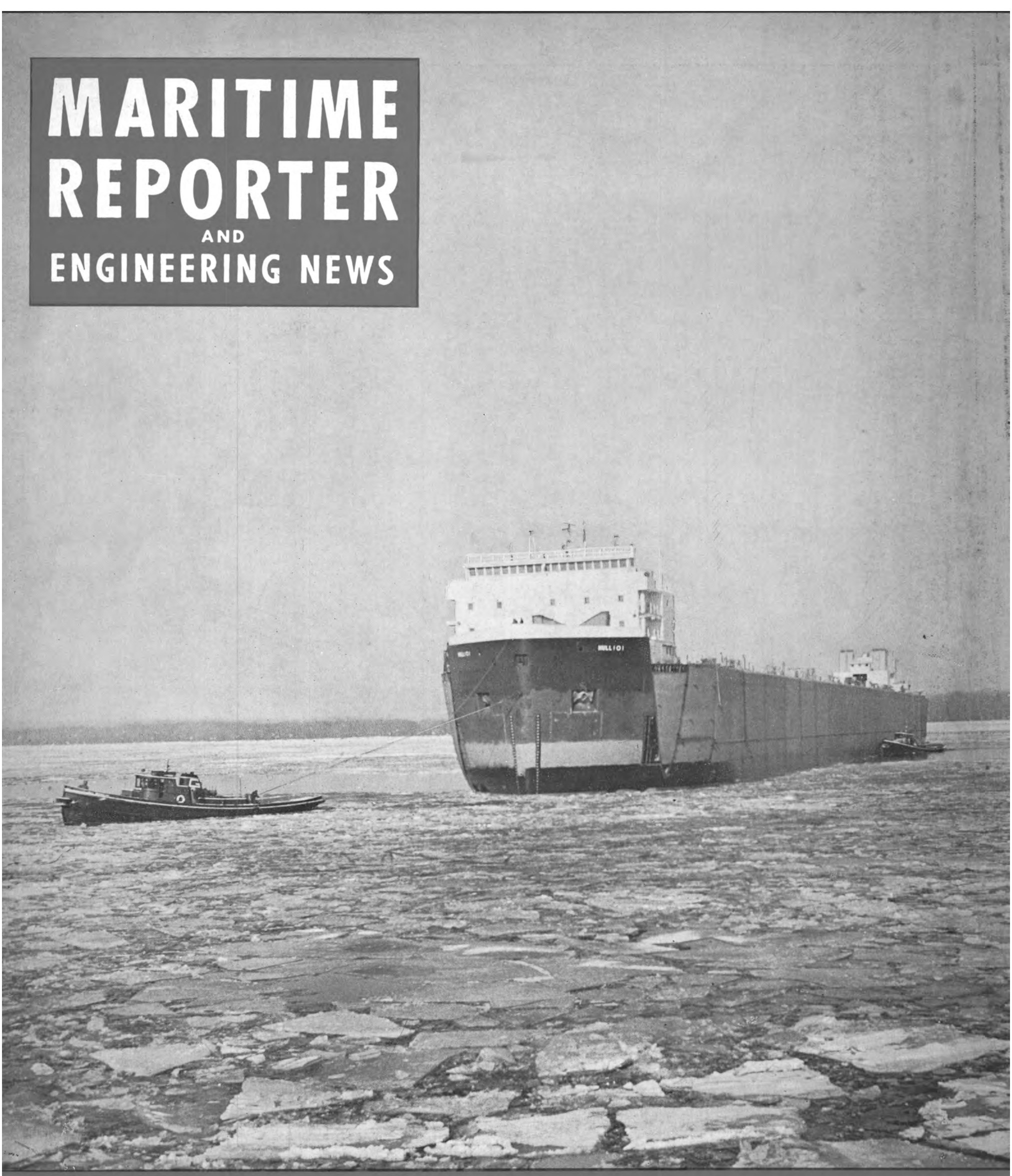
MARITIME
REPORTER
AND
ENGINEERING NEWS



Litton's Erie Marine Yard Constructs Largest Great Lakes Self-Unloader Using Unique Construction Techniques

(SEE PAGE 6)

MARCH 1, 1971

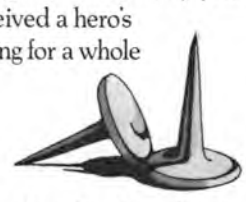
Around the world with a tin clock.

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.

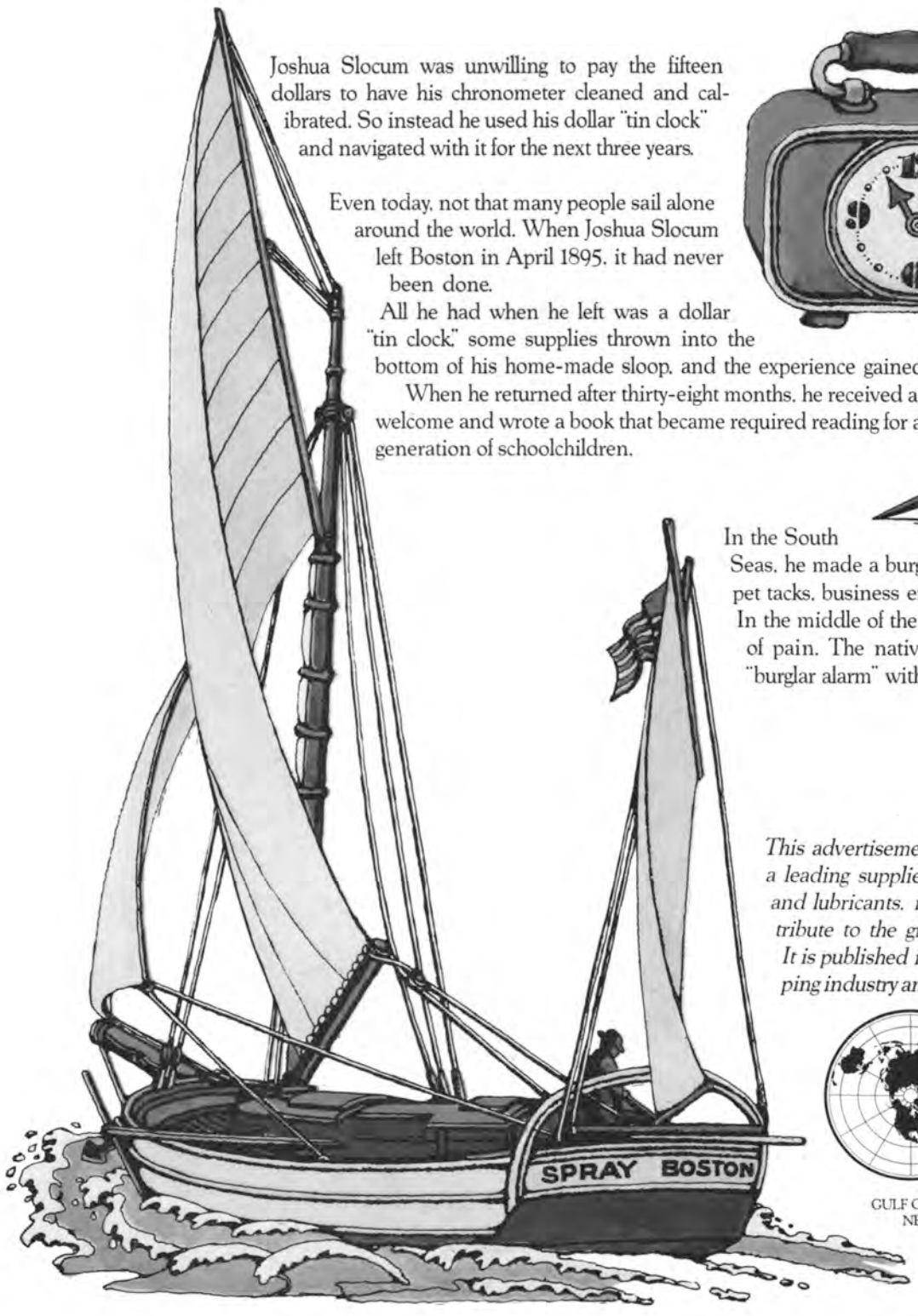
Even today, not that many people sail alone around the world. When Joshua Slocum left Boston in April 1895, it had never been done.

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.



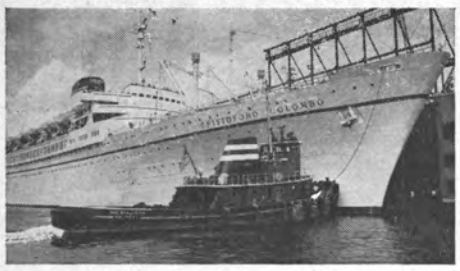
In the South Seas, he made a burglar alarm by placing carpet tacks, business end up, around the deck. In the middle of the night, there were shrieks of pain. The natives had stepped on the "burglar alarm" with their bare feet.



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.

Gulf

GULF OIL TRADING COMPANY,
NEW YORK, N.Y. U.S.A.



Cristoforo Colombo discovers the new McAllister.

Docking and undocking now faster, more efficient than ever.

The newest addition to the McAllister fleet, the 3160-hp Kort-nozzle tug "Jane McAllister," is shown here undocking the pride of the Italian Line, "Cristoforo Colombo." The "Jane's" flanking rudder system gives her a powerful edge in manuverability that pays off in speed, economy and safe conduct of the ship.

The "Jane" is only one of four new powerful tugs that are swelling the McAllister fleet. Supertugs for superships. So, whatever your harbor movement needs, including tug and barge transportation, why not discover for yourself the new McAllister?
McAllister Bros. Inc., 17 Battery Place, N.Y. 10004.

Mac has the knack.

Venezuela Seeks U.S. Shipyard Bids On Seven LNG Ships

Seemingly unable to obtain suitable delivery schedules from European yards at this time, Venezuelan Government Mission is currently soliciting proposals from U.S. shipyards on the construction of seven LNG (liquefied natural gas) carriers—three of 120,000 cubic meters and four of 109,000 cubic meters capacity.

The first ship is required by mid-1975, with completion of the contract by the end of 1976. Apparently, delivery dates are sufficiently imperative to compensate for any higher than foreign prices that may be quoted by American yards.

With extended deliveries being offered abroad and foreign ship prices climbing, the U.S. shipbuilding industry may soon obtain its first export contract in many years.

Reprieve Given To 4 M-Class Cargo Ships By Prudential-Grace

It was announced by Prudential-Grace Lines in November 1970 that four M-class passenger-cargo ships, the Santa Magdalena, Santa Maria, Santa Mercedes, and Santa Mariana, would be laid up at the end of February, along with the passenger ships Santa Rosa and Santa Paula.

While the two passenger ships have been laid up permanently in Norfolk, Va., the four M-class ships have been given a reprieve and will continue to be used to carry bananas and other products between Port Newark, N.J. and the West Coast of South America. These four vessels will no longer have passengers, but will be used only for cargo.

Corps Of Engineers Flatdeck Barge Bids To Be Opened Mar. 16

The Corps of Engineers, 2nd & Chestnut Streets, Philadelphia, Pa., will open bids on or about March 16 for construction of one all-welded, steel, flatdeck barge. The measurements of the vessel are to be 80 by 29 by 7 feet, and it is to be delivered within 180 calendar days to the U.S. Army Engineer District, Jacksonville area office, Clewiston, Fla.

Bidders who are interested should refer to DACW 61-71-B-0057.

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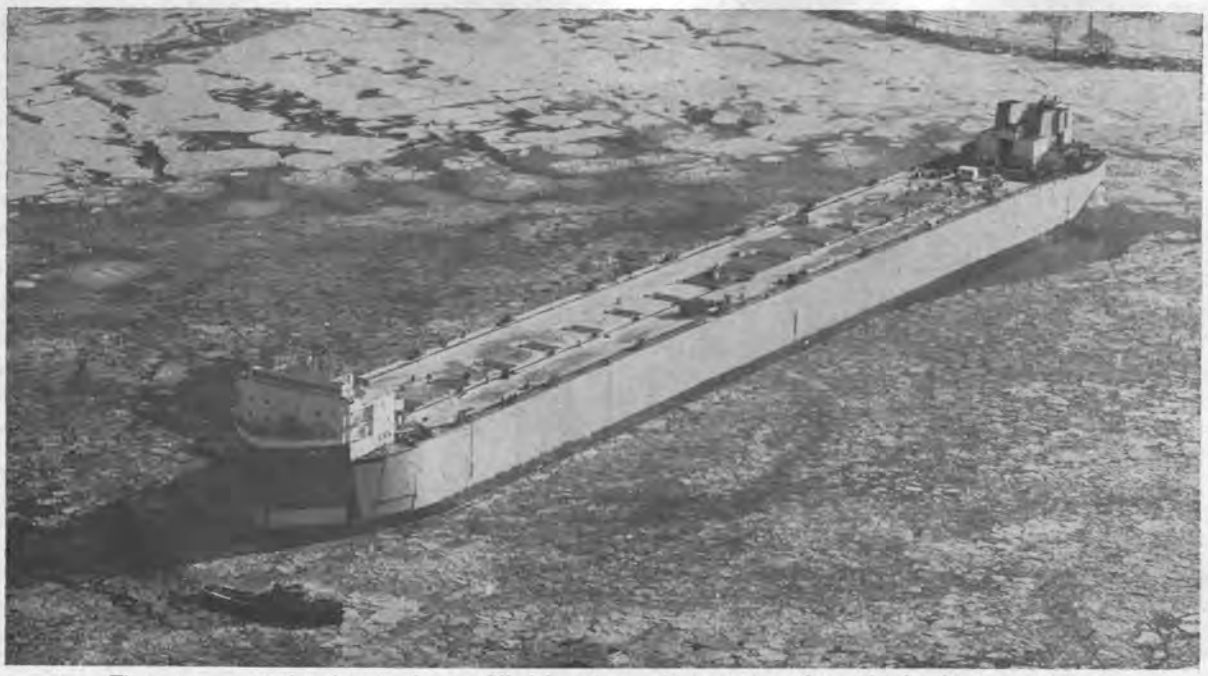
Talk to TODD



Three tugs spin the ship in the ice-filled bay just prior to going alongside the fitting-out pier.

