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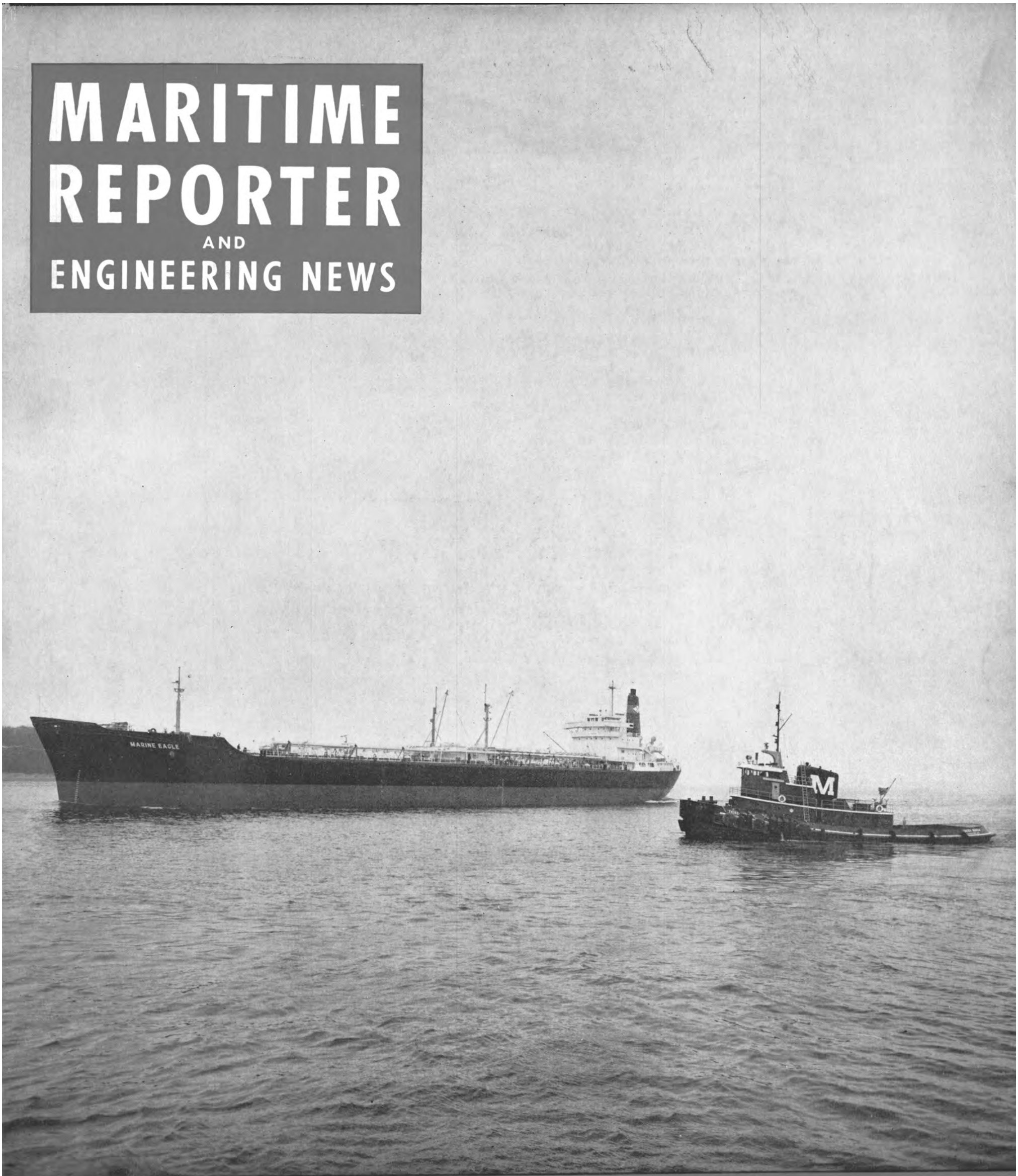

Marine Eagle—First U.S.-Flag Ship Designed To Carry Refrigerated Anhydrous Ammonia

(SEE PAGE 6)

JUNE 15, 1969

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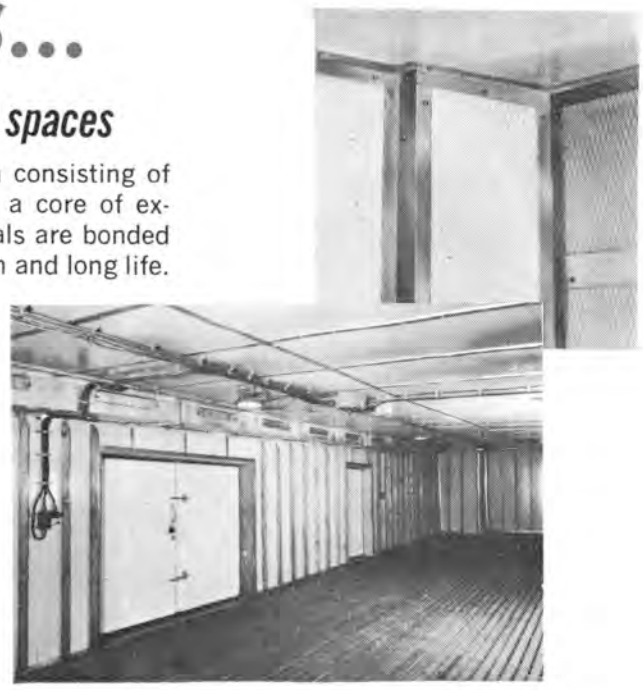

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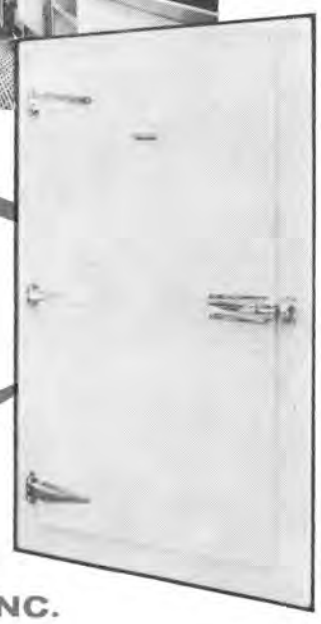

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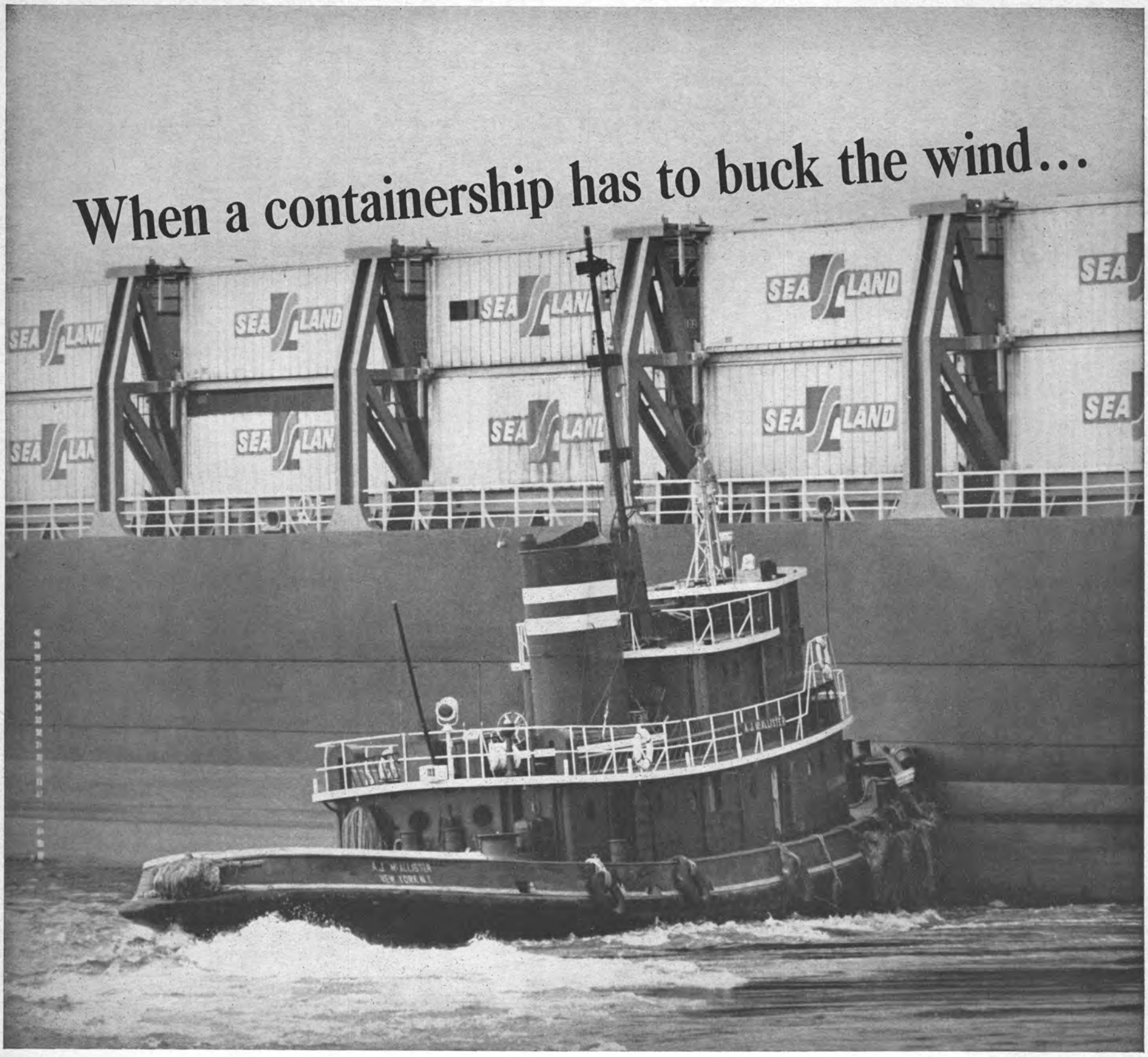

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Waterman Requests Mortgage Insurance For C-4 Conversion

The Maritime Administration has announced that Waterman Carriers Inc., has applied for government mortgage insurance to help finance $6-million worth of conversion work on two former government-owned C-4 troopships—General R. M. Blatchford and Gen. Leroy Eltinge.

Waterman, which recently obtained title to the two vessels from its related company, Waterman Steamship Corp., is having the ships converted at the engine works division of Dillingham Corp., Portland, Ore., into breakbulk cargo carriers. Waterman traded in two old ferryboats for the C-4's.

Bellinger To Build Two Trailerships

Bellinger Shipyards, Inc. of Jacksonville, Fla., has received contracts for the construction of two trailerships; one from Tropical Shipping & Construction Co., West Palm Beach, Fla., and one from West India Shipping Co., West Palm Beach, Fla.

The Tropical Shipping vessel will be equipped with 1,800-bhp diesel machinery and have the following dimensions: 235 feet by 45 feet by 20 feet. The other will be powered by 1,600-bhp diesel machinery, will be 180 feet long and have a beam of 35 feet and a depth of 14 feet. The latter vessel will be equipped with a bow door for over-the-beach loading and unloading.

Roll-On Ship Ordered In Spain For Service To Central America

A new roll-on/roll-off trailership for service to Central America by Tica Line, has been ordered in Spain by Eagle Inc. of Miami, Fla., according to **H. G. Teitelbaum,** president of Eagle. The vessel will be built by Construcciones Navales Yarza S.A. of Vigo, Spain and is due for delivery about November of 1970.

Mr. **Teitelbaum** said that the vessel, which will have four decks, two for trailers, one for automobiles, and one for pallatized cargo, will have a 17-knot speed.

All designs and supervision on the vessel, which is to be named Proud Eagle, is being performed by John J. McMullen and Associates, New York naval architects. Dovar Shipping Agency Inc. acts as representative for Tica Line.

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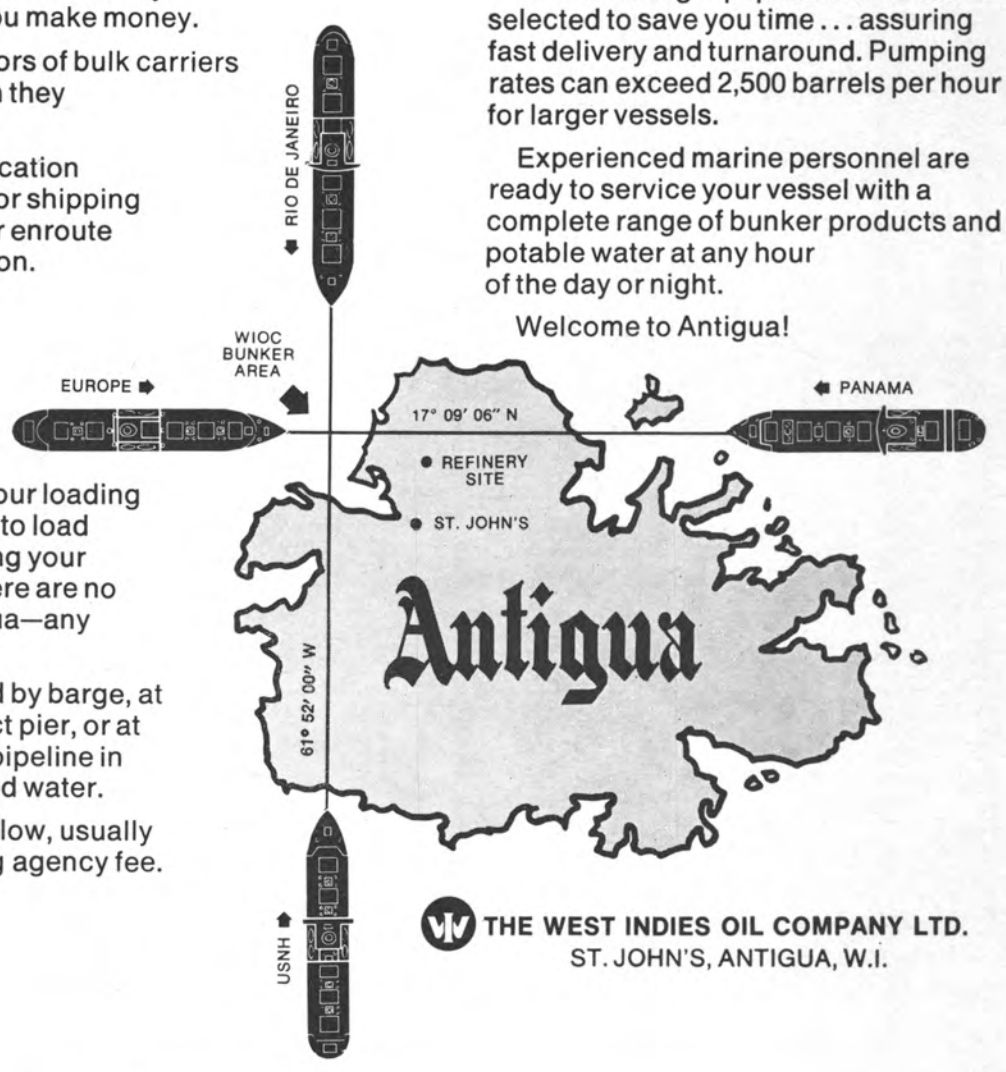

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Marine Eagle--First U.S.-Flag Ship Designed To Carry Refrigerated Anhydrous Ammonia

Marine Eagle is escorted on her first trip by the Teresa Moran of Moran Towing and Transportation Company.

H. Lee White, president of Marine Transport Lines, Inc., has announced the placing into service of the SS Marine Eagle, the first U.S.-flag vessel designed for the ocean transportation of refrigerated anhydrous ammonia. The Marine Eagle was converted for this service by the Newport News Shipbuilding and Dry Dock Company. The vessel is chartered by E. I. du Pont de Nemours & Company from Marine Transport Lines, Inc., under a long term charter.

The 614-foot 9-inch-long, 80-foot beam vessel is classified by the American Bureau of Shipping with special notation that the specially designed tanks are fitted to carry liquid cargoes at atmospheric pressure and temperatures no lower than –28°F. The vessel meets all special requirements of American Bureau of Shipping and U.S. Coast Guard for a vessel of this type.

Four independent tanks, installed on the centerline, are designed for the carriage of a total of about 8,400 long tons of anhydrous ammonia at approximately atmospheric pressure and –28°F. temperature. Fourteen centerline and wing tanks, totaling about 565,000 cubic feet, are provided for the carriage of methanol and other Grade B and C chemicals. Double bottoms and selected deep tanks are provided, sufficient for the carriage of about 9,070 tons clean ballast.

Each ammonia tank is fitted with one Bingham deepwell pump rated at 1,000 gpm. Two of the T-2, 2,000-gpm pumps were converted for self-stripping by the addition of Penco Hydraulics "Primavac" system for use in methanol tanks.

The anhydrous ammonia is automatically maintained refrigerated by means of three direct refrigeration plants installed in a midship deck house and manufactured by Lewis Refrigeration Company. Each plant is rated at 28 tons of refrigeration and utilizes a Sulzer oil-free compressor as its primary component.

The ammonia tanks are insulated on all surfaces with six inches of glasswool insulation held in place by a wire mesh and special plastic studs. The tanks are constructed of a special low-temperature steel which was manufactured by Lukens Steel Company.

The vessel's exterior hull, deck, and superstructure were coated using a du Pont epoxy system.

Other features of the Marine Eagle are as follows: the installation of an 800-hp Bird Johnson bow thruster; the provision of a special deck foam fire-fighting system manufactured by the National Foam Company and especially suitable for polar solvents such as methanol; the installation of extensive instrumentation in the wheelhouse, engine room, and cargo control room on the main deck aft for remote monitoring of cargo operations; the upgrading of the main propulsion motor to 7,000 shp and the auxiliary generator sets to 600 kw, and the installation of all new radio and electronic equipment.

Principal service of the Marine Eagle will be the carriage of anhydrous ammonia from du Pont's Beaumont, Texas plant to their Repauno plant in Gibbstown, N.J. Methanol will also be carried from Beaumont to Gibbstown and other East Coast ports.

Western Gear Elects Neben And Messer Division Vice-Presidents

Ernest W. Neben

Elwin Messer

Ernest W. Neben, manager of Western Gear Corporation's Heavy Machinery Division, Everett, Wash., and **Elwin Messer,** manager of the Advanced Systems Division, were elected division vice-presidents at the company's board of director's meeting in Los Angeles, Calif.

Mr. **Neben,** who joined Western Gear in August, 1966, was elevated to his post as division manager in July, 1967. He holds a master of science degree in mechanical engineering from the Brooklyn Polytechnic Institute, New York. A registered professional engineer, Mr. **Neben** is a member of the American Society of Mechanical Engineers, the American Society of Chemical Engineers, and The Society of Naval Architects and Marine Engineers.

Mr. **Neben** served in the United States Navy during World War II. Prior to joining Western Gear, he was affiliated in executive positions with several major companies in the machinery manufacturing industry, both in Rochester, N.Y., and in the San Francisco Bay Area.

Mr. **Messer** was elevated to his present position as division manager when Western Gear created the Advanced Systems Division in August, 1968. Since joining the company in 1962, Mr. **Messer** has served successively as a division production manager, division marketing manager, and, most recently, group marketing manager.

A graduate of Massachusetts Institute of Technology with a bachelor of science degree in naval architecture and marine engineering, Mr. **Messer** is a registered professional engineer, and an active member of The Society of Naval Architects and Marine Engineers. He is a former chairman of SNAME's Pacific Northwest Section.

Todd Receives $40-Million Containership Conversion Contract From Sea-Land

J. T. Gilbride, president of Todd Shipyards Corporation, New York, has announced the execution of a contract with Sea-Land Service, Inc. for the Todd complex of shipyards to perform containership construction and conversion work that will increase Sea-Land's capacity by 2,350 containers. Due to expanding market demands and the increasingly competitive climate in the relatively new ocean container transportation concept, the contract requires completion of work by December, 1969.

The program encompasses the construction of three forebodies, each 533 feet long, similar to two already under construction by Todd for Sea-Land. The forebodies will be joined to the upgraded sterns of the presently operating Sea-Land containerships, Seattle, Anchorage and Baltimore. After severing, the forebodies of the latter C4 type containerships will be joined to the sterns of three T2 tankers acquired by Sea-Land from the Government. Additionally, the Mission Dolores, a reserve fleet tanker, acquired by Sea-Land will be converted to a containership. The overall arrangement of forebody construction, usage of sterns and forebodies of operating C4's and the utilization of reserve fleet tankers will result in an increase of four vessels to the present Sea-Land fleet of 35 containerships.

The approximate program cost, it was announced, would be in excess of $40,000,000, and will result in a 20 percent addition to the container-lift capability of Sea-Land.

Five of seven Todd yards will share in the work which will be programmed so as to minimize the "out of service time" of the presently operating vessels and speed completion of the converted ships. Construction work will be performed at the Los Angeles yard with severing, joining and upgrading work performed at that yard and at the Galveston, Houston, San Francisco and Seattle Divisions.

On April 4, the Los Angeles yard launched the first of the new jumbo forebodies in the record time of 184 days from concept to launch. This forebody will be joined to the stern of the troopship General Muir and delivered to Sea-Land to permit an August 4th on berth commitment which is approximately 60 days ahead of schedule.

First Of Two Powerful Twin-Screw Harbor Tugs Delivered To Red Star Towing

Robert W. Sanders, president of the Red Star Towing and Transportation Company, New York, has announced the delivery of a new tugboat called the Red Star. Built by the Equitable Equipment Company in New Orleans, the Red Star is a 95-foot, twin-screw, 2,100-horsepower tug, outfitted with the latest automated equipment. The new tug will be placed in regular New York service for ship docking and general harbor operations.

The Red Star is the first of two new tugboats to be completed for the company this summer. The second tug, the 4,200-horsepower Ocean Star, is being constructed by the Halter Marine Corporation, also in New Orleans, and is scheduled for a late July delivery.

These tugs are a continuation of Red Star's new construction program which just saw the delivery of the ocean barge Sea Star. The Sea Star is an 11,000-ton, ocean-classed, dry cargo barge and is already in service.

First ABS Certificate For Submersible Given To Hyco-Built Craft

Pisces II, a submersible built by International Hydrodynamics Co. Ltd., of Vancouver, B.C., is the first submersible to receive an interim certificate from the American Bureau of Shipping. The local ABS surveyor, **F. P. Miller,** senior surveyor, presented the certificate to **Mack Thomson,** designer of the Pisces Class of submersibles, after the successful completion of sea trials by Pisces II. The certificate represents the completion of extensive tests and inspections of the submersible to the satisfaction of the American Bureau of Shipping. The tests included a manned test dive to an ocean depth of 2,400 feet.

Pisces II was built under contract for Vickers Limited, Shipbuilding Division, Lancashire, England. International Hydrodynamics will operate the submersible in Canada during its shakedown and crew-training period prior to shipping to England later this year. The Vickers' crew will be trained in all aspects of maintenance, operations and piloting by International Hydrodynamics. International Hydrodynamics Co. Ltd. designs and manufactures its Pisces-Class submersibles for sale and lease.

To date the company has completed two submersibles, the Pisces I, for 1,800 feet depth and the Pisces II, for 3,300 feet depth, both with a 1.5 safety factor.

Pisces III, which was recently completed, will also dive to 3,300 feet, and will be available for lease by the company. In addition, the company has designed two other submersibles, the Pisces IV and V, which with their HY-100 steel hulls will be capable of diving to 6,500 feet. The company plans to start assembly of the Pisces IV in September, 1969, at the plant of its new subsidiary, Hyco International Engineering Inc., in San Pedro, Calif. Pisces V will be assembled in Vancouver, B.C.

Thomas F. Horton, president of the company, stated that "All future Pisces-Class submersibles will be fabricated to meet the rigid ABS certification standards. We will also build Pisces IV to meet U.S. Navy safety certification requirement."

At the presentation of the interim-class certification certificate Mr. **Thomson** said, "We are particularly pleased to be the first manned submersible to be certified by ABS. This certificate represents almost 16 months of effort from design through completion of sea trials. We have always taken pride in the quality of our workmanship and the ABS certification seems to justify all of our long hours and hard work."

NAMS Changes Name— To Include Shipyards

At the beginning of its twentieth year of operation the National Associated Marine Suppliers, Inc. (NAMS) has voted to change its name to National Association of Marine Services, Inc. (NAMS) and to enlarge its membership to include shipyards and repairers of commercial vessels.

According to **James C. Taylor,** president of the suppliers group, the smaller shipyards and repairers have the same problems legislatively and credit wise as do the suppliers of goods and necessaries and therefore the joining of the two groups into one strong organization should prove extremely beneficial where services to the shipping industry is concerned.

At their 19th Annual Meeting held in New Orleans the following officers were elected: president—**James C. Taylor,** R. J. Taylor Co., Baltimore; senior vice-president—**J. B. Delaney III,** J. B. Delaney Co., New Orleans; treasurer—**M. N. Broughton,** Anders Williams Co., Norfolk, and executive vice-president and secretary—**C. Willman Brown,** Washington, D.C.

Alco Transport Names Shields Vice-President

Lebron Shields has been named vice-president of Universal Alco Bahamas, Ltd. and Alco Transport, Inc., it has been announced. Both companies, located in Miami, are subsidiaries of U.S. Freight Co., New York.

SUPERTUG

That's what they call the new McAllister tugs built by St. Louis Ship. They're the most powerful tugboats operating in New York harbor. They're able to dock the largest to the smallest ocean going vessels with unsurpassed power, thrust, and maneuverability. The "Supertug" Helen McAllister has now joined her sister ship, the Marjorie McAllister, delivered by St. Louis Ship several months earlier.

Built for McAllister Brothers, Inc. of New York, each of the 4000 h.p. tugs is equipped with a Kort nozzle and triple rudders. They were designed by Marine Consultants & Designers, Inc. of Cleveland, Ohio and C. R. Horton of Wilton, Connecticut.

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Northern California Section Discusses Mobile Drilling Platforms—Elects Officers

New Section chairman **Graham Fraser** (left) with **W. B. Hill** of Babcock & Wilcox Co., membership committee chairman (center), and **L. S. Jue,** naval architect with San Francisco Naval Shipyard and executive committeeman.

New Section vice-chairman **W. B. Hickman** (left) with **L. A. Harlander,** vice-president, Matson Navigation Company and past chairman, (center), and **Douglas Finlayson** of Marcona Corporation and papers committee chairman.

The May dinner meeting of the Northern California Section of The Society of Naval Architects and Marine Engineers heard an excellent paper entitled "Mobile Drilling Platform Development," prepared by **J. O. Crooke** and **Ray Lacy** of Bethlehem Steel Company's Beaumont, Texas shipyard. Mr. **Lacy** presented the paper.

The paper describes the problems involved in offshore drilling and the design of drill rigs to solve these conditions. Several types of equipment are described in the paper.

During the business session of the meeting, officers for 1969-70 were elected. **Graham Fraser** of PACECO was elected chairman. The other officers for the coming year are: **William Hickman** of Ocean Machinery as vice-chairman, **Arthur Haskell** of Matson Navigation Company as secretary-treasurer, and **David Seymour** of Thomas T. Lunde, Inc., and **B. V. Andrews** of Stanford Research Institute as executive committeemen.

M. Guralnick, president of Morris Guralnick Associates, San Francisco naval architects, (left) with Lt. **Eugene A. Silva,** USNR.

Hugh Downer, outgoing Section chairman and vice-president of Marcona Corporation (left) with **R. Lacy,** author.

Dillingham Expanding Honolulu Cargo Service

Dillingham Corporation has announced an expansion of its Dillingham Line, Inc., Los Angeles-Honolulu surface cargo service, effective July 1. Breakbulk cargo at existing common carrier rates will be accepted by the Dillingham subsidiary for San Francisco, Guam and Marianas Islands via Honolulu in 15-knot vessels.

Dillingham Line has offices in Honolulu, San Francisco, Los Angeles and New York, and representatives in Portland and Seattle. Its Guam agent is **Atkins Kroll** with offices in Agana. A Dillingham maritime services spokesman said their surface freight capability is being extended to assist in increasing trade capabilities of the U.S. Trust Territory and other fast developing Pacific Islands.

Dillingham has previously moved cargo into Guam in support of its own construction projects. The corporation operates other maritime transportation services, shipyards, and servicing facilities in U.S. West Coast and other Pacific Ocean areas, including Australia and New Zealand.

Kawasaki Firms Merge To Increase Operations

The three member firms of the Kawasaki Group, i.e., Kawasaki Dockyard Co., Ltd., Kawasaki Aircraft Co., Ltd. and Kawasaki Rolling Stock Mfg. Co., Ltd., recently signed a memorandum for their merger. On April 1, 1969, after extensive preparatory arrangements they formally merged into a single company with the name of "Kawasaki Heavy Industries, Ltd."

Their merger has enabled them to make a new start as a large-scale, all-round manufacturer of various kinds of machinery centering on their traditional specialties including ships, aircraft and rolling stock. The new company is expected to make rapid advances, fully demonstrating the merits of its diversified operations.

Avondale Launches Third Destroyer Escort

Destroyer escort Patterson poised on side launching ways ready for christening. The next DE is on ways ready to be moved into launching position.

The destroyer escort Patterson (DE-1061), the third in a series of 27 of a new class of Navy ships being built by Avondale Shipyards, has been launched in New Orleans.

The Patterson is one of 27 ships procured from Avondale under multiple-year contracts awarded in 1964 and 1966. This ship is designed for optimum performance in locating and destroying submarines.

Principals of the launching included **Miss Laura Winslow** as sponsor; Rear Adm. **William M. Harnish,** USN, director, Office of Program Appraisal, Department of the Navy, as principal speaker; **Henry Zac Carter,** president and chairman of the board of Avondale Shipyards; Rear Adm. **Jamie Adair,** USN, deputy commander, Naval Ships Systems Command, and Capt. **R. J. Leuschner,** USN, supervisor of shipbuilding, conversion and repair for the 8th Naval District. The invocation was given by Capt. **J. G. Power,** (CHC), USN, chaplain for the 8th Naval District.

The ship is equipped with integral bow-mounted long-range sonar, variable-depth sonar and gyro stabilizers which provide for improved seaworthiness and increased anti-submarine capabilities over previous DE's.

The Patterson is 438 feet in length with a beam of 47 feet and is capable of attaining speeds in excess of 25 knots. Her total complement consists of 19 officers and 226 men.

Principals at DE launching were, left to right: Rear Adm. **Jamie Adair, Miss Laura Winslow,** sponsor, **Henry Zac Carter** and Rear Adm. **William M. Harnish.**

DE-1061 slides into the Mississippi after christening at Avondale Shipyard.

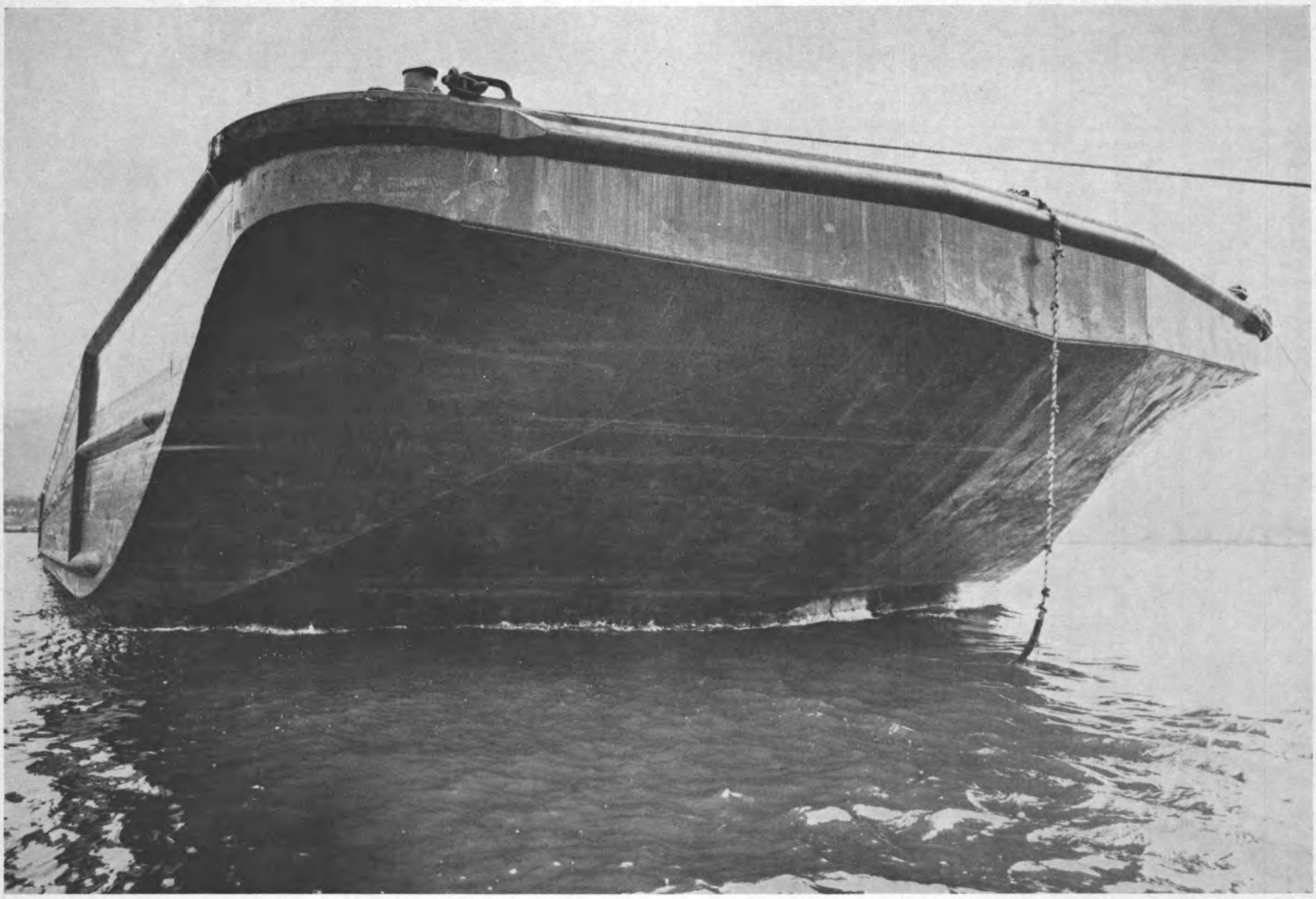
Soren Winger Joins International Chartering

International Chartering Services, 17 Battery Place, New York, N.Y., has announced that **Soren Winger** has joined its dry-cargo ship-chartering staff. Mr. **Winger** was previously associated with Hjalmar Bjerge, Oslo, for a period of 2½ years and later with another chartering concern here, Hansen & Tidemann Inc.

Anglo-Norness Orders 250,000-DWT Tanker

The Scott Lithgow Group, on the Lower Clyde, Scotland, has announced the receipt of an order valued at $19.2-million for a 250,000-dwt oil tanker for the Anglo-Norness Group.

The ship will be built in Lithgow's Kingston Yard and delivered about the end of 1972.



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Promises Of A Revitalized Merchant Marine Made Across The Nation On Maritime Day

National Maritime Day, 1969, as it was celebrated across the nation, brought forth varying ideas as to the vitality and future of the U.S. merchant marine. Where national figures held the spotlight, national problems were discussed. Where local and regional leaders spoke, the subjects dealt with local problems. The theme of the national speakers was mostly the same—1. The administration of President **R. M. Nixon** promises to act soon, 2. Something must be done soon to rebuild the nation's merchant fleet, and 3. The maritime industry must become united.

Andrew E. Gibson, Maritime Administrator, after dealing with the usual problems, told the Savannah, Ga. Propeller Club something new and encouraging. He said "The Maritime Administration has at the moment under serious study a proposal to build two or three large nuclear merchant ships within the next five years. Such ships will represent the latest in marine and nuclear-reactor technology that this country has to offer." He singled out 250,000-dwt tankers for use in the Northwest Passage and large containerships with 120,000 shp powerplants as the likely candidates for the nuclear plants.

James J. Reynolds, president of the American Institute of Merchant Shipping (AIMS), spoke early in World Trade Week before the New York Propeller Club and then to the Baltimore Propeller Club. He told the New York group that there is a distinct change in the atmosphere in Washington government circles concerning rebuilding the American merchant marine and the new administration from the president down includes many men knowledgeable and interested in maritime affairs. He believes President **Nixon** will announce shortly an across the board maritime modernization program.

In Baltimore Mr. **Reynolds'** main theme was the need for unity in labor and management.

Ralph E. Casey, executive vice-president of AIMS, stated that the changed atmosphere in Washington to rebuild U.S. shipping plus the revolutionary advancements now taking place in the maritime industry gave him a feeling of optimism, a feeling that the American merchant marine is not dead, a feeling that somehow—and soon—America will regain her prestige as the foremost maritime nation of the world.

Across the nation in Portland, Ore., **Albert E. May,** vice-president of AIMS, told the Propeller Club basically the same thing.

The Washington, D.C. Propeller Club heard **Rocco C. Siciliano,** Under Secretary of Commerce. He stated: "There is no question in the White House, the Commerce Department, the Maritime Administration, or elsewhere as to the need to halt the deterioration of past years, and to revive our merchant fleet. There is full recognition of the immediacy of the need to do so. The difficulties of years past have taught us that if we are to err, we would prefer to err on the side of action and initiative instead of on the side of indecision and reaction. Nor will there be lengthy delay in coming forward with a program to achieve this. Such a program will be presented to Congress for its consideration this summer—not, we hope, during the Indian summer."

Speaking at the Maritime Day luncheon in Seattle, Wash., **Edwin M. Hood,** president of the Shipbuilders Council of America, told his audience that U.S. shipyards have been and still are expanding and modernizing, and that they can handle any shipbuilding program that may develop. He expressed strong optimism that the federal government will very soon come up with a rebuilding program worthy of its name.

In Chicago **Stanley Barer,** transportation counsel of the Senate Commerce Committee, stressed the need for various industry and labor factions to drop their differences as an essential first step in rehabilitating the nation's shipping.

At a ceremony held at Castle Clinton in Battery Park, New York, U.S. Sen. **Vance Hartke** told a noontime gathering that "The American shipping interests cannot expect much financial assistance from Washington until it steps up its attempts for increased efficiency . . . The industry cannot look to the White House for support until it shows willingness to help itself."

The Port of Philadelphia celebrated Maritime Day with a luncheon and a cruise on the river.

In New Orleans **Robert B. Barkerding Sr.,** Dock Board president, discussed the future and the possible solutions for shipping problems in that area of the country.

The St. Louis, Mo., Propeller Club joined with the American Waterways Operators in a combined celebration of Maritime Day and the 25th anniversary of the founding of the AWO. Rear Adm. **Russell R. Waesche Jr.,** USCG, was the principal speaker at a luncheon. His theme was waterway safety. **Braxton B. Carr,** president of AWO, and **George H. Blohm,** chairman of the board of the AWO, spoke at other sessions during this two-day affair.

Thus the nation celebrated Maritime Day 1969 with much oratory and special affairs. However, there was the continuous theme presented by those close to the government and those who help make policy that a constructive maritime policy will be forthcoming this summer.

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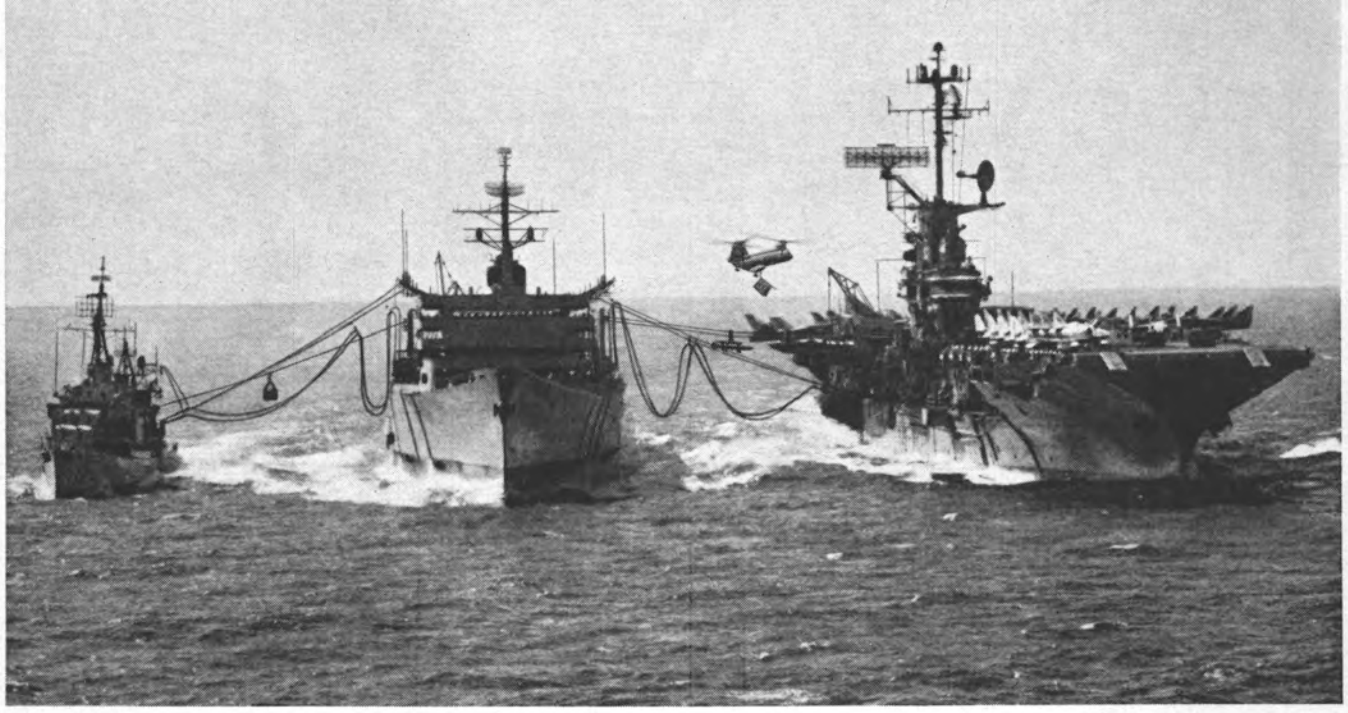

The U.S. Navy tackled a problem: how to transfer at sea the high volume of cargo needed for effective fleet operation. Through competitive bidding, Western Gear obtained contracts to turn a concept into working hardware.

The resulting replenishment-at-sea system is unique in its function, and is a model of effective design and rugged construction. It meets the Navy requirement for complete control of loads at high speeds and in foul weather, day or night. Even missiles can be transferred at speeds up to 700 feet per minute, without exceeding 2 G's shock load.

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Center For Maritime Studies Reports U.S. Shipbuilding Costs Can Be Cut 25%

An intensive, in-depth study of the U.S. shipbuilding industry released recently concludes that costs of U.S.-built ships in an improved procurement environment could be reduced by as much as 25 percent.

The 145-page report, entitled "Improving the Prospects for United States Shipbuilding," was released by the Center for Maritime Studies, a research organization at Webb Institute of Naval Architecture, Glen Cove, N.Y. It culminates an 18 month multi-discipline study involving naval architects, marine engineers, economists, industrial engineers and business executives familiar with shipbuilding and operation.

The report examines all the direct and indirect factors which affect shipbuilding prices and efficiency, including quantities and types of ships ordered and effects of possible shipyard capital improvements. Additionally, the report assesses cost and performance of foreign shipyards.

In a clear concise manner, the report clears up a popular misconception that productivity levels of the domestic shipbuilding industry are inferior to other U.S. construction industries and foreign shipbuilders. Comparing domestic shipbuilding price trends with those of the commercial building industry during the past 10 years, the study found that while building prices rose about 30 percent in this period, prices of new cargo ships remained nearly constant and tanker prices decreased considerably. This, it is concluded, attests to the gains in shipbuilding productivity.

The comparison of U.S. and foreign shipbuilding industries, using tanker construction to gauge relative productivity, showed that the U.S. is more efficient than Japanese and British yards and slightly behind the better shipyards in Sweden and West Germany.

Despite this favorable level of productivity, higher U.S. wages prevent domestic shipyards from competing in the international shipbuilding market. Thus, although Japan's productivity is about 79 percent of the U.S., its wage rate is only about one-fourth that paid by U.S. yards. To meet Japanese shipbuilding prices, currently about 50 percent of the U.S. levels, U.S. yards would have to increase productivity 2½ times.

