MARITIME
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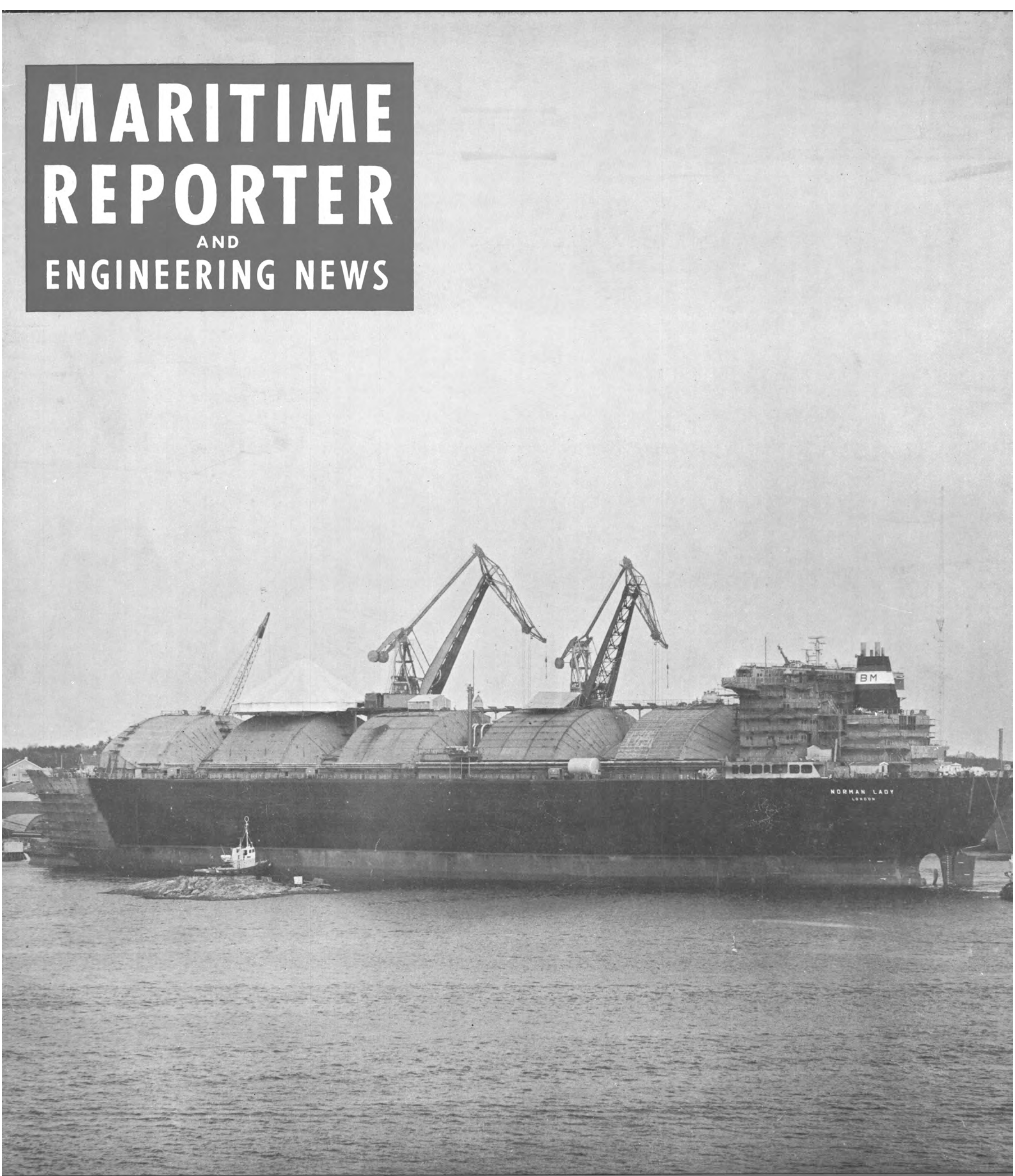
ENGINEERING NEWS



The Norman Lady

Rosenberg Verft, Stavanger, Norway Launches First LNG Carrier Utilizing The Moss Rosenberg Tank System

(SEE PAGE 11)

AUGUST 1, 1973

Photograph courtesy of The Science Museum, London.

"What is it? Where did it come from?"

The year was 1897. The occasion, the naval review celebrating the DIAMOND JUBILEE OF QUEEN VICTORIA.

Suddenly there dashed out among the assembled ships a small craft scooting along at the then incredible speed of 34½ KNOTS.

From the astounded naval officers came cries of, "What is it? Where did it come from?"

It was the "TURBINIA," the first ship powered by turbine engines. It had been built at Wallsend on the Tyne in 1894, with engines invented by SIR CHARLES PARSONS, and taken secretly to COWES for its surprise appearance in the naval review.

The "TURBINIA" was only 100 ft. long with a 9 ft. beam, and although it was a sensation, it was some time before Parsons could persuade commercial ship owners to take an interest in his invention.

Turbine driven ships today are a far cry from the "TURBINIA" and their complicated engines call for precise lubrication.

Popular with ship owners and engineers are Gulf Harmony turbine oils. These premium quality oils are especially designed for the lubrication of turbine bearings and gears and for auxiliary machinery aboard turbine driven ships. They are fully inhibited with anti-rust, anti-oxidant and anti-foam additives.

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Transocean Antifouling System in excellent condition after 25 months service

Port side of the m.v. 'Atlantic Forest' showing the smooth, clean surface after 25 months at sea.

The m.v. 'Atlantic Forest' just after drying up at the Wilton Feyenoord shipyard in Schiedam, Holland.

9th September, 1972. The 43,000 ton m.s. 'Atlantic Forest' drydocks in Holland having been in service for 25 months. Representatives of the owners, the builders and the paint suppliers together with the captain attend the guarantee inspection. Nippon Paint Co. Ltd., Transocean member in Japan, had specified the following treatment for the flat bottom and the side bottoms:

One Coat of Code 1.25 Transoprene Primer
Two Coats of Code 2.54 Transoprene Barrier High build, and
Two Coats of Code 2.71 Transvinyl Anti-fouling

As soon as the ship fell dry, it was obvious that the condition of the paintfilm was excellent!

Seaweed and other marine life had grown on those parts where mechanical damage had brought forward the bare metal of the bottom but otherwise the surface was entirely smooth and clean. The boottopping paint applied did not contain poison and here an eight feet wide area of seaweed was found. However, where the anti-fouling was applied it disappeared completely.

Transvinyl Anti-fouling Code 2.71 is a product of the combined researches of Transocean companies in various parts of the world.

Its content of cuprous oxide ensures a good protection against the growth of shells and especially barnacles, other toxics provide protection against algae, the biggest problem as far as protection against fouling is concerned.

The combination of vinyl resin and a special quality resin is claimed to be the best medium for an anti-fouling with a high cuprous oxide level and can remain outside the water for some time without significant damage to the anti-fouling properties without causing the paintfilm to flake.

The 'Atlantic Forest' again proves the success of the Transocean anti-fouling system in bringing greater economy and efficiency to shipowners across the world.

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National Shipping Asks CDS For Bulk Carrier

A construction differential subsidy in connection with a 40,000-dwt hatchless bulk carrier intended for a Canadian Pacific Coast-U.S. East Coast service has been applied for by National Shipping Corp., Wilmington, Del. In addition to the maximum 39 percent subsidy, an operating subsidy of $715,982 a year would be required. Estimated to cost $22 million, the ship would be used to haul lumber from Canada and phosphate from Florida back to Canada's western provinces.

MonArk Custom Craft Gets USCG Contract For Two Crew Boats

The U.S. Coast Guard, 400 Seventh Avenue, S.W., Washington, D.C. 20590, has awarded a contract in the amount of $510,588 to MonArk Custom Craft, Inc., Jeanerette, La. 70544. The contract is for two crew boats of welded aluminum construction, and each will be about 65 feet in length. One of the vessels will be propeller-driven and the other waterjet-propelled.

Holland America Line Subsidiary Merges To Form Big Lift

The board of directors of Holland America Line have announced that the company's subsidiary of Van der Laan Shipping and Trading Company B.V. in Rotterdam, the Netherlands, and Van Twist B.V. in Dordrecht (which consists of two companies, Van Twist Forwarding B.V. and Crane Rental van Twist B.V.), will be merged and continue their operations under the name of Big Lift.

G.M.A. Meykor has been named managing director of the new company, and will be headquartered in Dordrecht.

Big Lift will remain as the agent for the Van der Laan Shipping and Trading Company (Netherlands Antilles) Inc. at Curacao, which has a fleet of vessels used for carrying floating equipment, as well as heavy cargo. **B.J. van der Laan** will continue to manage the Van der Laan Shipping and Trading Company, and is also managing director of Big Lift-Curacao.

Besides maintaining an office in Curacao, Big Lift also has offices in New Orleans and London. The company plans to open offices in New York and Switzerland. Currently, Big Lift is represented by other agents in Canada, West Germany and Japan.

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ANOTHER PLUG FOR THE TRADE DRAIN.

For U.S. vessels to compete successfully with foreign-flag ships for the carriage of U.S. foreign trade, they've got to be highly productive.

Converting break-bulk freighters into containerships is an effective way of making them more productive.

And that's exactly what Lykes Lines asked Todd to do for 13 of their freighters.

Hull-cutting, plug construction and reassembly add 97 feet to each vessel, enabling them to transport 166 containers in addition to break-bulk cargo.

The Lykes awards bring to 62 the number of freighters for which Todd has received conversion contracts from U.S. flag operators during the past decade. Which is kind of a nice "plug" for Todd.

Talk to TODD

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Maritime Fruit Orders 24 Tankers In Venture With Swan Hunter

Maritime Fruit Carriers Company Limited has announced that it has completed financial arrangements for its joint venture with Swan Hunter Group Limited of Great Britain. The joint company, known as Swan Maritime Company Ltd., was established to engage in the purchase, sale, leasing and financing of vessels and has already executed shipbuilding contracts with Swan Hunter Shipyards for the purchase of 24 oil tankers.

The vessels involved range in size from 31,000 deadweight tons to 261,000 deadweight tons and are scheduled for delivery from 1974-78. They are eligible for receipt of British Government guarantees to finance 80 percent of the cost price of each vessel, providing it flies the British flag, and 80 percent of the sale price of each vessel sold for export. Swan Maritime also holds options for the construction of additional tankers which would be delivered in 1978-80.

Swan Maritime will be capitalized at approximately $26.5 million; its shares will be owned 65 percent by Maritime Fruit Carriers and 25 percent by Swan Hunter Group, the largest shipbuilders in Great Britain. In addition, 10 percent has been reserved for Hutchison International Company Ltd. of Hong Kong, with whom negotiations are currently in progress.

Maritime Fruit Carriers' equity investment in Swan Maritime has been primarily funded by a loan from the First National Bank of Boston for $25 million.

Maritime Fruit Carriers Company is an international organization specializing in refrigerated shipping and oil transportation. Through its Universal Gas & Oil Company subsidiary, the company will also engage in the transportation of liquefied gases.

Swan Hunter is the largest group of its kind, employing 25,000 people. It owns shipbuilding and ship repairing yards on the northeast coast of England as well as in Scotland. Swan Hunter also has worldwide ship repairing interests.

Columbus Line Names McCallum Canadian Director

Neil McCallum

Neil McCallum, well-known in the container trade between North America and Australia and New Zealand, has been named by Clarke Transportation Canada Ltd. as the new director for Columbus Line, Canada.

Mr. **McCallum,** who has worked both in Canada and the United States, brings to his new post some 20 years of experience with Australian and New Zealand markets.

He began his North American maritime career in Montreal in 1961. Prior to joining Columbus, he was assistant director with Dart Containerline in Canada.

Born in England, Mr. **McCallum** spent much of his life in New Zealand, where he worked during the 1950s in that country's shipping industry.

New Greek Offices For U.K.-Based Firm

A branch office in Greece has been opened in Piraeus by Wilson Walton International Limited, the Croydon-based company which specializes in design, supply and installation of systems for the safe and efficient operation of ships. Of particular current interest is the Wilson Walton/Airscrew inert-gas system designed to prevent explosions in vessels engaged in the carriage of oil and associated products, with special emphasis on VLCCs.

A.R. Greaves has taken charge of the Greek operation, and the address of his office is: Wilson Walton International Limited, 11-15 Filellinon Street, Piraeus, Greece.

GE Names Agami To International Sales And Marketing Post

George A. Agami

George A. Agami has been appointed to the post of sales engineer in the export market for General Electric's Marine Turbine and Gear Products Department in Lynn, Mass., according to **Robert H. Kiefer,** manager of export marine sales.

In his new position, Mr. **Agami** is responsible for international sales and market development for GE ship propulsion steam turbines and gears. He works closely with the department's overseas manufacturing associates located throughout the free world, and with shipyards, shipowners, and operators as well. General Electric Company is a leading supplier of marine steam turbines and gears for ship propulsion applications.

A native of Cairo, Egypt, he holds a bachelor's degree in mechanical engineering from Cairo University, and was employed as an engineer at the Aswan Hydroelectric Power Station in Aswan, prior to joining GE.

Since 1967, Mr. **Agami** has been in the employ of GE's International Sales Division, headquartered in New York City, first as a marine projects engineer, and most recently as a marine sales engineer. He is a member of The Society of Naval Architects and Marine Engineers.

Matson Trailerships To Be Chartered From First Chicago Leasing

Matson Navigation Company has announced an agreement to charter its two new 25,000-ton 24-knot roll-on/roll-off trailerships from First Chicago Leasing Corporation, a subsidiary of First Chicago Corporation.

The twin 700-foot vessels, each valued at about $30 million, are under construction at Sun Shipbuilding and Dry Dock Company, Chester, Pa.

The first vessel, S/S Lurline, will be the first ro/ro ship of its type in Pacific trade when it enters service this month. The second ship will follow at the end of the year.

The trailerships, which can carry freight of virtually any size that can be moved on wheels, will complement Matson's lift-on/lift-off container service.

Matson, a wholly owned subsidiary of Alexander & Baldwin, Inc. of Honolulu, introduced containerization to the Pacific 15 years ago.

Hitachi To Build Three Tankers For Overseas Shipholding

Overseas Shipholding Group, Inc. (OSG), 511 Fifth Avenue, New York, N.Y. 10017, has announced that it has placed orders with Hitachi Shipbuilding & Engineering Co. Ltd. of Japan for the construction of three tankers aggregating 487,000 deadweight tons. An 80,000-dwt tanker and a 128,000-dwt tanker are to be delivered in the second half of 1976. A 279,000-dwt tanker is scheduled for delivery in the first half of 1977 and has been chartered on a long-term basis. All three vessels will be 50 percent owned by OSG.

OSG presently owns and operates a fleet of 38 tankers and dry bulk carriers, aggregating in excess of 1.8 million deadweight tons.

OSG's new-building program now encompasses 22 ships representing an aggregate cost of over $600 million. Over two-thirds of the 3,247,000 dwt now on order has already been chartered on a long-term basis. By April of 1978, when the last of the new ships now on order is scheduled to be delivered, OSG's fleet will total 60 vessels aggregating in excess of five million dwt, including ten 50 percent owned and six 60 percent owned vessels.

Joseph H. Winer Named President Hudson Engineering

The Hudson Engineering Company of Hoboken, N.J., has announced the appointment of **Joseph H. Winer** as president and chief executive officer. He will serve as a director of Hudson Engineering Company, Merrin Electric, Jefferson Electric and Heat Exchanger Engineering, Inc. In addition, Mr. **Winer** has been appointed as a director and member of the executive committee of Perth Amboy Dry Dock Co., which recently appointed **Alfred C. Bruggemann** as its president.

In his new position, Mr. **Winer** succeeds the late **Martin A. Ansbro** as president of Hudson Engineering Company and its affiliated firms. The Hudson Engineering Company was founded in 1922, and since that time has established its solid reputation in the field of ship repairs in the Port of New York by its continued activity and success over the past 50 years.

Mr. **Winer** comes to the Hudson Engineering Company with an extensive background in the maritime field. He graduated from Stevens Institute of Technology in mechanical engineering in 1944, and subsequently earned a master's degree in nautical engineering—also from Stevens—in 1963. During the early years of his maritime career, Mr. **Winer** served as chief engineer aboard ships of Luckenbach Steamship Company, Inc. and American President Lines, and for the past 28 years has been with American President Lines in varying capacities, including chief engineer, port engineer, and most recently as vice president of the Atlantic region.

Joseph H. Winer

He is well-known in maritime circles and, because of his overall background in operations, design and administration, will bring to the Hudson Engineering Company the necessary capability and talents to continue its growth and success.

Mr. **Winer** is a member of The Society of Naval Architects and Marine Engineers, The American Society of Mechanical Engineers, and The National Society of Professional Engineers.

St. Martin's Press Publishes New Atlas On World Shipping

The "World Atlas of Shipping," edited by **W.D. Ewart** and **H. Fullard,** is both an excellent atlas and an authoritative guide to shipping and the sea.

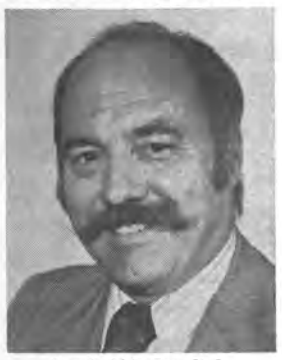
The atlas begins with a detailed description of the sea, its composition, movement, geography and life. This is followed by a history of the evolution of shipping and its craft, from the first seagoing vessels, through steam, to the modern diesel-using giants. Bulk carriers, tankers, modern and conventional cargoships are individually discussed, together with accounts of design, building, and equipment. The section concludes with a discussion of recent port developments, waterways and world shipping lanes.

The atlas section of the book has 128 pages of full-color maps showing both physical and political details of all parts of the world. An 84-page index acts as a guide to all the place names.

This combination of maps and text, integrated with almost 150 illustrations and diagrams, makes the book a truly invaluable reference guide not only for those who are fascinated with the sea and its vessels, but also for every armchair traveler and adventurer.

"World Atlas of Shipping" is available at $22.50 per copy from St. Martin's Press, Inc., 5 South Union Street, Lawrence, Mass. 01843.

Bethlehem Steel Ship Repair Sales Promotes Gomlick



Louis W. Gomlick

The promotion of **Louis W. Gomlick** to assistant manager of ship repair sales, Bethlehem Steel Corporation's shipbuilding department, was announced by **C.R. Wise,** manager, ship repair sales.

Mr. **Gomlick** had been serving as assistant to manager, ship repair sales. He will remain at the 25 Broadway office in New York City.

A native of New York City, Mr. **Gomlick** served in the U.S. Marine Corps from August 1953 to August 1956.

In 1957, he was graduated from Pennsylvania State University with a bachelor's degree in civil engineering.

He then became a member of that year's Bethlehem management training program and was initially assigned to the Sparrows Point, Md., plant.

Mr. **Gomlick** was assigned to Bethlehem's former Brooklyn 27th Street Yard in January 1958 and served there as a special technical trainee until October 1959, when he joined the ship repair sales office in New York. The following year he became a salesman, the position he held until he was named assistant to manager, ship repair sales, in March 1969.

Subsidy Request Made For Chemical Carriers To Trade With Russia

The Maritime Administration recently disclosed that subsidy has been sought for the first ships intended to be used specifically in future trade with Russia.

To be chemical carriers, the six 67,000-deadweight-ton vessels are to bring to the United States and other world markets ammonia from the Soviet Union after delivering superphosphoric acid to Russia.

The total estimated value of the shipbuilding involved was $348 million by the applicant, Suwannee River Lines Inc., Los Angeles, Calif., a company organized by four "employees" of Occidental Petroleum Co., the pioneering U.S. corporation to work out long-range trade agreements with the USSR.

The four employees were identified as **Dean B. Lewis, Raymond Gill, Kenneth A. McGraw,** and **Michael D. Godett.** Suwannee's application indicated that it "may ultimately" sell the shares held by the four to Occidental.

These are the first liquid bulk chemical carriers for which subsidy was sought under the new long-range program to rebuild the entire U.S.-flag merchant fleet.

Three of the chemical carriers would be heated-refrigerated types. The other three would be refrigerated only, Suwannee explained.

Friede and Goldman of New Orleans, La., is said to be developing the design. A builder has not yet been chosen.

The heated-refrigerated types are expected to cost some $60 million each, with construction subsidy of $23.4 million each, or 39 percent, to be required to equalize foreign costs. The refrigerated-only models, Suwannee said, were estimated at $56 million each, with a subsidy of about $21.8 million each, or 37.5 percent.

Suwannee also said it intended to apply for operating subsidy later. At least tentatively, Suwannee said the three heated-refrigerated vessels would haul superphosphoric acid to Russian Black Sea ports. All six would pick up Russian ammonia from both Black Sea and Baltic ports for U.S. and other world markets.

The application brought to some $5.1 billion the value of shipbuilding represented by pending applications at MarAd.

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Rosenberg Verft Launches Norman Lady

First LNG Carrier Utilizing The Moss Rosenberg Tank System

Spherical Cargo Tanks Made Of Nine Percent Ni-Steel Have Undergone Extensive Testing And Analyses By Det Norske Veritas. Feature Of This System Is That No Secondary Barrier Is Required.

The first ship featuring the Moss Rosenberg system for transporting liquefied natural gas (LNG) was launched recently at the Rosenberg Verft, Stavanger, Norway. The launching of this 87,600 cubic meter LNG carrier, the Norman Lady, heralded the start of a series of LNG-ship construction by this yard. Scheduled for construction is a sistership and three 125,000 cubic meter LNG ships. The Norman Lady is being built for Buries Markes, Ltd. of London.

The Moss Rosenberg system is based on spherical cargo tanks. This method of cargo containment was developed while the firm was building chlorine carriers. For the LNG ships, the firm retained Det norske Veritas to conduct strength calculations, experimental investigations and material testing and research. This design investigation called for the spherical tanks on the Norman Lady and its sistership to be constructed of 9 percent Ni-steel.

A main feature of the Moss Rosenberg cargo containment system is the continuous supporting skirt attached at the equator of the tanks and welded to the ship structure. No other rigid connection exists between the tanks and the hull. By a special arrangement of the insulation, the thermal contraction of the cargo tanks is accommodated in a limited part near the top of the skirt, which contracts equally much as the tanks in this area without causing noticeable stresses in the tanks and the hull.

The geometrical shape has made a complete stress analysis of the cargo tanks with supporting skirt possible. In this analysis, the cargo tanks and the hull have been considered as one structure.

The extensive stress analysis, material testing and experimental investigation also have made it possible to design a system with unique safety. The traditional secondary barrier is omitted.

The basic criteria of the Moss design is that it be fail-safe or that it shall leak before failure. This approach is valid and can be accepted so long as one has a clear understanding of the growth pattern of defects in the tanks under actual service conditions. In this design, fracture mechanics analyses show that the at-sea service time span between (a) the onset of tank leakage due to fatigue, and (b) final defect growth to critical proportions, is sufficient for the vessel's crew to take safe remedial action. In order to use this design approach, it was necessary to learn more about the mechanical properties of the tank materials.

THE NORMAN LADY under control of tugboats immediately after launching at the Rosenberg Verft in Stavanger, Norway. The tank covers and erection tent provide a unique profile.

In the firm's construction programs, both double normalized and tempered 9 percent nickel steel and 5083-0 aluminum will be used. Although both of these materials have been tested extensively and both have demonstrated good performance in cryogenic service, not enough was known about the heavy-gage properties. For this reason additional material studies are being made.

The mechanical properties of the dished plates for the steel tanks are according to the requirements of ASTM A-353-67a, "Nine Percent Nickel Alloy Steel Plates, Double Normalized and Tempered, for Pressure Vessels." Where the requirements of Det norske Veritas steel quality NV 20-2 exceed those of ASTM, the higher standards are applied. The main exceptions in excess of ASTM A-353 are increased frequency of Charpy V-notch impact testing, the use of transverse impact specimens, a tighter requirement for tensile test elongation, and ultrasonic inspection of plates for laminations. The forged equator profile sections are produced according to Det norske Veritas Specifications 20-2 for 9 per-

(Continued on page 13)

TANK SEGMENT being moved by cranes to the ship for joining with a lower section. Some shipyards will assemble tanks completely prior to installation aboard the ship.

JOINING OPERATION in the ship requires careful planning and manufacturing of the tank segments. This view shows the inner bottom which serves as a jig for assembly.

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The Norman Lady—

(Continued from page 11)

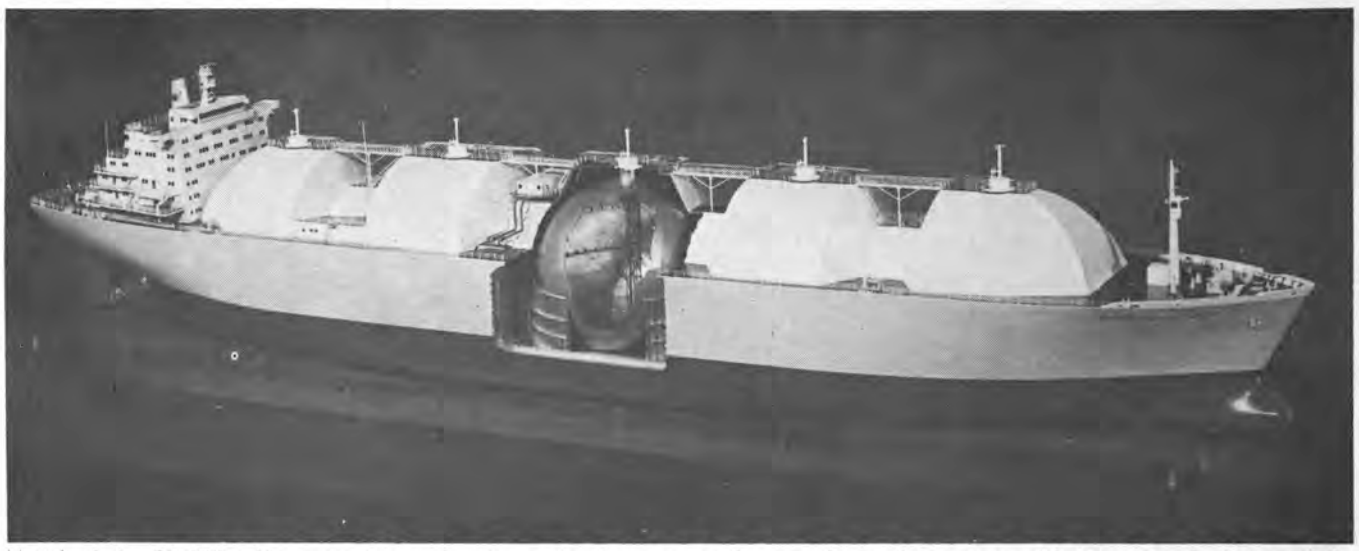
cent nickel steel. For the forged material, Charpy V-notch impact tests are performed on short transverse specimens oriented with the fracture surface parallel to the longitudinal direction of the forging. Similarly, tensile, yield and elongation minima are checked in both the short and long transverse directions.