Largest Great Lakes Self-Unloader Enters Service For Bethlehem This Spring

Hull No. 101 Being Built By Erie Marine Division Of Litton Industries Reflects Innovations In Ship Design, Unloading Equipment And Construction Techniques.

C.E. Tripp and G.H. Plude*

When Erie Marine Division's Hull 101 is completed this spring, it will add to the Great Lakes fleet not only the largest vessel that navigation regulations will permit but also the most innovative both in design and method of construction. The addition of this vessel will bring Bethlehem Steel Corporation's Great Lakes fleet to seven ships and will increase its per trip capacity by almost 50 percent.

The number and capacity of the U.S. Great Lakes iron-ore fleet had dropped at an increasing rate during the 15 years preceding the start of this ship's design. Meanwhile, the shipment of iron ore from the head of the Lakes had reached a peak in the early 1950s and after a subsequent drop of approximately 50 percent, resumed a steady climb. The major part of the increase was due to the increases in pellet production.

In 1962 the Corps of Engineers approved an increase in the size of the new proposed lock at Sault Ste. Marie. The size of the new lock was set at 1,200 feet long by 110 feet wide with a draft over the sills of 32 feet at low water datum. The maximum size vessel that will be allowed to transit the lock will be 1,000 feet long overall and 105 feet in beam.

To meet these opportunities, Litton Industries decided to construct a new automated ship assembly facility at Erie, Pa., and retained Marine Consultants and Designers, Inc. to integrate the design of a new vessel with the new building facility. At that time Marine Consultants and Designers were completing the design for United States Steel Corporation of another large vessel, now under construction at American Ship Building Company.

The question of overall size and configuration was studied in detail, taking into account not only the economics but also navigational restrictions and existing loading and unloading facilities.

In addition to the lock restrictions, there were areas in the St. Marys River that restricted the overall size. It was generally accepted that the 1,000-foot by 105-foot vessel would experience some difficulty negotiating certain bends. It is now known that the Corps of Engineers will widen six of the more restrictive bends in the river.

Existing loading and unloading facilities were considered. The depth of the vessel and the size of the hatches were directly affected. To load a vessel without turning it around required the cargo to be discharged near the ship's centerline. The angle of repose of the cargo, the angle of slide (chute), and the height of the chute pivot were all critical. The conveyor-belt-type ship loaders as found at Taconite Harbor and Silver Bay provided the most flexibility from the vessel's standpoint and gave more freedom in the design.

The restrictions imposed by the existing unloading facilities were even more formidable. Not only were the unloading rigs restrictive, but also the stockpile areas and equipment for moving the cargo from the vessel. Due to several of these factors and the fact that pellets would be the only ore cargo, it was decided to make the vessel self discharging with conveyor belts and hoppered cargo hold. Hewitt-Robins, Inc., a division of Litton Industries, was retained to develop the unloading system. The unloading rate was set at 20,000 long tons per hour.

The design was developed to be compatible with the new Erie Marine ship assembly facility. The parallel midbody was designed for modular construction at Erie while the bow and stern were designed as separate units to be constructed elsewhere. (Later decided to be built at Ingalls Shipbuilding Corporation). The basic design was completed in late 1967. Final modifications were made early in 1968 to meet Bethlehem's specific requirements. The depth of the vessel was increased to 49 feet during this period in order that the draft could be increased at a later time simply by the addition of a minimum amount of steel strapping on the spar deck. If the strapping is added, the vessel will be able to operate at a draft of 30 feet 6 inches.

Design

The criteria laid down in the lines development was that the vessel be capable of a minimum of 16½ mph loaded, carry a maximum deadweight, be capable of loading uniformly with very little cargo trimming and unloading uniformly throughout its full cargo-hold length.

The deadweight dictated a large block coefficient. The speed and block dictated a transom stern. The twin-screw arrangement was dictated by the unloading equipment.

A small bilge radius was used (15 inch), to help achieve the desired capacity and simplify construction, and as a result there are rather sharp transitions at the entrance and run. There is a definite discontinuity along the bilge aft where the bilge begins to rise to the transom. The transition from a 15-inch bilge radius to a 5-foot radius was done using a conical section over a very short distance to minimize construction problems.

The skeg dimensions were controlled by the space necessary for the unloading wheel and stern thrusters.

An attempt was made to keep the parallel middle body as long as possible. However, the originally contemplated eighteen 48-foot modules scheduled for construction was modified to 17, and a half module each added to the bow and stern.

The vessel is divided longitudinally into three

(Continued on page 8)

*Mr. **Tripp,** president, and Mr. **Plude,** project engineer, Marine Consultants & Designers, Inc., Cleveland, Ohio, presented the paper condensed here before the January meeting of the Great Lakes and Great Rivers Section of The Society of Naval Architects and Marine Engineers.

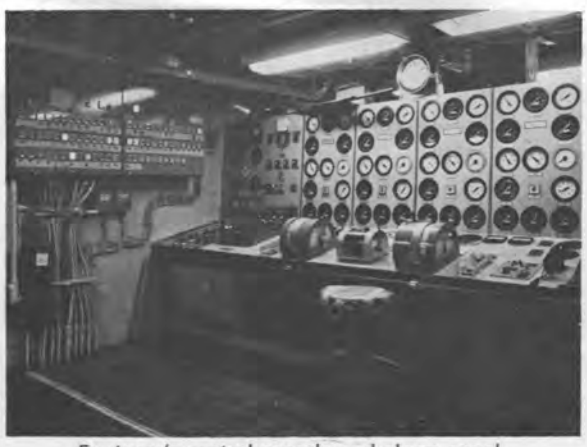
Principal Characteristics

Length overall	1,000 ft. 0 in.
Length bet. perp.	988 ft. 6 in.
Length on waterline	998 ft. 0 in.
Beam, mld.	104 ft. 7¼ in.
Depth at side, mld.	49 ft. 0 in.
Max. draft, summer, mld.	27 ft. 10 in.
Design draft, mld.	25 ft. 9 in.
Block coeff. on lbp	0.924
Midship coeff. on lbp	0.999
Displacement, summer, mld.	74,400 tons
Displacement, design, mld.	68,330 tons
Light ship weight	15,510 tons
Total deadweight, summer draft	58,890 tons
Total cargo cubic	1,647,705 cu. ft.
Total ballast capacity	38,872 tons
Brake horsepower, normal	14,800
Shaft horsepower, normal	14,000
Sea speed, design draft	16.0 mph
Crew accommodations	33
Gross tonnage	33,000
Net tonnage	30,000

Note: All tonnages in long tons

STUBBY, comprised of only bow and stern welded together, is shown leaving its birthplace at Litton's Ingalls Nuclear Shipbuilding yard in Pascagoula, Miss., to steam 2600 miles to Lake Erie, where the modular midbody was inserted to become the largest ore carrier on the lakes.

A view of the pilothouse looking to port.



Engineer's control console and alarm panel.

Control console for cargo-handling equipment.

Great Lakes Self-Unloader—

(Continued from page 6)

watertight compartments between cargo-hold extreme bulkheads. Two of these are ballast and void spaces, port and starboard, and the third is the cargo space. Each of these spaces is further subdivided transversely. The ballast and void spaces are each, port and starboard, divided into nine separate watertight compartments by ten bulkheads and the cargo space is divided into four compartments by five bulkheads.

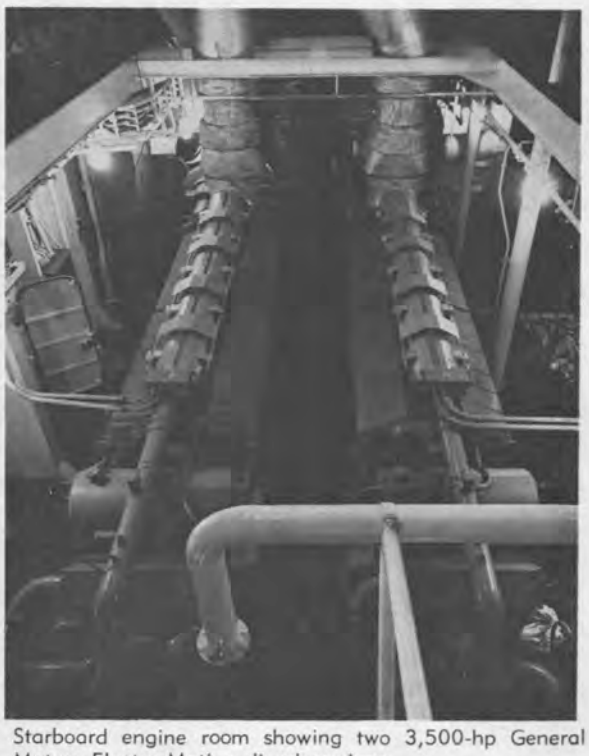
There was no question at any point in the design about the inclusion of bow thrusters. There are two 750-hp units with intermittent power capability of 1,000 hp. The decision to use two tunnels rather than one was based on thruster diameter and the desire to keep the tunnels submerged at light ballast drafts.

The decision to use two stern thrusters was not so clearly defined. Twin-screw maneuverability, cost and limited space motivated against, while size of the vessel and river navigation argued for installation. The argument was resolved by conducting side thrust tests using the twin screws and comparing this with the thrust estimated to be available from an installation similar to that on the bow.

Hull

In all phases of the midbody structural design the integration of the production facility and the structural details were a prime consideration in deciding the method by which structural steel was used.

The Erie Marine shipyard was considered as a production-line manufacturing facility. Material flowed through the line to a final assembly point, while labor was reasonably fixed at one location to allow repetitive operations.



Starboard engine room showing two 3,500-hp General Motors Electro-Motive diesel engines.

The shipyard technical staff developed innovative techniques for handling, moving and aligning modules.

Throughout the module fabrication, alignment of module to module and midbody to bow and stern, a Laser theodolite was used. The red Laser beam aligned on a desired reference point throws a point of red light on the target. Moving the structure with its attached target until the point of light is properly located on the target brings the unit into proper alignment. Theoretically, the structure can be located to within 1/16 of an inch. Practically, the limits are greater and depend to some degree on the structure being aligned and outside influences such as wind. Unloading equipment tolerances required that the longitudinal centerlines of the bow, each module and the stern fall within a zone ½ inch each side of the vessel's centerline regardless of whether the offset of the centerline was caused by horizontal or angular misalignment.

The midship structure was developed almost entirely on the basis of the shipyard manufacturing process. Because of the development of a procedure to use electro-gas welding effectively for seam welds it allowed the choosing of a narrower basic plate width as a building block than would normally have been the case. The 90-inch width is the maximum width that can be purchased maintaining the minimum add-on unit costs for width.

The conventional transverse side framing and transverse stiffener arrangement on the cargo-hold slopes was revised to longitudinal framing to suit the panel welding machine production. Dishing of the cargo-hold slopes between stiffeners in a direction that would restrict the flow of the cargo dregs was a consideration motivating against the use of longitudinal cargo-hold stiffening but it was felt to be less of a problem with the pellet cargo than with an all-purpose carrier. Considerable subjective discussion took place on the suspected disadvantages of longitudinal side framing versus transverse framing relative to side shell-dock damage. The closely spaced longitudinals and the heavy transverse webs appeared to provide equal shell support and production became the controlling consideration.

No riveted seams are used as crack arresters. Instead a grade EH plate is used at the bilge and gunwale; they are normalized after forming and carried a minimum of 6 feet onto the deck and bottom shell.

Cargo-hold slopes and hogbacks were plated with a 50,000 psi yield steel to gain a slightly higher Brinell than was available with mild steel for improved abrasion resistance.

The upper and lower flanges of the hull girder were made of higher strength steels to gain a 1,000-long-ton deadweight improvement.

Because of the wide hatch spacing (48 feet), the high strength materials were used between the hatches on the assumption that the stress lines would enter this area to some degree and that this plate was not isolated as in the case with close hatch spacing.

The original design contemplated thirty-five 11 foot 6 inch by 21 foot 5½ inch hatches. This was later revised with the increase in depth since adequate cubic for pellets was available using 18 hatches. Provisions have been made for adding the additional 17 hatches.

The Walz & Krenzer hatches are dogged, opened and closed by individual electrically driven hydraulic units located at each hatch. The dogs are horizontally moving pins, gang operated on each side of the hatch, by a single cylinder also on each side of the hatch. Opening and closing is done by torque arms operating from a hydraulic rotary actuator. The hatches are hinged at the forward edge (with one exception) and rotated 180 degrees to the open, stowed position between the hatch openings.

Machinery

The main propulsion units consist of four Electro-Motive Division, General Motors Corporation, Model 20-645E7 diesel engines, each mounted on a common skid with, and powering, four E.M.D. Model A-10 a-c main generators having through shaft drives connected to pneumatic disconnect clutches and powering two Falk double-input, single-output main reduction gears. The vessel is twin screw, two engines and a gear for each shaft. The propel-

Aft thruster motors with vent ducts looking to starboard.

Port rotary actuator steering gear.

lers are controllable pitch of Escher Wyss manufacture, 18 feet in diameter.

The procurement of the basic machinery was unique in that it was obtained as a package from the Electro-Motive Division and consists, with the exception of the reduction gears and control systems, essentially of standard production-line components. The basic prime mover output of the main units is programmed to completely satisfy the power needs of the vessel operation and fulfills multiple function requirements, underway and at dockside, by providing 14,000 shp, rectified electrical d-c power for maneuvering and unloading, and electrical a-c power for ballasting and ship service use. In addition to the main propulsion equipment, the Electro-Motive Division package included the 850-kw ship's service generator, the four thruster motors, the six main unloading conveyor motors and the controls for the propulsion, thruster and conveyor power programming and distribution.