Although such an increase was not found to be feasible, significant improvements in U.S. shipbuilding productivity would be expected to follow the inauguration of a long-range building program. The resulting stabilized production conditions in individual shipyards would not only lead to the economies of multiple production, but would permit accelerated investment in new capital equipment. It is shown that for different rates of output there are different optimum levels of investment.

The report states that with a long-range shipbuilding program—involving at least five or six similar ships per year in each participating yard—substantial cost reductions could be achieved. It notes that in recent years the domestic shipyards have received contracts to build relatively few merchant ships, the number in each yard varying from year to year. These ships involved a wide variation of design which, it is pointed out, precluded the cost savings that accrue from repetitive production of similar ships.

Following are some of the key conclusions and recommendations of the study:

1. The single most important requirement for improved efficiency in U.S. shipbuilding is a stable long-range production situation. Only a relatively few merchant ships have been ordered annually in recent years and the ship construction programs have been uncertain and variable in character. This lack of stability has handicapped U.S. shipyards' efforts to reduce costs.

2. U.S. shipbuilding programs should be predicated on building ships in quantity. The number of vessels of similar design to be built in each participating yard should be as large as practicable, utilizing to the greatest extent feasible basic designs applicable with minimum differences to different owners—or standard major components, such as powerplant and stern. Significant cost reductions would result from building ships in groups of 30 or more over a five-year period.

3. A stable shipbuilding environment with long-term, multiple construction programs underway would encourage shipyards to increase their expenditures for more efficient production facilities. The optimum is found to be above the present level of investment.

4. A natural consequence of industry stability would be a trend toward designing ships for production economies. Significant cost reductions can be realized by a more rationalized approach to ship design to eliminate features which add measurably to construction costs. Simplification of structure and hull outfitting, and modular construction of crew accommodations and powerplant, also would provide major cost savings.

5. Shipyards must continue to upgrade their management techniques. Ways and means must be found to attract and retain highly competent young professionals in a variety of disciplines including industrial engineering, production planning control and cost accounting systems, as well as naval architecture and marine engineering.

6. Accelerated research and development programs aimed at improved ship construction techniques are urgently needed. In addition to projects to produce ship designs for "producibility," emphasis should be placed on the development of improved shipbuilding procedures.

Significantly, many of the cited advancements in shipbuilding facilities and techniques are already employed by American shipyards. These include: numerical lofting and tape control for plate layout and cutting, automatic welding and advance outfitting of subassemblies. However, the United States, in comparison with other shipbuilding nations, was found to be deficient in organized shipbuilding research and development activities. Such efforts abroad are usually jointly funded by private industry and government. Here in the United States, government support or participation in such projects is virtually nil. Most of the shipbuilding research is carried out by the individual yards which, for competitive reasons, are reluctant to exchange information with other shipyards. It is recommended that one or more shipbuilding research groups be established to coordinate the efforts of individual organizations, government agencies and private shipyards.

Miss. Marine Building Two Twin-Screw Towboats

Mississippi Marine Corp., Greenville, Miss., is constructing two twin-screw towboats for stock purposes. To be powered with 670-total-bhp diesels, each towboat will have the following dimensions: 65 feet in length, 20 feet in beam and 9 feet in depth.

Hillman Barge Delivers Six Double-Skin Tank Barges

This semi-integrated double-skin tank barge, shown after launching at the Hillman Barge & Construction Company's Brownsville, Pennsylvania shipyard, is one of six 200-foot by 35-foot by 12-foot units delivered to the Upper Mississippi Towing Corporation and Hennepin Towing Company. Three of these barges are certificated by the U.S. Coast Guard for Lakes, Bays and Sounds Service and have a Special Service Load Line. The other three barges are classed by the American Bureau of Shipping for Unlimited Service and certificated by the U.S. Coast Guard for Ocean Service.

The hull is divided into 16 watertight compartments and two cargo tanks. Between the cargo tanks, is a cofferdam pump room which minimizes the length of cargo piping between the two tanks, and permits the carriage of mixed cargoes that require segregation. Both the American Bureau of Shipping and the U.S. Coast Guard have approved these hulls as Type I Tank Barges.

The barges are designed to carry a wide range of liquid products, from Grade A petroleum to the heavier liquids of 2.0 specific gravity. The total volume is 10,300 barrels with a cargo capacity of 1,354 tons at an 8-foot 6-inch draft.

The cargo tank bottom is coiled with 6-inch ship channels. Each tank has four independent banks of channel coils, complete with drain piping and condensate overboard system.

The cargo system, including suction, fill and discharge piping is independent for each tank. All piping and fittings are schedule 10 stainless steel.

The cargo pump, a Blackmer model HXLS-8B, is vertically mounted in the cofferdam pump room and is hydraulically driven through a Link Belt gear reducer. Hydraulic power is provided with two Vickers pumps driven by a GM 4-71 diesel engine.

This type of double-skin tank barge is considered most versatile in the transportation of liquid chemical products. The isolated piping systems allow carriage of various combinations of cargoes. The designed tank volume, and heavier scantlings provide for a cargo of maximum tonnage, regardless of the specific gravity of the commodity. On the basis of the Type 1 hull design, a wider range of products can be loaded. With minimum conversion, poisonous commodities can be carried.

Atlantic Container Promotes Caffaro And van Campenhout

Atlantic Container Line, Ltd., New York, N.Y., has announced the appointment of **J. T. Caffaro** as equipment control manager and **W. A. J. van Campenhout** as assistant marketing manager.

Mr. **Caffaro** formerly had been assistant manager,equipment control. Mr. **van Campenhout** had been manager, ocean rates and conferences.

The two promotions are the latest in a series of changes taking place at Atlantic Container Line in preparation for the expansion of the company's operations by the addition of six new roll-on/roll-off containerships in the next 12 months. The line currently operates four 14,200-ton ro/ro containerships in trans-Atlantic service.

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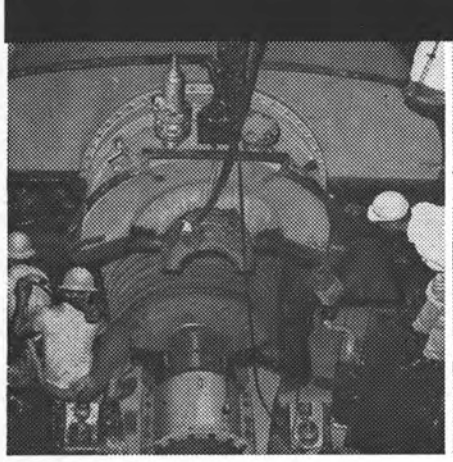

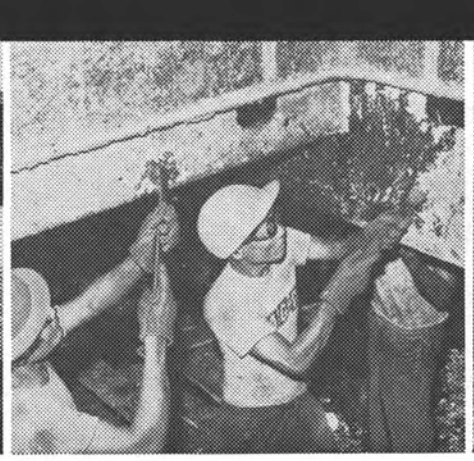

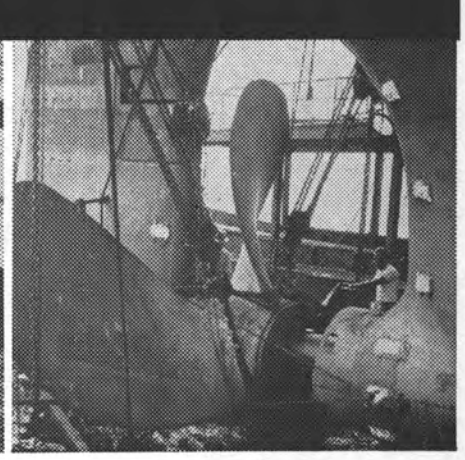

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Paceco To Supply San Francisco's First Container Crane

The San Francisco Port Commission has awarded Paceco a contract for the Port's first container-handling crane. It will be installed next spring at the new 68-acre Army Street Terminal.

Called a "Portainer," the new crane will handle 20- and 40-foot containers weighing as much as 30 long tons. By traveling over rails already installed at the $27-million terminal complex, the single crane will be capable of servicing four of its eight berths.

The Portainer's boom, when lowered to its horizontal (loading/offloading) position, will have an outreach of 113.5 feet. When the crane changes working areas or is not handling containers, the boom is raised, giving the crane an overall height of 210 feet.

It will be used initially by American President Lines and States Steamship Company.

Paceco, a division of Fruehauf Corporation, has designed and built more container cranes for ports than all other crane manufacturers in the world combined. The San Francisco order brings to 36 the number of international ports with Paceco Portainers in operation or on order.

Houston Port Expansion To Handle Containers Starts This Month

The first step in a construction project aimed at improving and expanding the Port of Houston's container-handling facilities started this month, according to **J. P. Turner,** executive director.

The initial phase, to cost an estimated $750,000, will provide a 16-acre container marshalling yard immediately behind wharves 26 and 29, two of the six modern open-type wharves designed especially to handle containers. This will be followed by the installation of a bridge crane.

Several container cranes are already in operation and plans are under study for the installation of two gantry cranes on the two wharves.

The immediate project will be the first of several planned by the port in which new marshalling yards and associated facilities are to be built, according to Mr. **Turner.**

Jiri Nekoksa Joins Wilson, Walton Int.

Jiri Nekoksa has joined Wilson, Walton International of Hoboken, N.J. as manager of the Cathodic Engineering Department, it was announced by **Charles Potosnak,** vice-president of the firm. Mr. **Nekoksa** was formerly associated with Chemoproject Design, Engineering and Consulting Corp. of Prague, Czechoslovakia, and was active in projects of pipe line engineering design for chemicals, petroleum products and water.

Mooremack Planning Roll-On/Roll-Off Ramp For Elizabeth Terminal

A stern ramp platform for handling roll-on/roll-off cargo for the new Sea-Bridge class ships of Moore-McCormack Lines is planned for the company's berths at the Port of New York Authority's Elizabeth Terminal complex on Newark Bay.

Application for permission to build the platform has been made by the Port Authority to the U.S. Corps of Engineers.

The platform, approximately 64 feet by 75 feet, is to be built at the northeast corner of the terminal development, where the Port Elizabeth Channel enters Newark Bay. The concrete deck will rest on steel piles penetrating to rock about 85 feet below mean low water.

Moore-McCormack already has put the first of the new Sea-Bridge ships, the Mormacsea, into service and expects delivery of the remaining three from the Ingalls Shipyard, Pascagoula, Miss., by the end of this year. They are designed for lift-on/lift-off containerized freight as well as for roll-on/roll-off.

Interolsen Appoints Collins Los Angeles District Manager

S. F. Alioto, chairman and chief executive officer, Interolsen Agencies, Inc., San Francisco, has announced the appointment of **Robert E. Collins** as district manager for Los Angeles.

Mr. **Collins** has been northern California sales manager for States Line since January, 1966. From 1955 to 1966 he was employed in San Francisco by Westfal-Larsen Company, Inc. as traffic manager. Mr. **Collins** studied business administration at the University of San Francisco.

"We are delighted to obtain the services of Mr. **Collins** to continue implementation of our total-transportation total-cost concept" said Mr. **Alioto.** "He knows the Pacific Coast/European trade and the trans-Pacific trade and has had extensive experience with modern transportation equipment and techniques."

As district manager for Interolsen Agencies in Los Angeles, Mr. **Collins** will work closely with shippers and receivers of cargo, concentrating on Fred. Olsen Interocean Line and Scindia Steam Navigation Company services, represented by Interolsen on the Pacific Coast.

Bender To Build Three Twin-Screw Towboats

Bender Welding & Machine Co., Mobile, Ala., has been contracted by Radcliffe Materials, Inc., Mobile, Ala., for the construction of three twin-screw towboats. Designated Hull Nos. 404, 405 and 406, each towboat is to have the following dimensions: 83 feet by 38 feet by 8 feet and will be powered with 1,700-total-bhp diesels.

ARCO Breaks Ground For Large Refinery To Use Alaskan Oil

Atlantic Richfield Company recently broke ground for a new 100,000-barrel-a-day oil refinery on a 1,200-acre site 11 miles northwest of Bellingham, Wash.

U.S. Sen. **Henry M. Jackson, Thornton F. Bradshaw,** president of Atlantic Richfield, and top state and local officials simultaneously sparked an electrical contact which set off a series of earth-scattering blasts marking the start of formal construction of the largest installation of its kind in the Pacific Northwest.

The new plant at Cherry Point, on the Strait of Georgia, is expected to be completed by late 1971 at a cost of more than $100,000,000.

Mr. **Bradshaw** said major components of the new refinery will include a 100,000-barrel-a-day pipe still, 35,000-barrel-a-day hydrocracker, 35,000-barrel-a-day catalytic reformer, 60,000,000-cubic-feet-per-day hydrogen generation plant and a 29,000-barrel-per-day delayed coker.

Crude oil from Alaska will be shipped to the Cherry Point refinery by tanker. Plans call for a pier extending about 2,000 feet into the Strait of Georgia, capable of handling tankers of up to 125,000 dwt and 75,000 dwt at separate locations. Refined products will be moved to market by pipeline, barge and tanker.

Other ARCO refineries are located near Los Angeles, Houston, Philadelphia, Chicago and at Sinclair, Wyo.

General contractor for the design and construction of the refinery is Ralph M. Parsons Co., of Los Angeles.

Todd Nominates W.B. Rand A Director

William B. Rand

William B. Rand, former president of U.S. Lines Co., has been nominated as a director of Todd Shipyards Corporation, it was announced by **J. T. Gilbride,** president of Todd. Mr. **Rand** will stand for election at the annual meeting of stockholders, June 18, 1969.

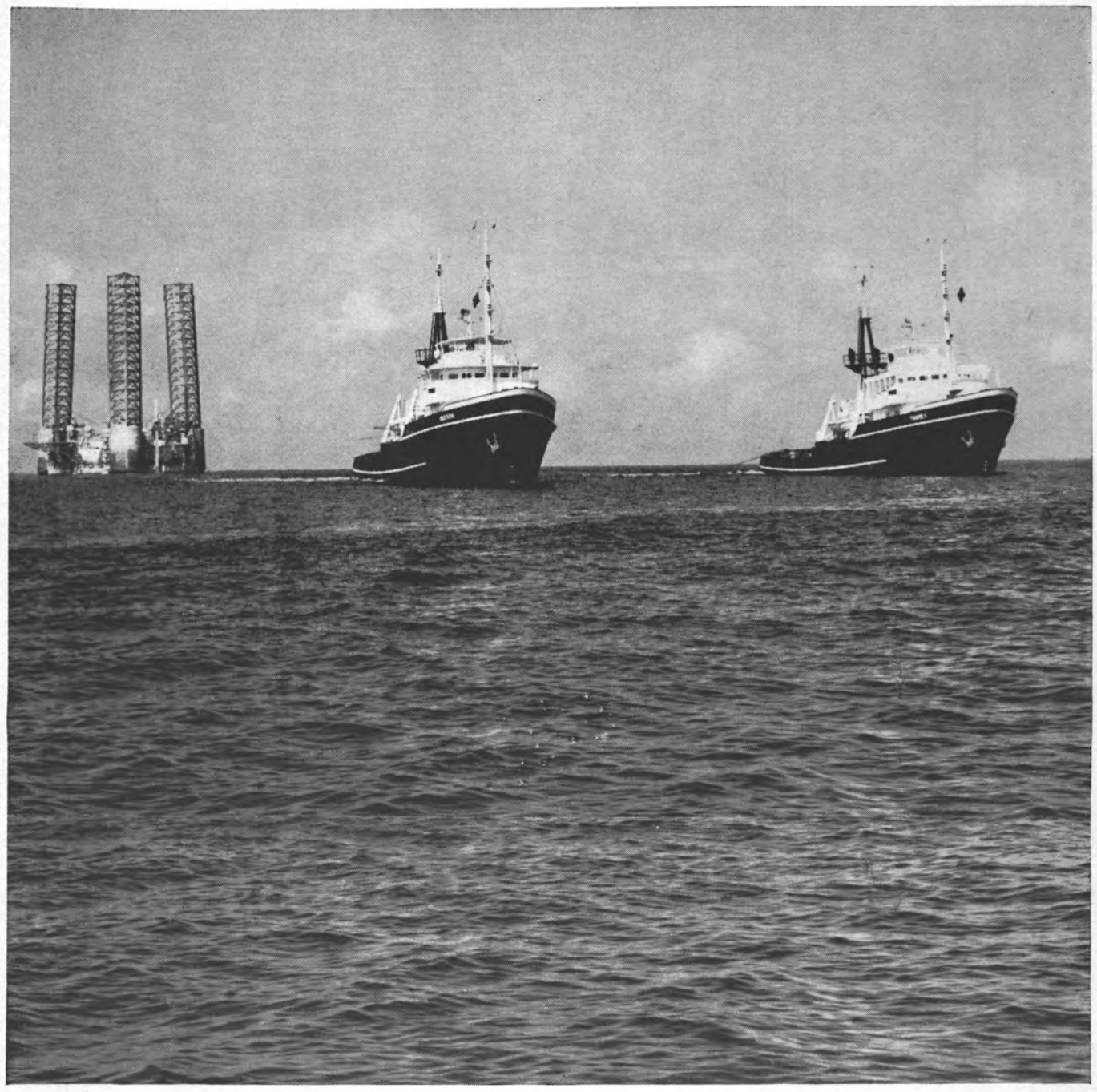
Mr. **Rand** served as president of the United States Lines Company from 1961 to 1966. Since that time he has served as an independent shipping consultant.

He is a trustee of the Atlantic Mutual Insurance Company and the Dollar Savings Bank and a director of the Marine Midland Grace National Bank, Luckenbach Steamship Company, Inc., and the George W. Rogers Construction Corporation.

Atlantic Container Line Relocates N.Y. Offices

Atlantic Container Line, Ltd. has announced that it is moving its headquarters to new offices at 30 Church Street, New York, N.Y. Formerly located at 26 Broadway, ACL's executive and administrative offices will now be located on the 19th floor at the new address.

ST. LOUIS SHIP LAYS KEEL for snagboat/towboat Ros. The new 170-foot by 42-foot by 7-foot 8-inch vessel will be powered with 1,000-total horsepower diesels and will be equipped with three 40-foot-long spuds and a diesel-powered 60-ton-capacity revolving crane. The Ros is intended for use on the Alabama, Blackhawk and Tombigbee river systems. Delivery is scheduled for early 1970. Participating in the keel laying were, left to right: **William Thoms,** resident inspector, USAE; **Richard P. Conerly,** president, Pott Industries Inc.; **George A. Johnson,** chief Marine Design Div., USAE Philadelphia; Col. **James A. Johnson,** contracting officer, USAE Philadelphia; **John W. Gurley,** chief of Operations Div., USAE St. Louis; Col. **Robert E. Snetzer,** district engineer, USAE Mobile; **Robert J. Patrick,** chief engineer, St. Louis Ship; **Mrs. Edwin R. Decker,** wife of the district engineer, USAE St. Louis; **Stephen Jeney,** chief Repair and Construction Branch, Marine Design Div., USAE North Atlantic; **Thomas O. Gaillard,** chief of Operations Div., USAE Mobile, and **Edward Renshaw,** president, St. Louis Ship.



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CB&I Builds Its Own Model Tank To Aid In Design Of Offshore Structures

Much of the entire facility's key operating equipment is on a traveling bridge across the wave tank at Chicago Bridge & Iron Company's Marine Research Center. Shown here is the testing of an offshore storage and tanker loading facility, with divers viewing the wave actions.

A giant wavemaking test facility —believed to be the largest privately-owned installation of its type in the nation—has been placed in service at the Marine Research Center of Chicago Bridge & Iron Company at Plainfield, Ill.

Capable of simulating wave forces of virtually any body of water in the world, the new CB&I wave test tank is 250 feet long, 33 feet wide and has a unique, moveable bottom which can be adjusted to desired depths to a maximum of 18 feet. When filled to capacity, the tank contains 1,250,000 gallons of water.

Fundamentally a design tool, the facility is used to test scale models of proposed underwater structures, such as oil storage tanks. Results of the tests provide CB&I design engineers with accurate information about the effect of waves on very large static or dynamic structures which will be affixed to the ocean floor.

The tank also is used to develop information about wave forces to be encountered in towing large structures from on-shore construction sites and submerging them at final undersea locations.

While the regular waves created in the CB&I tank are less than two feet high, they can exert essentially the same forces on scale models that 100-foot-high waves do on full-size structures.

In addition to the model wave test facility, the Marine Research Center has another major tool—an Underwater Test Tank some 40 feet deep and 24- to 20-feet in diameter. Its primary missions are: to test very large-scale models of dynamic marine structures by setting the structures in motion, rather than the water, and to develop new techniques in welding and other underwater operations.

Proving of theoretical designs by model testing for many types of marine structures has a top priority at CB&I, a worldwide metal plate fabricating and construction firm with executive offices at Oak Brook, Ill. Of particular importance are designs for a rapidly-growing market in offshore - oil - drilling, storage and handling systems. Offshore operations now produce some 18 percent of all crude oil and will account for about 40 percent by 1975, according to industry spokesmen.

CB&I has invested more than $500,000 in its new marine research facility at Plainfield.

Product manager **Robert S. Chamberlin** explains it this way: "While use of scale models to confirm design assumptions has long been common practice in both the aircraft and shipbuilding industries, relatively little has been done in the field of marine structures.

"Our wave facility was designed and built of necessity. No existing facility had the characteristics of size and variable depth we felt were needed to test models large enough to assure engineering accuracy."

The resulting CB&I wave test installation is unique and highly impressive.

At one end of the tank, a 200-hp pneumatic generator can produce regular waves 18 to 20 inches high, with lengths up to 30 feet. At the other end, a rock-filled, inclined absorber mat simulates a beach to eliminate backwash action of the waves.

Nine moveable concrete slabs—each 33 feet wide and 20 feet long —can be positioned in the tank to create desired test depths or to simulate bottom contours. One of the slabs has an open steel grid to which test models are attached (and to allow researchers to observe model action from beneath the ocean floor). The slabs are supported by steel hangers at five-inch intervals down the sides of the tank.

General Dynamics Names J.D. Pierce Vice-President

Joseph D. Pierce

Joseph D. Pierce, general manager of the Electric Boat division, has been named a vice-president of General Dynamics, it was announced by **Roger Lewis,** president.

Mr. **Pierce,** a veteran of more than 25 years in marine system engineering and management, joined General Dynamics in 1951 as chief electrical engineer of the Electric Boat division, Groton, Conn. He held a number of engineering management positions at the division and was named general manager in 1967.

Previously, he had been head of the United States Navy Bureau of Ships' submarine electrical section and had worked with Westinghouse Electric Corporation.

Born in Ione, Ore., Mr. **Pierce** received a BS degree in electrical engineering from Northwestern University in 1940 and has done graduate work at the University of Pittsburgh.

Fleischmann Joins Gotaas Larsen Inc.

Frank Fleischmann, previously in the operations division of Global Bulk Transport Inc. (States Marine), has joined the tanker operations staff of Gotaas Larsen Inc., shipowners and brokers at 122 E. 42nd Street, New York, N.Y.

Fruehauf Appoints Flagan V-P Research And Development

Robert G. Flagan has been appointed vice-president of research and development, it was announced by **William E. Grace,** president and chief executive officer of Fruehauf Corporation, Detroit, Mich.

Mr. **Flagan** has over 10 years with the firm and most recently was vice-president-manufacturing for the Fruehauf Division. He has also held the positions of director of manufacturing and director-research and engineering for that division.

In making the announcement, Mr. **Grace** said, "Mr. **Flagan** brings a diversified engineering and manufacturing background to his new position. He is well qualified to direct the overall operations of the Research and Development Division which serves a vital function in advancing our company's technology. His appointment is another example of Fruehauf's policy to promote executives from within the company."

Mr. **Flagan** is a graduate of Gonzaga University, Spokane, Wash., with a BS degree in mechanical engineering. He holds various patents relating to trailer construction and is a member of the American Society of Metals and Society of Automotive Engineers.

Fox And Flohr Join Boise-Griffin Co.

Boise-Griffin Steamship Co., Inc., 90 Broad Street, New York, N.Y. 10004, has announced that it has named **Daniel J. Fox** as assistant line manager of its Persian Gulf service. Mr. **Fox** had previously served with Nedlloyd Lines.

Also named was **William N. Flohr,** who joined the Boise-Griffin's solicitation staff in May. Mr. **Flohr** had previously served with Holland American Line and Black Diamond Lines for 13 years.

STUDENT PAPERS PRESENTED—At a recent meeting of the Los Angeles Metropolitan Section of The Society of Naval Architects and Marine Engineers, two students from California Institute of Technology presented technical papers. Shown left to right are: **John Enroth** of the American Bureau of Shipping and Section vice-chairman; **Edwin James,** author of paper entitled "Force and Moment on a Slender Body Translating Near a Wall"; **Michael Wilson,** author of paper entitled "A Note on the Mutual Interaction Between Viscosity and Surface Gravity Waves in Ship Resistance," and **Henry Rumble** of the Rand Corporation and Section chairman.

Today. There's A New Tug on the Ocean. The Halmar 110. The All-Oceans Tug.

There's a new all-purpose tug on the ocean. Designed and built to handle the toughest ocean towing jobs you can dream up. The all-new **Halmar 110**, a new class of tugs from Halter Marine Services, the shipbuilder of uncommon initiative.

The **Halmar 110** is available in horsepower ranges from 1700 to 4500. Classed by the American Bureau of Shipping for Maltese Cross A-1 Ocean Towing Service, capabilities of the new class include ship docking, anchor handling, and deep-water towing. The design of the **Halmar 110** incorporates a high-performance hull form that provides a high towing speed and bollard pull.

The new **Halmar 110** ocean and harbor tug is constructed to a standard design for speed in delivery. Modifications to the specifications can be made easily to meet your precise operational requirements. Call Halter. We'll break your ocean down to size with a **Halmar 110**. The all-oceans tug.

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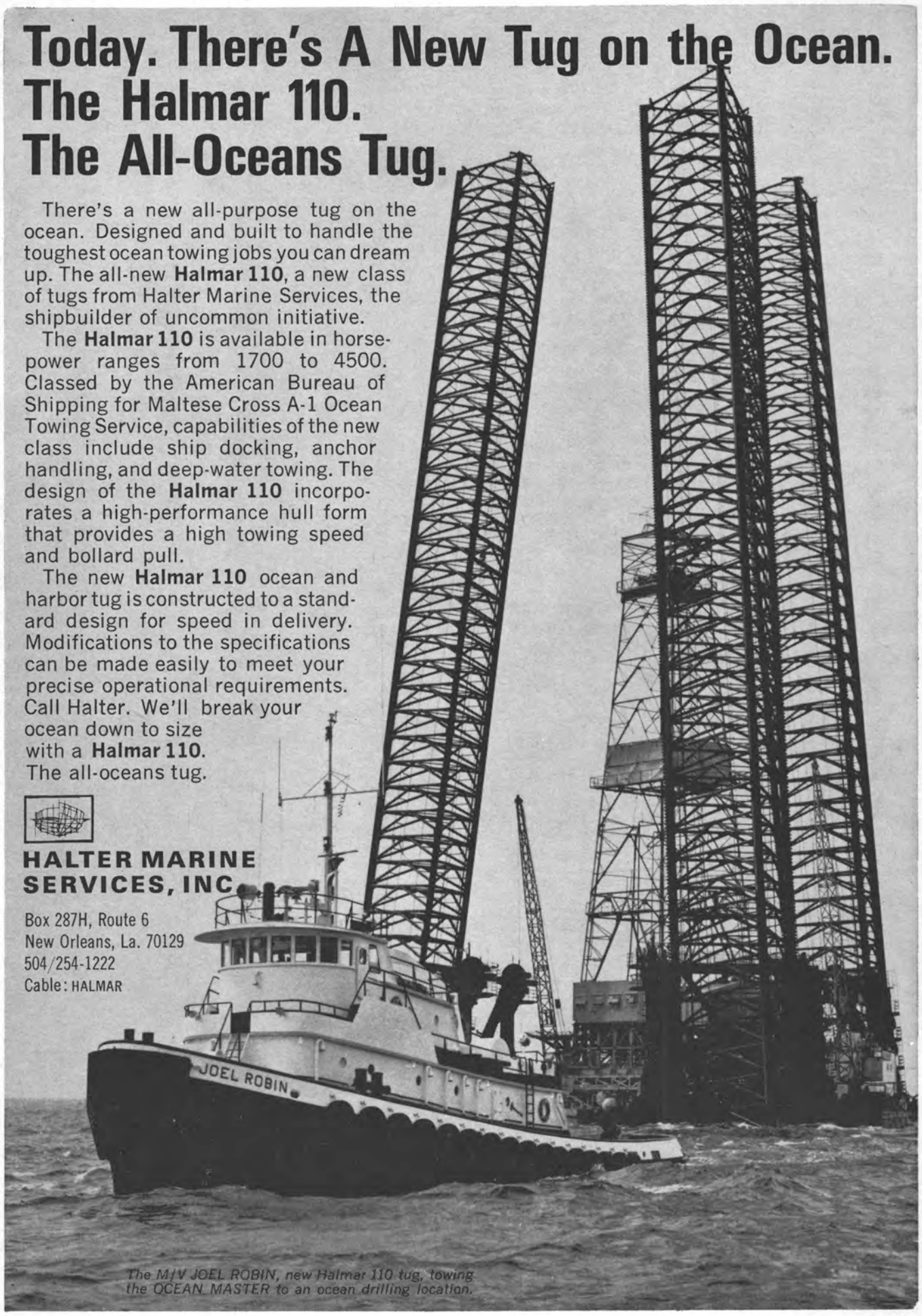


The M/V JOEL ROBIN, new Halmar 110 tug, towing the OCEAN MASTER to an ocean drilling location.

SNAME Chesapeake Section Discusses Determination Of Ship Service Margins

Principals at the recent Chesapeake Section, SNAME, meeting were, left to right: **Robert Taggert,** Section chairman; **George H. Levine,** co-author; **Jacques Hadler,** moderator, and **Seth Hawkins,** co-author.

Attendees at the May meeting of the Chesapeake Section of The Society of Naval Architects and Marine Engineers, held at the Washington Navy Yard Officers' Club, heard an interesting paper entitled "Comments on Service Margins for Ships" written and presented by **George H. Levine** and **Seth Hawkins** of Robert Taggart Incorporated.

The authors presented a method which they felt would afford a more rational determination of service margins for ships. They described the present sources of data and methods with recommendations for the areas requiring further research. The authors contend that the method to estimate service margins is simplified to the point where one might be suspicious of its validity, and whether or not such a margin is economically justifiable. They propose a method of determining service margins which would take into account ship route, long-term average speed, time period over which speed is averaged, age of ship at which average speed is required, and ship displacement for normal operation during this time. This would essentially provide a division of the service margin into two parts, a speed margin and a power margin, representing the environmental effects and the deteriorative effects which are to be expected during the operation of any ship.

Jacques Hadler acted as the moderator of the technical session during which the excellent prepared comments of seven discussors were presented. The authors were then given the opportunity to comment on the discussions prior to the meeting's adjournment.

Goal Of $250,000 Set By Kings Point Fund

A target of $250,000 has been set for the Sixth Annual Giving Drive of the Kings Point Fund, Inc., it was announced by Fund President **James H. Yocum.**

Even before the drive was formally launched, Mr. **Yocum** disclosed, over $50,000 had been donated. This includes two anonymous gifts of $25,000, plus contributions of $600 from the Women's Propeller Club Port of New Orleans, and $500 from the Foreign Commerce Club of New York.

The two last amounts are specifically earmarked for the Midshipman Loan Fund, which is maintained to assist deserving Academy undergraduates with expenses they cannot otherwise meet while they continue their training. Unlike students at other service academies, Kings Point Midshipmen are unsalaried. The Fund now has $250,000 on loan.

One $25,000 gift is to be added to the sail-training endowment established by the Kings Point Fund in 1968. The other is restricted to a number of specific uses.

While restricted gifts are welcome, Mr. **Yocum** said, the Fund is particularly interested at present in unrestricted donations for the sake of greater flexibility in meeting an increasing range of trustee-approved needs.

The Kings Point Fund is fully accredited as a non-profit educational foundation. Created 11 years ago, it has just completed its most successful campaign, with aggregate contributions of slightly more than $200,000. In a brochure distributed, setting forth its 1969 goals, describing areas of need, and stressing tax advantages to donors, Mr. **Yocum** notes last year's record accomplishment and adds:

"But we are not satisfied. While the cost of living, and learning, continues to rise, we dare not be. Relatively, the needs of the Kings Point student community are greater, rather than less, as the years pass. As they enlarge, so must the Fund's ability to meet them."

Donations and inquiries may be addressed to the Kings Point Fund, Inc., U.S. Merchant Marine Academy, Kings Point, N.Y. 11024.

M. Rosenblatt Names Chiang Technical Dir. Basic Ship Design

Wei P. Chiang

Lester Rosenblatt, president of M. Rosenblatt & Son, Inc., naval architects and marine engineers of New York and San Francisco, has announced the appointment of **Wei P. Chiang** as technical director of the Basic Ship Design Division of the company.

Mr. **Chiang,** a graduate of Massachusetts Institute of Technology in 1946 with a MS degree in naval construction, joined M. Rosenblatt & Son, Inc. as a naval architect in 1955. His previous position with the company was as head of the Scientific & Tests Section. Prior to joining M. Rosenblatt & Son, Inc., Mr. **Chiang** was connected with the Tai-Koo Shipyard in Hong Kong and the Kiangnam Naval Shipyard in Shanghai as shipyard superintendent and hull superintendent, respectively, for the period 1949 to 1953.

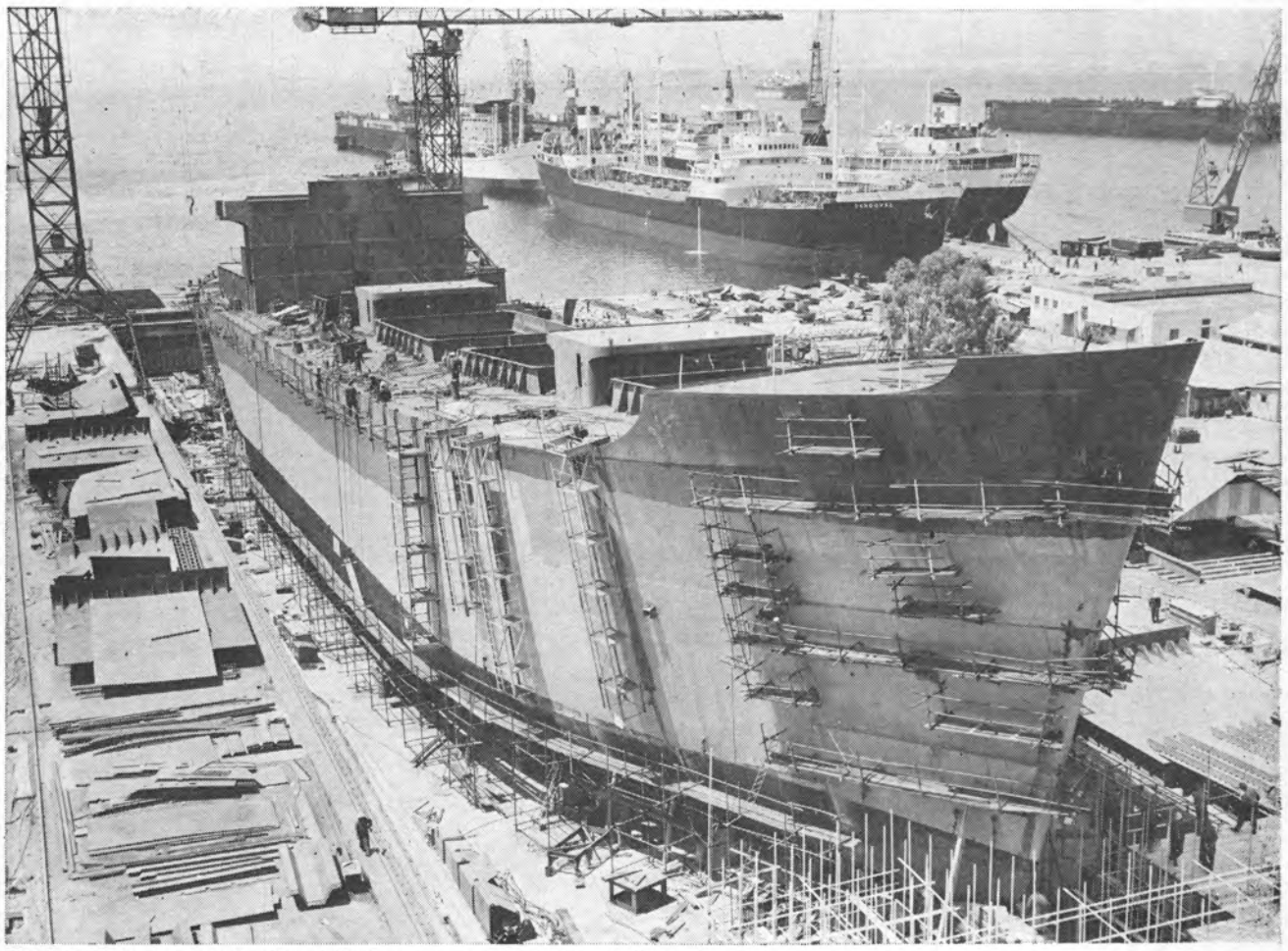
Mr. **Chiang** is a member of The Society of Naval Architects and Marine Engineers.

Sovereign Marine Lines Opens New York Office

F. W. Mark, president of Sovereign Marine Lines Inc. of New York, has announced that the company has opened its new office at 17 Battery Place.

Also announced was the appointment of **D. N. Aruta** as manager of the office. Mr. **Aruta** has previously been associated with American Export Isbrandtsen Lines, Marine Transport Lines, National Bulk Carriers and A. Fronsdal and Co.

Auxiliaries for the **SD.14s** (built in Greece) final decision was Stork



The first SD.14 under construction at the Scaramanga yard of Hellenic Shipyards.

yet another proof of confidence in our engines

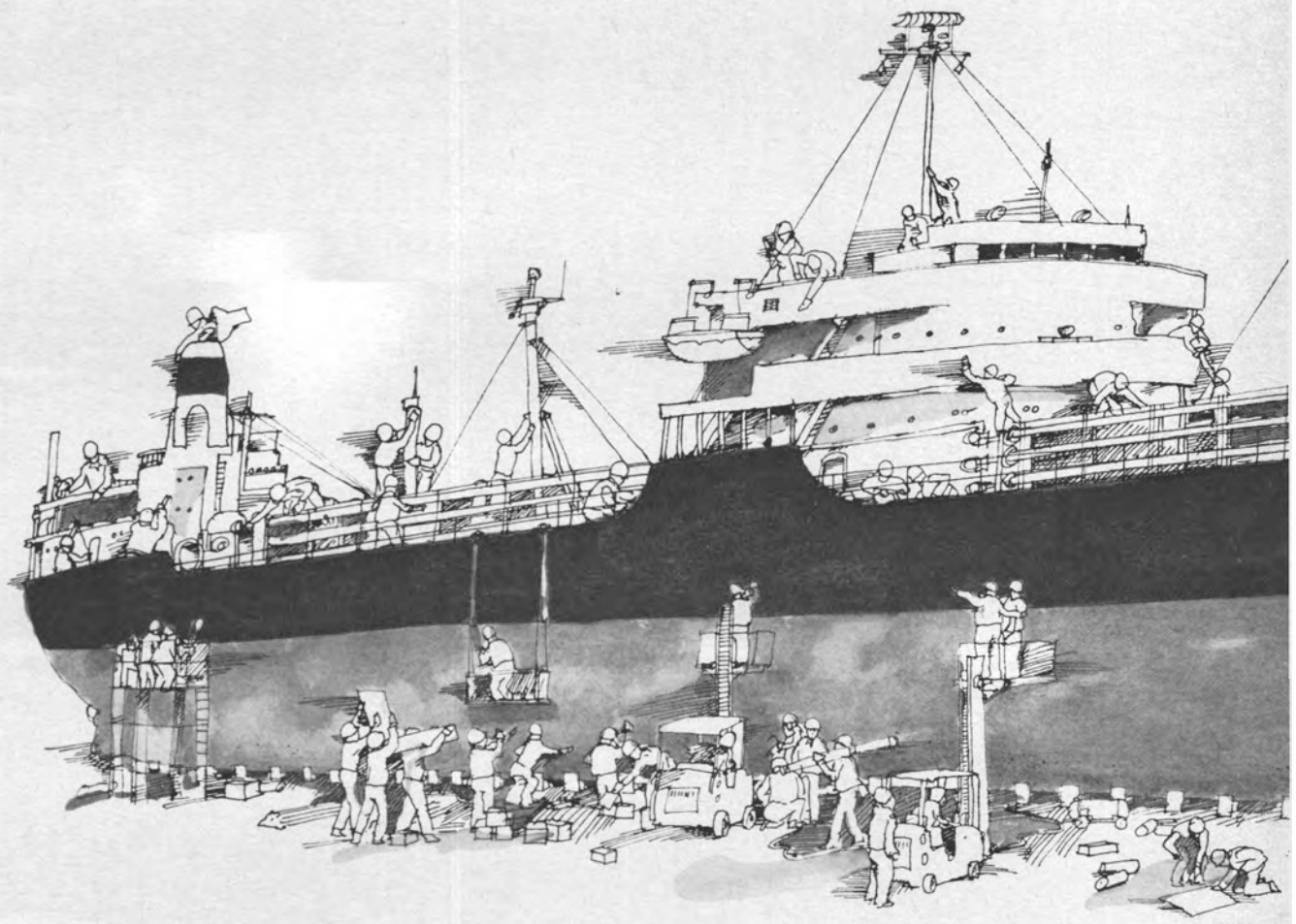
Hellenic Shipyards finally have chosen Stork auxiliary engines for their series of nine SD.14 ships now under order. These vessels are the successors to the famous Liberty ships, and in each one three Stork four-stroke diesel engines, type Ro 158, with a capacity of 335 hp at 1200 rpm will be installed. This order demonstrates the confidence in our products. Also in Greece. We will gladly use our experience to advise you in all your propulsion and auxiliary problems. Without any obligation on your part.

Outputs 36 - 36,000 hp and rpm's up to 1,800

VMF/STORK-WERKSPOOR
DIESEL ENGINE DIVISION

MACHINEFABRIEK STORK - WERKSPOOR-AMSTERDAM - STORK DIESELMOTOREN - KROMHOUT MOTOREN
P.O. Box: 4196 - Amsterdam - Holland - Telephone: (020) 216621 - Telex: 14321 - Cables: Storwerkdiesel

North Vancouver B. C.: Stork Werkspoor Pacific Ltd., 171 West Esplanade; **Montreal 630 Que.**: Stork Werkspoor Canada Ltd., 1600 Norman Street, Lachine; **New Orleans:** Oosterhuis Industries Inc., P.O. Box 30587, telex 58278; **Portland, Oregon**: Hamilton Engine Sales Inc., 2580 N.W. Upshur Street; **San Francisco**: West Winds Inc., 178 Townsend Street; **Wilmington, Cal.**: Dockside Machine & Ship Repair. 131 N. Avalon Blvd.; **Mexico 7 D.F.**: Division de Motores Stork Werkspoor de Mexico S.A., Calle Queretaro 225-B.



