

# MARITIME REPORTER AND ENGINEERING NEWS



**Grain In Five Deck-Mounted Tanks  
Transported In Oceangoing Service  
Using One PAC Barge And Tug**

(SEE PAGE 6)

**DECEMBER 1, 1971**

## Around the world with a tin clock.

Joshua Slocum was unwilling to pay the fifteen dollars to have his chronometer cleaned and calibrated. So instead he used his dollar "tin clock" and navigated with it for the next three years.

Even today, not that many people sail alone around the world. When Joshua Slocum left Boston in April 1895, it had never been done.

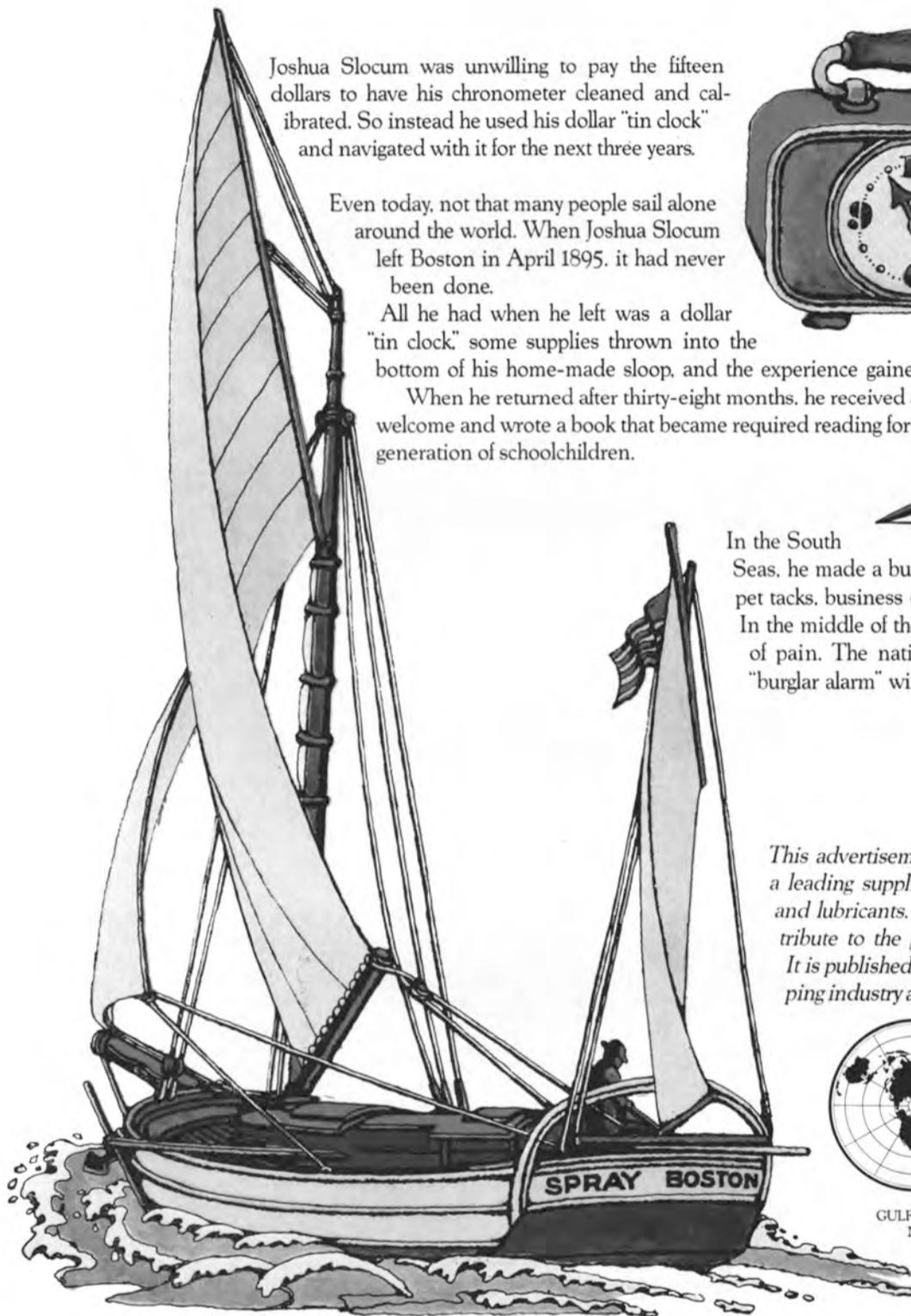
All he had when he left was a dollar "tin clock," some supplies thrown into the bottom of his home-made sloop, and the experience gained from forty years at sea.

When he returned after thirty-eight months, he received a hero's welcome and wrote a book that became required reading for a whole generation of schoolchildren.



In the South Seas, he made a burglar alarm by placing carpet tacks, business end up, around the deck. In the middle of the night, there were shrieks of pain. The natives had stepped on the "burglar alarm" with their bare feet.

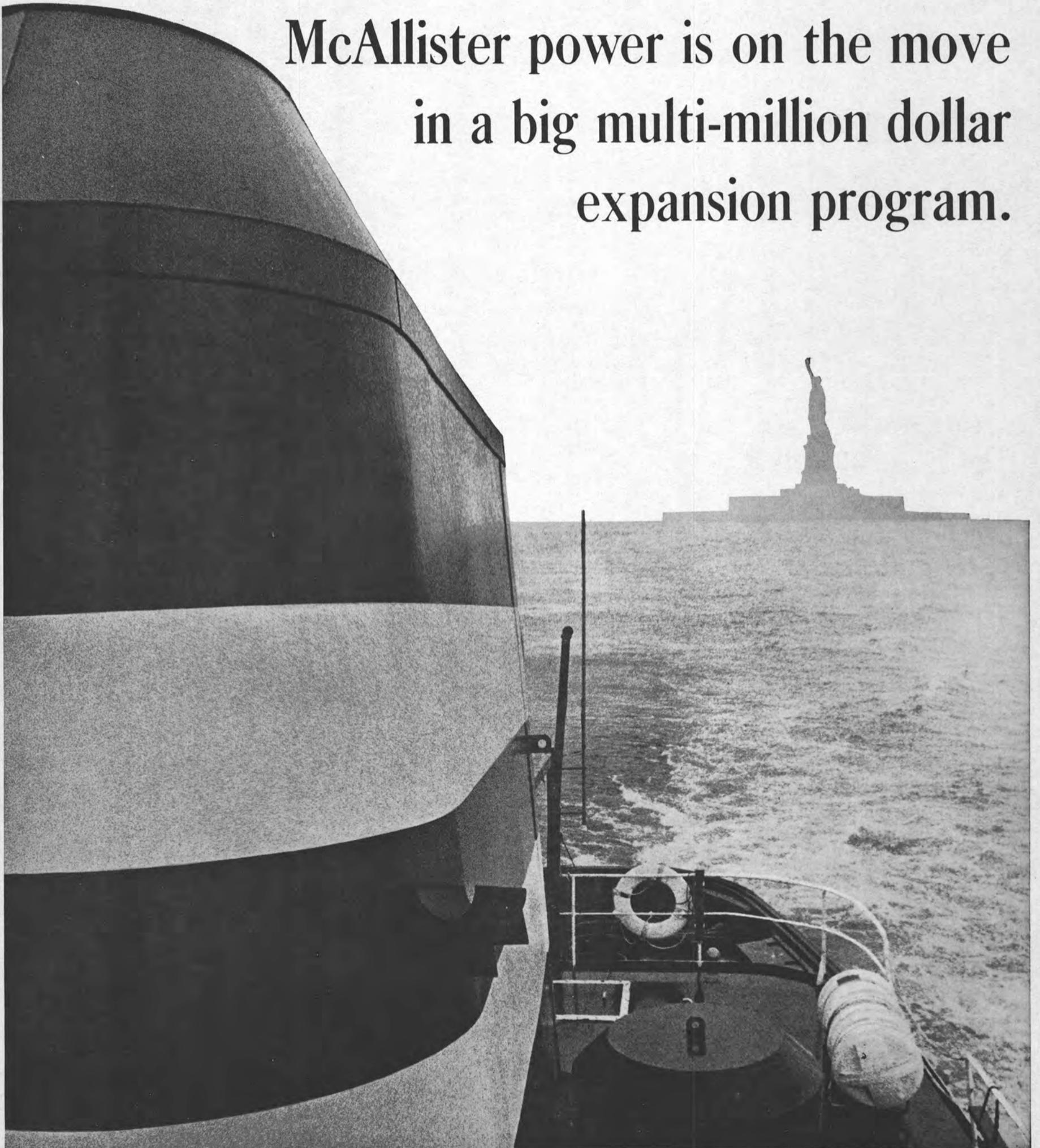
*This advertisement, prepared by Gulf Oil, a leading supplier of quality marine fuels and lubricants, is one of a series paying tribute to the great explorers of the sea. It is published in the interest of the shipping industry and those associated with it.*



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### St. Louis Ship To Build 2,650-hp Towboat For O.F. Shearer & Sons

St. Louis Ship, a division of Pott Industries, Inc., St. Louis, Mo., announced that it had received an order for one 2,650-hp towboat from O.F. Shearer & Sons, Cedar Grove, W. Va.

The Hydrodyne-type hull will measure 126 feet by 30 feet by 11 feet and will be powered by one GM 16-645E5 diesel engine. The towboat, to be named the James K. Ellis, will be a duplicate of the St. Louis Ship-built M/V Winchester, which has been so successful since joining O.F. Shearer & Sons' fleet in September 1970. The new vessel will be delivered in May 1972.

### Equitable To Build Twin-Screw Tug For Barbados, W.I.

Equitable Equipment Company, Inc., was awarded a contract to build a 95-foot twin-screw ABS oceangoing tug for the Port Department of the Government of Barbados, West Indies.

Principal dimensions are 95-feet 6-inches in length, a 28-foot 2½-inch beam, and a 13-foot 1⅞-inch depth at midship. Propulsion units will be two Caterpillar D-398 diesels having a total continuous duty rating of 1,700 horsepower.

Equitable Equipment Company, Inc., is one of the world's largest builders of tugs, offshore crew boats, and supply vessels and barges. Equitable is located on New Orleans' Industrial Canal at France Road and Chef Menteur Highway and has a second shipyard in Madisonville, La.

### Valad Electric Receives Contract For LHA Equipment

Valad Electric Heating Corp., 71 Courtland Street, Tarrytown, N.Y. 10591, has received its largest dollar contract to date from Litton Ship Systems, Pascagoula, Miss., to build their electric ventilation duct heaters for the LHA Project. The current contract is for five ships with a possibility for a total of nine ships, pending Congressional Funding approval. Deliveries will extend throughout 1972 and 1973.

Valad Electric Heating Corp. is a manufacturer of a complete line of marine and industrial forced air and convection space heaters, vent duct heaters, galley equipment and in-process heating equipment for shipboard applications and shipyard use and maintenance.



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## Oceangoing Barge Transports Grain In Deck-Mounted Silos



The PAC tug Sioux pushed the huge barge 388 miles from Central Ferry, Wash., to Astoria, Ore. and then switched to hawser towing for the trip southward in the Pacific. Some trips will also be made to Hawaii under the charter.

One-barge one-tug grain shipments from the Upper Columbia and Snake Rivers directly to southern California recently became a reality.

The grain barge PAC 312-1, pushed by the PAC tug Sioux, left Western Farmers' elevator in Central Ferry, Wash., carrying the equivalent of 130 railroad box cars of barley stored in five huge deck-mounted grain tanks. It was pushed to Astoria, 388 miles and seven dams away, by the Sioux, which then switched to hawser towing at sea for the trip to Long Beach, Calif.

The highly specialized PAC tug and barge team is under charter to Western Farmers Association, according to **Dick Carlen**, manager of PAC's river division. Seventeen-day round-trip service between Central Ferry and southern California ports is contemplated. Some trips will also be made to Hawaii under the charter.

By 1976, after completion of Lower Granite Dam, the big barge will be able to move from the Pacific up the Columbia and Snake Rivers as far east as Lewiston, 57 miles upriver from Central Ferry.

Barge PAC 312-1 is the only grain barge on the Pacific Coast capable of loading to capacity with grain at upriver ports and moving directly to sea.

Launched in 1969, the barge was built by Gunderson, Inc., at Portland, Ore. It is 312

feet long and has a breadth of 68 feet. In preparation for its new role, it recently underwent modifications at the Guntert & Zimmerman yard at Stockton, Calif.

Added were five deck-mounted metal grain tanks, each 60 feet in diameter and 33 feet high. A single tank holds 1,300 tons, giving the barge total capacity of 6,500 tons and up to five varieties of grain. An 18-inch sweep auger is built into the tank.

Certified for unrestricted ocean service, the modified PAC 312-1 represents an investment of more than \$1 million, Mr. **Carlen** noted.

Teamed with the unusual barge, the Sioux is a unique shallow-draft oceangoing tug with river capabilities. It is equipped with twin screws and Kort nozzles and develops 3,000 horsepower. A high wheelhouse provides visibility during push towing, and six deck-mounted hydraulic winches provide tight control over the barge.

The Sioux was built for PAC by Martinac Shipbuilding, Tacoma, at a cost in excess of \$1 million. It was launched in 1970.

PAC is the trade name for Pacific Inland Navigation Company, Inc., and a number of wholly owned subsidiaries that provide cargo movement in the Pacific, Alaska and on the Columbia. Corporate headquarters are at Seattle. Columbia River operations are directed by Mr. **Carlen** from Vancouver, Wash.

## Bethlehem Singapore Receives First Drill Platform Contract



**J.O. Croke**, left, general manager of Bethlehem's Beaumont, Texas, shipyard, and **J.L. Steitle**, president of Teledyne Movable Offshore, Inc., signing the contract for the first drill rig to be built at Bethlehem's Singapore facility.

Bethlehem Singapore Private Ltd. has received a contract from Teledyne Movable Offshore, Inc., of Lafayette, La., to design and construct a self-elevating mobile offshore platform capable of drilling to a depth of 25,000 feet in as much as 250 feet of water. To operate in Southeast Asian waters, the rig is scheduled for completion in October 1972.

Announcement of the award was made by **J.O. Croke**, general manager of Bethlehem's Beaumont shipyard, which is the U.S. sales representative and engineering consultant for the Singapore yard.

The mat-supported platform, Movable Rig 16, is the first to be awarded to the Singapore yard since its completion a few months ago. A joint venture of Bethlehem Steel Corporation and the Development Bank of Singapore, the yard is on a 79-acre tract.

Movable Offshore, a Teledyne company, began operations in 1957 and now has two mobile drilling rigs and 10 platform drilling and work-over rigs. It recently opened offices in Singapore as part of an international expansion program.

The new shipyard specializes in the design and construction of mobile offshore drilling platforms and associated equipment and also builds supply boats, barges, storage units, dredges, and fixed platform equipment.



**DISTINGUISHED SERVICE CITATION:** **Ralph C. Christensen**, vice president of the American Bureau of Shipping, was the recent recipient of the American Legion Distinguished Service Medal and Citation. The award was made at the 31st annual Robert L. Hague Merchant Marine Industries Post Guard of Honor Dinner-Dance held at the Waldorf-Astoria Hotel, New York, N.Y., on November 6, 1971. Shown above are Mr. **Christensen** (left), Post Commander **John H. Ingraham**, engineering services representative for the Ameron Corrosion Control Division, and **Thurland T. Wilkinson** (right), general chairman of the Guard of Honor Dinner-Dance and vice president and general manager of Trinidad Corporation.

## Equitable To Build Two-Story All Welded Steel Offshore Quarters Unit For Humble Oil

Equitable Equipment Company, Inc., has been awarded a contract by Humble Oil & Refining Co. for the construction of a 42-foot by 42-foot two-story all welded steel offshore quarters unit with a 60-foot by 60-foot heliport for location in the Gulf of Mexico.

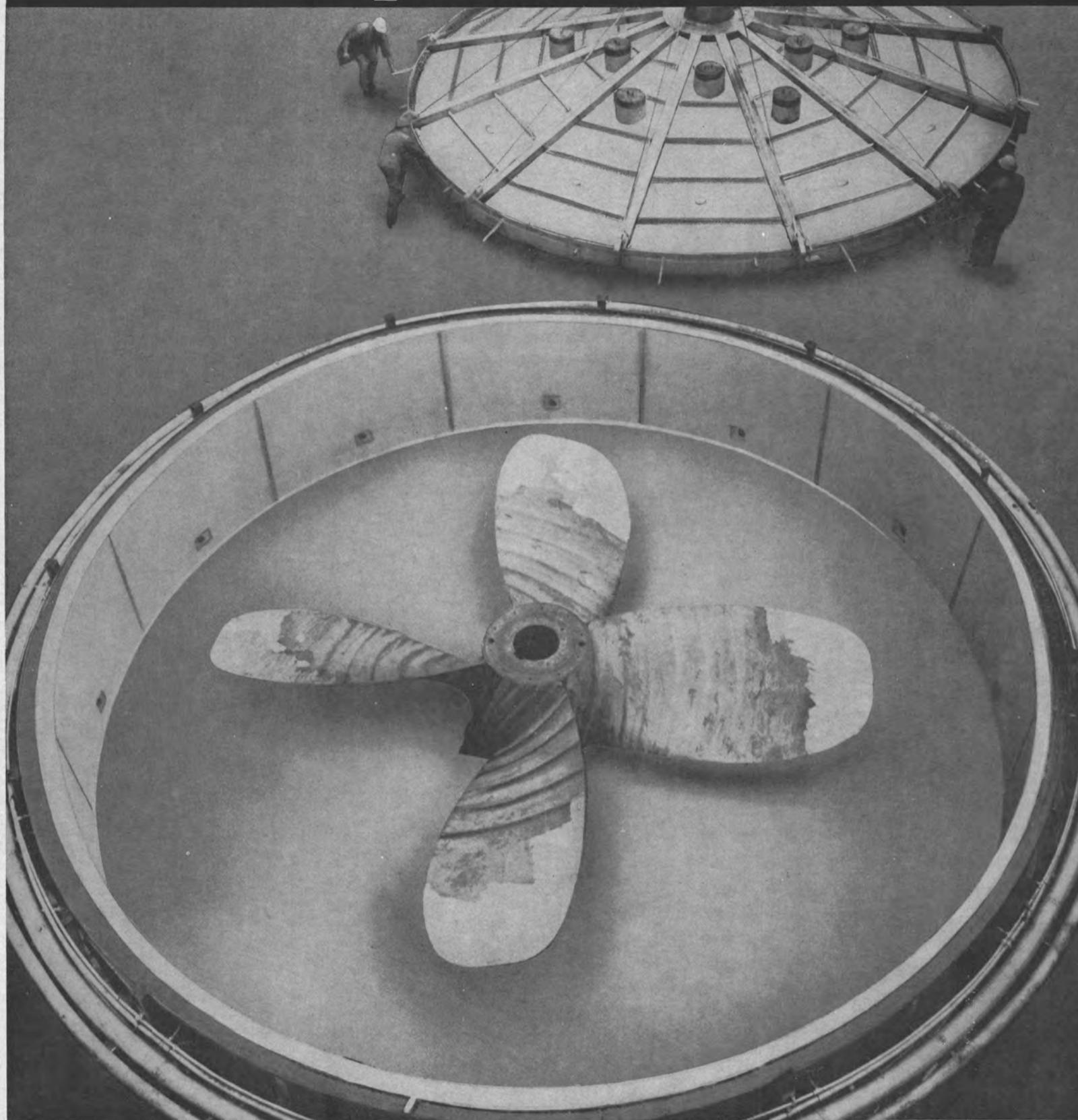
The quarters unit will be completely outfitted with a modern stainless steel electric galley. Mess hall and galley will be arranged for cafeteria-style feeding. It will be designed and outfitted with four-men staterooms, recreation facilities, two superintendents' offices and staterooms. The building will also contain a utility room for equipment. Additionally, the quarters unit will have a year-round air-conditioning system. The quarters building design will provide structural requirements for withstanding a 62.5 pound per square foot horizontal wind loading (125 m.p.h.) from any direction. The building will also be designed to meet the structural requirements of a 5,700 pound per square foot concentrated load on any square foot of the building's heliport deck area.

Equitable Equipment Company Incorporated's main office and yard are located at 4325 France Road, New Orleans, La. 70126.



**GET-TOGETHER:** The three senior captains of United States Lines enjoy a rare get-together at Newport News Shipbuilding where their containerships are berthed awaiting settlement of the East Coast longshoremen's strike. From the left in photo are Capt. **A.J. Knowlton** of the American Apollo; Capt. **B.J. Hickey**, skipper of the U.S. Lines' American Liberty; **T. Wilhelmsen**, United States Lines port engineer; Capt. **A.J. Alexanderson** of the American Legion, and **G.G. Via Jr.**, the Tenneco shipyard's manager of marketing for commercial ships. Although long-time friends, the skippers are usually a week behind each other on their regular voyages between East Coast Ports and the Far East.

# Avondale's own Superdome.

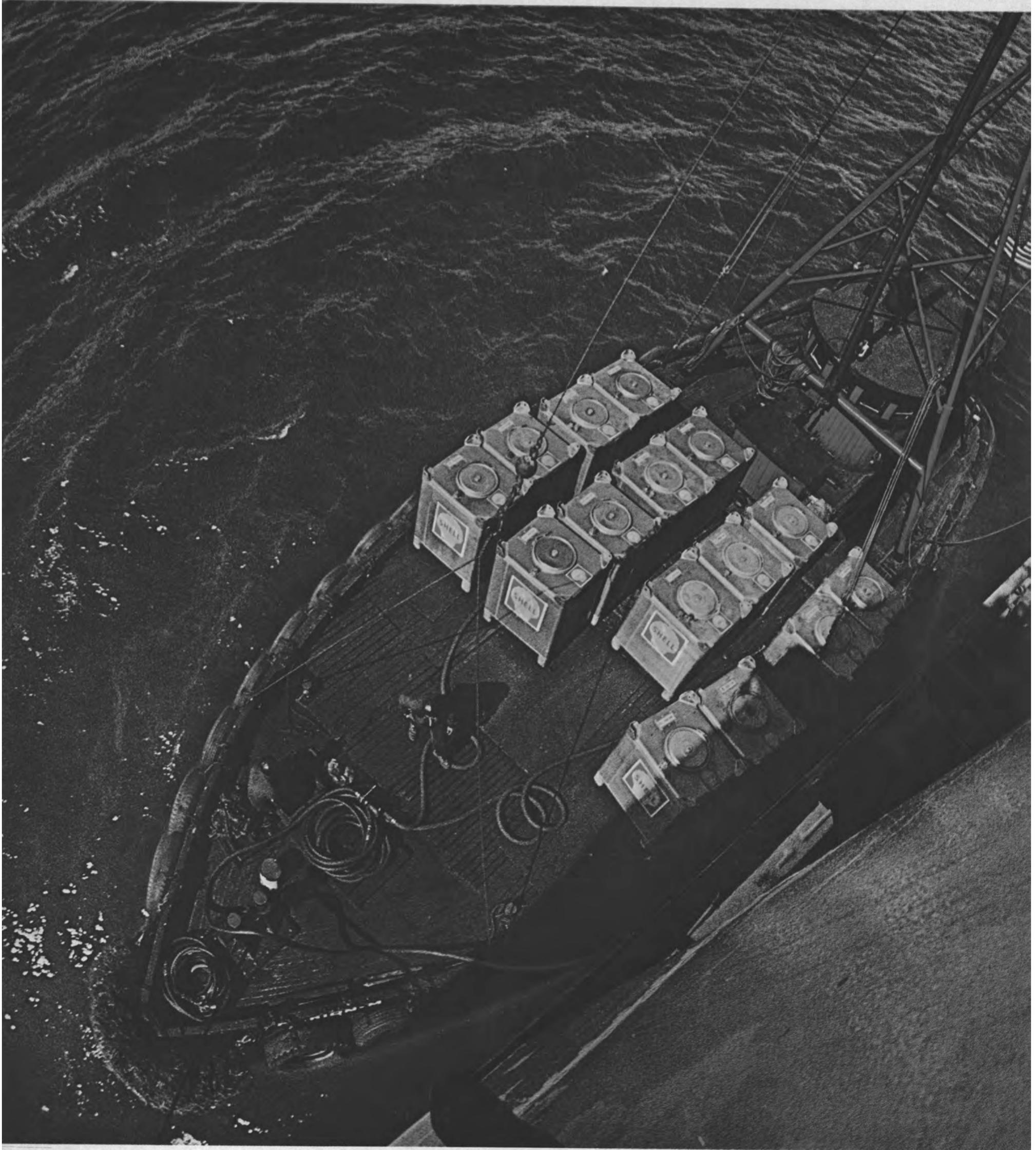


Here is a super dome designed for fabrication, not entertainment. This dome is a mammoth stress relieving furnace, whether it be for propellers or other weldments and castings. Its inside diameter measures 28' 10", its walls 5' 3", and 8' 10" in the center. 12 Maxon burners distribute heat evenly up to 1,500°F. (maintained by a Honeywell controller). Accessible by truck or barge (via the Harvey Canal) and normally serviced by a 50 ton shore based crane, this stress relieving dome offers the usual Avondale super service.