The engine room was designed for one-man operation. Starting, stopping, running and monitoring functions all can be performed at the console. Main engine throttle control from the pilothouse or engine room is the electric-pneumatic type.

The basic control for assigning the main engines for the various functions (unloading, thruster, propulsion, ballast, etc.) is located in the engine control room. The engine room can pass this control to the pilothouse if desired. The actual thruster controls are centered in the pilothouse and control can be transferred to the remote stations as necessary.

The ballast system is unique in that each ballast tank has its own pumps, thus there are 18 pumping stations on the spar deck. There are 36 deck mounted Byron-Jackson deepwell turbine-type ballast pumps—one fill pump (3,100 gpm) and one discharge pump (3,600 gpm) at each station. The vessel can be completely dewatered in about three hours. All valving has been eliminated except for one shut-off valve at the sea connection for each tank. The sea connections are conical and eliminate the necessity of lay-up fittings for grease and steaming out.

All quarters are air conditioned by means of the Norris Warming heating, ventilation and air-conditioning system. Each room has its own bulkhead-mounted thermostat. Heating is provided electrically. The wheelhouse is air conditioned and ventilated by a packaged unit. The cargo unloading control room and the engine control room are air conditioned, each by its own packaged unit.

Unloading System

The unique unloading system was designed by Hewitt-Robins to handle a varying unloading rate from 6,000 to 20,000 long tons per hour with a free-flowing material of two-inch lump size and below. It causes a minimum of cargo cubic loss to elevate the cargo from the tank top to the upper deck level, utilizes a minimum number of transition points and changes in flow direction and it is hoped will provide a system requiring fewer operating personnel, no tunnel-gate operators and less clean-up than has previously been possible.

The main components of the system consist of a specially designed metering feed gate, a single 10-foot wide steel-cord conveyor belt, a 60-foot diameter wheel elevator, a 98-foot long by 10-foot wide transverse boom conveyor and a centrally located, programmed control station.

Material is fed from the cargo hold to the tunnel conveyor by means of 105 newly developed metering gates. The design of the system is predicated on discharging from all gates simultaneously (with the exception of those gates over weigh scales). This allows unloading the vessel in a manner that induces the least strain on the hull, simplifies ballasting, but necessitates microscopic control of the flow through each gate. This is accomplished by a weir gate concept.

The 105 gates are divided into six groups. Each group is gang operated by its own hydraulic power unit operating a single set of opening and closing cylinders moving connecting rods tying the gates together. Each group of gates is individually operated from the central control station to provide one-sixth of the total material flow.

The 10-foot wide conveyor is used to transport the material from the gates to the unloading boom via the wheel elevator. The width is larger than normally used for two important reasons; it provides additional cargo hold cubic by allowing wider separation of the slopes and the belt is lightly loaded at all unloading rates to reduce spillage to a minimum.

The conveyor is equipped with six weigh scales, one at the end of each section of gates. These units provide the feedback information to the control panel necessary to the operation of the system and provides the signal for automatic closure in the event of overloads.

The conveyor operates at 600 fpm for unloading rates below 12,000 long tons per hour and at speeds varying between 600 and 1,000 fpm, depending on the unloading rate from 12,000 to 20,000 long tons per hour.

The rotary elevator is similar to an undershot waterwheel in appearance and operation with the exception that it is supported by two bogy idlers and has no spokes or axle. The wheel is not powered. It rotates as a result of the friction between it and the conveyor belt wrapped around its circumference.

The hold conveyor wraps around approximately 210 degrees of the outside circumference of the wheel, leaves the wheel to wrap around two drive pulleys and then return to the hold along the same route used during the elevating process but separated from the wheel by idlers.

The conveyor contacts the wheel at its lowest point. Material on the belt is trapped in one of a number of compartments formed by the wheel sides, successive radial diaphragms and the belt riding on the wheel circumference. A closing belt on the inner circumference forms the last closure on the compartments holding the material trapped until it rises to the highest point on the wheel. Here the inner closing belt falls away from the inner circumference, allowing the material to fall by gravity to a hopper where it is transferred to the transverse boom for discharge over the side.

The transverse boom conveyor stows athwartship within the vessel's beam. It extends over the ship's side, port or starboard, at any distance up to a maximum of 40 feet by means of a double-acting hydraulic cylinder and cable rigging.

The unloading control station, located on the generator deck on the centerline, provides reasonable good visibility of the boom point in its extended position and houses the control console for all the unloading equipment. The boom is extended or retracted at this point, the unloading rate set and maintained, the conveyor operated, and the feed gates opened and closed.

Navigation

The usual navigating equipment is provided including two Raytheon radars, Mackay radio direction finder, Raytheon fathometer (reading forward and aft), Benson Electric draft meters (reading forward, aft and midship), Sperry gyro-compass system, Leslie-Tyfon whistles, Henschel rudder-angle and shaft rpm indicators, Henschel engine order telegraph, Lorain County Radio radio-telephone (AM and FM), Hose McCann navigating-lights panel and ship service Dial-X telephones, and Carlisle-Finch searchlights.

Vertical module construction. This unique method facilitates positioning of subassemblies and permits concentration of labor and tools in a small area.

Joining panels by use of the electro-gas welding process.

The fabrication building at Litton's Erie plant. Panels of 48-foot-long by 90-inch-wide plate with three stiffeners are produced on a production line in this building.

The 48-foot plates are moved to the assembly building via special trailers. The period from reclaiming steel from the storage yard to the module rotation is about two weeks.

SNAME Pacific Northwest Section Has Varied Program; Tours Western Gear, Holds T&R Briefing, Hears Technical Paper

Members who participated in two interesting programs are shown left to right: **Lou D. Chirillo,** Todd Shipyards, Seattle, vice chairman of the Section; **Larry Glosten,** National Coastwide-Inland Waterway Transport Technical and Research Panel; **Thomas Harrigan,** Western Gear Corp. (HMD), Section papers chairman; **Robert Kennard,** chairman of the technical and research committee; **Peter Sias,** Systems Support, chairman of the Section; **Hans Schaefer,** National Shipyard Facilities Technical and Research Panel; **E.C. Lund,** assistant chief engineer at Western Gear Corp. (HMD), who authored and presented the evening's technical paper entitled "Deep Submergence Rescue Vehicle (DSRV) Handling Considerations on ASR 21 and 22"; **Kenneth Wheeler,** Sea Grant Program, Pacific Northwest committee; **Robert Spafford,** PMS 391 Naval Ship Systems Command, Washington, D.C., and **John Christiansen,** J.J. Henry Co., Inc.

Blustery wet weather, so familiar to Pacific Northwesterners, did not dampen the enthusiasm of 122 members and guests of the Pacific Northwest Section of The Society of Naval Architects and Marine Engineers, gathered for their regular meeting on January 7, 1971, in Everett, Wash.

An extremely interesting evening began with a tour of Western Gear Corporation (HMD) plant facilities, which included discussions on the manufacturing aspects of rather large components belonging to the Deep Submergence Rescue Vehicle Handling System for the ASR 21 and ASR 22. The tour ended with a detailed demonstration of a working ¼-scale mock-up of the DSRV Handling System.

Prior to the evening's technical presentation, **Peter M. Sias,** chairman of the Pacific Northwest Section, emphasized the need for greater participation in technical and research disciplines and introduced **Robert Kennard,** chairman of the technical and research committee of the Section, who briefed attending members of the various national panels currently involved in technical and research programs. Mr. **Kennard** introduced three members who are serving on some panels—**Larry Glosten,** National Coastwide-Inland Waterway Transport Panel; **Hans Schaefer,** National Shipyard Facilities Panel, and **Kenneth Wheeler,** Pacific Northwest Section Sea Grant Program representative.

Mr. **Glosten,** L.R. Glosten and Associates, mentioned a proposed coordinated panel discussion with U.S. West and East Coasts and Canadian members. Emphasizing the need to exchange dialogue between U.S. and Canadian shipyards, Mr. **Schaefer,** chief engineer, Todd Shipyards, Seattle Division, believed this will better overall shipbuilding techniques. Mr. **Wheeler,** Design Analysis, highlighted the many anticipated benefits regarding the national Sea Grant program.

After the technical and research briefing session, **Thomas Harrigan,** Section papers chairman, introduced **E.C. Lund,** assistant chief engineer, Western Gear Corporation (HMD), who authored and presented a paper entitled "Deep Submergence Rescue Vehicle (DSRV) Handling Considerations on ASR 21 and 22."

For the past 2½ years, Mr. **Lund** has headed the DSRV Handling System design group and has worked closely with other Western Gear Corporation personnel to assist in the overall construction and installation of the DSRV handling equipment.

As a result of the need for an improved submarine rescue system, the Deep Submergence Rescue Vehicle was conceived and designed in the mid-1960s, and to support deployment of this vehicle, a special and unique handling ship was required. This led to the development of the ASR 21 Submarine Rescue Ship, and after the completion of plans and specifications by J.J. Henry Company, Alabama Dry Dock and Shipbuilding Company was awarded a contract by the Navy to construct ASR 21 and 22. Western Gear Corporation was subsequently awarded a contract by Alabama Dry Dock and Shipbuilding Company to design, manufacture and install the DSRV Handling System.

After many months of concept study, testing and design development of a recovery system, it was determined that a stabilized lift platform suspended from the ASR by four wire ropes at a 100-foot depth, was the most feasible method of capture. With cables acting as the means of initial attachment and alignment, the DSRV is effectively positioned on the lift platform by actuation of its retractable capturing arms.

To lift the platform which captures the DSRV, an electrohydraulic bridge crane was developed and is equipped with four synchronized hoist drums with a combined rated lift capacity of 165,000 pounds.

The platform is a fabricated steel structure weighing approximately 26,000 pounds, and it was carefully designed to allow proper water entrapment which, in conjunction with the bridge crane ram tensioners, provides relative platform stability as the ASR heaves. To emphasize the extensive study and test work involving platform stability, Mr. **Lund** presented a film showing a rather unique, fully instrumented, wave simulator which was designed and built at Western Gear. The outputs from the instruments were transmitted into a recording oscillograph which was used to record the outputs from all instruments simultaneously. In addition to the oscillograph, underwater moving cameras recorded the heaving of the submerged platform, and analysis of the data collected proved the ram tensioners could reduce platform motion to the tolerances required by the specifications.

Discussing the paper were **Robert Spafford,** PMS 391 Naval Ship Systems Command, and **John Christiansen,** J.J. Henry Co., Inc. Mr. **Spafford** congratulated Mr. **Lund** for his well-presented paper and mentioned some of the logistic problems involving the handling of the complex equipment but which have been solved along with many new handling innovations. Mr. **Christiansen** also agreed with Mr. **Spafford** of a job well done in the presentation of Mr. **Lund's** paper and related the tremendous effort between various parties involved in solving of interface problems, particularly the structural innovations involving the hinging arrangements of the overhead crane outriggers.

Gulf Oil Foundation Presents Assistance Grants To Three Maritime Schools

The Gulf Oil Foundation has presented Departmental Assistance Grants in the amount of $1,500 each to Maine Maritime Academy, Castine, Maine, Texas Maritime Academy of Texas A&M University, Galveston, Texas, and Webb Institute of Naval Architecture, Glen Cove, N.Y.

The check for Maine Maritime Academy was presented to Admiral **Rodgers** by Capt. **Richard Smith,** marine district manager of Gulf's Philadelphia office. The check for Texas Maritime Academy was presented to Rear Adm. **J.D. Craik,** USCG (ret.), superintendent, by **D.G. Brown,** manager, U.S. fleet of Gulf Oil Company. The check for Webb Institute was presented to its president, Rear Adm. **W.A. Brockett,** USN (ret.), by **W.C. Brodhead,** vice president, marine department, of Gulf.

Shown above during the presentation of the Departmental Assistance Grant to Texas Maritime Academy, left to right, are: (seated) Capt. **C.R. North,** manager, marine department, Gulf Oil Co., Port Arthur, Texas; Mr. **Brown;** Rear Admiral **Craik,** and **Emmett O. Kirkham,** chairman of the Academy board of visitors; (standing) Capt. **A.R. Philbrick,** executive officer of the Academy; **A.E. James,** manager of transportation, Gulf Oil Co., Houston, Texas, and Capt. **Robert A. Land,** marine superintendent, Gulf Oil Co., New York.

Maine Maritime Academy superintendent Adm. **E.A. Rodgers** said the money will be used to support an expanded tanker training program for students preparing to serve as licensed officers in the maritime industry. School officials at Texas Maritime Academy said the grant will be used for equipment for the new campus at Pelican Island, Galveston. Webb Institute officials said the grant will be used for support of the school's scholarship program under which all undergraduates attend the Institute tuition free.

The purpose of Departmental Assistance Grants is to further special projects proposed by selected departments in colleges and universities. Together with other sections of its educational assistance program, Gulf will distribute more than $3 million 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 master of the long haul is a master indeed—
He may be called upon to tow floating units of any size or type—
from dredges to drydocks, from barges to battleships,
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in distress under the most adverse conditions to a safe haven—
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Todd Low To Convert Five APL Cargoliners At $32.5 Million

Todd Shipyards Corporation is the apparent low bidder, at just under $32.5 million, to convert five American President Lines Seamaster-class cargoliners to containerships. Acceptance of Todd's bid awaits agreements between APL and the Maritime Administration on several details, including the degree of MarAd participation in construction subsidy.

Todd said the work will be handled in its Seattle and Los Angeles yards. The company agreed to deliver the first converted Seamaster in 345 calendar days, and the final one in 525 days.

The addition of a 90-foot midbody to each ship will be the main feature of the big remodeling job. With hold reconstruction, this will enable each Seamaster to carry 414 forty-foot containers and 48 twenty-foot boxes.

Still undecided is the proposed containerization of six Mariner/Master Mariner freighters. This awaits further negotiations between APL and MarAd. The contracts for these vessels have not gone to bid.

For the five-ship Seamaster contract, Todd bid $6,493,375 on each cargoliner. Other yards wanted up to 765 calendar days to complete the job.

