Pittock Block, Portland, Ore.—$41,165, for 12.2 mi. grad., drain., and ballasting, on Secondary State Hwy. No. 9-A, West Salt Creek to Twin—by Director of Highways, Olympia. 5-13

CLARK CO.—**General Construction Co.,** 3840 Iowa St., Seattle—$70,893, for 0.7 mi. clear., grad. and drain on alternate primary state hwy. No. 8, Second and Main Sts. to Kaiser access rd., Vancouver—by Director of Highways, Olympia. 5-13

KING CO.—**Toney Romano,** 1833 Dearborn St., Seattle—$36,274, for removing street car rails and resurf. on Airport Way—by Board of Public Works, Seattle. 5-17

LINCOLN, SPOKANE AND STEVENS COS.—**Diesel Oil Sales Co.,** 2155 Northlake, Seattle—$21,359, for about 45.5 mi. bitum. retread surf., light bitum. surf. treatmt. and non-skid single seal treatment—by Director of Highways, Olympia. 5-21

PIERCE CO.—**J. D. Shotwell,** 1624 Puget Sound Bank Bldg., Tacoma—over $100,000 for surf. work—by U. S. Engineer Office, Ft. Lewis. 5-26

SPOKANE CO.—**Roy L. Bair,** 1220 Ide Ave., Spokane—over $100,000 for surf. streets, driveways, and sidewalks—by U. S. Engineer Office, Spokane. 5-7

PROPOSED PROJECTS

Arizona

NAVAJO CO.—Bitum. surf. treatm. will be given a 13-mi. stretch of the Showlow-Pinetop highway to temporarily complete this road project—by Public Roads Administration. 4-27

California

LOS ANGELES CO.—Federal approval has been granted for an additional $300,000 for completion of the Aliso St. viaduct. 4-30

Idaho

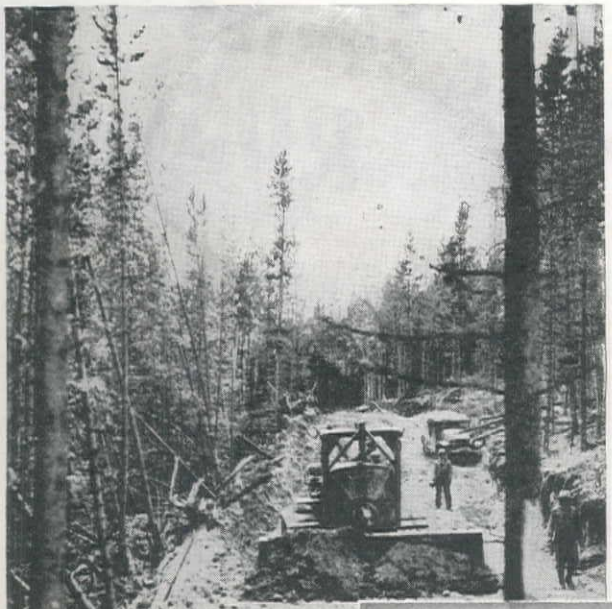
The Public Roads Administration has approved the project for a mineral access road from Myers creek westward down Camas creek, near Salmon, to be built by the Forest Service. 5-24

Bridge & Grade Separation...

CONTRACTS AWARDED

Oregon

DOUGLAS CO.—**Johnston Bros.,** Newberg—$8,619, for 247 lin. ft. pile trestle bridge, Baker Creek Bridge on the Scholls Secondary Hwy.—by State Highway Commission, Portland. 5-14

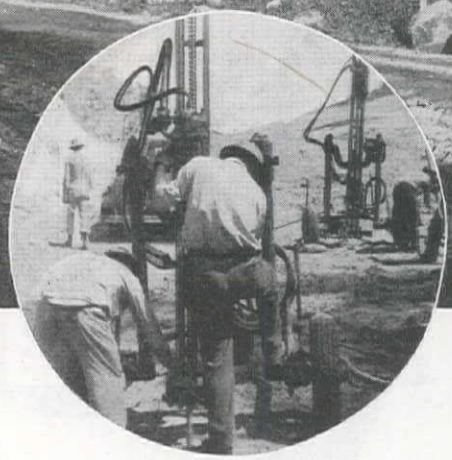


From ALASKA *to* PANAMA

GOODALL Quality Rubber Products withstand extremes in climate on the world's two toughest construction jobs!

• On the Alaskan Highway—GOODALL hose, boots and clothing stand up under snow and 50° below zero weather.

• At the other end of the thermometer—GOODALL products do the job on the Pan-American Highway in jungle heat and dampness.



TODAY, more than ever before, it's the hose that will "stand the gaff" that counts. Western contractors on oustanding war jobs, like the Alaskan and Pan-American highways, continue to switch to GOODALL because they know all GOODALL rubber products—hose, belting, gaskets, boots and clothing—do the job with these three main advantages:

SPEEDIER—No time lost from costly blow-outs or early replacement!

CHEAPER—Longer life and no lost time, pays dividends and dependable service!

SAFER—Each product is built to do the job, with an adequate safety factor to "stand the gaff"!

Four district offices in the West with personnel trained in synthetic and natural rubber, are at your service. A staff of technicians, with modern equipped laboratories at our mills, are available to you without cost or obligation. Why not call on us today for a solution to your current and post war rubber problems?

GOODALL RUBBER COMPANY
(CALIFORNIA)

LOS ANGELES, 13, 510-514 E. 4th St. . MIchigan 2207

SAN FRANCISCO, 678-A Howard St. . . SUtter 7944

Mills — Trenton, N. J.

SALT LAKE CITY, 251 W. South Temple St., Phone 3-8021

SEATTLE, 524½ First Ave., So. . . . . Elliott 7043

73 Years of Know How

Washington

KING CO.—**H. C. McBride,** 421 Maple St., Bellingham—$10,460, for foot bridge across Duwamish River at Allentown—by County Commissioner, Seattle. 5-25

KING CO.—**MacRae Bros.,** 2733 - 4th Ave. S., Seattle—$496,169, for steel, reinf. conc. and timber overcrossing struct. and approach ramps and P.C.C. paving on Spokane St., in Seattle—by Director of Highways, Olympia. 4-30

Airport . . .

CONTRACTS AWARDED

Arizona

COCHISE CO.—**A. Teichert & Son,** and **John C. Gist,** 1846 37th St., Sacramento, Calif.—less than $50,000, for roads and hangar taxiways at an advanced flying school—by U. S. Engineer Office, Phoenix. 5-10

PIMA CO.—**Nathan A. Moore,** 2455 Sherwood Rd., San Marino, Calif.—over $100,000, for landing mat expansion (roadmix) at a basic flying school—by U. S. Engineer Office, Phoenix. 5-6

PIMA CO.—**H. L. Royden,** 2420 W. Jefferson, Phoenix—less than $50,000 for a compass swinging base and approaches at a basic flying school—by U. S. Engineer Office, Phoenix. 4-29

PIMA CO.—**United Concrete Pipe Corp.,** and **Arizona Sand & Rock Co.,** Box 1522, Phoenix—over $500,000, for taxiways, apron exten., & motor park at a modification center—by U. S. Engineer Office, Phoenix. 5-18

YUMA CO.—**Tanner Construction Co.,** Box 1832, Phoenix—over $100,000, for a service apron, involv. excav., grading & paving at an airfield—by U. S. Engineer Office, San Diego, Calif. 5-25

YUMA CO.—**Tanner Construction Co.,** Box 1832, Phoenix—less than $50,000, for parking apron & perimeter road at a ground gunnery range landing field — by U. S. Engineer Office, Los Angeles. 5-3

Hints for BIGGER CRANE OUTPUT

BUCYRUS ERIE

Here are a few simple hints that may help you increase your crane output:

1. Be sure footing is good. A little extra time spent preparing good footing will be more than repaid by increased speed, steadiness and safety of operation. Remember not to let the side of the machine toward the load be low.
2. Do not exceed stability ratings; do not operate with boom angle greater than 78° to horizontal.
3. Accurate control means speed. Keep brakes and clutches in proper adjustment.
4. Use sufficient parts of line to insure needed accuracy of control, combined with minimum stress on the machine.
5. Do not propel machine while boom is at high angle.
6. If you have to move with a load in soft going, the cats will "climb" better if you move with the load behind. Don't travel with close-to-maximum loads.
7. If you move with a load, it should be snubbed to the machine to prevent it from swaying.
8. Set up a regular schedule for inspection and lubrication.

Bucyrus·Erie

SOUTH MILWAUKEE, WISCONSIN

WASHINGTON: Bucyrus-Erie Co., 3408 First Ave. So., Seattle; Clyde Equipment Co., 3410 First Ave. So., Seattle; Construction Equipment Co., 1118 Ide Ave., Spokane. OREGON: Clyde Equipment Co., 17th and Thurman Sts., Portland. CALIFORNIA: Bucyrus-Erie Co., 390 Bayshore Blvd., San Francisco; Crook Co., 2900 Santa Fe Ave., Los Angeles. UTAH: The Lang Co., 267 W. First So., Salt Lake City. COLORADO: Ray Corson Machy. Co., 1646 Wazee St., Denver. IDAHO: Intermountain Equipment Co., Broadway at Myrtle, Boise. NEW MEXICO: R. L. Harrison Co., 209 Fourth St., Albuquerque. ARIZONA: D. S. Stapley Co., 723 Grand Ave., Phoenix. MONTANA: Westmount Tractor & Equipment Co., 150 E. Spruce St., Missoula. ALASKA: Northern Commercial Co., Seattle, Wash.

YUMA CO.—**Tiffany Construction Co.**, Box 846, Phoenix—less than $50,000, for parking apron & perimeter road at a ground gunnery range landing field—by U. S. Engineer Office, Los Angeles, Calif. 5-3

YUMA CO.—**United Concrete Pipe Corp.**, and **Arizona Sand & Rock Co.**, Box 1522, Phoenix—less than $50,000 for parking apron & perimeter road at a ground gunnery range landing field—by U. S. Engineer Office, Los Angeles, Calif. 5-3

California

RIVERSIDE CO.—**Bressi & Bevanda**, 208 W. 8th St., Los Angeles—over $100,000, for parking aprons and landing field expan. at an army air base—by U. S. Engineer Office, Los Angeles. 5-7

SAN BERNARDINO CO.—**George Herz & Co.**, Box 191, San Bernardino—less than $50,000, for pave. parking areas at an air depot—by U. S. Engineer Office, San Bernardino. 5-4

SAN BERNARDINO CO.—**Phoenix Construction Co.**, Box 906, Bakersfield—less than $50,000 for a taxiway at a flying school—by U. S. Engineer Office, San Bernardino. 5-3

Colorado

DENVER CO.—**Northwestern Engineering Co.**, Rapid City, South Dakota—over $50,000, for grad. and pave. at a modif. center in the Denver vicin.—by U. S. Engineer Office, Denver. 5-26

Nevada

DOUGLAS CO.—**Harms Bros.** and **N. M. Ball Sons**, Box 430, Berkeley—over $100,000, for paved facil.—by U. S. Engineer Office, Sacramento, Calif. 5-14