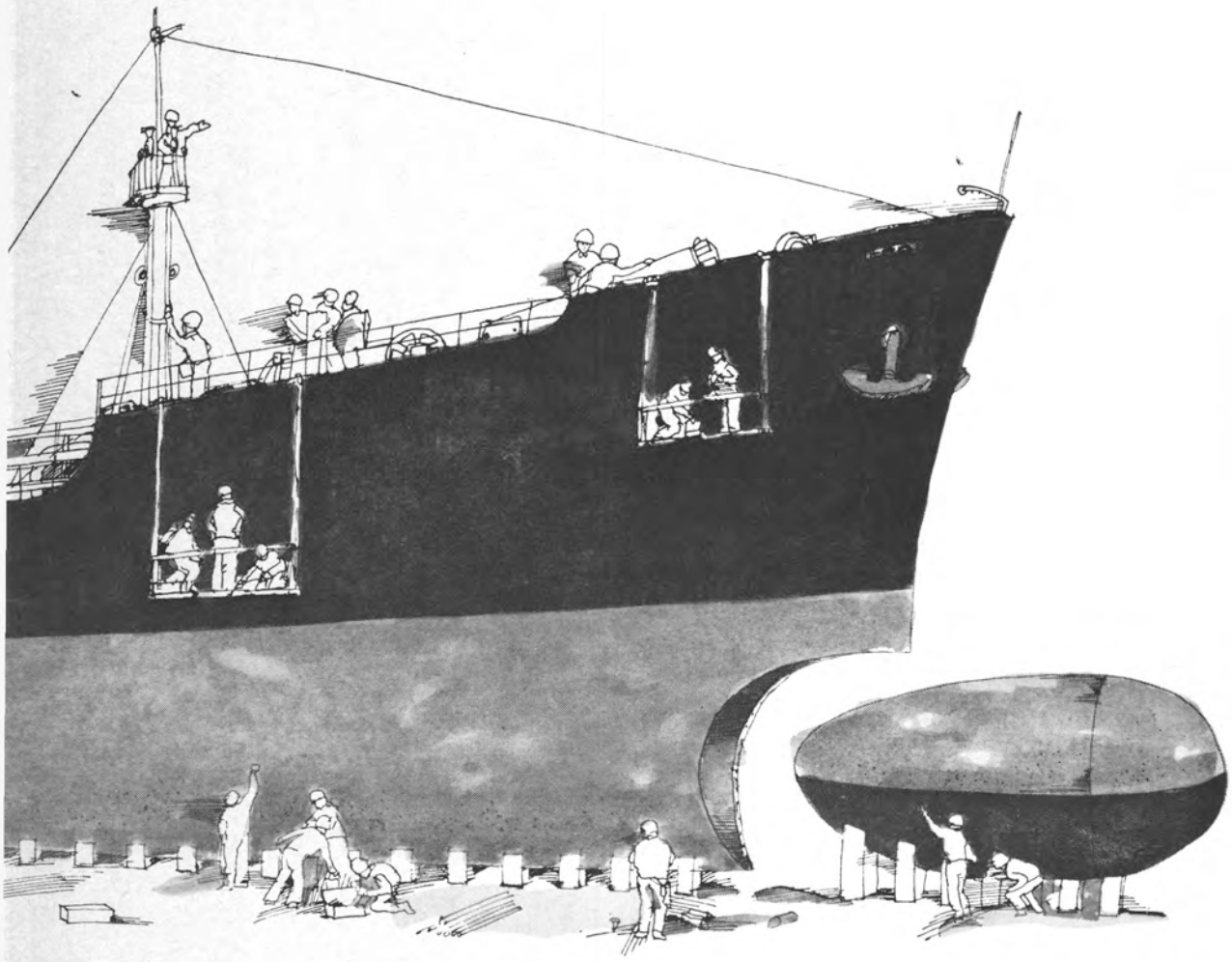
NEWPORT NEWS: WE CAN MAKE ALL AT ONE PLACE.

We do the whole thing.

We've got the in-house facilities to handle not only general repair and maintenance, but also the largest conversions and modifications. Including the major "jumboizing" jobs. And nobody can even come close to us in shot blasting.

After all, we developed it.

Our automated systems, efficient operation and skilled technicians all keep repair time at a minimum. And that saves you money.



ANY REPAIR A SHIP COULD NEED. ALL AT ONE TIME.

For instance, a bulk carrier came into Newport News recently for a "shave and a haircut" —an annual hull and machinery overhaul. In five days she was back at sea.

That's probably faster than you could get your car back from the body shop!

You might say that our specialty is getting your ship out of the yard faster than anybody else.

NEWPORT NEWS SHIPBUILDING AND DRY DOCK COMPANY
NEWPORT NEWS, VIRGINIA 23607
A MAJOR COMPONENT OF TENNECO TENNECO INC.

The Vanguard Class Ore/Oil Ships

N. J. Thompson and T. B. Thomas*

It is no longer sufficient to limit economic considerations in the design of a new ship only to questions of speed, power, fuel, maintenance and repair expense, offhire time, etc. Today, with the tremendous capital investment required for such large units, a complete analysis must be developed covering worldwide shipping and trading possibilities, commodities requiring transportation, trade routes, basic cargo, complementary backhauls, etc. Our company is essentially a natural resources company, using ships and shipping as a tool in an overall production to receiver system. All of our raw materials produced worldwide are marketed on a cost-and-freight basis, giving us complete control of transportation costs as part of the overall system costs.

The employment of dual and multi-purpose carriers allows us to function effectively in the transportation of our own varied commodities as well as in third party transportation. Even more importantly, our ability to handle products aside from our own initial production of iron ore, has led us into the ownership and exploitation of deposits of other raw materials worldwide.

In a typical voyage we will lift iron ore from Peru to Japan from where we will ballast to the Persian Gulf, lifting crude from the Persian Gulf to a European port, ballasting to the Mediterranean to Libya, lifting crude from Libya to Los Angeles, with a final ballast leg from Los Angeles to Peru. Table 1 is a comparative pro forma for this operation.

The three 130,000-dwt Vanguard vessels for the San Juan Carriers' Ltd. fleet which Marcona will operate are being built in Japan, and it is not without coincidence that Marcona markets a good deal of its iron-ore products in that country. Two of the vessels, Hulls 900 and 901, will be built by Mitsubishi Heavy Industries, and the third vessel, Hull 1117, by Kawasaki Dockyard Ltd.

General Description

The vessels are all welded ore/oil carriers, steam turbine propelled, engines and accommodation aft, of a design and layout similar to San Juan Carriers' earlier designs which have now become fairly conventional. Extra features of this particular design are: a single controllable-pitch propeller, extensive engine room automation, high standards of accommodation and remote control of the cargo-oil system from a central control room. A bulbous bow of the builders standard design will be installed. Extensive use of high-tensile steel has been made in the hull design and riveted seams have been eliminated at the upper deck and the bilge.

The vessels are being constructed to ABS rules and are intended to be classed + A1 E – "Ore and Fuel Oil Carrier" or "Ore Carrier" + AMS. They will also meet International Load Line Regulations 1966 (Type B Freeboard), SOLAS 1960, I.L.O. regulations regarding cargo gear and crew accommodation and, of course, the maritime laws and regulations of the Government of Liberia where the ships will be registered. In addition, U.S.C.G. regulations will be applied for the fire-fighting equipment and U.S. Public Health for the potable-water service, but without official survey and certificate.

The vessels will be assigned dual gross and net tonnages under the Liberian rules, but will only be able to use one at a time. The tonnages for the ore/oil condition will be the same as if the vessels were tankers and intended for trades where alternate voyage legs are in oil followed by ballast or ore. The ore tonnages are considerably less due to exemption of the wing ballast tanks and intended for use should the vessels not be engaged in the oil trades for some time.

The vessels have sufficient capacity to lift their full deadweight in either ore or oil. In the ore condition, centerline holds 1, 2, 3, 4 and 5 will be used for the cargo; in the oil condition, all wing tanks and centerline holds 1, 2, 4 and 5 will be utilized. Number 3 centerline hold will be left empty in the oil condition to reduce bending stresses. The vessels are not

(Continued on page 26)

*Mr. **Thompson,** staff naval architect, and Mr. **Thomas,** staff marine engineer, Marcona Corporation, presented the paper condensed here before a recent meeting of the Northern California Section of The Society of Naval Architects and Marine Engineers.

Table 1—TYPICAL 130,000 DWT COMBINATION ORE/OIL CARRIER

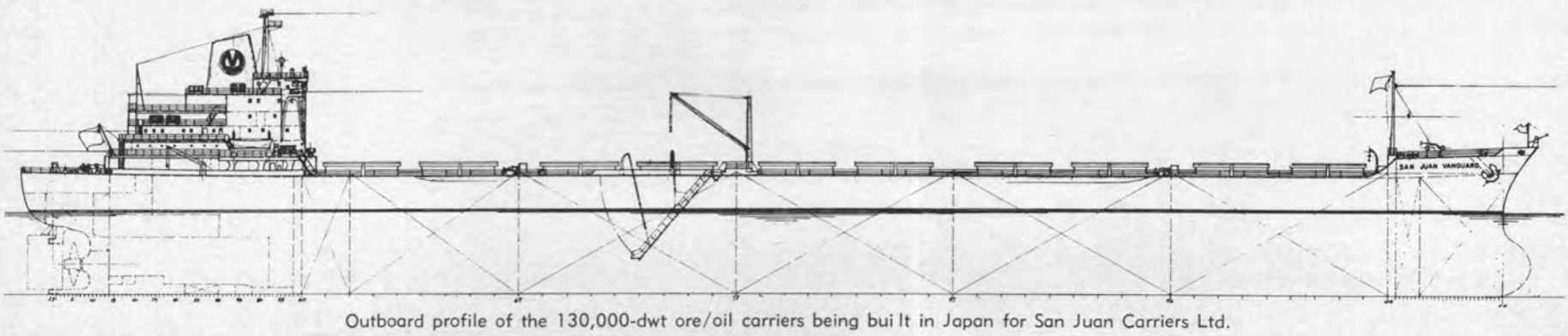
Comparison Transporting Iron Ore Peru/Japan returning in ballast (Condition 1) against backhauling Persian Gulf Crude to Europe thence backhauling Libyan Crude Oil to Los Angeles (Condition 2).

VOYAGE ITINERARY	Condition 1 Ballast Miles	Condition 1 Return Days	Condition 2 Combined Miles	Condition 2 Ore-Oil-Oil Days
Peru/Japan	9062	23.8	9062	23.8
Japan/Persian Gulf			6403	16.8
Persian Gulf/Europe			11243	29.4
Europe/Libya			2809	7.4
Libya/Los Angeles			13726	36.0
Ballast return to Peru	9062	23.8	3905	10.2
Total steaming days & mileage	18124	47.6	47148	123.6
Contingency days		1.0		3.0
Port days		6.5		16.0
Total voyage days		55.1		142.6
VOYAGE COSTS:				
Fuel costs		$ 73,700		$179,400
Port costs		12,000		41,000
Miscellaneous & contingencies		3,500		9,700
Total voyage cost		$ 89,200		$230,200
Assumed vessel cost @ $6,400/day		352,600		912,600
Total voyage & vessel cost		$441,800		$1,142,800
Credit oil revenue (assumed):				
125,138 L/T (Persian Gulf/Europe) @ $4.85			$606,900	
121,000 L/T (Libya/Los Angeles) @ $3.61			436,800	
Total supplemental revenue				—1,043,700
Net cost—Iron Ore		$441,800		$99,100
Cost per ton—Ore (126,399 L/T)		$3.50		$0.78
Steaming time loaded		50%		72.2%
Steaming time in ballast		50%		27.8%

CONCLUSION

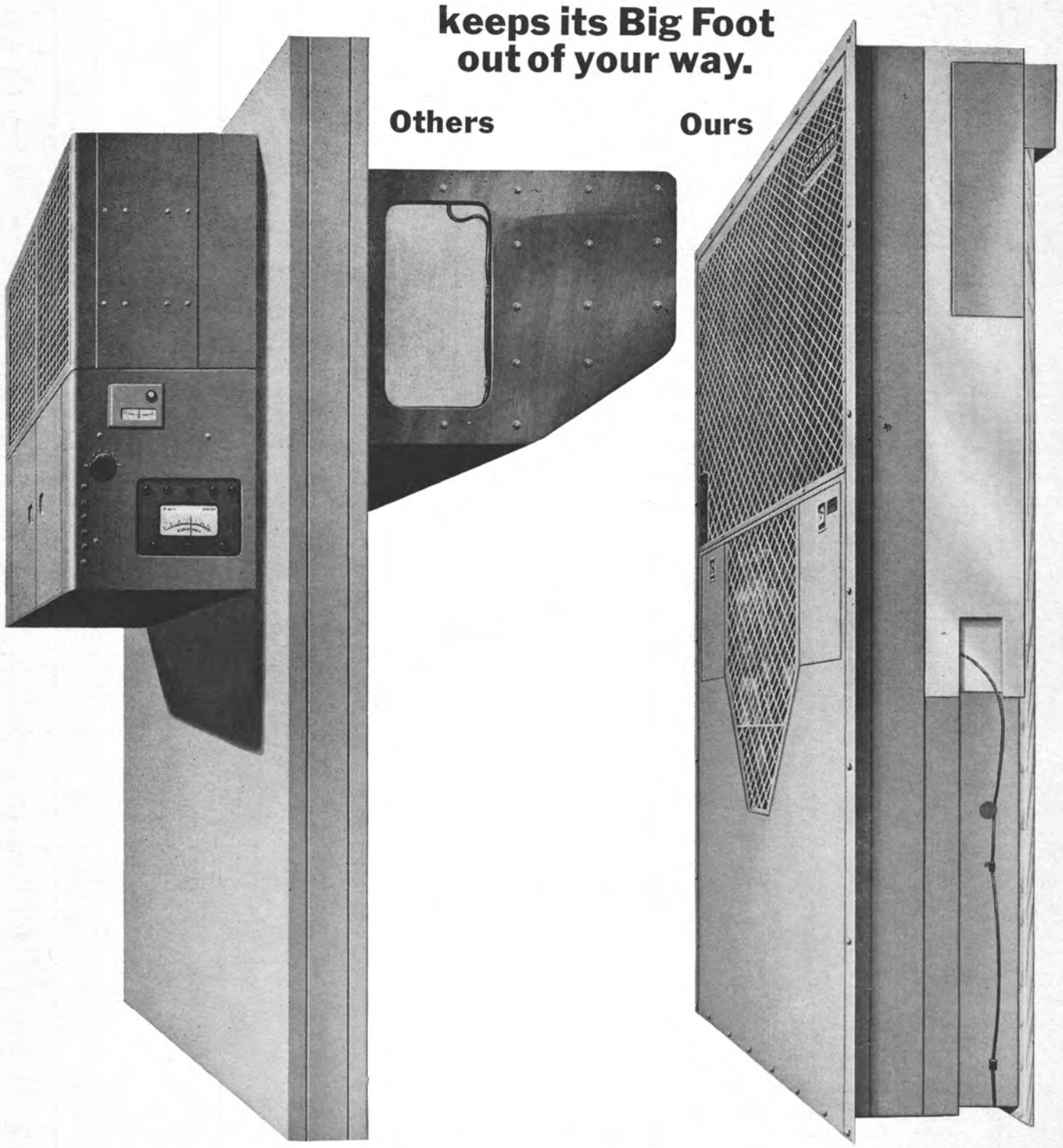
Peru/Japan ore rate is reduced by 77.7% when backhauling oil.

NOTE: This relative presentation is based on approximate per diem rates for the vessel used, and typical freight rates assumed for comparative purposes only.



Outboard profile of the 130,000-dwt ore/oil carriers being built in Japan for San Juan Carriers Ltd.

Carrier's Frostmaster® keeps its Big Foot out of your way.



We went out of our way to stay out of your way when we designed the 12 5/16 inch deep Big Foot cargo container refrigeration unit.

It's the most compact in the industry. It saves cargo space.

Because Frostmaster doesn't bulge into the box, it doesn't put a dent in profits. It's flat as a wall so it loads flush. In fact you can use Frostmaster as a wall . . . which not only lets you get a high end-load but rack-loading strength as well.

For ease of maintenance, Frostmaster's up-front accessibility saves time and minimizes shutdown losses. And there's the close limit thermostatic control for automatic refrigeration, electric heating, and evaporator defrost. Via rail, ship, or road, Frostmaster cools to 20 below and warms to 70 above.

Our Special Products Division will tell you all about the Big Foot. Write them at Syracuse, N. Y. 13201. It'll be a step in the right direction.

Carrier Air Conditioning Company

Carrier®

Vanguard Class Ships—

(Continued from page 24)

designed, however, for any alternate hold loading of ore. The double bottom spaces under the five holds are divided into three separate void spaces and utilized for cargo, ballast and bilge piping.

The loading and discharge of an ore cargo requires a minimum of obstructions on deck. To this end some ingenuity was needed to keep all deck piping as low as possible. Hatches were made as large as possible to safely accommodate some of the large buckets (up to 25 tons of cargo per grab) now being used at steel plants. The five holds on these vessels each have two large hatches about 46 feet square to allow as much free digging as possible. Each hatch cover consists of two parts, one port and one starboard, being split on the centerline. The covers roll together when a wire is attached to one of the pair. Power is provided by one of the winches on the upper deck. Before opening, the covers have to be jacked up and a separate hydraulic jacking system is provided for hatch cover raising.

Covers to holds 1, 2, 4 and 5, since these holds will contain oil, have special double neoprene seals around the perimeter as well as on the centerline joint.

Loading or discharge of iron ore products is a dirty, dusty process. An air washing system is being provided to clean the air during these operations for all accommodation, commissary and machinery spaces. Accommodation spaces are air conditioned, excluding commissary spaces, sanitary spaces and the wheelhouse.

Special attention has been paid to the layout of the bridge and chart room and the location of informative equipment relative to bridge personnel. In view of the size of the vessels and the position of the wheelhouse aft, provision is made in the bridge wings for a c-p propeller control stand in addition to the main c-p propeller and engine control stand in the wheelhouse. Rudder angle and shaft rpm indicators are also provided in the bridge wings. A closed circuit marine television with camera is mounted on the foremast with camera direction control and monitor in the wheelhouse.

Machinery

The machinery is not identical for the three ships. Mitsubishi has a license agreement with Westinghouse, and builds its turbines in Japan; while Kawasaki builds its own design. MHI builds Combustion Engineering boilers; while KDY builds to its own design.

The propulsion turbines are two-cylinder cross-compound type consisting of one h-p turbine and one l-p turbine. The turbines are designed for use with a controllable-pitch propeller; therefore, no astern element is provided.

The turbines with the c-p propeller are capable of developing ahead or astern power with rated steam and exhaust conditions. They are designed for the maximum efficiency obtainable consistent with reliable operation when delivering normal rated power with bleeding. The power is divided approximately equally between h-p turbine and l-p turbine under maximum power conditions. The turbine rotors are of flexible-shaft design to minimize steam leakage across the diaphragms and glands.

Connections are provided to permit independent operation of the h-p turbine and l-p turbine in emergency situations. This is accomplished by an emergency steam supply to the l-p turbine or an exhaust connection from the h-p turbine exit to the main condenser.

Five remote-operating bleeding connections are provided for the extraction of steam from the turbines for heating the seawater distilling plant, feedwater heaters and l-p steam generator.

Table 2—Principal Characteristics

(Tonnages are approximate)

Length, overall	957 ft. 9½ in.
Length, between perp.	908 ft. 4¼ in.
Breadth, molded	137 ft. 9½ in.
Depth, molded	74 ft. 1¾ in.
Designed draft, molded	52 ft. 4 in.
Deadweight @ designed draft	129,570 tons
Registered gross tonnage	77,000 tons
Ore (incl. hatch), 100% full	2,691,000 cu. ft.
Ore (incl. hatch), self-trimmed to 35° rest angle	2,340,000 cu. ft.
Cargo oil (incl. hatch), 100% full	5,756,000 cu. ft.
Trial speed, designed draft	16.4 knots
Service speed, designed draft	15.9 knots
Designed fuel consumption	114.5 tons per day
Endurance	23,000 sea miles

The main propulsion turbines operate at a constant rpm and the control of the ship's speed and direction is accomplished by varying the pitch of the propeller. The main propulsion turbines are fitted with a hydraulic constant-speed governor which is capable of maintaining the propeller rpm at either 85 or 50 rpm. During maneuvering condition, the propeller speed is controlled at 50 rpm and during normal at-sea operations at 85 rpm.

The main reduction gear is of the double-reduction tandem articulated type. The casing is a rigid casing of welded construction.

The steam generating plant consists of one main boiler and one auxiliary boiler.

The main boiler has sufficient capacity to supply necessary steam for propulsion and domestic use at sea.

The main boiler is a marine watertube boiler, consisting of two drums and watertubes between them, water-cooled furnace, superheater, economizer and a rotary regenerative gas air heater.

The main boiler is arranged for burning oil under forced draft and is provided with automatic combustion-control equipment, feedwater regulator, automatic superheater steam temperature control equipment and burner automatic control equipment.

The main boiler is equipped with four fuel-oil burners on the roof wall of the furnace. The burners are 'Volcano A.B.C.' steam and mechanical pressure atomizing type, manufactured by licensee in Japan. The burner consists of an atomizer gun, and forced-draft air register with fuel shut-off valve. These burners have a turn-down ratio of 5.5:1. The fuel oil is distributed to each burner from a burner manifold by a branch connection pipe.

The operation of increasing or decreasing the number of the burners is remotely and automatically operated by pushbuttons on the control consoles, or by the automatic combustion control signal.

'Bailey Mini-Line' air-operated combustion-control equipment is installed for the boiler. This control system regulates fuel and air supply to the boiler to ensure that the steam pressure at the superheater outlet is within predetermined limits. The combustion air is automatically controlled by actuating the inlet vanes of the forced-draft fan. Fuel-oil supply is automatically controlled by means of regulating a valve located in the fuel-oil supply line. Manual adjustment of the oil and fuel/air ratio is provided by means of an auto-manual selector switch.

The main boiler is equipped with a 'Copes' two-element feedwater regulator. The regulator is operated by air and consists of a thermostat-type water-level sensing device, steam-flow sensing device, an auto-manual selector switch and a feedwater regulating valve.

The main boiler is equipped with a soot-blower system of the steam nozzle tube type.

The auxiliary boiler is a two drum marine watertube boiler and consists of steam and water drum, tube, header and water walls. It is arranged for burning oil under forced draft and is provided with automatic control equipment and feedwater regulator.

Two turbo-generator sets are provided. One set is driven by the main propulsion h-p turbine by means of a gear coupling and mechanical clutch when the main propulsion unit is operating near rated speed condition, or driven by a directly connected single-stage condensing back-up turbine during maneuvering and low-speed condition of the main unit. The other set is driven by a single reduction-geared atmospheric-condensing standby turbine.

The back-up turbine develops 1,800 hp, which is sufficient power for continuous rated generator output and for driving at rated capacity the main feed pump which is supplied with 855 psi desuperheated steam at the turbine-inlet stop valve from the desuperheater, and exhausting to the main condenser.

The back-up turbine idles in the vacuum of the main condenser, the generator being driven by the main unit and the back-up turbine being supplied gland seal steam under normal service condition; that is, it is always on a standby condition.

The standby turbine develops sufficient power for continuous rated generator output, being supplied with 285 psi desuperheated steam at the turbine-inlet stop valve from the desuperheater and exhausting to an atmospheric condenser. The standby turbine speed is reduced to 1,800 rpm at the generator through a single reduction gear.

One main feed pump is driven by the main propulsion turbine coupled with back-up impulse turbine. This pump is operated in the same manner as the main generator. The back-up turbine for the main feed pump also drives the main generator.

The main generator and the main feedwater pump are driven by the main propulsion h-p turbine through a mechanical clutch in the normal seagoing condition at a shaft revolution of 85 rpm, and are driven by the back-up turbine in all other conditions. The clutch is engaged and disengaged remotely from the engine control room. If the main turbine revolutions drop or rise beyond predetermined values for the generator, or, if other abnormal conditions occur, then the clutch is disengaged automatically and the main generator and the main feedwater pump are driven by the back-up turbine. These control systems are of a hydraulic, electric and pneumatic type.

The KaMeWa, 26-foot-10⅞-inch, stainless-steel c-p propeller is controlled remotely from four control stations; the engine control room, wheelhouse and both bridge wings. The ahead or astern maneuvering is carried out by changing the propeller pitch while the shaft revolution is constantly kept at 50 rpm or 85 rpm.

Marcona's three new ships' engine rooms are not by any means fully automated, although many features are automated and remote operation of the main equipment is possible from a centralized control station. We feel that the present state of the art does not permit an unmanned engine room. Another reason for not going to fully automated engine room is that we have not been economically forced to do so at this time, and we cannot in any way economically justify the large added expense.

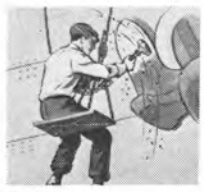
The Vanguard-class ships have an air-conditioned centralized control room located in the aft portion of the engine room on the third deck. The main control console is made up of main engine control, boiler control, auxiliary control and generator controls.

Some plain talk about fighting rust and other marine corrosion

Let's face it! Rust will always be with us. But we can fight it effectively and economically, whenever it occurs and reduce rust to a nuisance rather than a problem.

Corrosion Dynamics and the Development of the Arnessen Chipping Hammer.

Our interest in developing outstanding tools to combat and remove rust; scale and old paint go back many years. We found the marine personnel struggling with several important problems in relation to rust removal hammers.



The Weight Factor.

Some manufacturers of chipping tools incorporate motor and head in one unit. This makes them heavy and unwieldy. So heavy in fact, that workmen handling the tool soon tire and often drop it due to fatigue. This is costly.

Corrosion Dynamics solved this problem with the ARNESSEN CHIPPING HAMMER quite simply:

A) by separating motor and head. Reducing total overall weight, as well as the weight operator must hold and move.

B) Flexible shaft. The flexible shaft and corner head permits the ARNESSEN hammer to get at hard to reach places. The shaft also has a built in safety factor. Shutoff can be made by simple clutch action, preventing possible injuries, damage to unit.

C) Light pass operation. The efficiency of the ARNESSEN hammer permits operation on vertical, horizontal and irregularly shaped surfaces.

THE SUMMING UP: Operator Advantage

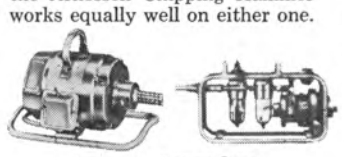
The Arnessen Chipping hammer is easier to operate, with less operator fatigue, greater overall efficiency.

Owner Advantage

In most cases a light pass over vertical, horizontal or bevel-shaped surfaces suffices to remove coatings and impurities. No need to go back over area, again and again. Corner finger heads let you get into hard to reach areas.

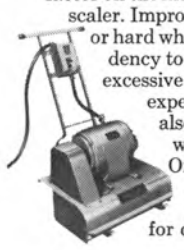
Air or Electric—Take Your Pick

You decide on the power source, the Arnessen Chipping Hammer works equally well on either one.



Arnessen Large Area Production Deck Scalers and Their Benefits

Wearability is an important factor on the multi-wheel deck scaler. Improperly designed or hard wheels have a tendency to crack creating excessive downtime and expense. Streaking also occurs due to wheel breakage. Often wheels are too brittle and not intended for deck operation.



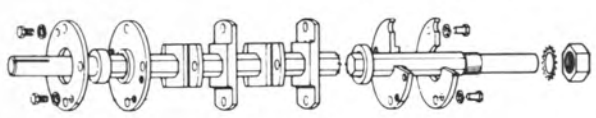
ARNESSEN HAS OVERCOME THESE FACTORS IN SEVERAL WAYS:

Two Cutter Wheel Sizes:

Arnessen uses 66 long life chrome alloy cutter wheels of two sizes, cutting an 11" swath on rust, epoxy undercoatings, cement coating, semihard deck coating, Navy non-skid deck coatings and paint.

Drum Design Prevents Streaking:

Due to its unique design and self aligning shock-mounted roller bearings streaking is eliminated.



Arnessen, a True Marine Production Scaler:

Operating at 2000 RPM through triple belt sheave drive, the Arnessen scaler is a true marine production unit cutting scaling costs 60% as it scales at 300 sq. ft. per hour.

Adjust While You Scale:

Arnessen's scaler is unique in yet another way. It allows you to adjust wheel cut as you approach heavily coated areas without stopping machine to make mechanical adjustments.

To meet varying deck conditions, Arnessen has developed 3 types of cutters, each engineered to let you work in a fast economical manner on a given surface.

Arnessen Users Span the World:

Steamship companies, the U.S. Navy, Coast Guard, Army Corps of Engineers, dredging and towing concerns, drydock and shipbuilding companies have Arnessen chipping hammers and deck scalers. Some ships have as many as 6 units. Machines may be rotated within fleet to meet maintenance requirements.

Arnessen Units Meet All Safety Standards:

We have subjected our scalers and hammers to every safety test and 3 years of sea trials, before offering the unit to marine users.

Call our U.S. and Canadian distributors for full details on all Corrosion Dynamics/Arnessen Units:

CALIFORNIA
Marine Electric Co., San Francisco
J. M. Costello Supply Co., Inc., Wilmington

FLORIDA
Tampa Marine Supply, Inc., Tampa

GEORGIA
Southern Marine Supply Co., Inc., Savannah

LOUISIANA
Standard Supply & Hardware Co., New Orleans

MARYLAND
The R. J. Taylor Co., Baltimore

NEW YORK
Maritime Electric Co., Inc., New York, N.Y.

OHIO
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Gilbride Tells Navy League Of U.S. Shipyards' Potentials

In a speech in Washington, D.C., **J. T. Gilbride,** president of Todd Shipyards Corporation, said that U.S. yards could respond effectively to any demand for new ships. Mr. **Gilbride** was a panelist at the Navy League 67th annual convention, held in the Sheraton Park Hotel. The subject of the panel was "Oceanic Doctrine—A National Need for Free World Maritime Leadership."

The Todd executive said his industry could adjust or expand operations and facilities to handle much higher levels of shipbuilding activity. He assailed industry critics who favor construction of some U.S.-flag merchant ships in foreign yards. Remarking that the shipbuilding industry is spending $100-million per year to increase capacity, improve productivity and reduce costs, Mr. **Gilbride** said that the yards could perform as they did in World War II when phenomenal records were achieved. Last year two existing U.S. yards doubled their capacity and next year two new yards will begin operating, all predicated on the anticipation of an increase in production.

Mr. **Gilbride** cited containerization as a current demonstration of the ability of U.S. shipyards. He said that American ship operators now lead the world in the exciting containership field, and that ships for such operations were either built or converted in private American shipyards.

Todd's president stressed that what is needed at the present time is, " . . . a clear and simple declaration of national intent. Once our federal government says that it intends to recapture its power at sea—and translates this policy into a wise and sensible long-range, stable shipbuilding program . . ." the American yards will be able to respond effectively. Mr. **Gilbride** stated that both the labor and management arms of the industry are working to focus national attention on the contribution of seapower to the nation's military and economic welfare. He spoke of building 50 or more merchant ships per year in American yards as part of a long-range reconstruction program.

The Todd official likened the seapower issue to the race for space. He said that when the Russians placed their first satellite in orbit, American industry, ingenuity and government rallied to the cause. He implied the Soviet advances at sea are more threatening, and should guarantee a high priority for reconstruction of U.S. seapower.

Mr. **Gilbride** said that there has never been the suggestion that any of our space vehicles should be built in foreign countries. He said that, "The same kind of attitude, determined policy, rationale and implementation could achieve the same beneficial results in respect to a reconstruction of U.S. seapower."

Bird-Johnson Elects Truex And Wicks Company Officers

Robert D. Truex

John G. Wicks

Howard H. Scott, president of Bird-Johnson Company, of Walpole, Mass., recently announced the election of two new officers of the firm.

Robert D. Truex was named treasurer. He is a graduate of the U.S. Merchant Marine Academy at Kings Point, and has spent the past 10 years in the marine industry in planning, engineering, estimating, project coordination, and contracting functions.

John G. Wicks has been named as assistant treasurer, and will serve under Mr. **Truex.** He is a graduate of Babson Institute, and has spent the past nine years in cost accounting, accounting supervision, and as a general accountant. He has been with Bird-Johnson Company for three years.

Bird-Johnson Company manufactures KaMeWa controllable-pitch propellers and bow thrusters. They have recently added the famous Hagglunds hydraulic motor to their product line.

Raytheon Names Cuthbertson Customer Service Supervisor Marine Products Operation

William Cuthbertson has been named customer service supervisor for Raytheon Company's Marine Products Operation, South San Francisco, Calif.

He joined Raytheon in 1964 and has served as supervisor of the replacement parts department. For 20 years prior to that he held various posts at the Air Ministry in London and in the supply organization of the Royal Air Force.

A native of Glasgow, Mr. **Cuthbertson** attended Creighton School, Carlisle, England and graduated from Tully House College in Carlisle.

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Single-Trip Capacity Of U.S. Containerships Exceeds 45,000 Containers On 178 Ships

Over 178 ships provide the U.S.-flag merchant fleet with a single-trip capacity of more than 45,000 containers, mostly of the 20-foot by 8-foot by 8-foot size. This tremendous container capacity includes full containerships and ships with an assigned partial container capability. All ships can carry containers either in their hold or on deck and most of them do. But, this summary gives credit only to those ships which have special container facilities.

Based on a summary prepared by the office of Government Aid, Division of Trade Studies, Maritime Administration, and updated to June 1, there are currently operating in the U.S. merchant fleet 17 new containerships and 67 vessels converted to full containerships. Of this group, there are 38 ships without cargo gear for handling the containers—being completely dependent upon shore facilities for loading and unloading. There are also 94 ships with partial container capacity.

The following tabulation indicates the extent of the container operation by steamship lines. As indicated previously, the list of ships with partial container capabilities cannot be considered as a full listing since all ships can carry containers.

Full Containerships

Owner	No. Of Ships Conv.	New	Total	Total Container Capacity	Container Size-Std. (in feet)
Alaska Steamship Co.	2	0	2	352	24x8x8.5
Amer. Export Isbrandtsen Line	6	3	9	6,112	20x8x8
Amer. President Lines	2	0	2	756	20x8x8
Containership Chartering Service, Inc.	3	0	3	1,080	35x8x8.5
Containship, Inc.	0	2	2	156*	17x8x8
				54*	35x8x8
Donmac Corporation	5	0	5	1,130	35x8x8.5
Hudson Waterways Corp.	9	0	9	1,709	40x8x8.5
Litton Industries Leasing Corp. (Operated by Sea-Land)	19	0	19	6,990	35x8x8.5
Madison Transportation Co.	1	0	1	332	35x8x8.5
Matson Navigation Co.	9	1	10	4,218*	24x8x8.5
Monterey Transportation Co.	1	0	1	360	35x8x8.5
Moore-McCormack Lines	0	1	1	800*	20x8x8
Pacific Far East Line	1	0	1	400	20x8x8
Sea-Land Service, Inc.	5	0	5	1,628	35x8x8.5
Seatrain Line, Inc.	2	4	6	NA*	NA
United States Lines	2	6	8	7,774	20x8x8
Totals	67	17	84	33,851	

Partial Container Capacity

Amer. Mail Line	8	1,415	20x8x8
Amer. President Lines	8	929	20x8x8
Farrell Lines	5	910	20x8x8
Grace Lines	10	1,528	20x8x8
Highland Steamship Corp.	1	18*	40x8x8
Hudson Waterways Corp.	1	NA*	NA
Matson Navigation Co.	5	490	24x8x8.5
More-McCormack Lines	11	2,706	20x8x8
Motorships of Delaware, Inc.	1	6*	NA
Pacific Far East Line	14	1,303	20x8x8
States Steamship Co.	9	1,338	20x8x8
Sun Leasing Co.	1	260*	40x8x8
Sunexport Holding Corp.	1	NA*	NA
Union Carbide Corp.	2	384	30x8x8
United States Lines	17	724	20x8x8
Totals	94	12,011	
Grand Totals	178	45,862	

*Has capacity for roll-on/roll-off vehicles or railroad cars. NA—either not applicable or not available.

Steady Flow Principle Of Water Lubrication Described In Bulletin

Technical Paper No. 300, published by Johnson Rubber Company, Marine Division, Middlefield, Ohio, presents the steady flow principle of water lubrication and a qualitative comparison between oil-lubricated sealed metal bearings and the Johnson "Demountable" water-lubricated rubber bearing as they apply to outboard marine stern tube and strut applications.

The 12-page paper describes the similarity between oil and water lubrication, the differences, and leads up to the single boundary layer phenomenon and the steady-flow principle of lubrication.

In addition, the paper describes the principles of lubrication, laminar flow and wedge shaped lubricant film. It also contains a non-quantitative comparison chart between oil-lubricated metal bearings, the Johnson "Demountable" open-water-lubricated rubber bearing system and the conventional flatted open-water-lubricated system. Copies of the paper may be obtained by writing the Johnson Rubber Company, Marine Division, Middlefield, Ohio 44062.

FIFTH LKA LAUNCHED at Newport News Shipbuilding and Dry Dock Company in current program. The 575½-foot amphibious cargo ship (LKA-117) was christened El Paso at an Armed Forces Day launching ceremonies by **Mrs. John G. Tower,** wife of the Texas senator. Senator **Tower** was the principal speaker at the affair presided over by the shipyard's president, **L. C. Ackerman.** Shown at the launching are, left to right: Congressman **Richard C. White** of Texas, representing the City of El Paso; Mr. **Ackerman; Mrs. Tower;** Senator **Tower;** the three maids of honor, the **Misses Penny, Jeanne** and **Marian Tower,** and **Mrs. Ackerman.**

Burton Shipyards Sold To DPA, Inc., Dallas

The acquisition of Burton, Inc., owners of the Burton Shipyard of Port Arthur, Texas, has been consummated by DPA, Inc., Dallas. The announcement of the completion of the purchase was made by **John Tuthill,** DPA president.

Mr. **Tuthill** also announced that **J. C. Garner,** Burton's president, has been elected to the board of directors of DPA.

Texas Transport Opens Cleveland Office

Texas Transport & Terminal Company Inc. has announced the opening of a Cleveland office located at 20800 Center Ridge Road (Rocky River), Cleveland, Ohio 44116, under the management of **W. H. Swanson.**

The office, situated in most modern quarters, is located mid-way between the airport and downtown Cleveland, with telephone number (216) 333-8150 and TWX 810-421-8675.

Texas Transport and Terminal Company Inc. maintains offices in the principal ports and cities throughout the United States, and is general agent for major ship operating companies, as well as full-cargo agents and chartering agents throughout the world.

Main Iron To Build Twin-Screw Tugboat

Main Iron Works, Houma, La., has been awarded a contract by Ocean Towers, Inc., for the construction of a twin-screw tugboat. Designated Hull No. 223, the tug will have the following dimensions: 100 feet 6 inches in length (BP), 27 feet in beam, 14 feet 9 inches in depth and will be propelled by 2,000-total-bhp diesel machinery.

COMBUSTION ENGINEERING'S NEW OFFICE BUILDING—Latest addition to Combustion Engineering's layout in Windsor, Conn., is the newly completed $2-million office building at the left. The 100,000-square-foot facility houses 700 employees. Located in the 600-acre office-manufacturing-laboratory complex are C-E's general offices and headquarters for the Utility Division and Industrial Group.

Matsumoto Yard Delivers Large Aluminum Boat With Gas Turbines To Alcan

Largest commercial aluminum boat built in Canada undergoes operational trials.

Aluminum Company of Canada, Ltd., recently unveiled the largest commercial aluminum boat ever built in Canada, the gas-turbine-driven Nechako, which will provide passenger and freight service for Alcan between Kitimat and the company's Kemano power station.

The 73-foot 9-inch vessel is capable of carrying 36 passengers in comfort, plus four tons of freight at speeds in excess of 20 knots. The new boat will replace the original Nechako, a conventional wooden supply vessel which is now in service and has operated continuously between Kemano and Kitimat since Alcan built the world's second largest smelter there in 1954.

Designed by Alcan's Project Development Division, the vessel was built by Matsumoto Shipyard Limited of North Vancouver which has many years of experience in the construction of aluminum gill-netters, seiners, fisheries patrol boats, a wide variety of work boats, government vessels and pleasure craft.

The vessel's gas-turbine propulsion system was the responsibility of United Aircraft of Canada, Limited, who selected and supplied the major components. Installation was done by Matsumoto Shipyard.

W. D. Bailey of Alcan's Project Development Division, said, "the basic design of this ship is applicable to a wide range of transportation uses in Canada or in any country where the sea or navigable rivers provide essential communications."

With minor modifications to the superstructure or deck equipment, he said, a boat of this design can be used as a freighter, for marine research, for any seaway, pier or dock maintenance work, harbor patrolling or a similar function. "We are currently investigating a number of applications," Mr. **Bailey** said.

The vessel is powered by two gas-turbine engines, each rated at 510 shp, driving controllable-pitch propellers through a hydrodrive strut transmission unit. These ST6K-70 engines are the marine version of the PT6 series of gas-turbine engines developed by United Aircraft of Canada, Limited, and have already been extensively tested in sea and other saltwater environments.

The Nechako has a beam of 20 feet 9 inches and a four-foot draft. It has comfortable aircraft-type reclining seats, as well as settees in the upper lounge. There is also accommodation for a crew of three.

The Nechako is slightly smaller than her predecessor and because she is of aluminum construction and uses the most modern machinery and equipment, she is about half the weight of similar-sized conventional vessels.

E. W. McKernan, manager of Alcan's power operations in British Columbia, who has been responsible for operation of the passenger and freight service between Kemano and Kitimat since its inception, plans to have the new vessel make three scheduled trips per week.

"The speed of the new ship will mean that we can cut in half the running time from Kitimat to Kemano," Mr. **McKernan** said. "Winter service in that area is very hard on wooden hulls, but aluminum performs very well under those conditions."

The original Nechako was built in 1930 by Vancouver Shipyards and was used as a patrol vessel during World War II. It was purchased by Kitimat Constructors Limited in 1951 and was inherited by Alcan in 1954 when production started at the Kitimat smelter.

National Steel Promotes Carpenter And Christensen

Gordon N. Carpenter

Don C. Christensen,

Two appointments at National Steel and Shipbuilding Company, San Diego, Calif., have been announced by **John V. Banks,** executive vice-president of the firm.

Gordon N. Carpenter, former purchasing agent, will assume the duties of chief estimator, and **Don C. Christensen,** former assistant purchasing agent, assumes the duties of purchasing agent.

Mr. **Carpenter** joined NASSCO in 1959 as a design engineer. He was advanced to purchasing agent in 1963. Mr. **Carpenter** earned his degree in marine engineering from the University of Michigan in 1953. He is past chairman of the San Diego Section of The Society of Naval Architects and Marine Engineers and is also a member of the American Society of Naval Engineers.

Mr. **Christensen** has been with the company since 1967. He retired from the U.S. Navy as a captain after 26 years' service. He served as supply officer of an aircraft carrier in the Korean operations and his last assignment was as force supply officer of cruiser destroyer force, U.S. Pacific fleet. He attended the University of Washington in Seattle, earning his bachelor of arts and science degree. Mr. **Christensen** is a member of the executive council, San Diego Council of Boy Scouts, and chairman of the Silver Strand District, Boy Scouts of America. He is also a member of the Coronado City Board of Appeals.

In announcing the new appointments, Mr. **Banks** said, "in order that the company may continue to benefit from the strongest management team, it is necessary that we make management assignments that respond to the shifting opportunities we are facing and at the same time provide for the broadening of management skills in other fields."

Fearnley & Eger Elects Lapsley V-P Special Projects

Fearnley & Eger, Inc., has announced the election of **Claud A. Lapsley** as vice-president in charge of special projects, thus promoting him from his previous position as manager of special projects.

Mr. **Lapsley,** who is a graduate of the U.S. Merchant Marine Academy, has been active in the steamship industry for 32 years, both ashore and afloat.