Production of the 101-foot 7-inch and the 108-foot 3-inch tanks of 9 percent nickel steel for the Norman Lady was as follows: The steel was received in the shipyard already shaped and cut to size with the edges beveled, ready for cleaning, fit up, and welding. Each dished plate was inspected for shape (sphericity) and for edge dimension and bevel, and is checked against a master prior to shipment from the mill.

In the Rosenberg yard, the cargo tanks are erected in the hull using large subassemblies with the hull inner bottom forming the erection platform. In other shipyards, the tank-erection procedures and production sequences are varied to suit the yard conditions. Some of the following considerations need to be integrated in any attempt to optimize the tank building:

1. Hull and tank building time spans.
2. Weld procedures useable, automatic versus manual.
3. Capital expense and availability of welding shops, tank welding jigs, and segment positioning and transporting rigs.
4. Lifting capacity.
5. Space limitations.
6. Availability and skills of labor.

All other things being equal, the shipbuilder feels that there is an advantage to build the tanks independent of the hull fabrication. Construction outside the ship has the advantage of being more amenable to automated and rationalized procedures and, at the same time, may reduce the building dock time span. Since the hull can be virtually completed and can be moved under its own power before the cargo tanks are installed, the independent tank building can even be performed at a location remote from the shipyard.

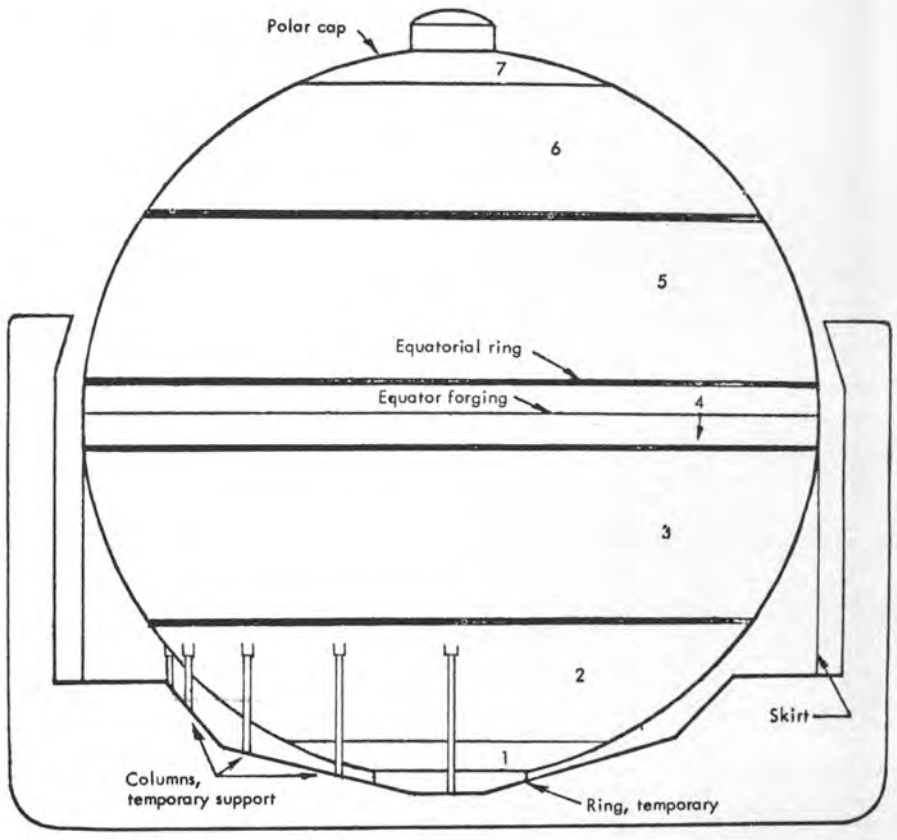


Model of the 87,600-cubic-meter ship with cutaway in the cargo tank area. Built of 9 percent nickel steel, each of two of the tanks have a diameter of 101 feet 7 inches, and the other three have diameters of 108 feet 3 inches.

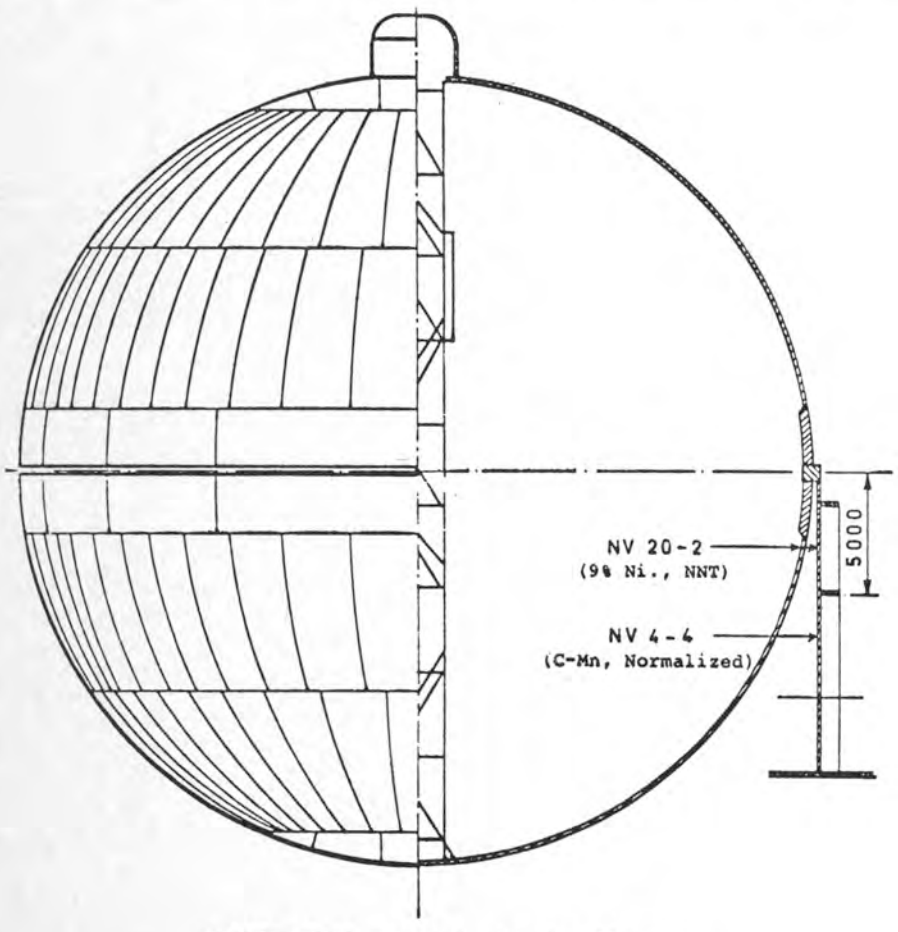
The Norman Lady

The Norman Lady, Hull 196, has an overall length of 816 feet 7 inches, a length between perpendiculars of 777 feet 7 inches, a molded breadth of 131 feet 2 inches, a molded depth of 75 feet 3½ inches and a maximum draft with a cargo density of 0.5 tons per cubic meter of 34 feet 3½ inches.

The ship has five insulated, independent spherical tanks and is designed for carrying LNG at atmospheric pressure. The lowest allowable temperature is minus 260° F.



TANK ASSEMBLY sketch shows the seven separate tank sections and method of erection.



TANK SHELL sketch showing the skirt support for the entire tank, fastened at the equator.

The propulsion plant consists of a single Kvaerner-General Electric steam turbine with a maximum continuous rating of 30,000 bhp at 95 rpm. Steam is supplied by two Moss-Foster Wheeler boilers, suitable for burning methane and heavy fuel. The trial speed has been set at about 19.7 knots, fully loaded, and at maximum continuous rating.

The maximum discharge rate is about 12 hours by means of submerged pumps, one in each tank. Cargo-tank insulation is designed to give a maximum boil-rate less than 0.25 percent per 24 hours.

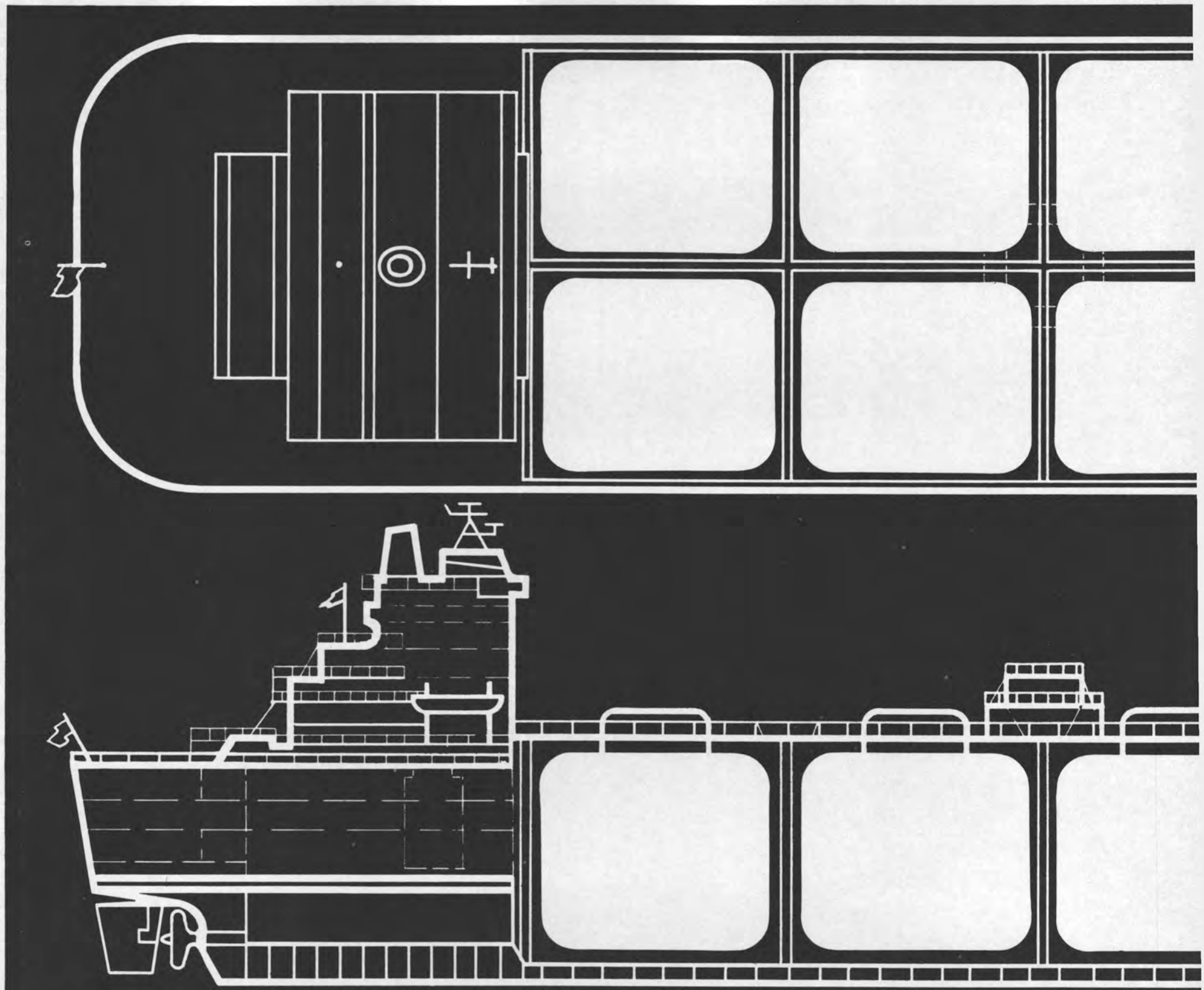
The Norman Lady is classed by Det norske Veritas for Ice C and as an EO, Tanker for Liquefied Gas. It also complies with the U.S. Coast Guard's rules and regulations for foreign-flag vessels.

Moss Rosenberg Licensees

The Moss Rosenberg LNG design has become an international concept. Seven foreign shipyards have been licensed to build LNG carriers according to this design. These are:

Kawasaki Heavy Industries Ltd. of Japan,
Mitsui Shipbuilding and Engineering Co., Ltd. of Japan,
Mitsubishi Heavy Industries Ltd. of Japan,
General Dynamics Corp. Quincy Shipbuilding Division of U.S.A.,
Howaldtswerke Deutsche Werft A.G. of West Germany,
Italcantiere, S.p.A. of Italy, and
Astilleros Espanoles S.A. of Spain.

R.S. Kvamsdal, manager, Development & License Department, Moss Rosenberg Verft, and **J.L. Howard**, president, Kvaerner Moss, Inc., New York, listed the advantages of their LNG system in a recent paper as: (1) low cost and high safety, and (2) low maintenance costs. They feel, that due to the extensive analytical studies and experiments, that the first ships to enter service in 1973 will have any source for trouble reduced to minimum.



Why build LNG containment tanks

Economy

First, material cost. Armco CRYONIC 5 Steel costs less than other cryogenic materials—20% less than 9% nickel steel. Second, operational savings. Armco CRYONIC 5 expands and contracts less than other plate materials—one-half as much as 5083-0 Aluminum. Less expansion/contraction means sounder insulation integrity. And a thinner wall, due to CRYONIC 5's higher strength, can result in increased capacity. Calculations, based on one containment system showed an additional annual $1 million of deliverable liquefied gas in a 125,000 m^3 tanker.

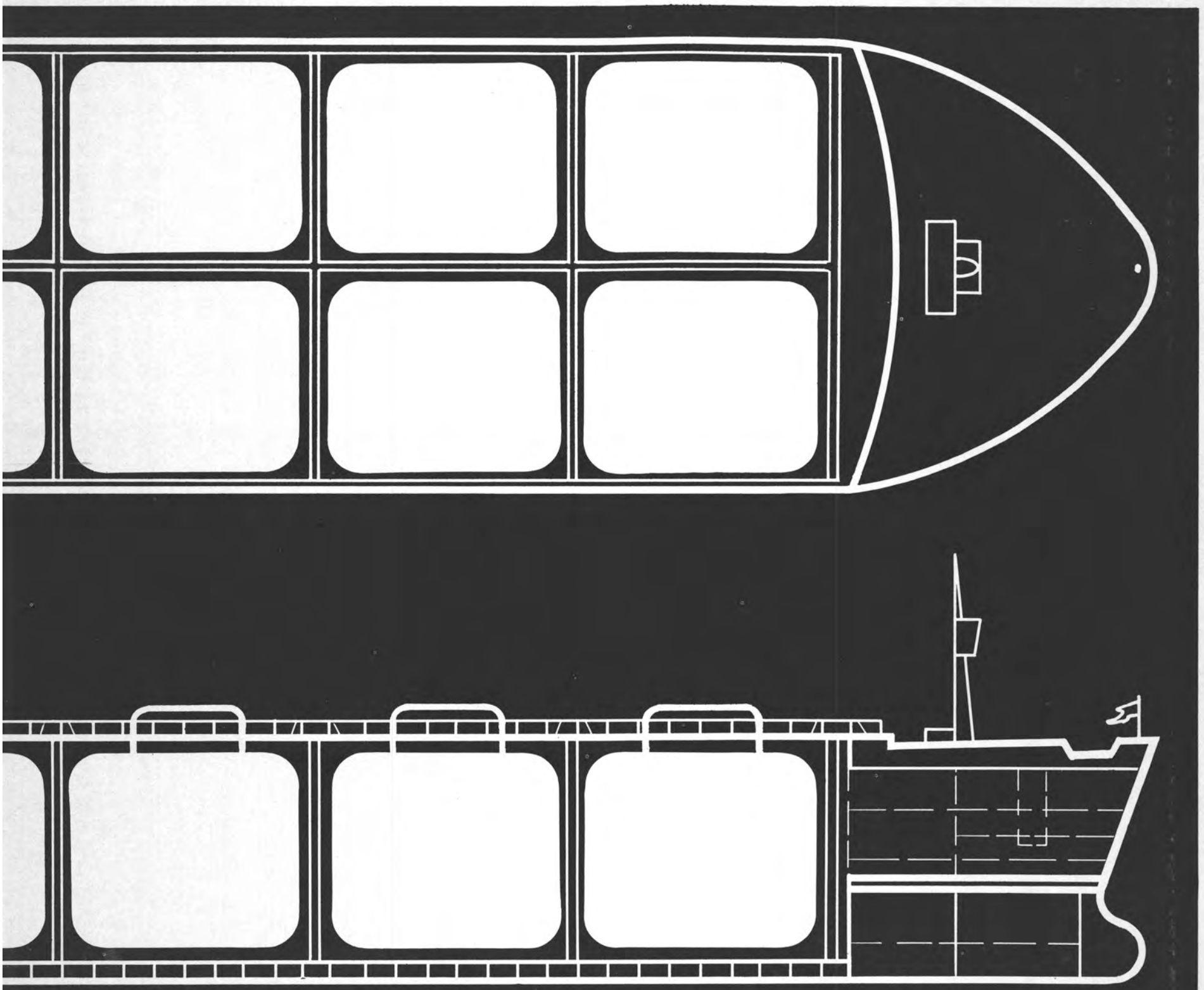
Toughness

Armco CRYONIC 5 Steel meets these *minimum* Charpy V-Notch values at —275 F, 25 ft-lbs (longitudinal), 20 ft-lbs (transverse), and 15 mils lateral expansion (transverse). They are a clear indication of CRYONIC 5's ability to provide a reliable containment system. After welding, Armco CRYONIC 5 provides sufficient toughness in the heat-affected zones to meet applicable regulatory requirements. Extensively tested, Armco CRYONIC 5 Steel provides the designer and owner a fail-safe material measured by fracture mechanics, crack propagation and conventional fatigue studies.

Weldability

Armco CRYONIC 5 Steel can be joined to other nickel-alloy steels, carbon steels and the austenitic stainless steels by all commonly used welding processes—manual, submerged-arc and gas metal-arc welding. Familiar, firmly established welding procedures, performed with existing equipment, can help achieve high quality welding, save fabrication time and eliminate the need for new equipment.

In addition, we provide CRYONIC 5 with an extremely low sulfur and phosphorus level. This combines with the low carbon level to give CRYONIC 5 excellent resistance to underbead cracking.



with Armco CRYONIC 5 Steel?

Acceptance

Armco CRYONIC 5 Steel is included in the ASME Boiler and Pressure Vessel Code as SA-645 with a maximum allowable design stress of 23,700 psi at room temperature. Ship containment tanks can be designed to acceptable design allowables. It also means that CRYONIC 5 meets the basic criteria for acceptance by the regulatory bodies governing this type of construction.

This combination of strength, toughness, weldability and economy makes Armco CRYONIC 5 Steel the logical material for LNG containment tanks.

If you would like more information on Armco CRYONIC 5 Steel, just mail this coupon to Armco Steel Corporation, Dept. H-243, Box 723, Houston, Texas 77001.

NAME _____ TITLE _____

COMPANY _____ ADDRESS _____

CITY _____ STATE _____ ZIP _____

CRYONIC 5 trademark of Armco Steel Corporation, Middletown, Ohio

ARMCO STEEL ARMCO

LARGEST ON WEST COAST: Standing as high as a 20-story building and having a lift-capacity of 200 tons, the largest shipyard crane on the Pacific Coast recently went into operation at the shipbuilding facilities of FMC Corporation's Marine and Rail Equipment Division, Portland, Ore. The huge crane, which weighs 710 tons and propels itself on special rails, is being used initially in the modular construction of four 650-foot 35,000-ton oil tankers for Chevron Shipping Company, under a $70-million order awarded FMC's Portland operation, formerly known as Gunderson, Inc. Each tanker will have a carrying capacity equal to 270,000 barrels of petroleum and will be used on the Pacific Coast. Developed after several years' study, the tankers combine a new double hull design and modern gas turbine power to produce a safe, economical tanker. The gantry-mounted whirley crane, mobilized by 24 wheels, rides on a track consisting of two rails, 37 feet apart by 630 feet long. Made from the heaviest rail stock rolled in America, the rails can support loads of 70 tons per wheel. The foundation required special attention in order to accommodate the heavy-duty crane operation. First, 458 wooden pilings 45 feet long were driven to form the base. Then, 1,200 yards of concrete were poured over 240,000 pounds of reinforcing steel, forming a solid surface on which the rails were mounted. Manufactured by Clyde Iron Works, Duluth, Minn., the crane components were transported on 15 railcars to the FMC yard. The mammoth $1.1 million crane was erected in 45 days by Fabindustries, Incorporated, Portland. **Bob Landregan,** plant engineer at FMC, coordinated the project.

Zapata Bulk Transport Applies For 3 ULCCs—Largest CDS Request

The Maritime Administration has received an application for a construction differential subsidy regarding the construction of three 390,000-dwt ultra large crude carriers (ULCCs)—the largest ever asked for in a CDS application. The request was made by Zapata Bulk Transport Inc., 1133 Avenue of the Americas, New York, N.Y.

The tankers will be used to transport crude oil to the United States, have a length of 1,200 feet, a beam of 225 feet, a loaded draft of 74 feet, and a speed of 16 knots. While the estimated cost is not known, two corresponding applications for tankers of 380,000 deadweight tons would approximate the price from $95 million to $106 million each.

Lloyd's Register American Committee Elects John Armstrong

John Armstrong Jr., vice president, Insurance Company of North America, has been elected chairman of the American Committee of Lloyd's Register of Shipping of London, England, the world's oldest classification society. Mr. **Armstrong** had served as a member of the committee since 1964 and was deputy chairman prior to his recent election.

Mr. **Armstrong,** who has served in various positions with INA since 1945, has had a seafaring experience spanning 18 years. He holds an unlimited license as master mariner. He is a member of the Insurance Planning Council of the American Management Association and a member of the Board of governors of the Pennsylvania Export Corps. He is a founder and former member of the Yacht Safety Bureau, now the Marine Division of Underwriters Laboratories.

He is also a member of the American Institute of Marine Underwriters, Maritime Association of the Port of New York, Foreign Traders Association of Philadelphia, the Board of Underwriters of New York, and the Delaware Valley Council. He was named Admiral in the Texas Navy, an honorary commission awarded by the Governor of Texas.

Made

First of seven 465,000 bbl LNG

SNAME Analyzes Shipyard Cost Reporting Systems

Who or what is responsible if construction costs of a new ship end up more than the original estimate? To answer this question, you need an efficient cost reporting and control system in your shipbuilding organization. Over the years, there has been difficulty in implementing such a system that is truly effective. In an effort to remedy this situation, The Society of Naval Architects and Marine Engineers called upon its Technical and Research (T&R) Program to conduct a study, the results of which are reported in Bulletin 6-1, "Analysis of Shipyard Cost Reporting Systems." The study and publication was accomplished by Panel SP-4 (Cost Reporting) with the approval of the ship production committee.

Bulletin 6-1 summarizes investigations into cost reporting systems currently in use in American shipyards and presents the panel's recommendation of a direct labor cost reporting system in which a well-defined work package is utilized for reporting and control. The compatibility of this system with requirements outlined in Department of Defense Instructions 7000.2 is discussed.

The method employed in the preparation of this bulletin was a questionnaire sent to shipyards concerning their present cost reporting and control systems. The answers to the questionnaire received from 16 major shipyards were tabulated and analyzed, and the results indicated a "package" cost reporting system was most desirable. The panel then conducted an in-depth study of one such system that has been in operation since 1967 on both commercial and naval construction.

T&R Bulletin 6-1, "Analysis of Shipyard Cost Reporting Systems," is available through The Society of Naval Architects and Marine Engineers, 74 Trinity Place, New York, N.Y. 10006, at $6 per copy. Members of the Society may obtain this bulletin at a price of $4 per copy. The price includes postage, if payment is included with order, via third class mail in the United States, and as "Printed Matter" in all other countries. Shipments will be insured or sent air mail at additional cost only if requested.

Lufkin Industries Promotes Ben Queen

Ben M. Queen

Lufkin Industries, Inc., P.O. Box 849, Lufkin, Texas 75901, has announced the promotion of **Ben M. Queen** to the position of acting sales manager of the Machinery Division. He replaces **C.D. Richards,** who is retiring.

Last fall, Mr. **Queen** was transferred from the Tulsa office, where he was district sales manager of the Mid-continent Division, to be assistant sales manager of the Machinery Division.

With Lufkin since 1958, he joined the company as a sales engineer in the Machinery Division in the Corpus Christi office.

Mr. **Queen** graduated from the University of Arkansas with a B.S. degree in geology.

Lufkin Industries' Machinery Division manufactures oil field pumping units and industrial and marine gears.

James C. Buckley, Inc. Appoints Associate —James R. Cass Jr.

James R. Cass Jr. has been named associate by James C. Buckley, Inc., transportation consultants, 1250 Connecticut Avenue N.W., Washington, D.C. 20036, with responsibilities in the area of ports and harbors.

Mr. **Cass** was formerly port engineer with the Massachusetts Port Authority for several years. More recently, he was with San-Vel Concrete Corporation, Littleton, Mass.

Grain Barge Built By Zidell Features Push-Button Operated Hatch Cover

The first barge built in the United States utilizing the French "Magroroll" barge hatch system was recently launched by Zidell Explorations, Inc., Portland, Ore. The new barge, Knappton CTC350 (shown above), is a self-unloading grain barge designed for service on the Columbia-Snake River system from Lewiston, Idaho, to Longview, Wash. It is owned by Knappton Towboat Co., Portland, who have placed it under contract to Coast Trading Co. Conventional hinged steel doors covering hatches have been replaced by two rolling aluminum alloy doors, each 100 feet long and 11½ feet wide. The doors unroll from opposite ends of the grain storage area, traveling on horizontal rollers. Each door is individually motor-operated from current supplied the barge by the assisting tugboat. A backup manual open-close system can be operated in case of power failure or other emergency. Knappton Barge CTC350 is the 141st barge launched by Zidell at Portland since 1961 and the third grain barge built by Zidell for Knappton. Although it has the same storage capacity (3,300 tons) as the other two, Knappton CTC350 has a lower profile—to gain greater ease in towing and maneuvering—as well as the "Magroroll" system.

Western Gear Corporation Offers New Literature On Marine Propulsion Gears

A 16-page illustrated catalog of Marine Propulsion Gears is available without charge from the Industrial Products Division, Western Gear Corporation, P.O. Box 126, Belmont, Calif. 94003.

The colorful brochure describes and gives specifications for marine gears in the 750 to 5,000-hp range for tugs, work boats, fishing fleet seiners, offshore service boats and offshore rigs, drill ships, and large oceangoing vessels. Pictures of many of the Western Gear-equipped vessels are shown.

Specifically described in the brochure are the PCMR (single reduction, vertical or horizontal reversing gear); RH and RV gears (single reduction reversing, horizontal or vertical); MG (single reduction, nonreversing, horizontal or vertical); VST (split-train double reduction, nonreversing, vertical); TSR (two speeds forward, one speed reverse); Vee Drives (to 600-hp 16-degree shaft angle); Custom Drives (turbine propulsion, double input units), and Offshore Propulsion (480, 660, 760 and 960 MGH-TP bidirectional thrust units). The units are manufactured at Western Gear's Industrial Products Division, Belmont, Calif., and Houston, Texas, plants.