New Mexico

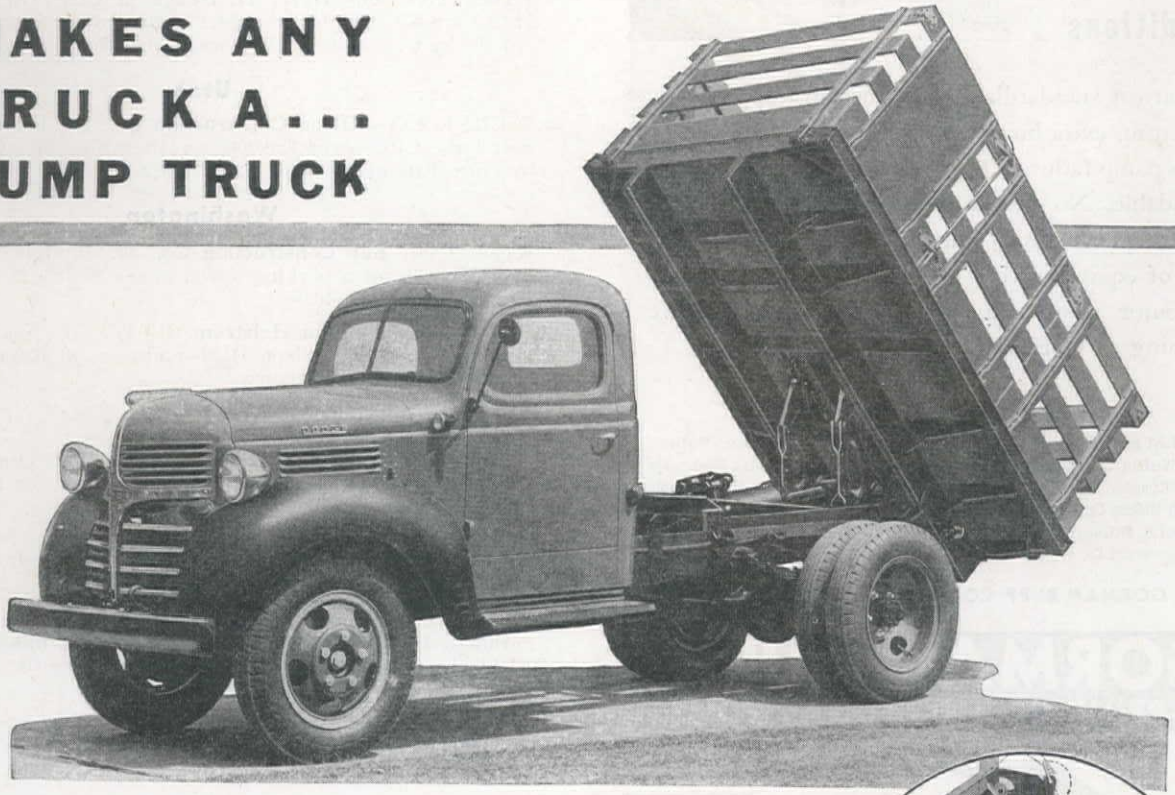
LEA CO.—**Public Construction Co.**, Denton, Texas—over $100,000, for runway paving—by U. S. Engineer Office, Albuquerque. 5-13

Oregon

YAMHILL CO.—**C. T. Malcolm**, Sherlock Bldg., Portland, and **A. A. Tieslau**, 1220 Eastshore Hwy., Berkeley, Calif. — over

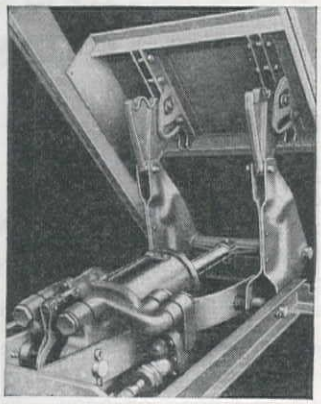
A HERCULES HYDRAULIC BOOSTER HOIST

MAKES ANY TRUCK A... DUMP TRUCK



Install HERCULES DOUBLE-ARM HYDRAULIC HOISTS under your platform, stake, express or special bodies, which are now idle. Unload the easy way!

With wartime restrictions preventing your purchase of all the new equipment you need, it's more important than ever that present equipment be used at maximum efficiency.



Model KXE Hercules Booster Hoist, with 6" cylinder, for bodies up to 12 feet long. Rated capacity of 4 tons with a 9 foot body. Control valve is operated from the driver's seat, and the low oil pressure required assures long life of unit.

Reinforcing plate relieves lifting strains. Assembly includes 12 foot steel sills for reinforcement of wood body sills.

UTILITY TRAILER SALES, Seattle, Wash.
NEWELL TRUCK EQUIPMENT CO., Portland, Ore.
A. PASTERIS CO., Oakland, Calif.
STANDARD CARRIAGE WKS., INC., Los Angeles, Calif.
STANDARD IRON WORKS, San Diego, Calif.
SAWTOOTH CO., Boise, Idaho
WESTERN CONSTRUCTION CO., Billings, Mont.
WYOMING AUTOMOTIVE SUPPLY CO., Casper, Cheyenne, Rock Springs, Sheridan, Wyoming
McKELVY MACHINERY CO., Denver, Colo.
MORROW & CO., Albuquerque, New Mexico

HERCULES STEEL PRODUCTS CO.

GALION OHIO

$100,000, for runways & taxiways—by U. S. Engineer Office, Portland. 5-14

Texas

CHILDRESS CO.—**Texas Bitulithic Co.,** Box 5297, Dallas—over $100,000, for taxiways—by U. S. Engineer Office, Denison. 5-5

HAYS CO.—**Rodgers & Stewart, Inc.,** San Antonio—less than $50,000, for taxiways—by U. S. Engineer Office, San Antonio. 5-5

HIDALGO CO.—**Harry H. Hedges & Co.,** 1910 Runnels St., Houston—$50,000, for shoulder stabilization at auxiliary field No. 9—by U. S. Engineer Office, Galveston. 4-28

Utah

WEBER CO.—**Olson Construction Co.,** 165 E. 4th St. South, Salt Lake City—over $50,000, for alterations to an air depot—by U. S. Engineer Office, Salt Lake City. 5-17

Washington

KING CO.—**Bay Construction Co.,** 309 Pontius St., Seattle—over $50,000, for a parking apron in the Seattle area—by U. S. Engineer Office, Seattle. 5-10

PACIFIC CO.—**John Helstrom,** 310 W. Roy, Seattle—$50,000, for completion of Willapa Harbor airport, at Raymond—by U. S. Engineer Office, Tacoma. 5-12

Wyoming

NATRONA CO.—**Peter Kiewit Sons Co.,** 1024 Omaha National Bank Building, Omaha, Nebr.—over $100,000, for taxiways—by U. S. Engineer Office, Omaha, Nebr. 5-7

PROPOSED PROJECTS

California

SANTA CLARA CO.—An appropriation of $134,000 has been authorized for exten. of runways and misc. bldgs. at Moffett Field—by Bureau of Yards & Docks, Washington, D. C. 4-7

Nebraska

SARPY CO.—Authorization has been granted by War Depart-

ment, Washington, D. C., for addtl. facil. at an army air force instal. to cost approx. $2,000,000. 5-6

South Dakota

PENNINGTON CO.—Authorization has been given by War Department, for addtl. const. at an army air force instal. to cost over $3,000,000. 5-6

Washington

KING CO.—An additional allotment of $1,400,000 has been made for the Bow Lake airport project, by the Civil Aeronautics Administration, Washington, D. C. 5-1

YAKIMA CO.—An additional allocation of $85,000 has been made by the Civil Aeronautics Administration for the Yakima airport project. 4-20

Water Supply . . .

CONTRACTS AWARDED

Arizona

PIMA CO.—**John W. Joynt Construction Co.**, 2533 Helen St., Tucson—less than $50,000, for water & elec. facil. at a bomb range detachment at an airfield—by U. S. Engineer Office, Phoenix. 5-20

California

LOS ANGELES CO.—**Dominguez Water Corp.**, 621 S. Spring St., Los Angeles—less than $50,000, for install. 10-in. water main at a port of embarkation hospital—by U. S. Engineer Office, Los Angeles. 5-18

LOS ANGELES CO.—**Hull-Smale & Robinson**, 1033 Avalon Blvd., Wilmington—for instal. a 42-in. welded steel salt water return pipe line to extend. approx. 1,200 ft. into Santa Monica Bay at El Segundo—by Standard Oil Co., El Segundo. 5-13

LOS ANGELES CO.—**Clyde W. Wood**, 816 W. 5th St., Los

More yardage broken fewer machine-hours lost

● Continuous, smooth operation of shovels and mucking machines depends to a large extent on the way your material is broken.

Hercomites* and Gelamites* lay down the rock and ore for easy, speedy handling —hold idle machine hours to a minimum.

More of these high-cartridge-count explosives are used today than ever before, because throughout the mining, quarrying, and construction industries their superiority has been definitely established. They are more economical and more effective. Six grades of Hercomite* and two of Gelamite* meet your requirements for nearly all types of blasting.

Thus, to get the maximum production from your present equipment . . . and hold powder costs to a minimum at the same time, investigate Hercomites* (2 to 7) and Gelamites* (1 and 2).

*REG. U. S. PAT. OFF.

HERCULES POWDER COMPANY
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A-90A

Angeles—less than $50,000, for a 2-in. water pipe line—by U. S. Engineer Office, Los Angeles. 4-30

SAN DIEGO CO.—**Walter H. Barber**, Box 1523, San Diego—$14,128, for rehab. 3,718 ft. of CI main in Oceanside—by City Council, Oceanside. 5-10

SAN DIEGO CO.—**G. E. Kerns**, 3712 Gaviota Ave., Long Beach—$6,812, for 2,524 lin. ft. furn. & instal. 14-in. stl. pipe in Oceanside—by City Council, Oceanside. 5-10

VENTURA CO.—**J. S. Barrett Co.**, 412 First National Bank Bldg., Santa Ana—less than $50,000, for a water supply system at an airfield—by U. S. Engineer Office, Santa Maria. 4-29

New Mexico

DE BACA CO.—**W. T. Davis Construction Co.**, Albuquerque—less than $50,000, for elevated water storage tank—by U. S. Engineer Office, Albuquerque. 5-11

Texas

BEXAR CO.—**Jud Plumbing & Heating Co.**, San Antonio—less than $50,000, for improv. for wat. supply—by U. S. Engineer Office, San Antonio. 5-13

BEXAR CO.—**G. W. Mitchell**, 612 Builders Exchange Bldg., San Antonio—over $50,000, for conc. water tank—by U. S. Engineer Office, San Antonio. 4-26