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One Shell bulk delivery system encompasses the use of those 450-gallon aluminum tanks you see on the small delivery vessel in our picture. Traditionally, lubricants were delivered in 55-gallon drums. The drums were hoisted aboard or pumped out, one at a time into a ship's storage tanks. A tedious, time-consuming operation.

By using the 450-gallon tanks, lubricants can be pumped aboard a ship *three times* as fast as with 55-gallon drums. *Three times as fast.* This trims costs.

Consider: the average cargo ship loads about 3500 gallons of lubricants in a single delivery. Daily operating costs run from \$3000 to \$8500. You can see how time saved is money earned. Thus it's no small wonder that shipowners warm to Shell's fast, bulk delivery systems.

Marine bulk lubricants deliveries such as this one require precise coordination of both men and equipment. The equipment must be responsive and dependable—the men good at handling it. It takes some doing. But at Shell we think it's good business to go out of our way for our customers.

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## ABS Publishes New River Rules

The 1971 edition of the River Rules used to design, build and maintain towboats and barges on inland waterways has been published by the American Bureau of Shipping.

The new River Rules, which incorporate all the Bureau's requirements for classing commercial vessels on rivers, canals, harbors and bays, have been significantly expanded to reflect changing conditions in the inland barging industry. The most significant changes have been the trends to increase the size and horsepower of towboats which push tows of 40 and more barges, and the increase in the number of specialty barges which carry a wide variety of industrial gases and chemicals.

Important new sections in the 253-page book are those encompassing the construction and classification of barges intended to carry dangerous chemical cargoes in bulk and covering cargo hand-

ling systems for dangerous chemical cargoes. These sections, which generally comply with U.S. Government recommendations and regulations, provide precise and detailed engineering data to be used in the design and construction of barges carrying a multitude of industrial chemicals at specified temperatures and pressures. The 101 chemical products range from acetaldehyde and chlorine and sulfuric acid and vinyl chloride.

Also included in the Rules, are sections on tank barges, dry cargo barges, towboats, propulsion machinery installations, propellers, pumps and piping systems, electrical equipment, fire extinguishing systems, welding, materials for hull and machinery, and surveys after construction. Another section provides tables of scantlings, in metric and British units, for shell plating, bulkhead plating, beams and other structural members of steel vessels.

The new River Rules, formally titled "Rules for Building and Classing Steel Vessels for Service on Rivers and Intracoastal Waterways," may

be ordered from the Manager-Publications, 45 Broad Street, New York, N.Y. 10004. The price is \$10, plus applicable sales or use tax.

## Chesapeake SNAME Discusses Conventional And Catamaran Hull Forms For Containerships



Pictured at the Walter Reed Officer's Club are, left to right: **Jorgen Strom-Tejsen**, chairman of the Chesapeake Section; **Mrs. Eugeniusz K. Haciski**, wife of the author of the paper; **Capt. L.A. Colucciello**, National Transportation Safety Board; **Mrs. Robert A. Weibel**, wife of the author of the paper; **Mr. Weibel**, Naval Architect, Industrial Department, USCG, Curtis Bay, Md., and **Seth Hawkins**, Naval Ship Research & Development Center.

The second meeting of the season for the Chesapeake Section of The Society of Naval Architects and Marine Engineers was held on October 20 at the Walter Reed Officer's Club, on the site of the famous hospital located just outside Washington, D.C.

**Jorgen Strom-Tejsen**, Section chairman, opened the session with a warm welcome to the 75 members and guests in attendance.

Moderator for the evening was **Capt. L.A. Colucciello** of the National Transportation Safety Board, who set the stage by introducing the authors—**Eugeniusz K. Haciski**, Chief Naval Architect, Industrial Department, USCG, Curtis Bay, Md., and **Robert A. Weibel**, Naval Architect, Industrial Department, USCG, Curtis Bay, Md. The subject of the presentation was "Comparison of Stability for Conventional and Catamaran Hull Forms for Containerships." This was quite a controversial subject in light of the discussions generated by the paper.

The presentation addressed the fact that stability is a major problem facing containerships. To maintain seaworthiness, the vessel must be extensively ballasted. The small transverse metacentric height necessary to produce the low angular accelerations required for fitted cargo on deck is in direct opposition to the greater transverse metacentric height necessary to produce a small amplitude on roll. Trying to overcome this problem, the authors analyzed the stability of three basic hull types: single hull, conventional catamaran hull, and unconventional catamaran hull. Considering stability characteristics alone, one type was superior. The intact stability comparison as presented clearly illustrated that the unconventional catamaran hull definitely had the best characteristics.

## Gulf Overseas Marine Applies For Title XI

Application for Title XI mortgage and loan insurance has been made to the Maritime Administration by Gulf Overseas Marine Corp., 811 Dallas Street, Houston, Texas, to assist in financing the construction of an offshore tug-supply vessel. The 165-foot vessel will be built by Halter Marine Services, Inc., Lockport, La., at an estimated cost of \$700,000.

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## Halter Marine Services Delivers 140-Ft. Tug Esteff S. De Felice



The new tug, designed primarily for work with the offshore industry, has a fuel oil capacity of 170,000 gallons for long-range and extended operations.

The Esteff S. De Felice, a 140-foot ocean tug designed and built for offshore oil field operations, has been delivered by Halter Marine Services, Inc., New Orleans, La., to De Felice Marine Contractors, Metairie, La. The new tug was launched by two floating cranes that lifted the 400-ton vessel from its building ways into the water at the Halter Marine shipyards in eastern New Orleans. This is one of the largest and heaviest vessels to be launched in this manner.

The Esteff S. De Felice has an overall length of 140 feet, a beam of 34 feet, and a designed draft of 14 feet. Gross tonnage is under 200.

The tug is powered by two EMD 16-645-E2 diesel engines with five sets of air-controls—three in the wheelhouse and one set for each of two stern stations. The tug is equipped with Falk reduction gears, two Waukesha 100-kw generators and a Markey TDSD 28 double drum winch with remote controls located at the two aft steering stations. Stainless steel propeller shafts swing two 108-inch four-bladed stainless steel propellers. B.F. Goodrich cutless bearings are used. The steering power units are two Sperry Cub pumps with 10 horsepower motors. Other equipment aboard the Esteff S. De Felice includes Barnes water pressure set, two Quincy air compressors, a Markey anchor windlass, and a Douglas Water-maker D-10 fresh water maker.

Electronic equipment installed aboard the tug includes a Raytheon single sideband radio, Fathometer and radiotelephone, two RCA radars, a Bendix direction finder, and a Konel Loran DX navigator.

Accommodations are provided for a crew of eight men. Staterooms for an additional eight persons are also provided for use by divers, salvage master, etc.

The all-electric galley is equipped with stainless steel reefers and has a large walk-in freezer for provisions on extended voyages. The mess room is adjacent to the galley and an officers' lounge is located on the 01 level. All accommodations are air-conditioned.

Hull construction is heavier than normal for a vessel of this type. Shell plating forward is 3/4-inch thick and the reinforced bow is capable of working in ice. The stern is heavily fendered in way of the stern rollers to provide protection from anchor buoys when working with mooring anchors. Careful attention was given to the design of the stern in order to prevent cable fouling the propellers or rudders when handling anchors.

The Esteff S. De Felice is the second tug built for the De Felice Company by Halter Marine Services and joins the M.T. Betty G., which was delivered last year. Both tugs were primarily designed for work with the offshore industry and have been working with pipe-laying and derrick barges. The Esteff S. De Felice is also equipped for long-distance ocean towing.

## Containerized Cargo Up 60% In East Coast No. America And Australia/New Zealand Trade

A dramatic shift toward containerization as a method of cargo handling has occurred in the past 18 months in the trade between the East Coast of North America and Australia-New Zealand, according to figures recently released by Associated Container Transportation, a major container shipping firm operating in the trade.

"Since January 1970, the movement of cargo by containers has jumped nearly 60 percent—from under 10 percent of the total cargo to over 70 percent," revealed Donald S. Chakas, executive vice president of ACT. "Total value of cargo exchanged between North America and Australia-New Zealand is over \$2.47 billion. The United States alone accounts for more than \$2.07 billion of this amount."

R. Keith Scott, senior Australian trade commissioner in the United States pointed out that

the U.S. has already surpassed Great Britain as Australia's prime supplier of goods, and has become the second most important market for his country after Japan. U.S. exports to Australia totaled some \$1.16 billion worth of goods in 1970-71, an increase of about \$81 million over 1969-70.

One of the major reasons behind the shift toward containerization has been the move by the major lines serving the East Coast of North America and the South Pacific to build completely new containerships for the trade. ACT, for example, will have five giant 25,000-ton cellular containerships operating in the trade by 1972. Two of these, ACT 3 and ACT 4, went into service in September.

"There has been increasing recognition by shippers at both ends of the trade of the economies inherent in containerization and the system of distribution it makes possible," said Mr. Chakas. "As a result, we look for the amount of containerized cargo to increase at a rate of approximately 5 percent a year for the foreseeable future."

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# KOCKS



## Thousands Attend Oil Industry Expo In Lafayette, La.

The Ninth Biennial Louisiana Gulf Coast Oil Exposition concluded after four days of buying, selling, explaining and demonstrating the equipment and services that keep the vast United States oil industry working.

Thousands of industry represen-

tatives, supervisors, foremen and engineers came to see first-hand the goods and services of the 325 participating exhibitors. For four days in near perfect weather, the oil industry was on display.

Visitors had the opportunity to view practically every type of equipment and service introduced in the past several years. Displays ranged from down hole equipment to helicopters and aircraft and to

the most unique and advanced in offshore workover rigs for multiple completion platforms.

The attendance at the 1971 LAGCOE by industry personnel was in excess of all expectations. A large international marketer in the oil industry commented: "We have never been at a show where there was such a large attendance of oil industry people, including

supervisors, foremen and engineers, that we were interested in seeing."

Industry personnel attending the exposition found what they came to see. A questionnaire circulated among exhibitors on the last day produced information as to sales made during the four days. Of those responding, many elaborated as to their result by comment rather than a hard dollar figure. Sixteen exhibitors listed sales figures totaling \$1,105,775 for 250 various products and services.



LAGCOE general chairman, **Keith Lindley** of Sun Oil Company, takes a turn inside the Whittaker Corporation's survival capsule. LAGCOE Queen, **Miss Becky Brown**, decided to stay outside and peek in the portals.

**Keith Lindley**, general show chairman, and **Gene Fullen**, co-chairman, greatly appreciated the comments of exhibitors. One large U.S. manufacturing concern that sells a product utilized in the industry and who was a first time exhibitor, commented, "We have received more help and cooperation from the people of LAGCOE than any show we have ever attended." Still another large oil industry manufacturing company's representative said, "Our cost for coming here was repaid many times over."

The events surrounding the serious business of exploring the products and services of today and tomorrow industry-wide at the show grounds included a barbecue prepared by the Chuck Wagon Gang of Odessa, Texas; a Cajun shrimp boil; a queen's coronation ball and breakfast, a press party and, of a more serious nature, a luncheon sponsored by the Greater Lafayette Chamber of Commerce in cooperation with PESA, featuring as speaker the Honorable **J. Gilles Masse**, Minister, Department of Natural Resources, Government of the Province of Quebec, Canada.

**B.R. McNulty**, president of PESA, urged the industry to tell its story to governmental leaders and the public at large. To communicate the facts of the oil industry as they are—not as special interest groups would have it.

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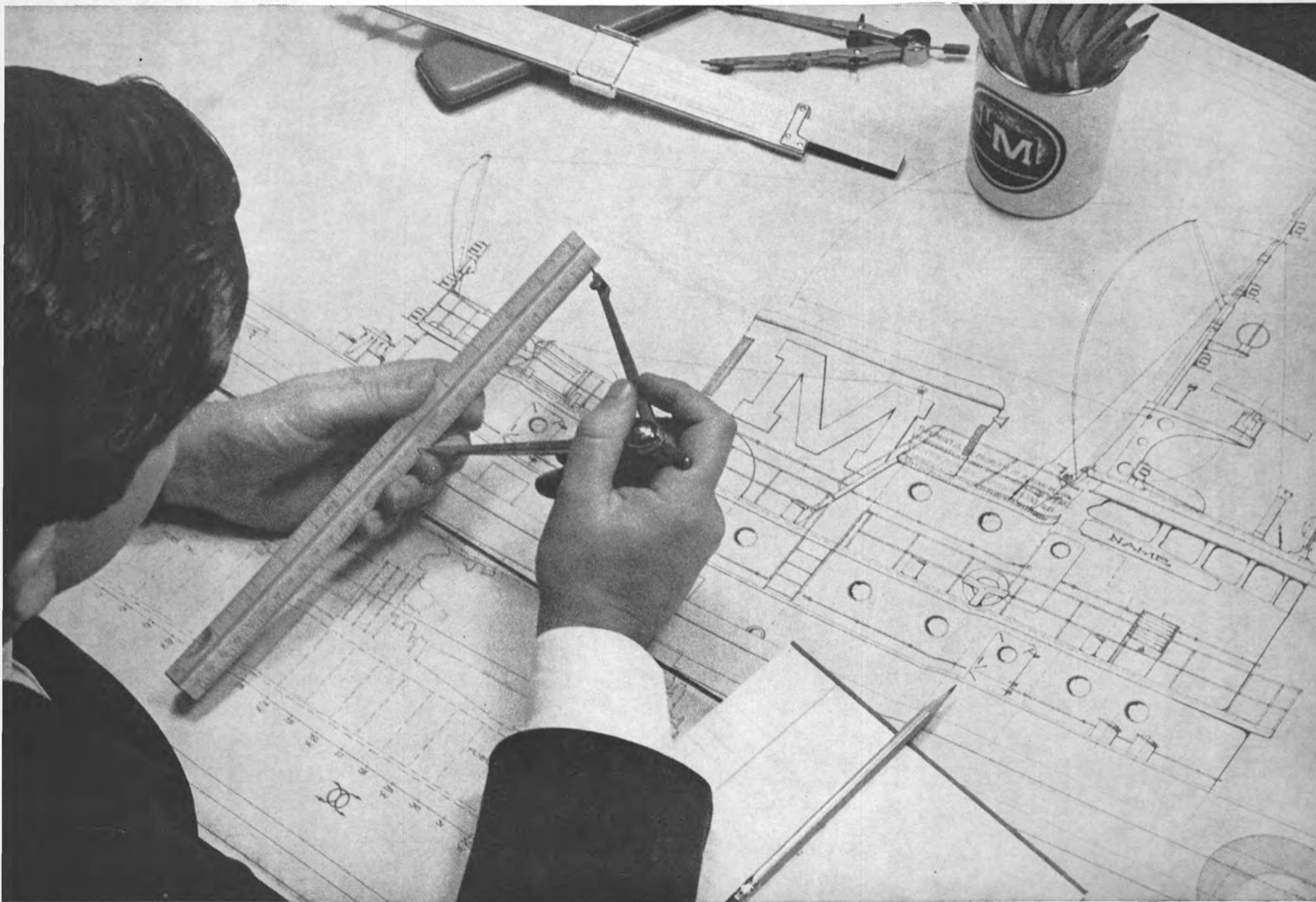


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# Sun Oil Company's Annual Tanker Report

## The World Tanker Fleet Increased By 14.2 Percent During 1970 With 24.7 Percent Registered In Liberia. The U.S. Retained Fifth Position In Tonnage With Only A Minor Gain During The Year.

The year ending of 1970 showed a tremendous growth in the world tanker fleet over that of 1969—101 more tankers, an increase of 20,745,000 deadweight tons, 79 more vessels under construction or on order at year end with an increase in average deadweight of 12,200 tons (from 104,100 tons to 116,300 tons). This rapid expansion was reported in the recent issue of the "Analysis of World Tank Ship Fleet, December 31, 1970" published by the Sun Oil Company.

The world tanker fleet at the end of 1970 numbered 3,994 vessels of 2,000 gross tons or more and totaled 166,774,000 dwt. During 1970, the fleet expanded by 101 vessels while deadweight tonnage rose by 20,745,000 dwt or 14.2 percent, Table No. 1. For the year as a whole, 213 vessels were delivered into the fleet, while 125 vessels were scrapped.

**Table No. 1—World Tankship Fleet at the End of 1970**

Dec. 31	Number of Vessels	Deadweight Tonnage
1960	3,264	65,780,000
1961	3,250	68,859,000
1962	3,259	71,996,000
1963	3,279	76,179,000
1964	3,359	85,126,000
1965	3,436	93,172,000
1966	3,524	102,909,000
1967	3,613	112,366,000
1968	3,775	128,128,000
1969	3,893	146,029,000
1970	3,994	166,774,000

Liberia continued to be the leading flag of registry in 1970, a position which was first attained in 1957, Table No. 2. With year-end registrations of 792 vessels, the Liberian-flag fleet totaled 41,133,400 dwt. The United Kingdom attained second rank in 1970 with 430 tankers. Norway was displaced to third position with 372 vessels. Japan and the United States remained in fourth and fifth positions respectively.

Other positional changes among the 12 largest flags of registry included Greece, Panama, France, Italy and the USSR. Greece moved up to sixth place displacing Panama to seventh and France to eighth position. Italy recovered its ninth position from the USSR.

Once again Liberia provided the greatest additions to deadweight tonnage during 1970 with a net increase of 6,527,200 dwt or 18.9 percent above the previous year, Table No. 3. The United Kingdom added 3,412,800 dwt to its tankship fleet in 1970. Greece, Norway and Japan had net additions of more than two million dwt each.

At the end of 1970, 24.7 percent of the world

tankship carrying capacity was registered in Liberia, up from 23.7 percent in 1969, Table No. 4. The United Kingdom again increased its share of the world fleet to 13.1 percent in 1970 from 12.4 percent in 1969. Although the United States flag increased its carrying capacity slightly in 1970, its share of the world total dropped from 6.2 percent in 1969 to 5.5 percent in 1970. Ten years earlier, the United States flag had amounted to 14.1 percent of the world total carrying capacity.

The 14.7 percent increase in world carrying capacity during 1970 compares favorably with

a 13.8 percent gain in the previous year and a 10.3 percent annual average growth for the ten-year period ending in 1970.

### The Average Tanker

The average deadweight tonnage of ocean-going tankers of 2,000 gt or more was 41,800 dwt at the end of 1970, and the average speed was 15.8 knots, Table No. 5. Average deadweight tonnage increased 4,300 dwt or 11.5 percent during 1970. Over the past decade, the average deadweight tonnage of the world fleet rose 21,600 dwt or 106.9 percent. Average speed has advanced slowly but progressively during the past ten years.

Japanese-flag tankers averaged the world's largest in 1970 at 71,200 dwt. This was 7,800 dwt or 12.3 percent greater than a year earlier, and more than three times the size of the average Japanese-flag tanker at the end of 1960, Table No. 6. The second largest average vessels, at 54,700 dwt, were under the Norwegian flag, while the third largest were registered in Liberia at 51,900 dwt.