Great Grandson Of Founder Joins Moran Organization

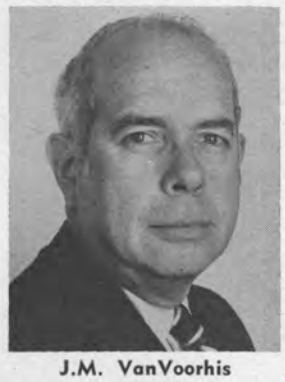
Edmond J. Moran Jr.

Thomas E. Moran, chief executive officer, has announced that **Edmond J. Moran Jr.,** has joined Moran Towing & Transportation Co., Inc., and is assigned to the New York sales department of the company.

Mr. **Moran** is the great-grandson of the founder of the Moran company and is the youngest son of its chairman of the board, Adm. **Edmond J. Moran.**

Edmond J. Moran Jr. graduated from Georgetown University in 1967 and completed his studies in its Graduate School of Foreign Service the following year.

VanVoorhis Named At Johns-Manville



J.M. VanVoorhis

J.M. VanVoorhis has been appointed general marketing manager, equipment insulation sales department of Johns-Manville Corporation, it was announced by **M. W. Burleson,** general manager, Industrial Insulations Division. Mr. **VanVoorhis** has also been elected vice president of Johns-Manville Sales Corporation.

Mr. **VanVoorhis** joined Johns-Manville in 1946 as a research engineer and has held district engineering, sales management and sales positions at St. Louis, Mo., and sales management responsibilities in New York.

A native of Bucyrus, Ohio, Mr. **VanVoorhis** was awarded a bachelor of arts degree from the College of Wooster and a master of science degree from Rutgers University. During World War II, he was an officer in the United States Air Force.

Active in civic affairs, Mr. **Van Voorhis** holds memberships in the Wings Club, Sales Executives Club of New York, Masons, Kappa Sigma National Social Fraternity and Sigma Xi Scientific Fraternity.

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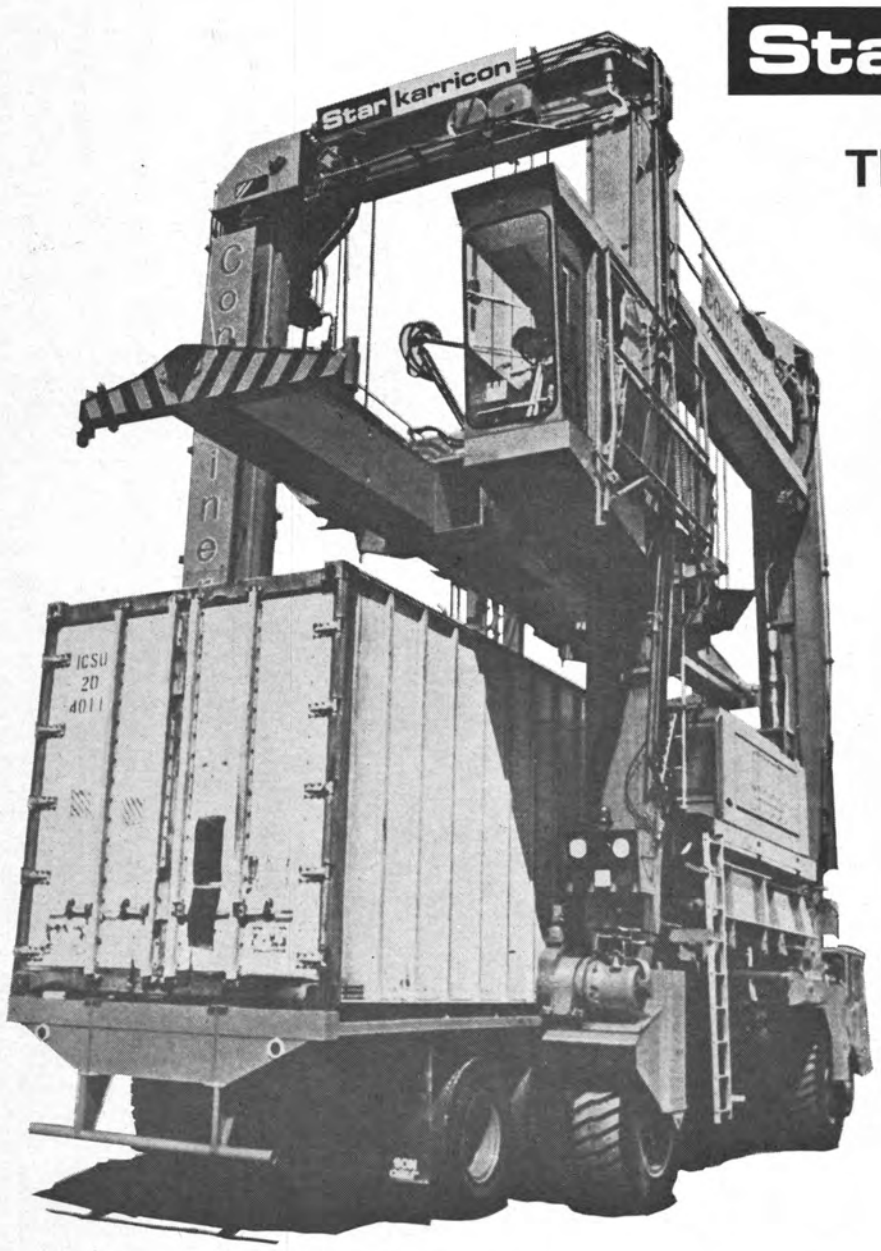
The Most Advanced Container Carrier



Star Karricon* is now being manufactured and sold in the U.S. and its territories by Star Iron & Steel Co., producers of Starporter container, bulk and general cargo handling systems.

***Manufactured under license from Rubery Owen & Co., Ltd., Staffordshire, England.**

Karricon is already the leading straddle carrier in England and Europe. Here's why:

High Speed Operation. Adjustable telescopic spreader handles all containers—even those twisted or on uneven ground.

Great Maneuverability. Will clear and stack containers three high. Unbelievably small turning radius.

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Southeastern Representative: John Blake Engineering & Sales Co. / P.O. Box 23541, New Orleans, La. (zip code 70123) (Area Code 504) 821-4051

MSC Requests Bids For Charter Offers Of Nine New Tankers

The U.S. Navy's Military Sealift Command has issued a request for proposals from the maritime industry and private investors to build as many as nine tankers for long term charter by the Navy.

MSC will use the tankers to supply Army, Navy, Marine and Air Force bases worldwide.

Dated February 4, the request for proposals indicated the command will consider time or bare-boat charter of the tankers. Offers are to be submitted by June 11, 1971.

The request for proposal states: "It has been determined that long-term requirements for the logistical support of the military forces dictate the time and/or bare-boat charter of new construction by the commander, Military Sealift Command, to replace Government-owned T-2 tankers in the fleet . . . Offerors should be prepared to cause to be constructed one or more tankers to a maximum of nine, for time or bare-boat charter to MSC on a long-term basis . . . It is the Government's desire to foster domestic shipbuilding facilities. Accordingly, offerors proposing to charter more than three tankers are urged to consider having them constructed in more than one shipyard."

In order to obtain standardization of the tanker design, MSC encourages the use of lead yard-follow-yard technique. In an effort to spread the ship construction work, MSC has requested that all nine tankers be delivered within 900 days after award of a contract.

Proposals were requested for five, eight, and 10-year periods with successive options allowing the Government to extend the charters up to 20 years. Ships being sought are to be 25,000 deadweight tons with a capacity of 220,000 barrels.

Maximum overall length was set at 600 feet, molded beam at 90 feet and full load draft at 32½ feet. Minimum speed is to be 16 knots with the ships being able to cruise 12,000 nautical miles. The crew complement is set at 30 men for each vessel.

The MSC Specifications for Tanker Construction and pertinent contractural documents are available at MSC headquarters in Washington, D.C. 20390. The RFP number is N0003371R0016.

Proposals in response to this request are due June 11, 1971.

Great Lakes Dredge Elects Hussin VP

Vincent G. Hussin

Vincent G. Hussin, manager of overseas dredging for Great Lakes Dredge & Dock Company, has been elected a vice president of the company.

Mr. **Hussin** will continue to headquarter at Tampa, Fla., where he has been in charge of overseas dredging operations for Great Lakes for the last two years. Prior to that, he was executive vice president of Gahagan Dredging Corporation, which sold its assets in 1968, part of which were acquired by Great Lakes. Mr. **Hussin** had been in the Tampa headquarters of Gahagan for eight years prior to joining Great Lakes.

He is a native of Green Bay, Wis., and attended Pasadena Junior College before beginning his 31-year career in dredging. Mr. **Hussin** is a member of the Tampa Chamber of Commerce and The Propeller Club.

Rankin Joins Thibodeaux & Co.

C.L. Rankin, formerly vice president in charge of the Gulf area for States Marine-Isthmian Agency, has joined C.J. Thibodeaux and Company, marine chartering brokers, Houston, Texas.

Mr. **Rankin** will manage their dry cargo chartering department.

Ian Cushenan Named Division President At American Ship

Ian Cushenan

Ian Cushenan has been named president of the Transportation, Cargo and Material Handling Division of The American Ship Building Co., Cleveland, Ohio.

Mr. **Cushenan,** a former star defenseman in the National Hockey League and with the Cleveland Barons, has previously been associated in various businesses with American Ship chairman and chief executive officer **George M. Steinbrenner III.**

Mr. **Cushenan** began his business career in 1966 with the Kinsman Marine Transit Co. in Cleveland. Four years ago he became president of Great Lakes Associates in Buffalo, N.Y., and two years ago, added the duties of vice president of Great Lakes International, Cleveland stevedoring firm.

During the past year Mr. **Cushenan** has also supervised American Ships's river terminal facilities in Cincinnati and Nashville. All of these operations, as well as lakes shipping, are now part of the division Mr. **Cushenan** heads as president.

Lloyd's Register Amendments To Rules

The technical committee of Lloyd's Register of Shipping has recommended a number of additions and amendments to the Rules for the Construction and Classification of Steel Ships.

Provisional rules have been introduced in Chapter R(J) for the classification of tankers intended for the carriage of liquid chemicals in bulk. These requirements have been introduced to fulfill the many requests which Lloyd's Register has received to approve arrangements for particular chemical cargoes, for which standard practices have been developed. Cargoes are limited basically to those which are liquid at ambient temperatures and pressures, but provision is made for cargoes to be carried at temperatures down to 0°C (32°F) and at pressures up to 0.7 kg/cm² (10 lb/in²). The requirements take account of the latest IMCO thinking on this subject.

Other sections of the ship Rules have been substantially amended; the first stage of a complete revision of the Rules for ships up to 90 meters (approximately 295 feet) in length, previously shown in the 1967 Rules for Steel Ships, has been carried out. It is the intention to publish these as a separate book in due course.

The Rules for dredgers, hopper dredgers, sand carriers and hopper barges, which previously appeared as Section D.36 of the Steel Ship Rules, have been completely rewritten as a result of considerable changes in size of vessel and service requirements which have taken place since the Rules for such craft first appeared in 1963.

The Rules for electrodes for welding in hull construction have been amplified to include requirements for wire/gas combinations, one-sided welding processes and contact welding with gravity and similar devices. Requirements have also been introduced for the approval of consumables for use in welding higher tensile steels.

On the engineering side, the Rules for gas turbines have been extended and revised and now form a new Section 9 in Chapter H.

In a ship for unrestricted service having steam turbine propelling machinery supplied with steam from a single main water tube boiler, it is now necessary for means to be provided to ensure emergency propulsion in the event of failure of the main boiler.

In line with the proposed IMCO figure, the demarcation flash point temperature in the Rules has been standardized at 60°C (140°F) (closed cup test).

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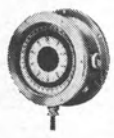
3 cm. and 10 cm. — True and Relative Motion Displays for any vessel.



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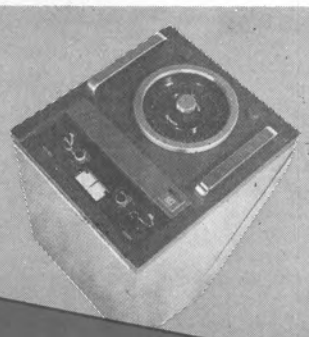

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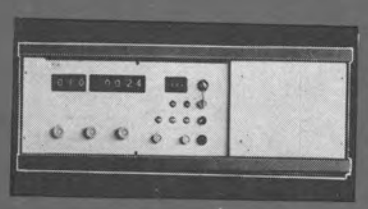

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Four Papers Presented At Winter Meeting Of Great Lakes And Great Rivers Section

Authors and officers pictured above during the winter meeting in Erie, Pa., left to right, are: **R.F. Vollack,** Section secretary-treasurer; **J.M. Davis,** author; **G.H. Plude,** author; **H.M. Tiedemann,** author; **C.E. Tripp,** author; **J.B. Woodward III,** Section papers chairman, and **R.A. Stearn,** Section chairman.

Erie, Pa., was the site of the winter meeting of the Great Lakes and Great Rivers Section, The Society of Naval Architects and Marine Engineers on January 21, 1971. More than 200 members and guests attended the business and technical sessions in the morning.

The following papers were presented and distributed: "Offshore Engineering Surveys," by **Henry M. Tiedemann,** president of H.M. Tiedemann Company, New York, N.Y.; "Great Lakes Maritime Academy," by **James M. Davis,** president of Northwestern Michigan College, Traverse City, Mich.; "Development of a 1000' Great Lakes Self-Unloader," by **Carl E. Tripp,** president, and **George H. Plude,** project engineer, of Marine Consultants and Designers, Inc., Cleveland, Ohio (see cover and three-page feature, this issue); and "The Economic Potential of Ferromanganese Nodules in the Great Lakes," by **Edward Callender,** Great Lakes Research Division, The University of Michigan, Ann Arbor, Mich.

Numerous photographs and slides accompanied the papers on offshore engineering and the 1,000-foot self-unloader.