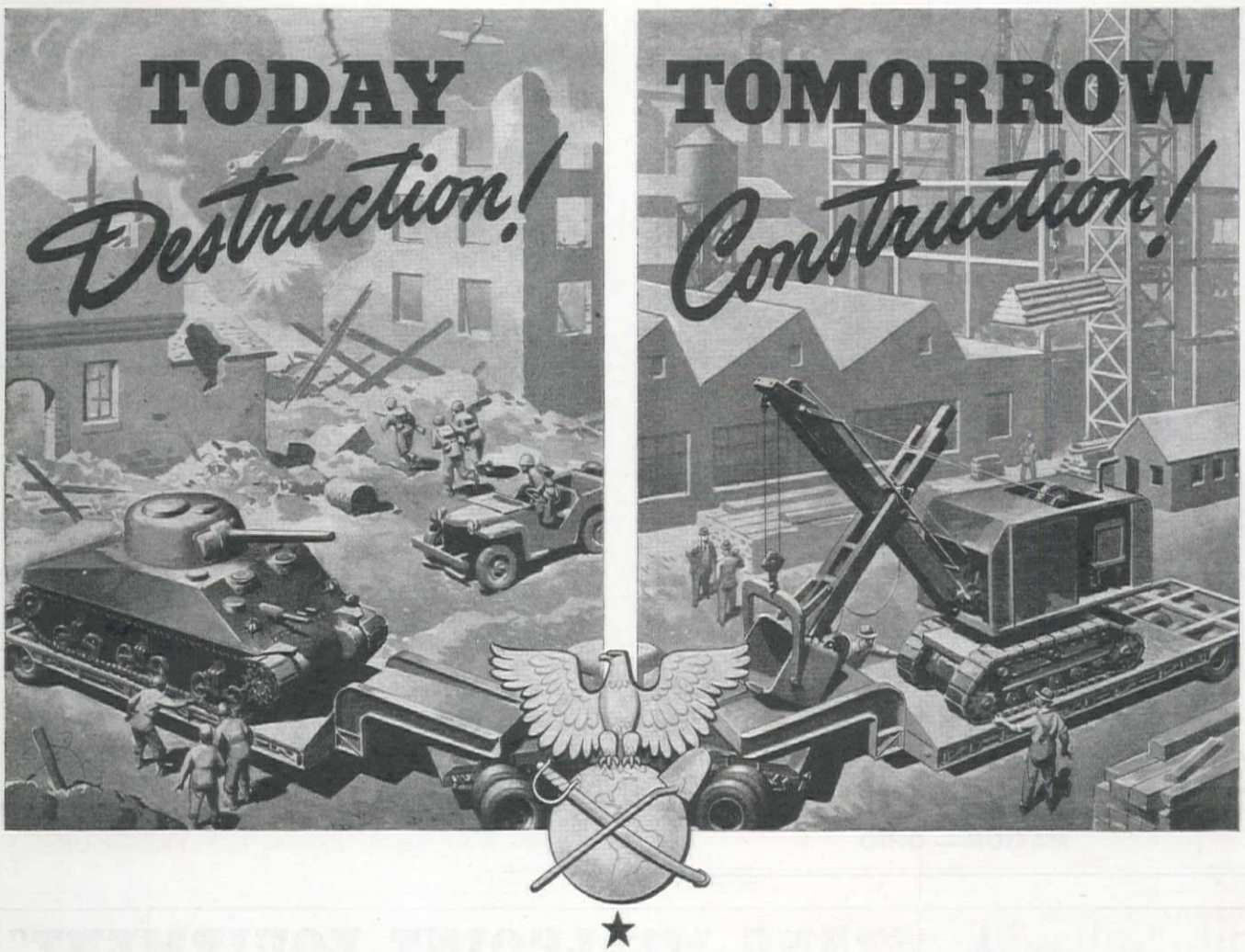
Utah

DAVIS CO.—**J. B.** and **R. E. Walker**, 21 S. 10 West, Salt Lake City—for a reservoir and pipe line in Layton—by Federal Works Agency, Salt Lake City. 4-29

TOOELE CO.—**Macco-Robertson Co.**, 811 Paramount Blvd., Clearwater, Calif.—approx. $500,000, for 32 mi. of a water supply line of 8, 10 and 12-in. welded steel pipe, at an army air base at Wendover—by U. S. Engineer Office, Salt Lake City. 5-5

Washington

GRANT CO.—**McAtee and Heathe**, E. 3527 Trent Ave., Spokane—less than $50,000, for a water supply system—by U. S. Engineer Office, Seattle. 5-24



The big jobs of tomorrow will require big men with broad ideas and big, sturdy machines to do the work.

The equipment which is having its trial-by-fire in this global war will be all the better suited for the gigantic tasks of reconstruction. The magnitude and scope of the engineering jobs which await America are almost beyond conception—but when it comes to Heavy-Duty Trailer Equipment, we are ready.

Fruehauf pioneered the Carry-all type of heavy Trailer. Today we have an entire plant devoted to making these units for war. Their capacities run from 8 to 60 tons. They carry many types of battle equipment, even up to great tanks with heavy guns and armor.

Many of the features of these war-time Fruehauf heavy-duty Trailers have always been incorporated in our units. Many other features are the direct result of war's demands and military experience. Combined, they will enable Fruehauf Carry-alls to render vital and immediate service in the era of post-war construction.

FRUEHAUF TRAILER COMPANY • *Western Manufacturing Plant, Los Angeles*

Sales and Service Branches: *Los Angeles, Fresno, Phoenix, Seattle, San Diego, San Francisco, Portland, Denver, Salt Lake City*

World's Largest Builders of Truck Trailers

Member Automotive Council for War Production

"ENGINEERED-

FRUEHAUF *Truck-* TRAILERS

TRANSPORTATION"

REG. U. S. PAT. OFF.

TRUCK-TRAILER TRANSPORT IS DOING AN ESSENTIAL JOB FOR ALL AMERICA

PROPOSED PROJECTS

California

SANTA BARBARA CO.—The U. S. Engineer Office, Santa Maria, plans to build a 10-in. water main from Laurel Canyon Rd. to the Hoff General Hospital in Santa Barbara, to cost $17,000. 4-20

Utah

SALT LAKE CO.—The Union Pacific Railroad Co., Salt Lake City, received approval from the Salt Lake City Commission for a standpipe and 6,400 feet of water main exten. at the north end of the Salt Lake yards, to cost approx. $10,000. 5-6

Sewerage . . .

CONTRACTS AWARDED

California

ALAMEDA CO.—**McGuire & Hester,** 796 66th Ave., Oakland—$11,149, for new outfall sewer betw. city disposal plant & low tide level of San Francisco Bay—by City Clerk, San Leandro. 5-19

LOS ANGELES CO.—**B. D. Zaich & Son,** 309½ W. Broadway, Glendale—$9,850, for sewer in Stoner Ave.—by Board of Public Works, Los Angeles. 5-10

ORANGE CO.—**G. E. Kerns,** 5574 Atlantic Blvd., Long Beach—over $50,000, for sew. disp. plant expan.—by U. S. Engineer Office, San Bernardino. 5-17

RIVERSIDE CO.—**Shipyard Construction Co.,** 2609 Cherry Ave., Long Beach—over $50,000, for sewage treatment plant at an army air base—by U. S. Engineer Office, Kingman, Ariz. 5-24

SAN BERNARDINO CO.—**Matich Bros.** and **E. L. Yeager,** Box 87, Riverside—over $100,000, for sewers, water systems & roads for A.A.F. supply dept.—by U. S. Engineer Office, San Bernardino. 5-10

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SAN FRANCISCO CO.—**Fred J. Early, Jr.,** 369 Pine St., San Francisco—over $50,000, for storm water pumping plant & addtl. drainage—by U. S. Engineer Office, San Francisco. 4-30

SAN FRANCISCO CO.—**E. J. Treacy,** 1115 Clement St., San Francisco—$3,650, for extension of the Hyde St. storm drain outfall—by Department of Public Works, San Francisco. 5-6

Colorado

UNANNOUNCED CO.—**J. B. McDowell,** Denver—over $50,000, for a sewage disposal plant at an airfield—by U. S. Engineer Office, Denver. 5-21

Montana

UNANNOUNCED CO.—**M. F. Kiely & Son,** Box 65, Butte—$9,737, for conc. tile storm sewer, manholes, catchbasins and inlet sand trap—by State Board of Examiners, Helena. 5-17

Nebraska

SCOTTS BLUFF CO.—**Inland Construction Co.,** 3867 Leavenworth St., Omaha—less than $50,000, for outfall sewer—by U. S. Engineer Office, Omaha. 5-13

New Mexico

DE BACA CO.—**F. D. Shufflebarger,** Albuquerque—less than $50,000, for addts. to reservoir & sew. disp. plant—by U. S. Engineer Office, Albuquerque. 5-11

OTERO CO.—**Hayner & Burn Co.,** Las Cruces—over $50,000, for sew. treatm. facil.—by U. S. Engineer Office, Albuquerque. 5-11

PROPOSED PROJECTS

Texas

BEXAR CO.—The City of San Antonio has a federal grant of $66,000 for sewage treatment plant improv., total cost $86,000. 4-20

Waterway . . .

CONTRACTS AWARDED

Washington

KING CO.—**General Construction Co.,** 3840 Iowa St., Seattle—$34,705, for riprap bulkhead work on Seaview Ave. from W. 68th St. to point 250 ft. north of W. 80th St., Seattle—by Board of Public Works, Seattle. 5-25

PROPOSED PROJECTS

California

LOS ANGELES CO.—The War Production Board has granted the Rubio Wash debris basin project an AA-4 priority rating. The project will cost approx. $350,000—by Los Angeles County Flood Control District. 4-14

Dam . . .

CONTRACTS AWARDED

California

SOLANO CO.—**Guerin Bros.,** 208 S. Linden Ave., So. San Francisco—$92,825, for enlargement of the Lake Herman Dam, on Sulphur Springs Valley creek, near Benicia—by California-Pacific Utilities Co., San Francisco. 5-18

Oregon

CLACKAMAS CO.—**Gilpin Construction Co.,** 2850 N.W. Front Ave., Portland—$225,000, (approx.) for a 700-ft. reinf. conc. dam across the west side of the east basin of Willamette Falls, near Oregon City—by General Electric Co., Portland. 5-17

Texas

HARRIS CO.—**Macco Construction Co., Inc.,** Ferry & Freight Sts., Oakland, Calif.—$1,233,000, for completion of the Barker Dam at Buffalo Bayou, 15 mi. W. of Houston—by U. S. Engineer Office, Houston. 4-29

PROPOSED PROJECTS

Oklahoma

BRYAN, MARSHALL & JOHNSON COS.—Plans for const. 3 dikes & 2 cuts, detouring the Washita River one mile east & involv. excav. of 8,000,000 cu. yd. at the cost of approx. $5,000,000, protecting the Cumberland pool from flood waters of the $50,000,000 Denison Dam. The 3 dikes will have total length of 25,000 ft. & the 2 cuts will be 9,000 ft. long. 4-29

Building . . .

CONTRACTS AWARDED

Arizona

COCHISE CO.—**Paddock Engineers Co. of Texas,** 900 S. Ervay St., Dallas, Texas—over $50,000, for WAAC bldgs. at an advanced flying school—by U. S. Engineer Office, Phoenix. 5-6

MOHAVE CO.—**Allied Contractors,** 9700 W. Pico Blvd., Los Angeles, Calif.—over $50,000, for WAAC bldgs. at an army air base—by U. S. Engineer Office, Kingman. 5-20

PIMA CO.—**James I. Barnes Construction Co.,** 1119 Montana St., Santa Monica, Calif.—over $500,000, for addtn. to hangar bldgs. at a modification center—by U. S. Engineer Office, Phoenix. 5-17

California

ALAMEDA CO.—**Austin Co.,** 1001 Ray Bldg., Oakland—approx. $95,000 for remod. a plant in Oakland—by General Electric Co. 5-24

ALAMEDA CO.—**Chas. L. Harney,** 625 Market St., San Francisco—$187,500, for 600-unit trailer park in Oakland—by Housing Authority, Oakland. 5-13

ALAMEDA CO.—**I. M. Sommer & Co.,** 580 Market St., San Francisco—$81,497, for bldgs. and util. for a 170-unit trailer camp at 77th and San Leandro Sts. in Oakland—by Housing Authority of the City of Oakland. 5-25

ALAMEDA CO.—**Stolte, Inc.,** 1405 San Antonio Ave., Alameda—$87,186, for bldgs. & util. for a 200-unit trailer camp — by Housing Authority, Alameda. 5-10

CONTRA COSTA CO.—**G. W. Williams Co.,** 10 California Drive, Burlingame—over $300,000 for bldgs.—by U. S. Engineer Office, Sacramento. 5-24

FRESNO CO.—**L. H. Hansen & Sons,** Box 1784, Fresno — over $100,000, for WAAC bldgs.—by U. S. Engineer Office, Sacramento. 5-20


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FRESNO CO.—**Theodore G. Meyer,** 735 Portola Dr., San Francisco—over $100,000 for bldgs.—by U. S. Engineer Office, Sacramento. 5-11

KERN CO.—**Davies & Keusder, Inc.,** 118½ North Larchmont Ave., Los Angeles—over $100,000, for temp. frame bldgs.—by U. S. Engineer Office, Los Angeles. 5-5

LASSEN CO.—**G. A. Bell Engineering Co.,** 816 W. 5th St., Los Angeles—over $100,000 for bldgs.—by U. S. Engineer Office, Sacramento. 5-18

LOS ANGELES CO.—**J. Paul Campbell,** 5601 West Manchester Ave., Los Angeles—$350,000 for 95 eight-room frame and stucco double dwell. in the Venice district—by Airport Housing Corporation, Los Angeles. 5-5