The average speed of the world tankship fleet remained unchanged in 1970 at 15.8 knots, Table No. 7. Liberian, United States, Greek, Panamanian and Swedish flags increased average speed by 0.1 knot compared with the previous year. The average speed of the Netherlands tanker fleet declined by 0.1 knot while

(Continued on page 16)

**Table No. 2—Flag of World Tankship Fleet**

1970 Rank	Flag	Number of Vessels	Deadweight Tonnage
1	Liberia	792	41,133,400
2	United Kingdom	430	21,631,700
3	Norway	372	20,344,600
4	Japan	263	18,720,800
5	United States	350	8,911,000
6	Greece	206	7,593,200
7	Panama	175	6,140,600
8	France	123	6,001,600
9	Italy	143	5,098,800
10	U.S.S.R.	338	5,039,500
11	Sweden	83	3,846,800
12	Netherlands	87	3,326,400
	All Others	632	18,985,200
	Total World	3,994	166,773,600

**Table No. 3—Changes in Deadweight Tonnage  
December 31, 1970 From December 31, 1969**

Flag	Deadweight Tons	Percent
Liberia	+ 6,527,200	+18.9
United Kingdom	+ 3,412,800	+18.7
Norway	+ 2,228,200	+12.3
Japan	+ 2,119,000	+12.8
United States	+ 113,100	+ 1.3
Greece	+ 2,253,400	+42.2
Panama	+ 521,300	+ 9.3
France	+ 582,500	+10.7
Italy	+ 688,900	+15.6
U.S.S.R.	+ 384,600	+ 8.3
Sweden	- 26,500	- 0.7
Netherlands	+ 170,500	+ 5.4
All Others	+ 1,769,500	+10.3
Total World	+20,744,500	+14.2

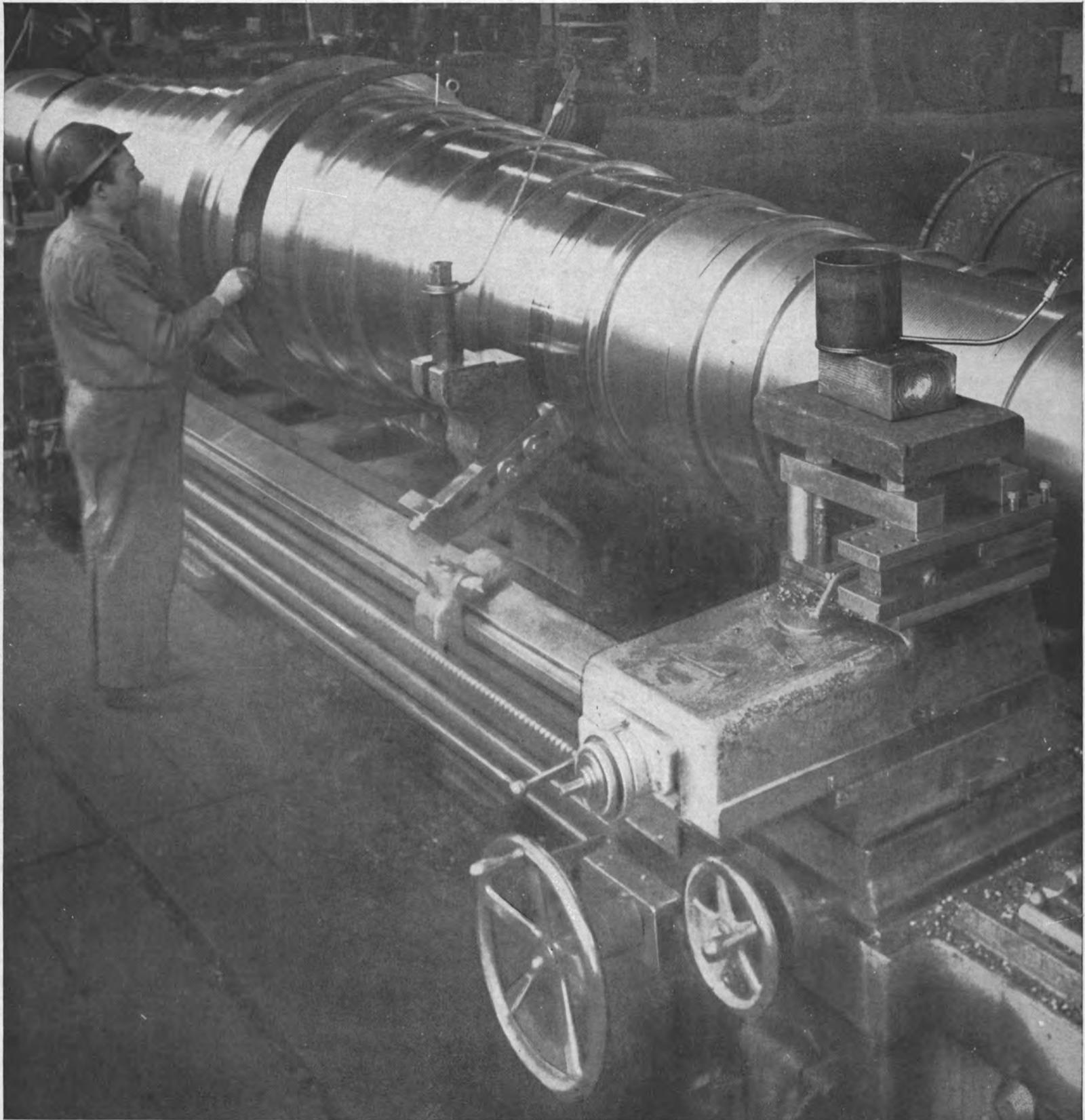
**Table No. 5—Average Deadweight Tonnage and Speed**

Year	Average Deadweight Tonnage	Average Speed (Knots)
1960	20,200	15.1
1961	21,200	15.2
1962	22,100	15.3
1963	23,200	15.4
1964	25,300	15.6
1965	27,100	15.7
1966	29,200	15.7
1967	31,100	15.7
1968	33,900	15.8
1969	37,500	15.8
1970	41,800	15.8

**Table No. 4—Carrying Capacity by Major Flags of Registry**

Flag of Registry	1970 Percent of World	1969 Percent of World	1960 Percent of World	Percent Change 1970/69	Annual Average Increase 1970/60
Liberia	24.7	23.7	18.3	+19.3	+13.7%
United Kingdom	13.1	12.4	14.4	+21.0	+ 9.2
Norway	12.2	12.5	14.1	+12.2	+ 8.8
Japan	11.2	11.4	3.6	+12.6	+23.5
United States	5.5	6.2	14.1	+ 1.4	+ 0.3
Greece	4.5	3.6	3.2	+42.9	+14.0
Panama	3.7	3.9	5.6	+ 9.8	+ 5.8
France	3.6	3.8	4.6	+10.6	+ 7.9
Italy	3.1	3.1	3.9	+15.8	+ 7.8
U.S.S.R.	2.9	3.1	1.8	+ 7.5	+15.8
Sweden	2.3	2.7	3.7	- 0.4	+ 5.3
Netherlands	2.0	2.1	2.9	+ 4.9	+ 6.0
All Others	11.2	11.5	9.8	+11.3	+17.0
Total World	100.0	100.0	100.0	+14.7	+10.3%

The report printed here was prepared by the Corporate Development Group of Sun Oil Company under the direction of James S. Cross, director, Economics and Industry Affairs. It is the 29th edition of a report which was developed originally for national security planning purposes and has since been used widely by industry.



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## Sun Oil Annual Tanker Report—

(Continued from page 14)

the remaining six principal flags remained unchanged. Over the ten years ending with 1970, the average speed of the world fleet increased 0.7 knots, ranging from no increase for Liberia to 2.1 knot gain for the USSR.

The average age of the world tankship fleet declined to seven years and three months at the end of 1970 from seven years and six months one year earlier. During the past ten years, the average age has ranged narrowly between a high of seven years and nine months in 1963 and 1967 and a low of seven years and three months at the end of 1970.

The youngest fleet among the major flags at the end of 1970 was the Japanese with an average age of four years and two months—one month older than a year earlier, Table No. 8. The second youngest fleet was the Norwegian at four years and eleven months—four months younger than in 1969. The oldest fleet among the major flags was registered in the United States. At 16 years and five months, the U.S.-flag fleet reduced its average age six months during 1970.

A distribution of carrying capacity by year of construction for the major flags of registry indicates that 69.5 percent of the Japanese-flag fleet was built during the five-year period of 1966-1970, and all except 6.8 percent was constructed in the past ten years. For the United States flag, the opposite situation applied, with 12.9 percent of the carrying capacity constructed in the past five years and 75.1 percent prior to 1961.

### Construction

There were 649 tankships of 2,000 gt or more under construction or on order in world shipyards at the end of 1970, Table No. 9. These totaled 75,447,000 dwt and averaged 116,300 dwt per vessel. One year earlier there were 570 vessels totaling 59,328,000 dwt on order averaging 104,100 dwt per vessel.

Of the total deadweight tonnage under construction or on order at the end of 1970, more was intended for registry in Liberia than under any other flag.

At 18,114,000 dwt, Liberia's share represented 24.0 percent of worldwide tonnage under

Table No. 6—Average Deadweight Tonnage

Flag	1970	1969	1960
Liberia	51,900	45,700	29,700
United Kingdom	50,300	43,200	18,100
Norway	54,700	47,400	19,300
Japan	71,200	63,400	23,400
United States	25,500	24,100	18,600
Greece	36,900	31,400	25,500
Panama	35,100	33,600	22,500
France	48,800	41,100	22,700
Italy	35,700	32,900	20,300
U.S.S.R.	14,900	15,200	12,400
Sweden	46,300	45,600	20,200
Netherlands	38,200	35,100	18,600
Total World	41,800	37,500	20,200

Table No. 7—Average Speed in Knots

Flag	1970	1969	1960
Liberia	15.9	15.8	15.9
United Kingdom	15.7	15.7	14.5
Norway	15.9	15.9	14.5
Japan	15.8	15.8	15.2
United States	16.2	16.1	15.7
Greece	15.5	15.4	15.5
Panama	16.0	15.9	15.4
France	16.1	16.1	15.3
Italy	16.1	16.1	15.2
U.S.S.R.	15.4	15.4	13.3
Sweden	16.1	16.0	14.9
Netherlands	15.5	15.6	14.7
Total World	15.8	15.8	15.1

construction and was equal to 44.0 percent of the existing Liberian-flag fleet at the end of 1970, Table No. 10. The flag intended to receive the second largest amount of new tonnage was Norway with 15.4 percent of the world total. The United Kingdom followed in third position with 13.2 percent of the world total. Thus more than half of the total tonnage under construction is intended to be registered under these three flags. For the entire world, deadweight tonnage under construction or on order at the end of 1970 amounted to 54.2 percent of the total current tonnage.

Within the 12 flags intended to receive the most tonnage under construction, Denmark was scheduled to receive the largest vessels, averaging 237,500 dwt each. Vessels intended for registry in Japan averaged 203,800 dwt while anticipated deliveries for Liberian registry averaged 183,000 dwt at the end of 1970. The smallest tankers, averaging 20,200 dwt were scheduled to be registered in the USSR.

Of the total tonnage under construction worldwide at the end of 1970, almost one-third or 24,248,000 dwt was being built in Japan, Table No. 11. This was 3,140,000 dwt or 14.9 percent more tonnage than was under construction in Japan one year earlier. Second among the countries of construction in 1970 was Sweden, with 7,894,000 dwt in its yards at year end, up from 7,298,000 dwt one year earlier.

Table No. 8—Average Age By Major Flags Of Registry

Flag	Dec. 31, 1970		Dec. 31, 1969	
	Years	Months	Years	Months
Liberia	7	8	8	0
United Kingdom	5	9	6	1
Norway	4	11	5	3
Japan	4	2	4	1
United States	16	5	16	11
Greece	8	7	9	6
Panama	11	5	10	7
France	6	8	6	10
Italy	8	4	9	1
U.S.S.R.	7	3	6	10
Sweden	5	6	5	3
Netherlands	8	1	7	10
Total World	7	3	7	6

Table No. 9—Tankships Under Construction or on Order (Not Including Combined Carriers)

Dec. 31	Number of Vessels	Deadweight Tonnage	
		Total	Average Per Vessel
1960	366	15,366,000	42,000
1961	352	15,737,000	44,700
1962	324	14,040,000	43,300
1963	387	19,211,000	49,600
1964	332	17,683,000	53,300
1965	403	20,591,000	51,100
1966	441	27,385,000	62,100
1967	469	41,444,000	88,400
1968	514	53,729,000	104,500
1969	570	59,328,000	104,100
1970	649	75,447,000	116,300

Table No. 10—Tankers Under Construction or on Order December 31, 1970 by Country of Registry

Intended Flag	Number of Vessels	Total	Deadweight Tonnage	
			Average per Vessel	Percent of Fleet Existing
Liberia	99	18,114,000	183,000	44.0
Norway	86	11,640,000	135,300	57.2
United Kingdom	90	9,978,000	110,900	46.1
France	36	5,267,000	146,300	87.7
Japan	21	4,280,000	203,800	22.9
Denmark	12	2,850,000	237,500	124.5
Italy	22	2,574,000	117,000	50.5
Sweden	19	2,113,000	111,200	54.9
United States	21	1,873,000	89,200	21.0
West Germany	32	1,564,000	48,900	51.1
Spain	11	1,266,000	115,100	53.0
U.S.S.R.	62	1,255,000	20,200	24.9
All Others	138	12,673,000	91,800	44.8
Total World	649	75,447,000	116,300	45.2

France maintained third place among countries of construction with 6,644,000 dwt being built compared with 6,091,000 dwt in the previous year. Denmark had 6,177,000 dwt under construction or on order at the end of 1970, up sharply from 3,721,000 dwt a year earlier.

All principal countries of construction had more tonnage under construction or on order at the end of 1970 than a year earlier except the United Kingdom, which declined to 3,044,000 dwt in 1970 from 3,452,000 dwt in 1969.

### Specialty Vessels

Throughout the years, the annual "Analysis of World Tank Ship Fleet" has attempted to maintain historical perspective by displaying summary tabulations covering a period of ten years or more. In earlier editions, this presented no particular difficulty since most of the new deliveries were conventional tankers. More recently, however, substantial numbers of combined carriers, liquid gas carriers and specialty vessels have entered the world fleet and have been included in the various totals and averages developed in the analysis.

Since it is impractical to reconstitute earlier data by arbitrarily including or excluding certain vessel types, it has been decided to continue the present format, but to list a summary of specialty vessels included, beginning with 1970 data, Table No. 12.

### Cargo Performance

In an attempt to provide vessel operators, charterers and brokers with a tool for quick estimates of oil-cargo delivery performance, the Sun Oil Company's analysis this year presents the barrels per day delivery capability of selected-size tankers on more than 50 of the largest world trade routes. While the specific tanker sizes and voyages used in this study will not satisfy all requirements, the presentation can serve as a useful source of general information and as an aid in decision making.

Table No. 11—Deadweight Tonnage Under Construction or on Order By Country of Construction

Country of Construction	Dec. 31 1970	Dec. 31 1969	Dec. 31 1960
Japan	24,248,000	21,108,000	2,755,000
Sweden	7,894,000	7,298,000	2,602,000
France	6,644,000	6,091,000	1,181,000
Denmark	6,177,000	3,721,000	845,000
Spain	5,582,000	3,897,000	470,000
Norway	4,818,000	2,553,000	840,000
West Germany	4,244,000	2,700,000	1,800,000
Netherlands	3,880,000	1,898,000	807,000
United Kingdom	3,044,000	3,452,000	2,629,000
Italy	2,963,000	2,347,000	490,000
United States	1,873,000	1,458,000	509,000
U.S.S.R.	1,431,000	624,000	0
All Others	2,649,000	2,181,000	438,000
Total World	75,447,000	59,328,000	15,366,000

Table No. 12—Specialty Vessels Included in World Tankship Fleet Analysis—December 31, 1970

Specialty	Number of Vessels	Deadweight Tonnage
Ore/Oil	128	8,032,800
Bulk/Oil	77	6,320,600
L.P.G. Carriers	66	750,500
L.P.G. Combined Carriers <sup>1</sup>	34	504,300
Methane (L.N.G.)	11	234,700
Solvents, Lubes & Specialties	79	1,411,600
Chemical	54	767,500
Asphalt & Bitumen	21	275,400
Sulfur	11	237,300
Whale Factory	11	233,200
Wine	9	57,400
Molten Phosphorous	2	20,800
Total	503	18,846,100

<sup>1</sup> Includes LPG/Chemical, LPG/Oil and LPG/Ammonia combined carriers.

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## Gotaverken Appoints Douglas Blomberg



Douglas Blomberg

In connection with a recent reorganization at Gotaverken's Arendal yard, **Douglas Blomberg**, general manager, has been appointed assistant sales manager and head of initial design.

The company also announced four other appointments as follows: **B.G. Renborg** has been appointed general manager and head of production; **Eskil Mare** has been appointed general manager and head of the machinery installation drawing offices; **Arne Moen** has been appointed general manager and head of fitting out departments, and **Rolf Bergstrand** has been appointed general manager and head of central production control.

## Worthington Licensed To Market Vac Strip Cargo Stripping System

Worthington Marine & Industrial Products, Harrison, N.J., a subsidiary of Worthington Corporation, has announced a licensing agreement with Worthington-Simpson Ltd., London, to manufacture and market the Vac Strip automated tanker cargo stripping system in the United States. As a result of the agreement, WM&IP, a leading producer of cargo pumps, becomes the first U.S. manufacturer of a complete cargo unloading system, including stripping, designed and supplied as a single, integrated package.

Worthington's Vac Strip cargo unloading and stripping system utilizes traditional split-case horizontal cargo pumps throughout the entire operation, eliminating separate stripping pumps and their accompanying fittings and fixtures. It provides automatic one-step cargo unloading and stripping by keeping main cargo pumps operating at a maximum capacity, taking into account the results of decreasing cargo levels in the tanks and automatically adjusting flow speeds to assure maximum discharge—without losing suction and without the need for repriming. The result, Worthington says, is lower initial installation cost, reduced maintenance, and faster tanker turnaround.

The heart of the system is a Worthington split-case centrifugal cargo pump and a separator tank which is positioned along the suction line. Throughout most of the unloading, the cargo pump operates normally. As the cargo tank level falls, air and gas become separated from the cargo liquid in the separator tank. As air and gas levels increase, a system of vacuum pumps, valves, diaphragms and vents come automatically into

operation to relieve pressure above the liquid in the separator tank, and keep the separator tank filled to an adequate level. The vacuum pump initially cuts in and out, and eventually, as stripping progresses, operates continuously. When the suction-discharge balance can no longer be met by the vacuum-pump-and-separator arrangement with cargo pumps operating at full capacity, a butterfly valve on the discharge line closes gradually,

assuming positions that allow maximum stripping to continue at reduced pump speeds.

The Vac Strip system is pneumatically controlled, and eliminates the need to throttle the pumps manually to match pump speed to reduce drainage rates of the tanks. The system is equally suitable for turbine or electric motor drive, and lends itself equally well to assisting in the control of ballasting rates.

The Vac Strip system has proved itself as a separate system in numerous tanker applications, and has been credited with substantially reducing turnaround time. In one case, unloading time was reduced from about 36 hours to about 26 hours, a substantial saving for tankers which operate at costs up to about \$1,700 per hour.

For more information, contact **J.F. Connell**, Worthington Marine & Industrial Products, Inc., Harrison, N.J.



## How a great lady of the

**The 71,500m<sup>3</sup> "Polar Alaska" has carried 14,500,000 barrels of LNG from Alaska to Japan at -259F. Her secret? Integrated tanks made of Invar\* 36% nickel-iron alloy.**

Invar alloy has an extremely low coefficient of expansion which permits the use of flat-design membranes.

This allows at least 90% of the welding to be done with automatic welding machines.

Invar alloy also has excellent low-temperature mechanical properties. And is tough at cryogenic temperatures down to -453F.

Phillips Petroleum and Marathon Oil used Invar alloy for "Polar Alaska" and her sister LNG carrier, "Arctic Tokyo"—both built in Sweden by Kockums Mekaniska Verkstads AB.

Eight other LNG tankers with Invar alloy tanks are in the works. Three of these—being built for El Paso Natural Gas Company and to be completed

\*A Registered Trademark of Société Creusot-Loire (IMPHY)

## MarAd Announces Research Program On LNG Transportation

Plans for a research program to improve the competitiveness of U.S.-flag vessels in the transportation of liquefied natural gas have been initiated by the Maritime Administration.

The agency, according to Assistant Secretary of Commerce for

Maritime Affairs **A.E. Gibson**, has sent a letter to gas companies, naval architects, shipbuilders, and other interested groups, requesting their ideas for the specific elements to be included in the effort.

From the responses, Maritime will develop a research program that will be carried out on a joint cost-sharing basis between industry and the agency. Maritime, Mr. **Gibson** said, has allocated up to

\$1.2 million as its contribution to the funding.

"The marine transportation of natural gas today," Mr. **Gibson** explained, "is almost totally the outgrowth of technology developed in other nations. LNG carriers which will be built and registered in the U.S. using this technology will be competing with foreign-flag LNGs on their own ground.

"Our goal is to develop a new

and unique technology based on American capabilities and techniques that will give U.S. ships a competitive edge," he added.

"Some research applicable to this goal is being carried out in this country today by private interests. We anticipate drawing these fragmented efforts together into a coherent program that will benefit U.S. shipyards, operators, and gas companies directly."

Mr. **Gibson** explained that this proposed research program is designed to do for liquefied natural gas carriage what containers and barges have done for general cargo movements. "These innovations have proven beyond doubt that by applying advanced technology to ocean shipping, American ship operators can compete with lower-cost foreign-flag operators. There is every reason to believe that we can improve the productivity of American LNG carriers to the point where they too can compete effectively with foreign vessels of this type."

He pointed out that the basic technology used in cryogenic carriers, such as LNG vessels, was developed in this country. The world's first LNG ship, the Methane Pioneer, a converted C1 freighter, was designed and converted in the United States in the late 1950s. He added that this country still retains its lead in basic cryogenic technology.

"However, foreign firms have built upon this technological base, and nearly all of the gas-containment systems for LNGs currently in use in the world are built to these foreign designs," Mr. **Gibson** said.

"Our goal is to restore this nation's former lead in this specific area," he added.

### Seatrains Lines, Inc. Renegotiates Financing

Seatrains Lines, Inc., New York, N.Y., has renegotiated some \$95.5 million in current and long-term bank obligations, a move which will reduce to less than half that portion of bank debt due for repayment during the current fiscal year, the company announced. **Howard M. Pack**, president, said Seatrain had agreed with The Chase Manhattan Bank to extend through fiscal 1976 repayments for borrowings to finance expansion of the company's container and shipbuilding operations.

The renegotiated financing significantly improves the company's balance sheet, Mr. **Pack** noted, "and defers the burden of debt repayment to years in which Seatrain should benefit more substantially from the major building and expansion programs it is now completing."

Mr. **Pack** said that under the new agreement, the company would repay approximately \$21 million of current bank debt during fiscal 1972, and an additional \$24 million during fiscal 1973. Under the previous agreements the financing schedule would have called for repayments of more than \$78 million during the two years.



## East keeps her cool.

in 1974-75 — will be 120,000m<sup>3</sup> each!

Of course, Invar isn't the only nickel alloy suitable for LNG tankers. 9% nickel steel and type 304 stainless steel are also being used with great success.

So how do you know which nickel alloy to use?

It all depends on the design of your ship.

To learn more about nickel alloys for cryogenic service, call us or write Dept. MR1271, The International Nickel Company, Inc., One New York Plaza, New York, N.Y. 10004. In Canada, The International Nickel Company of Canada, Limited, P.O. Box 44, Toronto-Dominion Centre, Toronto 111, Ontario. In England, International Nickel Limited, Thames House, Millbank, London, SW1, P4QF, England.



Flat-membrane design tank of Invar alloy.  
Design developed by Gaz/Transport

## INTERNATIONAL NICKEL

## Three Technical Papers Presented Before SNAME California Sections Annual Meeting



Pictured left to right are: **Thomas T. Lunde**, **Morris Guralnick**, **Charles R. McCardell**, **Robert Herbert**, **K.T. Liu**, the five authors, and **Fred Shumaker**, Chevron Shipping Co., Northern California Section papers committee chairman.

The annual meeting of the California Sections of The Society of Naval Architects and Marine Engineers was held in Monterey on October 1-2.

A technical paper covering "The USNS Range Sentinel (T-AGM 22)—The Making of a Missile Range Tracking Ship" was presented by San Francisco naval architect **Morris Guralnick**. The paper generally outlines the problems in conversion of a World War II Victory Ship to one capable of tracking the Poseidon missile concurrently being fitted in U.S. submarines.

Discussions, particularly on the unique flume stabilization design, were offered by **John Vasta**, Litton Ship Systems, and **Thomas Wilson**, Harbor Boat.

The second technical presentation was "The Design & Construction of the 9,650-Dwt Cement & Bulk Carrier M/V Anahuac II," by **Thomas T. Lunde** and **C.R. McCardell** of the firm of T.T. Lunde, Inc. This paper outlined the development of a business based on a completely new transportation system. It describes the extent to which a naval architect must occasionally become involved in all phases of a vessel's economics and business operation, from the detailed analysis of cement characteristics, to survey of the cement market on the East Coast of Mexico, ship design, bidding, political influence effects on construction and final practical operational tests.

Discussions were presented by **R. Boston**, U.S. Coast Guard, **Larry Glosten**, naval architect, and **John Marriner**.

The final paper, "Special Ships for Forest Products Transportation," was presented by **R.N. Herbert** and **K.T. Liu** of the San Francisco firm R.N. Herbert Associates. The paper describes the authors' participation in the development of an "open-hatch" type vessel for handling newsprint and pulp products.

Aside from the technical problems of structural strength, this design also provides an unusual safety problem in respect to flooding



Attending the festivities were **Daniel D. Strohmeier** (left), national president of SNAME, and **Arthur Haskell**, vice president, engineering, Matson Navigation, and chairman of Northern California Section.

after a collision. This paper recognizes this and is, in a large part, devoted to the development of a proposal for a "survivability index" in lieu of the antiquated "one-compartment" standards derived from the U.S. Maritime Administration's pre-World War II Regulations.

Discussions were offered by **Arthur Haskell** of Matson Navigation, and **Henry Kozlowski** of American President Lines.

## Carrier Overseas Corp. To Erect Warehouse And Office Building

A 204,800-square-foot warehouse and office building will be constructed in Syracuse, N.Y., by Carrier Overseas Corporation, the subsidiary of Carrier Corporation responsible for the company's air-conditioning business outside the United States and Canada. It will be used to crate and store products and consolidate shipments destined for customers abroad, according to **Walter Steitler**, president of Carrier Overseas Corporation.

The new building will also provide office space for the technical and sales training departments and the advertising distribution center of the international operation's headquarters staff, Mr. Steitler said. Studios to make audio-visual material in a number of languages will be included.