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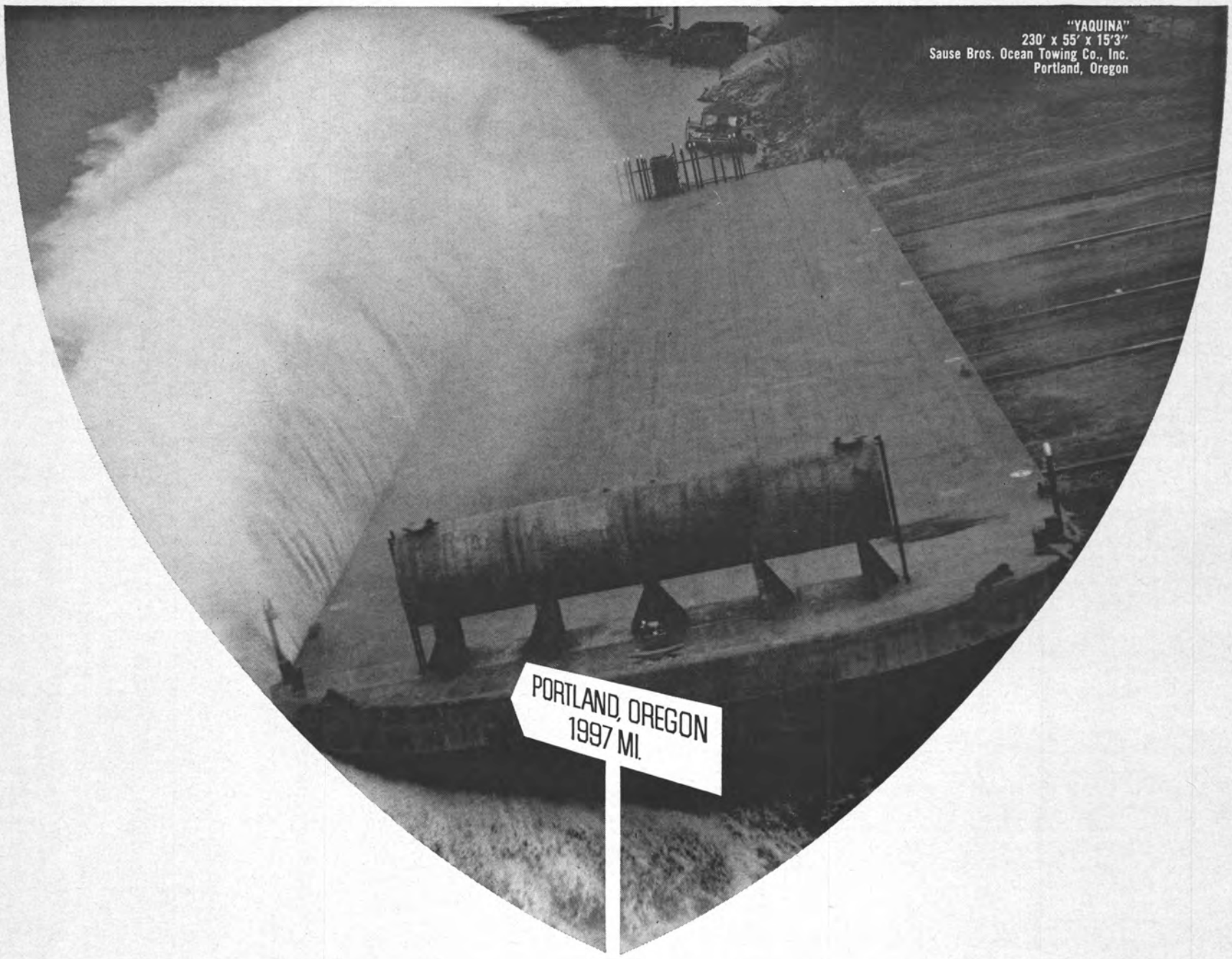

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Marine Operations Add To Texas Gas Growth

The 12 months that have passed since Texas Gas Transmission Corporation expanded from a two-division company into one of five divisions have comprised the most important year in its history, **W. M. Elmer,** chairman and chief executive officer, told stockholders at their annual meeting in New York City.

He added to that a declaration that Texas Gas' "over-all long-term future is brighter than ever before." He supported his remarks with a review of operations of the company's five divisions—Gas Transmission Services, Inland Waterways Services, Trucking Services, Oil and Gas Exploration and Production, and Offshore Marine and Dredging Services.

The Inland Waterways Services division, Trucking Services division, and Offshore Marine and Dredging Services division were added to the Texas Gas corporate operation on May 15, 1968 with merger of American Commercial Lines, Inc., into Texas Gas.

Mr. **Elmer** described the Gas Transmission Services division of Texas Gas—the company's original division—as "the most important segment of our operations," having contributed 58 percent of the company's net income in 1968, before interest and Federal income taxes. He told, however, that the new five-division operation of Texas Gas is a "cohesive force which will strengthen each of the divisions' operations."

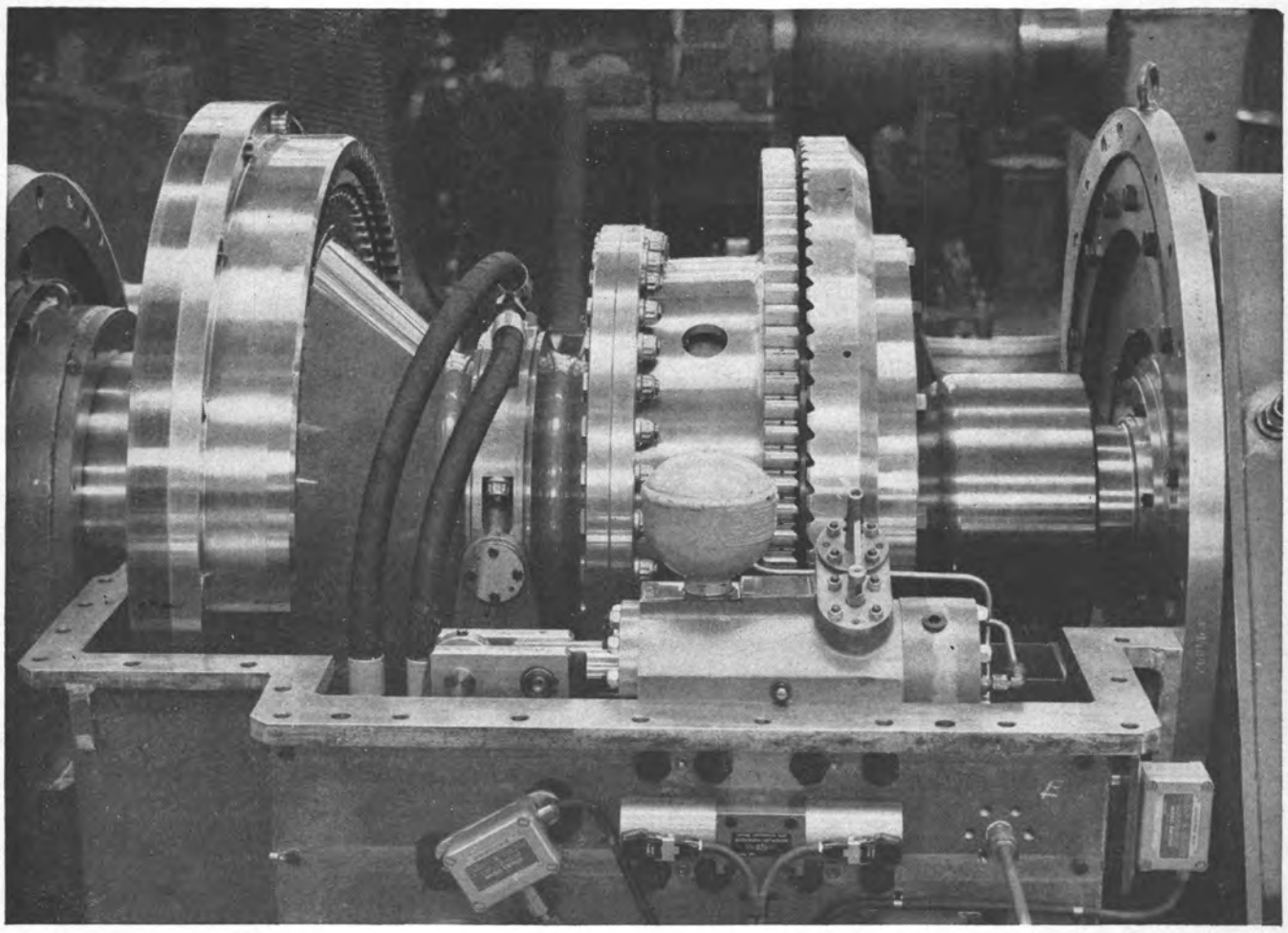
The Inland Waterways Services division of Texas Gas, in providing 19 percent of 1968 net income, before interest and taxes, on 15 percent of net plant investment, was referred to as the second largest division of the company. Growth of inland waterways freight service opportunities for the division's American Commercial Barge Line Company, further improvement of inland waterways, increases in volume of imported goods to be moved on the inland waterways system, and anticipated permanent authority to acquire a major operator serving the Gulf Intracoastal Waterway were seen by Mr. **Elmer** as reasons for continued and greater profitability within the division. A modernization program being conducted at the shipyard of Jeffboat, Inc., also a part of the Inland Waterways Service division, will greatly improve that company's competitive position in the shipbuilding industry.

The Trucking Services division of Texas Gas, which contributed 12 percent of the company's 1968 earnings, before interest and taxes, on 4 percent of net plant investment, was reported by Mr. **Elmer** to be seen as having an excellent year in 1969. Operating results thus far in 1969 for companies in the Trucking Services division—Commercial Carriers, Inc., Terminal Transport Company, Inc., the N.S. Cordin companies, and Piggy-Back Leasing Corporation—indicate they will make important contributions to the company during the year, Mr. **Elmer** said.

The Oil and Gas Exploration and Production division, which contributed 7 percent of 1968 net income, before interest and Federal income taxes, on 6 percent of net investment, continues to operate successfully, according to Mr. **Elmer.**

Operations by companies in the Offshore Marine and Dredging Services division—Crestwave Offshore Services, Inc., and Bauer Dredging Company—were described by Mr. **Elmer.** He expressed great optimism about the future of Crestwave, which he said very successfully completed its first full year of operation in 1968. Crestwave provides a broad range of services in offshore areas. It operates two of the most modern drilling and workover rigs in the Gulf of Mexico, and also jointly owns and operates equipment used in installing offshore gathering pipelines, platforms, and other producing equipment necessary for the production and gathering of offshore gas and oil. Bauer Dredging Company conducts dredging operations in various locations, including rivers and harbors. It currently has three dredges in foreign waters, Mr. **Elmer** said.

LARGEST TANKER BUILT IN SPAIN and the first of three 148,622-dwt ships was launched recently by Astilleros de Cadiz, S.A. The 944-foot 10½-inch Malago was ordered by Fletamentos Maritimos, S.A. The ship will be propelled by a Manises-Sulzer 12RD-90, 27,600-bhp diesel engine built by Astilleros de Cadiz. The yard has orders also for two 115,000-dwt and two 230,000-dwt tankers for foreign firms. The yard management also has announced plans to build tankers up to 330,000 dwt.



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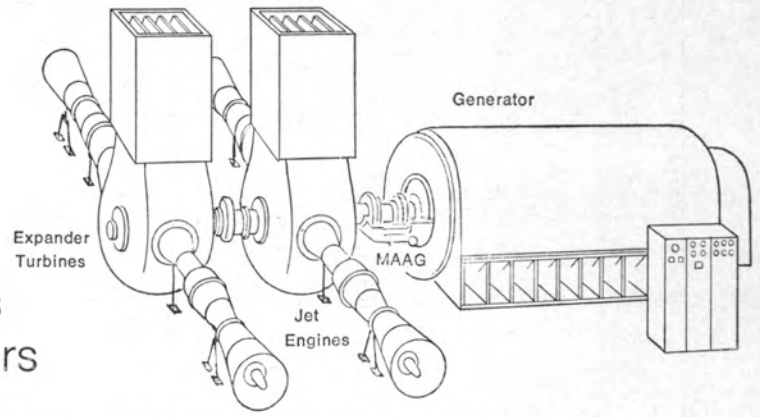

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Latin American Conferences Offer Reduced Freight Rates As Incentive For Palletization

An incentive plan to encourage United States shippers to pre-palletize more of their cargo was announced in New York City by a number of the conferences belonging to the group of Associated Latin American Freight Conferences, which set rates for 20 steamship lines serving Central and South America and the Caribbean.

Charles D. Marshall, chairman of the conferences, said that the plan, providing for a freight allowance of from $1.50 to $2.50 per ton, is a first in the Latin American trades and should result in significant savings for shippers, carriers and Latin American consumers at a time of steady cost rises.

"We consider this a major step forward to induce more shippers to use this more efficient method of shipping their goods to Latin America," Mr. **Marshall** said.

The palletization method is a simple one. Instead of shipping goods by the package from a factory in the United States to a port of destination, the shipper consolidates or "unitizes" packages onto pallets and the unitized load is bound together by one or another method. Most commonly, tough steel straps are used but many other methods, including gluing, are used to provide a single load of multiple packages.

The palletization method saves time and money for shipper and carrier alike because it requires less handling and permits lower labor cost during both the inland and ocean portions of the trip. Additionally, because the cargo is unitized, pilferage is reduced, as is the danger of physical damage to the cargo while en route. Unloading of cargo from trucks or rail cars at ocean terminals is speeded up. Likewise handling across the dock and loading into vessels becomes a faster and more economical operation.

"The conferences are eager to share such savings with the people of Latin America, because our ultimate goal is to land cargo at the lowest possible cost to consumers," Mr. **Marshall** declared. "We also want our shippers to participate in the fruits of increased efficiency, because with lower costs both they and we can hope for increased trade and better business."

The conference chairman pointed out that shippers must follow certain guidelines to obtain the freight reduction. They must supply pallets and pre-palletize the cargo themselves. These pallets go with the shipment and can be used by Latin American consignees later on in their own warehouses and distribution operations.

The smallest pallet size allowed is 32 inches by 40 inches at the base and it must carry a minimum 1,500 pounds and have a minimum overall cubic measure of 40 cubic feet. All surfaces must be reasonably flat as well as squared on the four sides to look like a smooth block. The load must be packed strongly enough so that three pallets can be placed on top of one another in the vessel.

More specific information on the pre-palletization incentive rules adopted by the several conferences may be obtained from individual shipping line members or from the offices of the Associated Latin American Freight Conferences at 11 Broadway, New York, N.Y.

Tidewater Marine Opens Office-Shop Facilities In Morgan City, La.

A new office, warehouse and maintenance shop facility at Morgan City, La., has been occupied by Tidewater Marine Service, Inc., New Orleans-based marine transportation company.

The new facility is a 25,000-square-foot two-story building construction annexed to a small office building formerly occupied by Twenty Grand Marine Service, Inc. which was acquired by Tidewater Marine a year ago.

Costing $220,000, the new building will serve as operational and administrative headquarters for the company's Gulf Coast fleet of approximately 200 crew and utility boats, cargo vessels, in-shore and oceangoing tugs. At the junction of the Atchafalaya River and Bayou Beouf, the new facility provides approximately 1,150 feet of water frontage for docking and maintenance.

Tidewater Marine, which operates a worldwide fleet of more than 400 vessels in service to the offshore oil industry, will share space in the new building with a number of its subsidiary or affiliated firms including Tidewater Contractors, Tidex-Pan Marine, and Twenty Grand Marine Service.

DEEP-SEA DIVING BARGE LAUNCHED—Jansen Marine Corporation, of Troutdale, Ore., recently launched a specially designed crane and deep-sea diving barge. The 155-foot by 60-foot by 12-foot steel barge will be outfitted with a 150-ton crane, winches, decompression chambers, helicopter port and complete living accommodations. The barge and her 20-man crew, will soon begin a six month tour of around-the-clock, deep-sea diving service in Alaska's Cook Inlet.

Just how slow is slow?

MARQUARDT DOPPLER SONAR TAKES THE HAZARD OUT OF CRITICAL DOCKING MANEUVERS

"All clear...dead slow, ahead!" "Talking" a supertanker into its berth or through constrictive docking areas requires precision judgment, timing, and control of speed and direction. □ The new Marquardt Doppler Sonar Docking System tells you exactly "how slow is slow." **Here is a system which, for the first time, displays true ship velocity in all directions within 1/100th of a knot, regardless of weather conditions or current drift.** □ This unique system uses the Doppler principle—measuring the doppler shift of sonar beams reflected from the harbor bottom. The differences in frequencies represent velocities—fore and aft, port and starboard—and are instantaneously displayed in knots on the panel. □ Marquardt also has Doppler Sonar precision deep water navigation systems for geophysical and oceanographic research and survey applications. Your Marquardt representative can demonstrate how Doppler Sonar navigation can reduce hazards, lost time and costs in your fleet operations. Contact Marquardt today for complete information.

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Raymond International Names Grandle And Helen Offshore Construction Mgrs.


Robert R. Helen


Edward D. Grandle

Raymond International Inc., a major worldwide construction company, has announced personnel changes designed to "consolidate and intensify all of the company's activities in offshore construction in the United States and overseas."

Robert R. Helen has been named senior vice-president and general manager of the Heavy Construction Division, and **Edward D. Grandle** has been appointed manager of the Offshore Construction Division. A new office of the Raymond Offshore Construction Division was opened recently in San Francisco at the World Trade Center.

Mr. **Helen** was appointed a Raymond vice-president last year. Previously, he was president of Healy Tibbitts Construction Company of San Francisco, a wholly owned Raymond subsidiary. During a 21-year association with Healy Tibbitts, he had been involved in offshore construction of offshore pipelines, offshore platforms, piers and related installations.

Mr. **Grandle,** who joined Raymond in 1959 in the Heavy Construction Division, is a graduate of the University of Kansas, where he received a B.S. in civil engineering. He later studied at Delft University in The Netherlands on a Fullbright Fellowship. With Raymond, Mr. **Grandle** was assigned to a variety of offshore construction projects, including drilling platforms, dolphins and piers, production platforms and foundations. He has worked in Venezuela, the Gulf of Paria in Trinidad, California, the Canary Islands and Nigeria.

Johnson Demountable Bearing Shown At Fishing Exhibition

A new Johnson demountable bearing and stuffing box combination for propeller shafts, designed specifically for commercial fishing industry ships, was displayed and demonstrated at the recent World Fishing Exhibition in London, England. It is a product of the Marine Division of the Johnson Rubber Company, Middlefield, Ohio, manufacturers of rubber propeller shaft bearings, demountable housings, torque journal hub propellers and originators of the steady flow principle of water lubrication.

Full information on this bearing/stuffing box combination may be obtained from Johnson Marine Division, The Johnson Rubber Company, Middlefield, Ohio 44062.

Vorta Systems—New Name For Eagle International

Eagle International, Inc., of 220 S. Main Street, Wauconda, Ill., has changed its name to Vorta Systems, Inc., according to an announcement by **Charles M. Eaton,** executive vice-president of the firm.

The change in name reflects the growth in size and the varied products produced.

Vorta Systems, Inc. produces shipboard antenna systems, including TV antennas. **L. Clavin,** president, stated that the volume of sales for the firm has doubled in the last year.

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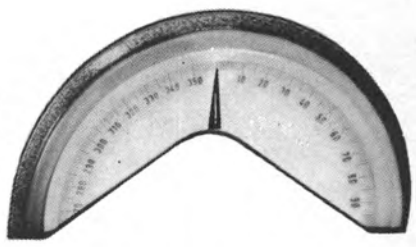

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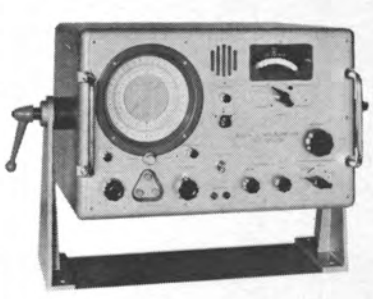
NAVIGON—an automatic visual radio direction finder to obtain reliable bearings of radio signals on a large CRT screen over wide frequency ranges including Loran. New, long range Navigon Radio Location Charts available for North Atlantic Ocean, Bay of Biscay and the North Sea. Provides radio LOPs anywhere, anytime and fixes on short or long distances. Insures safe coastal approach beyond the range of marine radar.



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An Advance In Navigation Technology

The Newly Developed Litton Marine Navigator Can Be A Valuable Aid In Marine Exploration By Providing Precision Navigation

Warren A. Wanamaker and Dr. Jerome S. Lipman*

The existence of important requirements and critical problems of marine exploration has led to the development of a fully-automated, self-contained, all-weather system that provides continuous real-time precision navigation throughout the world. The new system was made possible by recent advances in navigation technology.

Known as the Litton Marine Navigator (LMN), it integrates a sonar-doppler velocity sensor and navigation satellite receiver with an inertial navigation system.

The inertial navigation system, with its associated general-purpose computer, is the nucleus of the LMN. Its continuous operation over the total dynamic range of vehicle kinematics (independent of all environmental and operational characteristics) ensures the availability of timely and accurate data, free from interruption and loss of information. It provides the required multiple-angle resolution and filtering of the sonar-doppler velocity, thus ensuring its fidelity over the spectrum of vehicle dynamics and minimizing the effects of spurious doppler noise.

The sonar-doppler velocity information is introduced into the inertial system in a fashion commonly referred to as either a "damped inertial mode" or a "continuous gyrocompass mode." The desired degree of damping is a function of the characteristics of the operating environment and is automatically selected by the system. The way in which the system is integrated yields velocity accuracies bounded only by the limitations of sonar-doppler accuracy (more accurate than a ship's log) and inertial platform heading accuracy (more accurate than a gyrocompass).

The long-term position accuracy of the LMN is automatically obtained from periodic position resets from the U.S. Navy Navigation Satellite System, which is now available for commercial use. The uninterrupted precision velocity information from the sonar-doppler-augmented inertial system essentially removes errors (caused by the inaccuracy of the user's knowledge of his own velocity) from the position fix by the navigation satellite.

The LMN system includes the required data channels and controls for incorporating a multi-channel digital recorder to provide a record of all generated velocity, position, attitude, and sensed information. The digital recorder is an optional unit that can be furnished by the user if desired. An X-Y plotter and paper tape printer are part of the basic system.

The requirements for system power are met with input of 115-volt, 60-cycle, 3-phase power. In addition, the unit contains batteries that ensure continuous operation of the inertial navigation system during an interruption of the primary power source.

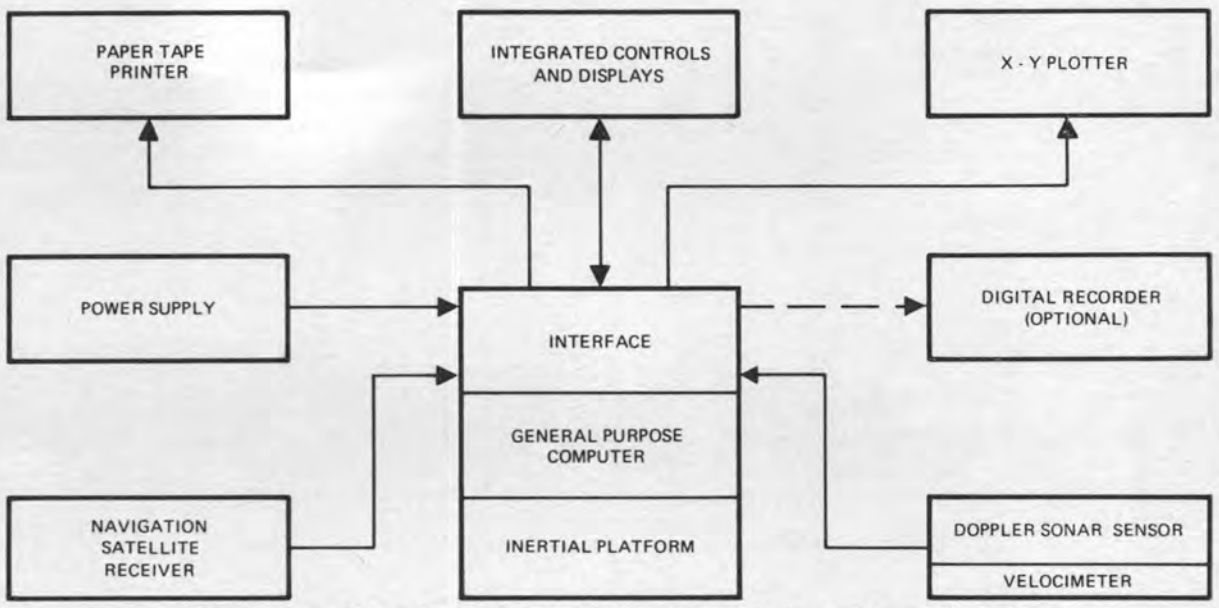
An inertial navigation system, consisting of an inertial measurement unit and a general-purpose computer, is capable of performing the total navigation function by itself. However, because its errors are not totally position- or velocity-bounded, its accuracy tends to degrade over long periods of time. Augmentation by the sonar-doppler and the navigation satellites provides limits to velocity and position errors. The inertial navigation system also provides precision heading.

The general-purpose computer of the LMN is a solid-state machine with a basic 8,000-word memory, which is expandable in increments to 32,000 words. The machine is optimized to solve navigation and steering problems.

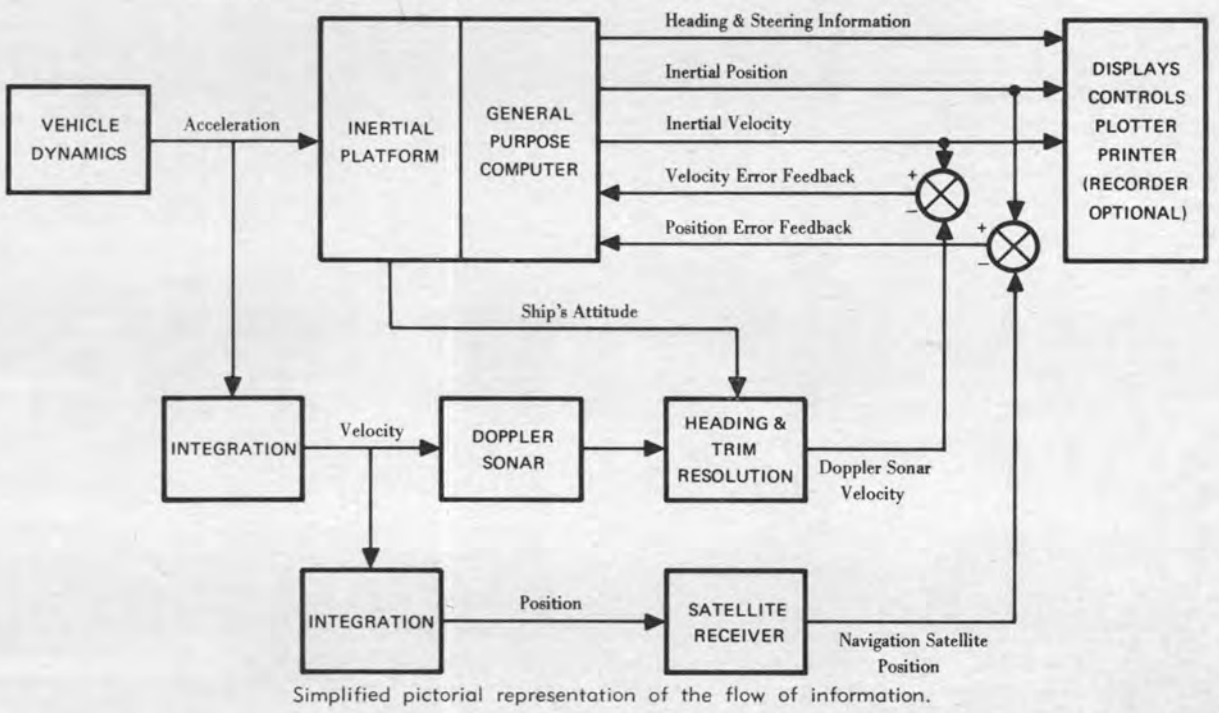
The doppler-sonar sensor directs four beams of acoustic energy to the ocean bottom. The return signals provide doppler shift relative to the ocean bottom in water depths of up to 100 fathoms. If the depth of the water is greater than 100 fathoms for a certain period of time, the system switches automatically to the water volume reverberation mode. This latter mode is not as accurate as the other, because vehicle velocity is determined relative to unknown velocities of currents. When the automatic switch is made to the second mode, the coupling coefficients of the doppler-sonar-augmented inertial system are altered, placing greater emphasis on the inertial system.

The Navy's satellite system is the most accurate, worldwide, operational, position-fixing system. Positions can be determined every 100 to 110 minutes (nominally). In normal operation, the satellite receiver is in continuous search mode, so that, during a satellite fly-by, the signal is acquired and tracked automatically. The satellite doppler count and message is inserted into the computer. Based on the relative motion measured during the fly-by, and using data editing routines, the user's position is computed and the LMN is reset.

The Litton Marine Navigator is now a commercially available, worldwide, all-weather, completely automated, precision navigation system. Its most accurate mode of operation is in continental shelf waters, where it has an accuracy of better than 600 feet. The mechanization and format of operation provides a synergistic gain in total system accuracy, i.e., better than the best of the individual accuracies taken independently.



Block diagram relating the basic subsystem elements of the Litton Marine Navigator.



Simplified pictorial representation of the flow of information.

*Mr. **Wanamaker,** manager of Navy and Marine programs marketing, and Dr. **Lipman,** office of the chief scientist, Guidance & Control Systems Division, Litton Systems, Inc., Woodland Hills, Calif., presented the paper condensed here before the Oceanology International 1969 symposium held in Brighton, England.

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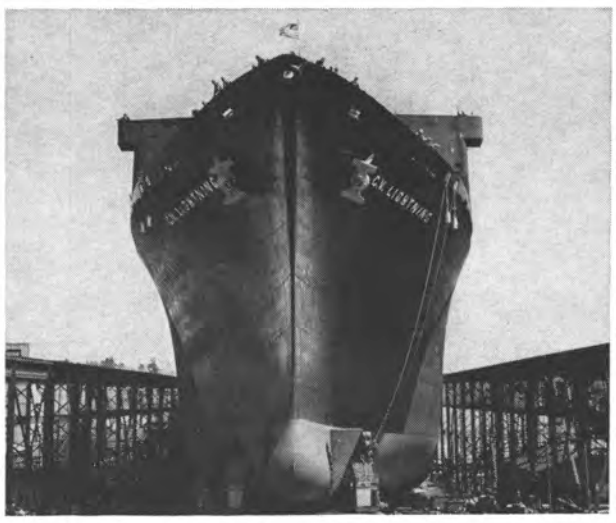

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Gas-Turbine Propelled Tanker Being Proposed By Sun Ship

Sun Shipbuilding and Dry Dock Company has currently in the proposal stage a 250,000-dwt twin-screw gas-turbine-propelled tanker, according to **Charles Zeien,** vice-president-engineering. Speaking before the Ship Technology Session of the American Petroleum Institute's 14th Annual Tanker Conference, Mr. **Zeien** stated that the propulsion plant would be rated at 50,000 shp and be composed of either two Pratt and Whitney FT4A-2 or General Electric's LM-2500 gas turbines.

The technical paper presented by Mr. **Zeien,** described briefly the design and operational experience with the gas-turbine ship Adm. Wm. M. Callaghan, which Sun Ship designed and built and is being operated under charter to MSTS by American Export Isbrandtsen Lines. He expressed the opinion that this ship has performed exceptionally well and has given the Navy and marine industry an experimental test bed to accummulate experience for gas-turbine propulsion of a commercial vessel.

Speaking on the use of gas-turbines to propel a tanker, Mr. **Zeien** listed the advantages and disadvantages as follows:

Advantages—

1. The cargo space of the tanks will be approximately 4 percent larger than what would have been possible with an equivalent steam plant. The lower weight of the engine room machinery, approximately 1,000 tons, is reflected in increased cargo deadweight. Since the LM-2500 engine is contemplated (which has a fuel rate of about 0.41 pounds per shaft horsepower hour), the bunker requirements of the two vessels are about the same so that the lower engine room weight can be readily translated into increased cargo capacity.

2. The potential for lower manning requirements for the engine room, even to a zero engine room watch, should be attainable now that the experience of the Callaghan has been evaluated.

3. Ship's unavailability is reduced. With the engine change-out procedure used for gas-turbine units, the time required for overhaul in a shipyard will be limited by the underwater work the vessels require. This should make the ship available to carry cargo at least five additional days per year.

Disadvantages—

1. The fuel for gas turbines costs more than fuel for steam turbines because of its higher quality. For a 50,000-shp ship, this higher cost was estimated at $1.7-million per year, assuming that jet fuel can be purchased for $3.10 per barrel as compared with regular marine bunker at $1.90 per barrel.

2. A different source for auxiliary heat and power requirements would have to be met. Cargo tank heating steam could be provided by a waste heat boiler located adjacent to the main engine uptakes.

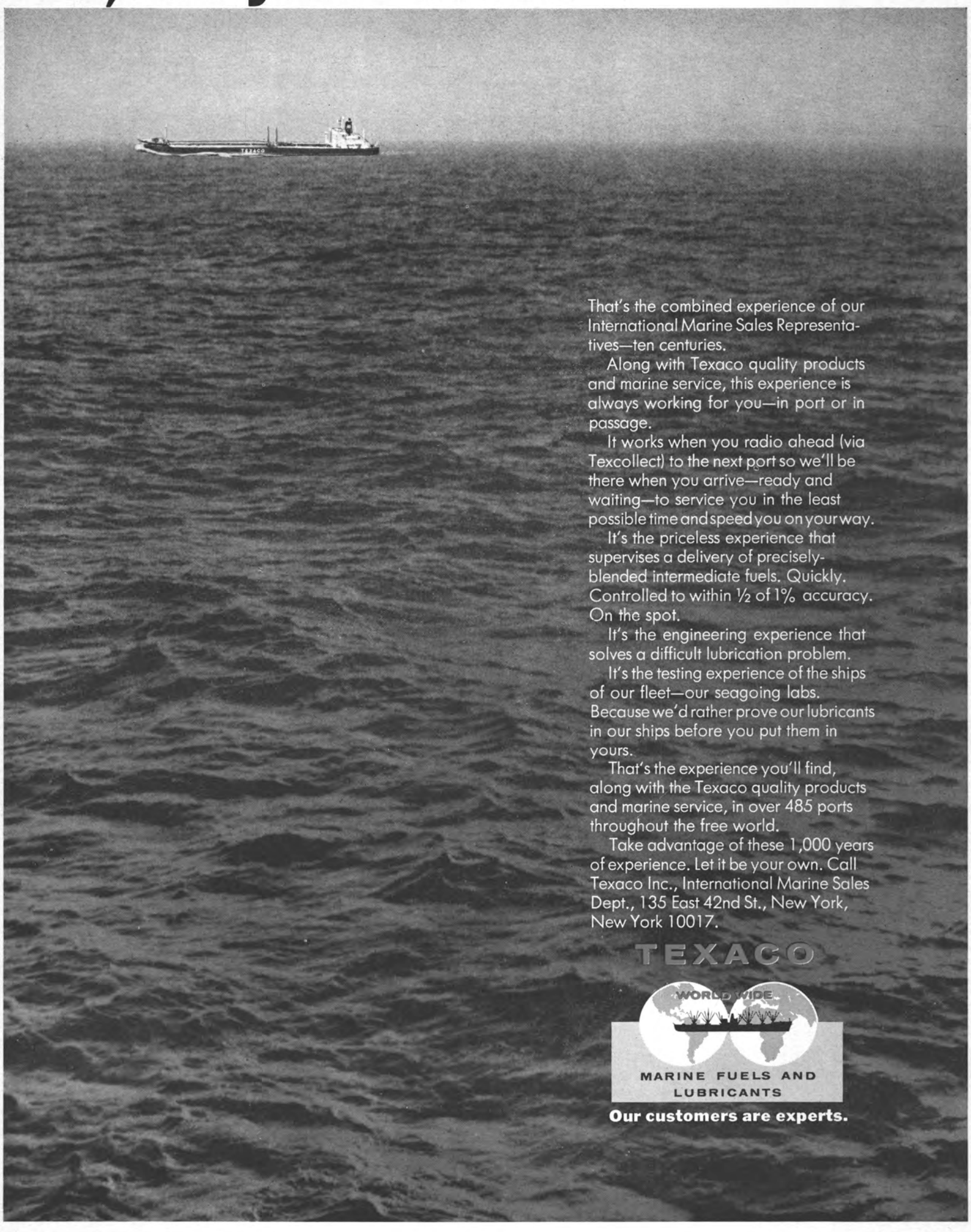
Mr. **Zeien** discussed relative construction costs and time, based on the Callaghan experience. He stated that "it is our present position that the cost of the gas-turbine powerplant is about the same as a steam powerplant of similar horsepower."

With regard to shipbuilding time, Mr. **Zeien** felt that a gas-turbine ship can be constructed in one to two months less time than a steam-propelled ship. This conclusion was based on simplified installation work and testing and fewer and smaller components and pipes.

"To reiterate," advised Mr. **Zeien,** "it would be the task of the prospective owners to assess the advantages of: shorter building time, lower manning, additional cargo deadweight, and hopefully, lower service costs against the admittedly higher fuel costs."

He concluded by stating: "Gas-turbine ships are undoubtedly here to stay, and their expected increase in use will in itself reduce the cost of the over-all powerplant relative to steam; this, coupled with active research going on at present to develop a marine gas turbine burning less costly fuel while not sacrificing its other advantages, definitely spells tough competition for steam turbines in the not too distant future."

1,000 years at sea



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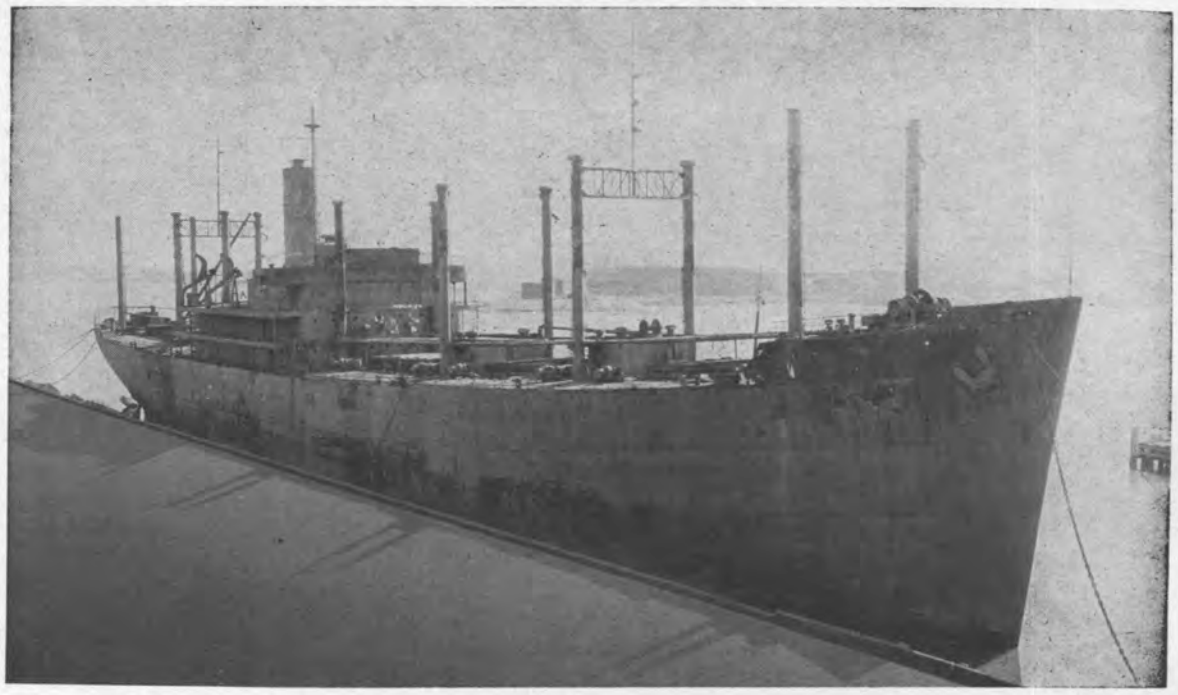

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TURBINE: Worthington-Moore type S4—5-stage—6097 RPM—740°TT—440#—serial No. 7108 & 7106. GEAR: 6097/1200—type 14x7—serial No. 7108—5.081:1 ratio. GENERATOR: Crocker-Wheeler 102-HD—300 KW—120/240 DC—6-pole—3-wire—stab. shunt—1200 RPM—type CCD—serial 973583. Suitable for units 7541 & 7543 and 7089 & 7188. WILL SELL ARMATURE SEPARATELY: 12-Hole flange—⅝" bolt holes—8.247" diam.—7" B.C. —flange & shaft 5".

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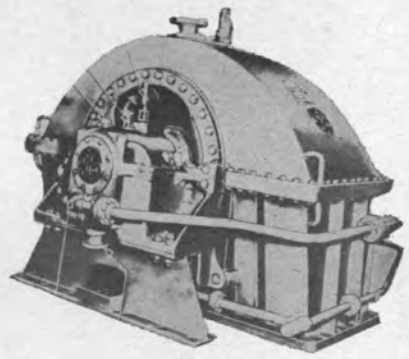

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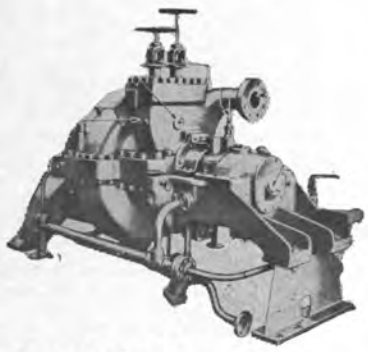

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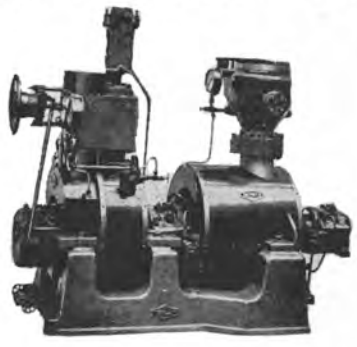

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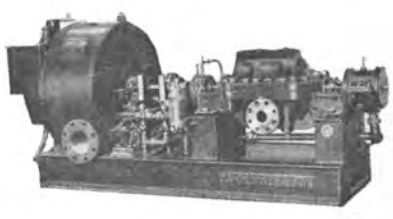

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C2-S-J1—North Carolina—2 UQS-2—150 GPM @ 1465 T.D.H.—4000 RPM—115 H.P. Turbine. Form S2RM—Moore steam turbine—1½" steam inlet—440 lbs WP—750°F @ 10 lbs gauge. Water rate 26.8 lbs BHP/hr.

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New—as pictured above—with ABS certificate. From VC2-S-AP2 Ex-Medina Victory. For Crocker-Wheeler generator 102-HD-DP—type CCD—compound—serial 973-643; 999-795 and others in this group. Bearing shaft size commutator end—3½"; Flange size 8¼" OD; Bolt Circle 7", with 12 holes ½" diameter.

ALLIS-CHALMERS

120/240 volts DC—type MCW 21-11—1200 RPM—stab. shunt—148171 & 148173—from ex Stamford Victory—completely re-wound anuary 10, 1968—ABS—(1).

WESTINGHOUSE

120/240 volts DC—1250 amps—1200 RPM—stab. shunt—frame CB 208.4—Instruction Book 8301—51-S-20P-923 and 18-83H-313.

GENERAL ELECTRIC

120/240 volts DC—1250 amps—1200 RPM—stab. shunt—serial No. 2222725-2222807—In G.E. Instruction Book G.E.I. 16584.

C-2 ARMATURES

North Carolina C2-S-AJ-I—General Electric—120/240 volts DC—type MPC—stab. shunt.

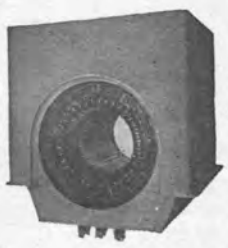
T2-SEA-1 TANKER MAIN STEAM & AUXILIARY EQUIPMENT

B MAIN TURBINE ROTORS

Large Turbine Rotors—Lynn
Large Turbine Rotors—Schenectady
Elliott Turbine Rotors—Fit G.E. small Schenectady turbine

C G.E. MAIN PROPULSION GENERATOR REVOLVING FIELD

G.E. reconditioned—June 1967



D G.E. MAIN GENERATOR STATORS

E

REWOUND WESTINGHOUSE MAIN PROPULSION GENERATOR REVOLVING FIELD

Was rewound for Gulf when removed from "Gulf Moon". Since that time, it has been re-checked in the Westinghouse Service Shop and balanced. ABS and ready to go. —December 18, 1968—certificate number 68-BA4831 — A-67B-JW — 12/18/68 Baltimore.

WRITE FOR COMPLETE INFORMATION

F WESTINGHOUSE MAIN GENERATOR STATOR WITH OR WITHOUT COOLER

G

WESTINGHOUSE MAIN MOTOR FIELD COILS

COMPLETE SET

Westinghouse — universal type — newest design—80 pieces—one set.

H

T2 RUDDER

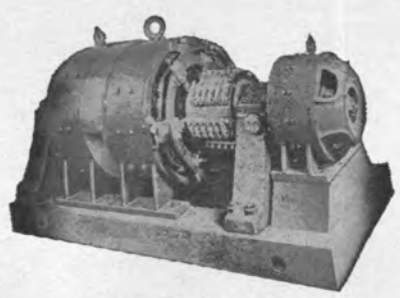
Reconditioned—ready to go.