LOS ANGELES CO.—**Jackson Bros.-Le Sage,** 547 S. Fairfax Ave., Los Angeles—over $500,000, for bldgs., until. & roads at a sub-port of embarkation hospital—by U. S. Engineer Office, Los Angeles. 5-25

LOS ANGELES CO.—**Millsap, Berger & Sayre,** 437 S. Hill St., Los Angeles—$213,000 for an industrial bldg. in Santa Monica—by Douglas Aircraft Co., Santa Monica. 5-12

LOS ANGELES CO.—**Zoss Construction Co.,** 1037 N. Cole Ave., Los Angeles—over $1,000,000, for temp. frame bldgs. at an army air force install.——by U. S. Engineer Office, Los Angeles. 5-6

MONTEREY CO.—**G. W. Williams Co.,** 10 Calif. Drive, Burlingame—over $100,000, for addtl. hosp. facil.—by U. S. Engineer Office, San Francisco. 5-13

ORANGE & LOS ANGELES CO.—**Guy F. Atkinson Co.,** Russ Bldg., San Francisco and George Pollock Co., Forum Bldg., Sacramento—$2,259,000, for marine barracks at Naval operating base, San Pedro, and for swimming pool superstructure at Naval air station, Los Alamitos—by Navy Department, Washington, D. C. 5-4

PLACER CO.—**MacDonald & Kahn, Inc.,** 200 Financial Center Bldg., San Francisco—over $1,000,000, for hospital bldgs.—by U. S. Engineer Office, Sacramento. 4-30

RIVERSIDE CO.—**Allied Contractors, Inc.,** 9700 W. Pico Blvd., Los Angeles—$194,474, for 140 temp. dwell. units in Arlington—by Housing Authority, Riverside. 5-11

RIVERSIDE CO.—**J & B Construction Co.,** 5572 Valley Blvd., Los Angeles—over $100,000, for hosp. expan. at a camp—by U. S. Engineer Office, San Bernardino. 5-13

SAN BERNARDINO CO.—**Wm. C. Crowell,** 170 E. California, Pasadena—$631,900, for 420 temp. dwell. units in San Bernardino—by Housing Authority, San Bernardino. 5-20

SAN BERNARDINO CO.—**Ford J. Twaits Co.,** 451 S. Boylston, Los Angeles—over $1,000,000, for army air force supply depot—by U. S. Engineer Office, San Bernardino. 5-6

SAN DIEGO CO.—**Baruch Corp.,** 625 S. Olive St., Los Angeles—$229,175, for 150 temp. dwell. units in San Diego—by Federal Public Housing Authority, San Diego. 5-20

SAN DIEGO CO.—**Wm. C. Crowell Co.,** 170 E. California, Pasadena—$1,100,000, for 70 temp. dwell. units in San Diego—by Federal Public Housing Authority, San Diego. 5-20

SAN DIEGO CO.—**W. D. Haxton,** 4271 Landis, San Diego—$57,161, for a 150-unit trailer camp in San Diego—by Federal Public Housing Authority, San Diego. 5-24

SAN DIEGO CO.—**Myers Bros.,** 3407 San Fernando Rd., Los Angeles—$264,607, for a community center at Linda Vista—by Federal Public Housing Authority, San Diego. 4-30

SAN DIEGO CO.—**Thomas & Beyer,** Chamber of Commerce Bldg., Los Angeles—$181,837, for 375 trailer units—by Federal Public Housing Authority, San Diego. 5-13

SAN DIEGO CO.—**Tifal, King & McKee,** 2880 El Cajon, San Diego—$119,350, for two contracts for a total of 290 trailer units at Chula Vista—by Federal Public Housing Authority, San Diego. 5-14

SAN FRANCISCO CO.—**L. C. Dunn,** 799 Monadnock Bldg., San Francisco—$2,380,242, for 2,000 temp. family dwell. units, a management & mainten. bldg., a cafeteria bldg., a children's service center & a comm. center at Hunters Point—by Housing Authority, San Francisco. 5-17

SAN FRANCISCO CO.—**Charles L. Harney,** 543 Call Bldg., San Francisco—$296,188 for a portion of the grading work for a 944-unit housing project and misc. bldgs. at Hunters Point—by Housing Authority of the City and County of San Francisco. 5-10

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SAN FRANCISCO CO.—**Heyman Bros.,** 564 Market St., San Francisco—$717,920, for grading & 552 temporary dwell. units at Hunters Point—by Housing Authority, San Francisco. 5-10

SAN FRANCISCO CO.—**Standard Building Co.,** 1500 Judah St., San Francisco—$1,094,925, for 944 temp. family dwell. units, a management & maint. bldg., a cafeteria bldg., children's service center and commer. center—by Housing Authority, San Francisco. 5-5

SAN FRANCISCO CO.—**State Home Builders,** 320 Judah St., San Francisco—over $150,000 for 56 residences and store bldg., for self. 5-19

SAN JOAQUIN CO.—**Louis Biasotti & Son,** 40 W. Clay Street, Stockton—over $300,000 for storage facil.—by U. S. Engineer Office, Sacramento. 5-18

SANTA BARBARA CO.—**Fluor Corp.,** 2500 Atlantic Blvd., Los Angeles—$500,000, (approx.) for an absorption plant on the Battles ranch, southeast of Santa Maria—by Union Oil Co., Los Angeles. 4-30

Colorado

DENVER CO.—**N. G. Petry,** Denham Bldg., Denver—over $50,000, for bldgs. in Denver vicinity—by U. S. Engineer Office, Denver. 5-21

EL PASO CO.—**Dutton, Kendall & Hunt,** 4515 Garfield St., Denver—over $350,000, for addtl. hosp. bldgs., roads, streets, and outside utils.—by U. S. Engineer Office, Denver. 5-5

PUEBLO CO.—**Newstrom Davis & Co.,** Denver—over $50,000, for temporary frame bldgs. & util.—by U. S. Engineer Office, Denver. 4-30

Idaho

ADA CO.—**H. J. McNeel,** Caldwell—over $50,000, for temp. frame bldgs. & appurt.—by U. S. Engineer Office, Portland, Oreg.

BANNOCK CO.—**Nordin Construction Co.,** 3030 Exposition Blvd., Los Angeles, Calif.—for 100 single family dwell. in Pocatello—by American Land Co., Inc. 5-17

New Mexico

GRANT CO.—**Modern Movable Homes,** Memphis, Tenn.—$154,000, for a housing project of 88 dwellings at Santa Rita—by Federal Public Housing Authority, Fort Worth, Tex. 5-11

OTERO CO.—**J. J. Bolinger,** Braniff Bldg., Oklahoma City, Okla.—$413,182, for a housing project in Alamogordo—by Federal Public Housing Authority, Fort Worth, Texas. 4-20

Oklahoma

OKMULGEE CO.—**Cowen Construction Co.,** Shawnee—over $1,000,000, for an army general hosp.—by U. S. Engineer Office, Tulsa. 5-6

Oregon

CLATSOP CO.—**James I. Barnes Construction Co.,** 1119 Montana Ave., Santa Monica—$451,000 for 240 temp. row type housing units at Astoria, on the highway to Seaside—by Portland Housing Authority, Portland. 5-4

MULTNOMAH CO.—**Ralph & Horowitz,** 1835 N. Flint St., Portland—$75,000 for addtns. to a bldg. at the Swan Island shipyard of Kaiser Co., Inc.—by Kaiser Co., Inc. 4-28

MULTNOMAH CO.—**Nordin Construction Co.,** 3030 Exposition Blvd., Los Angeles, Calif.—for 400 single family dwell. in Portland—for American Land Co., Inc. 5-17

South Dakota

PENNINGTON CO.—**Kileen & Wille Construction Co.,** Superior, Wis.—over $50,000, for temp. frame bldgs.—by U. S. Engineer Office, Fort Peck, Mont. 4-30

Texas

BELL CO.—**S. R. Frank,** 4826 Glenwick Lane, Dallas—over $50,000, for recreation bldg. in Killeen—by U. S. Engineer Office, San Antonio. 4-20

BEXAR CO.—**Victor Prassel,** San Antonio—over $50,000, for cold storage bldg.—by U. S. Engineer Office, San Antonio.

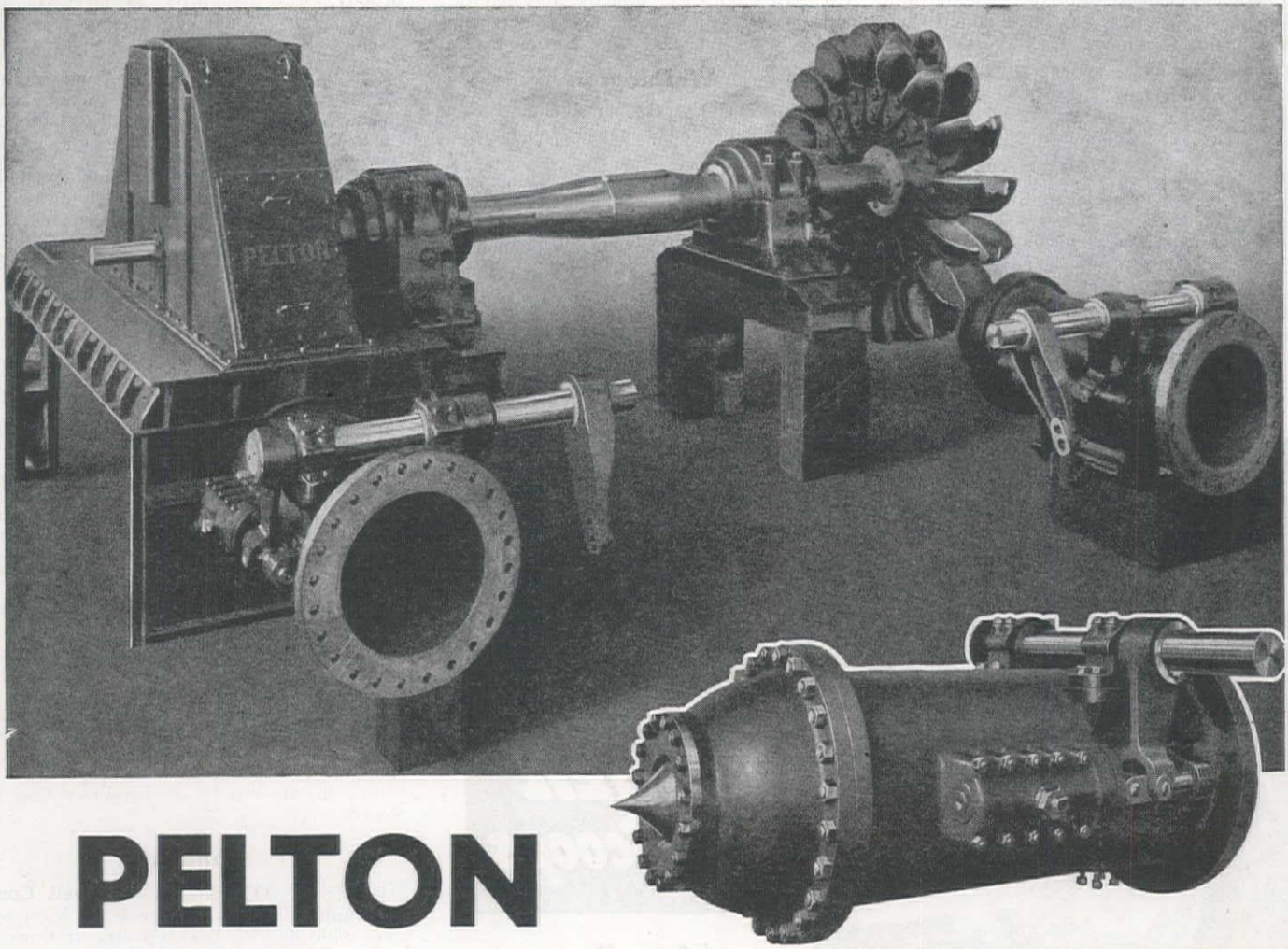
BEXAR CO.—**A. P. Rheiner and Son,** San Antonio—over $1,000,000 for addtl. storage facil. at an army air force instal.—by U. S. Engineer Office, San Antonio. 5-5

BEXAR CO.—**John Westerhoff & Sons,** 418 School St., San Antonio—over $50,000, for warehouse addtn., Fort Sam Houston—by U. S. Engineer Office, San Antonio.