Ground was broken last month and construction is scheduled to be completed next spring, Mr. Steitler said.

## First Spanish Ship With Bulbous Stern Launched At Astilleros Espanoles Sestao Yard



The Marques de Bolarque shown on the ways at the Sestao yard, built with both a bulbous bow and stern, has a relatively narrow beam for transiting the Panama Canal.

The 80,000-dwt bulk carrier Marques de Bolarque was recently launched at the Sestao shipyard of Astilleros Espanoles, S.A.

Built for Compania Maritima Zorroza, S.A., the new vessel, second in a series of this tonnage, has been named in honor of His Excellency **Luis de Urquijo y Landecho**, the Marques de Bolarque.

The Navy Commander acted as master of ceremonies and Her Excellency **Mrs. Pilar Rubio Morenes de Urquijo** served as sponsor. She was accompanied on the launching platform by the Marques de Bolarque; the president of Astilleros Espanoles S.A., **Francisco Aparicio Olmes**; officials representing the owners, shipyard officials, and celebrities from the financial and industrial world.

The new bulk carrier has the following approximate measurements: overall length of 833 feet, breadth of 106 feet, depth of 65 feet, and a draft of 47 feet.

The propulsion equipment, built in the Astilleros shipyards at Bil-

bao, consists of a main AESA-Burmeister & Wain engine, model 9K84EF, with an output of 23,200 bhp at 114 rpm.

The hull shape of the new vessel is unique in that this is the first Spanish ship to be built with a bulbous stern . . . to provide better propulsion and more efficient operation of the screw.

An important characteristic of this vessel is that it is relatively narrow, measuring approximately 106 feet, the maximum breadth allowed in the Panama Canal. This means that the vessel will be able to utilize the Canal, although not at its maximum draft, since vessels with a draft of more than 40 feet or so are not permitted in the Canal.

The current construction program for the Astilleros Espanoles shipyard at Sestao includes bulk carriers, oil tankers and OBOs. The OBOs will have a deadweight of 115,000, which makes them the vessels with the greatest tonnage built on the Bilbao Estuary to date.





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S1109

## Safmarine Names Three Directors

The board of directors of South African Marine Corporation (N.Y.) has announced the appointment of three new directors. They are Capt. Douglas T. Breckon, vice president, marine; C.B. Parkhill, senior vice president, and H.J. Thieck, senior vice president. These three new directors also serve on the company's executive committee.

Captain Breckon is a graduate of The Louis Botha Nautical Academy at Cape Town and joined South African Marine as a deck officer in 1954. He received his first command in 1959 on the Constantia. In 1960, he became assistant marine superintendent in the United States and was promoted to his present position in 1968.

Mr. Parkhill has 30 years of experience in the steamship industry

and joined South African Marine in November 1966 as general traffic manager. He later became vice president, sales/traffic, and was promoted to senior vice president in 1969.

Mr. Thieck joined South African Marine in Cape Town in November 1966, after having represented the line in South West Africa for 15 years. He came to the United States the same year as vice presi-

dent, operations, for South African Marine (N.Y.) and was made senior vice president in 1969.

## Moran Awards Todd Contract For First U.S.-Built LNG Barge

The first oceangoing liquefied natural gas barge to be constructed in the United States will be built at Todd Shipyards' Houston Division in Texas, it was announced by Thomas E. Moran, president of the Moran Towing Corporation, and John T. Gilbride, president of the Todd Shipyards Corporation.

The LNG carrier, expected to be completed in October 1972 at a cost in excess of four-million dollars, will have a capacity of 32,000 barrels of liquefied natural gas carried in four cylindrical aluminum tanks aboard the barge at a temperature of minus 260 degrees Fahrenheit.

A subsidiary of the Moran organization will charter the new barge to Distrigas Corporation of Boston, Mass.

## Ellis B. Gardner Jr. Elected AEI President



Ellis B. Gardner Jr.

At a meeting of the board of directors of American Export Industries, Inc., Ellis B. Gardner Jr. was elected president, chief executive officer, and a director of the company, it was announced by Peter L. Keane, chairman of the board of directors.

Mr. Gardner was previously senior vice president of Litton Industries and was the executive in charge of Litton's Marine Group of five separate companies. Mr. Keane, who had assumed the position of chief executive officer in June of this year, will remain as chairman of the board.

Prior to his association with Litton in 1959, Mr. Gardner was executive vice president and a director of Hewitt-Robins. He is a member of the American Bureau of Shipping, and a member of The Society of Naval Architects and Marine Engineers. He is also a member of the Maritime Transportation Research Board, and a member of the Society of Naval Engineers.

Mr. Gardner was born in Little Rock, Ark. in 1920. A graduate of Columbia University, he also attended the University of Buffalo Graduate School of Business Administration. He is Phi Beta Kappa and served with the Army Air Force during World War II.



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\* DuPont trademark—polyester fiber

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**J.W. Armstrong Elected Vice President/Sales Nabrico Marine Div.**



**J.W. Armstrong Jr.**

J.W. Armstrong Jr. has been elected vice president/sales of the Marine Division of the Nashville Bridge Company. The promotion was announced by Nabrico president John B. Kopp.

Mr. Armstrong was given the responsibility of marine sales in August of this year and elevation to vice president is another step in his Nabrico career that began as a machinist and welder when he was 17. He continued his Nabrico employment through high school and college. After earning his B.S. degree at M.T.S.U., Mr. Armstrong has devoted full time to the Nashville Bridge Company. He is a "second generation" Nabrico man—his father, J.W. Armstrong Sr., spent 45 years with the company.

Mr. Armstrong's experience includes designing machinery and piping for towboats and barges, sales and service in the Marine Division, and as a contract administrator in the finance department prior to his present assignment.

**Thibodaux Boiler Works Appoints Charles White**



**Charles F. White Jr.**

Charles F. (Charlie) White Jr. has joined Thibodaux Boiler Works of Thibodaux, La., in materials handling equipment sales. He will be in charge of sales in the Gulf Coast area for a new line of pneumatic tanks now in production by Thibodaux Boiler Works. These pneumatic tanks are specifically designed for handling drilling mud and cement materials for the drilling industry.

A native of Louisiana, Mr. White served in a similar capacity with Perry Shankle Company of San Antonio before joining Thibodaux Boiler Works, Inc. From 1957 to 1968, he was sales manager of materials handling equipment for Delta Southern, Baton Rouge, La.

**New Sensing Device For Flume Stabilization**

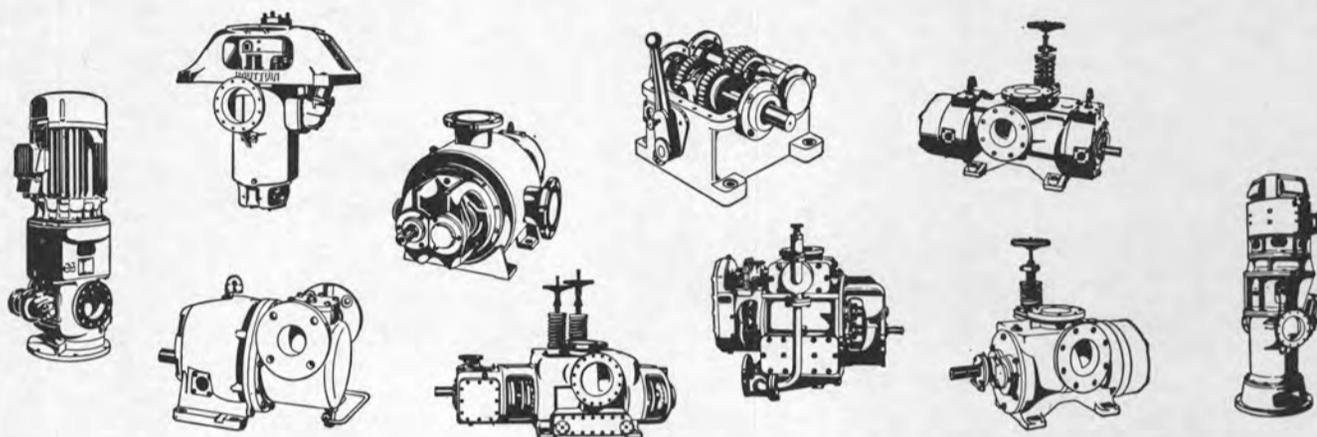
Flume Stabilization Systems, Inc. of New Jersey, has announced its second generation of ship roll stabilizers. In addition to designing and marketing their patented passive stabilizers, the New Jersey corporation has expanded the line of designs to now include a full range of stabilization equipment—from fin stabilizers

to the new automated tuning system for passive tanks.

The primary purpose of this tuning system is to insure that the Flume tank liquid is at the proper level for maximum stabilizer performance at all times. This feature is important, since ship's personnel are thus relieved from the necessity of calculating the vessel's stability and checking the liquid level during the voyage in order to maintain the maximum roll reduction.

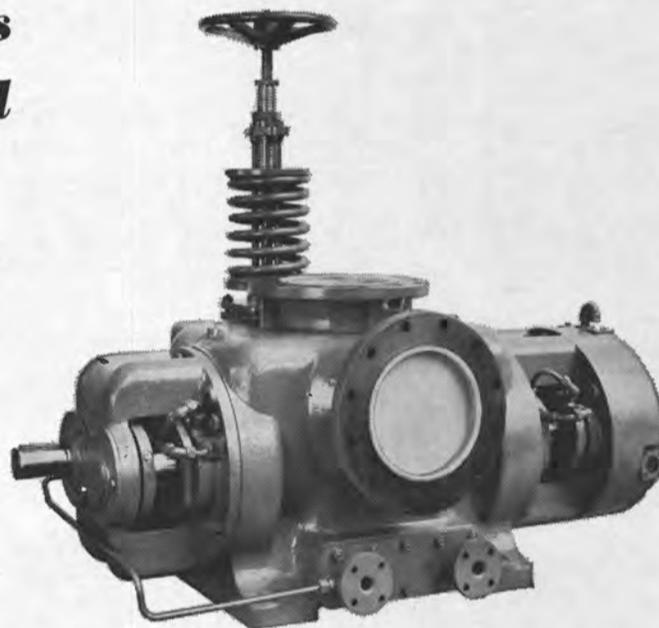
To achieve this, the ship's roll motion and the movement of the liquid within the stabilizer are analyzed, compared, and the phase relation determined. The bridge console display system indicates whether the tank is performing at its peak efficiency or if liquid should be added or removed. After extensive laboratory testing and prototype test in an existing Flume tank installation, the system is now in production for standard installations.

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## SC&NO Barge Lines Appoints A.J. Claes



A. Joseph Claes

Joseph R. Cordaro, executive vice president of Sioux City And New Orleans Barge Lines, Inc., Clayton, Mo., has announced the appointment of **A. Joseph Claes** to the operations department of SC&NO. In his position, Mr. Claes will be responsible for the allocation, distribution and marketing of equipment for the Southern Division.

Mr. Claes graduated from Quincy College, Quincy, Ill. in 1965, with a business administration degree.

## Vincent Lane Joins Sulzer Bros. Inc.



Vincent J. Lane

Vincent J. Lane has joined Sulzer Bros. Inc., 19 Rector Street, New York, N.Y., as manager of the newly formed Controllable Pitch Propeller Department. Mr. Lane was formerly vice president and general manager of Propellers, Inc. With the merger of that organization's functions into Sulzer Bros. Inc., he will continue to be responsible for the activities of Escher Wyss in the U.S.A., relating to propellers and bow thrusters. Escher Wyss is a member of the Sulzer Group of companies.

## Hitachi-Zosen Delivers Fourth Of 13 Panmax-Type Bulk Carriers



The Panmax-type 60,503-dwt general-bulk carrier Evelyn is shown undergoing sea trials. The Evelyn is the fourth in a series of 13 similar ships being built by Hitachi-Zosen.

The launching and delivery ceremonies of two 60-type bulk carriers took place recently at Hitachi Zosen's Maizuru (Japan) shipyard. One ship, the Evelyn for Angelica Maritime Corporation, was completed and sailed. This ship has entered service between Australia, West Germany, America and Japan. The other ship, the Jaguar for Fidelity Maritime Corporation of Liberia, was launched and will be delivered in January, 1972.

This class of ship has a length between perpendiculars of 705 feet 2 inches, a breadth of 105 feet 7 inches, a depth of 68 feet 5 inches and a full-load draft of 40 feet 7 1/2

inches. The 60,503-dwt ships have a cargo-hold capacity of 2,620,390 cubic feet. They are powered by a Hitachi Sulzer 7RND 76-type diesel engine developing 14,000 bhp, which gives the ship a trial speed of 16.8 knots.

Hitachi Zosen had contracts for 13 ships of this type. The Evelyn was the fourth ship to be delivered of the series. It is classed by the American Bureau of Shipping. The keel was laid on March 24 and launching took place on June 19, 1971. The Jaguar, the fifth ship of the class is being classed by Bureau Veritas. All 13 ships will be delivered by the end of 1974.

## 'LIFELINE' Model 3 SEARCH INITIATOR BUOY

- Self-anchoring
- Mooring for survivors
- Radio and light beacon
- Emits marker dye
- Wreck locator

The "Lifeline" Buoy Model 3 is designed for use on coastal vessels under 75' (22.86m), and is automatically released when the vessel founders. On leaving its seating rack the buoy automatically performs the following functions:—

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- Releases marker dye, and/or marker dye and shark repellent into the ocean.
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- Becomes a stationary rallying point for survivors.
- Serves as a wreck marker for future salvage operations, diver inspections, recovery of valuables, etc.

The Model 3, as shown, is one of several models available.



Higgs "Lifeline" Model 3, Automatic Anchoring Device for Buoyant Lifesaving Equipment. Suitable for vessels of 75 feet (22.86m) and under.

Canadian Patent 849286. U.S. and world wide patents pending.

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## Trans-Sonics, Inc. Appoints Hjulian Distributor Sales Mgr.



Julius R. Hjulian

Julius R. Hjulian has been named distributor sales manager for Trans-Sonics, Inc., Burlington, Mass., responsible for planning and managing the national field sales effort on behalf of TRANSCALE™—a new line of crane safety devices for construction and longshoring markets. His primary initial duties will be to recruit and train a nationwide distributor sales organization.

Prior to joining Trans-Sonics, Mr. Hjulian held sales and marketing positions with the J.I. Case Co.'s Construction Equipment Division in Racine, Wis.; Link-Belt Speeder Company in Toronto, Canada and Cedar Rapids, Iowa, and the Scale Division of Fairbanks Morse in New York, N.Y. and Chicago, Ill. Mr. Hjulian is a

graduate of DeVry Institute of Technology and holds a B.S. degree in industrial management from Bradley University.

Trans-Sonics is a 23-year old manufacturer of precision measuring and control instruments. Formerly involved primarily in aerospace and defense work, the firm's current major efforts are commercial-oriented including, in addition to TRANSCALE, liquefied natural gas (LNG) gaging systems and other liquid level control systems for the marine market. Trans-Sonics is traded over-the-counter.

## De Laval Issues New IMO Pump Data Book

De Laval Turbine Inc. has announced the publication of a new Data Book on its IMO Marine Rotary Pumps.

The new 36-page book, Bulletin No. 3400M, contains selection guides, specifications, performance tables, and mounting dimensions of the standard line of Marine Fuel Oil Service, Lube Oil Service and Fuel Oil Transfer Pumps.

It also discusses various lube and fuel systems, as well as principles of operation and basic designs and advantages of the IMO pump in these systems.

Further information may be obtained by contacting **B. Hawks**, Manager Marine Sales, IMO Pump Division, De Laval Turbine Inc., P.O. Box 321, Trenton, N.J. 08602.

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"Navigator" off-shore self-propelled drillship owned and operated by Zapata Off-shore Company. Inter-Zinc was used exclusively on the hull, main deck fittings, substructure and heliport bracings. The hull, substructure and heliport bracings were overcoated with Intergard Mastics.

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**Inter-Zinc is an inorganic zinc silicate coating designed for greater protection of steel surfaces.** It is extremely corrosion resistant. Its high metallic zinc content provides exceptional cathodic protection to exposed steel in abraded areas.

**Inter-Zinc requires no special curing solution for hardening.** It is self curing. It can be applied at temperatures as low as 0°F or up to 95% relative humidity with no effect on the cure. It can be subjected to extreme changes in atmosphere 20 minutes after application. Inter-Zinc provides superior durability resistance to "rust creep" and has remarkable abrasion resistance when cured.

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**Inter-Zinc is specifically formulated** for simple over-coating. Overcoat Inter-Zinc with any Intergard Two Package Epoxy or Vinux Primer. Overcoat Inter-Zinc with Intergard 4437 for interim contamination protection and/or for subsequent top coats of conventional International Alkyds, Intergard Epoxies or Latenac High Performance Coatings.

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Naval Architects, Marine Engineers, Chief Draftsmen .....	533
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<b>NAVY</b> .....	364
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Ship Chandlers, Dealers & Agents .....	74
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Superintendents, managers and purchasing agents .....	1,146
Naval architects, engineers and chief draftsmen .....	793
Other employees (draftsmen, inspectors, foremen and others em- ployed by shipbuilding and repair companies) not included in above classifications .....	90
<b>VESSEL OPERATING COMPANIES—</b>	
<b>OCEAN, RIVERS, HARBORS, OFFSHORE OIL DRILLING AND RELATED OPERATIONS</b>	
(Owners, Agencies & Brokers) Companies, directors, owners, agents, presidents, vice-presidents, managers, secretaries and treasurers .....	4,277
Port engineers, superintendents, purchasing agents, port captains, port stewards, naval architects and engineers shoreside .....	1,275
Other employees ashore not included in above classifications .....	38
<b>PROFESSIONAL MEN:</b>	
Naval architects, engineers and consultants shoreside .....	1,468
Admiralty lawyers and insurance .....	30
<b>MARINE SUPPLIES &amp; EQUIPMENT:</b>	
Manufacturers, dealers and agents .....	2,211
Ship Chandlers .....	207
Allied marine industries .....	256
<b>GOVERNMENT:</b>	
U.S. Navy and U.S. Coast Guard shoreside .....	31
U.S. Maritime Administration, U.S. Senators, U.S. Congressmen and others in official capacities .....	42
<b>SCHOOLS, LIBRARIES AND ORGANIZATIONS</b> .....	76
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1



### G.M. 6-71 DIESEL GENERATOR SET

60 KW—440/3/60—1200 RPM—with switchgear.

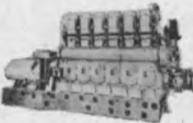
2



### 350 KW 120/240 VDC DIESEL GENERATOR SET

Ingersoll-Rand heavy duty type S engine—8 cyl.—505 HP—10 1/2" x 12. GENERATOR: G.E. 350 K.W. 120/240—600 RPM—switchgear. Good condition—as removed from Grace Line ships.

3



### 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. 35-10P-913. Complete with switch gear.

**\$12,500.**

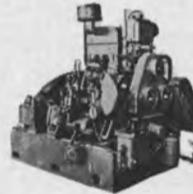
4



### UNUSED 100KW SUPERIOR DIESEL GENERATOR SET

GENERATOR: 120/240 VDC—417 amps—stab. shunt—1200 RPM. DIESEL: Superior GBD-8—8 cyl.—5 1/2" x 7.

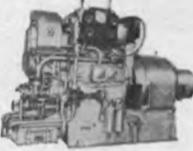
5



### UNUSED 10 KW SUPERIOR DIESEL GENERATOR SET

GENERATOR: Delco 10 KW—120 VDC—83.3 amps—1200 RPM. ENGINE: Superior diesel—2 cyl.—4 1/2" x 5 3/4"—15 HP—heat exchanger cooled.

6



### 100 KW G.M. 3-268A DIESEL GENERATOR SET

Like new. ENGINE: G.M. 3-268A—3 cylinder—6 1/2" x 7" bore and stroke. GENERATOR: General Electric—100 KW—440 volts—3 phase—60 cycle.

## TURBO GENERATOR SETS

7



### 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 operates 615 PSI—850°TT.

8



### WESTINGHOUSE 60 KW 120 VDC M-20-EH

120 VDC—1800 RPM TURBINE: M-20-EH—20 lbs—dry & saturated—25" vacuum. 7283 RPM. GEAR: 7283/1800. GENERATOR: 60 KW—120 VDC—500 amps—SK—stab. shunt wound.

9



### 300 KW WORTHINGTON-MOORE CROCKER-WHEELER UNITS

AP2 ExMedina Victory units. Worthington-Moore turbine—440 lbs—740°TT—28 1/4" vac.—type S4—5-stage—6097 RPM—serial 7547 & 7548. GEAR: 14x7—6097/1200. GENERATOR: Crocker-Wheeler 300 KW 120/240 DC—1250 amps—type 102-H—compound—973643—999759—armature flange 8 1/4"—bolt circle 7"—12 holes. Also new armature in stock (weighs 1840 lbs). Also have 2 units—generator 102 HP—300—KW120/240—stab. shunt—1200 RPM.

10



### VICTORY 300 KW WESTINGHOUSE TURBO GENERATOR SET

440#—740°F—5930 RPM—2A-9794-15-16-17—coupling non-recessed on steam end of pinion—5 3/4". GENERATOR: Westinghouse 300 KW—120/240 DC—1250 amps—1200 RPM—C.B. 208.4.

11

## G.E. 600 KW GEARED TURBO GENERATOR SETS



G.E. 600 KW geared turbo generator sets—525 lbs—825°F. TURBINE: Type FN3-FN-20—6-stage—882 HP—600 KW—525/565 lbs. G—superheat 355/371°F—exhaust pressure 1" abs. Test steam chest 850# G. 10033 RPM—6390 lbs steam flow per hour. REDUCTION GEAR: Single helix—single reduction—10033/1200. GENERATOR: G.E.—600 KW—450/3/60—1200 RPM—type AT1—0.8 PF—961 amps continuous—2 hours 25% overload—(750 KW) 1200 amps—5 minutes (900 KW) 1400 amps. Totally enclosed—water cooled—amb. temp. reg. 50°C. EXCITER: 7.5 KW—120 VDC—direct connected. Complete with rheostat type voltage regulator & motor operated generator field rheostat.

FURNISHED WITH ABS OR LLOYD'S CERTIFICATE

12

## WESTINGHOUSE MAIN GENERATOR LEVER OPERATED CONTROL CUBICLES

— COMPLETE —

13



### 1000 KW G.E. TURBO GENERATOR—READY TO GO—WITH A.B.S.

TURBINE: Type FSN—eight stage—9268 RPM—525 lbs—825°TT or 590 PSI & 0° superheat. Turbine serial No. 53729. GEAR: Serial 54804—9268/3600. GENERATOR: Serial 5596572—1000 KW—450 volt 3-phase 60 cycle—3600 RPM—0.8 PF—type ATB—2-pole—complete with air cooler. EXCITER: EDF—10.2 KW—120 volts—4-pole—3600 RPM—direct connected. UNIT JUST COMPLETELY OVERHAULED & IN EXCELLENT CONDITION—READY TO INSTALL.

14

## UNUSED GENERAL ELECTRIC 240 KW TURBO GENERATORS

TURBINE: DORV-518N—10012 RPM—410 lbs gauge—725°TT. GEAR: 10012/1200 RPM. GENERATOR: A/C—General Electric—200 KW—440/3/60—1200 RPM—D.C. exciter 40 KW 120 volts DC.

15

## UNUSED CROCKER-WHEELER 500 KW TURBO GENERATORS 120/240 VOLTS D.C.

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 temperature 50°C—application—steam turbine modified for class C4-S-A1, C4-S-A3 and T-API34 vessels.