T2 TAILSHAFTS

Reconditioned

PROPELLERS

T2 propellers



I WESTINGHOUSE EXCITER SETS

110 KW—28 KW—5 KW available
110 KW—32.5 KW—5 KW available

J

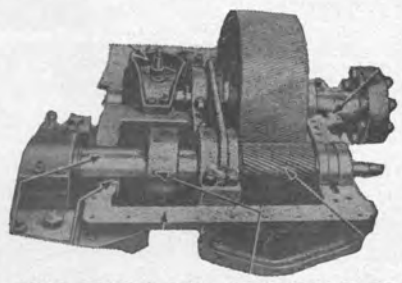
LORIMER

Emergency Generator Engine and Generator Parts

K

MAIN CIRCULATING PUMP MOTOR

125 HP—Westinghouse—Frame 876C—type CS—squirrel cage — 440/3/60 — 585 RPM. Reconditioned to ABS. Ready to go immediately.



L G.E. AUX. TURBO-GEN. REDUCTION GEARS

Bull gear & pinion. With ABS.

M WESTINGHOUSE AUXILIARY GENERATOR REDUCTION GEARS AND BEARINGS

COOLERS

N MAIN MOTOR AIR COOLER

Westinghouse—ABS—ready to ship

O MAIN GENERATOR AIR COOLER

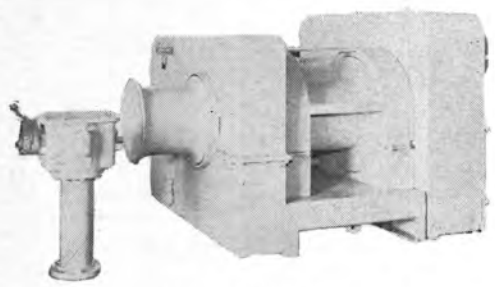
Westinghouse — reconditioned with ABS—ready to ship

P

G.E. MAIN GENERATOR COOLER type G4—bronze heads—AL brass tubes

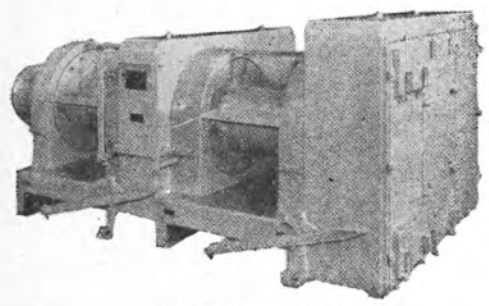
CARGO WINCHES, WINDLASSES & GENERATOR SETS

WINCHES



VICTORY TYPE UNIT WINCHES

50 HP—230 volts DC—Westinghouse, G.E. or Crocker-Wheeler. U-1, U-3 single speed—7450 lbs @ 223 FPM; U-2, U-5 double speed—19,000 lbs @ 96 FPM. We have both right and left hand. Send for flyer on these.



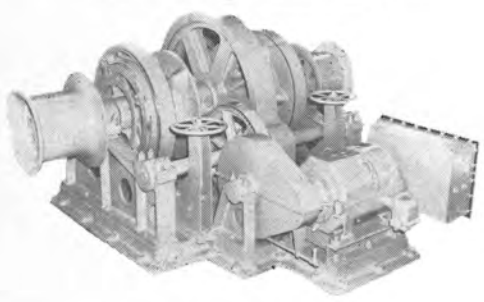
DOUBLE DRUM U-6 UNIT WINCHES

Double drum unit winch model U-6. DRUM: 16" diameter by 20" wide—with 28" flange. MOTOR: G.E. 50 HP — 230 volts — CDM — 1829 A.E.

AMERICAN ENGINEERING UNIT WINCHES

2 Full sets from "African Endeavor" and "African Enterprise." Winch duty: 7450 lbs at 223 FPM. MOTOR: G.E. 50 HP—230 volts DC—type CDM—1829 A.E.—181 amps—750 RPM.

WINDLASSES



NEW 2¼" McKIERNAN-TERRY

(2)—For 16,000 lb anchors—47½" center to center. 70 HP — 230 volt DC motors — with controls.

A.E.—2-7/16" WINDLASS

Made by American Engineering — from Ex-African "Enterprise" and "Endeavor". 65 HP —230 volts—234 amps.

HYDE #12 WINDLASS FOR 2 11/16" CHAIN

Built for Beth Quincy 29,000 ton class tankers. 12 x 14 wp 125-150 lbs—handle 16,500 lb anchors. Wildcat centers 4' 8". Completely reconditioned — new cylinders — new throttle valves—new piping.

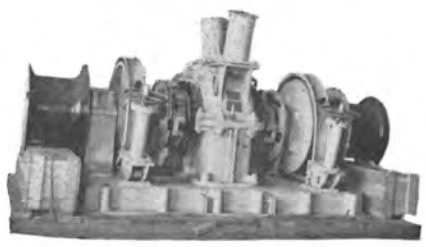
T-3 ANCHOR WINDLASS FOR 2⅜" CHAIN

American Engineering 13 x 14—handle two 13,000 lb anchors and 60 fathom chain at 35 FPM. Wildcat centers 6' 3".

T-2 WINDLASS FOR 2-5/16" CHAIN

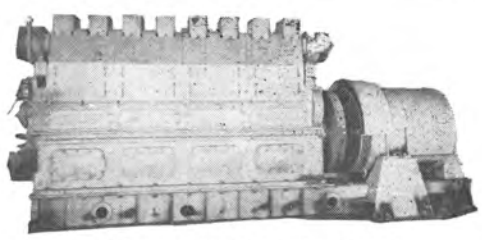
American Engineeirng type MALI-60-14—12 x 14—4' 8½" between wildcat centers.

UNUSED 1⅝" HEAVY DUTY LINK BELT WINDLASS



Below deck motor drive. Double Wildcat—driven by 50 HP—230 volt DC motor with vertical shaft and worm drive. Single speed—handles 7000 lb anchors and 60 fathoms of 1⅝" chain at 7 fathoms per minute. Wildcat centers 56". Complete with all controls and warping features. Total weight 27,500 lbs. With spares.

GENERATOR SETS



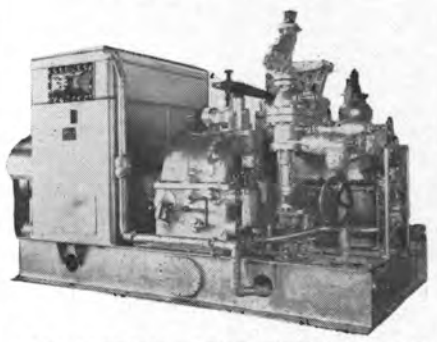
350 KW INGERSOLL-RAND DIESEL GENERATOR SETS

4 Available—engine type S—Ingersoll-Rand—1½ x 12—heat exchanger cooled—600 RPM. GENERATOR: General Electric—350 KW—120/240 volts DC—600 RPM. Complete with switchgear, coolers and air starting equipment.

290 KW DIESEL GENERATOR SET

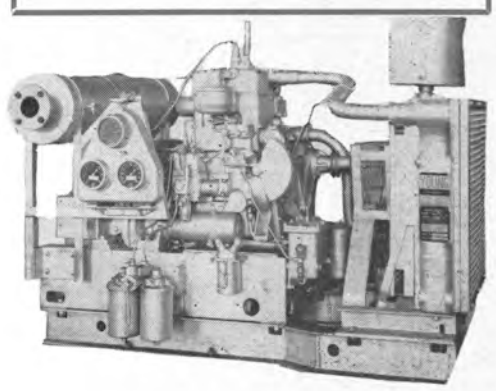
Westinghouse 290 KW generator—120/240 volts—1250 amps. ENGINE: GM 8-268A—6½ x 7—8 cylinder—1200 RPM.

G.E. 600 KW 440/3/60 TURBO GENERATORS



COMPLETELY RECONDITIONED BY G.E. SERVICE SHOPS WITH LLOYDS AND ABS CERTIFICATES

TURBINE: GE FN3-FN20 — condensing 6-stage — 525/565 lbs gauge. Super-heat 355/371 — 10033 RPM. GEAR: S-178—ratio 8.36:1—10033/1200. GENERATOR: 600 KW A.C.—type ATI—600 KW—750 KVA—450/3/60—1200 RPM—80% PF—totally enclosed—water cooled. EXCITER: 7½ KW—120 volts—62.5 amps—1200 RPM.



UNUSED 10 KW SUPERIOR DIESEL GENERATOR SETS

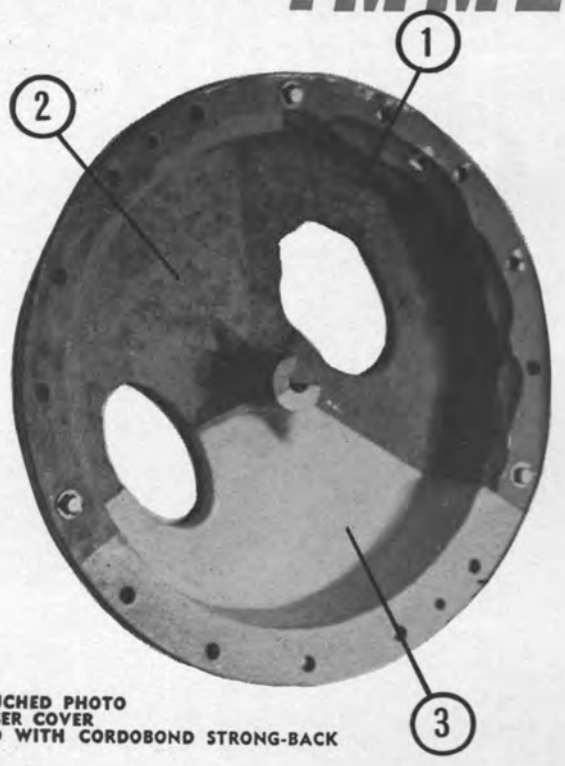
Radiator cooled units—120 volts DC—83.3 amps. ENGINE: Superior diesel model GAB-1—4½" bore—5¾" stroke—16 HP—equipped with Young radiator. Overall dimensions—57" high—57" wide—75" long.

EMERGENCY REPAIRS *IMMEDIATELY*

with

CORDOBOND®

STRONG-BACK METHOD



UNRETOUCHED PHOTO
CONDENSER COVER
REPAIRED WITH CORDOBOND STRONG-BACK

1. BEFORE

2. DETERIORATIONS FILLED WITH CORDOBOND STRONG-BACK PUTTY & LEVELING COMPOUND

3. CORDOBOND STRONG-BACK RESIN REINFORCED WITH FIBREGLASS CLOTH

® Reg. U. S. Pat. Off.

First proven under the most difficult conditions by the Navy, the Cordobond Strong-Back Method offers a fast and easy method of repair both aboard ship and ashore. Applied quickly by ship or maintenance personnel, Cordobond Strong-Back products are used extensively to repair:

SEA VALVES	PIPES	CONDENSER WATER BOXES
TANKS, BULKHEADS	DECKS	PUMPS
MACHINERY CASINGS	VENTS	DUCTS, ETC.

The Cordobond Strong-Back method provides a means of repairing piping systems carrying water, low pressure steam, oils, gasoline, alcohols, and many other liquids at temperatures up to 250°F at pressures up to 250 psi. Under emergency conditions, patches have been successful with pressures over 500 psi.

Complete in itself and requiring no special tools or fire, the Cordobond Strong-Back method owes its success to a new self-curing resin combined with special fibreglass materials. These provide a repair that has high tensile strength and strong adhesion to most surfaces. The process has wide application, is fast, versatile and economical.

The Cordobond Strong-Back components, when used according to directions, will repair anything from a pin hole to a complete break with a patch of great strength that clings tenaciously and lastingly.

Cordobond Strong-Back repair kits for effecting emergency repairs by ship personnel, have been furnished to thousands of navy and merchant vessels of all types and sizes.

Cordobond Strong-Back, furnished by Hubeva, is also used extensively in refineries, power and chemical plants, breweries, factories, etc.

TRAINED APPLICATORS AVAILABLE FOR REPAIRS OR INSTRUCTION

FOR COMPLETE INFORMATION, CONTACT

CORDOBOND STRONG-BACK PRODUCTS

Standard Resin • Leveling Compound • Strong-Back Putty • Strong-Back Sealer • Steel Putty • Cordobond • Repair Kits

THE LEADER IN PLASTICS FOR THE MARINE INDUSTRY

Hubeva Marine Plastics, Inc.

382 Hamilton Avenue **Brooklyn, New York 11231**

Phone: TR 5-6178 or your local agent

SOLE DISTRIBUTORS OF CORDOBOND STRONG-BACK PRODUCTS

AGENTS THROUGHOUT THE WORLD

Trained applicators available for repairs or instruction

AGENTS*

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PENNSYLVANIA Philadelphia
TEXAS Galveston
WASHINGTON Seattle
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BELGIUM Antwerp
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HOLLAND Rotterdam
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JAPAN Yokohama
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NORWAY Oslo
SPAIN Bilbao
WEST GERMANY Hamburg
MAURITIUS Port Louis
TRINIDAD Port-of-Spain
MALAYA Singapore
SOUTH AFRICA Durban, Capetown

*ALL HUBEVA AGENTS HAVE TRAINED PERSONNEL TO APPLY, INSTRUCT OR ADVISE IN THE APPLICATION OF CORDOBOND STRONG-BACK MATERIALS

Marine Industries Limited Delivers 8,120-DWT Coastal Tanker To Shell

New Shell Canada tanker can handle three separate grades of products simultaneously.

Marine Industries Limited, Sorel, Quebec, Canada, recently delivered a new 8,120-dwt tanker to Shell Canada Limited, adding to Shell's ever growing fleet of modern petroleum carriers.

The vessel, costing about $5-million, was constructed, in part, using new production methods put in force as part of the shipyard's continuing modernization program started in 1964. Up-to-date steelwork facilities enabled not only more efficient and economic production but also a better finished product in a shorter time period.

Christened the MV Lakeshell by the wife of Shell Canada's vice-president-transportation and supplies, **Robert P. Ritchie,** the vessel, now in operation, will transport petroleum products on the Great Lakes and the East Coast—from Fort William to St. John, N.B. The products, principally motor gasolines, jet fuels and heating oil, will be manufactured mainly at the Shell Montreal East Refinery where a $90-million expansion program is currently taking place. Products from the company's Sarnia refinery will also be included in the Lakeshell's schedule.

The main hull, of all-welded construction, has been strengthened for navigation in ice to Lloyd's Class 3, and the ship is one of the few Canadian-built tankers that complies almost in all respects with the proposed requirements of the International Convention on Load Lines, 1966. The 400-foot-long, 59-foot-wide tanker has been equipped with a bow-thruster unit to facilitate ease of movement in confined areas.

The main engine, a Ruston & Hornsby 8-cylinder A.O. type, is of the British revolutionary design of medium-speed geared marine diesel engines. It is capable of developing 4,000 bhp at maximum continuous power and drives a controllable-pitch propeller to enable it to cope with various load conditions. The engine can be controlled from three places in the wheelhouse, and also from the main control room in the engine room. The twin generators, also Ruston & Hornsby supply, are equipped with an automatic synchronizing system for paralleling operations. The vessel has a total bunker capacity sufficient for not less than 6,250 miles steaming with tanks 98 percent full, and will operate at a service speed of 13 knots.

The vessel has been constructed using every effort to ensure safety at sea for the complement of nine officers and 13 crewmen. A variety of automatic controls will enable this small crew to operate the vessel both sufficiently and safely.

The accommodation, located at the aft end of the vessel, has been constructed with the maximum comfort of the crew in mind with a minimum of upkeep. Fire-resistant bulkheads are lined with Navlite, laminated plastic exterior, enabling them to be cleaned easily with soap and water.

All the major items of furniture were tailormade by Marine Industries' joiner shop. Fitted carpets have been included in the officers' quarters to match the decor of the cabins. An officers' lounge together with the crew's recreation room will offer excellent facilities for TV viewing and other offduty activities. A high-velocity air-conditioning system has been installed throughout the accommodation.

The accommodation includes complete and modern galley, laundry and hospital facilities suitable for long trips.

The pump room, located just forward of the engine room, contains three electrically-driven cargo pumps of Stothert and Pitt manufacture. The horizontal-screw displacement type pumps have a pumping capacity of 380 tons each of cargo per hour. The pumping system is so designed that three separate grades of products can be loaded or discharged, completely segregated at all stages of the operation by using local or remote-control pushbutton starting and stopping of the cargo pumps.

The five main cargo tanks along with fuel oil and ballast tanks have been coated with epoxy paint to prevent corrosion. A final coat of International Interguard has given the cargo tanks a bright white finish which deviates from the normal drab colors of older tankers.

Allowance has been made for the installation of a complete system of cargo heating coils of the helical type in the five cargo oil tanks. The coils, although actually fitted in only two tanks, are standard and completely interchangeable enabling relocation or removal to suit the cargoes carried.

A unique tank-venting system coupled with a closed-cycle tank cleaning system allows automatic tank cleaning and gas freeing with a minimum of effort on the part of the crew.

This modern tanker replaces a former one bearing the same name, also built by Marine Industries Limited, which was laid up after 29 years of service.

Western Gear Completes Acquisition Of Rados

Western Gear Corporation, Lynwood, Calif., has completed the acquisition of Rados & Son Engineering Company, **B. J. Bannan,** president of Western Gear announced.

Rados has been renamed Rados Western Corporation and is being operated as a wholly owned subsidiary.

The Rados staff of about 85 naval architects and engineers, based in San Pedro, Calif., has expanded and strengthened Western Gear's involvement in the marine and oceanography field which contributed 24 percent of the company's 1968 volume.

Westinghouse Marine Div. Assigns Overly And Lucca To Service Department

Robert H. Overly

Frank P. Lucca

Robert H. Overly has been assigned as manager of the Marine Service Department at the Westinghouse Marine Division, Sunnyvale, Calif. He has been employed by Westinghouse for 20 years and is a graduate of the United States Merchant Marine Academy at Kings Point, N.Y. His most recent assignment had been as Westinghouse port engineer in New Orleans, La.

Frank P. Lucca has been assigned as supervisor of marine installation reporting to Mr. **Overly.** Mr. **Lucca** is a 25-year employee of Westinghouse and is a graduate of Worcester Polytechnic Institute, Worcester, Mass.

Mr. **Overly** will have the United States and international responsibility for repair and installation of all the shipboard main propulsion machinery, turbine generator sets, forced draft blowers, heat transfer equipment and mechanical drives produced at Sunnyvale and formerly produced at Lester, Pa. He reports to Mr. **Frederick W. Hassett,** manager of the Renewal Parts & Marine Service Department, Westinghouse Marine Division, Sunnyvale, Calif.

3,000-HP Gatco Tugboat Launched At Southern Ship

A 3,000-hp, twin-screw tugboat, the Gatco Florida, was launched recently by Southern Shipbuilding Corporation, Slidell, La. The 115-foot-long tug was designed and built by Southern Shipbuilding for Gulf-Atlantic Towing Company of Jacksonville, Fla.

The Gatco Florida is designed for towing and will deliver an 85,000-pound ahead pull at a speed of about nine knots. Free-running speed will be 12 knots, according to Southern Shipbuilding president **Alain R. Seligman.**

Harold Williams, president of Gulf-Atlantic Towing, **Mrs. Williams,** and several of the company's executives were on hand for the launching.

The Gatco Florida has a 32-foot beam and a design draft of 15.5 feet. It will have berthing quarters for 10 crew members. The boat will be powered by twin General Motors diesel engines.

Other equipment aboard the new boat will include a DX navigator, radar, automatic pilot, a plant for making its own fresh water, and towing winches. The Gatco Florida has all facilities for seagoing capability. It will be based at Jacksonville.

Matson Promotes Swanson And Schram To New Positions

Warren G. Swanson has been promoted to administrative assistant to the director of sales for Matson Navigation Company's freight marketing and sales division, it was announced by **George F. Collins,** director of sales.

Fred K. Schram, formerly sales representative, has been promoted to senior sales representative in Northern California to succeed Mr. **Swanson.**

Nuclear-Powered Ore-Oil Ship Being Designed In Germany

Plans for the world's largest nuclear-powered merchant ship, a 215,000-dwt ore-oil carrier, are nearing completion in West Germany.

According to Dr. **Manfred von zur Muehlen,** an official of the Society for the Application of Nuclear Energy in Shipbuilding and Shipping of Hamburg, the plans for the ship are scheduled to be submitted to the West German government this summer.

Government authorities, he said, will be asked to grant the ore-oil carrier project official recognition and subsequent development support.

Government subsidies are available, he said, either to cover the higher construction costs for an initial nuclear powerplant or to underwrite the operating costs in exchange for the availability of nuclear ship propulsion plants.

Dr. **von zur Muehlen** added that his organization was also working on the development of nuclear containerships.

The West German nuclear expert also noted that economic studies recently undertaken by his company had established that under certain circumstances nuclear ship powerplants in the range of 40,000 to 50,000 shp showed promise of economic superiority over conventionally fueled plants of similar output.

West Germany already has a nuclear-powered merchant ship, the Otto Hahn. This second ship is based on experience gained from the design and construction of the Otto Hahn.

Jersey Standard Promotes Moore And Doores To Logistics, Transport Posts

Thomas W. Moore

Jack H. Doores

Thomas W. Moore has been appointed worldwide logistics coordinator of Standard Oil Company (New Jersey). He succeeds **Robert H. Milbrath,** who was recently elected a vice-president and director of the company.

At the same time, it was announced that **Jack H. Doores** had been appointed manager, logistics planning for Jersey Standard, succeeding Mr. **Moore.**

Mr. **Moore** was graduated from the University of Kentucky where he received a bachelor of science degree in industrial chemistry and a master's degree in physical chemistry. He also received a master's degree in chemical engineering from the University of Michigan in 1934, the year he joined Esso Standard Oil Company as an engineer at the Bayway refinery in New Jersey. Esso Standard is now a part of Humble Oil & Refining Company, Jersey Standard's principal domestic affiliate.

Mr. **Moore** held various positions with Esso Standard and with the coordination and planning department of Jersey Standard prior to his election as a director in 1957 and a vice-president in 1958 of Esso International Inc.

He rejoined Esso Standard in 1959 as a director and vice-president and, the following year, was named a vice-president of Humble. In 1963 he returned to Esso International as senior vice-president and director and was elected an executive vice-president of that company in 1966. He was appointed Jersey Standard transportation coordinator in 1967 and manager, logistics planning in 1968.

Mr. **Doores** was most recently a vice-president and director of Esso International.

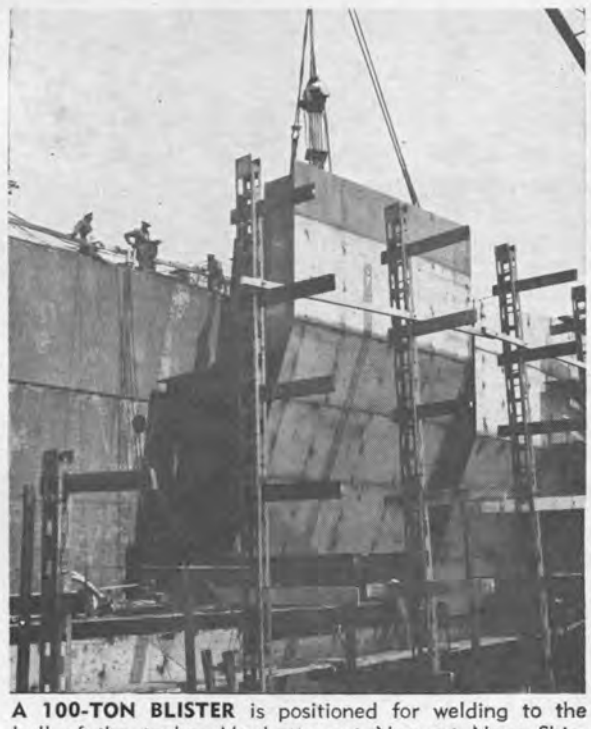
Mr. **Doores** received a bachelor's degree in chemical engineering from Iowa State University. He joined Esso Standard in 1944 at the Baton Rouge refinery in Louisiana. He held a variety of engineering and supervisory positions there until moving to New York in 1953 as a member of Jersey Standard's coordination and petroleum economics department.

In 1957 he became head of the department's coordination division and in 1959 was named a vice-president and general manager of the supply and transportation department of Esso International. In 1962 he transferred to London as senior eastern hemisphere advisor for Esso International and in 1964 was named a vice-president and general manager of that company.

He was elected a vice-president and director of Esso Standard Eastern, Inc., Jersey Standard's Far East regional affiliate, in 1965 and returned to Esso International as a vice-president and director last year.

International Tug Conference To Be Held In England

The first International Tug Conference will be held at Teddington, England, from October 7 to 9, 1969 according to an announcement by Ship and Boat International, 39 St. Andrew's Hill, London EC4. Representatives from more than ten maritime nations have already registered for the conference which will cover the manufacture of marine equipment, the shipyard, naval architecture, research institutes, tug owners and masters, and the owners of large vessels that use tugs.



A 100-TON BLISTER is positioned for welding to the hull of the tanker Manhattan at Newport News Shipbuilding and Dry Dock Company. The assembly is one of 22 installed on a 122-foot section of the ship. The blisters are designed to reinforce the Manhattan's hull for the ship's voyage for Humble Oil and Refining Company through the Northwest Passage ice fields this summer. The section at Newport News was cut away from the 940-foot Manhattan just aft of the bow at Sun Shipbuilding and Dry Dock Co., Chester, Pa., and towed to the Virginia shipyard last March. In a final step, it will be towed back to Sun and welded to its original location on the Manhattan. Sun holds the prime contract to winterize the ship for the voyage and two other shipyards are also sharing in the project.

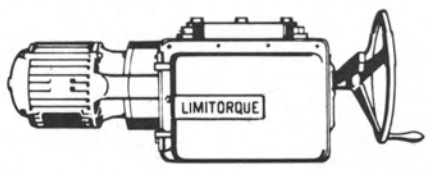
Limitorque

Trust us for automatic valve control reliability ... the U.S. Navy does.

"Reliability" is a word the U.S. Navy lives by, and so do all the design engineers who specify equipment for Naval ships.

The reliability of Limitorque automated valve controls in critical applications has been proved time and again.

That's why the Navy uses Limitorque valve controls for the Naval ships and classes shown below. Limitorque valve operators help to control and operate critical power systems: on fuel, water, steam and circulation lines; on pumps, on condensers, and on catapults. Limitorques are also widely used on firefighting lines; on ballast systems; on CO_2 lines, and on damage control equipment and systems on many ships. Some are even used to

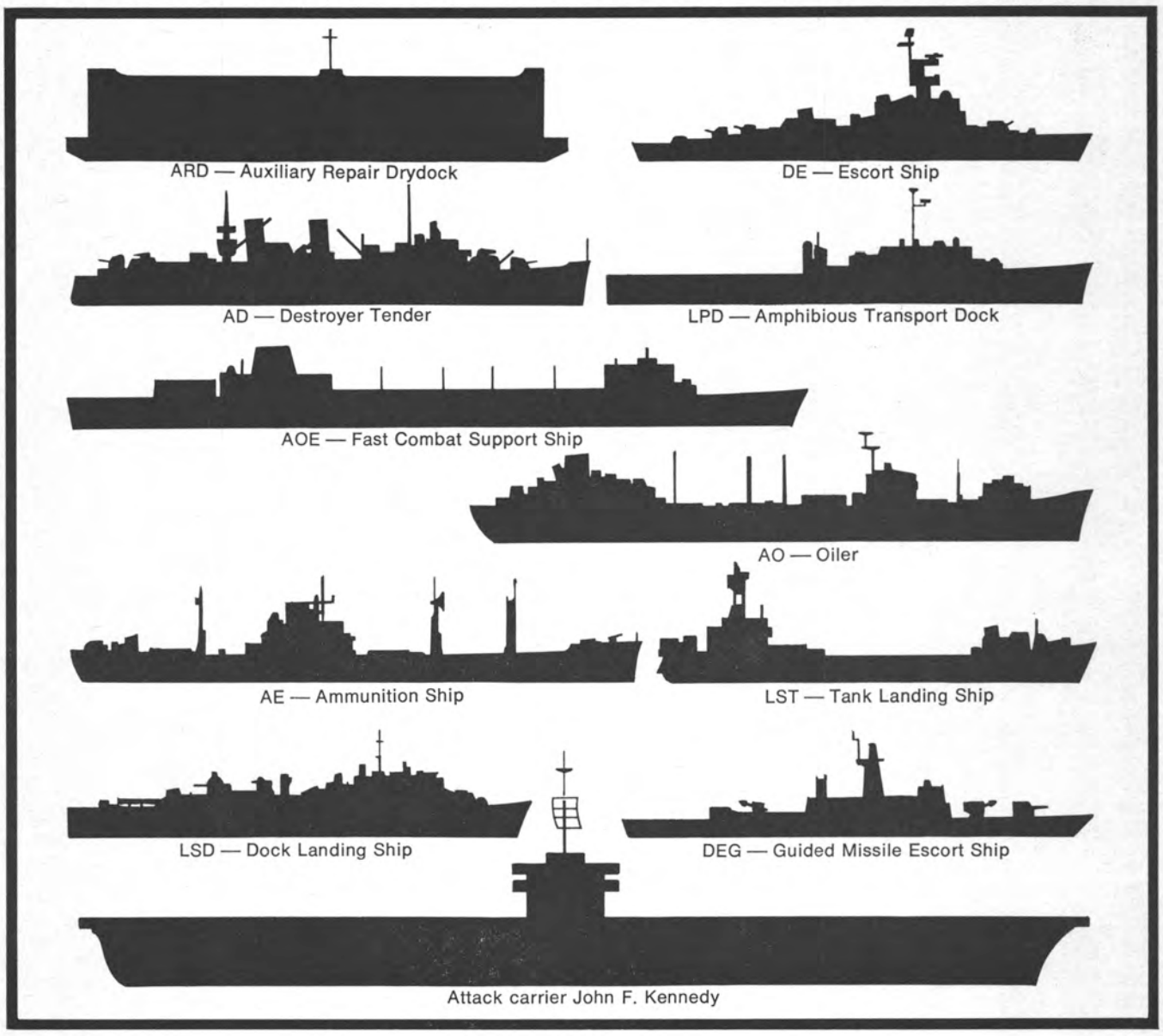


raise and lower ramps.

Limitorque operators save time and effort. They open and close valves anywhere on the ship—smoothly, instantly—by push-button or programmed sequence. Under emergency conditions, Limitorque valve operators help protect ships and personnel, by programmed automatic operation, or on command from damage control centers. Valve maintenance is minimized because the precision action of a Limitorque control protects valve components from undue wear and damage.

For reliable control of valves, hatches, ramps—wherever controlled linear or radial movement is needed—investigate *automated* control by Limitorque. Talk to your valve supplier *or request Catalog SMB-168. Limitorque Corp., Dept. (MREN-31), c/o Philadelphia Gear Corp., King of Prussia, Pa. 19406.*

LIMITORQUE
VALVE CONTROLS



San Francisco Announces Major Rearrangement Of Port To Improve Container Handling

The Port of San Francisco is planning the construction of new terminals and the expansion of present facilities to accommodate steamship lines growing with the changing technologies of ocean shipping.

Port Director **Rae F. Watts** announced the following terminal projects anticipated on the San Francisco waterfront, encompassing containerization, LASH, bulk commodities and the shipment of automobiles:

1. Improvements to the Army Street Terminal to provide increased cargo terminal area for the expanded container and breakbulk service of American President Lines and States Steamship Company.

APL will move from its present location at Pier 50 to the newer Army Street site where it will occupy 47 acres of open and enclosed storage space and have the use of six deep-water berths.

The new APL terminal has three working sides with aprons approximately 1,300 feet in length. Next to each berth is a clear-span, steel and concrete cargo transit shed ranging in length from 763 to 1,100 feet and each is 225 feet wide. The central core area for container storage has direct access to each berth and the deck load capacity is 1,000 pounds per square foot.

The move, APL reported, is consistent with the short and long range plans of the company to maintain its leadership in customer service.

Moving from Piers 15-17 in the northern waterfront area, States will operate from the remaining two berths and approximately 21 acres, which includes a cargo transit shed 1,000 by 225 feet and large open storage space.

The APL and States terminals will be completely separated with private entrances and will include terminal office and service buildings.

To facilitate the movement of containers for both APL and States, the Port Commission recently awarded an $825,000 construction and installation contract to Paceco for a container crane. To be installed next spring on the Islais Creek wharf to serve four berths, the crane will be capable of handling 20- and 40-foot containers weighing as much as 30 long tons. It will be the Port of San Francisco's first shore-base container handling crane.

All lines presently berthing at the Army Street Terminal will be relocated at other piers on the waterfront, including APL's vacated Pier 50 and possibly Piers 39 and 41, Mr. **Watts** said.

2. A new, 40-acre terminal will be constructed in the India Basin area for Pacific Far East Line's new shipping concept, the LASH (lighter aboard ship) system. When the huge ships enter service in early 1971, the Port will have ready a two-berth facility to accommodate the specialized liners. There will be acres of storage area for containers, a container crane serving the wharf, and a lighter loading station consisting of a 300,000-square-foot cargo transit shed designed with a canal system so that lighters may be floated inside the shed for easy loading and discharge of cargo.

PFEL will headquarter its six LASH ships at the Port of San Francisco and estimates that the six ships will carry more cargo in one year than ten conventional ships. Each liner is 814 feet long with a beam of 100 feet and carries a shipboard crane of 500-ton capacity for loading and discharge of the 61-foot lighters.

Mr. **Watts** pointed out that all three lines—APL, PFEL and States—are San Francisco-based steamship companies with their home office and main headquarters here. By providing new and improved terminal facilities, the Port assures that these lines will continue to center their far-reaching cargo operations in San Francisco, he said.

3. The passenger liners of American President Lines will be centered at Pier 33 in the northern section of the waterfront near Fisherman's Wharf and convenient to the downtown area. The two-berth pier is adjacent to Pier 35, headquarters for the passenger liners of Matson, Oceanic, P & O, Holland-American and Princess Cruise lines.

4. New construction is well along at the Port's Islais Creek Grain Terminal to increase its present storage and loading capacities. When completed early next year, the terminal will be capable of loading 1,200 tons of bulk commodities per hour from six automated spouts and will have a storage capacity of two million bushels. More than $5-million is being spent by the Port of San Francisco to make the terminal one of the most modern and efficient on the Pacific Coast. During construction the terminal remains operational, Mr. **Watts** pointed out, and with water depths of at least 40 feet, it is attracting some of the largest bulk carriers in the world.

5. The Port is looking toward increasing foreign automobile imports by providing an enlarged and improved foreign automobile terminal at Pier 92 which is located in the Islais Creek-India Basin area. Engineering plans are underway for the redesigning of the facility, and negotiations are being conducted for use of the terminal primarily by Japan's Toyota automobile. NYK and "K" Lines will operate a total of 11 new automobile carriers built especially for the Toyota. Wallenius Line is also expected to use the three-berth complex for imports from Europe and Japan.

The shift of a large portion of the Port's maritime activity to the southern section of the waterfront is part of an overall plan by the Port Commission to free certain piers in the northern section for redevelopment.

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Wiley Uses Almar 362 To Provide Smooth Hatch Cover Operation

With large cargo ships it is necessary to have huge hatch covers that operate smoothly and quickly. If not—it means lost revenue to the shipowner. An important cog in the operation of the cover is the axle, hinge and linkage system that needs to stay smooth and corrosion free for easy operation and maintenance.

Wiley Manufacturing Company of Port Deposit, Md., a subsidiary of Microdot, Inc., switched to using Almar 362, a special alloy of high strength and excellent corrosion resistance in the making of these vital parts.

Project engineers on the hatch covers that range in size from 15 feet wide and 20 feet long to 27 feet wide and 45 feet long report that previous materials used caused some corrosion problems because of the salt-sea atmosphere. They said the hatches would operate but that they would score the bearings and finally the hatch would take ten times as long to open if not corrected.

The Almar 362 is made by Allegheny Ludlum Steel Corporation.

Wiley tests the hydraulically operated hatch sections so that they can be opened in one minute. On board the cargo vessels when installed the hatches are called on to open in about two minutes with some of the very large ones slightly longer.

"We feel it is better to test the hatches at a faster rate here and we can adjust them to operate at the prescribed speed when installed," a design engineer at Wiley reported.

The Almar 362 material is purchased in 10- and 12-foot lengths and then cut to size as needed. The bar is purchased in 5, 4, 3, 2½ and ¾-inch diameters and then reground 0.015 before installing.

The finished bars, pins and axle hinges range in size from 10 inches long to 67/8 inches long.

Designed for the chemical process and industrial equipment industries, Almar 362 is well suited for Wiley's use because of its high strength and excellent corrosion resistance.

York Trailer Appoints Canning Dir. Of Eng.

Michael H. Canning

Michael H. Canning has been appointed director of engineering of the York Trailer Company Ltd. Group, Northants, England. He joined York about a year ago as manager, research and development, and will continue to be responsible for the group's technical development work, based at Market Harborough.

Mr. **Canning** was previously with International Harvester in Chicago, where he was in charge of advance design work in the research and development division.

Serodino Building Twin-Screw Towboat

Serodino, Inc., Chattanooga, Tenn., has received an order from Blue Grass Barge Co., Inc., Nicholasville, Ky., to build a twin-screw towboat. The dimensions of this towboat will be as follows: 65 feet by 24 feet by 8 feet, and it will be equipped with 850-total-bhp diesel engines.

Packaged Air Ejector Offers Space Spacing

A packaged, two-stage air ejector has been developed by Schutte & Koerting Company, Cornwells Heights, Pa., to produce vacuum on the condensers used with steam turbines in nuclear, fossil-fueled, and marine powerplants.

The ejector is unusual in that it utilizes "twin" first-stage and second-stage jet ejectors and a common, surface-type inter and after condenser. The design provides an excellent capability in a compact, packaged form.

Information on twin-element jet ejectors and other types of jet vacuum pumps can be obtained by writing to Dept. JA-74 Schutte and Koerting Company, Cornwells Heights, Pa. 19020.

Fruehauf Forms New Division To Provide Systems Approach To Physical Distribution

Fruehauf Corporation, Detroit, Mich., has formed a new division to apply the systems approach to the problem of physical distribution of goods. The new operation, called Integrated Systems and Products Division, provides tailor-made programs—including system study, engineering, equipment production, life cycle support, financing, and rental services—designed to speed up transportation of goods from factory to user and reduce distribution costs.

David Bernstein, executive vice-president, who made the announcement, said **Alexander Black** is vice-president and general manager of the new division which has its headquarters in Fullerton, Calif. Mr. **Black,** who has been with Fruehauf since 1959, was formerly vice-president and general manager of the Military Products Division, which he continues to head as part of the new division.

Mr. **Bernstein** said, "The object of the division is to provide engineering and equipment for integrated transportation of goods from origin to destination at the lowest possible costs, in the most effective manner. We are in a position to provide a complete system or a 'step' plan to accomplish the objective."

Examples of the kind of systems approaches the new division has or is working on are: the transportation of perishable foodstuffs from the point of origin to the retailer; air-cargo handling from the shipper to the consumer; rail land-bridge projects coast to coast; inland waterway systems between ports; automated container handling and storage, and terminal handling of ship containers.

The market for the new division's services and equipment includes any operation where rapid and efficient cargo or goods handling is required, with selectivity in cargo flow, and where reduction in current handling costs is the goal of management, whether commercial, military, or governmental.

Fruehauf produces truck-trailers, containers, material handling systems, railcars, container-handling cranes, and containerships. The company's operations also include a rental and leasing division; and a Research and Development Division. All of these support the Integrated Systems Division.

Alaska's Oil Rush Produces Large Order For Armco Steel And Arctic Marine Freighters

Oil industry activity in Alaska's North Slope—site of the largest oil discovery in recent years—is booming. Latest development, announced by National Supply Division of Armco Steel Corporation, is an order received from BP Oil Corporation for almost 10,000 tons of Armco Seal-Lock casing.

Armco is shipping the casing from its Ambridge, Pa., works, which is about 5,000 miles by rail and oceangoing barge from the frigid North Slope.

The North Slope, locked in ice except for a brief six-week period each year, has presented a tremendous logistics challenge to the oil industry. Temperature drops to 70°F. below zero. The site is more than 800 miles by land from the nearest warm-water port.

Supplies have been hauled in overland over a makeshift highway and by the largest airlift organized since the Berlin crisis.

From Armco's Ambridge plant, the casing will travel by rail to Seattle, a trip of about 2,000 miles. It will then be transferred to barges for the 3,000-mile trip around Alaska to the North Slope. Route of the voyage will be past the Aleutian Islands, through the Bering Straits, then around the northern tip of Alaska to Prudhoe Bay.

The flotilla of barges carrying casing and other equipment will be taken to the North Slope by Arctic Marine Freighters, a joint venture of Puget Sound Tug & Barge Co. and Alaska Barge & Transport. The shipment is scheduled to arrive in late July. Timing of the shipment by water is critical because of the brief six-week period during which the route is free of ice.

The 10,000 tons of Seal-Lock ordered by BP Oil totals 386,000 feet of casing: 100,000-feet of 13⅜-inch Seal-Lock, 216,000-feet of 9⅝-inch and 70,000-feet of 7-inch casing.

Barge Construction

American Bridge Division of United States Steel Corp., Ambridge, Pa., is building a hopper barge for Ohio Barge Line, Inc., Dravosburg, Pa. Designated Hull No. 3686, it will have the following dimensions: 200 feet by 35 feet by 12 feet.

Bethlehem-Beaumont Yard was contracted by Storm Marine Drilling Co., Corpus Christi, Texas, to build an offshore oil-well drilling barge. The barge to be of 5,200 gt and equipped with 5,000-bhp diesel-electric power units, will have dimensions of 166 feet by 109 feet by 16 feet. The barge has been designated Hull No. 4846.

Hillman Barge & Construction Co., Pittsburgh, Pa., was awarded a contract by Valley Line, St. Louis, Mo., to build a 1,400-dwt deck cargo barge. Designated Hull No. 6941, it will measure 150 feet 1½ inches by 50 feet by 10 feet.

Nashville (Tenn.) Bridge Co. will build two 3,600-dwt tank barges for Thomas Barge Co., 3858 Market St., St. Louis, Mo. Designated Hull Nos. 1992 and 1993, each barge will have the following dimensions: 264 feet in length, 54 feet in beam, and a depth of 12 feet.

Paducah Marine Ways, Inc., Paducah, Ky., was awarded a contract to build six 3,000-dwt oil barges by National Marine Service, Inc., St. Louis, Mo. Each barge will have dimensions of 298 feet by 54 feet by 12 feet.

Wall Shipyard (M & W Marine Ways, Inc.), Harvey, La., is to build a 3,200-dwt deck cargo barge for Sause Bros. Ocean Towing Co., Inc., Portland, Ore. Designated Hull No. 105, it will measure 230 feet in length, 55 feet in beam, and 15 feet 3 inches in depth.

Raytheon Producing New Direct Reading Loran A Receiver

A direct reading loran receiver that can be used to indicate lines of position from all loran A stations in the Atlantic and Pacific Oceans and the Gulf of Mexico has been introduced by Raytheon Company.

The fully transistorized A-1000 has simplified controls that enable the boatman or fisherman to match quickly a pair of traces from two loran transmitting stations ashore and then read directly the number of the line of position which is printed directly on the navigation charts. No computations or conversion tables are required.

A precise fix can be obtained in most areas up to several hundred miles offshore in less than two minutes. Loran fixes are commonly used by commercial fishermen and charter boat captains to pinpoint and re-find fishing spots offshore. The electronic navigation system, which is unaffected by weather, is so accurate that commercial fishermen also use it to log underwater and uncharted natural hazards and wrecks that could foul their nets.

The new Raytheon A-1000 loran is crystal tuned for stability and accuracy. It has a built-in antenna coupler and can operate from a simple antenna.

A trunnion mount is also provided to tilt the unit to the most convenient operating angle. The receiver measures 6¾ inches high by 14½ inches wide by 13 inches deep. It weighs 25 pounds.

It is offered for use with 12, 24, 32, or 115-volt systems at $1,189.

Complete information is available from Raytheon marine dealers or from **John Hartnett,** Raytheon Company, Marine Products Operation, 213 East Grand Avenue, South San Francisco, Calif. 94080.