DALLAM CO.—**Randall Construction Co.,** Box 1013, Amarillo—over $100,000, for storage facil.—by U. S. Engineer Office, Tulsa. 5-11

JONES CO.—**D. M. Harwood,** 2005 Canal St., Houston—for 23 duplex bldgs.—by Defense Plant Corp., Houston. 4-27

REEVES CO.—**Kucharo & Union Con-**



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struction Co., Neil P. Anderson Bldg., Fort Worth — $340,900 for 210 dwelling-unit housing project in Pecos—by Federal Public Housing Authority, Fort Worth. 4-29

RUNNELS CO.—**D. M. Harwood**, 2005 Canal St., Houston—for 13 frame duplex bldgs.—by Defense Plant Corp., Houston. 4-27

Utah

WEBER CO.—**Bethlehem Steel Co.**, Bethlehem, Pa.—approx. $100,000 for steel work on a squadron hangar in the Ogden area—by U. S. Engineer Office, Salt Lake City. 5-6

WEBER CO.—**Nordin Construction Co.**, 3030 Exposition Blvd., Los Angeles, Calif.—for 250 single dwell. in Ogden—by American Land Co., Inc. 5-17

WEBER CO.—**Olsen-Lucas Construction Co.**, Salt Lake City—approx. $100,000 for a new cold storage plant in Ogden—by Utah Ice & Storage Co., Ogden. 5-18

Washington

CHELAN CO. — **Gaasland Construction Co.**, 1161 Ellis, Bellingham—over $100,000, for temp. frame bldgs.—by U. S. Engineer Office, Seattle. 5-5

CLARK CO. — **George H. Buckler Co.**, Lewis Bldg., Portland—approx. $155,000, for an addtl. wing to Northern Permanente Hospital at Vancouver — by Kaiser Co., Inc., Portland.

KING CO. — **Western Construction Co.**, Arctic Bldg., Seattle—over $100,000, for a shed and utilities—by U. S. Engineer Office, Seattle. 5-14

KING CO.—**Johnson, Inc.**, and **Minnis & Moody**, Seattle—approx. $400,000, for an airport admin. bldg. at Bow Lake—by U. S. Engineer Office, Seattle. 5-14

KITTITAS CO.—**Gaasland Construction Co.**, 1161 Ellis St., Bellingham—over $100,000, for addtl. bldgs.—by U. S. Engineer Office, Seattle. 4-30

PIERCE CO.—**Bergesen, Wick & Dahlgren**, Box 428, Tacoma—$167,000 for a 100-unit housing project in the American Lake Gardens addtn. in Tacoma — by Federal Public Housing Authority, Seattle. 5-10

PIERCE CO.—**A. G. Homann**, Olympia—$98,302, for 100 family housing units at Tacoma—by Federal Public Housing Authority, Seattle. 5-12

PIERCE CO.—**Matheny & Bacon**, 1710 4th South, Seattle—$65,041, for 32 temp. frame family units at Wilkeson—by Federal Public Housing Authority, Seattle. 5-12

PIERCE CO.—**Standard Construction Co.**, Tacoma—over $100,000, for addtl. hosp. facils.—by U. S. Engineer Office, Seattle. 5-24

SPOKANE CO. — **Nordin Construction Co.**, 3030 Exposition Blvd., Los Angeles, Calif.—for 450 single family dwell. in Spokane—by American Land Co., Inc. 5-17

SPOKANE CO.—**Sound Construction & Engineering Co.**, and **Ford J. Twaits Co.**, Northern Life Tower, Seattle—over $1,000,000, for storage facil. at an army air forces instal.—by U. S. Engineer Office, Seattle. 5-4

Canada

BRITISH COLUMBIA—**Marwell Construction Co., Ltd.**, 540 Howe St., Vancouver—$100,000, for two repeater stations—by Department of Munitions & Supply, Ottawa.

BRITISH COLUMBIA—**Marwell Construction Co., Ltd.**, 540 Howe St., Vancouver—approx. $60,000, for addtn. to the R. C. A. F. hosp. at Patricia Bay—by Department of Munitions & Supply, Ottawa.

BRITISH COLUMBIA—**E. H. Shockley**, Admirals Road, Victoria — $435,000, for bldgs. at an air force center—by Department of Munitions & Supply, Ottawa. 5-14

MANITOBA — **Pearson & Leitch**, and **Couture & Toupin**, Winnipeg — approx. $253,000 for bldgs. for an army center at Brandon—by Department of Munitions & Supply, Ottawa. 5-14

PROPOSED PROJECTS

Arizona

COCHISE CO. — Assignment has been given to the Federal Public Housing Authority, San Francisco, Calif., to develop 180 family units & 325 dorm. units at Fort Huachuca. 5-20

MOHAVE CO. — The Federal Public Housing Authority, San Francisco, Calif., have been assigned to develop 100 dorm. units at Kingman. 5-20

YUMA CO.—Assignment has been given to the Federal Public Housing Authority, San Francisco, Calif., to develop 35 family units at Baghdad. 5-20

California

ALAMEDA CO. — Approval has been granted by the Bureau of Yards & Docks, Washington, D. C., for the following

projects: Housing for a hospital corps, WAVES, and roads for the Oak Knoll Naval hosp., $152,000; addtn. to bldgs. at the Naval supply depot, $78,000. 5-4

LOS ANGELES CO.—Plans are being prepared for a reinf. conc. bldg., at Vernon, to cost approx. $250,000—by Aluminum Co. of America. 5-12

LOS ANGELES CO.—An army hospital to cost over $1,000,000 is to be built near Torrance—by U. S. Engineer Office, Los Angeles. 4-23

LOS ANGELES CO.—**Beachill Builders,** 3518 Victory Blvd., Burbank, have made applications for priorities for 46 defense dwell. in Burbank, to cost $150,000. 5-6

LOS ANGELES CO.—The **Home Investment Co.** of Long Beach is planning to build 37 5-room dwellings and 10 6-room double dwellings in Long Beach, to cost $151,000.

PLUMAS CO. — Assignment has been given to the Federal Public Housing Authority, San Francisco, to develop 30 family housing units at Keddie. 5-20

SAN DIEGO CO.—Plans are being prepared for 100 temp. dwelling units in San Diego—by Federal Public Housing Authority, San Diego. 5-4

SAN DIEGO CO.—The Bureau of Yards & Docks, Washington, D. C., has approved a project, to cost $142,000, for conversion of Balboa Park bldgs. into hosp. and ward bldgs. 5-11

SAN DIEGO CO.—Bldgs. for housing the Marine Corps Women's Reserve at the Marine Base, to cost $558,734, have been approved by the Bureau of Yards & Docks, Washington, D. C. 5-11

SAN DIEGO CO. — **United Property & Construction Co.,** 2829 El Cajon Blvd., San Diego, will build fifteen 4-family dwell., to cost $165,000. 5-12

SOLANO CO. — The Federal Public Housing Authority, San Francisco, have been assigned the development of 216 dorm. units and 200 family units at Fairfield. 5-20

SOLANO CO. — Approval has been granted for addtl. quarters for enlisted and officer WAVES at Mare Island, to cost $324,182—by Bureau of Yards & Docks, Washington, D. C. 5-10

The following housing projects have been authorized for develop. by the Federal Public Housing Authority, San Francisco:

Portola, Plumas Co.—70 dormitory units, 60 family dwell. units.

Indio, Riverside Co.—20 family units, 50 dormitory units.

Dunsmuir, Siskiyou Co.—60 family units, 48 dormitory units.

Roseville, Placer Co. — 70 dormitory units.

Oroville, Butte Co.—50 dormitory units.

San Bernardino, San Bernardino Co.—100 dormitory units. 5-13

The National Housing Agency has approved the following privately-financed housing projects:

Rice, San Bernardino Co.—7 family units.

Victorville, San Bernardino Co.—18 family units.

Blythe, Riverside Co.—16 family units.

Saugus, Los Angeles Co.—50 family units. 5-21

Colorado

DENVER CO.—Plans are being prepared for a modification center, to cost over $3,000,000; includes hangars, shop and office buildings, and necessary util.—by U. S. Engineer Office, Denver. 4-29

DENVER CO.—Three recreational bldgs. are planned, each to cost over $50,000, by U. S. Engineer Office, Denver. 5-5

DENVER CO.—Plans are being prepared for a medical supply warehouse, by U. S. Engineer Office, Denver. 4-29

EL PASO CO.—Plans are being prepared for two barracks, and four other bldgs., to cost over $100,000—by U. S. Engineer Office, Denver. 4-29

PUEBLO CO.—The Federal Public Housing Authority has been assigned for develop. 50 family units at Pueblo. 5-20

PUEBLO CO.—The Colorado Fuel & Iron Corporation, Denver, has announced a plant expansion, to cost over $5,000,000, will include the addtn. of 74 new coke ovens and a new steam generating plant—by Defense Plant Corp., Washington, D. C. 5-6

Montana

CASCADE CO.—Federal Public Housing Authority has been assigned for develop. 50 family units at Great Falls. 5-20

CASCADE CO.—The National Housing Agency, Washington, D. C., has approved a privately-financed project for 30 dormitories at Great Falls. 5-20

Oregon

CLATSOP CO.—The U. S. Navy has approved a grant of $600,000 for expan. of the Astoria Naval station. 5-15

DESCHUTES CO.—A housing project of over 50 units has been announced for Bend, to cost $200,000. Another project of 24 units is planned for Redmond—by Federal Public Housing Authority, Washington, D. C.

JOSEPHINE CO.—The **Pacific Company,** Merlin, has been authorized to build a 100-ton chrome concentrating plant at the Briggs creek chrome property near Galice—by Defense Plant Corp., Washington, D. C. 5-11

Utah

PIUTE CO.—The Reconstruction Finance Corporation has made a loan of $450,000 to the Aluminum Inc., Nevada, for a plant to produce alumina from Utah alunite, at Marysvale. 5-20

SAN JUAN CO.—The Federal Public Housing Authority has been assigned for development of 25 family units at Blanding. 5-20

SAN JUAN CO.—The National Housing Agency, Washington, D. C., has approved a privately-financed project for 14 family units at Blanding. 5-20