Lloyd's To Represent Sperry During Manufacture Of Stabilizer Units In Japan

Lloyd's Register Specification Services will represent Sperry Marine Systems, Bracknell, Berkshire (a division of Sperry Rand), as the technical authority responsible for compliance with the engineering specifications during the manufacture of Sperry's Gyrofin ship stabilizers in Japan. Agreement between Lloyd's Register and Sperry was reached following Sperry Rand Corporation's decision to license Sperry Rand Far East Inc., Tokyo, to build the Sperry Gyrofin's machinery in Japan for sale to Japanese shipyards and shipowners.

The Gyrofin machinery for this modern folding-fin stabilizer is being built at Sasebo Heavy Engineering Co (S.SK.) under subcontract from Sperry Rand Far East. Sasebo Heavy Engineering will build the fin boxes and heavy machinery.

Under the agreement reached with Sperry, the services provided by Lloyd's Register will include a review of quality control arrangements, the inspection of components during manufacture and the supervision of shop trials to the owners' and shipyards' standards of acceptance. Lloyd's Register Specification Services will represent Sperry through its 10 offices in Japan, including a suboffice at Sasebo which is permanently staffed by engineer surveyors.

Overseas Decides To Build Four Tankers At NASSCO Without Differential Subsidy

Overseas Shipholding Group, Inc. (OSG), 511 Fifth Avenue, New York, N.Y. 10017, has announced that it has decided to order four U.S.-flag 89,000-deadweight-ton tankers without differential subsidies, which are primarily intended for use in the U.S. domestic trades. The company has reached an agreement in principle with National Steel and Shipbuilding Co. (NASSCO) for the construction of these vessels, three of which are to be delivered in 1977 and one in early 1978. This agreement replaces a previously announced agreement with NASSCO which contemplated differential subsidies for the same vessels. OSG will have a 60 percent interest in the four vessels, which have a total purchase price of $120,000,000.

These four new buildings will raise OSG's U.S.-flag tanker fleet to in excess of one million deadweight tons.

Joint Venture To Build New Super Class Rig

Ocean Drilling & Exploration Company of New Orleans, La., and Fearnley and Eger, Oslo, Norway, shipping firm, have announced the formation of a joint venture which seeks to build and operate a new super class of semisubmersible drilling rig for use in previously inaccessible areas of the world.

According to a joint announcement by Ocean Drilling president **Alden J. Laborde,** and Fearnley and Eger executive vice president **E. Kristen-Johanssen,** the new rig has been designed to drill from a floating position in water depths up to 1,500 feet and with modifications to 3,500 feet, using conventional mooring systems.

"The proposed new super class rigs will pave the way for exploration in geologically promising provinces under the most challenging sea and weather conditions.

"In addition to having greater drilling depth capability, the new class will also have greater working and storage areas," Mr. **Laborde** and Mr. **Kristen-Johanssen** said.

Invitations to bid on construction of the first of the new units will be forwarded to selected European, American, Canadian and Japanese shipyards.

It is anticipated that a contract for construction of the new unit will be awarded in September of this year, the two executives said.

Indame, S.A. Licensed To Produce And Market MMC Sonic Probes For Spain

An exclusive license to manufacture and service the MMC line of Sonic Point and Interface Probes for Spain has been awarded to Indame, S.A. of Bilbao, Spain, by Marine Moisture Control Co., Inc. of Inwood, N.Y., according to **Charles S. Schmukler,** president of the Inwood corporation.

Both the MMC Sonic Point and Interface Alarm Systems are solid state, with no moving parts subject to mechanical breakdown. They were developed in response to a marine requirement for precise and thoroughly dependable tank limit and liquid interface remote monitoring devices for liquid level control and pollution prevention.

The systems have earned a broad range of regulatory body approval worldwide. They can be furnished as intrinsically safe for use in hazardous areas, and are also available on special order for cyrogenic service to −350°F.

Indame, S.A. will provide Spanish language sales literature, and is prepared to accept and service Spanish orders immediately.

launch day at Sparrows Point

April 28, 1973. Here at our big yard in Maryland, the 70,000 dwt tanker *Chevron Hawaii* is shown a few hours before launch. She's the last of a series of 6 vessels of her class and size that we've built here.

On other ways on either side of her, thousands of tons of fabricated steel await installation on a large container ship, shown under construction on a way in the background.

Also in the background, the second, and the stern section of the third of four 120,000 dwt tankers on order here are under construction in our new 1,200 x 200 ft building basin, the largest in the United States. To follow these big tankers are five that will be more than double their size: 265,000 dwt, the largest ships ever built in this country. These nine tankers will keep the basin busy well into 1976. They are based on the ninth and tenth cost-saving "standard designs" developed since World War II by Bethlehem's Central Technical Division (CTD), which is headquartered here.

BETHLEHEM STEEL

SHIPBUILDING • SHIP REPAIR
OFFSHORE CONSTRUCTION
MARINE SERVICES

Barge Flotilla Leaves For Prudhoe Bay

Prefabricated Housing Modules Weighing Up To 900 Tons, Power Station Modules, And Large Water Tanks Are Some Of The Heavy Equipment That Had To Be 'Walked' Aboard Barges For The Trip To Alaska's Arctic Coast

Shown on a barge is one of five sections of the B.P. Alaska, Inc. base operations camp that will be carried to Alaska's North Slope. In the background are four sections of the camp yet to be loaded.

Eight massive barges carrying over $30 million worth of cargo were loaded in Seattle, Wash., on July 6, to make a 3,500-mile dash north to Prudhoe Bay on Alaska's Arctic coast.

The barges, carrying 20,000 tons of cargo for the Standard Oil Company (Ohio) oil operations on the North Slope, are expected to reach their destination by the 15th of this month.

The Arctic ice moves off the Alaska coast for about six weeks midsummer and the barges have to hurriedly drop their loads and head back south to avoid being trapped in the ice for the winter. Point Barrow, 150 miles west of Prudhoe Bay and the most northernly point in the United States, is virtually an ice trap if the wind is blowing from the north, and the barges may have to wait there for the wind to change and the ice to blow offshore. Last year, conditions were such that the barges taking up supplies had to wait about a week both on the inbound and outbound journeys.

B.P. Alaska Inc., as Prudhoe Bay operators for the Cleveland-based Standard Oil Company, organized the sea lift which is being carried out by Arctic Marine Freighters (AMF). AMF has landed cargo at Prudhoe Bay each year since the discovery of the oil field in 1968.

The cargo this year includes a new 95,000-square-foot operations camp specially designed for Arctic conditions by Wallace. Floyd, Ellenszweig, Inc. of Cambridge, Mass., and the first phase of a central power station which will eventually supply all the power needs for the Prudhoe Bay oil field. Two 17 MW gas turbines, each capable of generating 13,800 volts, and a control center with the necessary ancillary equipment, form a major part of the cargo. Also included is a fuel gas system for the camp, which was constructed in Seattle by W.D. Whinery Inc.

General Swalling, a joint venture with Alaska's Swalling Construction, prefabricated the camp; and Manson-Osberg, another joint venture, built the power plant. Alaskan firms engaged in subcontract work are Haskell Corp., City Electric Inc., Swalling Construction Co. Inc., and Holert Electric Co.

The operations camp, which will be capable of housing 150 men, will cost $18 million by the time it is installed at its North Slope location and linked up with the utilities.

"The critical time factors involved in operations in the Arctic and the size and value of the cargo make the whole exercise a very delicate one requiring precise planning," said **Leo L. Collar,** president of Puget Sound Tug and Barge Company, Arctic Marine Freighters' partner in the operation.

The base camp is divided into five sections, each 125 feet long, 50 feet wide and 45 feet high. Since some of the sections weigh up to 900 tons, they cannot be lifted aboard the barges by crane, but must be "walked" aboard by specially designed crawler transporters, mini-tractors that fit under the sections, hydraulically lift them and transport them aboard the barges.

The larger of the power station modules are placed on the barges in a similar manner.

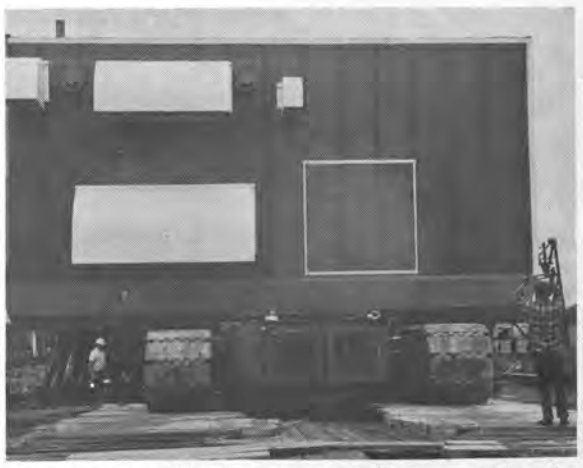
When the last of the camp modules was "walked" aboard, the crawlers were left on the barge for use in the delicate unloading operation that will occur at Prudhoe Bay. There, the modules will be transferred to smaller, shallow-draft barges eight miles from the shore because of the four-foot water depth near the coastline. To allow the crawler transporters to transfer the modules, both the oceangoing and shallow-draft barges will be positioned end-to-end in seven feet of water, and then take on water in ballast tanks until they are resting on the bottom. This will secure the barges so the crawlers can make the transfer.

The shallow-draft barges will then be floated and towed to a dock at the end of a 1,100-foot gravel causeway that has been prepared to receive cargo. Once there, the barges will be ballasted again, and crawlers will "walk" the modules off the barges and along a gravel road 20 miles to their locations.

AMF has installed a quick ballast and de-ballast system in the barges to speed up the entire operation. When the flotilla arrives at Prudhoe Bay, the cargo will have to be unloaded quickly to enable the tows to leave before the ice pack moves back to block their way.

Three large water tanks, two diesel tanks, other camp support equipment and over 10,000 tons of miscellaneous supplies were loaded aboard other AMF barges to sail north in the same flotilla.

Pictured are three large water tanks on an Arctic Marine Freighters barge loaded at Seattle for the 3,500-mile trip to Alaska's North Slope.



A large low-profile "creepy crawler" moves under the 559-ton camp module (also shown in top picture). The crawler hydraulically lifts the heavy modules up and slowly moves them aboard the barges.

Floating Shell service station speeds

turnarounds at Portland, Maine.

Ships can take on 4800 gal./hr. of Shell Lubricants here; 4000 gal./hr. at Hampton Roads; 4400 gal./hr. at New York City. Cost-saving bulk delivery of Shell Lubricants is available at 13 major ports on the East, West and Gulf coasts.

Shell knows that ships have to get back in service fast. That's where the profit is—when the ship is moving. So in Portland, Maine (and 12 other major ports) the speedy, cost-saving bulk delivery of Shell marine lubricants is available to serve you.

Ships in Portland Harbor, for example, can have their lubricants tanks filled in mid-harbor. No need to tie up at a dock. Shell distributor, Golten Ship Repair, sends out the Aubrey L. Hudgins. The little 95-gross-ton tanker has a capacity of 48,000 gallons of lube oils.

Advantages to motorships

The Hudgins pulls alongside a newly arrived ship. One man hooks up the connection and opens the ship's intake valve. Another man watches the sight in the ship's engine room. That's all there is to it. No cranes. No cargo nets. No tank trucks needed on a pier.

It's a speedy tank-to-tank delivery system that involves very little chance of product contamination, and no interference with cargo handling operations. The time for the turnaround is trimmed. Money is saved for the ship's operator.

MELINA® Oil—one oil in bulk for 8 different shipboard applications

Shell MELINA Oil can effectively lubricate a motorship's main engines—plus most other shipboard machinery. MELINA Oil is a diesel engine oil, air compressor oil, turbocharger oil, steering gear oil, stern tube bearing oil, and variable-pitch propeller oil.

Buying multi-purpose MELINA Oil, and having it pumped aboard in a speedy bulk loading operation makes good business sense. The savings in time, labor and paper work are obvious.

Golten Ship Repair tank boat, the Aubrey L. Hudgins, pumps Shell MELINA Oil into ship in mid-harbor at Portland, Maine. The Hudgins' pumps can deliver 4,800 gallons per hour from her 48,000-gallon-capacity tanks. Turnaround time for ships is speeded up by this fast, clean delivery system.

Bulk lube oil delivery of Shell marine lubricants at major U.S. ports offers motorships fast, clean, safe delivery. Lifting lube oil in bulk directly into ships' tanks is much faster than drums, safer and more economical than drums, and there is far less chance for product contamination.

Why not start saving with the speed and economy of bulk delivery of Shell lubricants at Seattle; Portland, Me. and Portland, Oregon; San Francisco; Oakland; Los Angeles; Houston; Galveston; Texas City; New Orleans; Hampton Roads; Philadelphia; and New York. Call your nearest Shell Office listed below. Transportation Sales Offices:

New York, N.Y., (212) 262-7310;
Baltimore, Md., (301) 821-5905;
Chicago, Ill., (312) 341-3275;
New Orleans, La., (504) 588-4942;
San Mateo, Calif., (415) 574-5300.
Shell Commercial Marketing,
One Shell Plaza, Houston, Texas 77002.

Shell Products Perform

SHELL

U.S. Navy's SES, Built By Aerojet, Sets Speed Record Of 88 Mph On Puget Sound

The Navy's SES-100-ton program is the stepping stone leading to the design and construction of a 2,000-ton-class ship.

The U.S. Navy's waterjet propelled SES-100A was recorded at 88 mph (76 knots) on July 2, 1973, establishing a speed record for surface effect craft as well as a milestone toward the goal of a 100-knot Navy.

The Aerojet Surface Effect Ships Division, Tacoma, Wash. 98401, who designed and built the testcraft under the direction of the Chief of Naval Material's Surface Effect Ships Project Office (PM-17), said the speed record was accomplished during a scheduled test run on Puget Sound. The technology resulting from the Navy's SES-100-ton test program will be applied to developing larger ships for the future fast fleet.

Adm. **Isaac C. Kidd Jr.,** Chief of Naval Material, who was at the controls of the SES-100A on an earlier test run, commented: "This is an opportunity I have been looking forward to for a long time, to come here and ride in this remarkable, innovative and pioneering form of propulsion at sea . . . the capability that promises to revolutionize the ways in which other men can go to sea."

Aerojet said speeds of 75 mph (65 knots) were attained as early as November 1972, and that many of the testcraft design and operating characteristics have been verified. The reliability of the SES-100A waterjet propulsion system has been proved throughout the test program.

The Navy's SES-100-ton program is the stepping stone leading to the design and construction of a 2,000-ton-class ship, to evaluate the overall utility of surface ships for the operating fleet.

The SES-100A is powered by four AVCO TF-35 gas turbine engines, manufactured by AVCO/Lycoming Division. It is propelled by waterjet pumps built by Aerojet Liquid Rocket Company of Sacramento, Calif. The surface effect ship has the tactical advantage of speed over submarines and other surface ships and will provide platforms for a variety of missions.

The major advantage of the surface effect principle associated with the SES is the ability to significantly reduce the total drag normally experienced by a traditional displacement hull ship. The SES-100A is supported on an internally generated cushion of air captured by fixed low drag sidewalls and flexible forward and aft seals. At low speed, the cushion forms a displacement bubble and the SES is subject to displacement and wave drag similar to a conventional ship, but the surface wetting drag is considerably less. As speed is increased, the SES-100A reaches and then exceeds "hump," which means that the displacement bubble and much of the drag associated with it has been left behind. The drag factors remaining are the aerodynamic drag and highly reduced levels of displacement, wave and surface wetting drag.

With the total drag reduced, the SES-100A can achieve much higher speeds than conventional ships without any increase in total power requirements. Speeds in the 76-knot range, well in excess of the maximum speed of the fastest conventional hull ships, have already been demonstrated, and speeds in the 80-knot range are planned for the near future.

The Navy's program objective is to extend this existing state of the art to ships of oceangoing size with military capability—ships with adequate range, speed and seakeeping characteristics. The Navy plans to acquire and operate prototype ships to evaluate concepts for future ship construction and to develop mission applications and logistics concepts. As a result, the prototypes will be fitted with weapons and sensors to complement their high speed capabilities. Such development will also establish an industrial base for future shipbuilding.

The Aerojet SES Division is currently working on a 2,000-ton SES, an advanced ship concept in the preliminary design phase.

Navy officials have said the surface effect ship could be the most significant change in surface fleet capability since steam propulsion replaced sails on naval craft in the 19th century.

The United States has been actively involved in developing these high-speed vehicles since 1962, and Aerojet has been a major contributor for seven of those 11 years. Additionally, Aerojet has been working in hydrodynamics and underwater propulsion for more than a quarter of a century.

The SES is a blend of the best technologies of the marine and aerospace industries. For example, the waterjet propulsion system which both propels the ship and provides steering was built by Aerojet Liquid Rocket Company, which for many years has made rocket engines for the nation's leading aerospace programs, including the vital propulsion systems which carried the Gemini and Apollo astronauts safely through their journeys.

The Aerojet SES Division originally began its work in California, but moved to Tacoma in 1971. The division employs more than 400 people, principally in the Perkins Building in downtown Tacoma. Testing of the SES-100A is carried out from a location at Sitcum Waterway.

The SES Division is one of 12 operating organizations of Aerojet-General Corporation, which is engaged in numerous diverse activities, such as water purification, pollution control, construction of chemical plants and storage tanks, electronics, manufacturing of nuclear reactor components, rocket propulsion and chemicals.

Marine Transport Lines Names Kerr, Tomalonis To New Marine Posts

Marine Transport Lines, Inc., a subsidiary of General American Transportation Corp., has announced that **Emory L. Kerr** and **Vincent P. Tomalonis** have been named to new positions in the marine department.

Mr. **Kerr,** formerly a superintendent engineer, is now manager of the marine department. He is a graduate of USMM Officers' School, Alameda, Calif., and is a licensed chief engineer. He had many years of sea duty with MTL prior to accepting shore assignment as port engineer and ship construction supervisor. Mr. **Kerr** was also previously with John J. McMullen Associates, Inc., until he resigned in 1971 to rejoin MTL.

Mr. **Tomalonis,** formerly a port engineer, is now superintendent engineer. A graduate of USMMA at Kings Point, N.Y., he had many years in both sea duty and ashore as port engineer for MTL. His background in ship repair and related fields includes two years as foreign shipyard representative, and eight years as president and general manager of a ship repair, container repair and stevedoring firm.

Bart Named President Matson Agencies, Inc.

G.E. Bart

G.E. Bart has been appointed president of Matson Agencies, Inc. newly established subsidiary of Matson Navigation Company.

R.J. Pfeiffer is chairman of the board of the new firm which has started operations as general agents for NYK Line in the western United States, including Hawaii and Alaska.

Mr. **Pfeiffer,** president of Matson Navigation Company, said the new company is part of an expansion program by Matson which will introduce roll-on/roll-off trailership service to the Hawaii trade this month.

Mr. **Bart,** a senior vice president of Matson Navigation Company, will direct the activities of Matson Agencies, Inc.

"Matson Agencies, Inc., has entered the general agency business with a full head of steam," Mr. **Bart** said. "We have the experience and expertise to provide NYK with as efficient service as is available anywhere in the shipping industry."

Piston Products Named By Hawthorn Leslie

Hawthorn Leslie (Engineers) Limited of St. Peter's Works in the U.K., announce the appointment of Piston Products, Inc. as their agent in the United States, responsible for the sale of Hawthorn Leslie products, including ships main propelling machinery and replacement parts for Sulzer and Doxford engines built by them.

Piston Products, Inc. is located at 1140 Bloomfield Avenue, West Caldwell, N.J. 07006.

MarAd Gets Title XI Request For Two 265,000-Dwt Tankers

Two subsidiaries of the First Pennsylvania Bank and Trust Company—First Pennsylvania Tanker I, Inc., and First Pennsylvania Tanker II, Inc.—have filed applications with the Maritime Administration for construction differential subsidies to build two 265,000-deadweight-ton tankers. Upon approval, Bethlehem Steel Corporation's Sparrows Point, Md., yard will construct the tankers; each is expected to cost about $83 million. The First Pennsylvania Tanker II vessel would be 18-percent owned by Maritime Fruit Carriers, Inc., according to the request.

Anderson Appointed Principal Surveyor For ABS In Orient

The appointment of **Warren L. Anderson** as principal surveyor for the Orient was announced by **Robert T. Young,** chairman and president of the American Bureau of Shipping. Mr. **Anderson** fills the post recently held by the late **Kenneth G.S. Robertson.**

As principal surveyor of the Orient, Mr. **Anderson** directs the activities of the American Bureau of Shipping in Japan, Taiwan, South Vietnam, Singapore, Hong Kong, Philippines, Korea, Indonesia, Thailand, Malaysia, Guam, and the Trust Territory of the Pacific Islands.

He joined the American Bureau of Shipping in August 1952 as a surveyor in the Los Angeles-Long Beach Harbor District. He transferred to Japan in 1955, serving as senior surveyor in Nagasaki and principal surveyor in Kobe, prior to his appointment in 1968 as principal surveyor for Japan, stationed in Tokyo. Mr. **Anderson** assumed his new post on July 1.

ADVERTISE TO THOUSANDS MORE ...IN MARITIME REPORTER/

Marine sales managers agree...management, engineering and purchasing personnel...shoreside...in vessel operations, shipbuilding, ship repair and naval architecture have the authority to specify, order and buy all types of marine equipment, products and services.

Sales managers tell us men aboard ship do not specify or purchase.

COMPARE THE TITLES OF THE READERS OF THE TWO MAGAZINES

MARINE ENGINEERING/LOG

OCCUPATIONAL BREAKDOWN OF TOTAL WORLD-WIDE CIRCULATION

		BUYING POWER
SHIPBUILDING & SHIP REPAIR COMPANIES		
Companies, Presidents, Vice Presidents, Secretaries, Treasurers, General Managers & Purchasing Agents		1,828
Works Managers & Superintendents		196
Naval Architects, Marine Engineers, Chief Draftsmen		767
Shipbuilding & Ship Repair Personnel (Draftsmen, Foremen, Inspectors & Others) not included in above classification	454	
SHIP OPERATING COMPANIES, OWNERS, AGENTS & BROKERS:		
Companies, Presidents, Vice Presidents, Secretaries, Treasurers, General Managers, Purchasing Agents, Passenger & Freight Agents		2,721
Marine Superintendents, Port Captains, Port Engineers, Port Stewards		1,224
Deck Captains, First, Second & Third Mates Only	1,979	
Engine Room Chiefs & Licensed Assistants	2,935	
Ship Operating Personnel Ashore & Aboard not included in above classifications	398	
PROFESSIONAL MEN:		
Naval Architects & Marine Engineers		1,476
Admiralty lawyers	20	
Insurance Companies, Agents & Brokers	55	
NAVY	313	
MARINE SUPPLIES & EQUIPMENT: Manufacturers	1,777	
Ship Chandlers, Dealers & Agents	34	
Bunkers (Coal & Fuel Oil)	4	
ALLIED MARINE INDUSTRIES:		
Freight Agents & Forwarders	1	
Exporter & Importers	7	
Stevedoring Companies not owning Floating Equipment	25	
Government Schools, Libraries, Students & Commercial Organizations	1,069	
Miscellaneous	863	
Awaiting Classification by Business & Industry	51	
NON BUYING POWER	9,985	

WORLD-WIDE BUYING POWER TOTAL 8,212

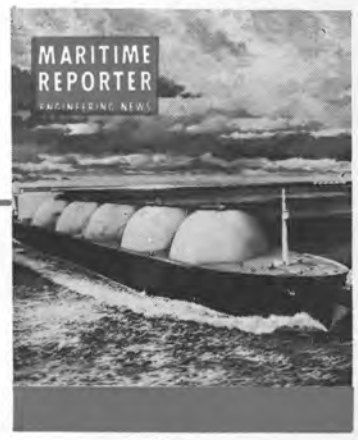
Why settle for less . . . . . MARITIME REPORTER/Engineering News

Source of information—Each publication's own official circulation statement—Available July, 1973.

MARINE BUYERS IN 1973–'74 ENGINEERING NEWS

Total circulation numbers are meaningless. Some magazines, apparently not wanted by thousands of shoreside buyers, inflate their total circulation numbers with thousands of non-buyers. The only readers of any value to marine advertisers are those with the authority to purchase... the shoreside buyers.

You be the judge... compare the readers of both magazines... separate the buyers from the non-buyers... for the one reaching the largest number of men you know can give business to your company.



...FOR THE ONE REACHING THOUSANDS MORE BUYERS.

MARITIME REPORTER/Engineering News

OCCUPATIONAL BREAKDOWN OF TOTAL WORLD-WIDE CIRCULATION

	BUYING POWER	NON BUYING POWER
SHIPBUILDING & SHIP REPAIR (Commercial, U.S. Navy and U.S. Coast Guard):		
Companies, directors, owners, presidents, vice-presidents, secretaries, treasurers, superintendents, managers and purchasing agents	4,044	
Naval architects, engineers and chief draftsmen	1,166	
Other employees (draftsmen, inspectors, foremen and others employed by shipbuilding and repair companies) not included in above classifications		110
VESSEL OPERATING COMPANIES OCEAN, RIVERS, HARBORS, OFFSHORE OIL DRILLING AND RELATED OPERATIONS		
(Owners, Agencies & Brokers) Companies, directors, owners, agents, presidents, vice-presidents, managers, secretaries and treasurers	5,600	
Port engineers, superintendents, purchasing agents, port captains, port stewards, naval architects and engineers shoreside	1,719	
Other employees ashore not included in above classifications		49
PROFESSIONAL MEN:		
Naval architects, engineers and consultants shoreside	1,625	
Admiralty lawyers and insurance		35
MARINE SUPPLIES & EQUIPMENT:		
Manufacturers, dealers and agents		1,896
Ship Chandlers		172
Allied marine industries		302
GOVERNMENT:		
U.S. Maritime Administration, U.S. Senators, U.S. Congressmen and others in official capacities		31
SCHOOLS, LIBRARIES AND ORGANIZATIONS		54
NON BUYING POWER		2,649

WORLD-WIDE BUYING POWER TOTAL 14,154

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MARITIME REPORTER AND ENGINEERING NEWS

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NEW YORK, N. Y. 10016
MUrray Hill 9-3266 • 7 • 8 • 9

DIESEL GENERATOR SETS

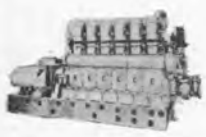
1

350 KW DIESEL GENERATOR SET

350 KW—120/240 volts DC—600 RPM—compound wound G.E. generator with switchgear. ENGINE: Ingersoll-Rand—heavy-duty type S—505 HP—10½x12—reconditioned to ABS.

2

250 KW DIESEL GENERATOR SET



ENGINE: Enterprise 12 x 15 DSG-6 — 6 cyl. — 450 RPM crank No. 50J. GENERATOR: Westinghouse 250 KW—120/240 DC—1040 amps—450 RPM. Typical serial No. 3S-10P-913. Complete with switch gear.

3

EMERGENCY GENERATOR
SUPERIOR 75KW 120/240 VOLT D.C.
DIESEL GENERATOR SET

With switchgear. ENGINE: Radiator cooled Superior GBD-8—6 cylinder—1200 RPM GENERATOR: Electric Machinery Co.—120/240 volts DC—316 amps—1200 RPM—stab. shunt.