16

## 400 KW + 50 KW SHIP SERVICE TURBO GENERATORS Formerly for DD-692 Class Vessels

TURBINE: DORV 618N—6-stage—10059 RPM. GEAR: S-193 single helical 10059/1200 RPM. GENERATOR: A.C.—400 KW—450/3/60—1200 RPM—0.8 PF—6-pole—D.C. EXCITER: 50 KW—120 volts—1200 RPM—stab. shunt. Turbine working pressure 634 lbs—850°TT. NET WEIGHT OF SET 14,855 lbs. O.A.L. 10'10"—O.A.W. 4'10"—O.A.H. 5'10". 2" Steam inlet—17" I.D. exhaust. Steam flow at 400 KW 5100 #/hour. WILL SELL ROTOR SEPARATELY

17

## GENERAL ELECTRIC 1250 KW TURBO GENERATORS

GENERATOR: G.E. 1250 KW—440/3/60—3600 RPM. GEAR: 7938/3600. TURBINE: FSN—10-stage—525 lbs/825°TT. With switch gear.

## TURBINE ROTORS

### MAIN PROPULSION

18



### 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.

19

## SPECIAL! COMPLETE TURBINE OR ROTORS

8500 HP G.E. C-3 Victory—Sun C-4's  
L.P.—Serial 77943 H.P. Serial 77942  
G.E.I. 16263

20

## NEW L.P. BLADE RINGS for large 8500 H.P. Victory

Joshua Hendy Westinghouse

21

## NEW 8500 H.P. G.E. TURBINES

Large Victory or C-3

H.P. #72271 L.P. 72272

10 BOXES SPARE PARTS, TOOLS & FITTINGS. WITH MANEUVERING VALVES. ALSO AVAILABLE

## U.S.M.C. RECONDITIONED SET H.P. & L.P.

With 13 boxes spare parts. H.P. 77994—L.P. 77987—with maneuvering valves.

22

- 23** 8500 H.P. G.E. — C-3 OR VICTORY  
H.P.—8-stage—6159 RPM—serial 62043  
L.P.—8-stage—3509 RPM—serial 62042  
G.E.I. 16263
- 24** 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
- 25** VICTORY SHIP AP2 H.P. & L.P. TURBINES  
NEW — UNUSED — 6000 HP 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

**AUX. GEN. ROTORS**

**250 KW & 300 KW  
ALLIS-CHALMERS ROTORS**



Typical serial No. 3067—will interchange with most 250 KW & 300 KW Allis-Chalmers as installed on Victory's and Moore C2-C3 vessels.

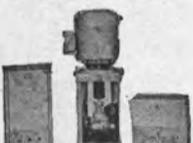
**300 KW 5965 RPM JOSHUA HENDY**

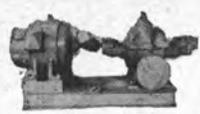
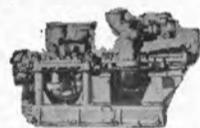
- 27** Turbine—3H-69 Gear—52269  
Turbine—3H-52 Gear—52252  
Turbine—3H-62 Gear—52262

**T-2 ROTORS, STATORS  
COOLERS, ETC.**

- 28** ELLIOTT 10-STAGE MAIN PROPULSION  
TURBINE ROTOR  
#28702—Ex-Texas Trader—will interchange with 10 stage  
G.E. 1st Row—1 1/8" to shroud—1 3/16" O.A.H.  
2nd Row—1 7/16" to shroud—1 9/16" O.A.H.
- 29** UNUSED G.E. MAIN GENERATOR  
AIR COOLER

**PUMPS**

- 30**  **VICTORY AP2 MAIN  
CIRCULATOR**  
Ingersoll-Rand—18 VCM—  
20" x 18"—10,500—10 lbs.  
MOTOR: 75 HP—Allis Chal-  
mers—230 VDC—670 RPM.  
Spare unused armature. Mo-  
tor frame F.B.V.—162.
- 31**  **UNUSED 10x9x12  
VERTICAL SIMPLEX  
FUEL OIL  
TRANSFER PUMPS**  
Furnished on some T-2 Tankers. 160 GPM Bunker C  
—viscosity 70 to 700 SSF 122°F @ 100 lbs. discharge  
pressure. WP steam 150 lbs.—exhaust 10 lbs. 1 1/2"  
steam inlet—1 1/2" exhaust. 4" Pump suction—3 1/2"  
discharge.
- 32**  **WORTHINGTON  
16"x14"x18"  
VERTICAL DUPLEX  
STRIPPING PUMP**  
1400 GPM @ 110 PSI—suc-  
tion lift 11.5 ft.—steam  
back pressure 15 lbs. 14"  
Suction—10" Discharge—  
2 1/2" Steam—4" Exhaust.  
Overall width 6'8"—Overall  
height 9'1 1/2"—depth 3'9 1/2"  
—wt. approx. 10,000 lbs.
- 33**  **NEW BLACKMER  
FUEL OIL TRANSFER  
PUMP**  
Rotary—50 GPM—50 lbs.—  
2"—5 HP—440/3/60—with  
starter & spares.
- 34**  **UNUSED BLACKMER  
VERTICAL ROTARY  
PUMP**  
4"—100 GPM—100 PSI—  
15 HP—440/3/60—gear  
head.
- 35**  **R-2418 WATEROUS  
CARGO PUMP**  
Bronze—14"—top discharge—capacity 2500 GPM—  
20 PSI. Bilge service—oil service—2400 GPM—75  
PSI. Reduction gear. ENGINE: Cummins JN-130M—  
6 cylinder—4 1/2 x 5—130 HP—air starting.

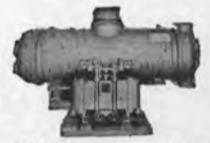
- 36**  **UNUSED WARREN  
BRONZE PUMP**  
1175 GPM—11.1 lbs.—8" x 8". MOTOR: Reliance  
10 HP—115 VDC—850—RPM—76 amps.
- 37**  **NEW WORTHINGTON  
VERTICAL SUBMERS-  
IBLE BILGE PUMP**  
For emergency use on passenger ships, etc. PUMP:  
JAS—264 GPM—171' head—two 6" inlets—one 5"  
outlet. Motor: 40 HP—230 VDC—149 amps.
- 38**   
6" Suction and discharge—210 GPM—45 PSI—125  
RPM. MOTOR: 10 HP—230 VDC—Frame 67—with  
gear.
- 39**  **UNUSED SIZE 4  
BUFFALO 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" x 4"—built  
for USN DD destroyers.

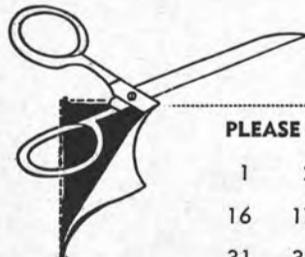
**WINCHES AND  
WINDLASSES**

- 40**  **VICTORY UNIT  
WINCHES**  
50 HP—230 VDC—U-1, U-2, U-4, U-5—reconditioned.
- 41**  **MODEL U-6 DOUBLE  
DRUM WINCHES  
WITH GYPSIES**  
50 HP—230 VDC—reconditioned.
- 42**  **HYDE NO. 7  
WINDLASS**  
1 3/4" Chain—Wildcat centers 3'3"—Handles 3000  
lb anchors. MOTOR: 8.7/35 HP—440/3/60—1800/  
450 RPM.
- 43**  **NEW—UNUSED LINK  
BELT WINDLASS**  
1 5/8" and 7000 lb. anchors. 56" Centers—50 HP—  
230 VDC—spares.
- 44**  **IDEAL WINDLASS—  
UNUSED**  
1-5/16" Chain—36" Centers—15 HP—115 VDC—  
1750 RPM—6000 lb. line pull.
- 45**  **UNUSED 70 HP  
McKIERNAN-TERRY  
WINDLASSES**  
2 3/4" Chain and two 10640 lb anchor & 30 fathoms  
chain @ 30 FPM. 70 HP—230 volts—shunt DC mo-  
tors—233 amps—550 RPM—55°C rise. Wildcat cen-  
ters 47 1/2". Base 9'5" wide x 11' long. Weight  
36,000 lbs.

- 46**  **LCT-6 JAEGER  
GASOLINE DRIVEN  
WINCH**  
With torque converter & free declutchable drum, 31-  
000 lbs @ 6 FPM or 3000 lbs & 350 FPM. DRUM:  
20"x23 3/4"x37 1/2". GYPSY: 15"x13". Twin Disc torque  
converter—6 cyl. Hercules gas engine model WXL3-3.  
Total weight approx. 4500 lbs—serial 81843.

**MISCELLANEOUS**

- 47**  **VICTORY  
AP2—WESTINGHOUSE  
MAIN PROPULSION  
GEAR**  
6000 SHP—Serial 4A—1620—Medina Victory.
- 48**  **UNUSED  
1135 SQ. FT.  
C.H. WHEELER  
CONDENSER**  
20" Ex. inlet—5/8" Cu-Ni tubes—with or without air  
ejector.
- 49**  **1 PAIR OF 300 HP  
UNION DIESEL  
ENGINES**  
Port and starboard—model 06—1300 HP at 350 RPM  
—4 cycle—direct reversible—11 x 15—overhauled  
1966—in good condition. Just in from Navy.
- 50**  **MODEL O-2-D M&T  
RECONDITIONED  
UNITS**  
Hydraulic starting steering,  
raising & lowering tailfin.  
Navy reconditioned 1965—  
fully checked out by us. Will  
demonstrate running. Wt.  
about 9500 lbs. PROPELLOR: 48"x24"—3 blade.
- 51**  **HYDE 30" DOCK  
CAPSTAN**  
10" x 10"—reversible—W.P. 125 lbs—2 1/2" steam—  
3" exhaust.
- 52**  **DOUBLE INPUT—  
SINGLE OUTPUT  
DIESEL REDUCTION  
GEARS**  
Farrell-Birmingham—3200 SHP. Reduction gear:  
1.81:1—handles two 1600 HP diesels @ 720 RPM.  
With hydraulic couplings & Fawick clutch. Port and  
starboard.
- 53**  **INGERSOLL-RAND  
MODEL 40 AIR  
COMPRESSOR**  
Two stage—135 CFM—7" x 6 1/4" x 5"—110 lbs—  
870 RPM—inner cooler. MOTOR: Allis-Chalmers 40  
HP—230 VDC—145 amps—1750 RPM—Model EB  
121.



PLEASE SEND INFORMATION ON THE FOLLOWING: (Please circle items)

12/1/71

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
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46	47	48	49	50	51	52	53							

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# T-2 TANKER MAIN & AUXILIARY EQUIPMENT

## From 2 Vessels Reconditioned by U.S. Gov't

### ALL MATERIAL IN FIRST CLASS CONDITION WITH A.B.S.



**MAIN PROPULSION ROTOR — G.E.**

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

#### 2 COMPLETE G.E. TURBINES

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

WILL INTERCHANGE WITH ELLIOTT MAIN TURBINE

- 2 COMPLETE SETS MAIN DIAPHRAGMS..
- 2 COMPLETE SETS LABYRINTH PACKING
- THRUST BEARINGS
- COMPLETE GOVERNOR ASSEMBLIES
- OPERATING CYLINDERS
- CONTROL VALVES
- SHAFT BEARINGS

ALSO

#### THROTTLE VALVE ASSEMBLY



**G.E. REVOLVING FIELDS**

Rewound 1968—main propulsion—by G.E. Seattle. Re-checked June 1971 by G.E. Service Shop—A.B.S.



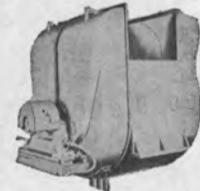
**WESTINGHOUSE REVOLVING FIELD**

With A.B.S.—ex-Ohio Sun.



**MAIN G.E. STATOR**

With A.B.S. — reconditioned 1970.



**WESTINGHOUSE MAIN GENERATOR STATOR**

Reconditioned Westinghouse — #39519P915 — Thermo-plastic winding.



**NEW—UNUSED G.E. MAIN GENERATOR COOLER**

Also Westinghouse—reconditioned to A.B.S.



**G.E. AUXILIARY TURBINE ROTOR**

For 525 KW G.E. Turbine DORV-325M—5645 RPM.



**COMPLETE T2 TANKER TURBO GENERATORS**

TURBINE: DORV-325M—525 KW—5645 RPM—435 PSIG—28" exhaust. REDUCTION GEAR: S-162—Form D—5641/1200. A.C. GENERATOR: 500 KVA—400 KW—440/3/60—1200 RPM—0.8 PF. D.C. EXCITATION GENERATORS: 75/55 KW—form AL—110 volts D.C.



**NEW STYLE AMPLIDYNE**

5LY148A—Type A.M.—Frame 605.



**75 KW—55 KW EXCITER ARMATURES**

Also stators & pedestal bearings—400 KW aux. generator revolving fields.



**T2 AUXILIARY GENERATOR S-162 REDUCTION GEARS—PINION & BULL GEAR—BEARINGS**



**AUXILIARY GENERATOR THROTTLE VALVE**



**WESTINGHOUSE MAIN CARGO PUMP MOTORS**

1 Unit—frame 874—125 HP—440/3/60—168 amps 590 RPM. 2 Units—frame 876C—125 HP—type CS—440/3/60—159 amps—585 RPM.

**G.E. MAIN CIRCULATING PUMP MOTORS—125 HP**

#### COFFIN FEED PUMPS



Type C-G 2-A



Type F

#### WESTINGHOUSE MAIN PROPULSION TURBINE

Profile (unshrouded)—serial 2-A-9361-21.



**COMPLETE G.E. THROTTLE VALVE**

With governor—for above turbine.

#### 2 WESTINGHOUSE AUX. 538 KW TURBO GENS

Turbines—gears—400 KW generators—(110 KW—32.5 KW—5 KW excitation).

WILL SELL ROTORS—GEARS—EXCITERS SEPARATELY. ALSO AVAILABLE — EXCITERS



(110 KW—28 KW—5 KW) or (110 KW—32.5 KW—5 KW) SWITCHGEAR FOR ABOVE

also available.

WEST. MAIN PROPULS'N MOTOR COOLER



**T2 ANCHOR WINDLASSES**  
1 American Hoist & Derrick —12x14 for 2 5/16" chain.  
1 American Engineering Co. —12x14 for 2 5/16" chain.

#### T2 WARPING WINCH

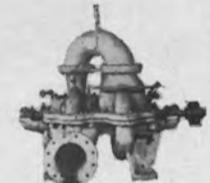
Poop—9x12—AH&D.

#### T2 DECK WARPING & HOSE HANDLING WINCH

8 1/4 x 10—Hunt Tool Co.

#### MAIN CIRCULATING PUMPS

Ingersoll-Rand—24 V.C.M.



**INGERSOLL-RAND CARGO PUMPS**

200 GPM—100 PSI—Model 6 GT—10" suction—8" discharge.

#### BRONZE T2 TANKER STRIPPING PUMPS

14x14x12—700 GPM @ 100 lbs. ALSO EX-MISSION 14x14x12 WILSON-SNYDER IN STOCK.



**T2 TANKER FIRE & BILGE PUMP**

Bronze — 10x7x10—vertical duplex. Steam pressure 150 lbs gauge—exhaust pressure 10 lbs gauge — discharge pressure 100 lbs gauge—300 GPM.



**MAIN INJECTION VALVES**

WRITE FOR INFORMATION ABOUT THE FOLLOWING EQUIPMENT & ANYTHING YOU MAY NEED:

T2 Tailshafts—Mission T2—SAE—2 Tailshafts—T2 Propellers—Mission Propellers—T2 Rudders — Mission Rudders — Large 14 1/2" Rudder Stocks — Auxiliary Steering Rams — Butterworth Heaters—Butterworth Pumps—Bilge Pumps—Auxiliary Circulators—Auxiliary Condensate Pumps—Main Condensate Pumps.



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## Promising Oil Strike Announced Off Coast Of Nova Scotia



Peter Nicholson, Nova Scotia Minister of Finance, points to Sable Island off the coast of Nova Scotia where Mobil Oil Canada Ltd. recently announced an oil and natural gas strike. Pictured left to right with Mr. Nicholson at the Plaza Hotel in New York are: Robert M. Norris, president, National Foreign Trade Council; T.J. Reddington, Government relations advisor, Mobil Oil Corporation, and A. Garnet Brown, Nova Scotia Minister of Highways and Tourism.

The discovery of oil on a small island off the coast of Nova Scotia may mean the future prosperity of the province and a huge new source of supply for an oil-hungry continent.

The Honorable A. Garnet Brown, one of the two members of the Nova Scotia Government who addressed a luncheon meeting of about 200 leading members of the financial and industrial community, made the statement in reference to a recent announcement that Mobil Oil Canada Limited and Texas Eastern Transmission Corporation have found oil on Sable Island. The island, known as "the graveyard of the Atlantic" because of the number of ships that have foundered there, is about 175 miles from Halifax, the capital city of the province.

Mr. Brown said the discovery is the first to be reported off the Atlantic coast of Canada and includes natural gas and condensate. He pointed out that the commercial significance of the discovery has yet to be proved and that it will take some time to do this. "The economic benefits would include employment, manufacturing, shipping and production revenue, as well as from the growth of a vast new ocean engineering industry producing the equipment and material for production, storage and pipelines," Mr. Brown stated.

The total expenditure this year by companies drilling off the Atlantic coast of Canada are expected to be at least \$100 million, twice the amount spent last year.

The Honorable Peter Nicholson, Minister of Finance for Nova Scotia, said the United

States is a major market for Nova Scotia bonds. During the last five years the province has had issues to a total of \$375 million. He said the improved transportation services with other parts of Canada, the United States, and abroad are an important factor in the province's overall economic development.

"There is the 56-acre container terminal which is linking our great and historic Port of Halifax with other ports of the world. This port already is providing container services on regular schedules to inland America, Europe, the Caribbean, Australia and New Zealand. The largest containerships in the world are weekly callers at Halifax." Mr. Nicholson said Nova Scotia's geographic position at the crossroads of world trade is one of the major reasons why the province is gaining international interest.

## Fishing Vessel Operators May Now Apply For Interim Capital Construction Funds

The Commerce Department's National Oceanic and Atmospheric Administration has announced that owners or lessees of commercial fishing vessels may now make application for Interim Capital Construction Fund Agreements.

Under a 1970 Amendment to the Merchant Marine Act, eligible citizens may enter into agreements with the Department of Commerce to establish a fund for the purchase, construction, or reconstruction of vessels documented for operation in the fisheries of the United States. This law allows taxpayers who deposit, among other things, income derived from the operation of vessels covered under the agreements to reduce their taxable income by the amounts of such deposits.

A Notice published in the Federal Register of October 9, 1971, contains the form of Interim Capital Construction Fund Agreement to be used for fishing vessels, provides instructions for making an application for an agreement, and invites comments regarding the contents and form of the Permanent Capital Construction Fund Agreement and related regulations.

This new program will be administered by the National Oceanic and Atmospheric Administration's National Marine Fisheries Service. Interested parties should write to the Director, National Marine Fisheries Service, Room 3356, Interior Building, Washington, D.C. 20235.



**WESTWARD HO:** Two Pacific cities were assured of major maritime gatherings when Western shipping executives recently joined forces in Tulsa, Okla. On hand at the national convention of The Propeller Club of the United States were (left to right) Drew Foss, vice president of Foss Launch & Tug Co., from Anchorage, Alaska; Frank Ewers, general manager, Marcona Corp. and president of the Club's San Francisco Chapter; Robert Langner, manager of the Marine Exchange of the San Francisco Bay Region; Kenneth Lewis, president of Castle & Cooke Terminals, Honolulu, and Herbert O. DuMont, general manager, Connell Bros. Co., Agana, Guam. The City by the Golden Gate will host the National Maritime Association's 1973 conclave, while Mr. Lewis's bid for Honolulu in 1978 received the approval of the almost 500 shipping and port executives gathered in Tulsa.

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An efficient sea-land point of transfer reaching deep into America's heartland and western coast with land bridges critical to intermodal shipping.

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## SNAME Honors Two Aqua-Chem Executives

Two Aqua-Chem, Inc., Milwaukee, Wis., executives have been granted honorary life membership in The Society of Naval Architects and Marine Engineers.

Charles D. Rose, vice president, marketing, and Philip Liu, chief thermal design engineer for the company's Water Technologies Di-

vision, were recently cited at a luncheon in New York City. The two were honored for their contributions to the Society's recently published book "Marine Engineering." Mr. Rose and Mr. Liu contributed a chapter on "Heat Exchangers." Mr. Rose also prepared a chapter on "Distilling Plants."

The awards were presented by Daniel D. Strohmeier, president of the Society.

## Contract To Build New Type Drilling Unit Awarded To Halifax

Southeastern Commonwealth Drilling Ltd., Calgary, Alberta, Canada, has awarded a contract for the construction of a new type of semi-submersible offshore drilling unit to the Halifax Shipyards Division of Hawker Siddeley Canada, Ltd.

The new vessel, to be known as the

Sedco 700 design, will be rectangular in shape. Its main deck will measure 195 feet by 225 feet, supported by eight columns, four along each side. Overall height of the vessel to the main deck will be 130 feet.

The Sedco 700, in operation, can be submerged to a maximum depth of 80 feet. Each corner of the vessel will be equipped with an electrically powered thruster, each capable of a 50,000-lb. thrust.

The new unit, valued at more than \$20 million including equipment supplied by the owner, will be the fourth offshore drilling vessel built for Sedco by Halifax Shipyards. The other three are triangular in shape with a circular pontoon supporting each corner.

## Capt. Vorenkamp Joins Acadian Marine Service



Capt. Rudy Vorenkamp

Doyle Landry, president of Acadian Marine Service Inc., has announced that Capt. Rudy Vorenkamp has joined Acadian as executive vice president. Captain Vorenkamp was formerly marine superintendent for Sedco Inc.'s Australian operations and prior to holding that position, was associated with major marine transportation companies throughout the world for approximately 15 years.

Acadian Marine Service, Inc., with offices in Lafayette, New Orleans, and Delcambre, La., is engaged in supplying marine transportation to oil companies and other firms throughout the world engaged in the exploration and development of oil and gas. Acadian owns, or has under construction, approximately 35 crew, utility, and cargo-towing vessels ranging from 27 to 185 feet.

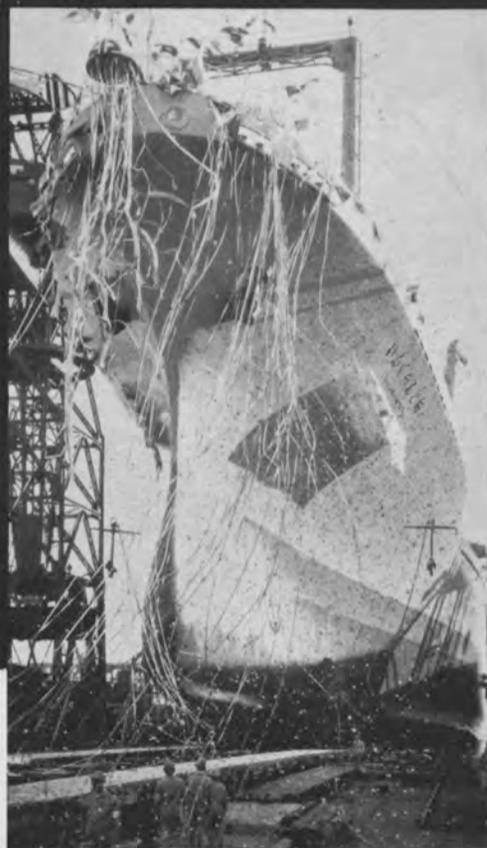
## Nathan Friedland Joins Tetra Tech, Inc.

Nathan Friedland has recently joined the marine research and development firm of Tetra Tech, Inc., in Pasadena, Calif., as group manager of the Ocean Systems, Naval Architecture, and Ocean Engineering Divisions.