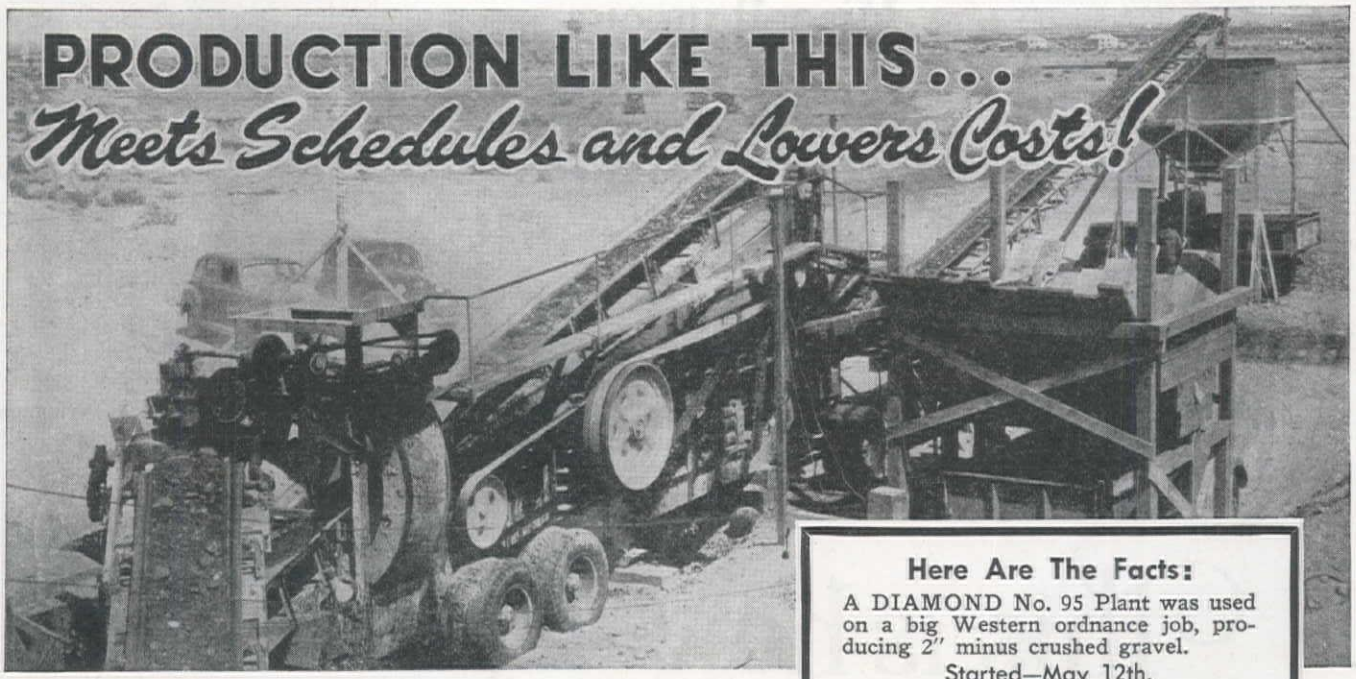
Plans are being prepared for the Federal Works Administration, Salt Lake City, for school buildings in the following locations:

Weber Co.—Ogden—On the site of the Bonneville Park housing project, to cost approx. $68,000.

North Davis Co.—Layton—Three bldgs. to cost $64,000; Verdaland Park housing project— $———; Saraha Village housing project—$56,000.

Tooele Co.—Tooele—Central grade

PRODUCTION LIKE THIS...
Meets Schedules and Lowers Costs!



5000 TONS PER DAY ON A 7 MONTHS' CONTINUOUS RUN!

Every experienced operator knows that to produce 5,000 tons of aggregate every 24 hours — and do it consistently, week after week, month after month — a plant must be perfectly balanced, ruggedly built — and trouble free. DIAMOND Portable Plants are constantly turning in high-production, non-stop records like this, and have for years. There are mighty good reasons why they do!

NO BOTTLENECKS In a DIAMOND Plant

EVERY unit — jaw crusher, roll crusher, vibrating screen, conveyor — is a PROVEN Unit. The exclusive DIAMOND "ROTOR-LIFT" assures maximum production of each unit and for the plant as a whole. For low-cost, high-output performance that meets or BEATS schedules — investigate DIAMOND. Ask for new Bulletin D-43-G.

Made in many sizes and types:

QUARRY PLANTS—port. and sta.	Portable washing-screening plants
No. 36—Portable, rotor-lift	Portable and stationary Crushers
No. 65—Portable, rotor-lift	Vibrating, rotary and scalping
No. 95—Portable, rotor-lift	Screens. Conveyors, bins, feeders.

Contact One of These DIAMOND Dealers!

COAST EQUIPMENT CO., San Francisco, Calif.
GARLINGHOUSE BROS., Los Angeles, Calif.
A. H. COX & CO., Seattle, Washington
LOGGERS & CONTR. MACHY. CO., Portland, Ore.
CONSTRUCTION EQUIP. CO., Spokane, Wash.
BROWN-BEVIS EQUIP. CO., Phoenix, Ariz.
C. H. JONES EQUIPMENT CO., Salt Lake City, Utah
OLSON MANUFACTURING CO., Boise, Idaho

Or write for Bulletins direct to

DIAMOND IRON WORKS, INC.
ESTABLISHED 1880
AND THE MAHR MANUFACTURING CO. DIVISION
1818 SECOND STREET NORTH MINNEAPOLIS, MINN.

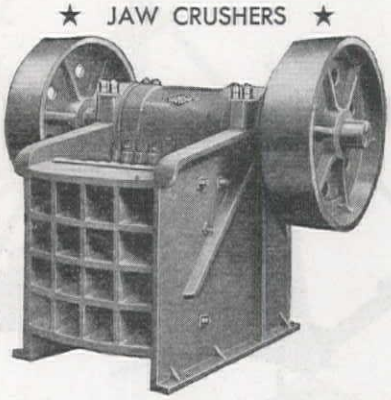
Here Are The Facts:

A DIAMOND No. 95 Plant was used on a big Western ordnance job, producing 2" minus crushed gravel.

Started—May 12th.
Finished—November 6th.

Calendar time—179 days, 24 hours a day, 7 days a week—total elapsed time—4,296 hours.
Schedule operating time—3,920 hours.
Actual operating time—3,320 hours or 84% of scheduled time.
Aggregate production — 463,223 cubic yards.
119 cu. yds. per scheduled hour for entire period.
139 cu. yds. per actual operating hour.

★ JAW CRUSHERS ★



DIAMOND was the first maker of jaw crushers to use roller bearings, the long jaw and structural steel base. Greater tonnage per rated capacity. Handles hardest rock. 10 sizes for every primary crushing need.

★ BALANCED VIBRATORS ★

Accurately balanced—fast, positive separation ALL OVER screen. No choke—fast delivery. 11 sizes—up to 4 decks.

DIAMOND

★ ★ ★

school addition—$45,700; Tooele Ordnance Depot housing project—$72,000. 5-4

Washington

CLARK CO.—The Federal Works Administration has approved an allotment of $687,500 for five school buildings and the enlargement of three existing school buildings in Vancouver. 5-6

KING CO.——The **Sand Point Construction Co.**, Seattle, will build 46 homes at Sand Point, to cost approx. $270,000. 5-25

Wyoming

NATRONA CO.—The National Housing Agency has approved a project for 50 family units at Casper. 5-20

Miscellaneous . . .

CONTRACTS AWARDED

Arizona

COCHISE CO.—**Elder R. Morgan & Co.**, 2300 Huntington Drive, San Marino, Calif. —over $100,000, for expan. of hosp. facil. at a fort—by U. S. Engineer Office, Phoenix. 5-3

COCHISE CO.—**Gilbert E. Olson Construction Co.**, 315 Title & Trust Bldg., Phoenix — less than $50,000, for railway spur at a fort—by U. S. Engineer Office, Phoenix. 5-20

MARICOPA CO.—**W. R. Skousen**, 548 N. Grand Ave., Mesa—approx. $50,000, for dust control at a gunnery base—by U. S. Engineer Office, Phoenix. 5-11

MOHAVE CO.—**Allied Contractors**, 9700 W. Pico Blvd., Los Angeles—less than $50,000 for fuel oil storage tanks of 50,000-gal. capacity and until. at a flexible gunnery school—by U. S. Engineer Office, Kingman. 5-7

PIMA CO.—**Miller & Stoutenburg**, Box 87, Hawthorne, Nevada—less than $50,000, for railroad spurs at a modification center—by U. S. Engineer Office, Phoenix. 5-25

California

CONTRA COSTA CO. — **Permanente Metals**, S. 14th and Perrelli, Richmond—contracts for new ships as follows:

Richmond Yard No. 1—25 Liberty ships and 35 Victory ships.

Richmond Yard No. 2—6 Liberty ships and 75 Victory ships.
—by U. S. Maritime Commission, Washington, D. C. 5-6

KERN CO.—**Hodges & Kahn**, 6779 Lexington Ave., Los Angeles—$1,886,340, for facil. for marine air station at Mojave—by Bureau of Yards & Docks, Washington, D. C. 4-29

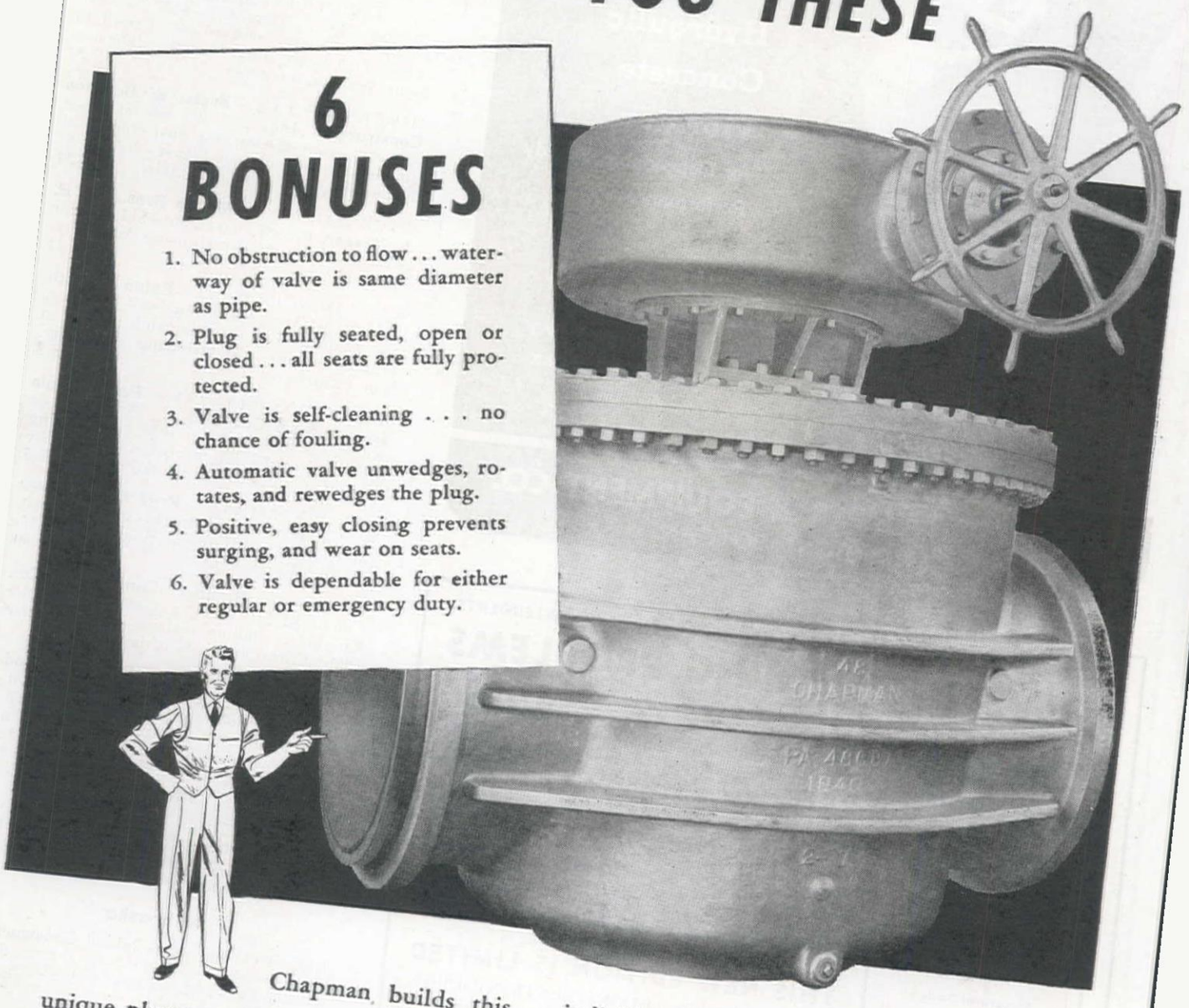
KERN CO.—**Albert Reingardt**, 3021 E. 2nd St., Long Beach—over $100,000, for sub-depot facil. at a bombing range—by U. S. Engineer Office, San Bernardino. 5-21

LOS ANGELES CO. — **Foster-Wheeler Co.**, Petroleum Securities Bldg., Los Angeles, for an alkylation plant, and **M. W. Kellogg Co.**, Jersey City, N. J., for a fluid

Only CHAPMAN'S Cone Valve GIVES YOU THESE

6 BONUSES

1. No obstruction to flow . . . waterway of valve is same diameter as pipe.
2. Plug is fully seated, open or closed . . . all seats are fully protected.
3. Valve is self-cleaning . . . no chance of fouling.
4. Automatic valve unwedges, rotates, and rewedges the plug.
5. Positive, easy closing prevents surging, and wear on seats.
6. Valve is dependable for either regular or emergency duty.