4

UNUSED
10 KW SUPERIOR
DIESEL GENERATOR SET

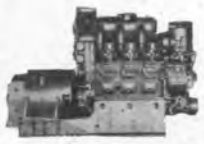
GENERATOR: Delco 10 KW — 120 VDC — 83.3 amps—1200 RPM. ENGINE: Superior diesel—2 cyl.—4½x5¾ — 15 HP — heat exchanger cooled.

5

500 KW—
120/240 VOLT DC
DIESEL GENERATOR SET
EQUAL TO NEW

GENERATOR: Allis Chalmers—Compound wound. Has Class "A" insulation. Output 500 KW—120/240 volts DC—2080 amperes—720 RPM—drip-proof—self-cooling. Ambient 50°C—temperature rise 40°C. ENGINE: Model GM 8-278—2-cycle—Vee type—8½"x10½"—air starting—720 RPM. Complete with switchgear. Condition very good. Still aboard naval vessel. Has Ross shell & tube type lube oil & raw coolers—temp. control valve—shock mounts.

6



300 KW
DIESEL
GENERATOR
SET

ENGINE: G.M. 6-278—6-cylinder—2 cycle—8¾"x10½"—750 RPM—with oil and water Ross Shell and Tube Heat Exchangers, instrument panel, pyrometer, etc. Vibro Isolators. GENERATOR: G.E. 300 KW—120/240 volts DC—1250 amps—shunt wound—continuous overload rating 375 KW—2 hours—55° Weight of unit approximately 26,000 pounds. Complete with shock mounts. Unit 13' 2" long, 64" wide, 8' high.

TURBO GENERATOR SETS

7

400 KW WESTINGHOUSE TURBO GEN SETS FOR BETH. SPARROWS PT. HULLS 400 TO 4500; QUINCY HULLS 1600

400 KW (500 KVA)—80% PF—1200 RPM—450/3/60. TURBINE: 585 lbs—840°TT—28½" vacuum—9018 RPM—serial 10A4462-3 & 10A4462-4. GEAR: 9018/1200 RPM. A.C. GENERATOR: 500 KVA—400 KW—450 volts—641 amps—80%PF—3 phase 60 cycle—1200 RPM—CR 40°—excitation amps 41—excitation voltage 120. Instruction book 5442. Switchgear available.

8

UNUSED 300 KW—240 VOLT DC
WESTINGHOUSE LOW-PRESSURE
TURBO-GENERATOR SET

GENERATOR: 300 KW—240 VDC—1250 amps—1200 RPM. GEAR: 5286/1200—frame 6x15—serial 10A-2612-4. TURBINE: Frame C-325—225 PSI—397° TF—5286 RPM—Serial 10-A-2611-4. Wt. 16,700 lbs. —complete in original factory crate.

9

LOW-PRESSURE
UNUSED 300 KW G.E.
120/240 VOLT DC
TURBO-GENERATOR SET

GENERATOR: 300 KW—120/240 VDC—1250 amps—1200 RPM. REDUCTION GEAR: 8.344:1 — 10012/1200 RPM—type S-182. TURBINE: DOR418N—449 H.P.—10012 RPM—working pressure 180/220 PSIG.

10

WESTINGHOUSE
440/3/60
200 KW UNIT

GENERATOR: Westinghouse 200 KW—250 KVA—450/3/60—1200 RPM—80% PF—with 40 KW—120 VDC on same shaft. GEAR: 9989/1200 RPM—double helical. TURBINE: Westinghouse — 540 PSI — superheat 322°F. Test 930 PSI 800°TT. Also operate 615 PSI—850°TT.

11

1250 KW G.E.
10-STAGE
TURBO GENERATOR
SET

TURBINE: 525—615 PSI—850°TT—7938 RPM—10-stage—type FSN. GEAR: Single helix—7938/3600. GENERATOR: 1250 KW—450/3/60/3600—.80 PF—type ATB with surface air cooler. Overload 25%— 2 hours—1563 KW.

12

6 EQUAL-TO-NEW
LATE TYPE 500 KW
SHIPS SERVICE TURBO
GENERATORS

1962—DeLaval. Very little use. Completely preserved with rotors and diaphragms crated separately. TURBINE: DeLaval —585 PSI — 840°TT—6-stage—6391 RPM—class CD — Also suitable 440 lbs.—740°TT—25" vac. GEAR: 6391/1200 RPM. GENERATOR: Allis-Chalmers—450/3/60. Totally enclosed, with static exciter and voltage regulator system. Weight 17,665 lbs. Complete with latest dead front switch gear. Also available are the condensers, circulating and condenser pumps. All very up-to-date, compact construction. Turbines will easily handle 600 KW if up-grading is desired.

13

AP2 VICTORY
WORTHINGTON-
MOORE
CROCKER-WHEELER
300 KW UNIT

TURBINE: 440 PSI—740°TT—28½" vacuum—type S4 — 5-stage — 6097 RPM — serial 7547 & 7548. GEAR: 6097/1200. GENERATOR: 300 KW—120/240 volts DC—1250 amps—compound wound—973643—999759. Armature flange 8½"; B.C. 7"—12 holes. ALSO NEW ARMATURES IN STOCK & 300 KW SHUNT ARMATURES.

UNUSED C-4

CROCKER-WHEELER

500 KW

GENERATOR ENDS ONLY

120/240 VOLTS D.C.—1200 R.P.M.

FORMERLY USED WITH WORTHINGTON-MOORE TURBINES & GEARS

14

Upgraded by U.S. Navy—rewound in glass. Generator Frame and Armature—Marine 500 KW type 3-1200—dripproof enclosure—base mount. Modified from Crocker-Wheeler generator frame 152HD — 240/120 volts DC — 2083/521 amps — 1200 RPM. Ambient temperatures 50°C. APPLICATION: For C-4-SA1; C4-SA-3; T-AP-134 vessels, using Worthington-Moore Turbine—Form S-6 and generator Form 14 x 10. No pedestal bearing.

15

WESTINGHOUSE 400 KW TURBO-GEN
835 LBS — 840°TT

Newport News Hulls 480—541 Esso ships. TURBINE: Westinghouse 835 lbs/840°TT—9018 RPM—6-stage —instruction book 1430-C1—serial 5A-7090-7 & 8. GEAR: 9018/1200 RPM. GENERATOR: Westinghouse 400 KW—440/3/60/1200 RPM—rewound field—instruction book 5442. EXCITER: 5.5 KW.

TWO 538 KW
WESTINGHOUSE
T-2 AUX. GENERATORS
(COMPLETE)

16

TURBINE: 538 KW @ 5010 RPM—438 PSIG—750°TT—28½" vacuum. GEAR: 5010/1200 RPM. A.C. GENERATOR: 400 KW 450/3/60/1200—0.8 PF. DC EXCITER: 32.5 KW—120 volts (variable voltage)—shunt—4-pole—DC excitation 5 KW. ALWAYS WELL MAINTAINED BY MAJOR OIL CO.

TURBINES & ROTORS

MAIN PROPULSION

17

BETH. CLASS—13,600 H.P.

Sparrows Point & Quincy 1600 hulls. H.P. turbine casing only. Excellent blading & labyrinth packing.

KNOWN 'ROUND THE WORLD

THE BOS'

313 E. BALTI

Main Office: (30

18

H.P. & L.P. COUPLINGS

1 Set—for Beth Class 13,600 HP 4400 hulls and Quincy 1600 hulls.

19

G.E. 6690 HP @ 7062 RPM
HIGH PRESSURE 8-STAGE
TURBINE

835 lbs—840°TT—#83341—originally built for Esso Christobol—Newport News.

T-2 TURBINES & ROTORS

20

COMPLETE WESTINGHOUSE T-2
MAIN TURBINE—UNSHROUDED
6600 HP—435 PSI—750°F
28" VACUUM—3720 RPM

Instruction book IB-8345—type D—serial No. 5A-2124-6—unshrouded. Unit complete with all packing, stationary blading, linkage, governors, diaphragms, nozzles, etc. WILL SELL ROTOR SEPARATELY OR COMPLETE TURBINE CASING & ROTOR. Always well maintained by major oil company.

2 COMPLETE T-2
G.E. TURBINES

21

#61818 and #61834—large Lynn—all stages magnafluxed.

ROTOR WILL INTERCHANGE WITH
ELLIOTT MAIN TURBINE
Will Sell Rotors Separately

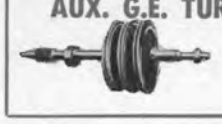
22

T2-SE-A1
MAIN PROPULSION
ROTOR — G.E.

Large Schenectady — serial 77418 — reconditioned Bethlehem Steel 1970—all stages magnafluxed.

T-2 TANKER
UNUSED—4 UNITS AVAILABLE
AUX. G.E. TURBO GEN. ROTORS

23



DORV — 325M — 5645 RPM — for 525 KW G.E.

VICTORY SHIP TURBINES & ROTORS

24

8500 H.P.
8-STAGE
TURBINES FOR
LARGE
VICTORY SHIPS

L.P. – 3509 RPM
H.P. – 6159 RPM

LP Serial #77943—HP Serial #77942—Interchanges Ingalls C-3—Class 442 & Sun C-4 vessels—U.S. Navy Victory "Liberty".

LP Serial #72272—HP Serial #72271—Interchanges Ingalls C-3—10 boxes of spares.

LP Serial #62042—HP Serial #62043—GEI 16263—Ridgeway Victory.

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25 **VICTORY SHIP AP2 H.P. & L.P. TURBINES NEW — UNUSED — 6000 H.P. SETS**

G.E.—H.P. & L.P.—with throttle valve
Westinghouse—L.P.—with throttle valve
Allis-Chalmers—H.P & L.P.—with throttle valve

26 **6000 H.P. G.E. — NORTH CAROLINA C-2**

H.P.—8-stage—serial 78040
L.P.—7-stage—serial 78043
G.E.I. 16262

27

19 STAGE WESTINGHOUSE H.P. ROTOR FOR AP2 VICTORY

Reconditioned — balanced—with ABS. Serial 4A-2079—type B — 19 stage reaction blades. Excellent — just out of shop. 13" Flange diameter with 14 bolts.

28

G.E. 8500 H.P. REDUCTON GEAR FOR LARGE AP3 VICTORY & C3

MD-48A—8500 HP—6159/3509/763/85 RPM.

29 **ALSO 6000 H.P. VICTORY AP2 REDUCTION GEAR**

Westinghouse 4A-1640.

PUMPS

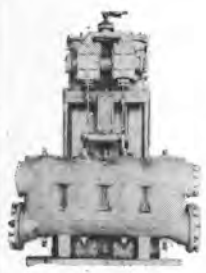
CARGO STRIPPING PUMPS

30

BRONZE T2 TANKER STRIPPING PUMPS

14x14x12—700 GPM at 100 lbs. Same pump available in steel for fuel oil transfer, etc.

31



WORTHINGTON 16"x14"x18" VERTICAL DUPLEX STRIPPING PUMP

1400 GPM @ 110 PSI—suction lift 11.5 ft.—steam back pressure 15 lbs. Suction 14" — discharge 10"—steam 2½" — exhaust 4". Overall width 6'8"—overall height 9'1½" — depth 3'9½"—wt. approx. 10,000 lbs.

32

UNUSED DELAVAL IMO ROTARY PUMP

175 GPM—35 PSIG—10 HP—120 volts DC—1750 RPM—serial E-8619—frame 324 VY—76 amps—mfg. by Electro Dynamics. With magnetic control. Excellent condition.

33 **NEW TURBINE DRIVEN FIRE AND GENERAL SERVICE PUMP**

Allis-Chalmers 6 x 5 pump, type SKH—1200 GPM—125 PSI—3500 RPM. Coppos turbine type TF-22-2½ — 3500 RPM. 273#—50° superheat.

34

DAYTON-DAWD 2-STAGE FIRE AND BILGE PUMP

Vertical 2-stage type TDV-10—20 HP—20 GPM @ 184'—3" discharge—4" suction—1775 RPM—Maumee Sun. Motor: 120 volts DC—20 HP—1775 RPM.

BOILER FEED PUMPS

Suitable for Navy and Merchant Vessels

35

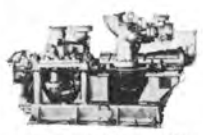
COFFIN TYPE CG-4A FEED PUMP

2 Available—very little use. Maximum 325 GPM—1760' head or 750 lbs Steam inlet 575 lbs. — 540°TT — exhaust 20 lbs. — speed 760 RPM.

36 **UNUSED DD445 CLASS WORTHINGTON TURBINE-DRIVEN FEED PUMP**

Worthington — drawing SL5043—425 GPM—1675' total dynamic head—5000 RPM 3-stage — double suction. Flanged 4½" inlet—4" outlet. Powered by Sturtevant steam turbine—282 HP—590 PSI. For Fletcher DD-445 Class Destroyers.

37



BUFFALO SIZE 4 FEED PUMPS

Terry Turbine—BM—273 HP—550 RPM—exhaust 15 lbs—590 PSI—superheat 0°—425 GPM Buffalo Pump—discharge pressure 750 lbs—5"x4"—built for USN DD destroyers. DD 445 Class Fletcher.

38

WORTHINGTON 3-STAGE UNUSED BOILER FEED PUMP

PUMP: 5" Worthington—460 GPM @ 750 PSI—5000 RPM—305 HP—steam flow 8052/hr—26.4 lbs HP hr. TURBINE: Sturtevant C-22—type 21—575# dry saturated steam—15 lb. back pressure—259°F water temperature—15 lbs/inch suction pressure.

39 **INGERSOLL-RAND BRONZE CARGO PUMP**

10GT—4500 GPM at 125 lbs.—2-stage—size 14x12.

40 **C-25 CARGO PUMP TURBINE SPARE GEARS**

One set of gears available for Westinghouse C-25 Cargo Pump Turbine.

MISCELLANEOUS

DOUBLE REDUCTION GEARS for Diesel Drive

41

3200 HP DOUBLE INPUT SINGLE OUTPUT DIESEL REDUCTION GEARS 20 DEGREE OFFSET

Farrell-Birmingham — 3200 SHP. REDUCTION GEAR: 1.81:1—handles two 1600 HP diesels @ 720 RPM. With hydraulic couplings & Fawick clutch. Port and starboard. Gear output 400 RPM. Suitable for dredge pumps. Non-reversing. OK for 38D8-⅛ engine.

42 **2:67:1 RATIO DOUBLE IN-LINE GEARS**

Farrell-Birmingham 3200 HP non-reversing — from seaplane tenders. Ratio 1.867:1. Complete with hydraulic couplings, etc. Will handle two 38D8-⅛ FM diesels. Has Fawick clutch.

43 **2100 HP DOUBLE INPUT SINGLE OUTPUT GEARS—3:435:1 RATIO**

Farrell-Birmingham — heavy duty — originally built for 2 heavy-duty direct-reversing engines —300 RPM—1050 HP each. Ratio 3.435:1.

44 **SINGLE ENGINE REDUCTION GEAR**

Farrell-Birmingham — non-reversing—1600 HP at 2.4909:1. With hydraulic couplings.

45 **ANCHOR WINDLASS**

Hyde 2-11/16" — 12x14 — 100 PSI — steam — 54,100 lbs.

46

SHARPLESS LUBE & DIESEL OIL PURIFIERS

Type M-34-W22-UM—15,000 RPM. BOWL MOTOR: 2 HP—230 volts DC—8.5 amps—3450 RPM—250 to 300 GPH. Originally built for C-1-A diesel vessels.

47

UNUSED 1135 SQ. FT. C.H. WHEELER CONDENSER

20" Ex. inlet—⅝" CU-NI tubes—with or without air ejector.

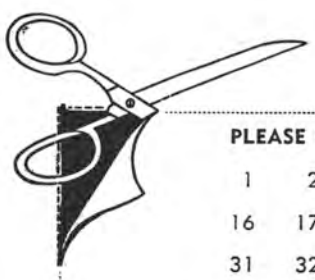
48

UNUSED 70 HP McKIERNAN-TERRY WINDLASSES

Chain and two 10640 lb anchor & 30 fathoms chain @ 30 FPM. 70 HP—230 volts—shunt DC motors—233 amps—550 RPM—55°C rise. Wildcat centers 47½". Base 9'5" wide x 11' long. Weight 36,000 lbs.

INQUIRE FOR ALL OTHER ITEMS

Forced draft blowers, reduction gear parts, bilge and ballast pumps, main circulators, general service pumps, F.O. transfer pumps, lube oil service, standby feed pumps, condensate pumps, aux. circulating pumps, feed water heaters, wash water pumps, etc.



PLEASE SEND INFORMATION ON THE FOLLOWING: (Please circle items) 8/1/73

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
46	47	48												

NAME..... COMPANY.....

ADDRESS..... POSITION..... PHONE.....

CITY..... ZONE..... STATE.....

Annual Ship Safety Awards Luncheon

U.S.-flag vessels that ply the rivers, the lakes and the oceans . . . the yards that built them . . . the seafarers who man them and the dock workers who load them . . . were honored in New York recently for outstanding safety accomplishments.

Among the records announced were those of 45 oceangoing and lakes vessels that, collectively, operated more than 227 years without a lost-time personnel accident on board.

Government officials and key executives for all segments of the U.S. maritime industry—East, West and Gulf Coasts and the Great Lakes — attended the Annual Ship Safety Awards Luncheon, sponsored by the Marine Section of the National Safety Council (NSC) and the American Institute of Merchant Shipping (AIMS).

Both NSC and Jones F. Devlin Awards were given. NSC Awards were presented by Rear Adm. **William F. Rea,** Chief of the U.S. Coast Guard's Office of Merchant Marine Safety and NSC Marine Section Chairman Capt. **Hewlett R. Bishop,** president of the National Cargo Bureau. Devlin Awards, sponsored by AIMS, were presented by AIMS president **James J. Reynolds** and Captain **Devlin,** retired United States Lines vice president in charge of operations, for whom the Devlin Awards are named.

Marine executives in attendance from the Gulf Area included, left to right: **Richard Willoch,** marine manager, Texaco, Inc., Port Arthur, Texas; Capt. **C.H. Waring,** manager, Accident Prevention Division, Lykes Bros. Steamship Co., New Orleans, La.; Capt. **Charles P. McFaull,** safety director, Delta Steamship Lines, New Orleans; Capt. **Lars N. Pedersen,** safety coordinator, United Fruit Company, New Orleans, and **William Fassler,** safety director, Chotin Transportation, New Orleans.

Mr. **Reynolds** and Captain **Bishop,** co-chairmen of the Downtown Athletic Club Luncheon, said in a joint statement: "Giant strides have been made in safety in the maritime industry in recent months. Our industry, of course, must face new safety challenges as we put into effect new safety procedures essential to the operation and handling of cargoes on our highly innovative ships, either in service or being built under the 1970 Merchant Marine Act.

"Our industry has become a world leader in maritime safety. We are working closely to achieve the highest standards of maritime safety, not only in our U.S. fleet, but in a world fleet that numbers over 20,000 ships. We have taken the lead in safety both in domestic and in international maritime organizations.

"Last year, in our merchant marine, the combined number of shipboard illnesses and injuries hit an 18-year low. However, we still have a long way to go. Working closely with the U.S. Coast Guard, and by our own stepped-up safety efforts through work with the NSC Marine Section, both U.S. maritime labor and management are determined to end all risks associated with a shipboard livelihood . . . or working in a shipyard . . . or handling cargoes dockside."

Messrs. **Bishop** and **Reynolds** said that industry efforts have succeeded, citing that the Marine Section, for the second consecutive year, has won the coveted NSC Cameron Award over 27 other industrial sections for excellence in safety and for introducing effective safety programs among its own members.

Two categories of awards were made, those from the National Safety Council being to companies with the lowest injury rate on a fleet-wide basis. The marine department of Texaco, Inc., based at Port Arthur, Texas, won first place in this competition. Oglebay Norton Co.'s Columbia Transportation Division received the plaque for the best record among Great Lakes "straight deck" fleets.

Hosts for Safety Awards Luncheon, left to right: **James J. Reynolds,** president, American Institute of Merchant Shipping; Rear Adm. **William F. Rea III,** USCG; Capt. **Hewlett R. Bishop,** president, National Cargo Bureau, Inc. and Capt. **Jones F. Devlin Jr.,** maritime consultant.

A special award went to the Atlantic Division of the Military Sealift Command for the least number of shipboard lost-time accidents among the four MSC worldwide fleets during the past year. Navy Capt. **Ben T. Douglas,** MSC Chief of Staff for the Atlantic, accepted the plaque.

Other National Safety Council awards went to Bethlehem Steel Corporation's Sparrows Point, Md., yard for the best employee safety record in 1972—a competition in which Bethlehem's Beaumont, Texas, and Hoboken, N.J., yards won second and third place, respectively; the U.S. Army Corps of Engineers, North Central Division, Chicago, Ill., for the best record with harbor equipment, such as tugs and dredges; the Subic Bay

(Continued on next page)

Executives from Bethlehem Steel Corporation, first, second and third place winners in Shipbuilding and Repair Division, left to right: **H.H. Howard,** assistant to vice president, shipbuilding department, Bethlehem Steel Corp.; **J.O. Crooke,** general manager, Beaumont, Texas, Yard; **Carl Andre,** safety director, Bethlehem Steel Corp.; **William H. Collins,** general manager, Sparrows Point, Md., Yard; **J.J. Brangan,** general manager, Hoboken Yard; **Donald W. Finley,** assistant managements representative, Bethlehem, Hoboken, and **Frank Barnako,** manager, safety and workmen's compensation, Bethlehem.

Maritime executives in attendance from Great Lakes Area, left to right: **Eugene T. Gilmore,** Columbia Transportation Division, Oglebay Norton Co., Cleveland, Ohio; **Robert E. Kratzert,** manager, vessel personnel and service, Columbia Transportation Division, Oglebay Norton Co., Cleveland; **John W. Manning,** vessel manager, The Hanna Mining Co., Cleveland; **Carl D. Kreske,** personnel manager, Cleveland-Cliffs Iron Co., Cleveland; **David L. Buchanan,** manager, administrative services, Great Lakes Fleet, U.S. Steel Corporation, Duluth, Minn., and Capt. **John Ranking,** Great Lakes Fleet, U.S. Steel.

Annual Ship Safety Awards—

naval ship repair yard in the Philippines, in the Government shipbuilding and repair division; United Brands Co., Baltimore, Md., best record among general cargo stevedores; and Union Dock Co., Ashtabula, Ohio, best among bulk cargo stevedores. In addition, Delta Steamship Lines, New Orleans, La., and the Great Lakes fleet of United States Steel Corp. won first-place recognition in the cargo and passenger vessel categories.

The Commercial Port of Guam had a representative at the luncheon to receive a second place award for safety and general cargo stevedoring.

Capt. **Richard N. LePage** of Farrell Lines Inc. of New York, N.Y., is presented with the U.S. Coast Guard Meritorious Public Services Award by Rear Adm. **William F. Rea III,** Chief, Office of Merchant Marine Safety of the U.S. Coast Guard. The award was presented to Captain **LePage** in recognition of his outstanding efforts in the promotion of safety of life and property at sea while serving as general chairman of the Marine Section, National Safety Council from October 1971 to October 1972. During his tenure as chairman, the Marine Section earned the William H. Cameron Award as the outstanding industrial section of the Marine Safety Council.

The second category of honors presented at the luncheon were the Jones Devlin Awards, presented to individual ships on the basis of operations without an accident causing a crew member to miss a watch. These were the awards that went to 45 ships whose aggregate safety record of 82,822 days exceeded 227 years.

Sixteen ships of the Great Lakes Division of United States Steel Corp. received Devlin Awards for operating a total of 38,121 days without a lost-time accident. In the tanker division, Texaco's Texaco Montana was honored for a record of more than seven accident-free years.

Delta Steamship's Delta Brasil was tops among dry cargo ships, with a safety record of 1,515 days, or more than four years.

Other companies receiving Jones Devlin Awards, and the number of ships in their respective fleets with accident-free records, were Cleveland-Cliffs Iron Co., two; Columbia Transportation Division of Oglebay Norton, two; Exxon Co. U.S.A., four; Getty Oil Co., (Eastern operations), two; Hanna Mining Co., one; Huron Cement Division of National Gypsum Co., one; Interlake Steamship Co., six; Lykes Bros. Steamship Co., Inc., four; Standard Oil Co. of Indiana, one; Mobil Oil Corp., one; Texaco, Inc., three, and United States Lines, Inc., one.

Waukesha Motor Names Brannaman And Price

James M. Brannaman has been appointed Western regional manager for Waukesha Motor Company. The announcement was made by **J.H. Steinberg,** vice president-marketing for the Waukesha, Wis.-based engine and power systems manufacturer.

Mr. **Brannaman** will operate from Waukesha's Western regional office in Downey, Calif. He has marketing responsibility for a territory stretching from the Rockies to the Pacific, and Southern California to British Columbia.

Most recently, Mr. **Brannaman** was OEM sales manager at Waukesha. Prior to joining Waukesha Motor Company, he served for 16 years in various marketing capacities with Cooper Bessemer Company. He has extensive West Coast marketing experience, and is a native of California.

At the same time, it was announced that **Richard W. Price** has been appointed to the position of manager-Los Angeles District, as part of Waukesha's West Coast marketing expansion program.

Mr. **Price** comes to Waukesha from Detroit Diesel's Allison Division, where since 1966, he served as zone sales manager, operating out of Huntington Beach, Calif. In this capacity, he worked closely with dealers, OEMs and end users of diesel engined equipment. Thus, he brings with him a valuable background in the West Coast markets.

He was previously a service engineer with Kaynor Manufacturing Company of Fullerton, Calif.

Speakers Announced For Six-Day Course At U.C. On 'Structures In The Ocean'

An international roster of instructors has been announced for a six-day intensive course, "Structures in the Ocean: Fixed and Floating Structures of Steel and Concrete in Hostile Seas," to be held September 17-22, 1973, at the University of California campus at Berkeley. Joint sponsorship is by Continuing Education in Engineering, U.C. Extension, and the U.C. College of Engineering. The course steering committee consists of Berkeley faculty members **Jack G. Bouwkamp, Ben C. Gerwick Jr.,** and **Robert L. Wiegel,** professors of civil engineering, and **J. Randolph Paulling Jr.,** professor of naval architecture.

Among the 24 speakers will be Comdr. **Richard L. Brown**, Offshore Liaison Office, U.S. Coast Guard; **Ben Burke,** senior engineering associate, Chevron Oil Fields Research Co.; **Bruce Collipp,** senior staff mechanical engineer, Shell Development Co.; **Odd E. Gjorv,** associate professor of civil engineering, University of Trondheim, Norway; **Yoram Goren,** vice president, Santa Fe Engineering Services; **Frode Hansen,** consulting civil engineer, Harris and Sutherland, London; **Eivind Hognestad,** director, engineering development, Portland Cement Association; **A.B. Killgore,** group vice president, offshore division, Santa Fe-Pomeroy; **Albert M. Koehler,** staff engineer, Brown and Root; **Roger Lacroix,** technical manager, Societe Generale d'Entreprises, Paris; **Pierre Launay,** managing director, Europe-Etudes, Boulogne-Billancourt, France; **Peter W. Marshall,** staff civil engineer, offshore division, Shell Oil Co.; **Harold R. Peyton,** technical review associate, Alyeska Pipeline Service Co., and **Gerald P. Smedley,** senior principal surveyor, Lloyd's Register of Shipping, London.