Previously, Mr. Friedland directed the design of advanced marine vehicles for such companies as Global Marine, North American Rockwell, and Aerojet General. He has also held leading positions with the naval architectural firms of George G. Sharp, Inc., and M. Rosenblatt and Son.

Mr. Friedland is an active member of The Society of Naval Architects and Marine Engineers, and the American Society of Naval Engineers.

# PACE-SETTING ENGINEERING TRENDS ARE IN ALL DEPENDABLE KHI SHIPS THAT CIRCLE THE WORLD



Kawasaki Heavy Industries is preparing for the eventual creation and construction of a gigantic 600,000 dwt ship. Now under construction is a mammoth building dock 420 meters long, 75 meters wide and 11 meters deep. This building dock is targeted for November 1972 completion. It is being constructed to meet ever-increasing, world-wide demands for KHI's superior ship-building engineering.

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# “When that storm hit, I thought I’d lost my tow for sure —any other rope would have parted.”

When the McAllister Towing Company first decided to use new blue-tinted Super 707 nylon rope, they didn't know what was in store for them. Captain Frank Bradley was to make a routine trip hauling two heavily laden mud dumpers. Out at sea, a sudden storm caught the captain and his tow. The load put on the Super 707 rope was so great that the heavy-

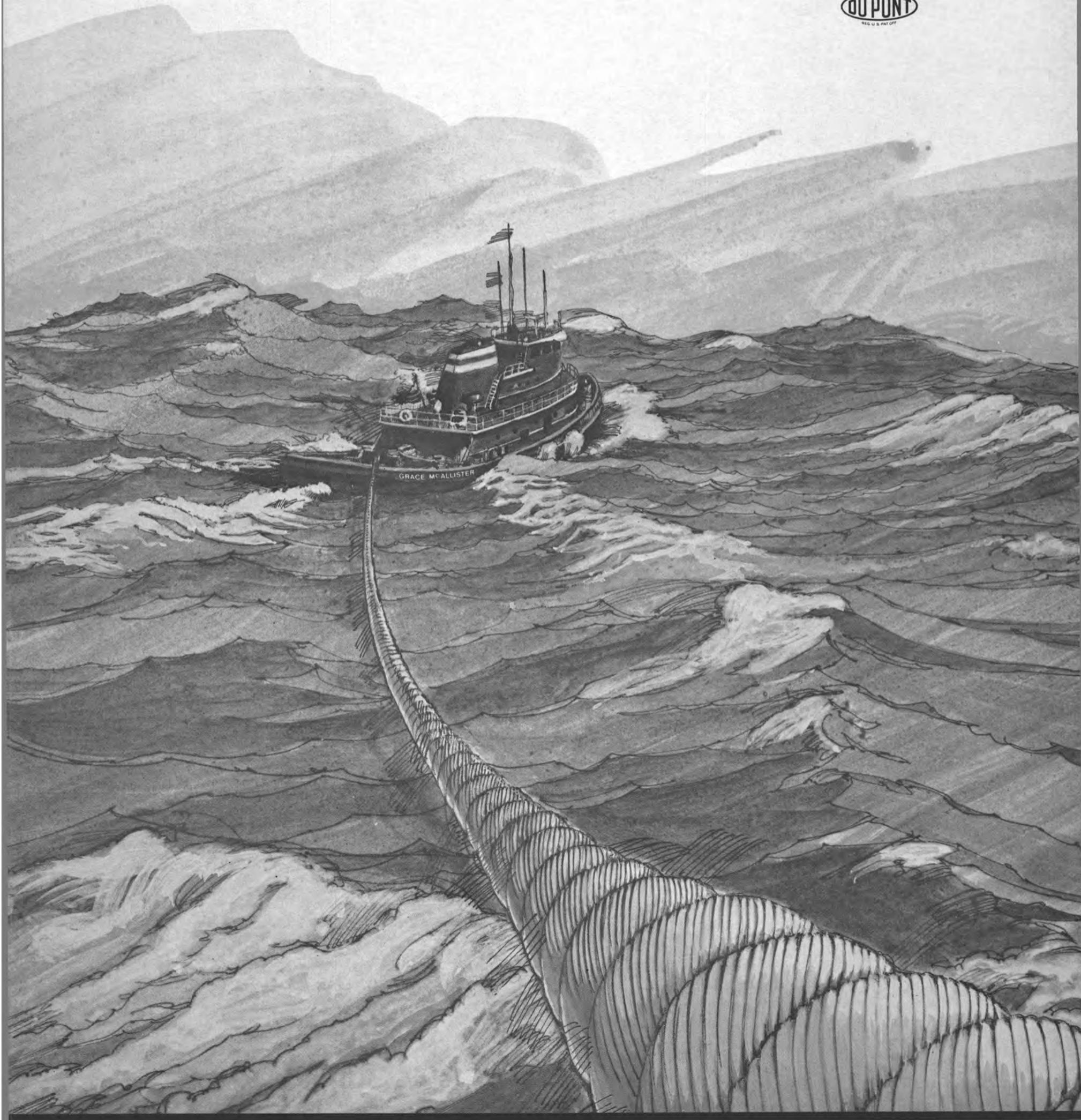
duty-steel thimble was bent. Yet the line held. And everybody and everything got back safely.

The large lines of Super 707 nylon now available are the strongest ever made per unit of weight. In a recent test, the breaking strength of a 3-inch-diameter rope of Super 707 exceeded the Military Spec (MIL-R-17343-D) for nylon by *twenty tons*—although it contained less nylon

than permitted by that spec.

And what that means to you is a tougher, more reliable rope. A longer-lasting rope—with greater resistance to abrasion.

So get Super 707 nylon rope. It's the tough one—tinted blue so you'll know it. For more information, write: Du Pont Company, Room 31H1, Wilmington, Delaware 19898.



## Crowley/Red Stack Opens Houston Office

Crowley/Red Stack, operators of Puerto Rico Marine Lines' tug and barge service between west Gulf ports and Puerto Rico, has announced establishment of a Houston, Texas, office.

The office is located in the Cotton Exchange Building, 1300 Prairie Avenue. Jack Brodie has been assigned to the office as owners' representative.

Lykes Lines will continue as general U.S. agents for this service.

The Houston office will also serve as Southwest headquarters for other Red Stack operations, including Bulk Petroleum Carriers, Puget Sound Tug and Barge, and Arctic Marine Freighters.

PRML initiated service between Gulf ports and Puerto Rico earlier this year utilizing oceangoing "super-barges" and mechanical lift handling of unitized and palletized freight.

One of the huge barges has been outfitted with a 340,000-cubic-foot covered structure which enables the barge to serve as a "floating warehouse."

Direct transfer of palletized cargo from the dock to flat-deck barges is accomplished by two teams of heavy-duty fork lift trucks, one operating on the dock, the other on the barge.

PRML provides service between Houston, Lake Charles, Port Arthur

and Galveston to Ponce, Mayaguez and San Juan, Puerto Rico.

Bulk Petroleum Carriers, a Red Stack affiliate, has been moving refined petroleum products to various East Coast ports from Puerto Rico.

Another Crowley/Red Stack Company, Arctic Marine Freighters, wrote maritime history in 1970 when it moved 187,000 tons of cargo from West Coast ports to northern Alaska's Prudhoe Bay, beyond the Arctic Circle, in the largest single commercial haul ever to move through Arctic waters. AMF hauled additional freight to Alaska's North Slope this summer.

## Fischer To Manage Mobil Oil's U.S. Marine Operations



Arthur E. Fischer

Arthur E. Fischer has been appointed manager, U.S. operations, in Mobil Oil Corporation's marine transportation department.

Mr. Fischer received a B.S. degree in economics and sociology from Bowdoin College in 1938. He joined Mobil in 1942 in New York and has spent his entire career in marine transportation.

He became manager of marine traffic in 1953 and of the inland division in 1957. In 1962, he was transferred to Beaumont as manager of the Gulf-East Coast tanker fleet. In 1967, he moved to Bermuda as president and general manager of Mobil's Bermuda-based marine companies. He returned to New York two years ago as employee relations manager of marine transportation.

Mr. Fischer is the former director of the American Waterways Operators, Inc., and of the Atlantic Coast and Gulf of Mexico Towboat Association. He has also been active in the National Safety Council, New York State Waterways Association, and numerous other marine trade organizations.

## Order For Twenty-Five Covered Hopper Barges To St. Louis Ship

Twenty-five covered hopper barges have been ordered by Wisconsin Barge Line, Cassville, Wis., from St. Louis Ship, a Division of Pott Industries, Inc., St. Louis, Mo.

The box barges, 200 feet by 35 feet by 12 feet, will be equipped with rolling covers. Delivery will be made in the spring of 1972. The 24th barge of this series will carry the distinction of being Hull No. 3000 delivered by the shipyard group of Pott Industries, Inc.



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It's the Carrier-Transcold 69NK. One of over 400 ordered by Columbus Line, Inc. The first production refrigeration unit of its kind made in the United States.

Clips on seagoing containers in minutes. With a forklift. With no trouble. Take it off just as fast.

Yet the 69NK gives you what you need to refrigerate your cargo when it's hauled by truck or train.

For instance, a Carrier serviceable compressor. Proved with years of marine use.

Air-cooled diesel power for operating economy.

Our clip-on unit is compact, too. Won't

eat up space, wherever it goes.

And for maintenance, you get at everything from the outside.

Of course, our 69NK is only the latest in a long line of Carrier-Transcold units made to meet maritime refrigeration specs. Something we've been doing for over 50 years. With service all over the world.

Clip on or built in? Ask us. Carrier-Transcold Company, Carrier Parkway, Syracuse, N.Y. 13201.



69NK simply clips to the container for shore duty, using the same air connections as aboard ship.

## Breda To Market B&W Boilers In Italy

Babcock & Wilcox (U.S.A.) and Breda Termomeccanica E Locomotive, S.p.A., Milan, have signed a license agreement giving Breda the right to manufacture and market B&W-designed marine boilers in Italy.

In announcing the agreement, Robert E. Whitam, B&W's man-

ager of Marine Commercial Operations, said the move marks the entry of B&W (U.S.A.) into the international marine propulsion machinery market.

Mr. Whitam noted that the preponderance of world ship construction is foreign, and that the agreement would now open up this previously untapped market for the company.

"In addition, we hope to convey

to domestic shipowners and operators a broadening of our scale of operations," Mr. Whitam said, pointing out that a "good percentage" of ships built overseas are owned and operated by American companies.

Babcock & Wilcox (U.S.A.) is one of the world's largest manufacturers of marine boilers with over 11,000 boilers installed aboard more than 4,700 vessels of all types.

Breda, which is also licensed by B&W (U.S.A.) to manufacture and market utility boilers in Italy, is a major manufacturer of mechanical machinery.

## USCG Icebreaker Project Officer Assigned To Lockheed



Project leaders confer over the hull model of the USCG icebreaker. Left to right are Comdr. David L. Green, newly assigned resident project officer for the Coast Guard; Martin L. Ingwersen, Lockheed's executive vice president for operations, and Earl R. (Buck) Saunders, Lockheed's icebreaker project manager.

Comdr. David L. Green, formerly Chief of the Naval Engineering Branch of the 11th Coast Guard District Headquarters in Long Beach, Calif., has been assigned to Lockheed Shipbuilding and Construction Company, Seattle, Wash., as the Coast Guard's resident icebreaker project officer. Lockheed is building the Coast Guard's new 400-foot 60,000-shaft-horsepower icebreaker under a \$52-million contract awarded in August.

Commander Green heads a Coast Guard office at the shipyard that will grow to 30 officers and men by July of next year.

A 1955 graduate of the Coast Guard Academy, New London, Conn., Commander Green also holds a master's degree in naval architecture and marine engineering from the University of Michigan.

His icebreaker experience includes duty as engineering officer and executive officer aboard the CGC Makinaw, an icebreaker assigned to the Great Lakes. Commander Green's other duty assignments have included command of the patrol boat Cape Fairweather, the Cape Christian Loran Station on Baffin Island, and the Coast Guard Resident Inspection Office at Avondale Shipyards, New Orleans, La.

## AEIL Appoints John H. Crosthwaite

American Export Isbrandtsen Lines has appointed John H. Crosthwaite as general manager of sales, according to an announcement by Laurence J. Buser, president and chief executive officer of the line.

Mr. Crosthwaite has been with the company since 1965, most recently as general sales manager for container operations. Prior to that, he was Midwest regional manager based in Chicago.

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## Seatrain Appoints Davis As Director-Marketing For France



James Davis

As further proof of Seatrain's rapid growth in Europe and especially France, the giant American container line has announced the appointment of **James Davis** as director-marketing for France.

According to **Neal Nunnely**, vice president and general manager in Europe, "Mr. Davis's appointment reflects the growing utilization of Seatrain's express service direct to the United States East and West Coasts from Le Havre.

"Mr. Davis was previously corporate marketing manager at Seatrain headquarters in Weehawken, N.J., and his wide experience in containerized transportation will be particularly helpful in assuring Seatrain customers the finest in service," Mr. Nunnely added.

Based in Paris, Mr. Davis will direct the efforts of Seatrain's specially trained staff operating through Jokelson & Handtsaem S.A. offices in France and southern Europe. He will report directly to Mr. Nunnely, who is based in Rotterdam and heads all European operations.

In recent weeks, Seatrain has added direct calls to the U.S. West Coast via Long Beach and Oakland, Calif. The new service follows just a short time after the company put three new giant containerships, including the gas turbine powered Euroliner and Eurofreighter, into the North Atlantic service. The line also operates ships to and from the U.S. East Coast and Puerto Rico.

## Sulzer Creates New Department To Handle Escher Wyss Propellers

Sulzer Bros. Inc., 19 Rector Street, New York, N.Y., and Propellers, Inc., 77 River Street, Hoboken, N.J., have announced the transfer of all Escher Wyss controllable pitch propeller activity from Propellers, Inc. to Sulzer Bros. Inc. Escher Wyss is a member of the Sulzer Group.

According to the recent announcement by **Richard Herold**, president of Sulzer Bros. Inc., and **W.B. Arnold**, president of Propellers, Inc., all future inquiries for Escher Wyss propellers, regardless of manufacturing source, will now be handled by the newly formed Controllable Pitch Propeller Department of Sulzer Bros. Inc., 19 Rector Street, New York, N.Y. 10004.

## Mooremac Promotes Moore And Gerardi

Robert E. O'Brien, executive vice president of Moore-McCormack Lines, Incorporated, has announced the appointments of **Charles F. Moore** as general traffic manager and **Daniel S. Gerardi** as outbound traffic manager.

As general traffic manager, Mr. Moore will oversee all traffic matters in the company's American

Republic Lines service to South America and the Robin Line service to South and East Africa. Mr. Moore joined Moore-McCormack Lines in 1937 and, with the exception of a tour of active duty in the Navy during World War II, has served in traffic positions in all the company's services since that time. In 1962, Mr. Moore was appointed freight traffic manager of the Robin Line Division, and traffic manager of the South American and

African outbound services in 1970.

Mr. Gerardi has been with the steamship company since 1951, being assigned first to the South American bill of lading department. After returning from the Korean War, Mr. Gerardi was reassigned to the South American Traffic department. He assumed the duties of assistant traffic manager in 1970. Mr. Gerardi is a member of the Foreign Commerce Club, and president of Maritime Athletic Association.

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3"	*2	20	
4"	2	42	89
6"	2	48	121
8"	3	74	184
10"	3	86	
12"	4	122	334
14"	4	150	
16"	5	186	
20"	6	252	
24"	7	340	

\*small cams

C-L couplings are available in weld neck, slip-on or screw neck (spl. order) short spool piece • aluminum or steel blanks available.

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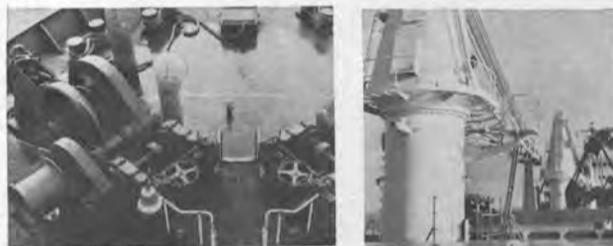
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## Matson Navigation Promotes W.N. Boyer

W.N. Boyer has been promoted to manager of preliminary design by Matson Navigation Company, it was announced by A.J. Haskell, vice president, engineering and marine operations.

Mr. Boyer joined Matson in October 1966 as a project engineer and has been senior project engineer since December 1968. He

served as project engineer for construction of Matson's container-ships Hawaiian Enterprise and Hawaiian Progress, both built by Bethlehem at Sparrows Point, Md.

Before he came to Matson, Mr. Boyer served with General Dynamics Electric Boat Division at Groton, Conn. He is a graduate of the University of Michigan and received a master's degree in engineering from the University of Connecticut.



**SOUTH AFRICA'S LARGEST TANKER:** The 217,400-dwt tanker Kulu for the South African Marine Corporation Ltd. (Safmarine) was recently completed at the Kure Shipyard of IHI (Ishikawajima-Harima Heavy Industries Co., Ltd.), Japan. The vessel's approximate measurements are 1,060 feet in overall length, 158 feet in breadth, 84 feet in depth, and 64 feet in draft. Powered by a 33,400-bhp IHI steam turbine, she runs at a service speed of 15.7 knots. The Kulu is the first of three large tankers ordered from IHI by Safmarine, and is the largest tanker ever built for South Africa. The second will be of the same size but the third will be an even larger 266,000-dwt tanker. The second ship, the Gondwana, was launched on September 30 at the same yard and is scheduled for delivery in early 1972. The construction of the third ship will be started in September 1972 and completed in April 1973 at the Kure Shipyard. The registered owner of the Kulu is the Kulu Tanker Corporation Ltd.

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## F.W. Hartmann & Co. Announces Elections

Joseph F. Daly, president of F.W. Hartmann & Company, Inc., announced that at a recent meeting the directors of the corporation elected Patrick Mongno as vice president, John Benasich as assistant vice president, Edward De Francesco as assistant vice president, and Arthur Cadore as assistant treasurer.

Mr. Mongno heads the Hansa Line USA/Mideast operation; Mr. Benasich is in charge of the Black Star Line; Mr. De Francesco heads the heavy lift, roll-on/roll-off and unitization departments, and Mr. Cadore is chief accountant of the company.

## NKK Names Sasabe To Managerial Post In New York Office



Sachio Sasabe

Sachio Sasabe has been appointed manager, shipbuilding and heavy industries department, New York office, Nippon Kokan (NKK), succeeding Hiroo Ikematsu, who has been named manager, initial design department, shipbuilding division, Tokyo.

NKK is Japan's only integrated shipbuilder - steelmaker - fabricator and the nation's number two steelmaker. The company's fiscal 1970 sales (April 1, 1970 to March 31, 1971) were \$1,631,000,000.

Mr. Sasabe will be responsible for the sale and service of ships and for promoting sales of heavy equipment manufactured by NKK. This includes the Munkloader, a high-efficiency gantry crane which sharply increases cargo handling capacity; ocean drilling machinery; steel containers; rolling mills and electric arc furnaces for steelmaking, and mechanical presses.

Since January 1968, he has been manager, shipbuilding division, export sales section, NKK-Tokyo headquarters. Prior to that time, he held executive positions in the business section of NKK's Tsurumi Shipyard near Tokyo and in the export ship section, Tokyo.

Mr. Sasabe joined the company in 1954, upon graduation from the Keio University. A native of Kamakura City, Kanagawa Prefecture, Japan, he resides in Manhattan.

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**Paul R. Tregurtha  
Elected Treasurer Of  
Moore And McCormack**



Paul R. Tregurtha

Paul R. Tregurtha has been elected treasurer and a member of the board of directors of Moore and McCormack Co., Inc., it was announced by James R. Barker, chairman.

Mr. Tregurtha is vice president, finance, of Moore and McCormack Co., Inc., and its subsidiary, Moore-McCormack Lines, Incorporated. He was formerly vice president and controller of Brown and Sharpe Manufacturing Company in Providence, R.I. He joined Double A Products Company, a subsidiary of Brown and Sharpe, in 1963, after graduating from Harvard Graduate School of Business Administration where he was a Baker Scholar.

Mr. Tregurtha received a bachelor's degree in mechanical engineering from Cornell University, Ithaca, N.Y., in 1958, subsequent to which he served in the U.S. Air Force.

**American Mail Line  
Orders \$5.4 Million  
In Containers/Chassis**

Orders totaling more than \$5.4 million for construction of 1,800 containers and 85 chassis have been announced by American Mail Line, Seattle-headquartered steamship company.

The equipment is part of the company's program to introduce a direct all-container service between the Pacific Northwest and Japan. In addition to containers and related shore-side equipment, AML is entering into service on its trans-Pacific trade route four C6 full containerships. The first such vessel, S/S Washington Mail, inaugurated the new service with a sailing on Sunday, October 24. Three other ships are expected to enter service during 1972.

Included in the contracts is the purchase of 1,500 8-foot by 9-foot by 40-foot dry containers which are being assembled by Hussmann Northwest of Seattle, with panels being produced by Cortec of Auburn, Wash. Leckenby Company, Seattle, will provide the steel fabrication.

In addition, American Mail Line is purchasing 150 8-foot by 8-foot 6-inch by 20-foot flat rack containers from Hussmann and a like amount from Busby, Inc., of Ellensburg, Wash.

Two Spokane, Wash., firms are producing the chassis on which the containers ride, the first of which was delivered recently. These include 55 twenty-foot chassis from the Comet

Corporation and 30 forty-foot chassis from the Brown Trailer Division of the Clark Equipment Company.

According to R.D. Bush, AML vice president, the 40-foot containers are a special design being produced for American Mail Line with an interior capacity of 2,565 cubic feet, 165 cubic feet more than the traditional 8-foot by 8-foot 6-inch by 40-footers. "This extra space," he stated, "qualifies many cargoes for lower inland freight rates. In addition, the

extra cube allows additional commodities to be shipped intermodal." Intermodal cargoes are those which are transported from point of origin to point of destination intact through various modes of transportation without restuffing.

In addition to the \$5.4 million in equipment, American Mail Line purchased through Hussmann Northwest 500 containers last year and 1,477 containers in 1968-69, all in the 20-foot length.

**Florida Motorships  
Appoints J.E. Roberts**

John E. Roberts, who has been in steamship agency work in Florida and the Virgin Islands for the past 12 years, has been named general manager of Florida Motorship Corp., Port Everglades, Fla.

The company is agent for Wallenius Caribbean Line, which has a roll-on/roll-off service to the Virgin Islands, Netherlands Antilles, and Panama.

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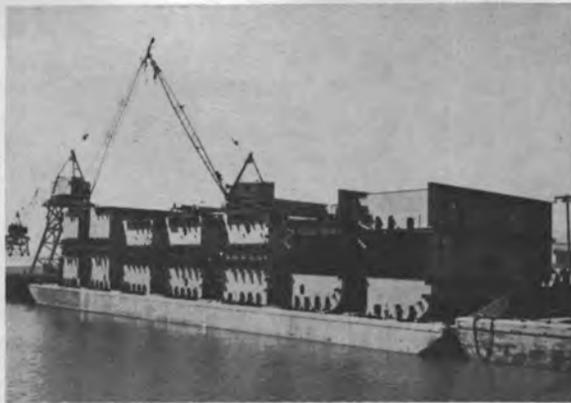


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### Marine Valves And Fittings Catalog Available From Mechanical Marine Co., Inc.

Mechanical Marine Company, Inc., Elizabeth, N.J., suppliers of liquid cargo handling equipment for 44 years, announces publication of a new 58-page catalog covering its complete line of marine valves and fittings. Included are pressure vacuum valves, vent check valves, angle cargo valves, suction bellmouths, valve operating stands, ullage covers, basket strainers, plate strainers, deck access box and various deck drains.