Following a buffet lunch at the Holiday Inn meeting location, the entire delegation toured one of the most modern shipyards in the world on the city's waterfront. Erie Marine personnel conducted groups of tours through the assembly and fabricating buildings and aboard the 1,000-foot self-unloading Great Lakes vessel they are now finishing for the account of the Bethlehem Steel Corporation.

A reception and dinner concluded the meeting activities in the evening.

The spring meeting of the Section will be held in Lorain, Ohio, on May 6, 1971. A meeting highlight will be a tour of American Ship Building Company and the 858-foot Great Lakes self-unloader for United States Steel Corporation, which that firm is now constructing.

Bethlehem Appoints William C. Brigham Asst. VP, Shipbuilding

William C. Brigham

The appointment of **William C. Brigham** as assistant vice president, shipbuilding, effective April 1, was announced by **Walter F. Williams,** vice president, shipbuilding, Bethlehem Steel Corporation. Mr. **Brigham** is now the general manager of the corporation's San Francisco shipyard. In his new position, he will be located in Bethlehem, Pa.

A graduate of Stanford University with a bachelor of arts degree in economics, Mr. **Brigham** joined the Bethlehem organization in August 1941 as a trainee at the San Francisco yard. He subsequently served as an estimator, supervisor, planning engineer and assistant to the manager before being named assistant manager in November 1958. He was named general manager September 1, 1965.

Although the yard's major activities are now repairs, conversions, and the building of barges, it was a major combination shipbuilding and repairing facility until the mid-sixties, when it ceased construction of oceangoing ships. Mr. **Brigham,** therefore, has had wide experience in new construction in addition to repair.

During his term as general manager, the yard constructed all 57 huge steel tube sections and the ventilation caisson for the Bay Area Rapid Transit District's underwater tube from San Francisco to Oakland, one of the largest industrial jobs ever handled by a West Coast shipyard.

Mr. **Brigham** also supervised the construction at the San Francisco yard of the largest commercial floating drydock ever built in the United States. This facility, a 65,000-ton lifting capacity dock, 900-feet long and 150-feet wide, can handle tankers as large as 230,000 deadweight tons. It was officially placed in service in September 1970.

Mr. **Brigham** is a past president of the Western Shipbuilders Association and a member of The Society of Naval Architects and Marine Engineers.

R.H. Yowell Appointed To New Post At MarAd

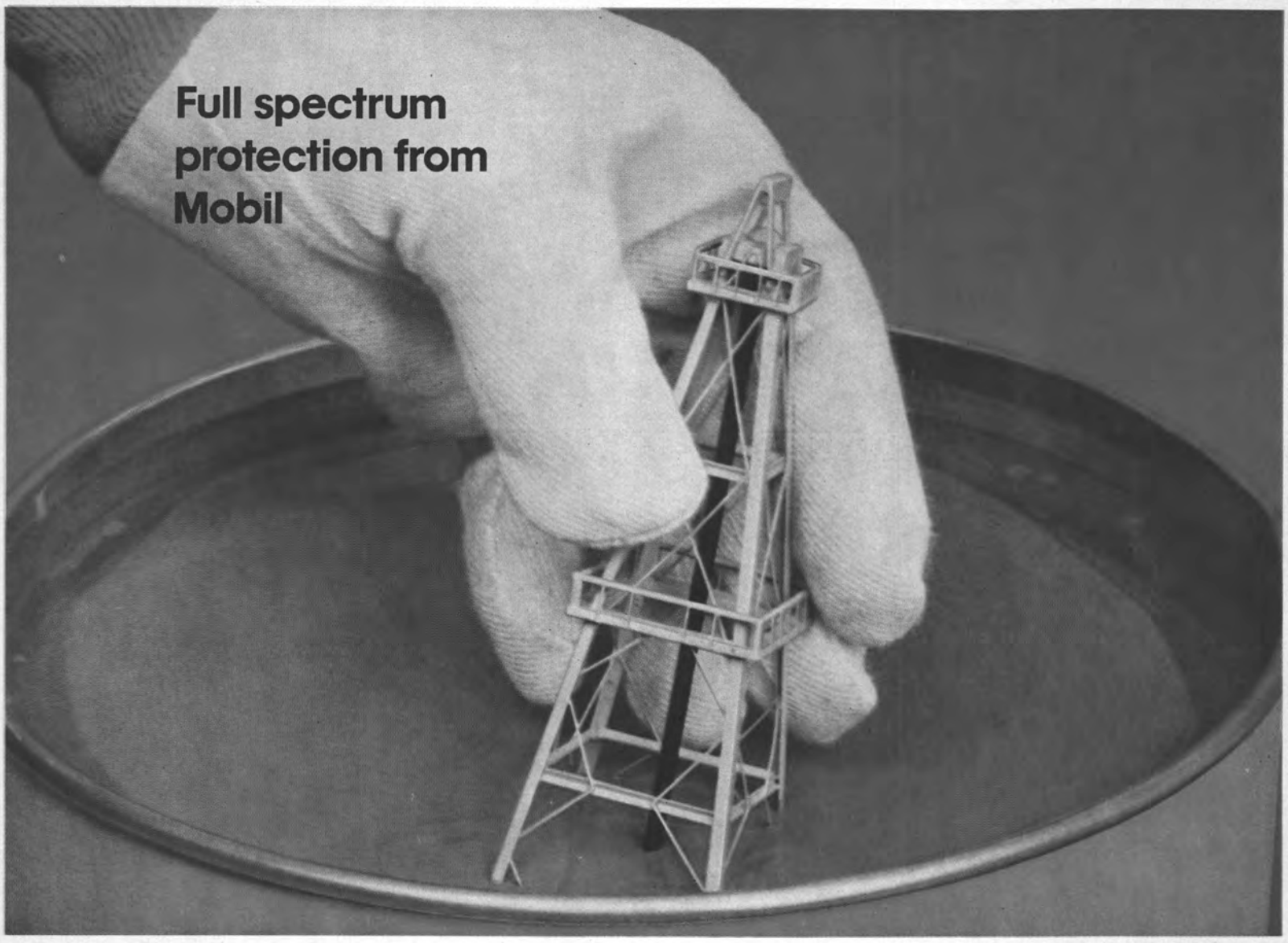
Roy H. Yowell

Roy H. Yowell, a veteran Government employee with 28 years of service, has been named Deputy Chief of the Maritime Administration's Office of Subsidy Administration, it was announced by **Andrew E. Gibson,** Assistant Secretary of Commerce for Maritime Affairs.

Mr. **Yowell,** who joined the MarAd staff in 1957 from the Justice Department, has been Chief of the Agency's Mortgage Insurance Contracts Division since April 1959. Earlier, he served as an examiner in the Office of Government Aid.

In his new position, Mr. **Yowell** will assist the Chief of Subsidy Administration in directing MarAd's Title XI Federal Mortgage-Insurance, Construction-Differential and Operating-Differential Subsidy programs as well as its subsidy rates, trade studies and statistics operations.

A native of Washington, D.C., Mr. **Yowell** received a B.A. degree in economics from the University of Maryland.



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Extensive testing proved Mobilzinc effective for adverse marine and industrial environments, including bridges, offshore rigs, pulp and paper mills, chemical plants, caustic environments, and areas exposed to heavy abrasion or high temperatures.

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171A

Seatrain Container Division Moves Into New Quarters

Seatrain Lines' Container Division has moved into its new corporate headquarters at Port Seatrain in Weehawken, N.J. One of the largest private container facilities in the world, Port Seatrain is located just across the river from 42nd Street, New York City, next to the Lincoln Tunnel.

The new office building is the heart of a revolutionary concept in container movement and control. The building's 60,000-square-foot office complex houses an electronically augmented container control system, which insures on-time delivery of all container movements. Trucks entering or leaving the yard pass through one of the seven bays under the building. All pertinent information is then punched into an electronic control system for instant display.

Seatrain has regular weekly sailings to Europe and twice-weekly sailings to Puerto Rico from Port Seatrain. By mid-April, Seatrain's giant new fast containership, the G.T.S. Euroliner, will berth at Port Seatrain, to be followed by three sister ships in the near future.

The 70-acre site has a two-berth finger pier with more than 1,800 feet of docking area which juts out into the Hudson River, and is capable of berthing two large modern containerships at the same time. Ultimately, three other piers could be constructed on the site. The present pier's 120-foot width readily permits a tractor-trailer combination to turn without backing up. Three double-ended sliding boom gantrys, two in operation and one under construction, can operate simultaneously. Each is capable of lifting 45 tons.

Located in the heart of the New York Port trucking area, Port Seatrain permits quick access to all rail and major highways.

New Boat Handling System Uses Pushbutton From Bridge To Launch Boat In 25 Seconds

A 5,500-pound pilot launch is shown suspended on a single gantline from the "wishbone davit" aboard the New Jersey.

The Sandy Hook Pilots' Association has installed a "wishbone davit" automatic boat handling system on the pilot boat New Jersey. With this davit, the mate on the bridge is able to launch or retrieve a pilot launch in 25 seconds by merely depressing one button.

The system employs a new type hydraulic davit which operates through a controlled sequence. The davit lifts a 24-foot self-balancing aluminum pilot launch, weighing 5,500 pounds, on a single gantline.

Basic design for the system was done by the pilot's marine superintendent, Capt. **Allen Peters.** Marine Safety Equipment Corporation of Farmingdale, N.J., provided all engineering services, constructed the davit, and provided all hydraulic and electric controls. Installation on board the New Jersey was done by Reynolds Shipyard, Rosebank, Staten Island, N.Y. Mon-Ark Boat Company of Monticello, Ark., built the launch to the pilot's specifications. Power is a GM 353 diesel driving through a Volvo outdrive. Service speed of the launch is 18.5 knots. The self-balancing device in the launch was fabricated and installed by the pilot's own personnel.

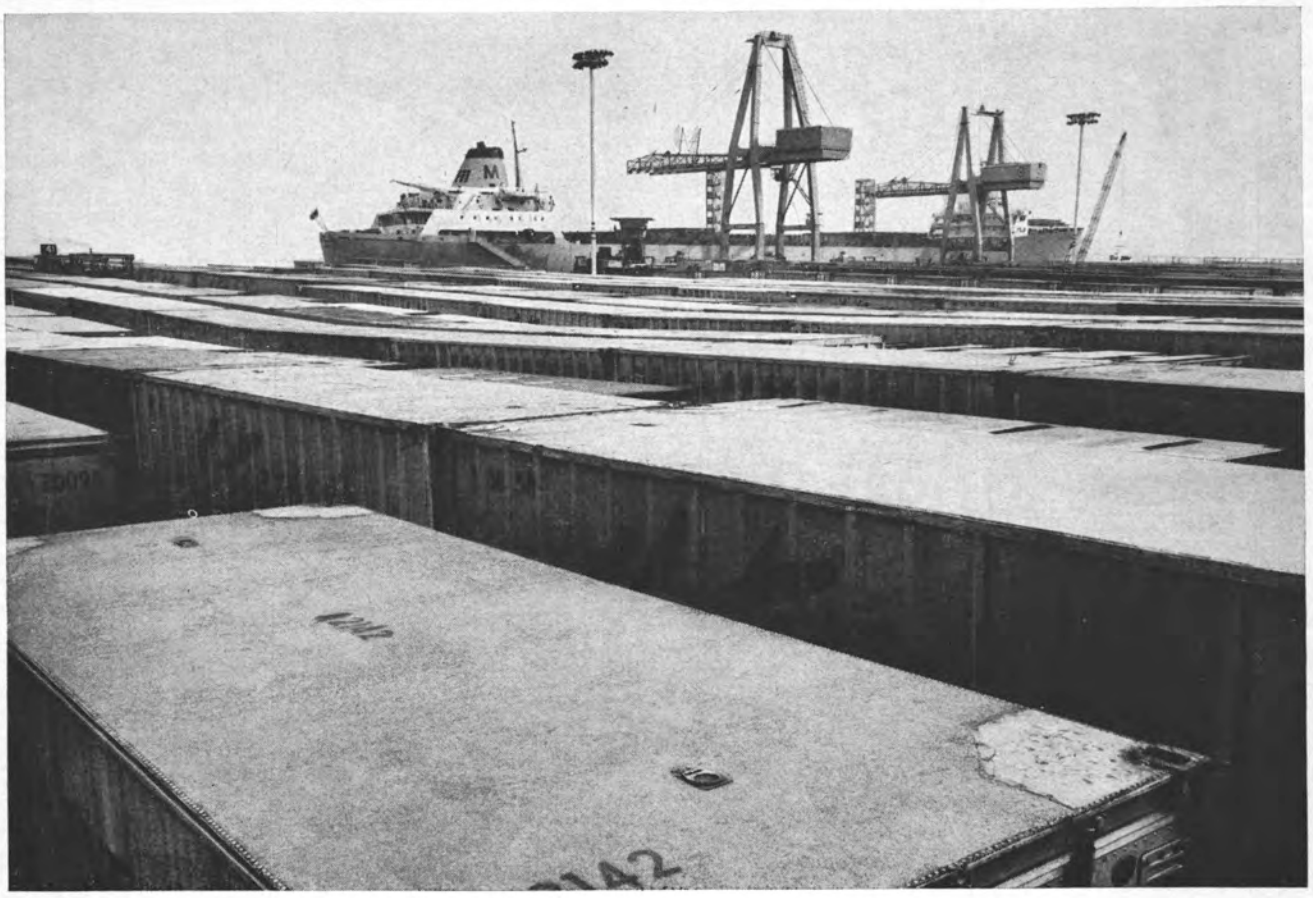
Jurong Yard To Expand Singapore Dock To Handle 300,000-Dwt Vessels

Jurong Shipyard Limited (JSL), Singapore, recently decided to expand its No. 2 repair dock from an existing 100,000-dwt to a 300,000-dwt capacity to meet the increasing demand for repairing large vessels.