Chapman builds this unique plug-type Cone Valve for manual, hydraulic, or electric operation . . . with the particular type of control best suited to the individual installation. And *you* can get these six exclusive Chapman advantages on any water, sewage, air or gas service. Check with Chapman *now,* on your own requirements.

The CHAPMAN VALVE Mfg. Co.

INDIAN ORCHARD, MASS.

catylitic cracker in Wilmington—by Texas Co., Los Angeles. 5-7

LOS ANGELES CO.—**Macco-Case Construction Co.,** Box 6, San Pedro—less than $50,000, for railroad track extension and instal. lighting system—by U. S. Engineer Office, San Pedro. 5-13

LOS ANGELES CO.—**Myers Bros.,** 3407 San Fernando Rd., Los Angeles—over $50,000, for facil. for processing motor vehicles at sub-port of embarkation—by U. S. Engineer Office, Los Angeles. 5-5

MONTEREY CO.—**Stolte, Inc.,** 1405 San Antonio Ave., Alameda—$172,250, for architect-engineer service at Pre-flight school, Del Monte Hotel—by Navy Department, Washington, D. C. 5-20

RIVERSIDE CO.—**Bressi & Bevanda Constructors, Inc.,** 208 W. 8th St., Los Angeles—over $50,000, for dust control at an air support command base—by U. S. Engineer Office, Kingman, Ariz. 4-20

RIVERSIDE CO.—**Matich Bros.,** and **E. L. Yeager,** Box 87, Riverside—$11,175, for grad. in Riverside—by Housing Authority, Riverside. 5-21

SAN FRANCISCO CO.—**Eaton & Smith,** 715 Ocean Ave., San Francisco—$521,166, for grading work for a housing project at Hunters Point—by Housing Authority, San Francisco. 5-5

SAN FRANCISCO CO.—**Pennsylvania Iron & Steel Co.,** 2451 E. 23rd St., Los Angeles—$192,960, for 120 ton floating stiffleg derricks for Peruvian Navy—by Navy Department, Washington, D. C. 5-3

SAN MATEO CO.—**Fritz Ziebarth,** 820 W. Esther St., Long Beach—over $100,000, for railroad yard—by U. S. Engineer Office, San Francisco. 4-30

YOLO CO.—**Berlinger Construction Co.,** Chico—$225,000, for a rice drier in the Knights Landing district—by Defense Plant Corporation, Washington, D. C.

UNANNOUNCED CO.—**Clyde W. Wood,** 816 W. 5th St., Los Angeles—over $100,000, for a gasoline fuel. system at an airfield in southern California.—by U. S. Engineer Office, San Pedro. 5-3

Idaho

SHOSHONE CO.—**The Bunker Hill & Sullivan Smelting Co.,** Kellogg, are building a zinc fuming plant at Kellogg, at an estimated cost of $1,250,000. 5-21

Nebraska

BOX BUTTE CO.—**Inland Construction Co.,** Omaha—over $50,000, for grading, excav., ditch and headwalls—by U. S. Engineer Office, Omaha. 5-18

Oregon

MARION CO.—**Foster & Kleiser Co.,** Portland—over $50,000, for camouflage work—by U. S. Engineer Office, Portland. 5-6

MULTNOMAH CO.—**Gunderson Brothers Engineering Co.,** Portland—for 800 24-ft. plywood lifeboats—by U. S. Maritime Commission, Washington, D. C. 5-7

MULTNOMAH CO.—**Portland Tug & Barge Co.,** 8444 N. W. St. Helens, Portland—over $100,000 for railroads—by U. S. Engineer Office, Portland. 4-30

MULTNOMAH CO.—**C. H. Wheeler,**

612 Pittock Block, Portland—over $50,000, for railway yards—by U. S. Engineer Office, Portland. 5-4

UNANNOUNCED CO.—**J. A. Terteling & Sons,** Box 1406, Boise, Ida.—approx. $1,800,000, for a grain alcohol plant on the Columbia River highway between Pasco, Wash., and The Dalles — Defense Plant Corporation, Washington, D. C. 5-10

Texas

BEXAR CO. — **Moore & Turner,** Milam Bldg., San Antonio — $50,000, for addtl. sodding in San Antonio—by U. S. Engineer Office, San Antonio. 4-20

CORYELL CO.—**A. Farnell Blair,** Decatur, Ga.—$50,000, for addtl. const.—by U. S. Engineer Office, San Antonio. 4-20

GRAY CO.—**J. Ted Wilkerson,** Oklahoma City, Okla.—less than $50,000, for driveways—by U. S. Engineer Office, Tulsa, Okla. 4-28

Washington

SNOHOMISH CO. — **Everett Pacific Shipbuilding Co.,** Everett—$3,500,000, for an 18,000-ton drydock—by Bureau of Yards & Docks, Washington, D. C. 5-7

SNOHOMISH CO.—**Axel Osberg,** 502 N. 62nd St., Seattle — $48,096, for 22.4 mi. clearing the Skagit transmission line right-of-way from the south fork of the Stillaquamish River to Darrington—by Board of Public Works, Seattle. 5-6

UNANNOUNCED CO.—**J. E. Haddock Co., Ltd.,** 3558 E. Foothill Blvd., Pasadena, Calif.—$1,380,000, for 2600-ton conc. floating drydocks for West Coast—by Bureau of Yards & Docks, Washington, D. C. 5-24

PROPOSED PROJECTS

California

COLUSA CO. — The War Production Board has granted priorities for a $140,000 rice drier in the Codora district. 4-23

The Navy Department, Washington, D. C., has given approval for the following projects:

Mills Field—San Mateo Co.—air transport service, $3,500,000.

Pleasanton-Alameda Co.—expansion of facil. for 5,000 men, to cost $1,600,000.

Oakland — Alameda Co. — warm - up apron, $113,000.

Moffett Field—Santa Clara Co.—addtl. const., $130,218.

Alameda — Alameda Co. — hangar, etc., $815,000.

Idaho

BANNOCK CO.—64.9 acres of land have been acquired for an addtn. to the Pocatello naval ordnance plant—by Bureau of Yards & Docks, Washington, D. C. 5-20

Washington

SNOHOMISH CO. — Authorization has been granted for a $5,000,000 expansion of the Everett Pacific Shipbuilding Co. to accommodate repair work on ships up to 10,500 tons—by Bureau of Yards & Docks, Washington, D. C. 5-7

TRADE WINDS

News of Men Who Sell to the Construction West

W. Horace Holcomb, formerly vice-president and general manager of the *Pelton Water Wheel Co.,* San Francisco, and who a year ago became assistant to the executive vice-president of *Baldwin Locomotive Works,* has now been appointed assistant to the president. He will continue to serve as vice-president of the Pelton Co.

* * * *

The Capitol Tractor & Equipment Co. of Sacramento and Reno has been appointed exclusive distributors for P. & H. excavators in a portion of central California and western Nevada. They will handle all machines from ⅜ to 1½ cu. yd. capacity.

* * * *

Elden R. Carl has been appointed Director of Industrial Relations by *Adel Precision Products Corp.* of Burbank. He was formerly with North American Aviation, Inc., and the Solar Aircraft Co.

* * * *

L. J. Roberts, sales engineer at the Pacific factory of *B. F. Goodrich Co.* in Los Angeles, has been transferred to the field engineering department of the company at its main office in Akron, Ohio.

The *Lomen Commercial Co.* of Nome, Alaska, has been appointed distributor for products of the Kotal Co. in the Alaskan territory. Kotal is a chemical method of speeding up asphalt road and airport construction. The Lomen Co. has been established in Nome since the Gold Rush days.

* * * *

A. R. Johnson, formerly associated with the Atkinson Pollock Co., construction contractors of Los Angeles, has been appointed engineering and sales representative for *Young Radiator Co.* in southern California and Nevada territory.

HOBART UHL

Hobart Uhl has been appointed manager of the San Francisco office of *American Lumber & Treating Co.,* succeeding **L. K. Andrews.** For the past seven years he has been sales promotion and traffic manager at the company's Chicago office.

* * * *

Universal Engineering Corp. of Cedar Rapids, manufacturers of rock crushers, asphalt plants and other road equipment, were awarded the Army-Navy "E" production pennant on May 19. The entire output of their plant is now devoted to war production.

* * * *

The Washington office of *The Thew Shovel Company* has been moved to Suite 700 in the Medical Science Bldg., 1029 Vermont Ave. N.W. **H. H. Buchanan** is manager of the Washington office, and **R. A. Reynolds** is his assistant.

* * * *

The *Griffin Wellpoint Corp.* of New York City have opened a southern branch office and warehouse at Jacksonville, Fla. **William J. Carr** will be manager, in charge of all rentals and sales.

C. W. ELIASON, Regional Director of Industrial Relations for the United States Maritime Commission (left), presented the "M" Pennant and the Victory Fleet flag, highest award of the Maritime Commission, to JOSEPH A. WHITE, general superintendent of the Pittsburg works of Columbia Steel Company, during brief ceremonies on May 27. Employees of the works were informed by the Navy Department that their continued faithfulness to America's war effort had resulted in the awarding of a gold star to the Army-Navy "E" burgee, previously won by the plant.

C. L. Cummins, founder and president of the *Cummins Engine Co.,* Columbus, Ind., has been appointed executive consultant on diesel engine production for the War Production Board at Washington, D. C.

N. R. KNOX, who has been with Bucyrus-Erie Co., South Milwaukee, Wis., for 23 years, and since 1933 has been vice-president in charge of manufacturing, was elected recently to the position of president of the firm, succeeding W. W. COLEMAN, who is board chairman.

NEW EQUIPMENT

Wooden-Wheeled Trailer

Manufacturer: Cooper-Bessemer Corporation, Mount Vernon, Ohio.

Equipment: Wooden-wheeled trailer.

Features claimed: To relieve the problem of shortage in foundry floor area due to practically doubling their output, a type of wooden-wheeled trailer was devised to transport out of the plant castings weighing up to 16 tons. Constructed from scrapped steel and discarded parts and two heavy wooden wheels, these trailers adequately perform a vital function in meeting today's unprecedented production schedules.

Photoelectric Protection System

Manufacturer: Photoswitch Inc., Cambridge, Mass.

Equipment: Photoelectric protection system.

Features claimed: A new long-range photoelectric protection system which is especially suited to the protection of harbors, yards, docks, industrial properties, airports, and similar large areas. It projects a fence of invisible light over distances as great as 1,500 ft. and gives instant local or central-station alarm if an intruder enters the protected area.

In operation, light source is aligned with receiver to which it focuses a modulated beam of infra-red light. Because the receiver responds only to the frequency of light emitted from the light source, it is not affected by other artificial light or by daylight. This permits extreme sensitivity and enables the equipment to function over a wide range. Once the invisible beam of light is momentarily broken, the alarm circuit latches in operation. An additional safety feature is that either power or tube failure will cause the alarm circuit to operate as though the light beam had been broken.

Industrial A.C. Arc Welders

Manufacturer: Harnischfeger Corp., Milwaukee, Wis.

Equipment: Industrial A.C. arc welders.

Features claimed: Engineered and built for industrial service, these machines are being made in 7 heavy duty and 4 intermittent duty models with a range of capacities for handling production welding under continuous operation. The new line features the recently adopted "Welding Service Range" ratings which show the actual minimum to maximum output of usable welding current. The heavy duty models are rated in different stages from the lowest of 50 amps. to a high of 1200 amps. The intermittent duty models range from 20 to 335 amps. Setting and control of current throughout complete welding service range involves one simple, easy-to-operate adjustment. By actual field tests the mechanical and electrical refinements in the A.C. models have realized operating efficiencies up to as high as 95 per cent with appreciably reduced maintenance cost.