U.C. faculty taking part, in addition to the steering committee members, include **Ray W. Clough Jr.** and **Joseph Penzien,** professors of civil engineering, and **Joe W. Johnson,** professor of hydraulic and sanitary engineering.

The course is intended for professional engineers, offshore constructors, oceanographers, designers, engineering managers and others. It will cover such topics as the nature of hostile environments, the forces generated in them and the gross response of structures exposed to them; optimal configurations for fixed and floating structures, including underwater storage vessels and caisson-type platforms; construction procedures and techniques; launching, mobility, behavior during transportation and installation; founding and sea-bottom conditions; stability and safety.

Detailed structural steel design will include joint design, fatigue, corrosion and abrasion. Materials, durability and design criteria for concrete structures will also be discussed.

The registration fee for the course is $385. A limited number of fellowships for full-time faculty are available at a reduced fee. Advance enrollment is required.

A brochure containing a full program description and registration forms may be obtained by writing to Continuing Education in Engineering, University of California Etxension, Berkeley, Calif. 94720, or telephone (415) 642-4151.

New Anti-Syphonic Valve Simplifies Vent Piping Of Shipboard Plumbing Systems

Simplified vent piping of shipboard plumbing systems is offered by a new anti-syphonic vent valve from the Mechanical Marine Division of Hayward Manufacturing Co., Inc., Elizabeth, N.J.

The Model FF-1 Vent Valve saves space, labor, and weight by eliminating the need to install individual unit vent piping through the decks of a vessel in order to vent to the atmosphere.

The device functions as both a vacuum breaker and a vent sealing valve.

As a vacuum breaker, it permits a number of toilets to be installed on a single manifold without the problem of escaping odors. Usually when toilets are manifolded flushing one or more of them creates a vacuum that pulls the water seal out of the unflushed bowls or sanitary traps, thereby allowing odors to escape. The Memarco FF-1 valve maintains the water seal by opening at only one inch of water vacuum and allowing air to enter until the pressure inside and outside the line is equalized.

As a vent sealing valve, the FF-1 prevents pressure buildup which can force out odors. In this instance, the valve closes at only one inch of water pressure to maintain equal pressure in the line.

The valve body is made of polyvinyl chloride (PVC) to provide complete resistance to marine corrosion, while a corrosion-resistant monel screen protects the rubber vent seal against damage. The FF-1 has ¾-inch IPS threads for ready attachment to a gooseneck vent line.

One valve is used for each toilet or sanitary trap and a cleanout fitting can be attached if desired.

The installation of valves of this type as plumbing vents aboard ship has the approval of the U.S. Coast Guard, the American Bureau of Shipping, and the U.S. Public Health Service.

For further information, contact **Dan Coleman**, Mechanical Marine Division, Hayward Manufacturing Co., Inc., 900 Fairmount Avenue, Elizabeth, N.J. 07207.

S.G. Stiles Of Shell Oil Proposed As Next President Of Asiatic Petroleum Corp.

J.D. Ritchie, president of Asiatic Petroleum Corporation (a Royal Dutch/Shell Group company) has announced that **S.G. Stiles** will be proposed to Asiatic's board as the next president of the company.

In 1948, Mr. **Ritchie** joined Anglo Saxon Petroleum in London from the Royal Navy. He will retire at the end of March 1974.

Mr. **Stiles** joined Shell Oil Company in California in 1947, and is presently vice president for transportation and supplies with Shell Oil at the company's head office in Houston, Texas. During his career, he has worked with Royal Dutch/Shell Group Companies in the Netherlands, Trinidad, Indonesia and the United Kingdom.

Ingalls Launches Fourth Farrell Lines Containership

The S/S Austral Entente is christened with a burst of champagne by **Mrs. Thomas J. Smith,** wife of the president of Farrell Lines. Left to right as the champagne flies are: **Mrs. Smith; Mrs. Thomas Sartor,** her matron of honor; Federal Maritime Commission Chairman **Helen Delich Bentley;** Farrell Lines president **Thomas J. Smith,** and **Fred W. O'Green,** president of Litton Industries.

Federal Maritime Commission Chairman **Helen Delich Bentley,** speaking at Pascagoula, Miss., on June 30, at the launching of the S/S Austral Entente, described the event as an inspiration of "pride in the skills of our shipbuilding industry in these United States."

Mrs. Bentley, principal speaker at the launching of the new containership built by Ingalls Shipbuilding Division of Litton Industries for Farrell Lines Incorporated of New York, also praised the evidence of progress being made by Ingalls at its new west bank facility, where two major naval contracts for 35 ships are centered.

"It would be remiss of me not to note that the delivery of this ship (Austral Entente) will be behind the original schedule," **Mrs. Bentley** said, "because of problems we've all heard about."

However, she added, "Innovation frequently creates problems in its initial stages, and sometimes it takes longer to shake them down than others."

The FMC Chairman noted, "Because of the immensity of the innovativeness of this project . . . the shakedown here was one of those that took longer."

Mrs. Bentley said: "I toured the new yard this morning, and must say I'm impressed with what I saw. This is what Litton had in mind when it announced its plans for the west bank yard."

The Austral Entente itself, **Mrs. Bentley** said, was shifted from the west bank to the east bank after construction started "to better balance this work force between the old and new facilities. Thus, there are now experienced workers supervising the less experienced on both banks, and the complement of skills is more evenly distributed."

Other speakers at the launching ceremony included Farrell Lines president **Thomas J. Smith,** and **Fred W. O'Green,** president of Litton Industries.

The Austral Entente, last of a series of four containerships being built for Farrell Lines by Ingalls, was christened by **Mrs. Smith,** wife of the Farrell Lines president, with **Mrs. Thomas J. Sartor,** widow of the late Captain **Sartor,** a vice president of Farrell Lines, as her matron of honor.

The Austral Entente, scheduled for delivery later this year, will join three sister ships—Austral Envoy, Austral Ensign and Austral Endurance—on Farrell Lines' trade route between Eastern and Gulf ports in the United States, and Australia and New Zealand.

The newest addition to the U.S. merchant marine is 669 feet in length, with a designed service speed of 23 knots, a shaft horsepower of 28,500, and a cruising radius of 16,500 miles. She is designed to carry 1,000 twenty-foot containers, and has first-class accommodations for 12 passengers.

In addition to the containers, Austral Entente's cargo capability includes 200,000 cubic feet of space for palletized or unitized cargo, and 400 tons of edible oils. The container space includes three holds that are fully refrigerated.

Austral Entente is the third ship launched this year by Ingalls. In addition, six ships have been delivered during the first six months of this year to the Navy and merchant marine.

NASSCO Launches First Of Coronado Class Tankers

The 38,300-dwt tanker S/S Coronado was launched from the ways of National Steel and Shipbuilding Company (NASSCO), San Diego, Calif., on Saturday, June 30, 1973.

The ceremonies began with a band concert by the U.S. Marine Corps Recruit Depot Band. The Marine Corps Color Guard was also present for the ceremony.

Mrs. Bernard E. Blakely of Haslemere, Surrey, England, was the ship's sponsor. She is the wife of the marine coordinator of the Royal Dutch Group of Companies and managing director, Shell International Marine, Ltd. Mr. **Blakely** was one of the speakers at the launching ceremonies.

Others participating in the colorful ceremonies included the Rev. Dr. **Robert H. Mayo,** pastor, First Presbyterian Church, San Diego; **Adolph B. Kurz,** president, Margate Shipping Company; the Honorable **Robert J. Blackwell,** Assistant Secretary of Commerce for Maritime Affairs; **John V. Banks,** president, NASSCO, and **John M. Murphy,** vice president, sales, NASSCO.

On January 4, 1972, President **Richard M. Nixon** visited NASSCO and announced the award of a contract for the construction of three Coronado Class tankers for Margate Shipping Company. Coronado Class tankers were named after the crown city of Coronado, Calif., and the S/S Coronado is the first of the class.

The new ship designed by NASSCO as the Coronado Class tanker will be 38,300 dwt, 688 feet in length, 90 feet in beam, and have a 47-foot molded depth. Propulsion will be a single-screw steam turbine for a sustained speed of 16 knots. The latest in automation has been designed in the ship's operational controls. A console in the engine room provides remote control of the plant after manual start-up, while a console in the wheelhouse controls engine speed and direction.

Immediately following the launch, Mr. **Blackwell** officiated in the keel-laying of a sister ship, the S/S Cherry Valley.

The S/S Coronado is scheduled for delivery on January 17, 1974. The S/S Cherry Valley, and the third ship in the group, on August 9, 1974, and March 14, 1975. When completed, the new ships will be time-chartered to Shell International Petroleum Company, Ltd.

Approximately 2,500 spectators were on hand to view the colorful ceremonies.

NASSCO is managed by Kaiser Industries Corporation and equally owned by Kaiser Industries Corporation and Morrison-Knudsen Company, Inc.

Poised high and ready to enter the sea is the S/S Coronado, 38,300-dwt Coronado Class tanker, being built at NASSCO for Margate Shipping Company. The new ship is 688 feet in length, 90 feet in beam, and has a 47-foot molded depth.

With the S/S Coronado successfully launched and in the background, the launch dignitaries pose for pictures. From the left are **Bernard E. Blakely,** marine coordinator of the Royal Dutch Group of Companies and managing director, Shell International Marine, Ltd.; **Adolph B. Kurz,** president, Margate Shipping; **Mrs. Kurz; Robert J. Blackwell,** Assistant Secretary of Commerce for Maritime Affairs; **Mrs. Blakely,** sponsor; **Mrs. Blackwell; John M. Murphy,** NASSCO vice president, sales and **John V. Banks,** president.

Principals involved in the keel-laying of the S/S Cherry Valley included, from the left, **Adolph B. Kurz,** president, Margate Shipping Company; the Honorable **Robert J. Blackwell,** Assistant Secretary of Commerce for Maritime Affairs, as keel-layer; **T.M. Sullivan,** NASSCO welding foreman, and **John V. Banks,** NASSCO president. The S/S Cherry Valley is one of three National Steel and Shipbuilding Company-designed 38,300-dwt Coronado Class tankers under construction for Margate Shipping Company.

Crane Consultants Named To Represent Systems Equipment

Crane Consultants, Inc. of Seattle, Wash., now represents Systems Equipment Incorporated (SEQ), a Houston, Texas, manufacturer of load indicating devices and related warning systems for cranes. Crane Consultants president **Lyle Harlson** explained that his firm will represent SEQ in Oregon, Washington, Idaho and British Columbia.

Crane Consultants plans to represent other crane and crane safety related equipment manufacturers, in addition to the present design, testing, safety training, inspection and certification services it performs nationally.

Systems Equipment Incorporated (SEQ) manufactures a complete line of crane overload warning, load and radius or boom angle devices that display the load, angle and reach readings on a console in the operator's cab. In addition, some of the systems provide audible and visual warnings if the operator reaches or surpasses predetermined limits.

Nickum & Spaulding Call For Bids For Skagit County Ferry

Skagit County, state of Washington, have retained the naval architectural firm of Nickum & Spaulding Associates, Inc. of Seattle, to prepare the contract plans and specifications for a 120-foot 100-passenger 22-vehicle ferryboat to run between Anacortes, Wash., and Guemes Island.

Shipyards interested in quoting on this vessel are requested to contact the naval architect at 71 Columbia Street, Seattle, Wash. 98104. A deposit of $50 will be required, which will be refunded with the return of the contract documents.

Waterside Sites Attract 78 Plant Facilities In First Quarter Of '73

Waterside sites attracted 78 plant facilities in the first quarter of 1973, **James R. Smith,** president of The American Waterways Operators, Inc., Washington, D.C., has reported. Terminals, docks and wharves led the field.

The AWO survey shows that production industries constructed, expanded or announced plans to construct 18 terminals, docks and wharves along commercially navigable waterways for the handling of freight to and from barges and for the exchange of freight by water carriers and other modes of transportation.

These developments brought the total of new terminal facilities to 1,822 which have been constructed along the nation's 25,543 miles of commercially navigable waterways since 1952 when AWO first started compiling such statistics. The 18 terminals, docks and wharves built during the first quarter of 1973 represented 23 percent of all new waterside plant facilities reported in the Association's survey for the period.

Forty-eight of the 78 industries which constructed or expanded, or announced plans to construct or expand plant facilities along or adjacent to navigable waterways during the first quarter reported investment expenditures totaling $1,280,380,000.

The list of new industry facilities or expansions does not represent the total number of such developments along navigable channels in the first quarter. However, AWO seeks to make the listing as comprehensive as possible.

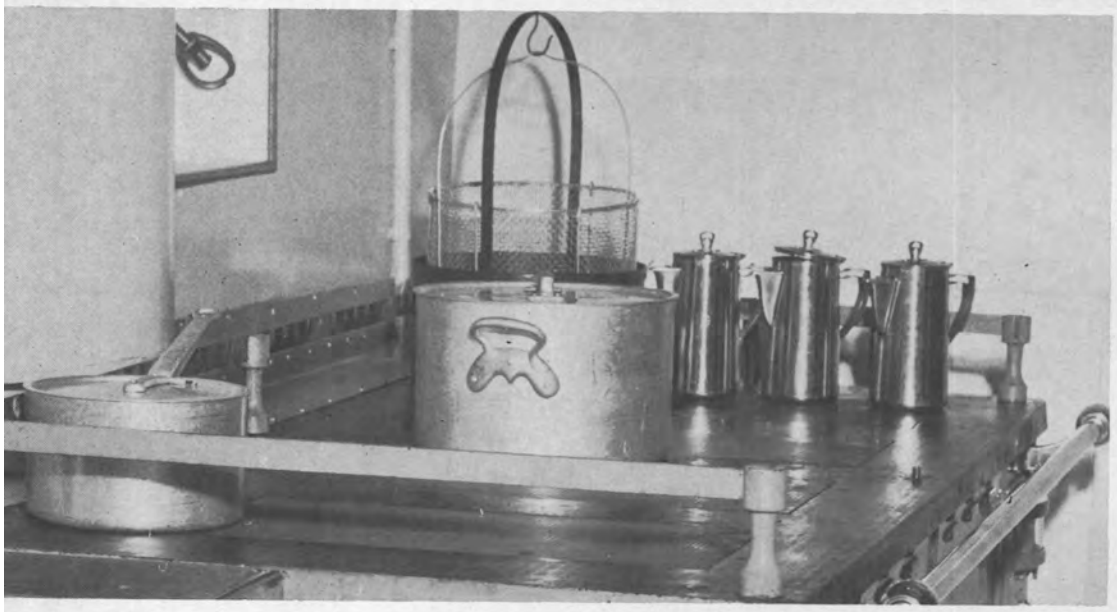
The AWO president said that the first quarter figures indicate sustained interest on the part of the management to take advantage of low-cost barge transportation (averaging three mills per ton-mile) for handling bulk-loading commodities. He pointed out that while all of these industries may not use water transportation, the availability of commercial barge service and the effect this service has on the general freight rate structure is a factor in plant locations. Additionally, he said, the availability of stable water supplies provided by navigation improvements attract industrial plant locations.

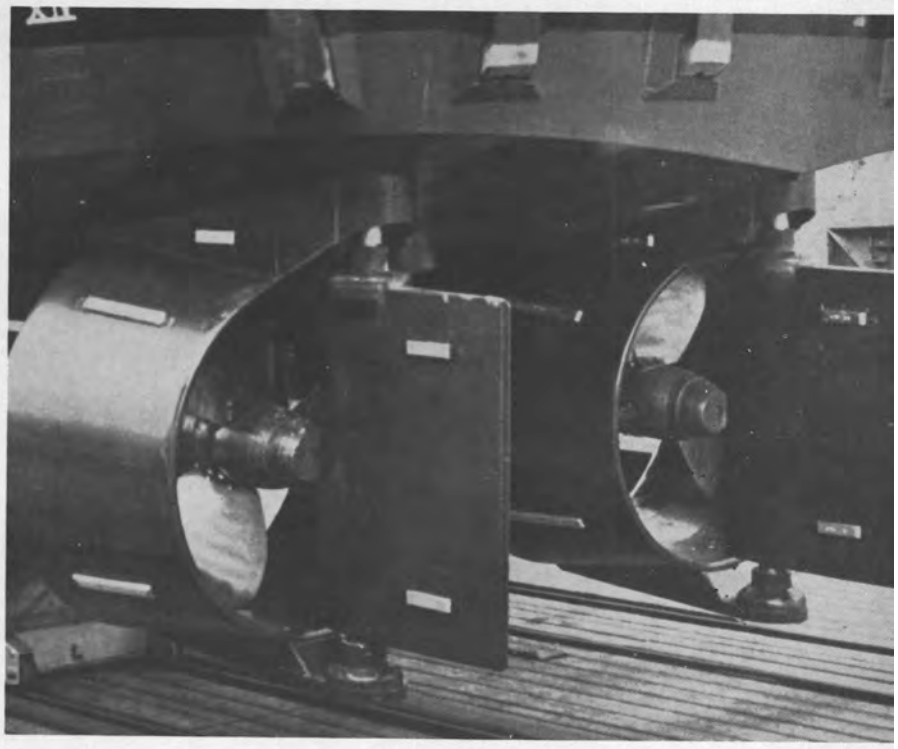
Analysis of the 78 waterside plants that were developed in the first quarter of 1973 shows that in addition to the 18 terminals, docks and wharves, 14 were chemical plants; 11 were general manufacturing units; nine were paper and wood products installations; eight were miscellaneous other facilities; four were metal producing facilities; four were shipyard related units; four were petroleum installations; four were rubber plants; one was a brewery, and one was a cement mill.

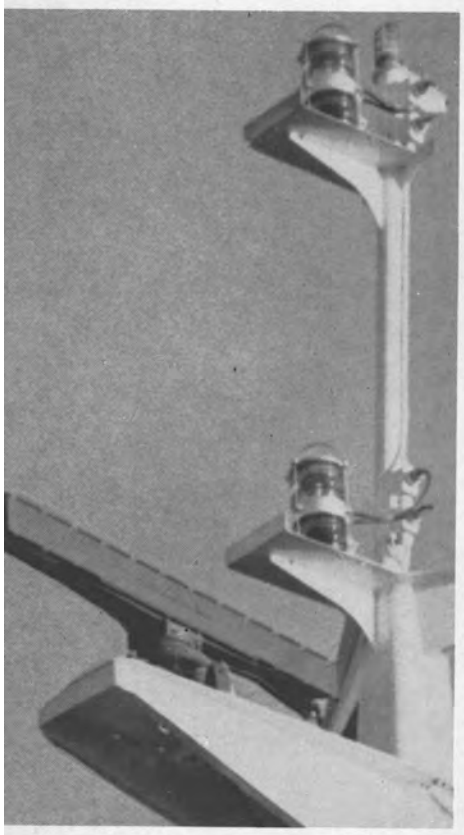
The waterways where the greatest activity took place in new plant starts and expansions in the first quarter of 1973 were the Mississippi River with eight; the Ohio River with six; the McClellan-Kerr Arkansas River Navigation System with six; the Gulf Intracoastal Waterway with six, and the Houston Ship Channel with five.

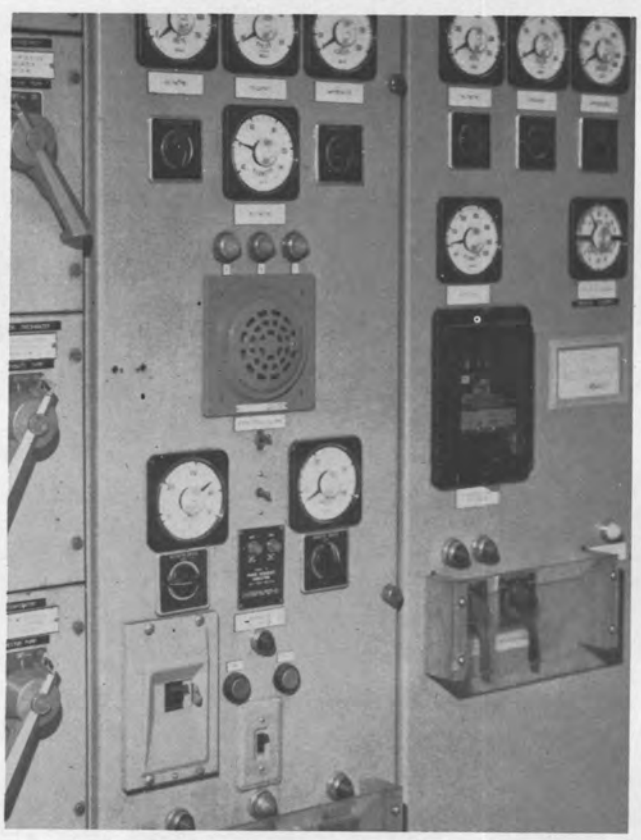
The American Waterways Operators, Inc. first began keeping waterside plant construction and expansion records in 1952. Since then, 8,719 waterside plant developments have been reported.

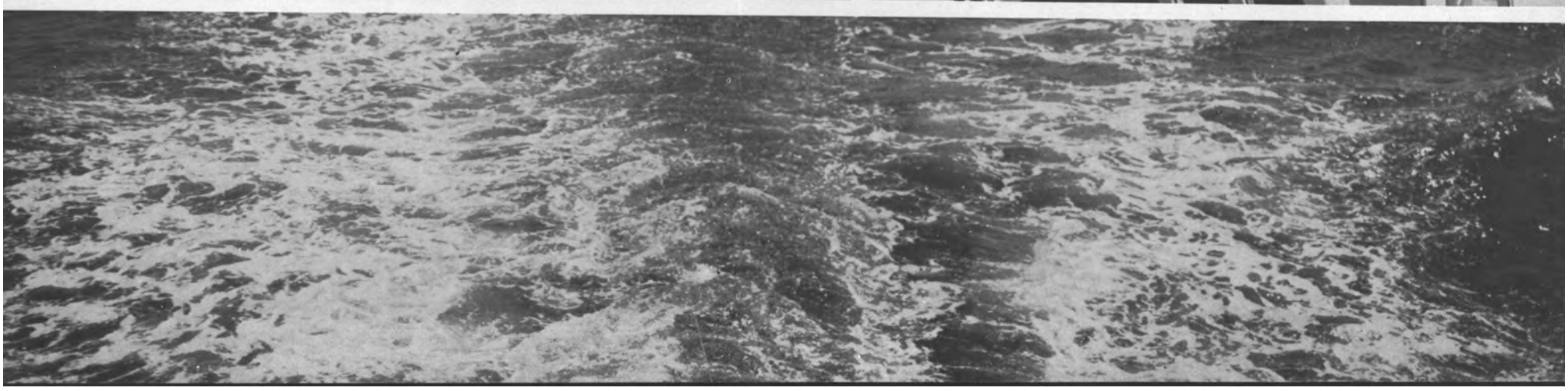
The Association recently published a pamphlet, "1972 Waterside Plant Locations and Expansions—A Study in Economic Growth," which lists plant developments along the navigable waterways during the last year. Single copies of the booklet are available free of charge upon request to AWO's executive offices at 1250 Connecticut Avenue, Suite 502, Washington, D.C. 20036.











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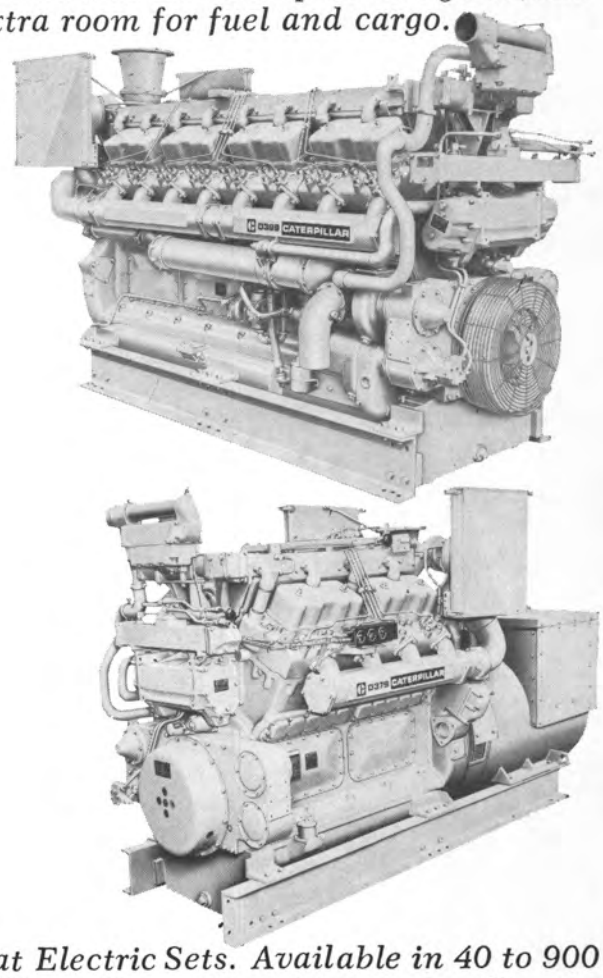

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First Of Three Texaco Spanish-Built Tankers Christened At ASTANO

The Texaco Spain, the first of three new 272,000-deadweight-ton mammoth tankers to be built for Texaco's international fleets by Astilleros y Talleres del Noroeste S.A. (ASTANO), was christened in ceremonies at the ASTANO shipyard in El Ferrol del Caudillo, Spain, on June 30. When delivered, the new tanker will be the largest in Texaco's international fleets.

Sponsor of the Texaco Spain's christening and launching was **Mrs. Augustus C. Long,** whose husband is a Texaco Inc. director, and chairman of the company's executive committee. The vessel will be owned and operated by Texaco Overseas Tankership Limited, London, England, under the British flag.

The Texaco Spain is the first tanker to be built for Texaco in Spain. She has an overall length of 1,129 feet, a molded beam of 176 feet, and a maximum draft of 67 feet. The ship is powered by geared steam turbines developing 31,550 shaft horsepower. Service speed will be 15 knots.

When delivered later this year, the Texaco Spain will join one of the world's largest tanker fleets. At the end of the first quarter of 1973, Texaco operated 162 tankers totaling 13,700,000 deadweight tons. These included 32 mammoth tankers used exclusively in international trade, totaling 7,300,000 deadweight tons.

The Texaco Spain is the 12th mammoth tanker built since 1969 in European shipyards to serve Texaco's growing petroleum requirements. During the year 1975, the company will have at least 40 of these giant petroleum carriers in its worldwide fleets.

The Texaco Spain will carry 2,020,000 barrels of crude oil in a single voyage, enough to supply the operating needs of the refinery at Escombreras, Spain, in which Texaco holds in interest, for more than 10 days. The deck of the Texaco Spain is long enough and wide enough to place 54 vessels the size of Christopher Columbus's Spanish-built flagship, the Santa Maria, in nine rows of six each between the vessel's bow and afterhouse.