MSB Approves Lykes Interest In Steel Firm With Foreign-Flag Ships

The Maritime Subsidy Board has given permission to Lykes Bros. Steamship Co., Inc., to acquire controlling interest in Youngstown Sheet and Tube Co., including the foreign-flag ship operations of the country's eighth largest steelmaker.

The board's approval of the takeover by the new company—Lykes Youngstown Corp.—of Lykes operating subsidy contracts was the issue before it. And, the key to the approval was the decision that Youngstown Sheet and Tube's various affiliates, which would be part of the new merged company, could be continued. The question of U.S. citizenship, of the controlling parties must still be settled, MSB indicated.

MRC Receives Charter From Philippines

A formal charter has been granted to Marine Resource Consultants, Inc., of Santa Monica, Calif. to conduct branch business in the Republic of the Philippines. MRC has previously worked as a foreign company in the Philippines as well as other places in the Far East. The official registration of the branch marks the ocean firm's first international charter.

"The development of marine resources is a worldwide undertaking," **John B. Gustavson,** MRC president stated. "We therefore find it necessary to work as nationals in various countries rather than as foreigners. Our branch in the Philippines will now serve as the administrative focal point for all our activities in the Far East offshore oil, mining and fisheries development."

After initially operating as a survey contractor, MRC has become engaged in the broad aspects of analyzing and acquiring offshore concessions, structuring capital requirements, and managing resource development programs. The corporation is presently privately held but is planning a major infusion of capital for projects in Australia, Taiwan, Brazil, Alaska, and the Canadian Arctic.

Mr. **Gustavson** also announced the establishment of MRC's European office. Located in Copenhagen, Denmark, this office will serve MRC clients in northern Europe with emphasis on the offshore developments in the North Sea, the Baltic, and around Greenland.

Ship Launches Herself While Party Watches

Recently, a 10,000-dwt tanker was so anxious to get into the water that it skipped the usual champagne launching ceremonies. The unusual incident occurred in Birkenhead, England.

Officials and guests were chatting on the dock and waiting to smash a champagne bottle across the tanker's bows when retaining bolts popped and she slipped silently down the ways.

The builders staged another ceremony later, after the runaway tanker had been corraled.

Oceanautic Names Bruce B. McCloskey Sales Engineer

Bruce B. McCloskey

Oceanautic Manufacturing & Research Company (OMR), Cincinnati, Ohio, has named **Bruce B. McCloskey** sales engineer responsible for marketing all OMR products. The firm manufactures tools and devices to aid the man-in-the-sea.

Mr. **McCloskey** has been associated with the marine field for more than 35 years. This includes both naval and civilian salvage and diving experience. Before joining OMR, he had undertaken a tour of active duty to accomplish special assignments for the U.S. Navy Supervisor of Salvage. Prior to this, Mr. **McCloskey** was a coordinator with North American Rockwell Corporation's Ocean Systems Operation in Miami, Fla. He has also served as a marine superintendent in Manila, and as a personnel manager in Guam.

Mr. **McCloskey** has degrees from San Francisco's Heald Engineering College and the University of Washington, Seattle, Wash. A member of the U.S. Naval Institute and Reserve Officers Association of the U.S., he is a past president of the Guam Chamber of Commerce and the Army and Navy Club of Manila.

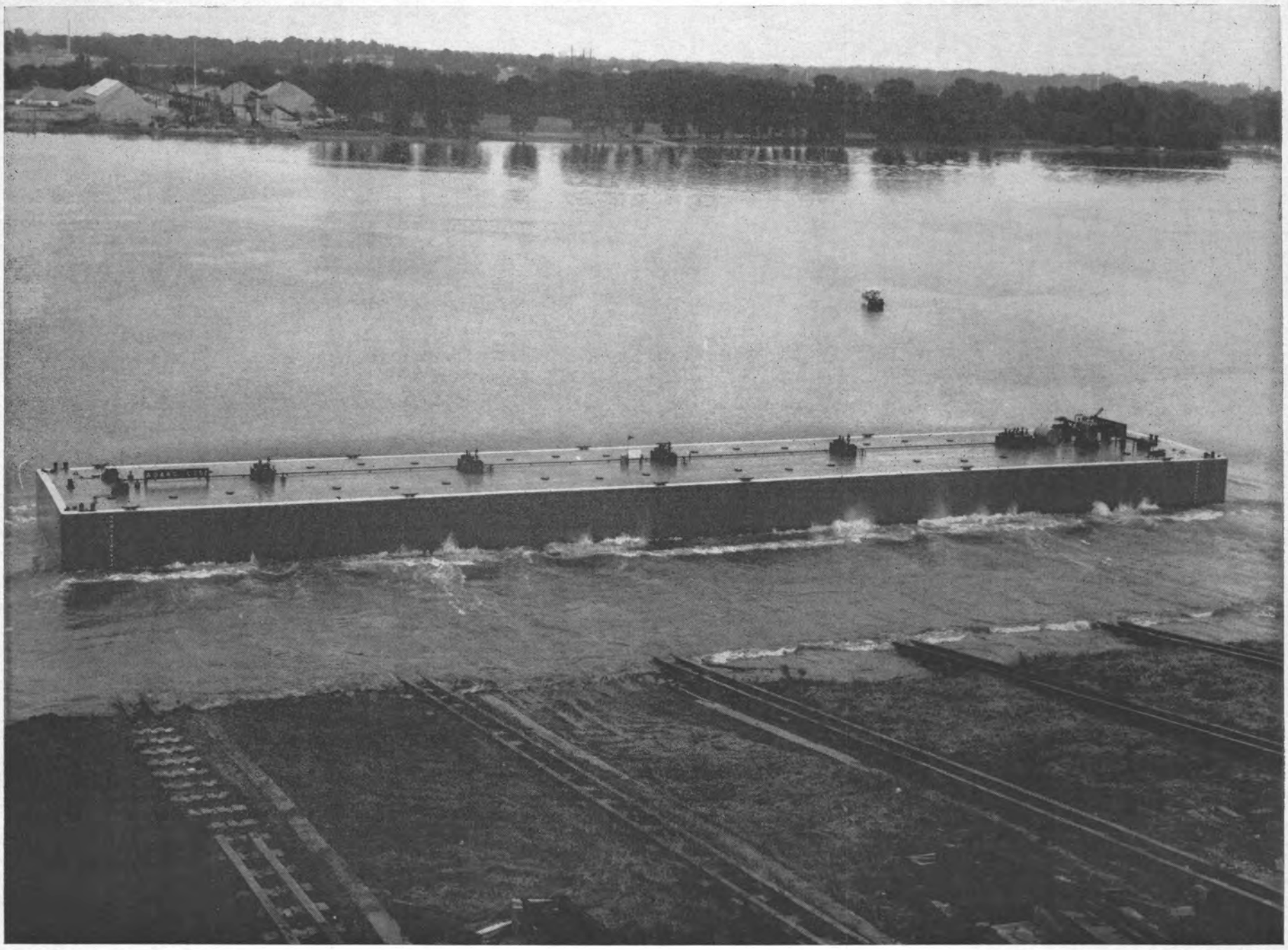
Pacific Inland Leases Barges For Alaska Run

Greyhound Leasing & Financial Corp., Chicago, has leased two new oceangoing barges to the Pacific Inland Navigation Co., Seattle. They will be used in moving more than 60,000 tons of cargo into Prudhoe Bay during July and August this year.

Pacific Inland has leased the flat-deck barges, which cost $828,000 each, for 12 years. The same company has been using a 9,000-ton barge and a 3,300-hp ocean tug chartered from Greyhound for a number of cargo movements to many parts of the world, and now has them employed in transportation to DEW line sites in Alaska.

The two new barges were built for Greyhound by Gunderson Bros. Engineering, a division of FMC Corp.

Pacific Inland provides worldwide tug-and-barge transportation and has services extending from Saigon to Seattle and to Prudhoe Bay in the Arctic.



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Financial Aid Asked For Gas-Turbine Tanker

Western Ocean Transport Company, New York, N.Y., has applied to the Maritime Administration for Title XI construction loan and mortgage insurance on a 38,400-dwt tanker. The tanker is to have a gas-turbine propulsion plant. The estimated cost of the vessel is $11.5-million.

According to the announcement, the hull would be constructed by Gunderson Bros. Engineering Corporation, Portland, Ore. and outfitting would be done by National Steel and Shipbuilding Company, San Diego, Calif.

Standard ISO Containers Serve As Special Bulk Units

International Ferry Freight Ltd. (I.F.F.) of England has developed in conjunction with I.C.I. plastics division a system for carrying granular chemicals in bulk in standard ISO box containers, which are back-loaded with general freight, thereby eliminating the costly return of empty containers. The containers and tipping skeletal trailers used in the system are being manufactured and marketed by York Trailer Company Ltd., Corby, Northants.

This is an important development in container operation which will increase the possibility of exporting granular materials in bulk, with advantages both to supplier and to consumer. The plastics division of I.C.I. has actively participated in this development because it will make it possible to supply plastic materials in bulk to customers in countries overseas to which the cost of delivery in bulk has previously been prohibitive.

York Trailer Company Ltd, is currently building a number of 30-foot ISO dry freight containers for this traffic. They are standard steel boxes with simple modifications that in no way impair the container's general utility and add only about 20 percent to its price. A specially-built bulk container is said to cost about six times as much as a modified York unit. The handling system and container modifications are the subject of a patent application by I.F.F.

The system works like this: a disposable plastic lining, made from Alkathene, I.C.I.'s polythene, is put inside the container and temporarily inflated to expand it to the contours of the interior. The cargo is then loaded from a hopper into the liner through four roof hatches, the hatches being used in turn to distribute the materials evenly in the container. When the container is full. the liner is sealed, the hatches closed and the container dispatched as a standard ISO container.

At the destination port, the container is transferred to a tipping skeletal trailer for transportation to the customer's plant. There, the hatch in the front end wall is opened and a funnel shaped discharge box, connected to a large-bore outlet pipe, is attached. The container is then tipped to off-load the cargo into a pneumatic discharge system.

With the disposable plastic bag discarded and all hatches closed the unit is, to all intents, a standard ISO container again, able to carry any dry freight cargo that can be loaded through its standard container rear doors.

York Trailer has introduced a tipping skeletal trailer for use with the container. It has a regular skeletal frame, but the outriggers—with international twistlocks—instead of being mounted directly on the chassis, are fitted to a perimeter sub-frame which is pivotted at the rear end and tipped by a standard tipping gear.

New Tanker Rate Procedure Goes Into Effect On July 1— Replaces Intascale And ATRS

A new tanker rate procedure to be used in determining the cost of transporting oil and other petroleum products on a worldwide basis has been published. It is scheduled to go into effect on July 1. It will be known as the Worldscale Rate Schedule.

This latest rate formula designation is expected to provide a more efficient method in reflecting truer costs in the daily operation of a tanker, and also in reducing time used for loading and discharging cargo—commonly referred to in shipping circles as laytime.

Worldscale is actually made up of reference points using percentages which are published tariffs covering the cost of transporting a long ton of petroleum from and to designated ports in the world. It has been designed to replace other rate schedules now in use, such as Intascale and the American Tanker Rate Schedule (ATRS).

While implementation of the Worldscale Schedule has been set for the first day of July, it will not automatically become effective in all areas of the market.

The Military Sea Transportation Service (MSTS), which charters a large portion of tanker cargo space from American owners, is known to be studying the situation. No official position has been declared by the government agency, which contracts all its U.S.-flag oil ship requirements under American tanker rate schedule (ATRS) terms.

The new Worldscale book will contain nearly 50,000 various rate calculations and can be purchased for $100 per copy through the offices of the Association of Shipbrokers and Agents, 17 Battery Place, New York, N.Y. 10004, or through the International Tanker Nominal Freight Scale Association Ltd., Baltic Exchange Chambers, 24 St. Mary Axe., London E.C. 3.

Borg-Warner Names Patrick President Of York Division

Gerard V. Patrick, chairman and chief executive officer of the York division of Borg-Warner Corporation, has also been named president of the division.

Mr. **Patrick,** who will continue as chairman, succeeds as president **William H. Roberts,** who has resigned.

Mr. **Patrick's** appointment was announced by **Stanley J. Roush,** Borg-Warner executive vice-president-air conditioning and building products. York, based in York, Pa., is a major manufacturer of air conditioning and refrigeration equipment.

Mr. **Patrick** joined York in 1963 as president after serving as managing director of Borg-Warner (Australia) Ltd. He was named vice-chairman of York in 1965 and chairman in 1966.

SNAME Publishes New Text— Ship Design And Construction

"Ship Design and Construction," the newly revised edition of "Design and Construction of Steel Merchant Ships" published in 1955, brings to the fore the marine profession's unprecedented strides in the design and construction of merchant ships from 1955 to the space age.

The new book, published by The Society of Naval Architects and Marine Engineers, represents the untiring efforts and professional experience of the editor, **Amelio M. D'Arcangelo,** professor of naval architecture and marine engineering at the University of Michigan, and 22 authors, all acknowledged authorities in their particular fields. A Control Committee of ten professional leaders, chaired by **David B. Bannerman Jr.,** has provided expert guidance through all phases of the book from the planning stage to the review of all manuscripts.

Completely updating "Design and Construction of Steel Merchant Ships" and complementing "Principles of Naval Architecture" published in 1967, the new "Ship Design and Construction" contains 618 pages and 450 illustrations. The underlying reasons for established practice are explained; material in other publications has not been included or has been considerably abridged and non-essential historical background has been omitted. In addition, each chapter contains many helpful references.

This new edition provides the student with the knowledge of how merchant ships are designed and constructed, establishing a good background for more advanced study. For the professional, it highlights and defines the basic design problems, providing references to technical data.

Distinctively bound in blue, the book may be purchased from The Society of Naval Architects and Marine Engineers, 74 Trinity Place, New York, N.Y. 10006. The price per copy for members is $20.00 (10 percent discount when payment accompanies order)—for non-members $30.00. (Mailing outside North America—$2.50.)

NUCLEAR FISH—Nuclear powered attack submarine Flying Fish hits the water at recent launching at Electric Boat division of General Dynamics. Flying Fish, 34th nuclear sub launched by the company, was christened by **Mrs. John W. Harvey** of Hamden, Conn., widow of the commanding officer of the Thresher. Principal speaker at the ceremony was Adm. **I. J. Galantin,** chief of naval material.

where the action is

LAST YEAR, Bethlehem's Sparrows Point Shipyard delivered more commercial ship tonnage than any other American yard: nearly 114,000 dwt.

THIS YEAR, Sparrows Point has delivered—or has on order to deliver—about 210,000 dwt of commercial ship tonnage, nearly double last year's performance.

NEXT YEAR—in the midst of this continuing activity—the yard plans to complete a massive shipbuilding basin for the construction of ships over 1,000 feet long and with capacities greater than 200,000 dwt. As part of a huge, multi-million-dollar building program now underway here, the basin (dotted outline in photo) will complement the yard's five existing major launching ways. This program also includes a new sandblasting and painting building, and a new panel shop, the key to a new system for speeding up the fabrication and handling of ship subassemblies.

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Lockheed's Wellhead Cellar Shown At Offshore Conference

Mockup of wellhead cellar, part of Lockheed Missiles & Space Co. subsea petroleum system announced at Offshore Technology Conference in Houston, Texas. Lockheed system is for completion, production and maintenance of wells.

Lockheed announced at the first Annual Offshore Technology Conference, held in Houston, it has designed a system by which man can work with oil wells on the ocean floor as comfortably as he labors on land. Details of the system were unveiled in a technical presentation at the conference by **John W. Hopkins,** manager of offshore petroleum sytems for Lockheed Missiles & Space Co., Sunnyvale, Calif.

Mr. **Hopkins** said the company, a national leader in advanced undersea vehicles and techniques, has spent three years developing the system as a solution to offshore oil problems and already has field-tested many elements of the new approach.

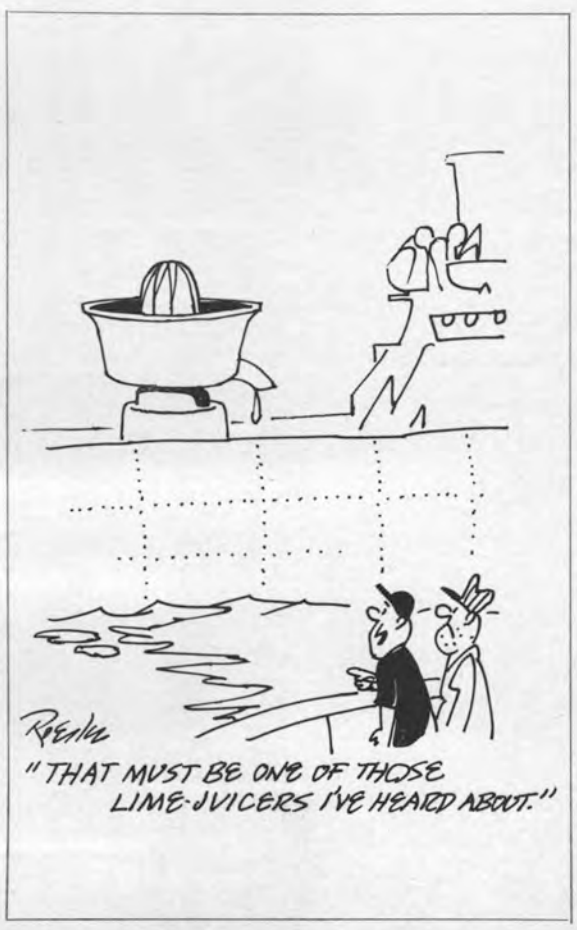
Key components of the system are: a 21-foot-high steel "cellar" fitted permanently over each wellhead in a sea-floor oilfield; a steel capsule in which workmen would be lowered from the ocean surface to the wellhead cellar, much the way oceanographers go down to great depths in bathyscaphes, and a permanent "manifold center" on the ocean floor, into which crude products from the subsea wells would flow for control and comingling before being transported through lines to separation facilities.

Each of these three components would be maintained at a one-atmosphere pressure, the normal air pressure at the surface, Mr. **Hopkins** said. Oxygen levels, temperature and other vital conditions for life support could be regulated to give workmen a comfortable environment.

Mr. **Hopkins** said the system would give oil producers an economical means of extracting petroleum from fields far offshore in water depths to 1,200 feet or more. The system would become competitive with other approaches at a depth of about 400 feet, and would have shallow-water applications under some conditions.

Complete installation of the conventional oilfield "Christmas tree" assembly through which oil and gas flow from a well could be performed within the wellhead cellar. And a Lockheed-invented procedure would permit workers to bring flowlines into the cellar, for connection to the well, through a port in the side of the cellar.

Mr. **Hopkins** said a number of undersea safety features have been designed into the Lockheed system. Chief among these is the buoyancy of the utility capsule. Should an emergency arise, all lines to the surface could be quickly sheared and the capsule would bob safely to the surface of the ocean like a cork. Its crew of workmen, being at atmospheric pressure, would never be exposed to the dangers of decompression.



We used to be unique.

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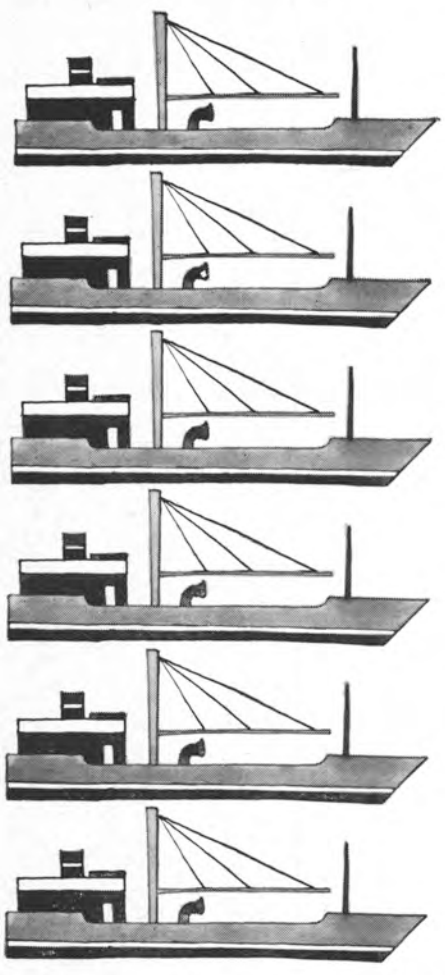
It's been six years now since Refineria Panama introduced bunkering by barge. (A unique service that saves ship owners as much as $1.00 a ton on bunkering bills.)

And it worked out so well that over 25% of the total bunker market at Panama is now supplied by barge.



Our success has recently attracted competition. But we're far ahead.

Why?

We have something our competitors don't: experience.

And, because of our experience, we have a lot more to offer:

Needless to say, we offer experienced personnel. But we also have the most equipment. (Six permanent units, with others available.)

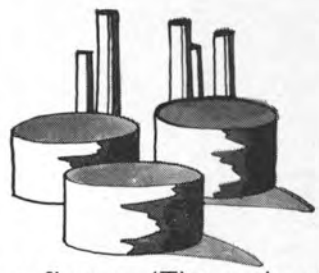
Which means we can handle larger volumes and more deliveries per day. (In fact, our capacity is more than triple the next largest barge supplier's.)

And, when you stem with Refineria Panama, we see to it that you get the proper transit position through the Canal. Because, while you're bunkering, we keep your agent informed of your completion time.

What else do we offer?

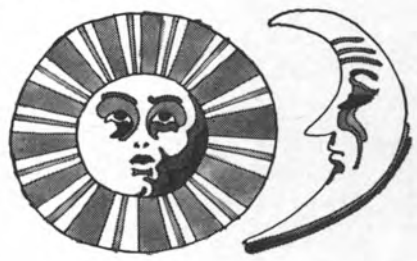
Deballasting service. Potable water.

Plus quick delivery of all grades of marine fuel. Because it comes straight from



our refinery. (The only refinery in Panama.)

What's more, we give you 24-hour service. At each end of the Canal.

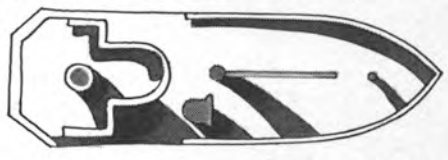


On the Atlantic side, we have barges at Colon Harbor and Sea Buoy. On the Pacific side, offshore from Taboga Island, just seaward from Balboa.

In short, when you come to Refineria Panama, you'll find out that there's more to bunkering by barge than bunkering by barge.

It took us six years to give you all these extras.

You might say we're six years ahead of anybody else.



Bunker with Refineria Panama, S.A.

Marine Fuel Sales Div./277 Park Ave., N.Y., N.Y. 10017/Cable: PANREFCO/Telex: 224790 (RCA)/Phone: 212-826-5040

Agent	Territory	Telex Number	Telephone
Note: United Kingdom and Italian owners may place their inquiries through their regular broker or to Refineria Panama, S.A., in N.Y.			
A. Anker-Nilssen A/S.	Norway, except Bergen & Haugesund.	856-6094 Oslo.	24-58-39
Oil-Shipping Co.	Benelux Countries & Germany.	844-22149 Rotterdam.	23-50-64
Josef Nilsson AB.	Sweden & Finland.	854-10080 Stockholm.	23-15-20
The Maritime Agency Ltd.	Denmark.	855-5845 Copenhagen.	(01) 15-1504
C. Kubon & Company A/S.	Bergen, Norway.	856-2130 Bergen.	32625
E. A. Gibson & Co., Ltd.	France, Switzerland & Spain.	886506-886507 London.	AVEnue 1050
Mitsubishi Shoji Kaisha.	Japan.	781-2222 Tokyo.	211-0211

Red Fox Winches Installed On Three New Work Vessels

The 300,000 pound single-line-pull waterfall-type double-drum winch built by The Red Fox Machine & Supply Co., aboard the Penrod Drilling Co. owned Hippo.

The Red Fox Machine & Supply Co. of New Iberia, La., recently furnished winches for the two largest supply vessels built to date by Levingston Shipyards, and supplied the towing winch for a large tug built by Halter Marine to serve in the Pacific.

The Levingston vessels were twin 192-foot prototype supply vessels, the Hippo and Rhino, built for Penrod Drilling Co. They will be operated by Petrol Marine Co.

These two vessels were put into immediate service with long tows. The Hippo is headed for Brazil towing a LeTourneau-type floating drilling rig (Penrod 59), and the Rhino is delivering a LeTourneau-type floating drilling rig (Penrod 58) to the North Sea.

The Red Fox winches on board the Hippo and Rhino are rated as 300,000-pound single-line-pull waterfall-type, double-drum winches. They are diesel powered and have a Twin Disc five-speed transmission. Each winch is equipped with a Twin Disc air clutch that operates the stern drum for towing and a jaw operated air clutch on the bow drum for anchor handling. The winches can be operated by either direct or remote controls. These winches have a capacity of 2,000 feet of 2¼-inch cable.

The Halter Marine vessel is the 110-foot tugboat Oio built for the Dole Co. The Red Fox winch on board is the first they ever purchased. The Oio is now in service making a 120-mile round trip daily between the main Dole plant on the island of Honolulu and another island 60 miles away. The Red Fox winch will tow 200,000 tons of pineapple a season. The winch is a 100,000-pound single-line-pull towing winch. This winch features two Twin Disc air clutches that give positive control of the two drums during spooling and towing operations. This adds greatly to the efficiency of the winch when operated from a remote-control station.

Aerojet-General Names Farrin Asst. Manager Surface Effect Ships Div.

Rear Adm. **James M. Farrin,** USN (ret.), former commander of several large naval shipyards, has been named assistant manager of the newly-formed Surface Effect Ships (SES) Division of Aerojet-General Corporation, El Monte, Calif.

A 40-year naval veteran who served as commanding officer of the shipyards at Norfolk, Pearl Harbor and Philadelphia, Admiral **Farrin** has been with Aerojet since 1965. Appointment to the new post was announced by **W. C. House,** Aerojet vice-president and manager of the SES Division.

The SES Division was established in late 1968 to develop prototype model surface effect ships for military and commercial applications. These vehicles ride on a cushion of air and are capable of operation at high speeds over land and water. The division is working under a contract from JSESPO (Joint Surface Effect Ships Program Office), an agency of the Navy and Maritime Administration, to develop a 100-ton craft capable of speeds upwards of 80 knots.

Admiral **Farrin** was graduated from the Naval Academy in 1929 and received a master's degree in naval architecture from the Massachusetts Institute of Technology in 1934. He served as assistant chief of the Bureau of Ships and as a professor of naval construction at MIT.

Aerojet-General is a subsidiary of The General Tire & Rubber Co., Akron, Ohio.

Babcock & Wilcox Introduces Line Of Plastic Refractories

Babcock & Wilcox Refractories Division has introduced a full line of plastic refractories for ferrous and non-ferrous applications and for industrial and marine boiler furnaces.

Six of the eight new plastics are airsetting materials. The other two, B&W Plastic Refractory 29 HS and B&W Plastic Refractory 60 HS, are heatsetting. All are shipped in 100-pound cartons, in segments for easy removal and placement.

B&W Plastic Refractory 24 PB, an alumina silica base material, is designed for all types of heat-treating furnace sidewalls and roof constructions, with a use limit of 2,400°F. It requires 147 pounds to place one cubic foot.

B&W Plastic Refractory 29 HS, a super-duty plastic, is excellent for patching and refractory construction in soaking pits, forge furnaces, rotary hearth furnaces, and reheat furnaces. It has an alumina silica base and is recommended for temperatures between 1,800 to 2,900°F. It requires 150 pounds to place one cubic foot.

B&W Plastic Refractory 60 HS provides slag resistance superior to fireclay and resistance to oil ash and iron oxide. It is suitable for a majority of industrial and marine boiler furnaces, including use as complete furnace linings, burner openings, door openings, and for forming special shapes and patching deeply spalled or eroded brickwork. It is a 60 percent alumina heatsetting plastic with a use limit between 1,800° F. to 3,000°F., and requires 152 pounds to place one cubic foot.

The other types are designed for industrial uses in forge shops, foundries, steel mills, etc.

Todd-CEA Burner Systems Installed On PFEL Ships

The SS Guam Bear and the SS Hawaii Bear, two C-4 troopships of World War II vintage, have been converted to containerships, equipped with automatic burner management systems and put into service by Pacific Far East Lines.

The automatic burner management systems, products of Todd-CEA, Inc., consist of two boiler front units and one console for each ship. The components were prefabricated and tested ashore for easy installation and assured operation. The system has been approved by the U.S. Coast Guard for a two-man engine room watch.

Each boiler-front package included a complete insulated burner with box; two Todd-CEA "D" type registers fitted with wide-range steam atomizers; piping for oil, air and steam and electrical wiring. Existing boiler fronts were removed and the new prefabricated packages fitted to the boilers.

The control console package was designed for installation at the throttle station, without moving the throttle, the engine room telegraph or the existing engineer's gauge board. Point-to-point wiring between the console and the boiler fronts was completed aboard ship after installation of the components.

An annunciator was installed on the console so the engineer can readily see the complete status of the burner-boiler operation.

Manual-auto stations were provided for remote control of boiler water level, combustion air and fuel pressure from the throttle station. An engineer's call system was fitted to the console to eliminate the need for the engine room watch to leave its station.

Todd-CEA provided two element FW regulators and upgraded the existing combustion control system. Automatic soot blowers and self-cleaning fuel oil strainers were also installed.

Todd-CEA engineers said automation of the Guam Bear, the first of the two ships converted, was highly successful. The system purged the furnace, lighted the first burner at completion of purge and cycled the second burner on and off as required by load demand. It was not necessary to manually control the burners from port load through maneuvering to full steaming. The Hawaii Bear automation is due for completion this month.

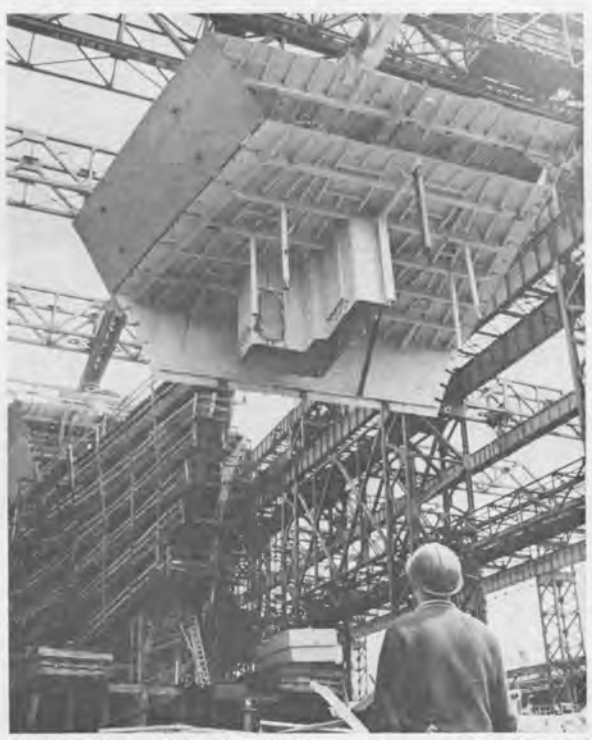
Propeller Club Convention— Merchant Marine Conference Scheduled For October 15-17

The 1969 Propeller Club Convention and Merchant Marine Conference will be held in Savannah, Ga. from October 15 through October 17. The convention's headquarters will be the new De Soto Hilton Hotel, located in the heart of the historic downtown district of Savannah.

The convention will feature, besides the business meetings, golf tournaments for both men and ladies, tours of the city and an industry or harbor tour.

The conference will have a full schedule of panel discussions, to be announced later.

General chairman for this 43rd annual convention is **W. L. Mingledorff Jr.,** c/o Savannah Electric and Power Companies, P.O. Box 968, Savannah, Ga. 31402.



HIGH RISE COMPARTMENT—A rigger at the General Dynamics shipyard in Quincy, Mass., watches a 76-ton section being lifted nearly 100 feet to become part of the forward section of the United States Navy oiler-supply ship Kansas City, scheduled for launching this month. The 659-foot vessel, designed to provide operating forces at sea with rapid replenishment of fuel, ammunition, missiles and other supplies, is one of 14 surface ships to be built at the shipyard during the next three years.

Made in U.S.A.

Introducing the new Raytheon 2840 Radar

Presenting for the first time in American-made radar circles: continuous view, no more vanishing blips – image re-paints 60 times a minute. More transistorized solid state circuits and fewer tubes than any radar in commercial use. • 48-mile range. Ideal for all coastal and ocean-going vessels, tugs, fishing fleets and yachts. Braille "feel-safe" knobs for rapid, easy adjustment. See it all happen for under $6000. Backed by a Raytheon reputation for stand-behind-it service around the world. • Model 2840—the most advanced radar in its class. For full information including Bulletin R-1 write Raytheon Company, 213 East Grand Ave., South San Francisco, California 94080.

RAYTHEON

Murer Joins Staff Of Norwegian America Line As Deputy Director

Erik Murer, a native Norwegian with worldwide experience in the shipping industry, has joined Norwegian America Line as deputy director for North America, with headquarters at the company's New York office. He assumes the title held for many years by **Fin Odd,** who was recently named to the top executive post in North America on the retirement of **Christian J. Mohn.**

Mr. **Murer** worked with the Shipping Division of the Norwegian Ministry of Supply and Reconstruction in London and Oslo in the immediate post war years and also served for a while in the Norwegian merchant navy.

Subsequently he was employed by Saguenay Shipping Company in Montreal, then was transferred to Jamaica as manager of the shipping division of Sprostons (Jamaica) Ltd. Later, with Sitmar Line, he was successively that company's Caribbean representative and joint manager of its Australian headquarters office in Sydney. In 1961, Mr. **Murer** joined the Norwegian shipping firm of Oivind Lorentzen, Oslo, and after a mission to Brazil was transferred to its New York office where he held the position of vice-president. He resigned that post in November, 1966 to become resident representative in Australia for Marine Chartering Company, Inc., of San Francisco, in charge of its operations south of the Equator.

Western Gear To Build Dam Gate Hoists

Actuation machinery to control the operation of the main gates on the Jones Bluff Lock and Dam, near Selma, Ala., will be manufactured by the Heavy Machinery Division of Western Gear Corporation, Everett, Wash.

The work will be performed under a $252,095 contract with the Mobile District, South Atlantic Division, U.S. Army Corps of Engineers.

The equipment will permit each of 11 gates to be raised or lowered independently for Alabama River downstream release water control by the 646-foot-long spillway. Western Gear, headquartered at Lynwood, Calif., was the lowest of nine bidders to provide the hydraulic and electrical hoist equipment for operation of the 50- by 35-foot gates atop the dam.

Construction of the project in Lowndes and Autauga Counties, Ala., is scheduled for completion in 1973 at a cost of about $52,600,000.

ACL Appoints Miggels, Nash And Penard

The appointments of three assistant managers in the Traffic Department of Atlantic Container Line, Ltd., New York, were announced by **O. I. M. Porton,** president, ACL, U.S.A.

A. A. M. Miggels was advanced from line manager to assistant traffic manager-liner services. **A. A. Nash,** formerly equipment control manager, was appointed assistant traffic manager—equipment control. **W. W. Penard** was named assistant traffic manager—documentation systems. He had been computer operations manager.

According to Mr. **Porton,** the new appointments are part of an overall expansion program at ACL designed to meet increased operational and administrative needs during the next 12 months when the line adds six new roll-on/roll-off containerships to its present fleet of four vessels.

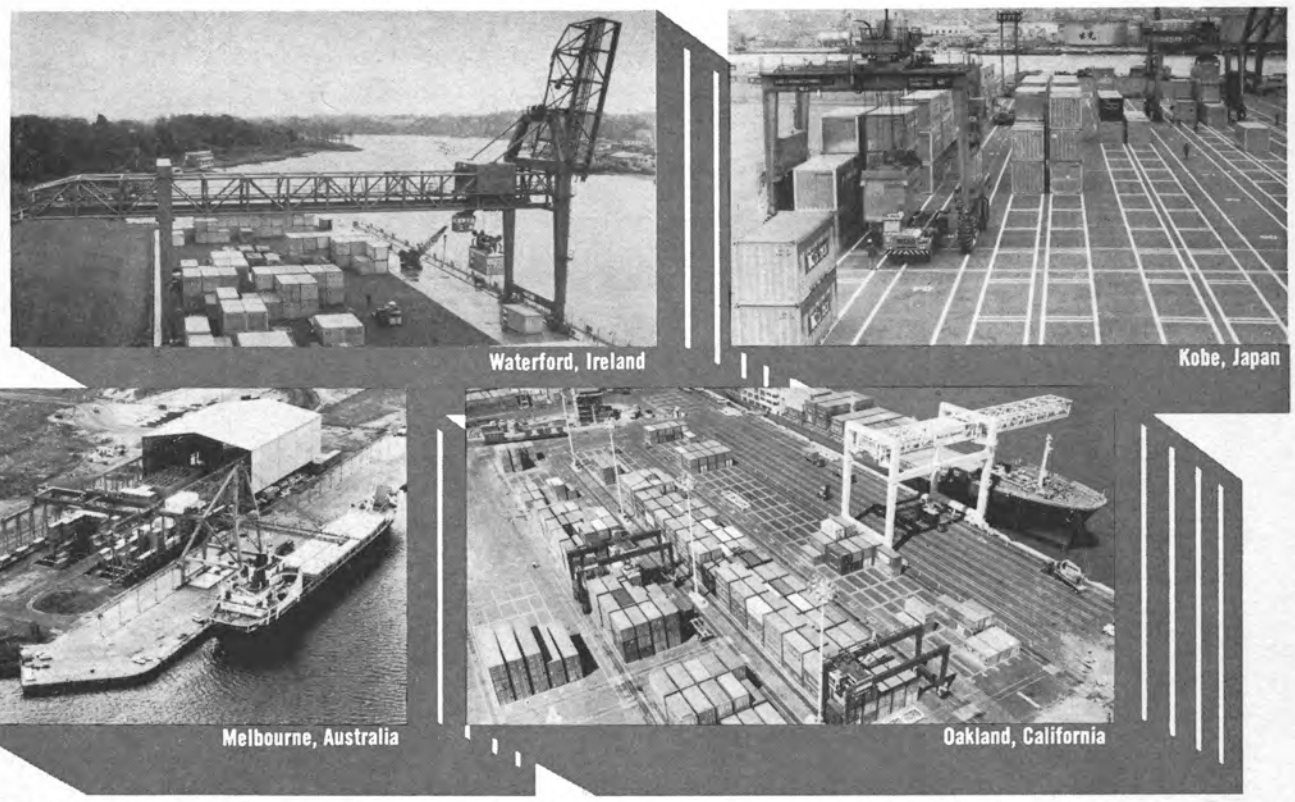
Maine Port Book Now Available

The 1969-1970 State of Maine Port Book, published by the Port Committee of the Greater Portland Chamber of Commerce and the Maine Port Authority, is now available for distribution.

The 112-page two-color booklet lists the services, personnel, and advantages of Maine's application for a Foreign Trade Zone in Portland and sub-zone in Machiasport.

The publication is free and may be obtained by writing to **Edward Langlois,** general manager, Maine Port Authority, Maine State Pier, Portland, Maine 04111.

PACECO container terminal systems



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- **Lower capital investment**
- **Lower operating costs**
- **Minimum yard development costs**
- **Maximum versatility, including railcar loading**
- **Stores more containers per acre**
- **Provides most economical expansion**

PACECO's container terminal systems offer a broad choice of equipment for the fastest most profitable container handling. Whether requirements call for a single long-span PACECO Portainer to serve an entire terminal as in Waterford, Ireland, or a low-profile Portainer, two PACECO Transtainers and terminal trucks as in Oakland, California, PACECO offers the ultimate system for your terminal. Systems have been developed with selections from ten basic Portainer® (pierside crane) models, nine rail-mounted or rubber-tired Transtainer® (terminal crane) models, and several low cost conveyance systems.

Let us help you select a customized PACECO system for your present requirements, one that can grow in economical modules as your terminal volume increases. Write for our Terminal Systems Brochure or request a visit by PACECO engineers. (A PACECO Terminal Systems motion picture is available for group showing.)

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Container Systems Division

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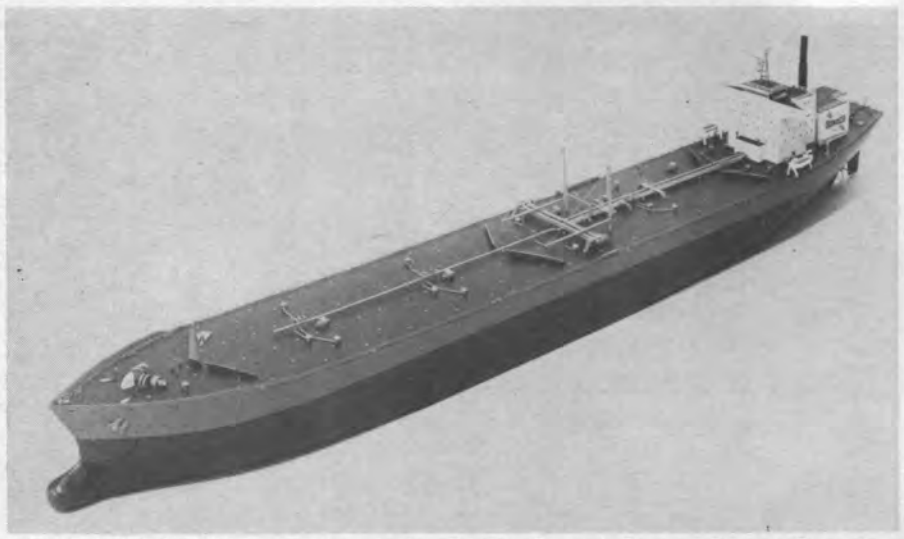
GE Supplying Central Operations System For 80,000-DWT Sun Oil Company Tanker



Model of the 80,000-dwt tanker, equipped with General Electric Central Operations System, being built for the Sun Oil Company by Sun Shipbuilding and Dry Dock Co.

Central Operations System (COS) for the main powerplant on a new 80,000-dwt tanker being built for Sun Oil Company, Philadelphia, Pa., is being supplied by General Electric's Industry Control Dept., Salem, Va.

The modern automated engine room console offers monitoring and control functions of the powerplant in addition to automated throttle control. The bridge control system complementing the COS engine room control, gives the officer on watch the option of maneuvering from the bridge through all propeller speeds, ahead and astern, by direct control with the throttle system or by the conventional telegraph relay system to the engine room.

The main COS console contains continuous and demand displays of key temperatures, pressures, and levels within the propulsion plant. Alarms built into the display indicate to the watchstander high or low out-of-limits conditions. Centralized control will enable the engine room to be manned by a crew of two on each watch.

The new tanker will be used to carry 592,000 barrels (24,864,000 gallons) of crude oil from the Gulf Coast to Sunoco's Marcus Hook, Pa. refinery. It will be 811 feet long, with a beam of 125 feet.

A marine steam-turbine geared propulsion unit rated at 24,000 shp at 92 rpm will power the new ship. The cross compound turbines and gear sets were provided by GE's Marine Turbine & Gear Department, West Lynn, Mass. A single main boiler will be used for propulsion while a much smaller auxiliary boiler will be available for port stand-by and emergency take-home power.

Centralized remote control of hydraulic-operated cargo valves and of two, 18,000-gpm centrifugal pumps will enable the tanker to discharge its cargo an hour faster than smaller, conventional 50,000-ton vessels.

The ship is being built by Sun Shipbuilding and Dry Dock Company, Chester, Pa.

HOUSE MOVING DAY for the General Le Roy Eltinge, troopship under conversion to C-4 status, presented unusual operation recently when the forward top three-deck section of the bridge was lifted and placed on the after house. Two gantry cranes held the huge structure in the air while the ship was moved to position. Work on a sistership, the General R.M. Blatchford, is progressing at a 30-day lag behind the Eltinge and will have same house moving later. Work is being done at the Port of Portland Swan Island repair yards by Albina Engine & Machine Works, division of Dillingham, for Waterman Steamship Corporation.

American Ship Elects Eckert Asst. Treas.

E. E. Eckert has been elected assistant treasurer of The American Ship Building Co., Cleveland, Ohio, by the board of directors. Mr. **Eckert,** chief insurance administrator for the company, will continue in that role in addition to the new duties.

A veteran of 24 years' experience in the insurance field, he joined American Ship when the new management team, headed by **George M. Steinbrenner III** and **Jacob O. Kamm** took over leadership of the company in October, 1967.