MORE COMPLETE information on any of the new products or equipment briefly described on these pages may be had by sending your request to the Advertising Manager, *Western Construction News*, 503 Market Street, San Francisco, California.

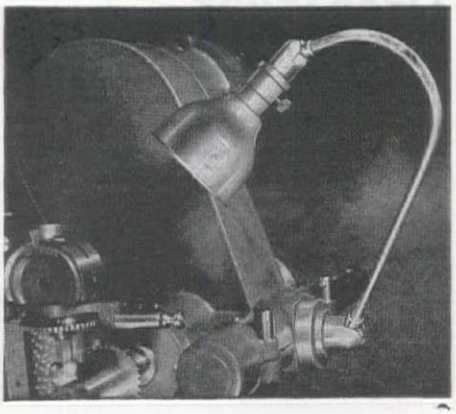
Portable Crushing Plant

Manufacturer: Iowa Manufacturing Co., Cedar Rapids, Iowa.

Equipment: Portable crushing plant.

Features claimed: This plant with a capacity of 200 tons of aggregate per hour can be knocked down into five units for quick transporting: a primary crushing plant, secondary crushing plant, sizing screen and bin, control panels, and power unit. This plant can be transported by truck at 30 or 40 mi. per hr., can be set up and put into operation or knocked down ready to travel in three to four hours.

The plant is designed so that it can be driven either by electricity, or by a combination of diesel and electric power, or by diesel power alone. In order to insure a smooth flow of aggregates through the plant, and to eliminate breakdowns, primary and secondary crusher plants, vibrating screens, and conveyors are independently driven. Entire plant is operated from a central control panel. The primary and secondary crushing plants are mounted on steel goose-neck trailers equipped with fifth wheel and pneumatic tires. The conveyors are carried with the secondary crushing unit. Bin legs are equipped with winches which lower the sizing screen into the bin and the bin onto the truck. (Illustrated below.)



Swivel Light Units

Manufacturer: Reliance Devices Co., Inc., New York, N. Y.

Equipment: Adjustable swivel machine-lighting units.

Features claimed: These units are unaffected by machine vibration because of patented spring construction inside the base and socket. The swivel base and swivel socket each have a wide range of movement and stay put at any angle. There are no set screws or wing nuts to adjust, the spring tension construction holds the complete unit in place at any angle. The unit is oil and dust-resistant and the wire is completely enclosed in the unit.

Heavy Duty Drill

Manufacturer: Skilsaw, Inc., Chicago, Ill.

Equipment: New ¼-in. heavy duty drill.

Features claimed: Designed especially to speed up tough "skin-drilling" in airplane construction, ideal for production drilling jobs up to ¼-in. in steel and ½-in. in wood. Lightweight, its diecast body, helical-cut gears and 100% anti-friction bearings assure smoother, quieter running.

Nylon Window Screen

Manufacturer: E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

Equipment: Nylon window screen.

Features claimed: To be available after the war, this new window screen containing no metal is being used exclusively for military purposes. It can be produced in any color, will not stain the sills, will not corrode, requires no painting, and has great durability.

LITERATURE . . .

Copies of the bulletins and catalogs mentioned in this column may be had by addressing a request to the Advertising Manager, *Western Construction News*, 503 Market Street, San Francisco, California.

Victor Equipment Company, San Francisco, Calif.—A new catalog of welding supplies for 1943 has been published recently. In its 32 pages are listed practically every piece of equipment likely to be used, including welding rods, brazing rods, welding and brazing fluxes, carbon rods and electrodes, arc welding cable, and protective clothing of all kinds.

The Rawlplug Co., Inc., New York, N. Y.—A handy 14" x 20" ready reference wall chart on expansion bolt and screw anchor dimensions has been published lately by the company.

South Bend Lathe Works, South Bend, Ind.—Catalog No. 10 describes the 10-in. precision lathes manufactured by the company. This 8-page, file-size catalog completely illustrates and describes toolroom lathes and quick change gear lathes in both floor leg and metal bench models. Attachments, accessories and tools for use with these lathes are also listed.

Preferred Utilities Co., Inc., New York, N. Y.—A 48-page booklet entitled "Dividends from your power plant" has been written for the purpose of explaining the importance of boiler efficiency as applied to such things as natural versus mechanical draft, carbon dioxide and carbon monoxide, excess air, etc. For greater clarity numerous examples, tables and sketches have been included.

Automotive Council for War Production, Detroit, Mich.—A 30-page bulletin describing the achievement of the first year of war production has recently been written. Well illustrated, it chronicles the great advances which have been made in war goods in the various industries; aircraft, tanks and combat vehicles, guns and ammunition, and marine vehicles.

Link-Belt Speeder Corp., Chicago, Ill.—Booklet No. 1960 describes the company's 500 series of cranes, draglines, and shovels. Pictures of units in operation are shown in one section, and in another section brief specifications are given. Description of the exclusive features of these units is also made.

R. G. Le Tourneau Inc., Peoria, Ill.—An eight-page, colored booklet to further "Lower Earthmoving Costs in War and Peace" illustrates equipment in vital work in all parts of the globe. Complete shop service, rapid repair aid, dealer help in job planning, use of factory instruction books, service charts and other pamphlets on operation, tire and parts conservation, training of "green" operators and many other subjects are fully explained.

International Acetylene Association, New York, N. Y.—A 20-page, pocket-size booklet entitled, "Handbook for the Welding and Cutting Operator" has been published as a helpful step in instructing users of the oxy-acetylene welding and cutting process how to prolong the life of their equipment. It contains a list of concise do's and don't's for the man who wields the blowpipe, and a wealth of other helpful information and suggestions.

Douglas Fir Plywood Association, Tacoma, Wash.—Section Six of the engineers handbook "Technical Data About Plywood" has recently been published. The subject covered is that of nail spacing in the use of Douglas fir plywood over a stud frame. Results shown are based on 650 tests made in the association laboratory.

General Electric Co., Bridgeport Conn.—A new 48-page manual on wiring for under-floor electrical distribution in H. H. Robertson cellular steel Q-floors has recently been issued. The hollow cells of Q-floors may be used as raceways for wiring, thus making it possible to provide electric power outlets wherever needed throughout the entire floor area. The manual includes catalog listings of wiring accessories and fittings, and detailed data on layout and installation procedure.

Independent Pneumatic Tool Co., Chicago, Ill.—A new manual detailing how to get maximum service from portable electric tools has just been published by this manufacturer of electric tools. Included in this 20-page pocket size booklet is detailed information on the more common and simple problems in connection with the maintenance of the motor, cable, switch and brushes.

I. F. Laucks, Inc., Seattle, Wash.—An 8-page illustrated brochure which is directed toward constructors of heavy laminated beams and arches, as well as manufacturers of sash, doors, plywood and other wood products. It explains the company's complete series of low-cost wood treatments for plant application. Among these are water-repellent toxic preservatives which meet the requirements of the National Door Manufacturers Association and the Western Pine Association.

Hubbard & Co., Pittsburgh, Pa.—Two pamphlets, one about the company's line of lightning arresters, and the other about a huge new Wind Turbine built in the mountains of Vermont, have been published. The lightning arresters are made for pole, transformer and crossarm; they have a high surge capacity, and will not lock out feeders.

Mine Safety Appliances Co., Pittsburgh, Pa.—A comprehensive 32-page handbook entitled "How to Make Your Safety Equipment Last Longer" has just been published. Covering every type of personal protective equipment, from protective hats, gas masks, respirators and gas instruments, through the list to safety clothing, this well-illustrated publication details the practical "do's and don't's" of safety equipment care for key personnel.

Victor Balata & Textile Belting Co., Easton, Pa.—A circular describing the company's pulley lagging has an especial wartime appeal because it conserves both power and belts. The pile-face surface, designed to promote better traction and longer belt life, is woven as an integral part of the lagging body, yet imparts no tension strain to the base—which maintains a snug fit on the pulley. This solid woven base prevents bolts or screws from pulling out.

Opportunity Section

This widely-read column can help you to sell your used machinery and other used equipment. For rates, write to the Opportunity Section, *Western Construction News*, 503 Market Street, San Francisco, California.

WORK WANTED

Work wanted with AG Cletrac with angle-dozer, A1 condition, also chisel, scraper and dump truck. Fred C. Madsen, Box 219, Battle Mountain, Nevada.

FOR SALE

5—8-Ton GOODMAN Locos, 36" gauge Combination Battery and Trolley
2—5-Ton MANCHA Locos, 36" gauge—Battery
2—3-Ton JEFFREY Locos, 24" gauge—Battery
2—8-Ton PLYMOUTH Gasoline Locos, 36" gauge
1—12-Ton PLYMOUTH Gasoline Loco, Standard gauge
15—24" gauge, 56 cu. ft. Tunnel Cars
2—24" gauge CONWAY Muckers, 25 h.p.
2—Battery Charging Sets
2—Drill Jumbos—24" gauge, 36" gauge
200—Ft. Tunnel Forms—16 ft. horse shoe
4—SULLIVAN Air Compressors. 2—600 cu. ft., 1—800 cu. ft., 1—1100 cu. ft. With motors
1—28 S RANSOME Concrete Mixer
1—28 S REX Concrete Mixer
1—BLAW KNOX Batcher and 21-yd. Bin
1—8-cu. yd. SAUERMAN Drag Scraper Outfit with 240 h.p. Thomas 2-drum Hoist
1—4-cu. yd. SAUERMAN Drag Scraper with 150 h.p. Thomas 2-drum Hoist
1—260-cu. ft. INGERSOLL-RAND Portable Air Compressor
1—VULCAN No. 1 Pile Driver, with 60-ft. Leads
1—2-yd. AMSCO Shovel Bucket—New
1—4-yd. ESCO Drag Line Bucket
1—¾-cu. yd. PAGE Drag Line Bucket
1—¾-cu. yd. Clam Shell Bucket
1—BUCKEYE Ditch Machine No. 4—15½"x6½'
2—AUSTIN Trench Machines, "00"-42 and "0"-42
1—300-ft. Heavy Duty INSLEY Steel Tower
1—40-h.p. 2-drum CLYDE Hoist
1—300-amp. LINCOLN Welder

SPECIAL

1—CEDAR RAPIDS CRUSHING PLANT with 15"x24" UNIVERSAL Crusher—With Bins and Conveyors
1—CEDAR RAPIDS CRUSHER—3"x36"
1—40 THEW LORAINE SHOVEL FRONT—COMPLETE WITH ¾-YD. BUCKET, STICKS AND BOOM

★

Broderick and Gordon

1900 - 31st Street Denver, 5, Colorado

Opportunity Section

(Continued)

C. H. & E. CONSTRUCTION EQUIPMENT

20" BAND SAW

Designed either as a stationary shop tool or as a portable unit for out on the job work. Gasoline engine or electric motor drive, or without power.

Write for Bulletin
3863 N. Palmer St.

SAW RIGS · PUMPS · HOISTS · MORTAR MIXERS · TANDEM ROLLERS · BAR BENDERS · BAG CUTTERS

C. H. & E. Manufacturing Co.
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FOR SALE: 37B Bucyrus-Erie gas shovel; 2T Monighan dragline, 75 ft. boom; 30B Bucyrus steam shovel; 20 International heavy duty dump trucks and 3 light flat rack trucks. Large supply parts and repairs for all equipment. Box 841, Western Construction News, 503 Market St., San Francisco, Calif.

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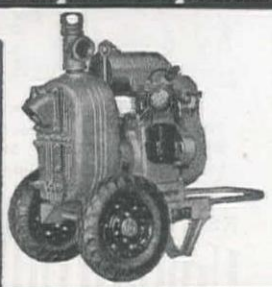

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