According to the expansion plan, the No. 2 dock (approximately 852-feet long, 184-feet wide and 40-feet deep) will be enlarged about 328 feet in length to about 1,180 feet. Construction will be started in July this year, with completion scheduled for March 1972. Construction costs will be approximately $7-million.

The Jurong Shipyard, which was established in 1963 as a joint venture between Japan's IHI (Ishikawajima-Harima Heavy Industries Co., Ltd.) and the Singapore Government, has a 90,000-dwt dock, a 100,000-dwt dock, and a 2,500-dwt floating dock, as main ship repairing facilities. Located near one of the major seaports of the world, it has repaired ships of many nations, including the United Kingdom, the United States, West Germany, the Netherlands, Norway, Sweden, Hong Kong, and Japan.

Recently, the major oil companies of the world have constructed large-scale oil refineries in the Southeast Asia area around Singapore, and large tankers of the 200,000-ton class, which call at the port, have increased in number. The dock expansion was planned in anticipation of orders for repairing these large vessels.



Matson wanted the highest capacity in containerships. B&W built the boilers to match.

38,800 tons. 719 feet long. And capacity for 1,168 twenty four-foot containers.

That's Matson's new *Hawaiian Progress* and *Hawaiian Enterprise,* two of the world's largest containerships.

And twin Babcock & Wilcox boilers will drive each of them, as well as four similar ships scheduled for later delivery. These boilers will deliver 95,000 pounds of steam per hour at 930 pounds per square inch pressure and 960 F. to achieve operating speeds of 23 knots.

An integral part of the boiler system is B&W's unique Progress Burners, the highest capacity burners available. They are so named because of their association with *Hawaiian Progress.*

Designed for high reliability and low maintenance, each boiler-burner package provides more than 20-to-1 turndown ratio. With no manual attention required.

Also helping to keep the two Hawaiians operating efficiently is automatic cleaning and sootblowing equipment from our Diamond Power subsidiary.

But dependable steam power and boiler cleaning equipment are only part of B&W's contribution to maritime progress. Automated control systems and closed circuit TV monitoring are also among the B&W products that increase efficiency and cut costs.

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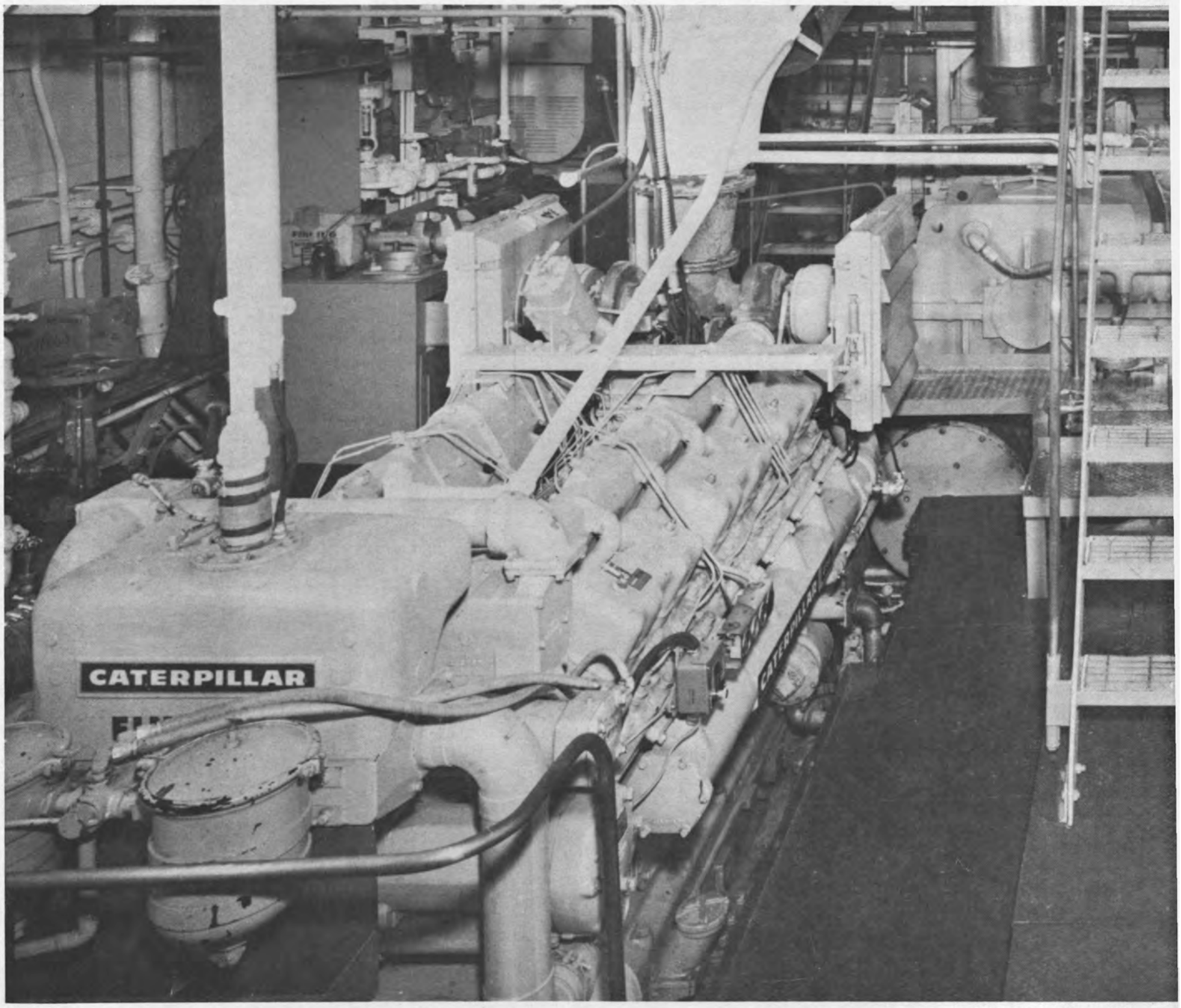
You might compound Cat Diesels on a single screw. Like the GULF JOAN which has four D398s connected to a Lufkin marine gear. This allows the use of from one to all four engines, depending on the load.

The Cat D398 Diesel Engines each develop 765 hp to give the GULF JOAN a total of 3060 propulsion hp. The 149 ft. tug has a 33 ft. beam and 18 ft. draft. She makes 14 knots light and 10 knots towing a 6000 ton deck cargo barge.

A single lever in the engine room controls all four engines or each can be controlled separately. So the captain has all the power he needs, but can use only the power he needs.

Ship's service aboard the GULF JOAN is supplied by two Cat D333 Diesels driving 75 kw generators. Another Cat



Engine drives the towing winch through a torque converter.

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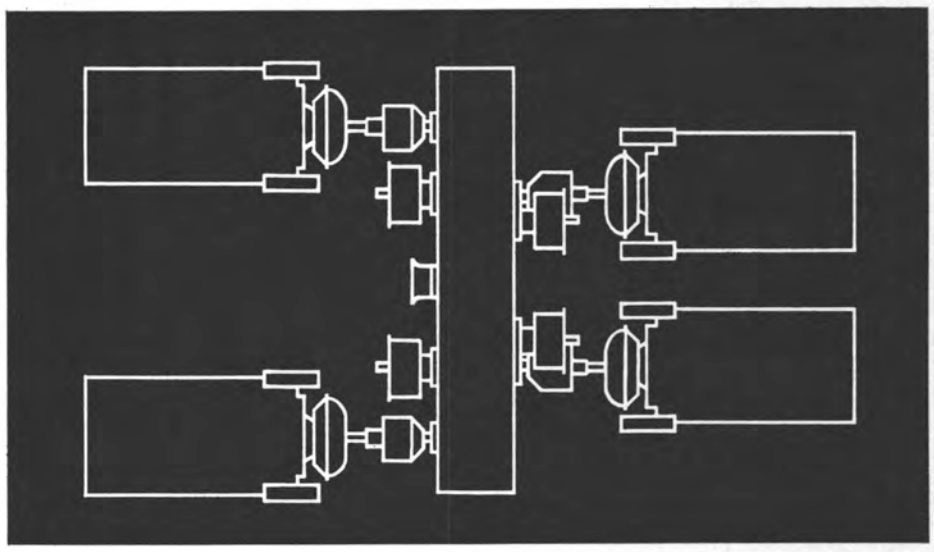
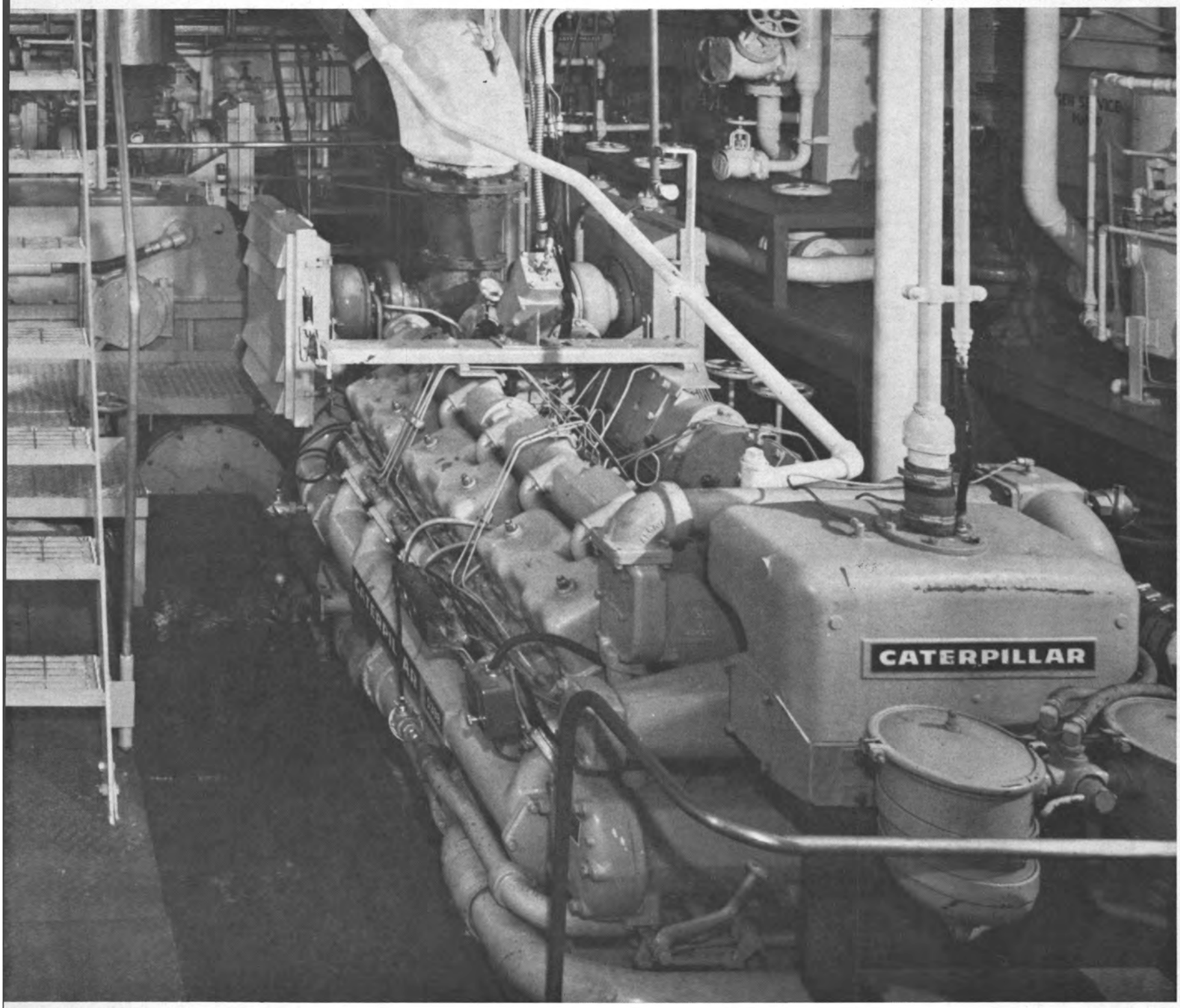
CATERPILLAR





Lloyd's Issues Report On World Shipbuilding

Lloyd's Register of Shipping reports that at the end of 1970 there were under construction in the world 1,955 ships totaling 21,510,420 tons gross. This is 132,751 tons more than the previous quarter's record figure, is 4-million more than at the same time last year, and is the highest ever recorded. These figures do not include newbuildings in Communist China and Russia, for which details are not available.

When the ships which are on order but which have not been commenced are included, the total order book stands at 78,503,994 tons gross. The sequence of record figures continues unbroken since December 1966, and the majority of the leading shipbuilding countries show increases to their order books. Domestic building programs, together with a surge of export orders, particularly for U.K. registration, are responsible for the huge increase of 5,629,139 tons gross in the Japanese order book. Further, gross tonnage launched in that country in 1970 topped 10-million tons. This is more than impressive when compared with the next leading country—Sweden, with 1,732,000 tons.

Of the ships building or on order, 48.3 percent are tankers and 33.4 percent bulk carriers. 6,687,533 tons gross, or 31.1 percent, of ships of which keels have already been laid are being built under the supervision of Lloyd's Register of Shipping.

Francis O'Donnell Named To MarAd Post

Francis J. O'Donnell

Francis J. O'Donnell has been appointed Chief, Office of Market Development, in the Maritime Administration's Eastern Region, it was announced by Capt. **Thomas A. King,** Eastern Region Director. Mr. **O'Donnell** will replace **C.H. Betjemann,** who is resigning. It is expected that Mr. **Betjemann** will continue in an advisory capacity on a part-time basis during the immediate future.

Mr. **O'Donnell** comes to his new position from Moore-McCormack Lines, where he served in an executive capacity since 1946 in Copenhagen, Oslo, Stockholm, New York, and Buenos Aires. During the closing years of World War II, he worked in London for the War Shipping Administration, a predecessor agency of the Maritime Administration.