In other action, the directors approved the regular quarterly dividend of 15¢ per share payable June 30.

Verolme Launches Large Esso Tanker— Fifth Of New Class

A new giant tanker, the 253,000-dwt Esso Cambria, was launched recently at the Verolme United Shipyard in Rotterdam, Holland. **Mrs. H. C. Kauffmann,** wife of the executive vice-president of Esso Europe Inc. christened the ship. Esso Europe is an affiliate of Standard Oil Co. (New Jersey).

The new ship will be the fifth of a new class of tankers to be delivered to the company when she is completed late this year. The Esso Cambria is part of a total European order for 22 ships placed by the International Esso organization.

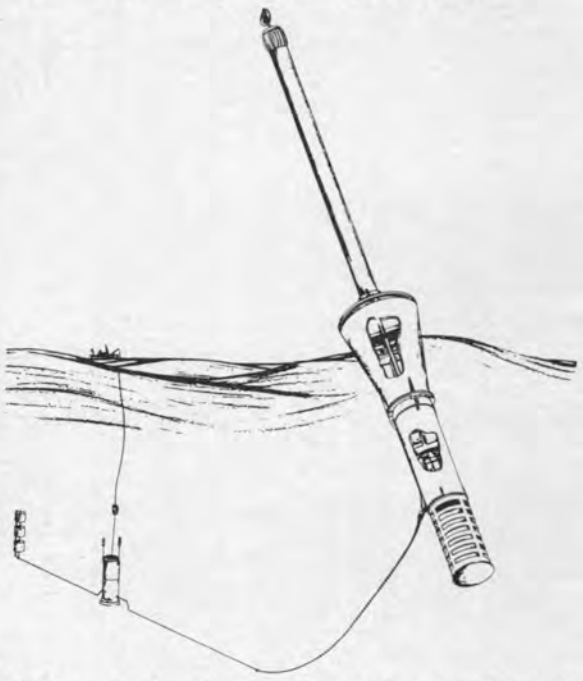
PORT ENGINEERS ANNUAL DINNER-DANCE—The Society of Marine Port Engineers New York, N. Y., Inc. recently held its annual dinner-dance in New York City. Shown above are the officers of the Society, left to right: **Philip A. Donahue,** first vice-president; **Harlan T. Haller,** chairman of the board of directors; **John C. Fox Jr.,** president; **Edward English,** chairman of the entertainment committee, and **Paul S. Farr,** secretary-treasurer.

10,000 hp on the way

These two towboats bring to five the total ordered from Dravo Corporation by Midland Enterprises, Inc., a subsidiary of Ohio River Company. The 5,000-hp vessels feature a new hull design and they are equipped with twin 9′9″ props housed in Dravo-modified Kort nozzles.

Dravo's research program, design capabilities and engineering skills assure you of the highest performance towboats available. For more information on Dravo-built vessels, contact Dravo Corporation, Marine Sales, Neville Island, Pittsburgh, Pennsylvania 15225.

GE Offers Floating Powerplant For Offshore Oil Production



Major parts of a floating powerplant system for deep-water, remote oil production are shown. Buoy contains modified aircraft gas turbine engine and alternators. Mooring system carries fuel from the bottom to the powerplant and electric power down to the cylindrical sea terminal for oil production use. Support vessel is lowering divers in capsule for periodic maintenance.

A modified aircraft jet engine propulsion system floating in a buoy would be a reliable, economical prime source of power for remote, deep-water oil production, General Electric engineers told the Offshore Technology Conference in Houston.

Such a system would be suitable where distance from shore—20 miles or more—is too great for shore-based electrical cables; and where the depths—300 feet and more—make the cost of offshore platforms excessive.

Russell N. Edwards and **Joseph E. Zupanick** of GE's Re-entry Systems organization presented the concept. Their design grew out of a cost study of all possible underwater power sources. The study also showed that a nuclear power supply becomes economical when the needed energy exceeds 500,000,000 kilowatt hours which would be required only for larger oil production operations.

Major parts of the power system are: a buoy containing the aircraft gas turbine engine and six aircraft alternators, a cable-conduit mooring line, and a sea terminal on the bottom.

The gas turbine, which requires only "minor conversion" for marine use has a nominal rating of 3,000 hp and operates on natural gas from an operating oil or gas well or from submerged fuel cache. The six alternators each have a nominal rating of 300 kw and are driven through a high-speed gear reduction unit. The power system described is designed to deliver 2,000 kva, 1,500 kw to a 400 Herz three-phase load at the bottom. The attended life of this power train "proved in aircraft use" would be more than five years.

All of the power train and auxiliary equipment is installed in a spar buoy with a displacement of about 5 tons. The buoy is patterned after GE's developmental "Sea Robin" buoy system which has survived near hurricane conditions. It is only 32 feet long, with a maximum diameter of 8½ feet. A damper at the submerged end provides stabilization.

The cable-conduit mooring system has the triple function of holding the buoy in place, supplying fuel from the bottom to the turbine, and carrying the electrical power from the alternators to the sea terminal.

The sea terminal consists of a cylindrical housing which contains equipment for power conditioning, turbine-fuel conditioning, pumping, instrumentation, controls, cooling and anchoring equipment. Also included is life support equipment to aid in periodic servicing by divers.

The authors said that a great deal of attention was given to the design of a filter system to remove salt from the turbine's inlet air. Inlet air is drawn from a pipe about 40 feet above the surface and always from the lee side, away from the wind. The air then passes through six inches of metal mesh which collects salt laden droplets; then through a centrifuge to spin crystals out; then through a resonant silencer and finally through a porous filter and to the turbine.

M.A.N. Augsburg Works Announces Staff Changes

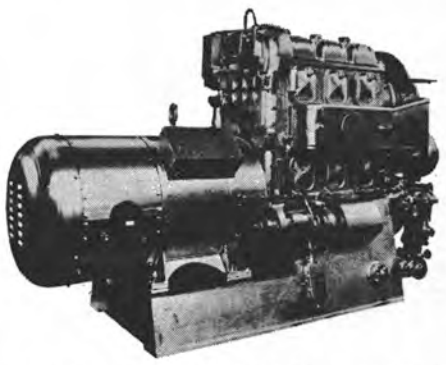
M.A.N. has announced a reorganization of the diesel engine sales and design departments at its Augsburg (Germany) Works. These two departments have been combined into the Diesel Engine Construction Division. Director **Klaus Bredschneider,** Dipl.-Ing., has been appointed head of the division.

Hans-Harald Deneke has been named head of the Diesel Engine Sales Department, succeeding **Hans Robkopf** who retired after 40 years of service with the company.

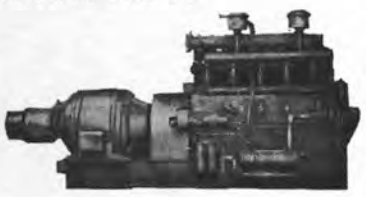
In another move, Director **Otto Voisard,** formerly head of M.A.N.'s technical office in Hamburg, has been appointed managing director of M.A.N. Turbo GmbH, Munich.

MARINE DIESEL GENERATORS

SUPERIOR, 10 KW, 120 Volts DC.
HERCULES, D0OC, 10 KW, 120 DC, Radiator cooled.
CATERPILLAR, radiator cooled, 15 KW, 120/240 Volts DC.
FAIRBANKS-MORSE, radiator cooled, 25 KW Continental Generator, 120/208/3/60.
Hercules DJXC, 25 KW, 120 DC.
GM 3-71, 30 KW, 120 DC.
Cummins A1, 30 KW, 120 DC.
MURPHY, Model ME 66, radiator cooled, 75 KW, 120/240 Volts DC.
CATERPILLAR DIESEL ENGINE, Model D17000, 167 HP, 900 RPM, with Louis-Allis Generator, 85 KW, 220/3/60.
LORIMER, F5SS, 75 KW, 120/240 DC, radiator cooled.
COOPER-BESSEMER, JS-5, 250 KW, 240 DC.



LORIMER 100 KW
450/3/60 Volts DC.



BUDA 6DHG691, 60 KW, 120 Volts DC.

GM-3-268A, 100 KW, 240/120 Volts DC.

SUPERIOR GBD-8, 100 KW, 240/120 Volts DC.

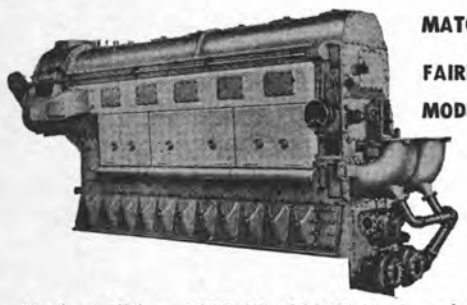
SUPERIOR, Model IDB-8, 100 KW, 450/3/60.

GENERAL MOTORS Model 3-268A, 152 BHP, 1200 RPM, with 100 KW Generators, 450 volts AC, 3 phase, 60 cycles.

GM 8-268A, radiator cooled, air start with Westinghouse Generator, 250 KW, 440/3/60, complete with switchboard.

GENERAL MOTORS DIESEL ENGINES, Model 8-278, with 500 KW Generators, 115/230 DC.

MARINE DIESEL ENGINES



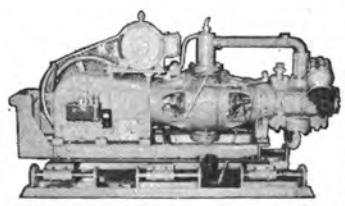
MATCHED PAIR . . .
FAIRBANKS-MORSE
MODEL 38D8-⅛
1 Port;
1 Starboard

Used condition, 1800 HP, 800 RPM, 2 cycle, 8½" bore, 10" stroke, Air Start. Complete with Westinghouse Reduction Gears, 2.216:1 ratio—with hydraulic coupling.

4—COOPER-BESSEMER, MODEL LS-8-DR
1300 HP, 277 RPM, direct reversing, turbo charged.

HYDRAULIC PUMPS (STEERING)
Hele Shaw, Type JLP 12, 1000 PSI, 850 RPM. Northern radial piston. Size 5430, 44 GPM, 1500 PSI, 850 RPM.

AIR COMPRESSORS



JOY CLASS WG82

JOY Air Compressors Class WG82, 2-stage rated 100 CFM at 300 PSI, water cooled, size 7" x 3⅜" x 7" Typical Shop #75652, with Reliance motor, 30 HP, 220/440/AC/3/60.
WORTHINGTON, 60 CFM, 110 PSI, with 15 HP Motor, 440/3/60.
WORTHINGTON, 60 CFM, 15 HP, 230 DC.
INGERSOLL-RAND, 150 CFM, 600 PSI, Model 75, with Westinghouse Motors, 75 HP, 230 DC.
INGERSOLL-RAND, 194 CFM, 110 PSI, 40 HP, 230 DC.
INGERSOLL-RAND, 50 CFM, 600 PSI, Model 30, with Westinghouse Motors, 15 HP, 230 DC.
CHICAGO-PNEUMATIC, 161 CFM, 100 PSI, 40 HP, 230 DC.
WESTINGHOUSE Air Brake, 246 CFM, 140 PSI, with 50 HP Motors, 440/3/60.
WORTHINGTON, 175 CFM, 125 PSI, with 50 HP Motors, 440/3/60.

STEAM AIR COMPRESSORS
Westinghouse Air Brake Company, Size 9½ x 9 x 10 Vertical.

REDUCTION GEARS . . .

FARREL-BIRMINGHAM, as orig. used on two 1375 HP electric motors, in submarine, 2 pinions, single output gear, Pinion RPM 1302, Gear RPM 280; ratio 4.65:1.

WESTINGHOUSE, 2.216:1 ratio, with hydraulic coupling; as used with 1800 HP, 800 RPM Fairbanks-Morse engine—Starboard.

FALK REDUCTION GEARS . . . Port and Starboard, interchangeable with T-3 Tanker Gears, Falk No. 148-300. Also interchangeable with Falk Gears on A051 Class Tankers (14 ships). Also on A097 to A0100 Tankers. Gears are available as complete assemblies and/or rotating elements in sets. Gears offered with a current inspection report of condition by a representative of Falk Corporation.

ALLIS-CHALMERS, 440 PSI, 740 F, with Allis-Chalmers Generators, 300 KW, 120/240 DC.

DE-LAVAL Turbines, 450 PSI, 750° F, with Crocker-Wheeler Generators, 300 KW, 120/240 DC.

TURBINE GENERATORS

JOSHUA HENDY Turbines, 300 PSI, temperature 550° F with Westinghouse Generators, 300 KW, 120/240 Volts, DC.

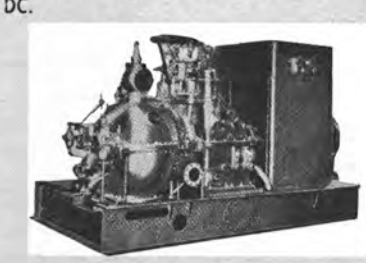
WORTHINGTON Turbines, Form S-4, 440 PSI, 740° F, driving on same comman shaft a 250 KW Generator, 440/3/60, and a 90 KW Generator, 125 Volts DC.

WORTHINGTON Turbines, Form S-4, 440 PSI, 740° F, with Crocker-Wheeler Generators, 300 KW, 120/240 Volts DC.

GENERAL ELECTRIC Turbine, Type FN3-FN24, Steam 265#G., Serial 54110, with G.E. Generator, 750 KW, 440/3/60, Frame 985 Y, Serial 580447.

JOSHUA HENDY Turbines, with Westinghouse Generators, 150 KW, 120 volts DC.

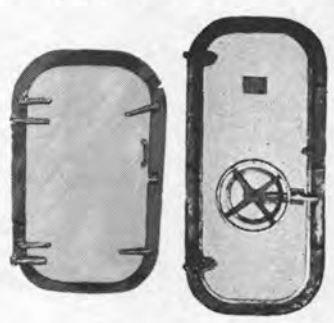
TERRY TURBINES, type TM5, 440 PSI, 750° F, with Crocker-Wheeler Generators, 300 KW, 120/240 DC.



WATERTIGHT DOORS

As removed from reserve "mothballed" vessels. Huge inventory of practically all sizes and types ready for immediate delivery . . . and more on the way. These doors have the frame trimmed and are suitable for re-use. Doors are available in 4, 6, 8 and 10 dog types; many are "Quick-acting-wheel controlled."

Save over new replacement costs as shown in the **"Typical Price"** listing below . . .
26" x 48"—4 dog type $ 60.00 ea.
26" x 66"—6 dog type $100.00 ea.
26" x 66"—Quick Acting $175.00 ea.



USED, GOOD STEEL
"QUICK-ACTING WHEEL TYPE"
and DOG TYPE

Other sizes and prices quoted on request.

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BEST BUYS!

AC & DC *Marine* PUMPS

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XPLORATIONS, INC.

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Phone: (503) 228-8691
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Ralph E. Ingram

(503) 228-8691

Hundreds of other pumps in our stock
Phone or mail required specifications.

AC PUMPS—Horizontal Centrifugal

2—Goulds, 2000 GPM, 470' head, Size 8x10, with Westinghouse Motors, 350 HP, 2300/3/60.

1—Ingersoll-Rand, 3000 GPM, 250' head, Size 8ALV, with Westinghouse Motor, 250 HP, 2200/3/60, 1775 RPM.

1—Worthington, 400 GPM, 150 PSI, 5½" suction, 3½" discharge, with G.E. Motor, 75 HP, 440/3/60, 3550 RPM.

2—Goulds, 300 GPM, 336' head, 3" suction, 2" discharge, with G.E. Motors, 50 HP, 440/3/60, 3550 RPM.

7—J.C. Carter, 365 GPM, 250' head, stainless steel, 3" suction, 3" discharge, with 220/440/3/60 Motors, 25 H.P.

6—326 GPM, 138' head, C.I. pump housing, 3" suction, 3" discharge, with Westinghouse Motors, 20 HP, 220/440/3/60, 1755 RPM.

6—682 GPM, 60' TDH, C.I. pump housing, 5" suction, 5" discharge, with Westinghouse Motors, 15 HP, 220/440/3/60, 1700 RPM.

2—Worthington, 80 GPM, 60 PSI, 2½" suction, 2" discharge, with G.E. Motors, 8 HP, 440/3/60, 3450 RPM.

3—Worthington, 650 GPM, 9 PSI, 6" suction, 6" discharge, with Star Motors, 6 HP, 440/3/60.

1—Worthington, 175 GPM, 20 PSI, 3½" suction, 3" discharge, with G.E. Motor, 3.74 HP, 440/3/60, 3450 RPM.

4—Worthington, 60 GPM, 22 PSI, 3½" suction, 2" discharge, with G.E. Motors, 3 HP, 440/3/60, 3450 RPM.

3—Allis-Chalmers, 35 GPM, 100' head, 2" suction, 1½" discharge, with Allis-Chalmers Motors, 3 HP, 440/3/60, 3500 RPM.

1—Allis-Chalmers, 65 GPM, 80' head, 1½" suction, 1½" discharge, with Allis-Chalmers Motor, 3 HP, 220/440/3/60, 3500 RPM.

2—Worthington, 13 GPM, 51 PSI, 1½" suction, 1½" discharge, with G.E. Motors, 2.64 HP, 440/3/60, 3490 RPM.

1—Worthington, 75 GPM, 22', 3" suction, 2½" discharge, with G.E. motor, 1.9 HP, 440/3/60, 3450 RPM.

5—Worthington, 30 GPM, 30 PSI, 1½" suction, 1½" discharge, with G.E. Motors, 1.75 HP, 440/3/60.

14—Warren, 6 GPM, 36 PSI, 1¼" suction, 1" discharge, with G.E. Motors, 1.25 HP, 440/3/60, 3450 RPM.

AC PUMPS—Vertical Centrifugal

6—Worthington, 275 GPM, 56.6 PSI, 8½" suction, 3½" discharge, with G.E. Motors, 22.9 HP, 440/3/60, 1180 RPM.

4—Worthington, 490 GPM, 35 PSI, 7" suction, 4½" discharge, with G.E. Motors, 19.6 HP, 440/3/60, 1175 RPM.

6—Chicago Pump Co., submersible, 400 GPM, 6 # suction, 30 # discharge pressure, with Wagner Motors, 15 HP, 440/3/60, 1740 RPM.

6—Dayton-Dowd, 1160 RPM, 15 PSI, 10" suction, 8" discharge, with Wagner Motors, 10 HP, 440/3/60.

4—Worthington, 100 GPM, 40 PSI, 5" suction, 3" discharge, with G.E. Motors, 7.37 HP, 440/3/60, 1750 RPM.

4—Warren, 135 GPM, 35 PSI, 6" suction, 3" discharge, with G.E. Motors, 6 HP, 440/3/60.

1—Worthington, 35 GPM, 62.4 PSI, 3" suction, 2" discharge, with G.E. Motors, 5.83 HP, 440/3/60, 1150 RPM.

7—Allis-Chalmers, 68 GPM, 114' head, Type SSV-C, 3" suction, 1½" discharge, with Wagner Motors, 7½ HP, 440/3/60, 1750 RPM.

3—Worthington, 350 GPM, 11.1 PSI, 10" suction, 3½" discharge, with G.E. Motors, 5 HP, 440/3/60, 1150 RPM.

12—Allis-Chalmers, 10 GPM, Size 2"x2½", with Wagner Motors, 3 HP, 440/3/60, 3600 RPM.

AC PUMPS—Horizontal Rotary

4—Warren, 197 GPM, 175 PSI, with Electro Dynamics Motors, 30 HP, 440/3/60, 1750 RPM.

2—Northern, 10 GPM, 350 PSI, 3" suction, 2" discharge, 200 RPM, with G.E. geared Motors, 5 HP, 440/3/60.

3—DeLaval, 25 GPM, 50 PSI, with G.E. Motors, 1.8 HP, 440/3/60.

AC PUMPS—Vertical Rotary

2—DeLaval, 550 GPM, 50 PSI, with G.E. Motors, 27.4 HP, 440/3/60, 1180 RPM.

7—Quimby, Size 2½, 10/6 GPM, 350 PSI, 2½" suction, 1½" discharge, with Wagner Motors, 6/3 HP, 440/3/60, 1160/865 RPM.

8—Blackmer, 50 GPM, 35 PSI, 420 RPM, with G.E. geared Motors, 2 HP, 440/3/60, 1750 RPM.

DC PUMPS—Horizontal Centrifugal

6—Worthington, Size 8L1, 2100 GPM, 138.5 TDM, with Westinghouse Motors, 100 HP, 230 DC, 1310/1750 RPM.

6—Worthington, Size 12 LA1, 4000 GPM, 67.3 TDM, with Westinghouse Motors, 100 HP, 230 DC, 1310/1750 RPM.

6—Worthington, Size 3UB1, 400 GPM, 280' head, with Westinghouse Motor, 50 HP, 230 DC, 1310/1750 RPM.

2—Weil, 400 GPM, 100 PSI, with 40 HP Motors, 230 DC.

1—Goulds, Figure 3380, 4" suction, 3" discharge, 250 GPM, 100 PSI, with 30 HP Motor, 230 DC, 2200 RPM.

6—Worthington, Size 4L1, 400 GPM, 83' head, with Westinghouse Motors, 15 HP, 230 DC, 1225/1750 RPM.

1—Aldrich, 8" suction, 6" discharge, with G.E. Motor, 12/25 HP, 115 DC.

3—Warren, 1175 GPM, 11.2 PSI, with Reliance Motors, 10 HP, 230 DC.

4—Gardner-Denver, 900 GPM, 30' head, with Crocker-Wheeler Motors, 10 HP, 230 DC.

1—Westco, 100 GPM, 100 PSI, 2" suction, 2" discharge, with 10 HP Imperial Motor, 115 DC.

DC PUMPS—Horizontal Centrifugal

2—Yeomans, 135 GPM, 3" suction, 115' head, 3" discharge, with Kimble Motor, 10 HP, 230 Volts DC.

2—Warren, size 5, 600 GPM, with Electro-Dynamics Motors, 8/4.5 HP, 230 Volts DC.

1—Warren, 5" suction, 4" discharge, with Reliance Motor, 7½ HP, 115 Volts DC.

1—Dayton-Dowd, 3" suction, 2½" discharge, with Crocker-Wheeler Motor, 5 HP, 120 DC.

1—Ingersoll-Rand, Model A, 45 GPM, 125' head, with G.E. Motor, 5 HP, 115 Volts DC.

3—Ingersoll-Rand, Size 1MVR, 50 GPM, with Electro-Dynamics Motors, 3.9 HP, 230 DC.

1—Fairbanks-Morse, 250 GPM, 13' head, with Fairbanks-Morse Motor, 3.72 HP, 230 Volts DC.

2—Worthington, 150 GPM, 22 PSI, 3½" suction, 3" discharge, with Diehl Motors, 3.47 HP, 230 Volts DC.

DC PUMPS—Horizontal Centrifugal

1—Yeomans, 40 GPM, 75' head, 1½" suction, 1" discharge, with Master Motor, 2 HP, 230 Volts DC.

2—Westco, 20 GPM, 50 PSI, with Century Motors, 1½ HP, 120 Volts DC.

2—Worthington, 60 GPM, 23.7 PSI, 2½" suction, 2" discharge, with Diehl Motors, 1.43 HP, 230 Volts DC.

7—Warren, 4 GPM, 38 PSI, 1½" suction, 1" discharge, with Century Motor (4-230 DC, 3-115 DC), 1.25 HP.

DC PUMPS—Vertical Centrifugal

2—Buffalo, Size 3 SAV, 400 GPM, 125 TDH, with Electro-Dynamic Motors, 50 HP, 230 Volts DC, 1350/1800 RPM.

1—Gardner-Denver, 1500 GPM, 56' head, 8" suction, 6" discharge, with Century Motor, 30 HP, 230 Volts DC, 1750 RPM.

1—Ingersoll-Rand, Size 18VCM, 8500 GPM, with Electro-Dynamic Motor, 20/40 HP, 230 Volts DC, 410/545 RPM.

2—Worthington, 16" LAS-2, 5600 GPM, 10 PSI, with G.E. Motor, 20/40 HP, 230 Volts DC, 540/720 RPM.

1—Ingersoll-Rand, 10" suction, 10" discharge, 1050/2000 GPM, with G.E. Motor, 20 HP, 230 Volts DC, 805/1150 RPM.

1—Worthington, 340 GPM, 33.6' 6" suction, 3" discharge, with G.E. Motor, 15 HP, 230 Volts DC.

1—Ingersoll-Rand, 1050 GPM, ... 5" suction, 5" discharge, with Crocker-Wheeler Motor, 15 HP, 230 Volts DC. 1150 RPM.

2—Ingersoll-Rand, 450 GPM, 15' head, 4" suction, 3" discharge, with G.E. Motors, 10/15 HP, 230 Volts DC, 1300/1750 RPM.

1—Allis-Chalmers, 750 GPM, 30.3' head, 5" suction, 5" discharge, with Star Motor, 10 HP, 230 Volts DC, 1750 RPM.

2—Buffalo, Size 3SLV, 425 GPM, 35 TDH, with Electro Dynamic Motors, 7½/15 HP, 230 Volts DC, 1310/1750 RPM.

3—Ingersoll-Rand, Size 1VHM, 18 GPM, 75 PSI, 3¼" suction, 1½" discharge, with G.E. Motors, 7½ HP, 230 Volts DC.

1—Worthington, 175 GPM, 50 PSI, 4" suction, with G.E. Motor, 7½ HP, 230 Volts DC.

2—Ingersoll-Rand, Size ..... 8 VCM, 1400 GPM, with Electro Dynamic Motors, 5/10 HP, 230 Volts DC, 950 RPM.

2—Ingersoll-Rand, Size 1½ VBM, 70 GPM, with Electro Dynamic Motors, 5/10 HP, 230 Volts DC, 1500/2000 RPM.

2—Ingersoll-Rand, Size 1MVR, 20 GPM, with Electro Dynamic Motors, 3/1.5 HP, 230 Volts DC, 1950/2600 RPM.

2—Worthington, 8" LS-1, 1400 GPM, 10 PSI, with G.E. Motors, 5/10 HP, 230 Volts DC, 875/1200 RPM.

2—Worthington, Type 1½ UZS-3, 20 GPM, 75 PSI, with G.E. Motors, 5 HP, 230 Volts DC, 1800 RPM.

2—Weil, 20 GPM, 40 PSI, 1½" suction, 1¼" discharge, with G.E. Motors, 3 HP, 230 Volts DC.

DC PUMPS—Horizontal Rotary

3—Worthington, Size 5GES, 400 GPM, 50 PSI, with Westinghouse Motors, 20 HP, 230 Volts DC, 1750 RPM.

1—DeLaval, 15 GPM, 350 PSI, 2½" suction, 2½" discharge, with Diehl Motor, 10 HP, 230 Volts DC.

2—Viking, Type EKK, 60 GPM, 70 PSI, 2" suction, 2" discharge, with Diehl Motors, 5 HP, 230 Volts DC.

3—National Transit, 50 GPM, 50 PSI, 3" suction, 2½" discharge, 3 HP, 230 Volts

DC PUMPS—Vertical Rotary

6—Quimby, Size 5, 400 GPM, 60 PSI, 6" suction, 5" discharge, with Westinghouse Motors, 30 HP, 230 Volts DC.

1—DeLaval, IMO, 250 GPM, 40 PSI, with G.E. Motor, 15/20 HP, 230 Volts DC, 1310/1750 RPM.

3—Worthington, Model 4GRVS, 225 GPM, 35 PSI, with G.E. Motors, 15/20 HP, 230 Volts DC.

4—Worthington, Model 4GRVS, 175 GPM, 50 PSI, with G.E. Motors, 7½/10 HP, 230 Volts DC.

1—Quimby, Size 4, 175 GPM, with Electro Dynamic Motor, 7.5/10 HP, 230 Volts DC, 865/1150 RPM.

2—Worthington, Type 3GRVS, 90 GPM, 75 PSI, 2¾" suction, 2½" discharge, with Diehl Motors, 7½ HP, 230 Volts DC.

1—Quimby, Size 2, 8 GPM, with Electro Dynamic Motor, 2/5 HP, 230 Volts DC, 575/1150 RPM.

2—Worthington, Type 2GRVS, 7 GPM, 400 PSI, with G.E. Motors, 2½/5 HP, 230 Volts DC, 900/1800 RPM.

BOILER FEED PUMPS — TURBINE & ELECTRIC

4—Worthington, Vertical type, single acting, triplex, constant speed, size 2¼ x 4, 47 GPM, 525 PSI, with G.E. Motors, 20 HP, 230 Volts DC.

2—Worthington, 5" UFD, 460 GPM, 750 PSI, 5" suction, 5" discharge, driven by Sturtevant Steam Turbine, Size CC-22', Type 21, 2½" steam inlet, 5½" exhaust.

2—Aldrich Pump Co. Triplex, Vertical, Size 2½ x 4, 65 GPM, 575 PSI, with G.E. Motors, 25 HP, 230 Volts DC.

2—Ingersoll-Rand, 165 GPM, 575 PSI, with turbine drives.

TURBINE DRIVEN PUMPS — Various

2—Worthington, Size 20-LAL-18, Main Condenser, Centrifugal, 10500, 27' head, Vertical, with Whiton Turbines, 95 HP.

1—Ingersoll-Rand, Size 5UV, Centrifugal, Horizontal, 1200 GPM, 225' head, 6" suction, 5" discharge, with Elliot Turbine, 84.3 HP.

1—Worthington, Fire, Flushing & Emergency Bilge, Centrifugal, Horizontal, Rating—Fire: 500 GPM, 150 PSI, Flushing: 1000 GPM, 60 PSI, Bilge: 750 GPM, 25 PSI, 5½" suction, 4½" discharge, with Whiton Turbines, 72.9 HP.

1—DeLaval, Fuel Oil Transfer, Vertical, Rotary, 250 GPM, 150 PSI, 7" suction, 6" discharge, with DeLaval Turbine, 35 BHP.

8—Goulds Main Circulating, Vertical, Centrifugal, 3700 GPM, 13 PSI, Size 12", with Elliot Turbines, 30 HP.

2—DeLaval Fuel Oil Service, Vertical, Rotary, 50 GPM, 350 PSI, 3½" suction, 3½" discharge, with DeLaval Turbines, 14.4 HP.

4—DeLaval—IMO, L.O. Service, Vertical, Rotary, 300 GPM, 45 PSI, 6" suction, 6" discharge, with DeLaval Turbines, 14.1 HP.

8—Allis-Chalmers, Type SSC-V, 68 GPM, 114' head, 3" suction, 1½" discharge, with Carling Turbines, 7½ HP, 1750 RPM.

2—Warren, 85 GPM, 60 PSI, For Lube Oil Service, Turbine Driven.

2 — Warren, Main Circulating, 3500 GPM, 13.5 PSI, Turbine Driven.

STOCKLESS ANCHORS

USED, GOOD QUALITY . . . SAVE!

3,000 pound size
8,000 pound size
10,000 pound size

ANCHORS... Unused, surplus 3000 # size Danforth

ANCHOR CHAIN . . . Used, good, with or without test certificate . . .
1 1/2" size
1 3/8" size
2 1/16" size
2 1/4" size

ANCHOR WINDLASS

1—LIDGERWOOD horizontal Anchor Windlass, double wildcat—for 2 1/16" Chain, double gypsy, with 50 motors, 230 volts DC, complete with controls.

1—Horizontal, of German Mfg., double wildcat—for use with 3" anchor chain, double gypsy with 230 VDC motor, complete with electrical control equipment.

American Engineering, horizontal, double 2⅛" Chain, 65 HP, 230 DC, complete.

7—American Hoist and Derrick Company, horizontal, double wildcat—for 2¼" chain double gypsy, 70 HP, 230 Volts DC, with electric controls.

3—Hesse-Ersted, horizontal, double wildcat, 2⅛" chain, 60 HP, 230 DC.

1—Hyde Horizontal Anchor Windlass double wildcat—for use with 2⅛" Anchor Chain, and with General Motors Electric Motor, 60 HP, 230 volts DC, 560/1700 RPM, Type CDM 18831 AE. Complete with Contractor Panel, Resistors, and Master Switch.

ANCHOR WINCHES

2—Jaeger, single drum—capacity approximately 900' of 1½" wire rope, double gypsy, with 35 HP Motors, 230 Volts DC, complete with electricals.

UNIWINCHES

LAKESHORE UNWINCHES, with Allis-Chalmers Motors, 50 HP, 230 Volts DC, complete with Control Equipment.

Single speed, double drum, 7450 # at 220 FPM.

Single speed, single drum, 7450 # at 220 FPM.

Two speed, single drum, 7450 # at 220 FPM, 14400 # at 105 FPM.

HYDRAULIC CYLINDERS

3000 PSI

Bore	Stroke	Rod Diameter	Overall retracted length	Action
10"	12"	3.75"	45½"	double
10"	26"	3.75"	58½"	single
2"	8"	1½"	20"	double
2.5"	15"	1.12"	25½"	double
3"	8"	1.37"	15½"	double
6"	8'	4"	144"	double
13"	9'7"	5½"	14'	double

STEERING STANDS

Brass Steering Stands. Complete with angle indicator on top, used, 11" base diameter by 35½" high, and with 42" overall, 8-spoke brass steering wheel.

$195.00 each

CAPSTAN WINDLASSES

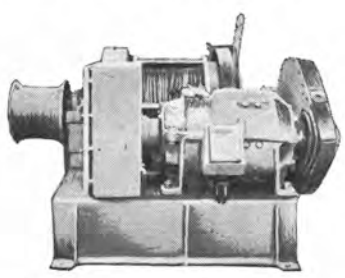
Model CWP-3, Vertical 24" Planetary Capstan Windlasses, Single Wildcat — using 1¼" Anchor Chain, Single Gypsy with 20 HP motor, 230 volts DC, complete with Contactor Panel, Master Switch, and Resistors.

3—Hesse-Ersted Vertical, Single Wildcat—for 1⅜" Anchor Chain, single gypsy, with HP General Electric Motor, 230 Volts DC, complete with Controller equipment.

Hyde, Vertical, Single Wildcat, for 1⅛" Anchor Chain, single gypsy, with 20/5 HP Motor, 440/3/60.

McKiernan — Terry, Single Wildcat — for ¾" chain, Single Gypsy, with underdeck drive with Star Motor, 7½ HP, 115 DC, with Electrical control equipment.

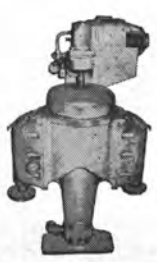
CARGO WINCHES



American Hoist and Derrick Company Winches with Westinghouse Motors, 50 HP, 230 Volts DC, complete with Contactor Panels, Master Switches, and Resistors.

Type 66—single speed, single drum.

Type 67—two speed, single drum.



CENTRIFUGES

Sharples Purifiers—For Diesel Service or for Lube Oil Service.

150 GPH—440 AC, 230 DC

350 GPH—230 DC

600 GPH—230 DC

FAIRLEADS

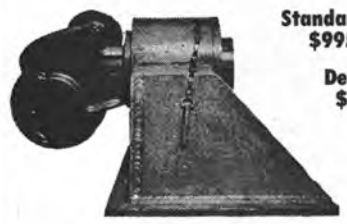
Designed and Manufactured by ZIDELL EXPLORATIONS, INC.

To Give You These Features:

One size fairlead with universal type sheave to accommodate wire rope sizes 1" up to and including 2".

Self Aligning, Swivel Type Head.

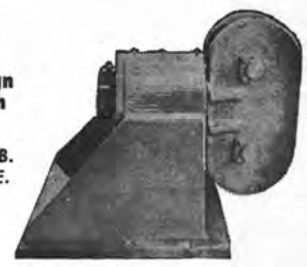
Dependable and Ruggedly built to perform consistently year after year with minimum maintenance.



Standard Design $995 each

Deluxe Design $1250 each

Model Design $1350 each



PRICES ARE F.O.B. PORTLAND, ORE.

SPECIAL ITEMS

COUPLINGS

(Flexible Couplings between Turbines and Reducing Gear)

1—Set from C3-S1-A3 Vessel

1—Set from C2-S-B1 (Moore built)

1—Set from AP2 Victory Ship

PROPELLERS

From C3-S1-A3 Vessel

From C2-S1-B1 Vessel

From AP2 Victory Ship

From Liberty Ships and LST Vessels

PROPELLER SHAFTS

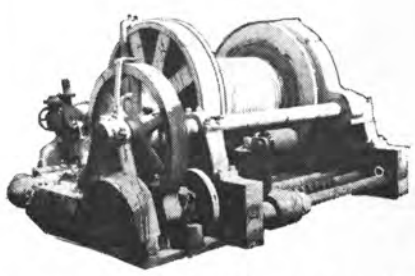
From C3-S1-A3 Vessel

From C2-S-B1 Vessel (Moore built)

From C2-SU Vessel

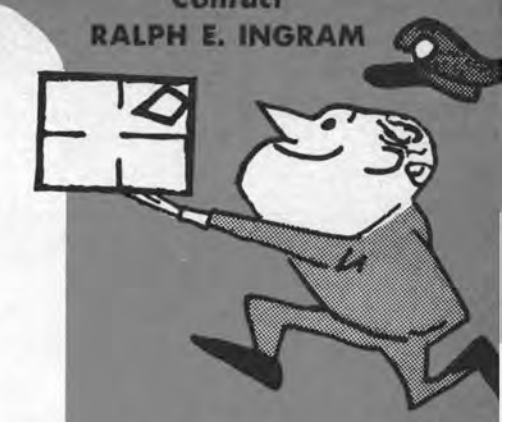
From Liberty Ships and LST Vessels

STEAM TOWING WINCH



Single drum, capacity 2000' of 2" wire rope, cylinder size 9" bore by 10" stroke.

Contact
RALPH E. INGRAM



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2 — TURBINE GENERATORS, Allis-Chalmers, Turbines: Impulse Condensing Type, 740° F, 440 PSI, 8000 RPM, Generators: 300 KW, 240 Volts DC, 2 wire, 1200 RPM.

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2—Jaeger, 2 drum, 2 speed, 50 HP, 230 DC.
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GENERAL SERVICE PUMP, Worthington, vertical simplex, Size 12 x 14 x 18, 600 GPM, 50 PSI.

BOILER FEED PUMP, Worthington Auxiliary, vertical simplex, Size 11 x 7 x 24, 120 GPM, 550 PSI.

FRESH WATER PUMPS, 2—Worthington, Size 4x6, horizontal duplex, 100 GPM, 80 PSI, 7½ HP, 230 DC.

BALLAST PUMP, Allis-Chalmers, Type SGV, Size 5 x 5, double suction, vertical centrifugal, 600 GPM, 30 PSI, 20 HP, 230 DC.

SUBMERSIBLE BILGE PUMPS, 2—Worthington, 5", vertical centrifugal, 600 GPM, 30 PSI, 20 HP, 230 DC.

BILGE PUMP, Allis-Chalmers, Size 5 x 5, Type SGV, double suction, vertical centrifugal, 600 GPM, 30 PSI, 20 HP, 230 DC.

EVAPORATOR TUBE NEST DRAIN PUMPS, 2—Allis-Chalmers, Type SS-LH, horizontal, Size 2½ x 2, 17 GPM, 127' head, 5 HP, 230 DC.

MAIN CONDENSATE PUMPS, 2—Allis-Chalmers, Type CF-2V, vertical volute, Size 6 x 3½, 170 GPM, 208' head, 20 HP, 230 DC.

DISTILLER CONDENSATE PUMPS, 2 — Allis-Chalmers, Type SS-L, horizontal centrifugal, Size 4 x 2, 45 GPM, 2 HP, 230 DC.

AUXILIARY CONDENSATE PUMPS, 2—Allis-Chalmers, Type CF-2V, vertical volute, Size 2½ x 1½, 30 GPM, 208' head, 7½ HP, 230 DC.

DIESEL OIL PUMP, Viking, Type ZKK, gear type, Size 3 x 2½, 40 GPM, 30 PSI, 2 HP, 230 DC.

DISTILLER FRESH WATER DISTRIBUTION PUMPS, 2—Allis-Chalmers, Type SS-DH, horizontal centrifugal, Size 2½ x 2, 55 GPM, 51' head, 2 HP, 230 DC.

FIRE PUMPS, 2—Allis-Chalmers, Type B2-V, vertical centrifugal, Size 4 x 3, 400 GPM, 280' head, 50 HP, 230 DC.

MAIN FEED PUMP, Terry Turbine, Type ZS-1, 124 HP, with Ingersoll-Rand horizontal pump, Size 4 x 3½, 4 stage, 250 GPM, 1340' head.

STEERING GEAR PUMP, Waterbury, Size 5, Type K, with Westinghouse Motor, 55 HP, 230 Volts DC.

LUBE OIL SERVICE PUMPS, 2—Quimby, vertical screw, Size 5, 400 GPM, 48 PSI, 6 x 5, 25 HP, 230 DC.

FUEL OIL TRANSFER PUMP, Quimby, vertical screw, Size 4D, 225 GPM, 50 PSI, 15 HP, 230 DC.

FUEL OIL SERVICE PUMP, Quimby, vertical screw, Size 2½, 20 GPM, 400 PSI, 2½ x 1½, 10 HP, 230 DC.

ICE WATER CIRCULATING PUMP, Allis-Chalmers, Type SS-RH, 10 GPM, 81' head, 1" x ¾", vertical volute, 1 HP, 230 DC.

HOT WATER CIRCULATING PUMP, Allis-Chalmers, Type SS-HH, 35 GPM, 70' head, 1¼ x 1¼, vertical volute, 2 HP, 230 DC.

REFRIGERATION CONDENSER CIRCULATING PUMPS, 2—Allis-Chalmers, Type SJK, 180 GPM, 81' head, 2½ x 2, horizontal volute, 7½ HP, 230 DC.

MAIN CONDENSER CIRCULATING PUMP, Allis-Chalmers, Type LS-V, 12,550 GPM, 20' head, 20 x 20, vertical volute, 100 HP, 230 DC.

AUXILIARY DISTILLER CIRCULATING PUMPS, 2—Allis-Chalmers, Type SG, 650 GPM, 29' head, 5 x 5, horizontal volute, 7½ HP, 230 DC.

AUXILIARY CONDENSER CIRCULATING PUMPS, 2—Allis-Chalmers, Type SE-V, 2820 GPM, 29.2' head, 12 x 12, vertical volute, 40 HP, 230 DC.

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6—Sections 14⅛" diameter, 26'—6" long,
2—Sections 14⅛" diameter, 18'—6" long,
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AUXILIARY FEED PUMP, Worthington, steam, Size 11 x 7 x 24 (2)

PORT FEED PUMP, Worthington, steam, Size 9½ x 6 x 24 (2)

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AUXILIARY CIRCULATING PUMP, Worthington, Size 8LS-1, 1240 GPM, 24.6' head, 10 HP, 230 DC (6)

MAIN CONDENSATE PUMP, Worthington, Size 2½-UZ-1, 120 GPM, 208 TDH, 15 HP, 230 DC (6)

AUXILIARY CIRCULATING PUMP, Worthington, Size 1½-UZS-3, 20 GPM, 208 TDH, 5 HP, 230 DC (6)

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6—100 HP, Westinghouse, Type SK, FR. 163, Style 1B4631, 1150 RPM, Shunt Wd. Horizontal, 2 B.B.

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1—40 HP, G.E., Type CDM, FR 95, Model 35A1663, 1800 RPM, Compound Wound, Horizontal, 2 B.B.

1—18/25 HP, Electro-Dynamic, 1225/1750 RPM, Compd. Wd., FR. 7½ S, Horizontal, 2 B.B.

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2—10 HP, Allis-Chalmers, 1225/1750 RPM, Compd. Wd., Type EB80, Horizontal, 2 B.B.

4—9.3 HP, Westinghouse, 640/852 RPM, Type SK, FR. 93.

120 VOLT D.C. MOTORS

1—304 HP, Westinghouse, 900 R.P.M., Shunt Wound, Horizontal, Pedestal Bearing.

3—25 HP, G.E., Type CDM, 1200 R.P.M., Horizontal, 2 B.B., unused. Removed from M.G. Sets.

20—7½ HP, Westinghouse Type SR, FR 43, Stab. Sh. Wd., 1750 RPM,.

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230 V, DC/115 V, DC. Ship's Lighting M.G. Sets for C3-S1-A-3 150 K.W. and Moore built C2 100 K.W.