This new catalog is subdivided by tab pages into sections covering each major product line. Each section contains product photographs, descriptive text, and typical parts reference drawings.

All products are identified by individual model number. Complete dimensional data and approximate weights are shown for each size of the various products.

Because it is complete and easy to use, this new catalog will be of particular interest to shipyard design engineers, naval architects, buyers and ship operators.

The catalog is available at no charge upon request. Write to Mechanical Marine Company, Inc., 900 Fairmount Avenue, Elizabeth, N.J. 07207, Attention: Daniel R. Coleman.



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## Gulf Oil Assistance Grant To New York Maritime College —Two Cadets Awarded Bonds



Shown left to right: Cadet **William F. Woehler**, Rear Adm. **Edward J. O'Donnell**, **William F. Muir**, assistant manager in the marine department of Gulf Oil Corporation, and Cadet **James Gage**, State University of the New York Maritime College, Fort Schuyler, Bronx, N.Y.

The State University of New York Maritime College, Fort Schuyler, Bronx, N.Y., received a \$1,500 assistance grant from the Gulf Oil Foundation, and two cadets each received a \$100 U.S. Government Savings Bond in a recent ceremony conducted in the presence of the Cadet Regiment of the College.

School officials said that the grant will be used for the Maritime College Development Fund, the purpose of which is to further special projects proposed within the college that are ineligible for formal budget support. Together with other sections of its educational assistance program, Gulf will distribute more than three million dollars in awards to students and institutions of higher education this year. The funds will provide for undergraduate scholarships, graduate fellowships, employee gift matching, capital grants, and other educational purposes.

The two cadets were awarded the U.S. Government Savings Bonds because of the demonstrated effectiveness during training on board ship. Cadet **James Gage**, son of Mr. and Mrs. **Henry P. Gage** of Jefferson, N.Y., demonstrated effectiveness in engineering. Cadet **William F. Woehler**, son of Mr. and Mrs. **David E. Woehler** of Detroit, Mich., received his bond for his knowledge of navigation.

The check, presented to Rear Adm. **Edward J. O'Donnell**, USN (ret.), president of State University of New York Maritime College, and the two bonds presented to the cadets, were awarded by **William F. Muir**, assistant manager in the marine department of Gulf Oil Corporation.

## 25th Anniversary For Bailey Refrigeration

This month, Bailey Refrigeration Co., Inc. of Brooklyn, N.Y., will celebrate its 25th anniversary. The company was founded in 1946 on Hamilton Avenue in Brooklyn in what **Ralph R. Bailey**, president, describes as "an office smaller than a stateroom." In a relatively short time the business was expanded, and a modern office and warehouse was constructed. Last year a much larger warehouse was added.

From an organization that originally served only the New York waterfront, Bailey now operates from the Brooklyn headquarters and branches in Washington and New Orleans. To serve the growing port of Miami, a new branch was recently established there. Now, shipments are made to ports and shipyards in almost all parts of the world.

With the success of the original company in refrigeration and air-conditioning, Bailey formed related organizations to serve the needs of not only the marine industry, but those of the indus-

trial and commercial fields as well. Bailey Refrigeration Co., Inc. handles the installation of complete systems, conversions, alterations and repairs, including round-the-clock service in emergencies.

Bailey Distributors, Inc. maintains a vast stock in its various warehouses of complete units and parts, most of which are described in their latest 180-page catalog. Bailey Carpenter & Insulation Co., Inc. handles the insulation of compartments for refrigerated cargoes and stores, the modernization of existing ships' interiors and voyage repairs to speed turnarounds.

In all, the three companies offer everything that anyone might require in refrigeration and air-conditioning. A fourth organization, Bailey Joiner Co., Inc. has a comprehensive line of marine furniture, illustrated in its 140-page catalog, and offers the services of qualified joiner mechanics.

Mr. **Bailey**, who has guided the company for the past quarter century, was graduated from Vir-

ginia Polytechnic Institute in 1936, and went to sea immediately as an engineer cadet on the S/S Santa Paula of the Grace Line. Three months later he received his third assistant engineer's license.

Mr. **Bailey** later served on several vessels of Agwi Lines as refrigeration engineer, junior engineer, and as third, second, and first engineer. He also supervised the construction of the S/S Agwiprince and the S/S Agwimonte. During the war, Mr. **Bailey** served as chief engineer on runs to the Persian Gulf. When the war ended, he was assistant general manager of Turbine Engineering Co. in charge of the conversion of vessels to refrigerated cargo ships.

Mr. **Bailey** is a member of The Society of Naval Architects and Marine Engineers, the Society of Marine Port Engineers of New York, The Propeller Club and the Downtown Athletic Club.

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## Chemical To Control Oil Spills Announced By Shell Oil Co.

Oil Herder (Trademark, Shell Oil Company), a new surface-active chemical agent to aid in the containment and cleanup of oil spills, recently introduced by the Shell Oil Company, Houston, Texas, has just received classification by the Environmental Protection Agency (EPA). The EPA has agreed to the classification of Oil Herder as "a surface collecting agent" in accordance with definitions as outlined in Annex X of the National Oil and Hazardous Substances Pollution Contingency Plan.

Concurrent with the EPA classification, the state of California, in an independent action, has licensed Oil Herder as an acceptable oil spill cleanup agent when used in accordance

with applicable regulations covering its use in waters under that state's jurisdiction.

Developed as part of Shell's Environmental Conservation program by the research and development laboratory of Shell Pipe Line Corporation, Oil Herder works entirely on the surface on the water. With the application of a relatively small amount of the chemical to the periphery of a spill, except under adverse wave conditions, the oil slick is not only contained, but will actually contract upon itself to facilitate removal.

In commenting on the EPA classification, Donald C. Appleby, in charge of marketing Oil Herder, stated: "The recognition of Oil Herder as a surface collecting agent by the Environmental Protection Agency follows more than a year of extensive testing by Shell to demonstrate the product's effectiveness under a variety of wind, weather and water conditions.

Regarding the California licensing of Oil Herder, Mr. Appleby stated: "We consider the action taken by California to be particularly significant because this is the only state we know of that has established formal procedures for evaluating and licensing oil spill cleanup agents.

"Oil Herder has been subjected to a series of tests by independent laboratories," Mr. Appleby added. "Results of these tests have shown Oil Herder to be fully biodegradable and nontoxic to fish, shrimp and oysters, and to such waterfowl as ducks, if used as directed. This data was supplied to both EPA and California and was used in their evaluation of the product."

The classification by the EPA and licensing by California are expected to clear the way for other Government and private organizations to use Oil Herder to protect coastal and inland beaches, harbors, marinas and other waterfront facilities threatened by contamination from approaching oil slicks. It was pointed out however, that such action will be subject to the judgment of the On-Scene-Coordinator that the particular spill conditions will permit the effective use of Oil Herder.

Oil Herder will work on petroleum oils and the normal variety of vegetable oils, as long as they are in liquid state. It contains no organic halides, heavy metals or other chemicals known to be harmful to process equipment or refinery catalysts.

"To the best of our knowledge, Oil Herder is the first surface collecting agent to be made commercially available for containing oil spills. It is also the first to be classified as such by the EPA and the first chemical cleanup to be licensed by California," Mr. Appleby said.

Mr. Appleby continued, "Oil Herder's biggest advantages are its speed and ease of application at the site of the spill, and the fact that it does not have the adverse ecological after effects usually associated with dispersants and detergents."

Recommended dosage rate for Oil Herder is two gallons per linear mile of spill perimeter every six hours if needed, with no more than three applications in a 24-hour period.

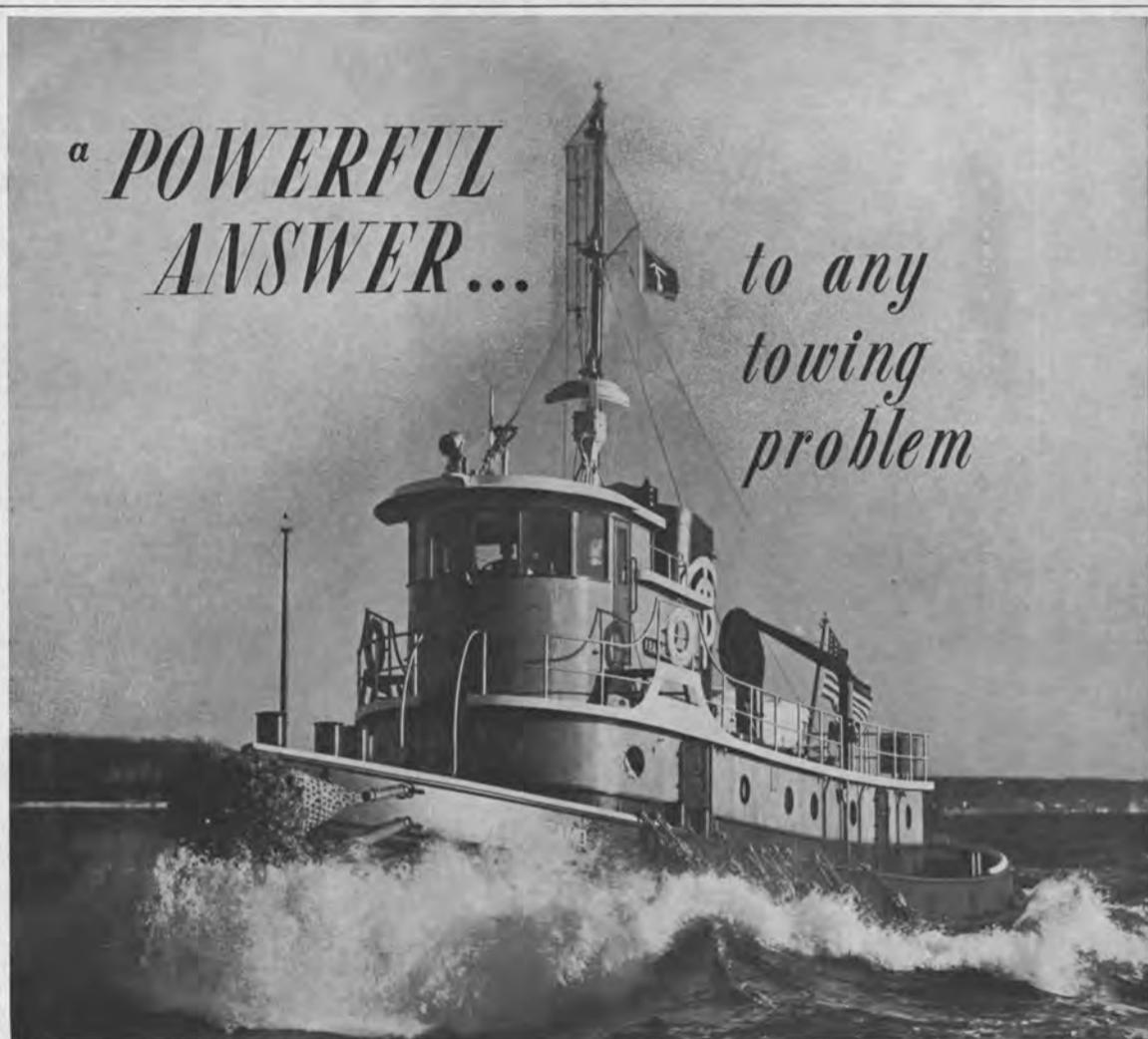
Commenting further on the product's application, Mr. Appleby said: "Oil Herder is extremely versatile in its mode of application because of the small amount required for the majority of spills. As an example, for spills that occur within harbors or other sheltered waters near loading/unloading points or waterfront storage or processing facilities, Oil Herder can be easily sprayed on the water at the spill perimeter with a common hand-operated garden sprayer from a small boat.

"For larger spills at sea," Mr. Appleby added, "Oil Herder can be applied by helicopter equipped with spray units such as those used for the spraying of crops."

Though not specifically covered by the EPA or California actions, preliminary research has shown that when Oil Herder is applied to the surf zone of a beach in front of an approaching spill, it may assist in cleanup operations by inhibiting the oil from penetrating the sand and by concentrating it into easily removable puddles and globules on top of the sand.

Mr. Appleby stated: "Oil Herder is now commercially available and is being stocked at key Shell locations throughout the country for immediate availability for spills occurring in various areas. Stocking points are presently at Sewaren, N.J., Chicago, Ill., San Francisco, Calif., Houston, Texas, and New Orleans, La." He added, "Plans are under way to increase the number of stocking points and will progress as usage develops."

Mr. Appleby pointed out, "In case of a spill, arrangements can be made to have Oil Herder shipped to the site by contacting the nearest Shell Order Center."



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**HITACHI DELIVERS WORLD'S LARGEST ORE CARRIER:** The 165,196-dwt Niizuri Maru has been delivered by Hitachi Zosen to her owners, Yamashita Shinnihon Steamship Co., Ltd. and Nissho Kisen Kaisha. This ore carrier, built under the 26th Government-sponsored shipbuilding program, will be placed in service between Japan and Chile, Australia, and Africa. The approximate measurements and principal particulars of the vessel are length overall, 1,030 feet; breadth, 145 feet, and depth, 79 feet. The cargo hold capacity is 3,384,894 cubic feet. The Niizuri Maru is powered by a Hitachi B&W 12K84EF type diesel main engine with a maximum output of 30,900 hp providing a trial speed (maximum) of 18.65 knots. The vessel has a complement of 28 persons (engine department, 10 persons).

## Swiftships, Inc. Elects Hoffpauir Vice Pres.



Jerry L. Hoffpauir

Ken Hidalgo, president of Swiftships, Inc., Morgan City, La., has announced the election of Jerry L. Hoffpauir, director of marketing and purchasing at Swiftships, as vice president of the shipbuilding firm. Mr. Hoffpauir has been part of the management team of Swiftships, Inc. since the company began its operations in October 1969. Prior to that time, he was a sales representative for Sewart Seacraft and a store manager for Sooner Pipe and Supply.

In making the announcement, Mr. Hidalgo said: "Jerry has played a vital part in the rapid success and growth of Swiftships. Through the years I have known him, he has demonstrated his managerial and administrative abilities. We are fortunate to have someone within our organization as capable as Jerry to move up into this important position."

Prior to his appointment as vice president, Mr. Hoffpauir's job as director of marketing involved worldwide travel for the procurement of contracts. In his new position, he will be conducting his duties from Swiftships' Morgan City plant.

## Eureka Chemical Co. Appoints Mike Kelley

Eureka Chemical Company, South San Francisco, Calif., has announced the appointment of Morriss (Mike) H. Kelley as assistant vice president. Mr. Kelley assumes direct responsibility for all Eureka marketing programs and will travel extensively to review and assist in implementing corrosion control programs in the world's fleets of commercial vessels and offshore drilling equipment.

Mr. Kelley formerly was manager of maintenance and repair for Global Marine Inc., Los Angeles, where his responsibilities included management of repair, upgrading, modification and maintenance for all of Global's 11 drilling ships and their drilling equipment. He assisted in planning the new Global drilling ships. Mr. Kelley also developed a "Self Inspection" program for better inspection of offshore units, which is being used worldwide in modified form by the United States Coast Guard.

Since college and his tour of duty as commander, USNR, Mr. Kelley has held highly responsible positions with Bethlehem Shipyard, Richfield Oil Corporation and Todd Shipyards.

He is a registered professional mechanical and consulting engineer and holds a chief engineer's license for steamships of unlimited horsepower. He is a member of The Society of Naval Architects and Marine Engineers, The American Society of Naval Engineers, The Society of Port Engineers in New York, and is past president and a charter member of The Society of Port Engineers Los Angeles and Long Beach. Mr. Kelley also is a member of the Society of Nondestructive Testing and The United States Naval Institute.



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"THERE'S A SWITCH. HE NAMED HIS DAUGHTERS AFTER HIS TUGS."

## Litton Names Krause General Manager Of Ship Systems Division

Charles A. Krause, vice president of Litton Ship Systems Division, has been named general manager of that division, it was announced by Fred W. O'Green, Litton Industries executive vice president and group executive for Defense and Marine Systems.

Mr. Krause's new position includes responsibility for Litton's series-production ship manufacturing facility in Pascagoula, Miss., and an advanced marine design center in Culver City, Calif. Most recently, he was vice president of program management for Litton Ship Systems.

Mr. Krause joined Litton's Data Systems Division in 1960. During 10 years with that division, he held a number of key operations and program management positions. He transferred to Litton Ship Systems in 1970 as vice president for finance and administration.

Mr. Krause was graduated in 1949 from Iowa State College, with a B.S. degree in electrical engineering and from Purdue University in 1950, with an M.S. degree in electrical engineering.

## Mesco Appoints Anand Chief Design Engineer Heat Exchanger Div.



Dr. R.K. Anand

Mesco Tectonics, Inc., Clifton, N.J., has announced the appointment of Dr. R.K. Anand, Ph.D., as chief design engineer for the Heat Exchanger Division. Dr. Anand holds a bachelor of engineering degree from Delhi University, a plant design certificate in air-conditioning and refrigeration from the Indian Institute of Technology, Kharagpur, India, as well as a master of science degree (research) and a doctor of philosophy degree from the University of Manchester in England.

Prior to this announcement by L.A. Nigro, executive vice president, Dr. Anand was a design engineer in Mesco's Heat Exchanger Division. He is now responsible for thermal ratings and design of heat exchangers, pressure vessels and their components, for compliance with the ASME and Tema Codes. Dr. Anand has done extensive original research and lecturing on fluid dynamics and turbulent heat and mass transfer, in which he excels. He was a professor of thermodynamics and heat transfer at the Indian Institute of Technology.

## Carboline Announces Three New Coatings

Three new protective coatings having excellent fast-drying properties have been released by the Carboline Company of St. Louis, Mo. These coatings enable steel fabricating shops to blast, prime, top coat, and ship structural steel all within one day.

Carboline's fast-drying coatings help meet completion deadlines and

tight schedules often encountered by steel fabricating shops. Also, as much as 30 cents per square foot is saved when top coats can be properly applied in the shop rather than in the field. The coatings are formulated to meet all fabricating shop requirements and withstand physical abuse during shipment and erection. A minimum of touch up is required at the job site.

Carbo Zinc FD, self-curing inor-

ganic zinc base coat can be top coated within two to four hours with one coat of Carboline 190 FD, epoxy polyamide or Polyclad 936 FD, high-build vinyl. The top coat dries within six hours.

Complete technical data on Carboline Fast Dry Coating Systems is available from Carboline Company, 328 Hanley Industrial Court, St. Louis, Mo. 63144.



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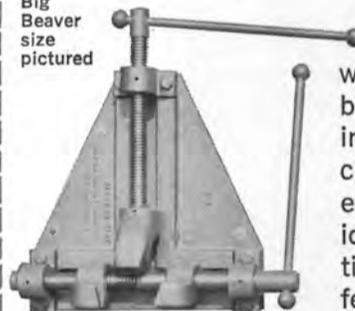
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## Drilling Platform Commissioned At Bethlehem-Beaumont Yard



Attending the commissioning of J. Storm II are left to right: **James C. Storm**, president, Marine Drilling Company, Corpus Christi, Texas, the rig's owner; **Mrs. W.A. Roberts Sr.**, **Mrs. W.A. Roberts**, sponsor; **W.A. Roberts**, senior vice president, Phillips Petroleum Company, Bartlesville, Okla.; **Mrs. Storm**, and **Ralph A. Leaf**, assistant manager, Beaumont Yard.

The J. Storm II, a mobile self-elevating oil drilling platform designed and constructed by Bethlehem Steel Corporation's Beaumont Yard, was recently commissioned in Beaumont, Texas.

Built for the Marine Drilling Company of Corpus Christi, Texas, the rig was sponsored by **Mrs. W.A. Roberts**, wife of a senior vice president for Phillips Petroleum.

The J. Storm II was designed to operate in the Gulf of Mexico in water depths up to 250 feet in the non-hurricane season. This is the second mobile drilling platform built for the Marine Drilling Company in the last two years.

A mechanical rig, the J. Storm II has a twin-unit propulsion-assist system consisting of two 6½-foot-diameter three-bladed propellers, each driven by one EMD 12-567 engine with reverse clutch and reduction gear.

The major components of the J. Storm II are a mat from which three steel columns extend 312 feet vertically, a self-contained drilling platform containing the machinery, mud pits, fuel and water tanks, storage areas, air-conditioned living quarters for 48 men, a heliport, and a skid unit upon which the derrick and drawworks are mounted.

The skid unit is equipped with a Continental Emsco 147-foot derrick with a 1,400,000-pound capacity, and a National 1625M drawworks powered by three Superior PTD-8 supercharged diesel engines. A National C-375 rotary is mechanically driven from the drawworks.

Within the interior of the platform are two National 12-P-160 Triplex pumps, each powered by one EMD 16-567 diesel engine. Here also are mud pits with a total capacity of 1,500 barrels, bulk mud tanks having a total capacity of 3,900 cubic feet, and storage space for 3,000 sacks of dry materials, 4,848 barrels of drilling water, 400 barrels of potable water, and 1,796 barrels of fuel oil.

The J. Storm II is built in compliance with the United States Coast Guard rules for artificial islands, and is constructed to the highest classification of the American Bureau of Shipping.



**SWEDISH STAMP PICTURES PACECO CRANE:** The Paceco Portainer crane operating in Sweden's Port of Goteborg gets official recognition on their new "Swedish Industry" stamp recently issued by the Swedish Postal Authority. Worth about 10 cents in U.S. postage, the 55 Ore stamp depicts the Skandia Harbour, considered Scandinavia's most important container port. The container handling crane from Paceco, a Division of Fruehauf Corporation, USA, has been in operation for almost six years.

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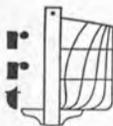
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## Gotaverken's Arendal Yard Delivers 100,000-Dwt OBO



Shown at the ceremony, from left: **Sture Odner**, chairman, Gotaverken; **Dan-Axel Brostrom**, chairman, AB Svenska Ostasiatiska Kompaniet; **Mrs. Agneta Corti**, who named the ship, and **Hans Laurin**, managing director, Gotaverken.

A naming ceremony was recently held at the Arendal yard of Gotaverken for a 101,500-dwt OBO carrier ordered from Gotaverken by A.B. Svenska Ostasiatiska Kompaniet, Goteborg. The ship was given its name, Fujisan, by Mrs. Agneta Corti. Among representatives of the owners at the ceremony were Dan-Axel Brostrom, chairman, Marc Wallenberg, Kristian von Sydow, managing director, and Gosta Kaudern, technical director.

The yard was represented by chairman of the board Sture Odner, managing director Hans Laurin, and other members of the board and management.

The new ship is one in a long series of about 25 units which the Arendal and the Oresund yards are building for several owners. The Fujisan is number seven in this series.

Like her sister ships, the new vessel will be propelled by a 9-cylinder diesel engine of Gotaverken's large-bore type. The engine, which has a bore of 850 mm and a stroke of 1,700 mm, develops 19,800 bhp at 115 rev/min and gives the ship a speed of 15.9 knots.

The Fujisan is the largest ship built by Gotaverken for the companies in the Brostrom Group. In all, the Gotaverken Group has now built 41 ships totaling 541,000 deadweight tons for Brostrom.

## Benson Bros. To Build 122-Foot Fishing Vessel

Benson Bros. Shipbuilding Company, Ltd., Vancouver, British Columbia, has received a contract from Longline Fishing Company for the construction of a 122-foot seiner. Capable of fishing in any ocean, the new vessel was designed by Cove, Hatfield & Co., North Vancouver.