The new Texaco tanker will be equipped with an inert gas system to provide a safe atmosphere at all times in all its cargo tanks. She will feature the latest electronic navigational aids, including a sonar/doppler system that is designed to assist in docking operations. Texaco has been an industry leader in the installation of this system, and has placed the equipment on all its owned mammoth tankers. The Texaco Spain will also be fitted with special tanks for the onboard retention of oil residues. This procedure is required on all Texaco tankers in order to maintain the company's policy of prohibiting the discharge of oil at sea.

Mark Shafer Named Terminal Operations Manager For PFEL

Mark L. Shafer has been promoted to manager-terminal operations for Pacific Far East Line in San Francisco, Calif., succeeding **Fred E. Martin,** who retired June 30. Mr. **Shafer** has been with PFEL for 16 years. He is a captain in the U.S. Naval Reserve and a graduate of the U.S. Merchant Marine Academy, Kings Point, N.Y.

Donald E. Hensinger, formerly operations supervisor, was promoted to Mr. **Shafer's** former position of assistant terminal manager.

Rose Barge Line Elects Capt. Eneix VP Marine Operations

Earl C. Rose Jr., president of Rose Barge Line Inc., Clayton, Mo., has announced the election of Capt. **Lloyd H. Eneix** to the newly created position of vice president-marine operations.

Captain **Eneix** has been with the St. Louis-based water transportation firm for 15 years. He previously served as towboat captain and port superintendent. His new responsibilities will include all marine operations of Rose Barge Inc. and subsidiaries.

Halter Delivers 100-Foot Offshore Vessel — 56 Vessels Currently Under Construction At Halter's Yards In Louisiana And Mississippi

Powered by General Motors diesels, the Grayshield has central air-conditioning and accommodations for sixteen passengers.

Halter Marine Services, Inc., New Orleans, La., a major shipbuilder of vessels for the offshore oil, gas, and ocean industries worldwide, has delivered the first of two 100-foot offshore supply ships to Gray Mackenzie Company, Ltd., for operation in the Persian Gulf. Gray Mackenzie is a diversified company servicing oil companies, tanker groups, and varied marine interests in the Persian Gulf area, and the company is a subsidiary of Inchgroup of London.

The new supply vessel, named Grayshield, has overall dimensions of 100 feet in length, a 24-foot beam, and a depth of 10 feet. It was built by Halter Marine to Lloyd's Register under Class 100A; it has accommodations for 16 passengers, using five two-man staterooms and one six-man stateroom.

The Grayshield is equipped with two General Motors 12V71N main engines with Twin Disc 5.0:1 reduction gears, bronze three-blade 56-inch-diameter Federal propellers turning on 4¼-inch-diameter stainless steel shafts. Generators are General Motors 30KW 371 units.

Deck equipment aboard the vessel includes a two-ton-capacity hydraulic crane, a double wildcat ¾-inch-capacity anchor winch, and a Gearmatic hydraulic deck winch with capacity for 150 feet of ½-inch cable that may be operated off the crane hydraulic system.

Accommodations also include central air-conditioning by a four-ton Carrier/Lennox air-cooled unit, two complete galleys, and two heads and one chart/navigation room. Navigational and communication electronics include a Decca D202 radar, Ross Combo flasher recorder Fathometer, an RF Communications single sideband H.F. radio, and an RF Communications "Ensign" VHF radio.

In addition to a second supply boat identical to the Grayshield, Halter Marine has recently delivered three 78-foot crewboats and one 65-foot crewboat to Gray Mackenzie. A fourth 78-foot crewboat is presently under construction by Halter Marine for the company.

Halter Marine Services presently has 56 vessels under construction at three shipyards in Louisiana and Mississippi. These include six 200-foot offshore supply boats, two 6,000-horsepower 150-foot tugs, barges, crewboats, towboats, and specialized vessels for varied operations.

GATX Pays $53 Million For American SS Co. —Enters Lakes Shipping

General American Transportation Corp. (GATX) has announced its entry into Great Lakes shipping with the acquisition of American Steamship Company (ASC) for approximately $53 million in cash, notes and common stock. ASC operates a fleet of 17 self-unloading bulk carriers engaged in transporting iron ore, coal, limestone and other commodities on the Great Lakes and St. Lawrence River and has four large self-unloaders under construction or on order.

During the six months ended December 31, 1972, ASC earned $6.8 million including tax benefit from utilization of a Capital Construction Fund. If ASC earnings are the same during the six months ending December 31, 1973, GATX estimates that after acquisition costs, 40 cents per share would be added to GATX's other earnings for that period. Since Great Lakes shipping is seasonal, ASC normally operates at approximately a break-even level during the first half of each calendar year, and earns substantially all its profits in the last half of the calendar year; that has been the pattern to date in 1973. **T.M. Thompson,** GATX chairman, and **C.T. Shen,** ASC chairman, said they expect ASC earnings for the six months ending December 31, 1973, to at least equal the $6.8 million which was earned in the six months ended December 31, 1972. Mr. **Thompson** added that the performance of the major divisions of GATX continues to be outstanding.

Mr. **Thompson** said that 200,000 shares of GATX common stock and $35 million in cash and notes were paid at the closing, and that an additional $10.3 million, the balance of the purchase price, will be paid in cash in the future, subject to effective reduction on the basis of a formula related to future ASC earnings.

Mr. **Thompson** said the operations of ASC will continue under present management and personnel from its present office, with Mr. **Shen** continuing as chairman of the board and chief executive officer.

DELAVAL DIESELS

AMERICA'S MOST POWERFUL DIESELS, BY DELAVAL, DRIVE THIS NEW ALASKA FERRY

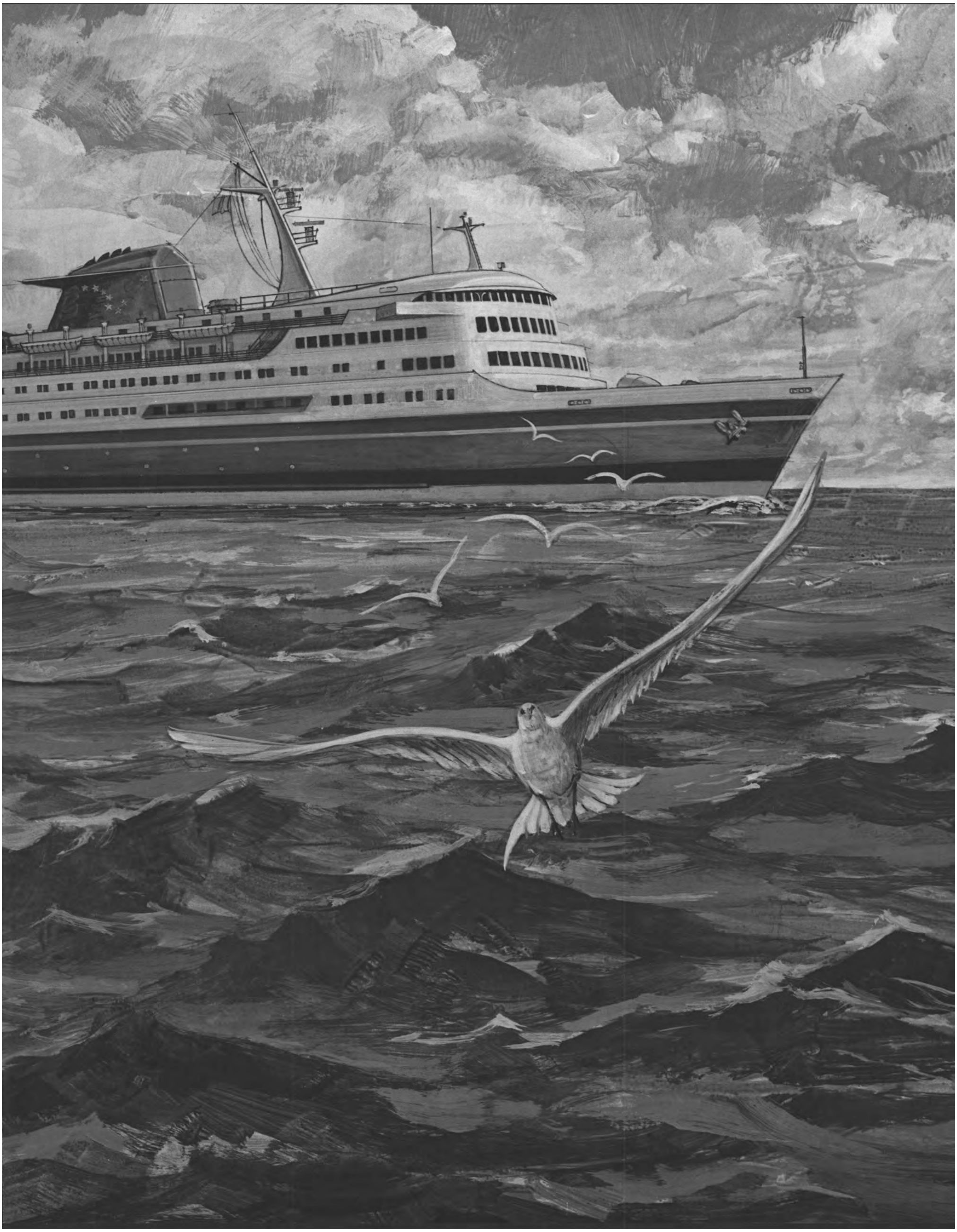
Two 9,200 horsepower DELAVAL Enterprise diesel engines power the 418-foot, ocean-going M/V *Columbia*, launched this year. That's something of a checkpoint in maritime history, because *these are the most powerful diesels designed and built by an American company to be installed in an American-built ship.*

And now, the producer of M/V *Columbia's* 16-cylinder RV Series engine offers a new achievement in this line of great diesels. It's the DELAVAL 20-cylinder RV20, delivering up to 12,500 bhp to ships of all types, from tugs to modern 100,000 dwt tankers.

The sleek M/V *Columbia* is being built by Lockheed Shipbuilding and Construction Company of Seattle, and designed by Nickum & Spaulding Marine Architects, whose other proud ships negotiate the challenging Alaska seas and inlets under DELAVAL diesel power.

For more information on how DELAVAL's Enterprise engines can bring your shipbuilding project important new economies in construction and during each year of the vessel's life, phone or write to us soon. DELAVAL Turbine Inc., Engine and Compressor Division, 550 85th Ave., Oakland, California 94621. (415) 638-0130.

DELAVAL



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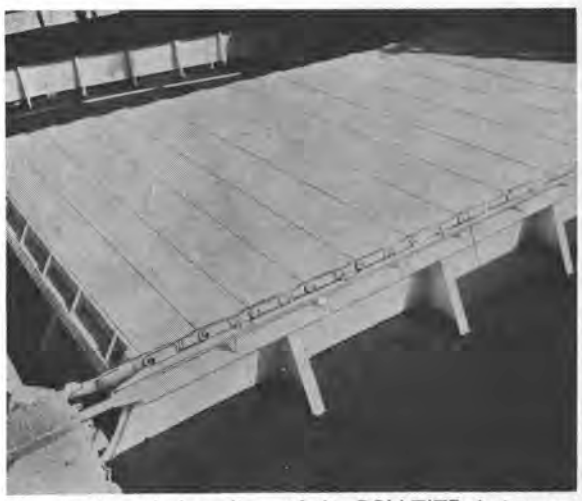
PACECO/ISRAEL CRANE CONTRACT: The new container terminal at the Port of Ashdod, Israel, will have two of the newest type terminal cranes available. They are the MACH (Modular Automated Container Handling) Transtainer® cranes built by Paceco, a Division of Fruehauf Corporation, Alameda, Calif., and will have high-speed power packages to reduce both lifting and travel time. They will also have provisions for future automation, which will further increase operating speed. After automation, higher speeds can be attained with the operator's task simply being one of monitoring the entire operation. Larger than most Transtainers, the cranes will have an overall height of 62 feet, and will be able to straddle 14 rows of containers stacked four-high. In addition to the 140-foot span, the cranes are cantilevered 23 feet on one side to service two traffic lanes outside the legs of the crane. Both cranes have a 35-MT rating and will be equipped with telescoping lifting spreaders for handling 20-foot and 40-foot containers. First operation of the cranes is scheduled for early 1974. **John F. Martin,** president and general manager of Paceco (center), signs the contract with **Meir Siwek** (left), and **Shmuel Achituv** (right), of Israel Port Authority.

New ROLLTITE Hatch Cover Secures And Locks Itself

The first installations of ROLLTITE, a new fully automatic patented hatch cover system, are already in service on Japanese and French-built ships. Using a unique but simple cleating system, the new design is the only hatch cover which secures and unlocks itself by its own operating action.

The cleating arrangement affords the following advantages: no cleats are required at the transverse joints between cover panels; no cleats are required at the hatch end nearest stowage, and cleats at hatch sides and hatch end remote from stowage are self-actuating by the opening and closing of the cover.

The cover itself resembles a continuous sheet which opens by rolling back onto a powered stowage drum at the hatch end. To close the cover, the drum rotation is merely reversed. The cover comprises panels connected to each other by hinges, and to the stowage drum by link arms. The length of each cover panel is arranged to facilitate coiling when stowed. In most cases, the stowage requirements of the ROLLTITE cover give a positive saving in deck space. Power for turning the stowage drum is provided by a motor and gearing incorporated in one of the stowage drum supports.



The simple and clean lines of the ROLLTITE design can be seen in this general view of a closed hatch.

Opening and closing is fully automatic and controlled by push buttons at each hatch. In operation, the cover is extraordinarily quiet, a feature often sought after by shipowners and operators.

Improved watertightness is a prime objective of ROLLTITE, especially to overcome increased deflections of large hatchways. In this respect, the ROLLTITE cover has:

— Sealing material which forms a single continuous seal both longitudinally and transversely.

— Permanent inter-panel transverse seals which are not under compression at any time.

— Wide peripheral compression seals which are located longitudinally under the cover top plate, and are thus advantageously protected from direct exposure to seawater.

— The wide seals and intrinsic flexibility of the cover can compensate for coaming movement.

The ROLLTITE minimal maintenance requirements are an important and beneficial feature. Apart from the hinge connections between panels, the only moving components of a cover are two wheels. The driving unit is completely enclosed and readily accessible for preventive maintenance, while the long-life seals should only normally require replacing at the second quadrennial survey.

Additional information on the MacGregor Ermans ROLLTITE hatch cover can be obtained from Central MacGregor Limited, bordering London Airport at 50 Salisbury Road, Hounslow Middlesex, TW4 6JP England.

New $20-Million Rig Travels 15,000 Miles To Work In North Sea

Ocean Drilling & Exploration Company of New Orleans, La., has announced the delivery on June 15, 1973 of its third new self-propelled semisubmersible drilling rig, the Ocean Kokuei, in Hiroshima, Japan.

The big new $20-million unit, the second of this type to be built by Mitsubishi Heavy Industries, Ltd. for ODECO Nihon, a joint venture between ODECO and Japanese interests, departed Hiroshima harbor on June 17 under its own power for the North Sea, where it will drill under a long-term contract for Burmah Oil.

According to **Alden J. Laborde,** Ocean Drilling president, the Ocean Kokuei's journey to the North Sea will take approximately 100 days—over a distance of 15,000 miles—at an average speed of six knots. It will later be joined by an assisting tug in order to increase the speed.

The Ocean Kokuei is the second new self-propelled unit destined for ODECO's drilling fleet in the North Sea. Two other new rigs of the same class, the Ocean Rover and Ocean Voyager, nearing completion in United States and Norwegian shipyards, respectively, will also see service in the North Sea by next fall.

The Ocean Kokuei has a rated drilling depth of 30,000 feet, and a rated water depth of 600 feet afloat. It has modern quarters for 80 men, and is the 22nd rig to go into service for the New Orleans-based company worldwide.

NYK Line Appoints Matson Agencies, Inc.

Signing the agreement for Matson Agencies, Inc. to represent NYK Line in Western United States, Hawaii and Alaska are **R.J. Pfeiffer,** Matson Navigation Company president, at left, and **Hiroshi Okutsu,** NYK senior resident representative, as **G.E. Bart,** Matson senior vice president, looks on.

The appointment of Matson Agencies, Inc. as general agents for Nippon Yusen Kaisha (NYK Line) in California, Washington, Oregon, Hawaii, Alaska, Nevada, Utah, Arizona, New Mexico, and Colorado was announced by **Hiroshi Okutsu,** NYK senior resident representative.

Matson Agencies, Inc., a wholly owned subsidiary of Matson Navigation Company, started agency operations for NYK's California container service on July 5 with the arrival of the containership Hakone Maru at Matson's Los Angeles container terminal.

"This extensive and integrated agency network, combined with the containerization experience and expertise of both Matson and NYK, will provide the finest for our customers in terms of technology and service," Mr. **Okutsu** said.

Matson agency activities will be closely coordinated with operations of NYK agents in other parts of the United States and Canada. NYK Line has served the U.S. Pacific Coast since 1896, when it inaugurated trans-Pacific service to Seattle. The line's Japan-California service was launched in 1926.

With the advent of the container age, in August 1968, NYK was the first in Japan to embark upon full container service to California, commencing with the Hakone Maru and the Haruna Maru. Since then, NYK has been serving its customers under the motto of "Speedy, Safe, and Steady Transportation." Continuing with this tradition, the line has recently started weekly service between California and Japan with four high-speed full containerships.

NYK inaugurated its full container service between the Pacific Northwest and Japan in May 1970, and now provides weekly sailings in this service. The line also operates extensive tramp services with specialized vessels for specific types of cargoes.

Dravo Corp. Builds Viking Line Towboat For Thomas Marine

Mrs. Sarah Jane Thomas breaks the traditional champagne bottle against the capstan of the F.P. Thomas, the third of Dravo Corporation's new Viking towboats to be put into service this year. With **Mrs. Thomas** are her sister, **Mrs. Charles A. Porter,** and her husband, **F.P. Thomas,** president of Thomas Marine Co., Butler, Pa.

The 5,600-horsepower towboat F.P. Thomas was recently christened by Thomas Marine Co., Butler, Pa., at the Allegheny River Wharf at Pittsburgh.

The boat is the third of the recently developed Viking line of towboats, designed and built by Dravo Corporation, Pittsburgh, to be put in service this year.

The traditional champagne bottle was broken on the new vessel's capstan by **Mrs. Sarah Jane Thomas,** wife of **F.P. Thomas,** president of Thomas Marine. She was assisted by her sister, **Mrs. Charles A. Porter.**

Powering the F.P. Thomas are two General Motors diesel engines which make the boat capable of tows carrying 25,000 tons or more of cargo. Electric power is supplied by radiator-cooled Detroit Diesel generators.

The pilothouse contains all of the communications and navigation equipment and instruments needed for day-and-night, all weather operations. These include radar, Fathometer, rate-of-swing indicator and two roof-mounted searchlights.

Immediately below the pilothouse is a Texas deck structure containing an electronics room and attractively decorated guest accommodations complete with bath and lounge area.

Most crew accomodations are located on the upper deck level just below the Texas deck. These comfortable quarters include rooms for the captain, pilot, two mates, cook and four crewmen. A modern galley and mess area, along with engineers' quarters are located on the main deck. The vessel is painted white with blue trim.

The F.P. Thomas is 140 feet long and 42 feet wide and carries 14,000 gallons of potable water and has an ultra-violet purification system.

One of the features of Dravo's Viking line of towboats is their unusual balance of speed, power and maneuverability, which enable the vessels to operate in all directions without having to be turned around.

The F.P. Thomas is owned by Dravo Leasing Company and will be operating primarily on the Mississippi River.

Dravo is also building an additional Viking towboat and four tank-barge fleets for Thomas Marine.

The F.P. Thomas is one of some 50 towboats and barges in the Thomas Marine fleet.

Britain's Youngest Merchant Fleet

Britain's merchant fleet is the "youngest" in its history, according to the Chamber of Shipping of the United Kingdom.

The average age of its 2,300 ships is under seven years and half the tonnage is less than five years old.

The fleet totaled 43-million deadweight tons in mid-1972. "The 1973 figure, which will be available shortly, is certain to be larger," the Chamber said.

Britain's tanker fleet at 25-million deadweight tons is the world's second largest (Liberia's is the biggest). Another 90 tankers, totaling 12-million deadweight tons, are due for delivery up to 1977.

Marine Steam Power Plant Heat Balance Practices Updated

Dramatic developments have been made in marine steam power plants in recent years, especially in the horsepower rating, physical size and arrangement of the plants. To keep pace with these new developments, The Society of Naval Architects and Marine Engineers' Technical and Research (T&R) Program has reviewed and updated T&R Bulletin 3-11, "Marine Steam Power Plant Heat Balance Practices."

Developed by Panel M-15 (Heat Balance) of the ships' machinery committee, Bulletin 3-11 takes a large step toward standardizing the assumptions, allowances and methods of treatment of the heat balance calculation for steam power plants up to 100,000 shp. While specifically applicable to oil-fired steam turbine power plants at maximum continuous power, this bulletin, with suitable modification, can be used for other service ratings, types of fuels, prime movers and auxiliary equipment.

Heat balance should form a vital part of the economic evaluation of a power plant, but it must be easily interpreted and unbiased in its comparative application as a basis for fuel consumption guarantee. This revision of Bulletin 3-11 helps to achieve this by standardizing allowances and making available reasonable standards of performance for components where specific information does not exist.

This bulletin includes data, practices, diagrams, symbols, abbreviations and forms for checking calculations. An example calculation is performed, including the completion of the heat balance and flow diagram and a standard check sheet. Also included are blank forms that are presented as transparencies and perforated for easy removal and duplication.

Similar bulletins are currently being prepared by Panel M-15 covering marine diesel and gas turbine power plants, thus affording the ship designer or shipowner an impartial basis to evaluate various types of propulsion systems.

T&R Bulletin 3-11, "Marine Steam Power Plant Heat Balance Practices," is available through The Society of Naval Architects and Marine Engineers, 74 Trinity Place, New York, N.Y. 10006, at $12.75 per copy. Members of the Society may obtain the bulletin for $8.50 per copy. If payment is included with the order, the price includes postage via third class mail in the United States and as "Printed Matter" in all other countries. Shipments will be insured or sent air mail at additional cost only if requested.

Philadelphia Gear Corp. Offers New, Standard High-Speed Gear Drives

Philadelphia Gear Corporation, King of Prussia, Pa. 19406, has announced the availability of a new line of high-speed gear drives to meet the current trends of commercial rotating machinery to be larger, faster and capable of transmitting more power. The new units will be offered with ratings up to 20,000-rpm pinion speed or a pitch-line velocity of 30,000 fpm. High-speed housings, up to models with 15¼-inch centers, will be fabricated from high-grade castings, while all sizes above this will be constructed from steel weldments.

Gears for the new line are precision quality, through hardened steel forgings, and they are precision hobbed and shaved for the greatest accuracy. Under unusual operating conditions, standard gear drives can be furnished with surface hardened and precision ground gears. This enables Philadelphia Gear to offer more compact gear drives with greater reliability in the higher velocity and horsepower ranges.

An important design option available is the selection of either single or opposed double helical gearing. With single helical gearing, external thrust loads do not affect gear tooth contact and are contained in the shaft assembly in which they occur. Another advantage of single helical gearing is that the groove between the two opposing helices is eliminated. This leads to a stiffer pinion with less tooth deflection and generally, a more favorable critical speed condition.

The new high-speed line offers a complete range of optional designs and auxiliary equipment. High-speed units can be furnished with surface hardened and ground gearing, vertically offset shafting, integral clutch brake units and/or completely integral or remote lubrication and cooling systems. Also available are shaft driven pumps, vibration pressure and temperature monitoring equipment, special bearings, couplings, guards, adaptors, and sole and base plates.

For additional information, write for catalog HS-2.

Central MacGregor Ltd. Names Wheway Chairman

Executive changes within the MacGregor Organisation were announced as follows:

A.J. Wheway, advisor to the group, has been appointed chairman of Central MacGregor Ltd.

D.A. Lawrence was appointed managing director of Central MacGregor Ltd. and, operating from the company's Hounslow offices, assumes the additional responsibilities of chairman of MacGregor & Co. (Naval Architects) Ltd., the group's U.K. operating company.

H. Tarkowski remains on the board of Central MacGregor Ltd. and was, in addition, appointed vice president of MacGregor International S.A., and will in the future operate from Paris.

R. Douek, president of MacGregor-Comarain S.A., Ville d'Avray, France, was appointed to the board of Central MacGregor Ltd.

Henri Kummerman remains in executive control of all group activities.

Equitable Equipment Names J.R. Lynch And F.T. Ventura

James R. Lynch

Frederick T. Ventura

It has been announced by **C.M. Keeney,** president of Equitable Equipment Company, Inc., New Orleans, La., that **James R. Lynch** has been named director of administration. Mr. **Lynch** is a graduate of California State University in Sacramento, Calif., and of Loyola University College of Law in New Orleans. He was formerly manager of contracts for commercial ships for Ingalls Shipbuilding in Pascagoula, Miss. In his present capacity at Equitable, he is responsible for all phases of administration of the company. Mr. **Lynch** is a member of the Louisiana State Bar Association and the American Bar Association.

Mr. **Keeney** also announced the appointment of **Frederick T. Ventura** as sales manager, marine department of Equitable Equipment. Mr. **Ventura** joined Equitable on May 1, 1973. He was formerly associated with George Engine Company, Inc. of Harvey, La., as sales representative. Prior to that, he was associated with the Pelican Paint Company, Inc., Metairie, La.; M.W. Kellogg, Inc., New York, and Gibbs & Cox, Inc., New York. He attended the U.S. Merchant Marine Academy in Kings Point, N.Y.

LNG-4 Conference Names Chairmen

Session chairmen for the Fourth International Conference on Liquefied Natural Gas (LNG-4) were named at a meeting of the program committee in Nice, France. LNG-4, which will cover all aspects of the rapidly growing LNG industry, will be held at the Palace of Nations located in Club des Pins, outside of Algiers, Algeria, on June 24-27, 1974.

The eight sessions and their chairmen are:

World Trade in LNG—**L.J. Clark,** chairman, Northern Gas Board, Newcastle-upon-Tyne, United Kingdom; **S. Ghozali**, president, SONATRACH, Algiers, Algeria.

Large Scale Transportation Projects—Dipl. Ing. **Christoph Brecht,** Ruhrgas AG, Federal Republic of Germany; a representative of Japan.

Liquefaction and Processing—**M. Grenier,** technical director, L'Air Liquide, Champigny-sur-Marne, France; **O.M. Ivantsov,** head of technical department, Ministry of Construction for Oil and Gas, Moscow, USSR.

Peakload Plants and Liquid Handling—**J.M. Geist,** Air Products and Chemicals, Inc., Allentown, Pa., USA; **G.F.I. Roberts**, British Gas Corporation, London, United Kingdom.

Marine Transportation—**R. Boudet,** chairman and general manager, Gazocean, Paris, France; **C.G. Filstead,** managing director, Conch Methane Services, Ltd., London, United Kingdom.

Storage Systems—**J.F. Isamat,** general secretary, Gas Natural S.A., Barcelona, Spain; **O. Khouani**, vice president, SONATRACH, Algiers, Algeria.