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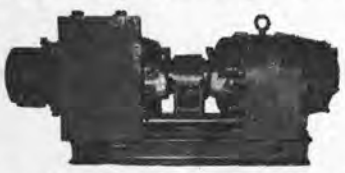

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1—150, 120 V, GE, Type CDM, Form AA, Model 24G, 1200 RPM, Compound Wound, Horizontal, 2 B.B.

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From 250 Watts to 500 KW in 115 Volt, 230 Volt and 120/240 Volt, 3 Wire DC. Any drive including Synchronous Motor. Let us have your inquiries.

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Hertner. Input: 230 V, DC, 28A. Output: 5 KVA, PF .85, 115 V, 60 cy., Ø1.

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Century. Input: 10 HP, 230 V, DC. Output: 7.5 KVA, 3.75 KW, 120/1/60.

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Fidelity. Input: 15 HP, 230 V, DC. Output: 12.5 KVA, 10 KW, 120/1/60.

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Burke Electric. Input: 20 HP, 230 V, DC. Output: 25 KVA, 12.5 KW, 120/1/60.

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Star Kimble. Input: 30 HP, 230 V, DC. Output: 25 KVA, 20 KW, 120/1/60.

Ideal. Input: 40 HP, 230 V, DC. Output: 31.3 KVA, 25 KW, 450/3/60.

Star Elec. Input: 40 HP, 230 V, DC. Output: 33.4 KVA, 25 KW, 450/3/60.

General Elec. Input: 230 V, DC, 40 HP. Output: 25 KW, 480 V, 60 cy, 3Ø, 24A, 1800 RPM.

Star Elec. Input: 125 HP, 240 V, DC. Output: 93.75 KVA, 75 KW, 450/3/60.

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Elec. Spec. Input: 1 HP, 90/130 V, DC. Output: .500 KVA, .500 KW, 115/1/60.

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Louis Allis. Input: 10 HP, 105/130 V, DC. Output: 7.5 KVA, 440/3/60.

Cont. Elect. Input: 12 HP, 120 V, DC. Output: 7.5 KVA, 440/3/60.

Star Elect. Input: 12½ HP, 115 V, DC, 1800 RPM. Output: 7½ KW, 120 V, 60 Cy.

Ideal. Input: 40 HP, 115 V, DC. Output: 31.3 KVA, 25 KW, 450/3/60.

Continental. Input: 50 HP, 115 V, DC. Output: 50 KVA, 25 KW, 120/3/60.

Burke. Input: 20 HP, 115 V, DC. Output: 25 KVA, 12½ KW, 120/1/60.

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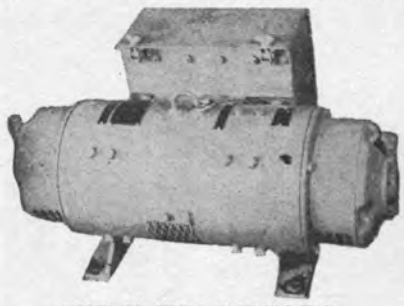

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G.E.—Type CG21ACS 2 bearing ball bearing

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Westinghouse	300 KW
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Worthington	150 KW
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Westinghouse CA 20	50 HP
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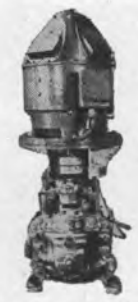
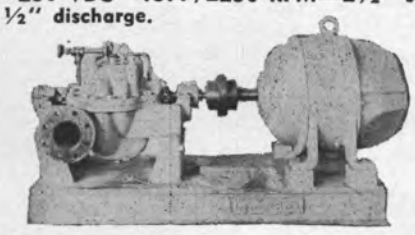
MARINE PUMPS
Fire – Bilge – General Service

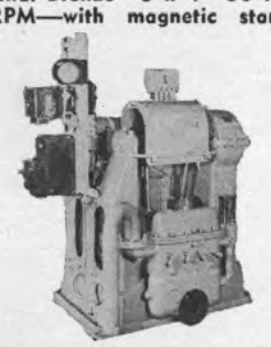
NEW ALL-BRONZE BUFFALO PUMP
Fire & General service—550 GPM @ 30 lbs.— 14.5 440/3/60 motor—built for USN.



AUXILIARY CONDENSATE
Worthington—1½ UZ-3—20 GPM @ 208′—5 HP—230 VDC—1577/2250 RPM—2½" suction —1½" discharge.



GENERAL SERVICE BUTTERWORTH & FIRE
2-Stage 300 GPM @ 339 ft. Mfg. by Gould & Ingersoll-Rand. Bronze—5 x 4—50 HP 230 VDC —2500 RPM—with magnetic starters—reconditioned.



RECIPROCATING PUMP
80 GPM @ 60 lbs.—self-priming motor-driven, with air dome. 2-Cylinder—5" bore—8" stroke— 4" suction—3" discharge Variable speed 6 HP motor—230 VDC—reduction gear ratio 22:1. German-built—long a favorite on foreign ships for reliability.

$1250.00

BRONZE FEED-WATER BOOSTER PUMPS
220/237 GPM @ 144′ head—2-stage—1750 RPM with 30 HP 440/3/60 motor control & spares. Built for USN.

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Barges On The Spot

For Charter

Hopper Barges	*Spud Barges*
175′ x 26′ Open	110′ x 30′
195′ x 35′ Open	120′ x 32′

Offshore Barges

120′ x 32′	120′ x 45′	190′ x 42′
120′ x 40′		160′ x 50′

Oil Barges 7,000 to 10,000 bbl.

Also Available: Various Deck Barges

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120′ x 30′ x 7′ Deck Barge

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RENT, LEASE OR SALE!

BARGE MOUNTED REVOLVING CRANE 50-Ton capacity, Barge dimensions: 57′ wide x 190′ long.
CRANES-WHIRLEYS: One American 1956 model R20 HHE heavy duty 50 Ton. One practically new American model 254 capacity 90 Tons at 50′, 25 Tons at 140′. One Clyde model 24E 50 Tons at 45′.
CONTINUOUS LIBERTY SHIP DISMANTLING—Marine parts always available.
STEEL BARGES AVAILABLE IMMEDIATELY—180′x42′x 12′ and 150′x42′x12′—A.B.S. Newly Constructed. OTHER SIZES ALSO AVAILABLE.

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NOTICE!

DREDGES — CONTRACTORS
OLD FAITHFUL IS BACK!!!
NEW 20 HP 230 VOLT D.C.

GEARHEAD MOTORS

30 R.P.M. OUTPUT

Star Electric Co.—20 HP—230 VDC—73 amps—1200 R.P.M.—compound wound—1 hr. duty—55° rise—with reduction gear 41.2:1—type 5R3165.

$1450.00 EACH

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NEW MARINE BOILERS FOR SALE

55/65,000#/hr. Wickes "A" type, 250 psi W.P. #6 Oil, Assembled, Ready for shipment as a package.
74,000#hr. B&W "St. Tube, Sec. Hdr. Type 300 psi W.P. #6 oil 500° TTF Suphtr., Unassembled.
121,650#hr. F.W. "Express type" 565 psi W.P. #6 oil 850° TTF Suphtr. & Economizer, Unassembled.
177,300#/hr. B&W "Express type" 300 psi W.P. #6 Oil, Unassembled.
211,027#/hr. B&W "Express type" 565 psi W.P. #6 Oil, 850° TTF Suphtr., Economizer, Unassembled.

All boilers have ABS stampings.

Other Marine & Stationary Boilers in Stock
Send Us Your Requirements

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FOR SALE
STEEL FLOATING DRY DOCK

Built: Dravo 1958
66′w. x 200′ long incl. 20′ apron each end
Capacity—843 tons 55′ between wing walls
Sinks to 15′ water over deck
2—25 HP 3 ph, 220/440 volt motors
2—Morris 12″ Pumps—4500 GPM each
Controls and Valves Centrailzed for 1-man operation
4 Hand Winches—Outlets for Welding Machines
Compressed Air Manifold
Inspection Invited
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CARRIER REFRIGERATION UNITS

40-Ton Air Conditioning & Cargo Refrigeration Units

Carrier compressor—model 7G8-EF—freon compressor with manual cylinder cut-out—426 RPM—39.4 tons—suction temp. 45°F—cond. temp.—105°F—35 HP—230 volt DC motor. Complete with motor control—refrigeration condenser—receiver — fittings. 8 Complete units. Dimensions: Compressor 6′8½″ long—4′ 10½″ OAW—approx. 6′ high over suction connection. Condenser about 14′ long—approx. 12″ diameter. Just removed from Grace Line vessels. Excellent for fishing industry, banana boats, air-conditioning quarters, etc.

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14″ & 16″ ALL-BRONZE PORTLIGHTS with deadlights

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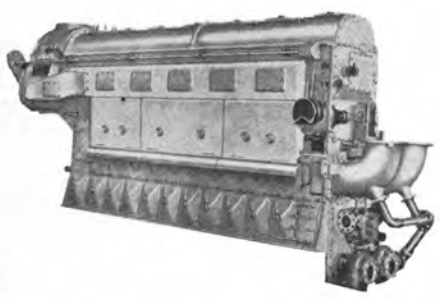
8 FAIRBANKS-MORSE MARINE DIESEL ENGINES

4-Model 38D8-⅛,
9 Cylinders, 1600 HP,
720 RPM, 8½″ Bore,
10″ Stroke, Air Start.
Condition:
Used, Very Good
$5,950. each



4-Model 38D8-⅛,
10 Cylinders, 1600 HP,
720 RPM, 8½″ Bore,
10″ Stroke, Air Start.
Condition:
Used, Very Good
$7,950. each

Take advantage of these well priced Engines, for use as standby Power Units and/or a Self-contained Warehouse of spare parts.

Contact:
Ralph Ingram

ZIDELL EXPLORATIONS, INC.
3121 S.W. Moody - Portland, Oregon 97201
Phone - 228-8691, Code 503 - Telex 036-701

NEW - UNUSED

1-5/16 ANCHOR WINDLASS

Made by Ideal Electric Co.—with spares. Double wildcat—1-5/16″—15 HP—115 volts DC—1750 RPM—all controls—two outboard gypsies. Wildcats 36″ between centers—6000 lb line pull @ 50 FPM. DIMENSIONS: O.A. width over gypsies—84″; OA length 81″. Will sell windlass without power if desired.

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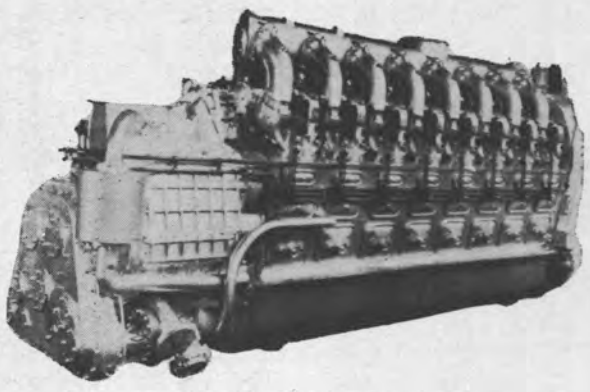
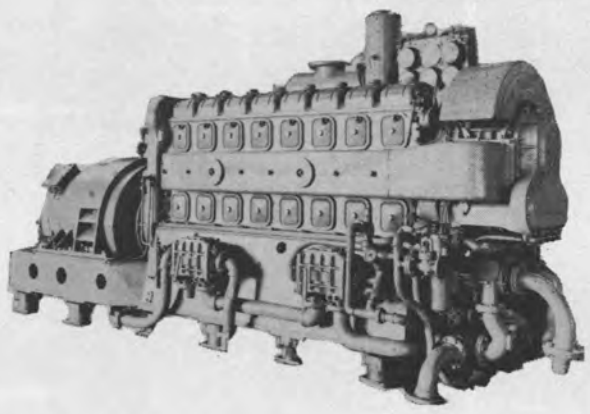
DIESEL WAREHOUSE
CLEARANCE
— We're Moving —
GENERAL MOTORS



16-278A DIESELS
1700 HP @ 750 RPM
Large Quantity to Move
COMPLETE INSPECTION INVITED
PRICE ~~$9750~~ ?

8-268A DIESELS
500 HP @ 1200 RPM
DRIVING
240 KW 3/60/440
GENERATORS
COMPLETE!
ALL ACCESSORIES



3-268A DIESELS — 150 H.P. @ 1200 RPM
DRIVING 100 KW 3/60/440 GENERATORS
COMPLETE — ALSO D.C. UNITS AVAILABLE

MANY OF THESE ENGINES HAVE BEEN MODERNIZED WITH THE LATEST TYPE PARTS

COME MAKE ANY INSPECTION YOU WISH
All Equipment is Priced to Move!

ALSO AVAILABLE:
FAIRBANKS-MORSE 10 CYL 38D8⅛ COPPER-BESSEMER NORDBERG GM 6-71 LORIMER

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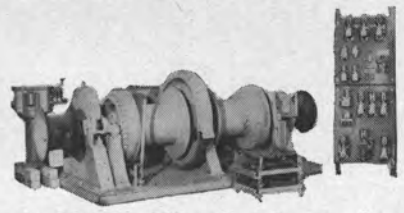
NEW YORK OFFICE: 11 Broadway — New York, N. Y. 10004 PHONE: 943-2640

3 TON CLYDE
DOUBLE DRUM WINCH



Driven by 10 HP—115 volts DC motor & controls —complete—drums declutchable.

$2250.00

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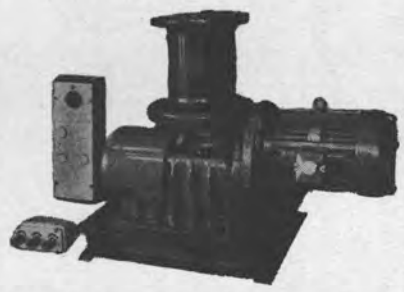
NEW – UNUSED
10 H. P.
REVERSING CAPSTANS

Shipboard Use
Duty 10,000 lbs @ 60 FPM



MOTOR: 10 HP—totally enclosed—fan cooled—continuous duty — horizontal flange mounted — special shaft & oil seal fitted—440/3/60—1760 RPM. CONTROL: Marine type water-tight push-button—forward/reverse/stop—watertight starter box—rated for 40 starts per hour—triple pole contactor with silver contacts, thermal overload relay and trip adjustment. DIMENSIONS: Barrel 10" diameter — Flange 10" diameter — approx. 26" wide and 36" long.

6 IN STOCK FOR IMMEDIATE DELIVERY

$1675

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NEW — UNUSED
ROSS COOLERS
FOR LUBE OIL SERVICE

Screw connections — copper jacket — cupro-nickle tubes. 8" diameter x 6'3" length—84 sq. ft. surface. Water inlet 3"—outlet 3". Oil inlet 2½". Two Pass. Complete with zinc plugs.

$695

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LESLIE PUMP GOVERNOR VALVE

New—in original crates. For U.S. Naval Vessels—type CT-HNS-3. For merchant vessels—type CTHS. Size 2". Typical serial 241-423. For immediate delivery.

$495

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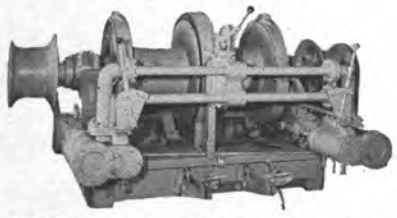
7 x 10 CLYDE DOUBLE DRUM

WINCHES



Drum 8500 lbs @ not less than 120 FPM; 13,000 lbs at no specified speed. Gypsy head 22,500 lbs. static pull. Foot brake to hold 17,000 lb. pull. Steam cylinders with standard 250 PSI.
DIMENSIONS:
9' 5¾" wide over winch heads
5' 10½" wide on bedplate
4' 1" deep over bedplate
6' 5" overall—brake pedal, etc.
2" steam—2½" exhaust.
Drums 16" diameter—20" wide—33 13/16" over flanges. Rebuilt by U.S.N. equal to new.

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T-2 TANKER VALVES

24" OVERBOARD DISCHARGE VALVES

Reconditioned to ABS standards

LOW INJECTION VALVE

Rebuilt to ABS and Coast Guard requirements

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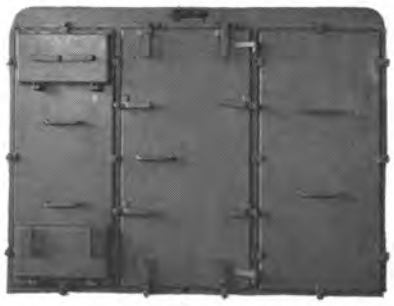
NEW ALLIS-CHALMERS

WINCH CONTROL PANELS



(7) 50 HP—230 volts DC—right hand—mfg by Allis-Chalmers. Resistors, control and brake. Dwg EK9231—U.S.M.C.—820-2—1404 ALT.

(6) As above, but left hand units.

$1195 each

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New Watertight Doors

FOR IMMEDIATE DELIVERY

6 Dog right and left hand hinged steel doors—with frames. Built and tested to A.B.S. specifications.

SIZES:
26" x 48"
26" x 57"
26" x 60"
26" x 66"
30" x 60"

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LExington 9-1900 ELgin 5-5050

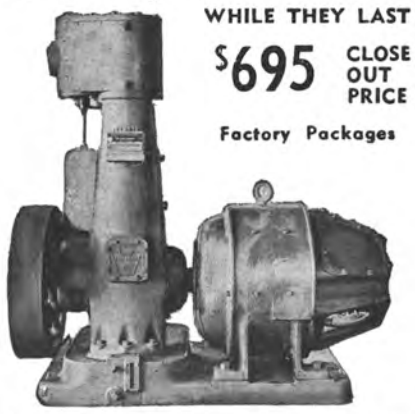
NEW-UNUSED LIBERTY SHIP

Troy-Enberg 20 KW Generators

WHILE THEY LAST

$695 CLOSE OUT PRICE

Factory Packages



120 volts DC—400 RPM—drip-proof marine type. 2-Wire direct connected set. Reciprocating 6 x 7 type E vertical self-oiling steam engine—plug & piston valve—220 lbs PSI—80 lbs. BP.

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NOW DISMANTLING

AIRCRAFT CARRIER "TARAWA"

CV-40—Essex Class—Built Norfolk

CALL FOR ANY ITEMS

Axial Flow Fans, Pumps, Navy, Auxiliary Condensers, Boiler Parts, Catapult Hydraulic Equipment, Armored Door Hatches, Winches, MG Sets, Motors, Etc.

NAVY YARDS PLEASE NOTE!

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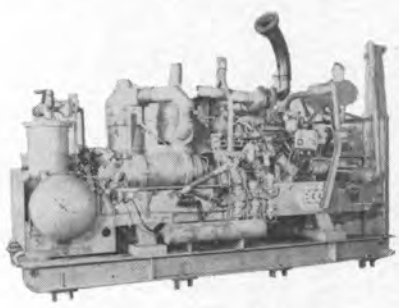
FOR AUTOMATIC REMOTE OPERATION OF UNMANNED BARGE, SHORE LOCATIONS etc.



Practically New

GARDNER-DENVER ROTA-SCREW ROTARY AIR COMPRESSOR

Model SP-600-DB—mfg by Gardner-Denver—600 CFM @ 100 lbs. Full load 1800 RPM—no load 1100 RPM. Water cooled. Engine is Caterpiller D-333—4½ x 5½—with electric starting. 6-Cyl.—turbo-charged. NOTE: This unit was used to remotely operate an anchor windlass on an unmanned barge. It has all automatic 24 volt electrically controlled air valves for low oil alarm, water temperature, shut down and starting service, and can be left for long periods of time unmanned. Complete with large air receiver, it was made by Elliott-Brandt—W.P. is 150 lbs.—test 500 lbs.—shell ¼"—heads ⅜"—radius of head 36". Dimensions: approx. 14'6" long—by 42".

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Have you checked our where-house?

If we don't have it in stock, we know where it is.

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National Metal AND STEEL CORP.

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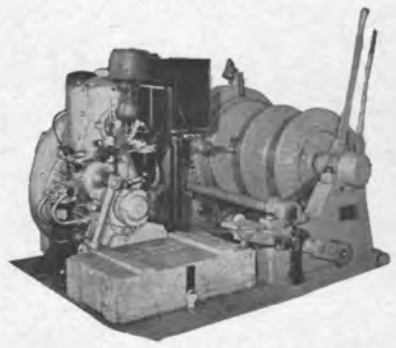
NEW

2500 LB DIESEL WINCHES



Small general purpose winches, mfg by Jaeger. Rated 2500 lbs @ 75 FPM. Driven by air-cooled Enfield single Cylinder diesel engine. Declutchable free spooling drum has center flange which can be removed if required. Excellent for small vessel use and general purpose service on all vessels. Has spare parts box. Weight about 1500 lbs.

$995 EACH

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TRANSFORMERS

15 KVA—3 per bank—450 V primary—117 volt secondary.

$190.00 PER BANK

Also inquire about other sizes: 10 KVA/20 KVA/ 25 KVA/37 KVA

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VERTICAL BOILER

Suitable for

Pile Drivers
Steam Cranes
Hoists, etc.

$1450.00

100 HP @ 100 PSI. Water heating surface 747 sq. ft. — total heating surface 1144 sq. ft. A.S.M.E. Built by International Boiler Works—East Stroudsburg, Pa. Height to top of cylinder 12' 0"—diameter 66"—4" main steam line—2 1½" safety valves —practically new—very little if any use. Oil burning. Boiler stamped Mass.—Standard—100#—5290—National Board No. 6395.

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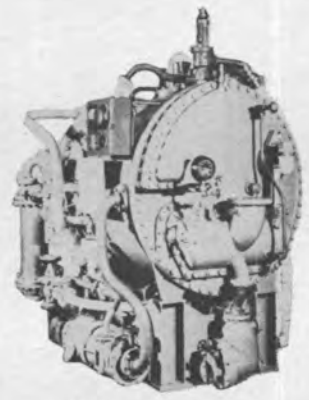
EVAPORATORS

Complete Solo Shell Units
12,000 Gal/Day - Low Pressure



TYPICAL UNIT

Griscom Russel—still aboard "African Enterprise" and "African Endeavor". Solo Shell—two effects in one unit. Complete with all pumps and 230 volt DC motors, salinometer, etc.

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5 H.P.–230 VOLT D.C. REVERSING CONTROLLER

Resister type—magnetic—semi-automatic—overload protection. Continuous duty—waterproof enclosure—16½" wide—23" high—10" deep. For starting, stopping, reversing topping winches and other uses requiring reversing starters.

$139.50

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14" R-2418 WATEROUS CARGO PUMP

With Reduction Gear & Diesel Drive

PUMP: All bronze body & rotors. Shaft and gears of Hi Tensile steel. Suction and discharge 14". Top discharge—side suction. CAPACITY: Bilge service 2500 GPM @ 20 PSI @ 71 HP. Oil service 2400 GPM @ 75 PSI @ 130 HP. Gear input at top (12 o'clock). Length of pump and gear: 75⅜" long by 51" wide. ENGINE: Cummins diesel model JN-130-M—6 cyl.—4⅛ x 5—130 HP @ 2500 RPM with power takeoff. Weight 2080 lbs.—reduction gear ratio 10.059:1—air starting but can be converted to electric starting. Typical serial No. 5289.

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NEW — UNUSED 3.5 K.V.A.—2.97 KW

GENERAL ELECTRIC

MOTOR GENERATOR SETS

G.E. Type CG-21ACR in a single frame. MOTOR: 5 HP—115 V.D.C.—38 amps—3600 RPM. GENERATOR: 3.5 K.V.A.—2.97 KW—115 volts—1 phase—60 cycle—30.4 amps—model 5LY128A5. DIMENSIONS: 30¾" long x 14" wide x 12¾" high. Includes magnetic motor starter—Westinghouse 115 V.D.C.—size 3DC—class 6311-S31—push button station. Voltage regulator: type CG-23ACE——weight about 800 lbs. each. 2 Boxes of spare parts.

230 VOLT D.C. ALSO AVAILABLE:
Exactly as above, except input is 230 volts DC.

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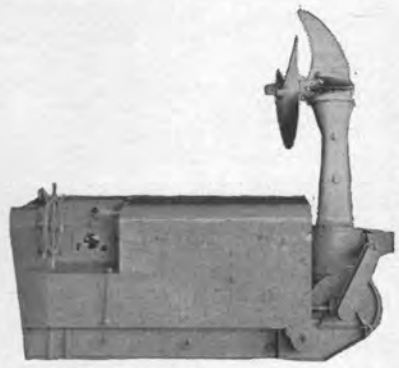
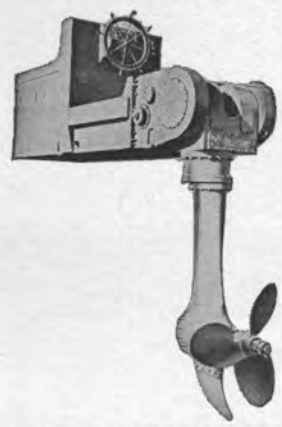
MURRAY & TREGURTHA

DIESEL PROPULSION UNITS

JUST ARRIVED — 7 UNITS



Model 02-D—powered by 6-cylinder G.M. 6-71 diesel—driven through Oliver gear—8708—forward ration 1:1.27—reverse 1:1—3 blade propeller—48" diameter—24" pitch—left hand—manual steering—electric starting. RECONDITIONED—READY TO GO!



1 Model 0-7 unit in stock. Powered by twin GM 6-71 diesels with hydraulic clutch & electric steering. Propeller diam. 64" pitch 48". Tailfin raised & lowered mechanically. 7' from bottom of unit to propeller hub center. Weight about 20,000 lbs. Propeller speed 308 RPM. Unit can develop up to 500 HP. Formerly used on Cargill Grain Co. barge "Carpolis". Actual photo on request. Can be demonstrated running in shop.

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DUPLEX STRAINERS
n good condition

4" **$349.00**
22" x 3" between mounting holes

2" **$249.00**
15" x 3" between mounting holes

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LExington 9-1900 (301) ELgin 5-5050

AXIAL FLOW FANS

NEW
UNUSED
230 V. D.C.

Navy size A10D2W6—LaDel Co., 10,000 CFM @ 3" S.P. MOTOR: Reliance Motor Co.—7.5/3.1 HP, 230 VDC—1310/1750 RPM. DIMENSIONS: 32⅛" OD—31¼" BC—29¼ ID—40¾" length.

$450.00

Navy size A8D2W5—Buffalo Forge Co.—8000 CFM @ 3" S.P. MOTOR: G.E. 6/1.8 HP—230 VDC—1310/1750 RPM. DIMENSIONS: 30 9/16" OD—29¼" BC—27¼ ID—37¾" length.

$329.50

AF80—Sirocco—8000 CFM @ 2" S.P MOTOR Welco 4/1.9 HP—230 VDC—1310/1750 RPM. DIMENSIONS: 30½" OD — 29¼ BC — 27¼ ID—37¾" length. U.S. Moritime type fan.

$329.50

AF100—Sirocco—10,000 CFM @ 2" S.P. MOTOR: Welco 5/2.2 HP—230 VDC—1310/1750 RPM. DIMENSIONS: 32½" OD—31⅛" BC—29¼ ID—40⅝" length. U.S. Maritime type fan.

$375.00

NEW — UNUSED — 115 V.D.C.

20000 C.F.M. — 115	10000 C.F.M. — 115
16000 C.F.M. — 115	5000 C.F.M. — 115 (explosion-proof)
12000 C.F.M. — 115	4000 C.F.M. — 115

RECONDITIONED — 440 V.A.C.

A1A4W5 to A16A4W5—with starter—440/3/60

1000 C.F.M.	6000 C.F.M.
2000 C.F.M.	8000 C.F.M.
3000 C.F.M.	10000 C.F.M.
4000 C.F.M.	16000 C.F.M.

LARGE AXIAL FLOW FANS 30000 C.F.M.

A304W5—25 HP—440/3/60, 30000 C.F.M. @ 3" static; 40000 CFM @ 1" static. I.D. 44¼"

THE BOSTON METALS COMPANY

313 E. Baltimore St. Baltimore, Md. 21202
539-1900 (301) 355-5050

M.G. SETS

NEW JANETTE 1 KVA SETS

2-Bearing Sets—type D.E.—3L. MOTOR INPUT: 2 HP—115 volts DC—3.5 amps—1800 RPM. OUTPUT: type C.E.I.—120 volts 60 cycle single phase. 8.3 amps—40°C Temp rise—0.8 P.F.

$179.50

1.24 KW G.E. MG SETS

G.E. Motor—3 HP—115 volts DC—1800 RPM. OUTPUT: G.E. generator—1.24 KW—1.56 KVA—120/60/1—0.8 PF—14.2 amps—1800 RPM. With spare armature. Overspeed trip on motor side.

$339.50

25 KW IDEAL M.G. SETS

INPUT: 40 HP—115 volts DC—290 amps—1800 RPM—frame 445. OUTPUT: Generator 31.5 KVA—25KW—440/3/60—1800 RPM. Control cabinet includes motor starter & generator control.

UNUSED SURPLUS 1 KVA SETS

INPUT: 1.75 HP—115 Volts DC—17 amps—1800 RPM. OUTPUT: 1 KVA—115 volts—8.7 amps—60 cycle single phase—0.9 PF. Unit is self-excited and will carry load immediately on starting. Regulation ±5%. Complete with magnetic starter & spare parts. Units designed and built to rigid Navy specs. SIZE: 19.5" long—26.5" wide—16" high. Weight 285 lbs. SPARES: 85 lbs. CONTROL: 20"X15"X10"—75 lbs.

$189.50

NEW 0.5 KVA HERTNER SETS

Type CHT-211761. INPUT: Motor 115 volts DC—9.0 amps—1800 RPM—1 HP. OUTPUT: 0.5 KVA—115 volts single phase 60 cycle—4.3 amps—.85 PF.

$127.50

CONTINENTAL: 3.7 KW—Input: 7½ HP 230 volts DC/28 amps/1800 RPM. Type D-324X—continuous. Output: Generator type DS-324XB 3.7 KW/7.5 KVA/120/1/60—62.5 amps—0.5 PF compound wound.

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NEW YORK OFFICE: 11 Broadway — New York, N. Y. 10004 PHONE: 943-2640

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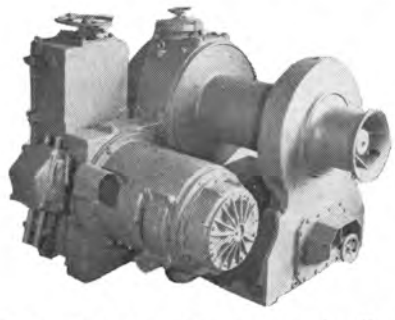

10 A.E.G. Unit-Type Winches—with all controls attached to winch. In very good condition—removed from vessel run for only 1 year. 3-Ton capacity—25 H.P.—230 volts D.C.—Priced to sell!!

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H. O. Penn Machinery Co., Inc., Caterpillar dir., 140th St. & East River, New York, N.Y. 10454
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Stork Dieselmotoren, Kromhout Motoren, P.O. Box 4196, Amsterdam, Holland.

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Murray & Tregurtha, Inc., 2 Hancock St., Quincy, Mass. 02171
Port Electric Turbine Div., 155-157 Perry St., New York 10014
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Western Gear Corp., Precision Products Div., P.O. Box 190, Lynwood, Calif. 90262

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Motorola Communications & Electronics, Inc., 4935 W. LeMoyne Ave., Chicago, Ill. 60651
RF Communications, Inc., 1680 University Ave., Rochester, N.Y. 14610
Radiomarine Corp., 20 Bridge Avenue, Red Bank, N.J. 07701
Raytheon Marine Products Operation, 213 East Grand Avenue, South San Francisco, California 94080
RCA Service Co., A Division of RCA, Marine Communications and Navigation Equipment Service, Bldg. CHIC-225, Camden, N.J. 08101

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York Corp., Grantley Road, York, Pa. 17405

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Columbian Rope Co., Auburn, N.Y. 13022
Jackson Rope Corp., 9th & Oley, Reading, Pa. 19604
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Tubbs Cordage Company, P.O. Box #709, Orange, Calif. 92669
Wall Rope Works, Inc., Beverly, N. J. 08010

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Sperry Marine Systems Div., Charlottesville, Va., 22901, Division of Sperry Rand Corp.

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Syntron, a division of FMC Corp., 398 Lexington Ave., Homer City, Pa. 15748

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Portable Light Co., Inc., 67 Passaic Ave., Kearny, N.J. 07032
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Northern Metal Co., Minor & Bleigh Sts., Philadelphia, Pa. 19136
Peck Equipment Co., 3500 Elm Ave., Portsmouth, Va. 23704
Zidell Explorations, Inc., 3121 S. W. Moody St., Portland, Ore. 97201

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Hughes Bros., Inc., 17 Battery Pl., New York, N.Y. 10004
Mowbray's Tug and Barge Sales Corp., 21 West St., N.Y., N.Y. 10006
Oaksmith Boat Sales, Inc., Fisherman's Terminal, Seattle, Wash. 98119

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Armco Steel Corp., 703 Curtis St., Middletown, Ohio 45042
Astilleros de Cadiz, S.A., Zurhono 72, Madrid 10, Spain
Atlantic Gulf & Pacific Co. of Manila Inc., 45 Muelle De La Industria, Manila
Avondale Shipyards, Inc., P.O. Box 52080, New Orleans, La. 70150
Barbour Boat Works, Inc., P.O. Box 1069, New Bern, N.C. 28560
Bender Ship Repair, Inc., 265 So. Water St., Mobile, Ala. 36602
Bethlehem Steel Corp., Shipbuilding, 25 Broadway, N.Y., N.Y. 10004
Blount Marine Corp., P.O. Box 360, Warren, Rhode Island 02885
Brewer Dry Dock Co., Mariners Harbor, Staten Island, N.Y.
Ira S. Bushey & Sons, Inc., 764 Court St., Brooklyn, N.Y. 11231
Conrad Industries, P.O. Box 790, Morgan City, La. 70380
Dillingham Corp., P.O. Box 3288, Honolulu, Hawaii 96801
Dravo Corporation, Neville Island, Pittsburgh 25, Pa.
Equitable Equipment Co., Inc., 410 Camp St., New Orleans, La. 70130
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Gotaverken American Corp., 39 Broadway, New York 6, N.Y.
Groignard Shipyards, P.O. Box 829 Colbert, Marseilles, France.
Halifax Shipyards, Ltd., P.O. Box 640, Halifax, Nova Scotia, Canada
Halter Marine Services, Inc., Route 6, Box 287H, New Orleans, La. 70126
Hillman Barge & Construction Co., Grant Bldg., Pittsburgh 19, Pa.
Hitachi Shipbuilding Co.,25 Nakanoshima2-chomeKitaku,Osaka-Japan
Ishikawajima-Harima Heavy Industries Co., Ltd., 50 Broad Street New York, N.Y. 10004
Jacksonville Shipyards, 644 E. Bay St., Jacksonville, Fla.
Jeffboat, Inc., Jeffersonville, Ind. 47130
Kawasaki Dockyard Co., 8 Kaigan-dori, Ikuta-ku, Kobe, Japan
LISNAVE, P.O. Box 2138, Lisbon, Portugual
Litton Industries, 9920 W. Jefferson Blvd., Culver City, Calif. 90230
Lockheed Shipbuilding and Construction Co., 2929 16th Avenue, S.W., Seattle, Wash. 98134
Lone Star Marine Salvage Co., 7200 S. Harbor Drive, Houston, Texas 77001
Maryland Shipbuilding & Drydock Co., P.O. Box 537, Baltimore, Maryland 21203
Matton Shipyard Co., Inc., P.O. Box 428, Cohoes, New York 12047
Mitsui Shipbuilding & Eng. Co., Ltd., Nihonbashi-Muromachi, Chuo-ku, Tokyo, Japan
Nashville Bridge Co., P.O. Box 239, Nashville 1, Tenn.
National Steel & Shipbuilding Corp., San Diego 12, Cal.
Newport News Shipbuilding and Dry Dock Co., Newport News, Va.
Nippon Kokan Kabushiki Kaisha, 2, 1-chome, Otemachi, Chivoda-ku, Tokyo, Japan
O.A.R.N. (officine Allestimento e Riparazioni Navi) Genoa, Italy
Pacific Coast Engineering Co., P.O. Drawer 6, Alameda, Calif. 94506
Pearlson Engineering Co., Inc., 8970 S.W. 87th Ct., Miami, Fla. 33156
Perth Amboy Dry Dock Co., Perth Amboy, N.J.
Puerto Rico Drydock and Marine Terminals, Inc., P.O. Box 2209, San Juan, Puerto Rico 00903
Rodermond Industries, Foot of Henderson St., Jersey City, N.J. 07302
L. Rodriquez Shipyard, 24 Molo Norimberga, Messina, Italy.
St. Louis Shipbuilding—Federal Barge, Inc. 611 East Marceau, St. Louis 11, Mo.
Sasebo Heavy Industries Co., Ltd., New Ohtemachi Bldg., Chiyoda-ku, Tokyo, Japan
Southern Shipbuilding Corp., P.O. Box 1089, Slidell, La. 70458
Tampa Ship Repair & Dry Dock Co., Inc., P.O. Box 1277, Tampa, Florida 33601
Terrin Agency, Inc., 17 Battery Place, New York, N.Y. 10004
Todd Shipyards Corp., 1 Broadway, New York City
Vare Corp., Equipment Systems Div., 516 Sylvan Ave., Englewood Cliffs, N.J. 07632
Vickers Ltd., 222 London Rd., St. Albans, Herts, England
Wiley Mfg. Co., Port Deposit, Md.
Wyatt Industries Inc., Port Houston Shipyard Div., P.O. Box 3052, Houston, Texas 77001
Zigler Shipyards Inc., P.O. Box 492, Jennings, Louisiana 70546

SHIP MODELS
Boucher-Lewis Precision Models, Inc., 36 E. 12 St., N.Y., N.Y. 10003

SHIP STABILIZERS
Lidgerwood Mfg. Co., (Superior Lidgerwood Mundy Corp.), 7 Dey Street, New York, N.Y. 10007
John J. McMullen Associates, Inc., 17 Battery Pl., N.Y., N.Y. 10004
Sperry Marine Systems Div., Charlottesville, Va., 22901, Division of Sperry Rand Corp.

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Combustion Engineering, Inc., Windsor, Connecticut 06095

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M. P. Howlett, Inc., 415 32nd St., Union City, N.J.
Luckenbach Steamship Co., 120 Wall St., New York 5, N.Y.

SWITCHBOARDS
Hose McCann Telephone Co., Inc., 524 23rd St., N.Y. 10011

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TANK CONTAINERS
Fruehauf Trailer Div., Fruehauf Corp., 10940 Harper Ave., Detroit, Mich. 48232

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Curtis Bay Towing Co., Mercantile Bldg., Baltimore 2, Md.
G & H Towing Company, 509 Texas Building, Galveston, Texas 77550
Henry Gillen's Sons Lighterage, 140 Cedar St., New York, N.Y. 10006
James Hughes, Inc., 17 Battery Pl., New York, N.Y.
Jackson Marine Corp., P.O. Box 1087, Aransas Pass, Texas 78336
McAllister Bros., Inc., 17 Battery Pl., New York, N.Y.
McDonough Marine Service, P.O. Box 26206, New Orleans, La.
P. F. Martin, Inc., Mall Bldg., 325 Chestnut St., Philadelphia, Pa.
Moran Towing & Transportation Co., Inc., 17 Battery Place, N.Y.
Nickerson Marine Towing Co., 1670 Southeast 17th Street, Ft. Lauderdale, Fla. 33316
Red Star Towing & Transportation Co., 500 Fifth Ave., N.Y. 10036
L. Smit & Co., 11 Broadway, New York 4, N.Y.
Suderman & Young Towing Co., 329 World Trade Center, Houston, Texas 77002
M. & J. Tracy, Inc., 1 Broadway, New York, N.Y.
Turecamo Coastal and Harbor Towing Corp., 1752 Shore Parkway, Brooklyn, N.Y.
Vancouver Tug Boat Co., Ltd., 10 Pemberton Ave., No. Vancouver, B.C., Canada

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Hubeva Marine Plastics-Lining, 435 Hamilton Ave., Brooklyn 31, N.Y.
Hydrosearch Co., Inc., Riva Rd., Annapolis, Md. 21401
Marine Moisture Control Co., 39 Redfern Ave., Inwood 96, L.I., N.Y.
Mechanical Marine Company, 45-15 37th St., Long Island City, N.Y.
Todd Products, Div. of Todd Shipyards Corp., Halleck St., Brooklyn, N.Y. 11231

VAN CONTAINERS—Insulated, Refrigerated, General Commodity
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Weather Routing, Inc., 90 Broad St., New York 4, N.Y

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Bethlehem Steel Corp., Bethlehem, Pa. 18018
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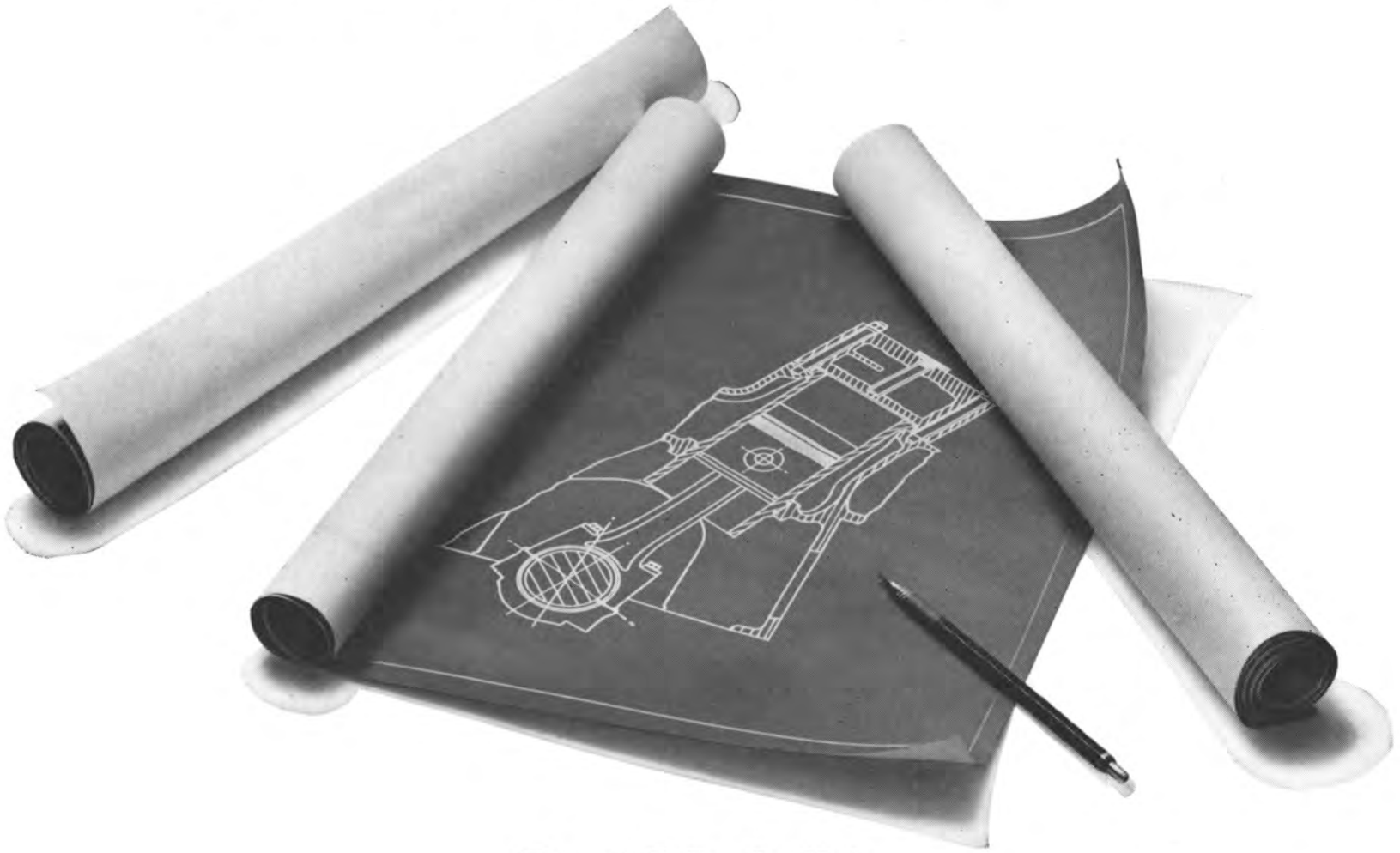

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