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**NEW B&W DIESEL IN PRODUCTION:** Burmeister & Wain Engineering Company, at its Copenhagen workshops, has begun production of its new diesel engine, the K-GF series. Three engines of the series are scheduled for testing by the end of 1972: a 6-cyl K90GF engine which will develop 20,400 bhp; a 7-cyl K90GF engine currently under construction at Mitsui, B&W's senior Japanese licensee, and a 9-cyl unit to be built by Hitachi. B&W maintains that these new units will result in increased hold capacity since the horsepower requirements for a vessel can be accommodated by a smaller engine. The first orders for K90GF engines were obtained by B&W's sublicensee in Scotland, John G. Kincaid & Co., of Greenock, for two 6-cyl units for delivery in 1973. Pictured during a recent discussion of the new engines in the New York offices of Burmeister & Wain American Corporation are, left to right: **Per Meulengracht**, manager, Burmeister & Wain American Corp., **Olav Grue**, managing director, Burmeister & Wain, and **N.E. Rasmussen**, vice president and general sales manager, Burmeister & Wain.

### H.M. Tiedemann Expands Vibration Analysis Facilities

H.M. Tiedemann & Company, Inc., 90 West Street, New York, N.Y. 10006, has recently acquired a Geiger Torsiograph. The Torsiograph supplements the vibration equipment presently in house including an Askania Vibrograph.

With the acquisition of the new component, H.M. Tiedemann & Co. is fully prepared to perform analysis of hull and machinery displacement and torsional vibrations, including those involving diesel engines.

H.M. Tiedemann & Co. has a staff of vibration experts. Having recently completed several projects successfully, this expanded service is now available worldwide.

### CONOCO/NCB To Operate \$24 Million Drilling Rig

Continental Oil Company of England and the National Coal Board have contracted to operate a giant semisubmersible drilling rig for two years. Due for delivery in February 1973, the drilling rig is being built at a cost of approximately \$24 million and has been specially designed for oil and gas exploration in one of the world's most hostile sea environments—the North Sea.

The rig, the SEDCO 702, is a self-propelled semi-submersible rig which will be able to drill to depths in excess of 25,000 feet, in water depths of up to 1,000 feet. Special design features will enable normal drilling to continue in 35-foot seas, and it will be able to withstand gale force winds and seas of more than 100 feet.

Conoco and the NCB will probably first use the rig on northern North Sea acreage. The advanced equipment, incorporating the latest in offshore drilling technology, is well suited for exploration in deeper waters of the North Sea.

The drilling rig is being built for SEDCO, Inc. by Avondale Shipyards in New Orleans, La. The rig will have living quarters for 90 people, and the ability to drill for sustained periods when it is impossible to re-supply due to weather conditions.

One of the problems of drilling exploratory wells in the North Sea is the shortage of drilling equipment. It is necessary to plan drilling pro-

grams at least two years in advance. Conoco indicated that its participation in this rig building program is an expression of optimism in the future of North Sea oil and gas prospects.

### Honeywell Receives Largest Shipboard ASW Award—Potential Value \$36 Million



Dr. **Robert L. Roderick**, president of Litton Ship Systems Division, signs the contract. Standing are (left to right): **William H. Parry**, Litton vice president and director of material; **Arnold P. Klimke**, Honeywell's operations manager; **W.E. Schafer**, contract administrator, and **Harrell H. Scales**, program manager.

A contract with a potential value of \$36 million has been awarded to Honeywell's Marine Systems Center, West Covina, Calif., by Litton Industries for antisubmarine warfare (ASW) weapons systems engineering on a new class of 30 U.S. Navy destroyers.

The subcontract is the largest shipboard ASW award in the 86-year history of the automation company, according to **Arnold P. Klimke**, Honeywell operations manager. Funding on the subcontract will be incremental, with the initial award of \$10,964,402 to provide ASW weapons systems engineering for the nine destroyers funded to date by Congress.

The Spruance class, slated to be the backbone of the Navy's destroyer forces, will have a primary mission of antisubmarine warfare, including operations as an integral part of carrier task forces. The ships are expected to be operational with the fleet in 1975. The vessels, designed by Litton Ship Systems' marine technology center, will be series-produced with modular techniques at its new ship production facility at Pascagoula, Miss. The modular approach will also be used by Honeywell in designing the ASW equipment.

"One of the missions of the Spruance-class vessel is to be superior in ASW capabilities," Mr. **Klimke** said. "This requires speed afloat and highly automated fire control."

The ASW systems aboard the ships will include torpedo tubes with their associated handling and storage equipment, the Mark 116 underwater fire control systems, and shipboard antisubmarine rockets (ASROCs) with vertical loading magazines.

Honeywell will engineer and integrate weapons systems designed for optimum fire control performance and will develop and install certain ASW equipment. The company will also provide planning for logistics support and data management procedures.

**Harrell Scales** will be program manager for Honeywell, Mr. **Klimke** said.

The 560-foot destroyers will be the Navy's first major combatant ships powered by marine gas turbine engines, instead of steam or diesel-powered engines. The Spruance-class will have a displacement of 7,000 tons and be armed with Sea Sparrow point defense missiles, two five-inch/54-caliber deck guns and ASW weaponry. Helicopters will operate from each ship to extend ASW defense and attack capability.



**GULF GRANT TO WEBB:** The Gulf Oil Foundation has again chosen Webb Institute of Naval Architecture as the recipient of a \$1,500 grant to be used to further Webb's policy whereby all undergraduates attend on tuition-free scholarships. Receiving the Gulf Oil gift from **Stanley J. Dwyer** (left), director of ship design, Gulf Oil Corp. and a Webb alumnus, are (center) Rear Adm. **W.A. Brockett** USN (ret.), president, and **Stanley Stockdale** (right), president of the Student Organization at the institute. Presentation of the gift was made at Webb Institute in the newly completed Livingston Library and lecture hall complex, to which Gulf Oil had previously made a major contribution. This year, Gulf Oil will distribute more than \$3 million to students and institutions of higher learning.

### Clifford M. Palmer To Chair Rudder Club's Thirty-Second Annual Christmas Party Dinner

With the Christmas season rapidly approaching, The Rudder Club is now doing the spade work in preparation for their Annual Christmas Party.

**Clifford M. Palmer**, vice president of Lee & Palmer, Inc., who has been appointed general chairman of the affair by Comdre. **James L. Bailey**, traffic manager of Wedemann & Godknecht, Inc., announced that the dinner will be held in the Grand Ballroom of the Statler Hilton Hotel, New York, N.Y., on Monday Evening, December 13, 1971. **Thomas J. Giardino**, traffic manager of the Marchessini Steamship Lines, will be the dais chairman of the dinner.

Cost per guest is set at \$21 each, including gratuity. Reservations may be made by contacting **Milton R. Nelson** of McAllister Brothers, Inc., 17 Battery Place, New York, N.Y. 10004 (Bowling Green 9-3200).

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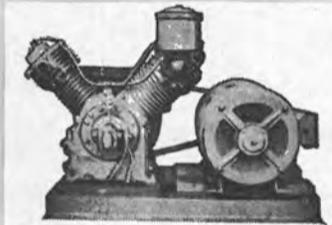
6—GENERAL MOTORS Diesel Engines —Model 12-567A, 900 HP, 744 RPM, 3 port, 3 starboard, each complete with Falk Reverse Reduction Gear, 2.48:1 ratio.

3—COOPER-BESSEMER Diesel Engines . . . Model L S-8-DR, 1300 HP, 277 RPM, direct reversing, turbo charged.

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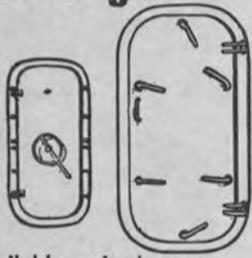


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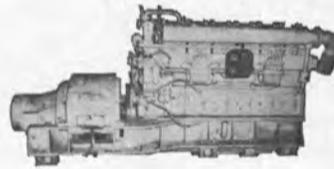
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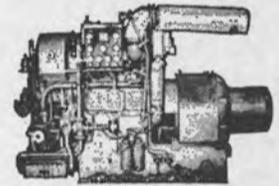
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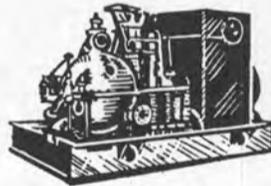
6—SUPERIOR Diesel Engines . . . Model GBD8 Marine, 150 HP, 1200 RPM, 8 cylinder, with Delco Generators, 100 KW, 120/240 DC.



1—GENERAL MOTORS, Model 3-268 A, Marine, 150 HP, 1200 RPM, 3 cylinder, with Westinghouse Generators, 100 KW, 450/3/60.

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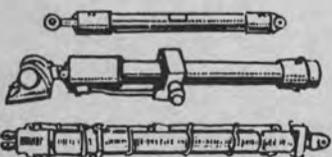
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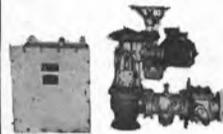
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5 KW — 120/1/60 A.C. — UNUSED  
10 HP 115 VDC TO 5 KW 120 VOLTS  
SINGLE PHASE AC



INPUT: 10 HP—115 volts DC  
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FIRST TIME IN A LONG TIME THAT 5 KW  
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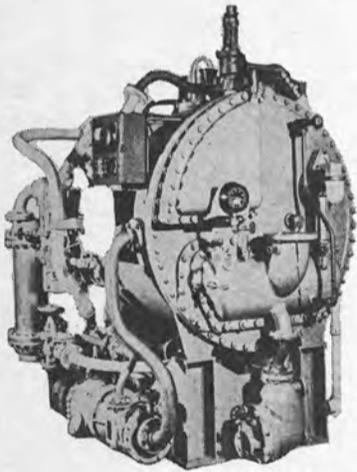
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DM-30—68 RPM output—ratio  
25.63:1. MOTOR: Westinghouse  
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225Y—class 1—2 HP—1720  
RPM—220/440/60/3—5.6/2.8  
amps. With push button starter  
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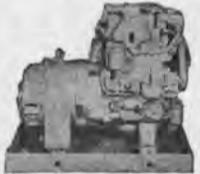
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GEN: 20 KW 120 VDC 1200 RPM. ENGINE: GM 2-71 diesel — 2-cycle — 4 1/4 x 5 — 142 cu inch — clockwise — 24 volt start.

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MISSION & T-2

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### MISSION & T-2

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MISSION

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Johnson Rubber Co., Marine Division, Middlefield, Ohio 44062  
Lucion Q. Moffitt, Inc., P.O. Box 1415, Akron, Ohio 44309  
Waukesha Bearings Corp., P.O. Box 798, Waukesha, Wis. 53186

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Combustion Engineering, Inc., Windsor, Connecticut 06095

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Refineria Panama, S. A. 277 Park Ave., New York, N.Y. 10017  
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Anixter-Netherlands, Utrecht Gebouw, Coalinga 75, Rotterdam 3002, Netherlands

Anixter-New York, 300 Executive Blvd., Elmsford, N.Y. 10523  
Anixter-New Orleans, 315 Notre Dame, New Orleans, La. 70130  
L. F. Gaubert & Co., 700 So. Broad St., New Orleans, La. 70150

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Eaton Corp., Industrial Drive Division, 9919 Clinton Rd., Cleveland, Ohio 44111  
Wichita Clutch Co., Inc., Wichita Falls, Texas 76307

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Carboline Co., 328 Hanley Industrial Court, St. Louis, Mo. 63144  
Devoe & Reynolds Co., Inc., Subsidiary Celanese Coatings Co., 414 Wilson Ave., Newark, N.J. 07105  
Enjay Chemical Company, 60 West 49th St., New York, N.Y. 10020  
Farbail Company, 90 West St., N.Y., N.Y. 10006  
Patterson-Sargent, P.O. Box 494, New Brunswick, N. J.  
Spee-Flo Co., 4631 Winfield Rd., Houston, Texas 77039

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Lighter Aboard Ship, Inc., 225 Baronne St., New Orleans, La. 70112  
Paceco, Div. Fruehauf Corp., 2350 Blanding Ave., Alameda, Calif. 94501

Star Iron & Steel Co., 326 Alexander Ave., Tacoma, Wash. 98421

## CONTAINER LASHINGS & COMPONENTS

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## CONTROL SYSTEMS

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General Electric Industry Control Dept., Salem, Virginia  
Henschel Corporation, 14 Cedar St., Amesbury, Mass. 01913  
Sperry Marine Systems Div., Charlottesville, Va., 22901, Division of Sperry Rand Corp.

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Carboline Co., 328 Hanley Industrial Court, St. Louis, Mo. 63144  
Radiator Specialty Co., 1400 Independence Blvd., Charlotte, N.C. 28205

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Conrad-Stork, Div. Stork-Werkspoor, P.O. Box 134, Haarlem, Holland  
Hoffman Rigging & Crane Service, 560 Cortlandt St., Belleville, N.J. 07109

Kocks Pittsburgh Corp., Four Gateway Center, Pittsburgh, Pa. 15222  
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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Marine Moisture Control Co., 449 Sheridan Blvd., Inwood, N.Y. 11696

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Fukushima, Ltd., 4 Yonbon-Cho, Chiyoda-Ku, Tokyo, Japan. (U.S. Rep. Alfred Conhagen, Inc., 172 Lyndhurst Ave., Staten Island, N.Y. 10305)

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Markey Machinery Co., Inc., 79 S. Horton St., Seattle, Wash. 98134  
Nashville Bridge Co., P.O. Box 239, Nashville, Tenn. 37202  
Pacific Pipe Co., 49 Fremont St., San Francisco, Calif. 94080  
Red Fox Machine & Supply Co., P.O. Drawer 640, New Iberia, La. 70560

A. G. Weser, Seebeckwerft, 2850 Bremerhaven 1, Germany  
Western Gear Corp., Heavy Machinery Div., Everett, Wash. 98201

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Kiene Diesel Accessories, Inc., P.O. Box 216, Franklin Park, Ill. 60131  
A.G. Schoonmaker, Box 757, Sausalito, Calif. 95965  
United Filtration Corp., 9600 John St., Santa Fe Springs, Calif. 90670

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L. F. Gaubert & Co., 700 So. Broad St., New Orleans, La. 70150  
Marine Industrial Products Co., 195 Paterson Ave., Little Falls, N.J. 07424

Merrin Electric, 162 Chambers St., New York, N.Y. 10007  
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Vacu-Blast Corp., Box 885, Belmont, Calif. 94002

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Bond Hydraulic Equip. Service, Inc., 117 Monroe St., Hoboken, N.J. 07030

Universal Hydraulics, Div. of Ohio Brass Co., 4500 Beidler Road, Willoughby, Ohio 44094  
Vickers, MGO Div., Troy, Mich. 48084

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## LININGS

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Carboline Co., 328 Hanley Industrial Court, St. Louis, Mo. 63144

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IRD Mechanalysis, Inc., 6150 Huntley Rd., Columbus, Ohio 43229

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Western Gear Corp., Industrial Products Div., P.O. Box 126, Belmont, Calif. 94003

## MARINE NAVIGATION EQUIPMENT & AIDS

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Edo Western Corp., 2645 So. 2nd St., W. Salt Lake City, Utah 84115  
Henschel Corp., 14 Cedar St., Amesbury, Mass. 01913

ITT Decca Marine, Inc., 386 Park Ave. South, New York, N.Y. 10016  
Marquardt Corp., 16555 Saticoy St., Van Nuys, Calif. 91406  
National Marine Service, 1750 So. Brentwood Blvd., St. Louis, Mo. 63144

Radiomarine Corp., 20 Bridge Avenue, Red Bank, N.J. 07701  
RCA Service Co., A Division of RCA, Marine Communications and Navigation Equipment Service, Bldg. CHIC-225, Camden, N.J. 08101

Sperry Marine Systems Div., Charlottesville, Va. 22901, Division of Sperry Rand Corp.

Star Lifeline, Ltd., 1148 W. 15th St., No. Vancouver, B.C., Canada  
Tracor, Inc., 6500 Tracor Lane, Austin, Texas 78721

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Nicolai Joffe Corp., P.O. Box 2445, 445 Littlefield Ave., So. San Francisco, Calif. 94080

Keoroff Marine (Div. of The Singer Co.) 21 West St., New York, N.Y. 10006

Merrin Electric, 162 Chambers St., New York, N.Y. 10007  
Metritape, Inc., 77 Commonwealth Ave., West Concord, Mass. 01742

Stow Mfg. Co., 225 Star St., Binghamton, N.Y. 13902  
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Combustion Engineering, Inc., Windsor, Connecticut 06095  
General Electric Co., Marine Turbine & Gear Dept., Lynn, Mass. 01910

General Electric Co., Gas Turbine Dept., Schenectady, N.Y. 12305  
Murray & Tregurtha, Inc., 2 Hancock St., Quincy, Mass. 02171

Port Electric Turbine Div., 155-157 Perry St., New York, N.Y. 10014  
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Western Gear Corp., Precision Products Div., P.O. Box 190, Lynwood, Calif. 90262

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Communication Associates, Inc., 200 McKay Road, Huntington Station, N.Y. 11746

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Coast Engineering Co., 711 W. 21st St., Norfolk, Va. 23517  
Crandall Dry Dock Engrs., Inc., 238 Main St., Cambridge, Mass. 02142

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Arthur D. Darden, Inc., 1040 International Trade Mart, New Orleans, La. 70130

Sharp DeLong, 29 Broadway, New York, N.Y. 10006  
Design Associates, Inc., 3308 Tulane Ave., New Orleans, La. 70119

Designers & Planners, Inc., 114 Fifth Ave., New York, N.Y. 10011  
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Christopher J. Foster, 14 Vanderventer Ave., Port Washington, N.Y. 11050

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Gibbs & Cox, Inc., 21 West St., New York, N.Y. 10006

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Morris Guralnick, Associates, Inc., 583 Market St., San Francisco, Calif. 94105

J. J. Henry Co., Inc., 90 West St., New York, 10006  
L. K. Hamyer, Box 408, Corona Del Mar, California 92625

Hydranautics, 6338 Lindmar Dr., P.O. Box 1068, Goleta, Calif. 93017  
C. T. Haruucci & Associates, Tourism Pier #3, San Juan, Porto Rico 00902

James S. Krogen, 1460 Brickwell Ave., Miami, Fla. 33131  
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

Marine Mining & Engrg., Inc., P.O. Box 5032, Concord, Calif. 94520  
Maritech, Inc., 38 Union Sq., Somerville, Mass. 02143

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Robert Moore Corp., 350 Main St., Port Washington, N.Y. 11050

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 Ethyl Corp. Marine Div. Perolin Co., New York, N.Y. 10001  
 Gulf Oil Trading Co., 1290 Ave. of Americas, New York, N.Y. 10019  
 Humble Oil & Refining Co., Humble Building, Houston, Texas 77002  
 Mobil Oil Corp., 26 Broadway, New York, N.Y. 10004  
 Refineria Panama, S. A., 277 Park Ave., New York, N.Y. 10017  
 Shell Oil Co., 1 Shell Plaza, Houston, Texas 77002  
 Texaco, Inc., 135 E. 42nd St., New York, N.Y. 10017

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Ameron Corrosion Control Div., Brea, Calif. 92621  
 Carbolite Co., 328 Hanley Industrial Court, St. Louis, Mo. 63144  
 Devac & Reynolds Co., Inc., Subsidiary Celanese Coatings Co., 414 Wilson Ave., Newark, N.J. 07105  
 Enjay Chemical Co., 60 West 49th St., New York, N.Y. 10020  
 Farboil Company, 90 West St., New York, N.Y. 10006  
 International Paint Co., 21 West St., New York, N.Y. 10006  
 Mobil Chemical Company, Metuchen, N.J. 08840  
 Patterson-Sargent, P.O. Box 494, New Brunswick, N.J.  
 Woolsey Marine Industries Inc., 201 E. 42nd St., New York, N.Y. 10017

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 Refineria Panama, S. A., 277 Park Ave., New York, N.Y. 10017  
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 Rotocast Plastic Products, Inc., 6700 N.W. 36th Ave., Miami, Florida 33147

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 Coolidge Propeller Co., 1608 Fairview Ave. E., Seattle, Wash. 98102  
 Federal Propellers, 1501 Buchanan Ave. S.W., Grand Rapids, Mich. 49502  
 Ferguson Propeller, 1132 Clinton St., Hoboken, N.J. 07030

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 Colt Industries, Inc., Fairbanks Morse Pump & Electric Div., 3601 Kansas Ave., Kansas City, Kansas 66110  
 Goulds Pumps, Seneca Falls, N.Y. 13148  
 Houttin-Pompen N. V. Sophialaan 4, Utrecht, Holland  
 Worthington Corporation, Harrison, New Jersey 07029

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 W. W. Patterson Co., 830 Brackett St., Pittsburgh, Pa. 15233

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 York Corp., Grantley Road, York, Pa. 17405

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 Columbian Rope Co., 309 Genesee St., Auburn, N.Y. 13022  
 Du Pont Co., Room 31H1, Wilmington, Delaware 19898  
 Jackson Rope Corp., 9th & Oley, Reading, Pa. 19604  
 Samson Cordage Works, 470 Atlantic Ave., Boston, Mass. 02210  
 Tubbs Cordage Company, P.O. Box 709, Orange, Calif. 92669  
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 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.

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Patent Scaffolding Co., 11-11 - 34th Ave., Long Island City, N.Y. 11106

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 National Metal & Steel Corp., 1251 New Dock St., Terminal Island, Cal. 90731  
 Zidell Explorations, Inc., 3121 S. W. Moody St., Portland, Ore. 97201

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 Mowbray's Tug and Barge Sales Corp., 21 West St., N.Y. N.Y. 10006  
 Oaksmith Boat Sales, Inc., Fisherman's Terminal, Seattle, Wash. 98119

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 Armco Steel Corp., 703 Curtis St., Middletown, Ohio 45042  
 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  
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 Belliard Murdoch S. A., Kattendijkdok Westkaai 21, Antwerp, Belgium  
 Bethlehem Steel Corp., Shipbuilding, 25 Broadway, N.Y. N.Y. 10004  
 Blount Marine Corp., P.O. Box 360, Warren, Rhode Island 02885  
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 Halter Marine Services, Inc., Route 6, Box 287H, New Orleans, La. 70126

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 Livingston Shipbuilding Co., P.O. Box 968, Orange, Texas 77630  
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 Litton Industries, 9920 W. Jefferson Blvd., Culver City, Calif. 90230  
 Lockheed Shipbuilding and Construction Co., 2929 16th Avenue, S.W., Seattle, Wash. 98134  
 Maryland Shipbuilding & Drydock, P.O. Box 537, Baltimore, Md. 21203  
 Matton Shipyard Co., Inc., P.O. Box 428, Cohoes, New York 12047  
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 Mitsubishi Heavy Industries, Ltd., 5-1 Marunouchi 2-chome, Chiyoda-ku, Tokyo, Japan

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 Newport News Shipbuilding and Dry Dock Co., Newport News, Va.  
 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  
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 Sasebo Heavy Industries Co., Ltd., New Ohtemachi Bldg., Chiyoda-ku, Tokyo, Japan  
 Sembawang Shipyard (Pte) Ltd., P.O. Box 3, Sembawang, P.O. Singapore, 27  
 Star Shipyards, Ltd., 61 Duncan St., New Westminster, Vancouver, B.C., Canada  
 Sumitomo Shipbuilding & Mochy. Co., Ltd. 2-1 Ohtemachi 2-chome, Chiyoda-ku, Tokyo, Japan  
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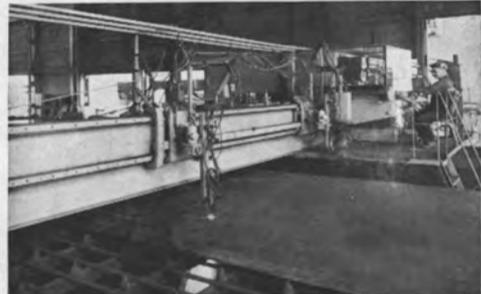
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