New Developments—**G.G. Haselden,** department of chemical engineering, University of Leeds, Leeds, United Kingdom; **P. Verret,** directeur, Direction des Etudes et Techniques Nouvelles, Gas de France, Paris, France.

Economic and Legal Aspects—**P.G. Smith,** executive vice president and general counsel, Southern Natural Gas Company, Birmingham, Ala., USA; **A. Reyes,** Chief, Technical Division of Conservation, Ministry of Mines and Hydrocarbons, Caracas, Venezuela.

In conjunction with the conference, tours of Algeria's major LNG installations, as well as its natural gas fields will be offered. There will be an opportunity to visit the world's first base-load liquefaction plant at Arzew in western Algeria. Constructed in 1964, the CAMEL plant processes gas from the Hassi R'Mel field for shipment to the United Kingdom and France, and more recently on an "as available basis" to other consuming countries, particularly the United States.

The Skikda plant in eastern Algeria, which first produced LNG in 1973, is the world's fourth such plant. It uses the mixed-refrigerant liquefaction cycle, and is designed to produce 430 million CF of gas per day as LNG, which goes to France. An additional liquefaction train is under construction. When completed, it will produce 200 million CF of gas as LNG per day for export to the United States.

In addition to the technical visits, LNG-4 delegates will have an opportunity to see many sights in Algeria, including the vast Roman ruins at Tipasa near the conference site; jewelry and handicrafts of the Kabyle region; Algeria's vast wine-making industry; beautiful mosques and Muslim architecture, and bartering in the old city—the Casbah. They will also be treated to feasts in the true desert tradition by their Algerian hosts.

As at LNG-3, held last year in Washington, D.C., all technical sessions will be translated simultaneously into both English and French, the official languages of the conference.

Persons interested in submitting papers at any of the sessions should submit abstracts, not to exceed 200 words in English and/or French, to Program Secretary, **F.M. Moys,** International Gas Union, 17 Grosvenor Crescent, SW1X7ES, United Kingdom.

The conference is being held under the patronage of Algeria's President **Houari Boumedienne,** the Algerian Government, and the Algerian Gas Union.

LNG-4 is being co-sponsored by the International Gas Union (IGU), London; the International Institute of Refrigeration (IIR), Paris, and the Institute of Gas Technology (IGT), Chicago.

URI Sea Grant Calls For Conference Papers On Floating Breakwaters

A call for papers for a conference on floating breakwaters, scheduled for April 30-May 2, 1974 at Newport, R.I., has been issued by the University of Rhode Island Sea Grant Program.

Major areas to be covered at the conference include theoretical analyses related to floating breakwaters, such as wave prediction, wave forces and wave suppression; model and full-scale experimental investigations; materials used in construction; applications of floating breakwaters for protection of coastal marinas and harbors, offshore power plants, supertanker terminals and oil rigs; possible applications to oil spill containment; economics of floating breakwaters, and conceptual models for future developments.

Although original papers are required, state-of-the-art reports will be considered. Abstracts not exceeding 300 words should be received prior to November 15, 1973, by Dr. **T. Kowalski,** Department of Ocean Engineering, Lippitt Hall, University of Rhode Island, Kingston, R.I. 02881.

AIR-SEA RESCUE VESSEL: The Jamaican Government formally accepted an all-aluminum 65-foot air-sea rescue vessel built by Swiftships, Inc., Morgan City, La. The vessel was officially dedicated at ceremonies in Kingston, during which **Jerry Hoffpauir** (right), vice president of Swiftships, Inc., presented a replica of the boat to the Honorable **Eric Bell,** Minister of Public Utilities, Communications and Transport. Mr. **Hoffpauir** said the vessel represents a new utilization for the popular Swiftships' design 65-foot crew boat. Other usages range from patrol craft to ferry and pleasure boats. The prime purpose of the boat is to get lifesaving gear to victims of plane crashes at sea. "The purpose of the air-sea rescue boat is not to pick up the passengers of a downed aircraft, but to get lifesaving equipment to them rapidly," Mr. **Hoffpauir** said. "With the innovation of the jumbo airliners capable of carrying in excess of 500 passengers, a particular problem has arisen for airports near the sea," he explained. "There exists the ever-present possibility of a crash into the sea and no effective way to get quick aid to the victims. This Swiftships boat is an answer to the problem," Mr. **Hoffpauir** said. Life floats in racks on the aft deck contain 50 floats certified for 10 passengers per float. Their light weight, coupled with the custom-designed stowage rack, enables one man to cast the floats into the water where automatic flotation is activated. Mr. **Hoffpauir** said relief is thereby provided for the in-water survivors until a larger vessel can arrive. In addition to rescue duty, the vessel is capable of seating 36 passengers and will be used to transport workers across Kingston Harbor to job sites in the city proper. Jamaican officials plan to expand its operational capacity even further to include customs duties, as well as serve as a pilot vessel. The replica was presented by Swiftships to the Honorable **Eric Bell** as a token of "appreciation for past business and in anticipation of future ventures between Swiftships and the Government of Jamaica. With the purchase of the vessel, the tourist-oriented country has taken that extra step to ensure the safety of visitors and residents. This additional safeguard epitomizes the progressiveness of Jamaica, which is rapidly becoming the leader of the Caribbean world."

Swan, Wooster Names Thane Brown President

Ian S. Ross, chairman of the board of directors of Swan, Wooster Engineering, Inc., 1618 S.W. First Avenue, Portland, Ore. 97201, has announced that **Thane E. Brown** has been named president of the company.

Mr. **Brown** is well-known in the port field, and has served on national committees and authored several papers concerning port engineering. He joined Swan, Wooster as chief engineer in 1963 after service with Portland Public Docks (now Port of Portland), and in 1966 was made an associate of the firm and, as vice president, assumed the duties of general manager.

In addition to port and harbor engineering, Swan, Wooster is active in the field of bulk materials handling and industrial buildings. Major projects are currently under way for the Ports of Sacramento, New Orleans, and Everett.

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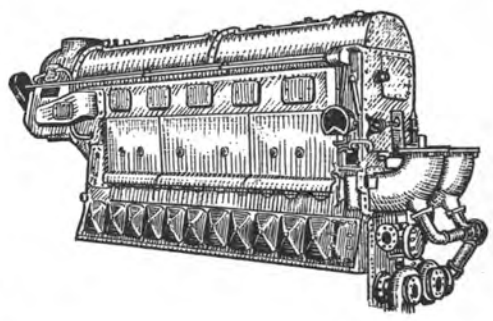

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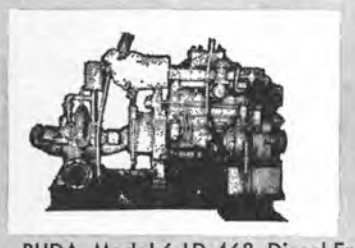
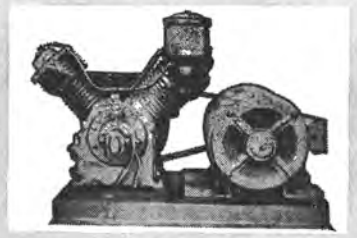


2—BUDA, Model 6-LD-468, Diesel Engines, 6 cylinders, 100 BHP, Marine, Gardner-Denver, centrifugal Pumps, Bronze, horizontally split case, 1000 GPM, 280' head, 6" suction and 5" discharge.



2—GARDNER-DENVER, 150 CFM, 125 PSI, Class WB, Size 7x5¾x5, with Diehl Motors, 45 HP, 230 Volts DC, 870 RPM, 167 Amperes.

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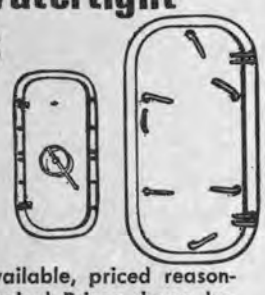

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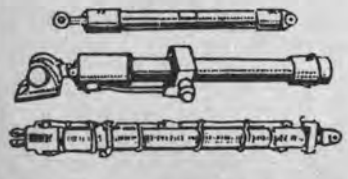

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2"	8"	1½"	20"	double
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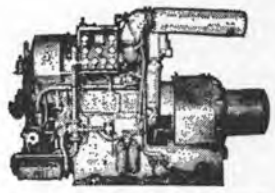

4—GENERAL MOTORS, Model 3-268A, marine, 150 BHP, 1200 RPM, 3 cylinders, with 100 KW Generators, 450/3/60.

3—GENERAL MOTORS, Model 3-268 A, Marine, 150 HP, 1200 RPM, 3 cylinders, with Allis-Chalmers Generators, 100 KW, 120/240 DC.

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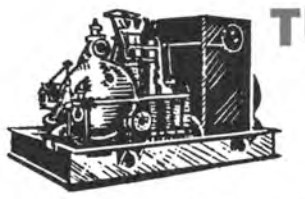

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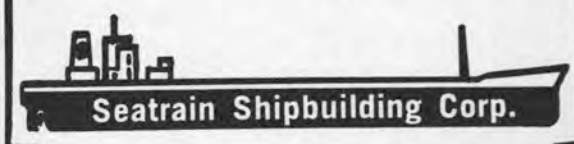

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VALVES

Reconditioned to ABS standards

24" OVERBOARD DISCHARGE VALVE

●

MAIN INJECTION VALVE

THE BOSTON METALS COMPANY

313 E. Baltimore St. Baltimore, Md. 21202
539-1900 (301) 355-5050

FUEL OIL OR LUBE OIL PURIFIER

DeLaval—600 G.P.M.—type B-1529C-60—with 3 H.P. 440/3/60 Motor. Mfg. by German DeLaval. Spare parts available.

THE BOSTON METALS COMPANY

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1000 GPM—125 LB

BRONZE FAIRBANKS-MORSE FIRE & GENERAL SERVICE PUMP

PUMP: Mfg by Fairbanks-Morse.. Horizontally split case — 1000 GPM—281' head — 3545 RPM. Suction pressure flooded—6" suction—5" discharge. Steelflex coupling. MOTOR: Fairbanks-Morse—440/3/60—squirrel cage—3600 RPM—class A insulation. Type KZK—continuous duty—dripproof—ambient temp. 50°C. Complete with Cutler-Hammer controller (reduced voltage magnetic starter). DIMENSIONS: 5' 5" OAL—23" OAW—2' 11" OAH. UNIT HAS HAD VERY LITTLE USE.

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SELF-PRIMING 6"

GASOLINE DRIVEN PUMPS

Frame mounted steel pumps—6" suction—6" discharge. Carver Pump Co. Model 6113—driven by 4-cylinder LeRoi gasoline engine model D-201P36. Capacity about 1400 GPM at 75'—1000 GPM at 135'. U.S. Navy surplus—in good running condition.

$1375.00 each

THE BOSTON METALS COMPANY

313 E. Baltimore St. Baltimore, Md. 21202
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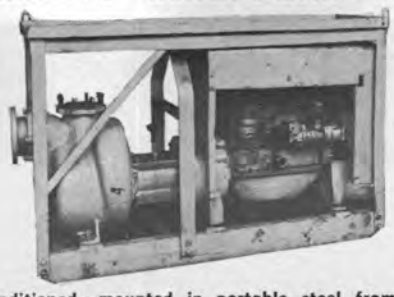
PORTABLE 6" CARVER SALVAGE PUMPS



Reconditioned—mounted in portable steel frame. 1750 RPM—1100 GPM @ 100' head; 1500 GPM @ 70' head; 1800 GPM @ 50' head; 2100 GPM @ 20' head. Leroi gas engine—model D-201P3 —4 x 4—1750 RPM—hand crank— —wt. 600 lbs. **$1450**

THE BOSTON METALS COMPANY

313 E. Baltimore St. Baltimore, Md. 21202
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UNUSED 1⅝" HEAVY DUTY LINK BELT WINDLASS

Below deck motor drive. Double wildcat—driven by 50 HP 230 VDC 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.

THE BOSTON METALS COMPANY

313 E. Baltimore St. Baltimore, Md. 21202
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Attention: Offshore Contractors, Dredgers!

1200 KW—525 Volt DC DIESEL SET

Completely Self-Contained on Railroad Flat Car—Ex-Navy Emergency Unit

GENERATOR: Allis-Chalmers — 525 VDC — 2290 amps—750 RPM—self-ventilating—horizontally split casing. DIESEL: G.M. 16-278A—8¾ x 10½—1700 BHP—720 RPM. Unit includes control panel & switches—excitation sets—aux. lighting generator driven by GM 2-71 2-cyl. 4½ x 5 engine at 1200 RPM. Generator is 120 VDC. Also included are silencers and mufflers.

ALL MOUNTED ON FLATCAR WITH STANDARD TRUCKS AND WHEELS—56½" GAUGE

Has air, water and oil tanks — starting air compressor—all on same car and interconnected. Entire unit was fabricated by Navy for Navy Yard use. Total weight 120,000 lbs. Shipping Dimensions: 40' long—9'4" wide—15' high. Car has steel wheels and can be certified to go over the road. **UNIT CAN BE EASILY REMOVED FROM FLATCAR AND PLACED ON VESSEL.**

THE BOSTON METALS COMPANY

313 E. Baltimore St. Baltimore, Md. 21202
539-1900 (301) 355-5050

NEW 7" RADIUS PANAMA CHOCKS

(MEET PANAMA REGULATIONS)

With extended legs for welding to deck. IMMEDIATE DELIVERY FROM STOCK.

THE BOSTON METALS COMPANY

313 E. Baltimore St. Baltimore, Md. 21202
539-1900 (301) 355-5050

M.G. SETS

APPROX. ½ KW 110/1/60 M.G. SET NEW—UNUSED

INPUT: 115 VDC—6.1 amps—3600 RPM. AC OUTPUT: 425 watts—4.55 amps—110/1/60. Ball bearing. 13⅞" long—7 9/16" wide—10½" high. Has radio noise supression filter. Net wt. 58 lbs—83 lbs packed for shipping.

$89.50 EACH

UNUSED—10 KW—120/1/60 M.G. SET

INPUT: Motor 25 HP — 120 VDC — 156 amps — 1800 RPM —flange-coupled to output generator.

OUTPUT: 10 KW generator — 120 volts 60 cycle single phase —108 amps — 0.80 PF — with direct-connected 125 volt 8 amp exciter. Motor starter by Cutler-Hammer. AC generator has voltmeter and ammeter. Bassler voltage regulator.

RECONDITIONED

BOGUE M.G. SET

230 VDC Input

7.5 KW 120/1/60 Output

Model 2635—2 bearing. INPUT: 15 HP.—230 VDC—57 amps continuous—1800 RPM. OUTPUT: 7.5 KW—10 KVA —83.5 amps—120/1/60—0.8 P.F

RECONDITIONED CONTINENTAL 2 KW—220 D.C. TO 120/1/60 A.C.

INPUT: 5 HP—230 VDC—20 amps. **OUTPUT:** 2.5 KVA —2 KW—120/1/60 AC—0.8 PF—1800 RPM—21 amps. With controls. 38" long—15" wide—480 lbs.

THE BOSTON METALS COMPANY

313 E. Baltimore St. Baltimore, Md. 21202
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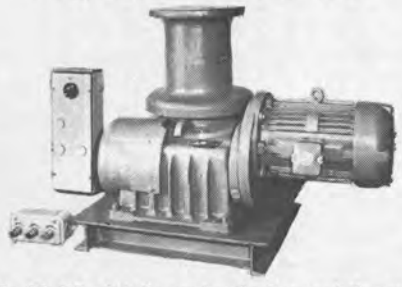
NEW — UNUSED

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 watertight pushbutton — forward / reverse / stop—watertight starter box—rated for 40 starts/hour—triple pole contactor with silver contacts, thermal overload relay & trip adjustment. DIMENSIONS: Barrel 10" diam.—flange 10" diam.—approx. 26" wide & 36" long.

$2450

THE BOSTON METALS COMPANY

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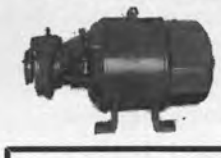
UNUSED ALLIS-CHALMERS FIRE & GENERAL SERVICE PUMPS



200 GPM — 180' head — 2½"x2"—bronze—flange connections. MOTOR: 20 HP—115 volts DC—2400 RPM—153 amps.

THE BOSTON METALS COMPANY

313 E. Baltimore St. Baltimore Md. 21202
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Bailey Refrigeration Co., Inc., 74 Sullivan St., Brooklyn, N.Y. 11231
ANCHORS AND ANCHOR CHAINS
Lockstad Co., Inc., 179 West 5th Street, Bayonne, N.J. 07002
AUTOMATIC DRAFTING SYSTEMS
Gerber Scientific Instruments Co., P.O. Box 305, Hartford, Conn. 06101
BEARINGS
BJ Marine Bearings, a Borg-Warner Industry, P.O. Box 2709, Terminal Annex, Los Angeles, Calif. 90054
Lucian Q. Moffitt, Inc., P.O. Box 1415, Akron, Ohio 44309
Waukesha Bearings Corp., P.O. Box 798, Waukesha, Wis. 53186
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Babcock & Wilcox Co., 161 E. 42nd Street, New York, N.Y. 10017
Combustion Engineering, Inc., Windsor, Connecticut 06095
BOW THRUSTERS
Murray & Tregurtha, Inc., 2 Hancock St., Quincy, Mass. 02171
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Gulf Oil Trading Co., 1290 Ave. of the Americas, N.Y., N.Y. 10019
Independent Petroleum Supply Co., 1345 Ave. of Americas, New York, N.Y. 10019
The West Indies Oil Co., Ltd., St. John's Antigua, W. I.
CARGO HANDLING EQUIPMENT
MacGregor International Organization, 49 Gray's Inn Road, London W.C.I., England
CATHODIC PROTECTION
Engelhard Industries, 430 Mountain Ave., Murray Hill, N.J. 07974
CLUTCHES, GEARS & BRAKES
Wichita Clutch Co., Inc., Wichita Falls, Texas 76307
COATINGS—Protective
Ameron Corrosion Control Div., Brea, Calif. 92621
Carboline Co., 328 Hanley Industrial Court, St. Louis, Mo. 63144
Devoe & Raynolds Co., Inc., Subsidiary Celanese Coatings Co., 414 Wilson Ave., Newark, N.J. 07105
EGD Spee-Flo Co., 4631 Winfield Rd., Houston, Texas 77039
International Paint Co., Inc., 21 West Street, New York, N.Y. 10006
Patterson-Sargent, P.O. Box 494, New Brunswick, N. J.
Philadelphia Resins Corp., 20 Commerce Dr., Montgomery, Pa. 18936
CONTAINERS—CONTAINER HANDLING SYSTEMS
Ameron Corrosion Control Div., Brea, Calif. 92621
Lighter Aboard Ship, Inc., 225 Baronne St., New Oreans, La. 70112
Paceco, Div. Fruehauf Corp., 2350 Blanding Ave., Alameda, Calif. 94501
RPC Division, Midland-Ross Corp., P.O. Box 490, Roxboro, N.C. 27573
Star Iron & Steel Co., 326 Alexander Ave., Tacoma, Wash. 98421
CONTAINER LASHINGS & COMPONENTS
American Engineered Products, P.O. Box 74 Nichol Ave., McKees Rock, Pa. 15136
W. W. Patterson Co., 830 Brocket St., Pittsburgh, Pa. 15233
CONTROL SYSTEMS
Frederick Cowan & Co., Inc., 120 Terminal Drive, Plainview, L.I. New York 11803
Galbraith-Pilot Marine Corp., 600 Fourth Ave., Brooklyn, N.Y. 11215
Henschel Corporation, 14 Cedar St., Amesbury, Mass. 01913
Sperry Marine Systems Div., Charlottesville, Va., 22901, Division of Sperry Rand Corp.
WABCO Fluid Power Division, 1953 Mercer Road, Lexington, Kentucky 40505
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Ameron Corrosion Control Div., Brea, Calif. 92621
Carboline Co., 328 Hanley Industrial Court, St. Louis, Mo. 63144
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Houston Systems Mfg. Co., P.O. Box 14551, Houston, Texas 77021
M.A.N. Maschinenfabrik Augsburg-Nurnberg AG, Werk Augsburg, West Germany
Paceco, Div. Fruehauf Corp., 2350 Blanding Ave., Alameda, Calif. 94501
Star Iron & Steel Co., 326 Alexander Ave., Tacoma, Wash. 98401
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Mark Products, Inc., 10507 Kinghurst Dr., Houston, Texas 77072
Trans-Sonics, Inc., P.O. Box 326, Lexington, Mass. 02173
DECK COVERS (METAL)
Marine Moisture Control Co., 449 Sheridan Blvd., Inwood, N.Y. 11696
Mechanical Marine Co., 900 Fairmount Ave., Elizabeth, N.J. 07027
DECK MACHINERY
Appleton Machine Co., P.O. Box 2265, Iron Mountain, Mich. 49801.
ASEA Marine, Rep. in U.S.A. by Stal-Laval, Inc., 400 Executive Blvd., Elmsford, N.Y. 10523
Markey Machinery Co., Inc., 79 S. Horton St., Seattle, Wash. 98134
A. G. Weser, Seebeckwerft, 2850 Bremerhaven 1, Germany
DIESEL ACCESSORIES
A.G. Schoonmaker, Box 757, Sausalito, Calif. 95965
DIESEL ENGINES
Bruce GM Diesel, Inc., 180 Route #17 S. at Interstate 80, Lodi, N.J. 07644
Caterpillar Tractor Co., Industrial Div., 100 N.E. Adams St., Peoria, Ill. 61602
Colt Industries Inc., Power Systems Div., Beloit, Wisc. 53511
De Laval Turbine Inc., Engine & Compressor Div., 550 85th Ave., Oakland, Calif. 94621
Electro-Motive Division General Motors, La Grange, Illinois 60525
M.A.N. Maschinenfabrik Augsburg-Nurnberg AG, Werk Augsburg, West Germany.
H.O. Penn Machinery Co., Inc., 1561 Stewart Ave., Westbury, N.Y. 11590
Sulzer Brothers, Ltd., Winterthur, Switzerland
Waukesha Motor Co., 1000 W. St. Paul Ave., Waukesha, Wis. 53186
DIESEL ENGINE MUFFLERS
Marine Products & Engrg. Co., 20 Vesey St., New York, N.Y. 10007
DOCK BUILDERS
GHH Sterkrade Ferrostaal Overseas Corp., 17 Battery Place, New York, N.Y. 10004
DOORS—Watertight—Bulkhead
Overbeke-Kain Co., 20905 Aurora Rd., Cleveland, Ohio 44146
Walz & Krenzer, Inc., 20 Vesey St., New York, N.Y. 10007
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Arnessen Electric Co., Inc., 335 Bond St., Brooklyn, N.Y.
Galbraith-Pilot Marine Corp., 166 National Rd., Edison, N.J. 08817
Harvard Murlin Div., P.O. Box 302, Quakertown, Pa. 18951
Merrin Electric, 162 Chambers St., New York, N.Y. 10007
Oceanic Electrical Mfg. Co., Inc., 159 Perry Street, N.Y. 10014
EVAPORATORS
Aqua-Chem, Inc., Water Technologies Div., Box 421, Milwaukee, Wis. 53201.
Bethlehem Steel Corp., Shipbuilding, 25 B'way, N.Y., N.Y. 10004
Riley-Beaird, Inc., Maxim Evaporator Profit Center, P.O. Box 1115, Shreveport, Louisiana 71130
FAIRLEADS
Appleton Machine Co., P.O. Box 2265, Iron Mountain, Mich. 49801.
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BJ Marine Products, subsidiary of Borg-Warner, P.O. Box 2709, Terminal Annex, Los Angeles, Calif. 90054
Hughes Bros., Inc., 17 Battery Place, New York, N.Y. 10004
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Robvon Backing Ring Co., 675 Garden St., Elizabeth, N.J. 07207
FLOATING EQUIPMENT—Steel—Aluminum Pontoons
Dravo Corporation, Neville Island, Pittsburgh 25, Pa.
GAS ALARM SYSTEMS
Riken Keiki Fine Instrument Co., Ltd., 2-7-6 Azusawa Itabashi-ku, Tokyo, Japan
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Way-Wolff Associates, Inc., 45-10 Vernon Blvd., Long Island City, N.Y. 11101
INSULATION—Marine
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Snelson Oilfield Lighting Co., P.O. Box 1284, Fort Worth, Texas 76101
LNG SHIP DESIGN AND LICENSING
PDM/GAZ Transport, 919 Third Ave., New York, N.Y. 10022
LNG TANKAGE
Gazocean U.S.A. Inc., 125 High St., Boston, Mass. 02110
Pittsburgh-Des Moines Steel Co., Neville Island, Pittsburgh, Pa. 15225
LININGS
Ameron Corrosion Control Div., Brea, Calif. 92621
Carboline Co., 328 Hanley Industrial Court, St. Louis, Mo. 63144
MARINE BLOCKS & RIGGING
Crosby Group, Box 3128, Tulsa, Okla. 74101
MARINE DRIVES—GEARS
Hoffert-Lowe, Inc., 108 Ridge Road, North Arlington, N.J. 07032
Philadelphia Gear Corp., Schuylkill Expressway, King of Prussia, Pa. 19406
MARINE EQUIPMENT
Comet Marine Supply Corp., 157 Perry St., New York, N.Y. 10014
Homelite Corporation, 70 Riverdale Ave., Port Chester, N.Y. 10573
ITT Henze Service, P.O. Box 1745, Mobile, Ala. 36610
Kearfott Marine Products, 780 South 3rd Ave., Mt. Vernon, N.Y. 10550
Nicolai Joffe Corp., P.O. Box 2445, 445 Littlefield Ave., So. San Francisco, Calif. 94080
Merrin Electric, 162 Chambers St., New York, N.Y. 10007
Metritape, Inc., 77 Commonwealth Ave., West Concord, Mass. 01742
Stow Mfg. Co., 225 Shear St., Binghamton, N.Y. 13902
Vokes Filter Div., (Cardwell Machine Co.), Cardwell and Castlewood Rd., Richmond, Va. 23221
Waukesha Bearings Corp., P.O. Box 798, Waukesha, Wis. 53186
MARINE FURNITURE
Bailey Joiner Co., 115 King Street, Brooklyn, N.Y. 11231
MARINE INSURANCE
Adams & Porter, 1819 St. James Place, Houston, Texas 77027
Midland Insurance Co., One State St. Plaza, New York, N.Y. 10004
R.B. Jones Corp., 301 West 11th St., Kansas City, Mo. 64105
MARINE PROPULSION
Babcock & Wilcox Co., 161 East 42nd Street, New York, N.Y. 10017
Combustion Engineering, Inc., Windsor, Connecticut 06095
Jacuzzi Bros., Inc., 11511 New Benton Highway, Little Rock, Ark. 72204
Murray & Tregurtha, Inc., 2 Hancock St., Quincy, Mass. 02171
Port Electric Turbine Div., 155-157 Perry St., New York, N.Y. 10014
Stal-Laval, Inc., 400 Executive Blvd., Elmsford, N.Y. 10523
Tech Systems, Inc., 405 Watertown Rd., Thomaston, Conn. 06787
Turbo Power & Marine Systems, Subsidiary of United Aircraft Corp., 1690 New Britain Ave., Farmington, Conn. 06032
MARINE SURVEYORS
Schmahl and Schmahl, Inc., 1209 S.E. Third Ave., Fort Lauderdale, Fla. 33316
MARITIME FINANCING—Leasing
General Electric Credit Corp., 4 Corporate Drive, White Plains, N.Y. 10604
Rhode Island Hospital Trust National Bank, 15 Westminster Street, Providence, R.I. 02903
NAVAL ARCHITECTS AND MARINE ENGINEERS
J. L. Bludworth, 4030 Wynne St., Houston, Texas
Breit Engrg. Inc., 441 Gravier St., New Orleans, La. 70130
James G. Bronson Associates, 166 Altamont Ave., Tarrytown, N.Y. 10591
Childs Engineering Corp., Box 333, Medfield, Mass. 02052
Coast Engineering Co., 711 W. 21st St., Norfolk, Va. 23517
Crandall Dry Dock Engrs., Inc., 238 Main St., Cambridge, Mass. 02142
Francis B. Crocco, Inc., Box 1411, San Juan, Puerto Rico
C.R. Cushing & Co., Inc., One World Trade Center, New York, N.Y. 10048
Arthur D. Darden, Inc., 1040 International Trade Mart, New Orleans, La. 70130
Design Associates, Inc., 3308 Tulane Ave., New Orleans, La. 70119
Designers & Planners, Inc., 114 Fifth Ave., New York, N.Y. 10011
M. Mack Earle, 103 Mellor Ave., Baltimore, Md. 21228
Christopher J. Foster, 14 Vanderventer Ave., Port Washington, N.Y. 11050
Friede and Goldman, Inc., 225 Baronne St., New Orleans, La. 70112
Gibbs & Cox, Inc., 40 Rector Street, New York, N.Y. 10006
John W. Gilbert Associates, Inc., 58 Commercial Wharf, Boston, Mass. 02110
Morris Gurainick, Associates, Inc., 583 Market St., San Francisco, Calif. 94105
J. J. Henry Co., Inc., 90 West St., New York, 10006
Hydranautics, 6338 Lindmar Dr., P.O. Box 1068, Goleta, Calif. 93017
C.T. Ilariucci & Associates, Tourism Pier #3, San Juan, P.R. 00902
Jantzen Engineering Co., 15 Charles Plaza, Baltimore, Md. 21201
James S. Krogen, 2500 S. Dixie Hwy., Miami, Fla. 33133
Littleton Research and Engrg. Corp., 95 Russell St., Littleton, Mass. 01460
Robert H. Macy, P.O. Box 758, Pascagoula, Miss. 39567
Marine Consultants & Designers, Inc., 308 Investment Insurance Bldg., Corner E. 6th St. & Rockwell Ave., Cleveland, Ohio 44114
Marine Design Inc., 1180 Ave. of Americas, N.Y., N.Y. 10036
Marine Design Associates, P.O. Box 2674, Palm Beach, Florida
Rudolph F. Matzer & Associates, Inc., 13891 Atlantic Blvd., Jacksonville, Fla. 32225
John J. McMullen Associates, Inc., 1 World Trade Center, New York, N.Y. 10048
George E. Meese, 194 Acton Rd., Annapolis, Md. 21403
Metritape, Inc., 77 Commonwealth Ave., West Concord, Mass. 01742
Robert Moore Corp., 350 Main St., Port Washington, N.Y. 11050
Nickum & Spaulding Associates, Inc., 71 Columbia St., Seattle, Wash. 98104
Ocean-Oil International Engrg. Corp., P.O. Box 6173, New Orleans, La. 70114
Pearlson Engineering Co., Inc., 8970 S.W. 87th Ct., Miami, Florida 33156
S.L. Petchul, Inc., 8-D So. New River Drive East, Ft. Lauderdale, Fla. 33301
Potter & McArthur, Inc., 253 Northern Ave., Boston, Mass.
M. Rosenblatt & Son, Inc., 350 Broadway, New York, N.Y. 10013 and 657 Mission St., San Francisco, Calif.
George G. Sharp, Inc., 100 Church St., New York, N.Y. 10007
T. W. Spaetgens, 156 West 8th Ave., Vancouver 10, Canada
R. A. Stearn, Inc., 100 Iowa St., Sturgeon Bay, Wisc. 54235
Richard R. Taubler, 50 Court St., Brooklyn, N.Y. 11201
H. M. Tiedemann & Co., Inc., 74 Trinity Pl., New York, N.Y. 10006
Whitman, Requardt & Associates, 1304 St. Paul St., Baltimore, Md. 21202
Yankee Shipwrights, P.O. Box 35251, Minneapolis, Minn. 55435
NAVIGATION & COMMUNICATIONS EQUIPMENT
American Hydromoth Co., 55 Brixton Rd., Garden City, N.Y. 11530
Edo Western Corporation, 2645 South 2nd West, Salt Lake City, Utah 84115
ELCO Corp./Safecraft Division, Maryland Road & Computer Ave., Willow Grove, Pa. 19090
Electro-Nav, Inc., 501 Fifth Ave., New York, N.Y. 10017
F&M Systems Co., P.O. Box 20778, 2525 Walnut Hill Lane, Dallas, Texas 75220
Henschel Corp., 14 Cedar St., Amesbury, Mass. 01913
Hose McCann Telephone Co., Inc., 524 W. 23rd St., N.Y. 10011
ITT Decca Marine, Inc., 386 Park Ave. South, New York, N.Y. 10016
ITT Mackay Marine, 2912 Wake Forest Road, Raleigh, N.C. 27611
Lorain Electronics Corp., 2307 Leavitt Road, Lorain, Ohio 44052
Magnavox Navigation Systems, 2829 Maricopa St., Torrance, Cal. 90503