The Maritime Administration's Market Development Office was established to further the implementation of the President's maritime program to substantially increase American-flag participation in the foreign commerce of the United States. The Eastern Region is comprised of the states on the Atlantic Seaboard and the Great Lakes and also includes West Virginia, Vermont, Puerto Rico and the U.S. Virgin Islands. Eastern Region headquarters is located in the Federal Building at 26 Federal Plaza, New York, N.Y. Mr. **O'Donnell's** telephone number is (212) 264-1338.

A graduate of the U.S. Merchant Marine Academy, Mr. **O'Donnell** holds the rank of lieutenant, USNR (ret.).

Matson Navigation Names Horkay Treas.

Thomas A. Horkay has been appointed treasurer of Matson Navigation Company, it was announced by **Malcolm H. Blaisdell,** president. Mr. **Horkay,** who has been assistant treasurer and director of planning, will continue his duties as director of planning in addition to serving as treasurer.

Mr. **Horkay** joined Matson's parent company, Alexander & Baldwin, Inc., in March 1968, after service with Hughes Aircraft. He became assistant treasurer and director of planning for Matson last November.

SHIPBUILDING COMMISSION: The Commission on American Shipbuilding, recently appointed by President **Nixon,** is shown holding its first conference at the Department of Commerce in Washington, D.C. The Commission was created by the Merchant Marine Act of 1970 to recommend a course of action to be taken on the Government's part and the shipbuilding industry, to improve the competitive position of U.S. shipyards in world markets. Shown at the meeting are, left to right: **Stanley Powell,** San Anselmo, Calif., former president of Matson Navigation; **John T. Gilbride,** Greenwich, Conn., president, Todd Shipyards Corp.; **Andrew E. Gibson,** Assistant Secretary of Commerce for Maritime Affairs; Commission Chairman **Albert G. Mumma,** Short Hills, N.J., chairman Worthington Corp.; **John H. Lancaster,** Maritime Administration, and acting executive director of the Commission; **W.H. Krome George,** Sewickley, Pa., president and director, Aluminum Company of America; **Charles A. Black,** San Mateo, Calif., national secretary-treasurer, National Marine Engineers Beneficial Association, and **Arthur M. Becker,** Bethesda, Md., attorney and partner, Mudge, Rose, Guthrie and Alexander.

Bailey To Automate Lakes Vessel

Bailey Meter Company, Wickliffe, Ohio, has received an order to automate the power boilers of the steamer William P. Snyder Jr., recently acquired by the Cleveland-Cliffs Iron Company of Cleveland, Ohio, from the Interlake Steamship Division of Pickands Mather and Co.

The ship is being converted from coal to oil-firing, using Babcock & Wilcox Saratoga type oil burners with Racer type wide range steam atomizers. The ship has two boilers with two burners per boiler and 5,000 shaft horsepower. Conversion is being made by the Manitowoc Shipbuilding Company in Wisconsin.

Included in the contract are a Bailey Pneumatic Control System for combustion and feedwater control, and a Bailey Marine Digital Burner Management System. Control consoles also will be provided for location in the engine room and at the boiler front.

The analog and digital control systems will be furnished as a completely integrated automatic boiler control system, which will permit operation of either or both boilers by automatic, remote, or local manual modes of control.

A subsidiary of Babcock & Wilcox, Bailey Meter Company is a leading manufacturer of instrumentation, control computers and systems for power plant, industrial process, and marine automation. Since 1964, Bailey has provided boiler control systems for over 160 ships, including complete engine room automation for the first steamship certified by the U.S. Coast Guard for operation without a fireman.

KROGEN DESIGNED GULF TANKER: This 163-foot steel tanker Gulfrey, recently delivered to the Gulf Oil Corporation for Panama Canal area service, can unload its 4,600 barrels of petroleum products in approximately two hours, reports her designer, Miami-based naval architects James S. Krogen & Co. Built by the Port Everglades Shipyard from Krogen's plans, the ship features powerful hydraulic pumps that make the above unloading feat possible, steam heating coils for crude oil cargoes, a three-ton boom for packaged cargo, and air-conditioned quarters for a crew of 11. Twin 565-hp Caterpillar D-379 diesels give the Gulfrey a speed of 11 knots when fully loaded. The ship's deadweight is 700 tons, with a beam of 30 feet and a draft of 9 feet 6 inches.

No. California Section Hears Paper On Web Plates Of Deep Web Frames

Participants in the Northern California Section meeting shown in the photo at left are, left to right: **Norman Thompson,** member of the Section's papers committee, Marcona Corporation; **Hans G. Payer,** author, University of California, and **F.E. Shumaker,** papers committee, Chevron Shipping. Photo at right: **Jack Troyer,** secretary-treasurer of the Section, Todd Shipyard; **W.B. Hickman,** Section chairman, Ocean Machinery Co., and **A.J. Haskell,** Northern California Section vice chairman, Matson Navigation Co.

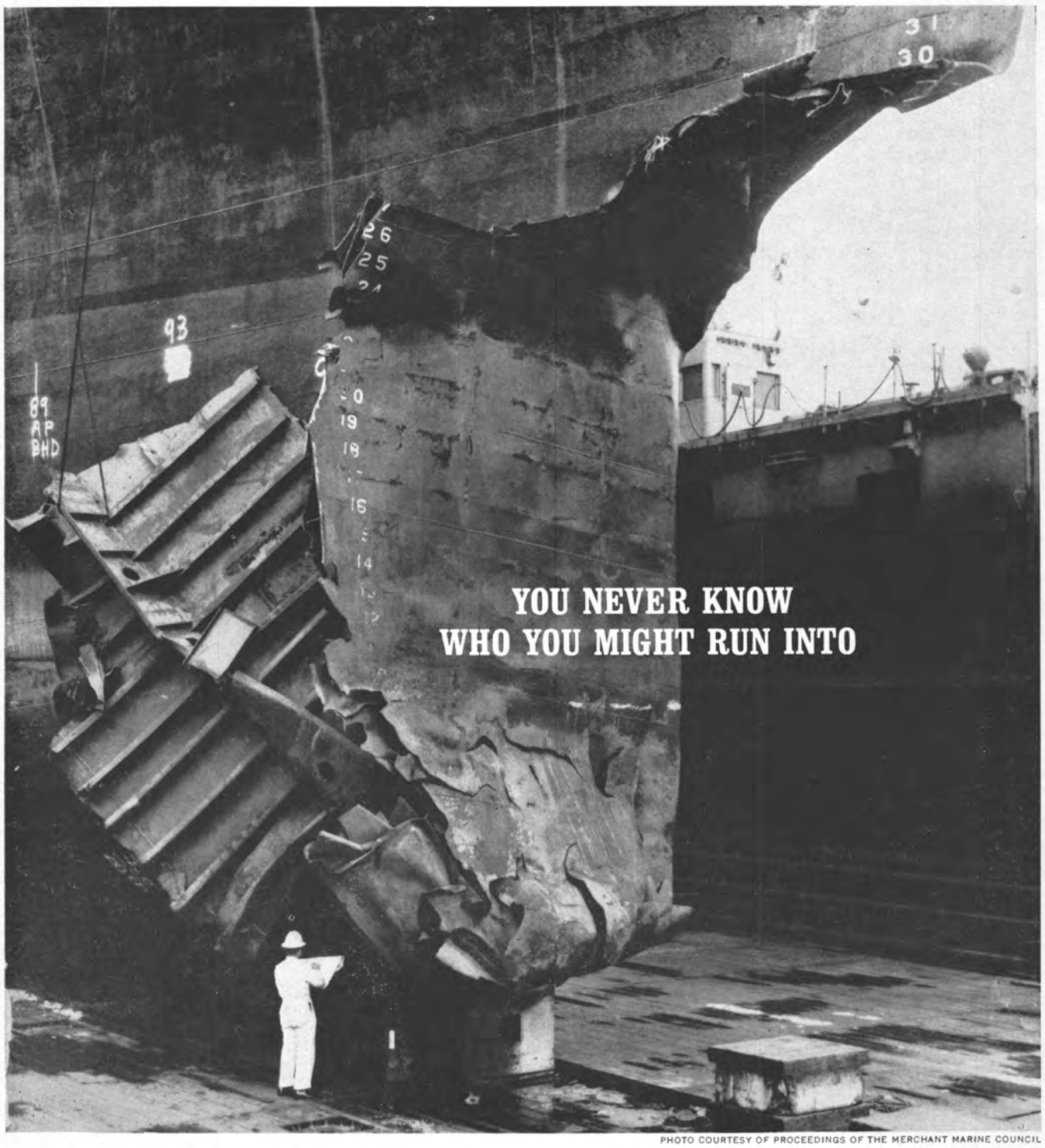
Approximately 50 members and guests heard a paper on "Buckling and Post Buckling Behavior of Deep Web Frames" at The Society of Naval Architects and Marine Engineers Northern California Section meeting on January 14, at the Engineers Club in San Francisco.

The author, **Hans G. Payer** of the University of California's department of naval architecture, explained that the increasing size of tankers was frequently causing deep web plates and other structures to be loaded to the point where they would buckle, but not fail. The paper deals with web plates of deep web frames loaded below and above the buckling load.

Emphasis is given to the influence of initial deflections, which commonly are encountered in welded constructions, on the response of the plate. The process of solving this type of peculiar structural problem was outlined and the character of the deflection and stresses involved illustrated. Full scale experiments were cited which established the validity of the basic theories involved.

Subsequent discussers, including Prof. **H.A. Schade,** developed the point that, prior to previous assumptions on similar vessels, buckling in the super sized structures does not necessarily imply either a design or accidental failure.

As knowledge of this phenomena is developed, it appears quite probable that a certain degree of buckling will be considered in the same sense as a house settling on it's foundations.



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Based on the pulse doppler sonar principle, this new generation speed log measures your true speed *over the bottom* to 800 feet depth. What's more, by having precise speed readings, it provides a continuous performance check for greater savings.

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TURBO GENERATOR SETS

1

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.

2

700 KW NON-CONDENSING MARINE TURBO GENERATOR SET

TURBINE: DRV-318-MRI — 850# — 850°TT — 24 pounds back pressure—10938 RPM. GEAR—Type S—432 — 10932/1200 RPM. GENERATOR: 700 KW — 440/3/60—1200 RPM.

3

75 KW 120 VDC GENERAL ELECTRIC TURBO GENERATOR SET

TURBINE: 225 lb W.P.—150° superheat—15 lbs back pressure—4962 RPM. GEAR—4962—1800 RPM. GENERATOR: compound—75 KW—120 VDC—651 amps—1800 RPM.

4

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.

5

300 KW WORTHINGTON-MOORE CROCKER-WHEELER UNITS

AP2 Ex-Medina Victory units. Worthington-Moore turbine—440 lbs—740°TT—28½" 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 8¼"—bolt circle 7"—12 holes. Also new armature in stock (weighs 1840 lbs). Also have 2 units—generator 102 HP—300 KW—120/240—stab. shunt—1200 RPM.

6

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—5¾". GENERATOR: Westinghouse 300 KW—120/240 DC—1250 amps—1200 RPM—C.B. 208.4.

7

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.

DIESEL GENERATOR SETS

8

G.M. 6-71 DIESEL GENERATOR SET

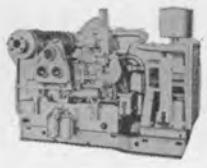
60 KW — 440/3/60 — 1200 RPM—with switchgear.

9

350 KW 120/240 VDC DIESEL GENERATOR SET

Ingersoll-Rand—heavy duty type S engine—8 cyl.—505 HP—10½ x 12. GENERATOR: G.E. 350 KW—120/240—600 RPM—switchgear. Good condition—as removed from Grace Line ships.

10



NEW—UNUSED 10 KW SUPERIOR GAB-2 DIESEL GEN.

4½ x 5¾—BHP 16—RPM 1200—radiator cooled. GENERATOR: Delco 10 KW 120 VDC—83.3 amps—75" OAL—57" OAW—57" OAH.

$1695.

TURBINE ROTORS

MAIN PROPULSION

11

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.

12

SPECIAL!

ATTENTION—OWNERS OF SUN-BUILT C-4 HULLS

GE LP ROTOR—77943 GE HP ROTOR—77942
These rotors will interchange on all Sun C-4 vessels.
G.E.I. 16263

13

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

14

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

15

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

16

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.

17

300 KW 5965 RPM JOSHUA HENDY

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

T-2 ROTORS, STATORS COOLERS, ETC.

18

ELLIOTT 10-STAGE MAIN PROPULSION TURBINE ROTOR

#28702—Ex-Texas Trader—will interchange with large 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.

19

LARGE G.E. MAIN PROPULSION SCHENECTADY TURBINE ROTOR

Turbine serial 77418—reconditioned with certificate. Just out of Beth shop 1970.

20

AUXILIARY GENERATOR ROTORS

DORV—325M—T-2 Tanker Aux. Generator.

21

WESTINGHOUSE MAIN PROPULSION REVOLVING FIELD

Ex-Ohio Sun—A.B.S.—ready to go. Serial 25R10

22

WESTINGHOUSE MAIN GENERATOR STATOR

A.B.S.—ready to go—certificate 70BA5297 — May 19, 1970—Rewound.

23

G.E. MAIN GENERATOR STATOR

A.B.S.—ready to go—mfg. by Elliott for G.E.—over G.E. design.

24

WESTINGHOUSE MAIN GENERATOR AIR COOLER

Reconditioned with A.B.S.

25

UNUSED G.E. MAIN GENERATOR AIR COOLER

PUMPS

26

VICTORY AP2 MAIN CIRCULATOR

Ingersoll-Rand — 18 VCM—20" x 18"—10,500—10 lbs. MOTOR: 75 HP—Allis-Chalmers—230 VDC—670 RPM. Spare unused armature. Motor frame F.B.V.—162.

27

NEW BLACKMER FUEL OIL TRANSFER PUMP

Rotary—50 GPM—50 lbs.—2"—5 HP—440/3/60—with starter & spares.

28

UNUSED BLACKMER VERTICAL ROTARY PUMP

4"—100 GPM—100 PSI—15 HP — 440/3/60 — gear head.