National Marine Service, 1750 So. Brentwood Blvd., St. Louis, Mo.
Radiomarine Corp., 20 Bridge Avenue, Red Bank, N.J. 07701
Raytheon Co. Marine Products, 676 Island Pond Rd., Manchester, N.H. 03103
Raytheon Co., Submarine Signal Div., P.O. Box 360, Portsmouth, R.I. 02871
Sperry Marine Systems Div., Charlottesville, Va. 22901, Division of Sperry Rand Corp.
Standard Communications Corp., 639 N. Marine Ave., Wilmington, Calif. 90744
Teledyne Hastings Raydist, P.O. Box 1275, Hampton, Va. 23361
Tracor, Inc., 6500 Tracor Lane, Austin, Texas 78721
The Waterways Co., 3512 Metairie Hts. Rd., New Orleans, La. 70002

OILS—Marine—Additives
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Gulf Oil Trading Co., 1290 Ave. of Americas, New York, N.Y. 10019
Shell Oil Co., 1 Shell Plaza, Houston, Texas 77002
Texaco, Inc., 135 E. 42nd St., New York, N.Y. 10017

PAINT—Marine—Protective Coatings
Ameron Corrosion Control Div., Brea, Calif. 92621
Carboline Co., 328 Hanley Industrial Court, St. Louis, Mo. 63144
Devoe & Raynolds Co., Inc., Subsidiary Celanese Coatings Co., 414 Wilson Ave., Newark, N.J. 07105
International Paint Co., 21 West St., New York, N.Y. 10006
Patterson-Sargent, P.O. Box 494, New Brunswick, N. J.
Transocean Marine Paint Association, P.O. Box 456, Delftseplain 37, Rotterdam, Holland

PETROLEUM SUPPLIES
Independent Petroleum Supply Co., 1345 Ave. of Americas, New York, N.Y. 10019
Shell Oil Co., 1 Shell Plaza, Houston, Texas 77002
Texaco, Inc., 135 E. 42nd St., New York, N.Y. 10017
The West Indies Oil Co., Ltd., St. John's, Antigua, W. I.

PIPE—Cargo Oil
Kubota, Ltd., 22, Funade-cho 2-chome, Naniwa-Ku, Osaka, Japan

PLASTICS—Marine Applications
Ameron Corrosion Control Div., Brea, Calif. 92621
Hubeva Marine Plastics, Inc., 390 Hamilton Ave., Bklyn, N.Y. 11231
Philadelphia Resins Co., 20 Commerce Dr., Montgomeryville, Pa. 18936

PORTS
Port of Galveston, P.O. Box 328, Galveston, Texas
Jacksonville Port Authority, 2701 Talleyrand Ave., Jacksonville, Fla.

PROPELLERS: NEW AND RECONDITIONED
Avondale Shipyards, Inc., P.O. Box 52080, New Orleans La. 70150
Coolidge Propellers, 1601 Fairview Ave. East, Seattle, Wash. 98102
Escher Wyss Gmbh, P.O. Box 798, Ravensburg, Germany
Federal Propellers, 1501 Buchanan Ave. S.W., Grand Rapids, Mich. 49502

PUMPS
Colt Industries, Inc., Fairbanks Morse Pump & Electric Div., 3601 Kansas Ave., Kansas City, Kansas 66110
Goulds Pumps, Seneca Falls, N.Y. 13148
Houttuin-Pompen N. V. Sophialaan 4, Utrecht, Holland
Jacuzzi Bros., Inc., 11511 New Benton Highway, Little Rock, Arkansas 72204

RATCHETS
W. W. Patterson Co., 830 Brocket St., Pittsburgh, Pa. 15233

REFRIGERATION—Refrigerant Valves
Bailey Refrigeration Co., Inc., 74 Sullivan St., Brooklyn, N.Y. 11231

ROPE—Manila—Nylon—Hawsers—Wire
American Mfg. Co., Inc., Noble & West Sts., Brooklyn, N.Y. 11222
Du Pont Co., Room 31H1, Wilmington, Delaware 19898
Jackson Rope Corp., 9th & Oley, Reading, Pa. 19604
Wall Rope Works, Inc., Beverly, N. J. 08010

RUDDER ANGLE INDICATORS
Galbraith-Pilot Marine Corp., 600 Fourth Ave., Brooklyn, N.Y. 11215
Henschel Corp., 14 Cedar St., Amesbury, Mass. 01913
Hose McCann Telephone Co., Inc., 524 W. 23rd St., N.Y. 10011
Sperry Marine Systems Div., Charlottesville, Va., 22901, Division of Sperry Rand Corp.

SANDBLASTING EQUIPMENT
Pauli & Griffin Co., 826 Folsom St., San Francisco, Calif. 94107

SCAFFOLD BOARDS
Howmet Corporaton, Southern Extrusions Division, P.O. Box 40, Magnolia, Arkansas 71753

SEWAGE DISPOSAL
Babcock & Wilcox Co., 161 East 42nd Street, New York, N.Y. 10017
Jered Industries, Inc., 1300 S. Coolidge Rd., Birmingham, Mich. 48008
Koehler-Dayton, Inc., P.O. Box 309, New Britain, Conn. 06050
LaMere Industries, Inc., 277 N. Main Street, Walworth, Wis. 53184

SHAFT REVOLUTION INDICATOR EQUIP.
Electric Tachometer Corp., 68th & Upland Sts., Phila., Pa. 19142
Henschel Corp., 14 Cedar St., Amesbury, Mass. 01913

SHIPBOARD VENTILATION
Coppus Engineering Corp., P.O. Box 457, Worcester, Mass. 01613
TANK S.A.P.P. Inc., 330 Madison Avenue, New York, N.Y. 10017 and 1020 Springfield Avenue, Mountainside, N.J. 07092

SHIPBREAKING—Salvage
The Boston Metals Co., 313 E. Baltimore St., Baltimore, Md. 21202
National Metal & Steel Corp., 1251 New Dock St., Terminal Island, Cal. 90731
Zidell Explorations, Inc., 3121 S. W. Moody St., Portland, Ore. 97201

SHIP BROKERS
Agemar, P.O. Box 1465, Maracaibo, Venezuela
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

SHIPBUILDING STEEL
Armco Steel Corp., 703 Curtis St., Middletown, Ohio 45042
Bethlehem Steel Corp., 25 Broadway, New York, N.Y. 10004
Huntington Alloy Products, Div. International Nickel Co., Inc., Huntington, W. Va. 25720
International Nickel Co., 1 New York Plaza, New York, N.Y. 10004

SHIPBUILDING—Repairs, Maintenance, Drydocking
Astilleros Espanoles, S.A. Zurbano, 70, Madrid 10, Spain
Avondale Shipyards, Inc., P.O. Box 52080, New Orleans La. 70150
Barbour Boat Works, Inc., P.O. Box 1069, New Bern, N.C.
Beliard, Crighton & Cie, P.O. Box 2074, Route des Docks, 59, Dunkirk, France
Bellard Murdoch S. A., Kattendijkdok Westkaai 21, Antwerp, Belgium
Bertram Marine, Division of Whittaker, 3663 N.W. 21 Street, Miami, Fla. 33142.
Bethlehem Steel Corp., Shipbuilding, 25 Broadway, N.Y., N.Y. 10004
Bludworth Shipyard, Inc., Box 5426, Cypress St., Brady Island, Houston, Texas 77012
Carrington Slipways Pty. Ltd., Tomago, N.S.W. 2322, Australia
Conrad Industries, P.O. Box 790, Morgan City, La. 70380
Curacao Drydock, Inc., P.O. Box 153, Willemstad, Curacao, N.A.
Devcon Corporation, Endicott Street, Danvers, Mass. 01923
Dillingham Shipyard, Pier 41, P.O. Box 3288, Honolulu, Hawaii 96801
Dravo Corporation, Neville Island, Pittsburgh 25, Pa.
Empressa Nacional Bazan, 65 Castellana, Madrid 1, Spain
Equipment Systems, Inc., A Microdot Co., P.O. Box 95, Port Deposit, Md. 21904
Equitable Equipment Co., Inc., P.O. Box 8001, New Orleans, La. 70122
General Dynamics, Electric Boat Division, 99M Eastern Point Road, Groton, Conn. 06340
General Dynamics, Quincy Division, Quincy, Mass. 02169
Halter Marine Services, Inc., Route 6, Box 287H, New Orleans, La. 70126
Havre de Grace, Havre de Grace, Md.
Hillman Barge & Construction Co., Grant Bldg., Pittsburgh 19, Pa.
Hongkong & Whampoa Dock Co. Ltd., Kowloon Docks, Hong Kong
Ishikawajima-Harima Heavy Industries Co., Ltd., 15 William St., New York, N.Y. 10005
Jacksonville Shipyards, 644 E. Bay St., Jacksonville, Fla. 32203
Jeffboat, Inc., Jeffersonville, Ind. 47130
Kawasaki Dockyard Co., 8 Kaigon-dori, Ikuta-ku, Kobe, Japan
Keiso Marine, Inc., P.O. Box 268, Galveston, Texas 77550
Keppel Shipyard (Private) Ltd., P.O. Box 2169, Singapore
Kockums Malmo, Fack, Malmo, Sweden
Litton Industries, 9920 W. Jefferson Blvd., Culver City, Calif. 90230
Lockheed Shipbuilding and Construction Co., 2929 16th Avenue, S.W., Seattle, Wash. 98134
Marathon Manufacturing Company
Marathon LeTourneau Offshore Company, 1700 Marathon Building, 600 Jefferson, Houston, Texas 77002
Marathon LeTourneau Gulf Marine Division, P.O. Box 3189, Brownsville, Texas 78520
Marathon LeTourneau Marine Division, LeTourneau Rural Station, Vicksburg, Mississippi 39180
Marathon LeTourneau Offshore Pte., Ltd., P.O. Box 83, Taman Jurong Post Office, Singapore 22, Singapore
Marathon Shipbuilding Company, P.O. Box 870, Vicksburg, Miss. 39180
Marathon Shipbuilding Company (U.K.) Ltd., Clydebank Bunbartonshire, G81-1YB, Scotland
Marine & Rail Equipment Division/FMC Corp., 4700 N.W. Front Ave., Portland, Oregon 97208
Maryland Shipbuilding & Drydock, P.O. Box 537, Baltimore, Md. 21203
Matton Shipyard Co., Inc., P.O. Box 428, Cohoes, New York 12047
Mitsui Shipbuilding & Engrg. Co. Ltd., 6-4, Tsukiji 5-chome, Chuo-ku, Tokyo, Japan
Mitsubishi Heavy Industries, Ltd., 5-1 Marunouchi 2-chome, Chiyoda-ku, Tokyo, Japan
Monark Boat Co., P.O. Box 210, Monticello, Ark. 71655
National Steel & Shipbuilding Corp., San Diego, Calif. 92112
Newport News Shipbuilding and Dry Dock Co., Newport News, Va.
Newport Ship Yard, Inc., 379 Thames St., Newport, R.I. 02840.
Northwest Marine Iron Works., P.O. Box 3109, Swan Island, Portland, Oregon 97208
Nuclear Service & Construction Co., Inc., 9296 Warwick Blvd., Newport News, Va. 23607
O.A.R.N. (officine Allestimento e Riparazioni Navi) Genoa, Italy
Odense Steel Shipyard Ltd., P.O. Box 176, DK-5100 Odense, Denmark
Paceco, Div. Fruehauf Corp., 2350 Blanding Ave., Alameda, Calif. 94501
Pearlson Engineering Co., P.O. Box 8, Kendall Branch, Miami, Fla. 33156
Perth Amboy Dry Dock Co., Perth Amboy, N.J. 08862
St. Louis Shipbuilding—Federal Barge, Inc., 611 East Marceau, St. Louis, Mo. 63111
Sasebo Heavy Industries Co., Ltd., New Ohtemachi Bldg., Chiyoda-ku, Tokyo, Japan
Savannah Machine & Shipyard Co., P.O. Box 787, Savannah, Ga. 31402
Sembawang Shipyard (Pte) Ltd., P.O. Box 3, Sembawang, P.O. Singapore, 27
Slocum Iron Works, Inc., P.O. Box 2506, 1752 Telegraph Road, Mobile, Ala. 36601
Sumitomo Shipbuilding & Machy. Co., Ltd. 2-1 Ohtemachi 2-chome, Chiyoda-ku, Tokyo, Japan
Swedish Shipbuilding Association, Fack S-402 70, Gothenburg 8, Sweden
Teledyne Sewart Seacraft, P.O. Box 108, Berwick, La. 70342
Todd Shipyards Corp., 1 State St. Plaza, New York, N.Y. 10004
Tracor/Mas, Inc., P.O. Box 13107, Port Everglades, Fla. 33316
Vancouver Shipyards Co., Ltd., 50 Pemberton Ave., North Vancouver, B. C., Canada

SHIP MODEL BASIN
Hydronautics, Incorporated, Laurel, Maryland 20810

SHIP ROUTING
Weather Routing, Inc., 90 Broad Street, New York, N.Y. 10004

SHIP STABILIZERS
Jered Industries, Inc., 1300 S. Coolidge Rd., Birmingham, Mich. 48008
John J. McMullen Associates, Inc., 1 World Trade Center, New York, N.Y. 10048
Sperry Marine Systems Div., Charlottesville, Va. 22901, Division of Sperry Rand Corp.

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Babcock & Wilcox Co., 161 East 42nd Street, New York, N.Y. 10017
Combustion Engineering, Inc., Windsor, Connecticut 06095

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Wm. E. Hough Co., 1125 P N.W. 45th St., Seattle, Wash. 98107

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James Hughes, Inc., 17 Battery Pl., New York, N.Y. 10004
Interstate Oil Transport Co., 214 Transportation Center, Six Penn Center Plaza, Philadelphia, Pa. 19103
McAllister Bros., Inc., 17 Battery Pl., New York, N.Y. 10004
McDonough Marine Service, P.O. Box 26206, New Orleans, La.
Moran Towing & Transportation Co., Inc., One World Trade Center, Suite 5335, New York, N.Y. 10048
Puerto Rico Lighterage Co., P.O. Box 1072, San Juan, P.R. 00902
L. Smit & Co., 11 Broadway, New York, N.Y. 10004
State Boat Corporation, 3701 Kirby Drive, Houston, Texas 77006
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Mechanical Marine Co., 900 Fairmount Ave., Elizabeth, N.J. 07027

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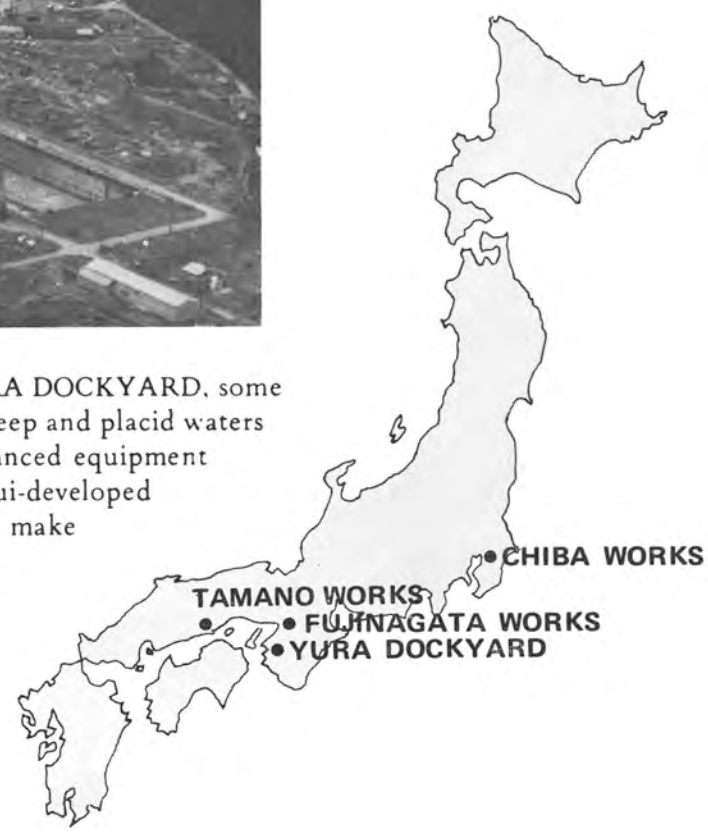

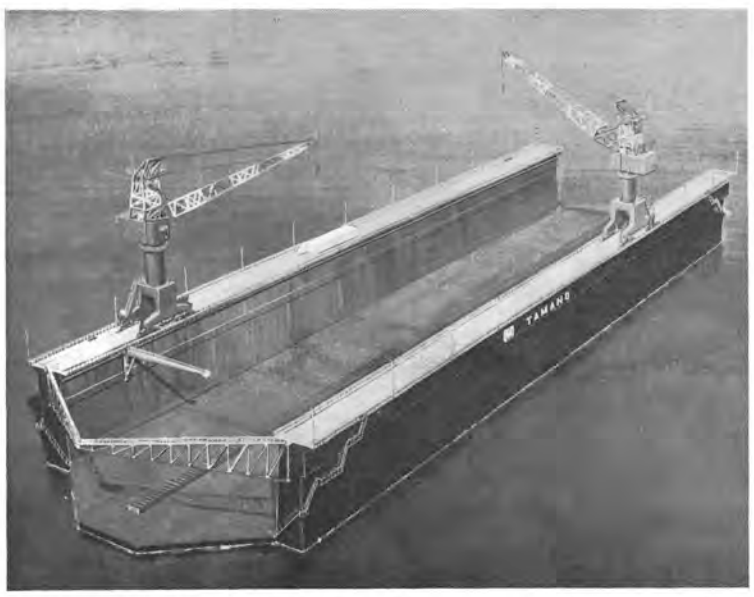

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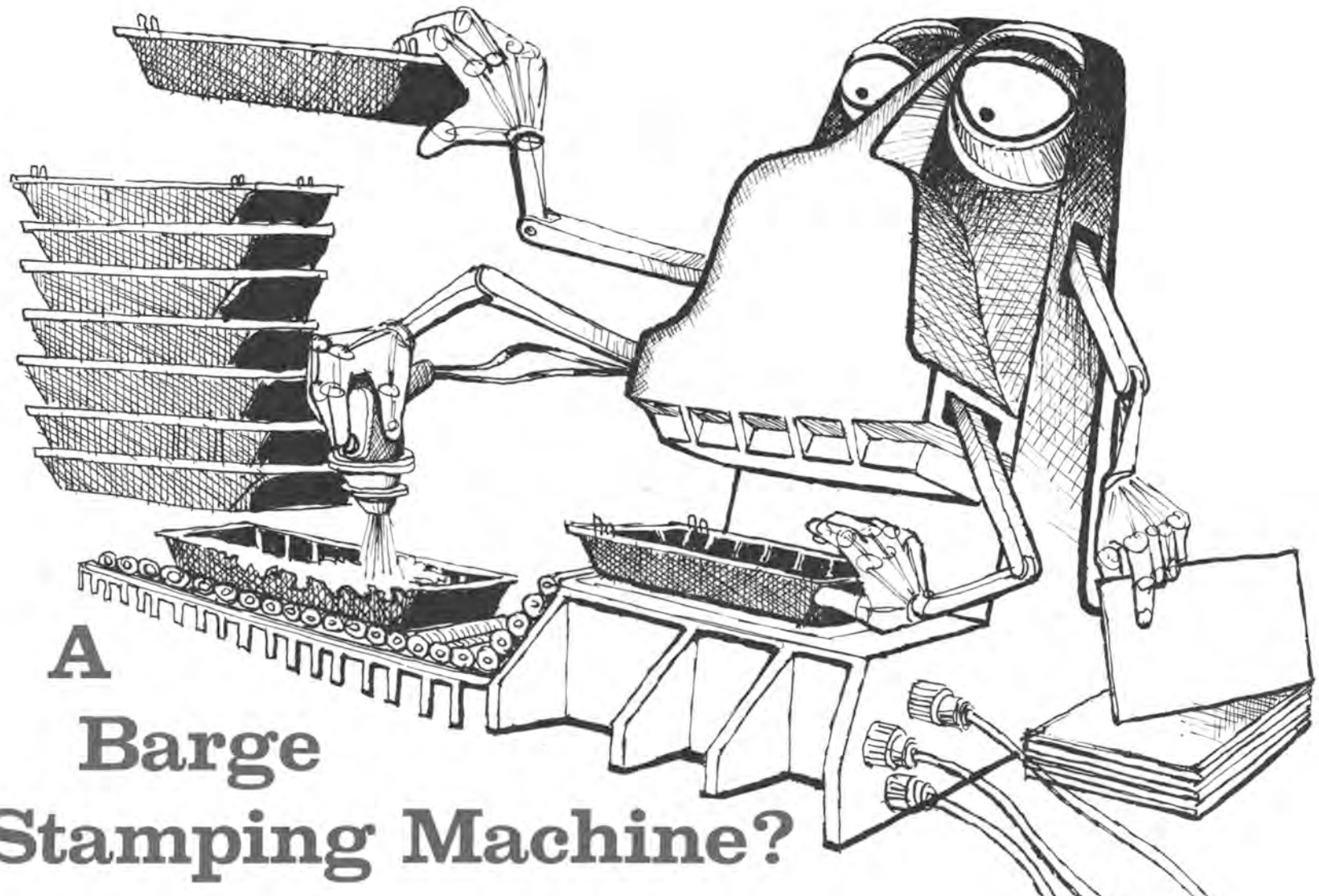

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