29

KINNEY MOLASSES PUMP

430/215 GPM—size 8x8—pressure 60 lbs.—142/280 RPM. Motor RPM 875/1750. Falk 6.25:1 reducer. G.E. 30/15 HP motor.

30

R-2418 WATEROUS CARGO PUMP

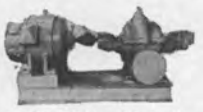
Bronze—14"—top discharge—capacity 2500 GPM—20 PSI. Bilge service—oil service—2400 GPM—75 PSI. Reduction gear. ENGINE: Cummins JN-130M—6 cylinder—4⅛ x 5—130 HP—air starting.

31

UNUSED BOILER FEED PUMP

Worthington Triplex—36.5 GPM—590 PSI—variable stroke—2¾ x 5—P_2—S_2—R_2 vessels. 40 HP—230 VDC—1800/2400 RPM.

32



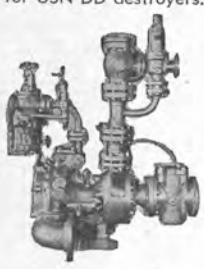
UNUSED WARREN BRONZE PUMP

1175 GPM—11.1 lbs.—8" x 8". MOTOR: Reliance 10 HP—115 VDC—850—RPM—76 amps.

33 

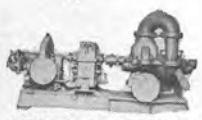
UNUSED SIZE 4 BUFFALO FEED PUMPS

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.

34 

COFFIN MODEL F BOILER FEED PUMP—VICTORY OR T2

Control valve 1¼"—Form V1—constant pressure regulator — type C — 150 HP—200 GPM at 575 lbs discharge pressure. 7200 RPM —440 PSI—500°TT.

35 

2 BRONZE I.R. 10GT CARGO PUMPS—14x12

4400 GPM—280' head—3500 GPM—350' or 4000 barrels/hr. IR-10GT—14 x 12—1750 RPM—driven by Elliott 2DRY turbine—400 HP—400 PSIG—500° TT—10 lbs. back pressure—4550 RPM. Gear: 4550/1750. Good condition.

36 

NEW WORTHINGTON VERTICAL SUBMERSIBLE 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.

37 

NEW—UNUSED BRONZE VERTICAL LST BALLAST PUMP

1500 GPM—56' head or 25 lbs. — 8" suction — 6" discharge. MOTOR: Century 30 HP—230 VDC—110 amps—1750 RPM — 40°T rise — stab. shunt—BB drip proof —controls available.

38 

EXCELSIOR MOLASSES PUMP—SIZE 5½"

6" Suction and discharge—210 GPM—45 PSI—125 RPM. MOTOR: 10 HP—230 VDC—Frame 67—with gear.

39 

BRONZE 14x14x12 CARGO STRIPPING PUMPS

700 GPM @ 100 lbs. Ex-T2 Tanker pump. Also available in steel.

40 

T-2 TANKER BILGE, BALLAST AND FIRE PUMP

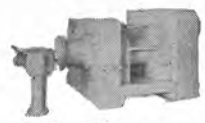
Bronze — 10x7x10 — vertical duplex. Steam pressure 150 lbs. gauge — exhaust pressure 10# gauge—discharge pressure 100# gauge —300 G.P.M.

WINCHES AND WINDLASSES

41 

AH&D SINGLE SPEED WINCHES

7250 lbs. @ 220 FPM—50 HP—230 VDC—with control. $1750 as is.

42 

VICTORY UNIT WINCHES

50 HP—230 VDC—U-1, U-2, U-4, U-5—reconditioned.

43 

MODEL U-6 DOUBLE DRUM WINCHES WITH GYPSIES

50 HP—230 VDC—reconditioned.

44 

WATERMAN STEAM DECK WINCH COMPOUND GEARED

Compound-geared "Valle Type"—9½ x 10. 7000 lbs.—185 FPM—single geared. 12,800 lbs. 101 FPM —compound geared.

45 

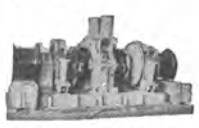
WATERMAN STEAM DECK WINCH—SINGLE GEARED

Single-geared "Valle Type"—9½ x 10—10,720 lbs. @ 238 F.P.M.

46 

HYDE NO. 7 WINDLASS

1¾" Chain—Wildcat centers 3'3"—Handles 3000 lb. anchors. MOTOR: 8.7/35 HP—440/3/60—1800/450 RPM.

47 

NEW—UNUSED LINK BELT WINDLASS

1⅝" and 7000 lb. anchors. 56" Centers—50 HP—230 VDC—spares.

48 

IDEAL WINDLASS—UNUSED

1-5/16" Chain—36" Centers—15 HP—115 VDC—1750 RPM—6000 lb. line pull.

49 

UNUSED 70 HP McKIERNAN-TERRY WINDLASSES

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

50 

3-TON CLYDE DOUBLE DRUM WINCH

3-Ton double drum winch—10 HP—115 VDC—declutchable drums—with controls. Drum is 16" in diameter and 28" wide. Winch OAW 10'2"—OAL 8'1".

MISCELLANEOUS

51 

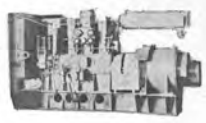
UNUSED DOCK CAPSTAN

15 HP—220/440/3/60—3000 lbs @ 100 FPM. Gypsy 8"—waterproof box—floorplate.

52 

HYDE 30" DOCK CAPSTAN

10" x 10"—reversible—W.P. 125 lbs—2½" steam—3" exhaust.

53 

LORIMER 75 KW 120/240 D.C. DIESEL GENERATOR SET

Lorimer engine FN—5 cylinder—7.5 bore—9.5 stroke —720 RPM—radiator cooled. GENERATOR: Ideal type DD—75 KW—120/240 VDC—720 RPM—313 amps—frame 350-27. CAN ALSO OFFER SAME GENERATOR WITH 75 KW 440/120/3/60 A.C. Emergency sets from T-2 tankers.

54 

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.

55 

VICTORY AP2—WESTINGHOUSE MAIN PROPULSION GEAR

6000 SHP—Serial 4A-1620—Medina Victory.

56 

INGERSOLL-RAND MODEL 40 AIR COMPRESSOR

Two stage—135 CFM—7" x 6¼" x 5"—110 lbs.—870 RPM—inner cooler. MOTOR: Allis-Chalmers 40 HP — 230 VDC — 145 amps — 1750 RPM — Model EB121.

57 

GRISCOM-RUSSEL EVAPORATOR

12,000 evap.—230 VDC pumps or 440 A.C. pumps. Complete with Weir automatic water valve.

58 

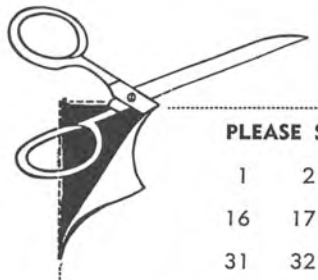
UNUSED 1135 SQ. FT. C.H. WHEELER CONDENSER

20" Ex. inlet—⅝" Cu-Ni tubes—with or without air ejector.

59 

1 PAIR OF 300 HP UNION DIESEL ENGINES

Port and starboard—model 06—300 HP at 350 RPM —4 cycle—direct reversible—11 x 15—overhauled 1966—in good condition. Just in from Navy.



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46	47	48	49	50	51	52	53	54	55	56	57	58	59	

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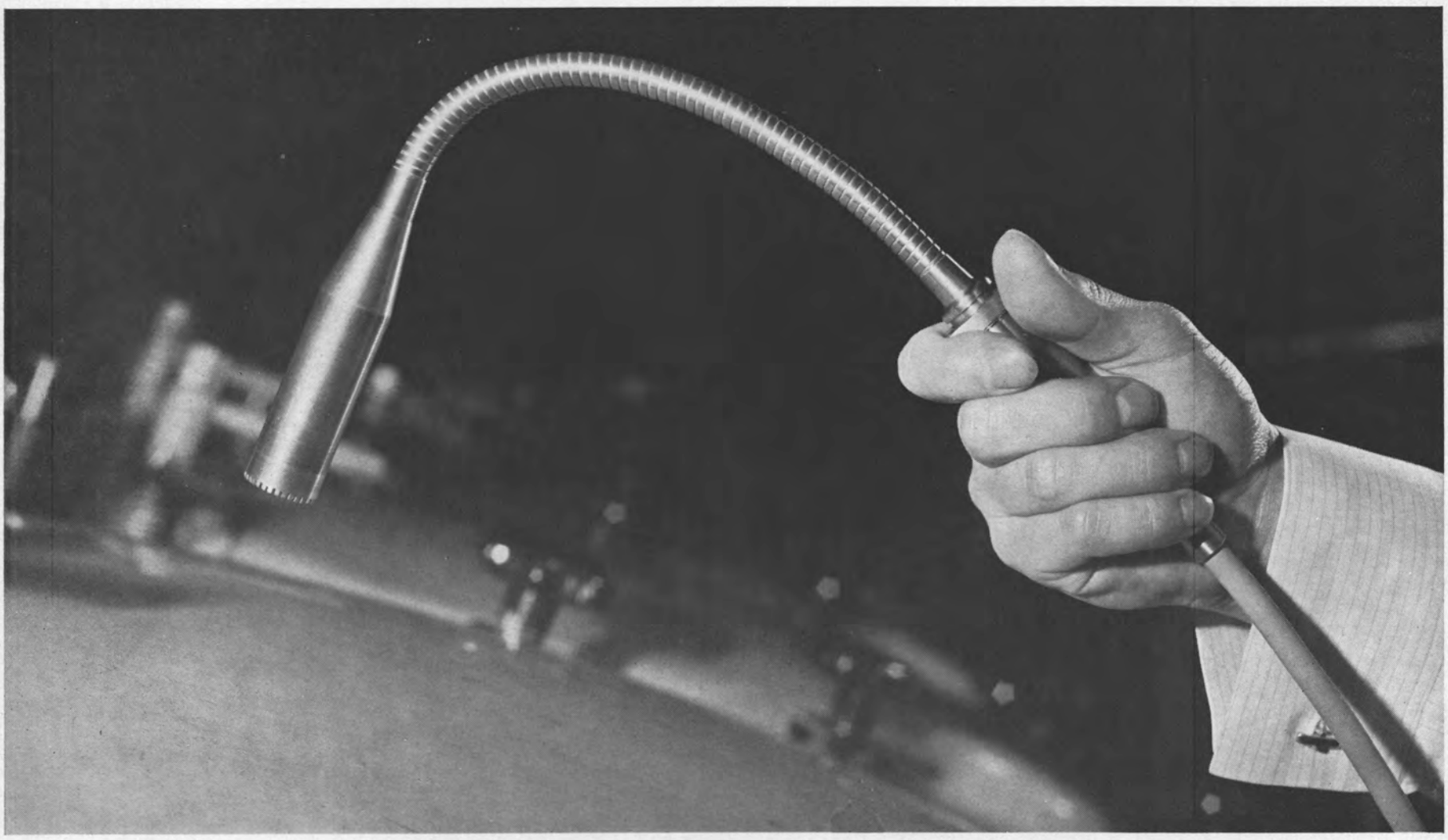
M.A.N.'s Research Program: Noise Control



M.A.N. research work covers air- and structure-borne noise. Active and passive noise control techniques are being developed. Active techniques, such as tuning out the natural frequency of the turbocharging system, eliminate avoidable sources of noise at an early design stage. Passive techniques concentrate on components of the finished engine and make use of intake silencers, inboard air silencers, acoustic trunking, etc. In addition, the engine can be resiliently mounted and even enclosed. To optimize the noise attenuation of the whole plant M.A.N. co-operate with the shipyard.

M·A·N
AUGSBURG (W.-GERMANY)

482 e

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New York, N. Y. 10036

Bird-Johnson Company Names Frank L. Narbut

Frank L. Narbut

Howard H. Scott, president of Bird-Johnson Company of Walpole, Mass., recently announced the appointment of **Frank L. Narbut** as Western regional manager. Mr. **Narbut** has been with the firm for 11 years. Prior to this, he was a chief engineer with Isbrandtsen Lines. His past five years have been spent as national service manager for Bird-Johnson's marine line of bow thrusters and controllable pitch propellers.

In his new capacity, Mr. **Narbut** will represent both the Marine and Fluid Power Divisions of Bird-Johnson Company. The Fluid Power Division is the exclusive licensee in the United States for the Hagglunds large high-torque low-speed hydraulic motors, and the smaller S.A.M.M. hydraulic motors and hydrosteppers.

Mr. **Narbut** may be reached at P.O. Box 6106, San Rafael, Calif. 94903, or by telephone at (415) 479-2438.

Long And Denecke To Marketing Posts At RF Communications

R F Communications, Inc., the Rochester, N.Y. subsidiary of Harris-Intertype Corporation, has announced two appointments in its marketing department. **M.B. Long** has been named manager, national marketing, and **R.H.Denecke** was appointed Northeast regional manager, national marketing.

Mr. **Long's** prime duties and responsibilities will be to establish and maintain a domestic sales distribution and marketing organization for the marine, land mobile and non-government industrial markets. He has previously served as manager, marine marketing and manager, marketing administration. Prior to joining RF in 1968, Mr. **Long** was employed by the General Electric Company, Communications Products Division, Lynchburg, Va.

Mr. **Denecke** will be responsible for marine and land mobile sales, service, policy, and dealer support along the Northeast Coast from Pennsylvania to Maine. With an extensive background in the land mobile sales field, he has spent the last four months with R F Communications as a sales engineer in its land mobile marketing group. Mr. **Denecke** was formerly employed by Motorola Communications and Electronics.

Pauluhn Electric Opens Houston, Texas Plant

Pauluhn Electric Mfg. Co., Inc., a major manufacturer of marine and industrial lighting fixtures and accessories, formerly located in New York, has announced the opening of its new headquarters in Houston, Texas.

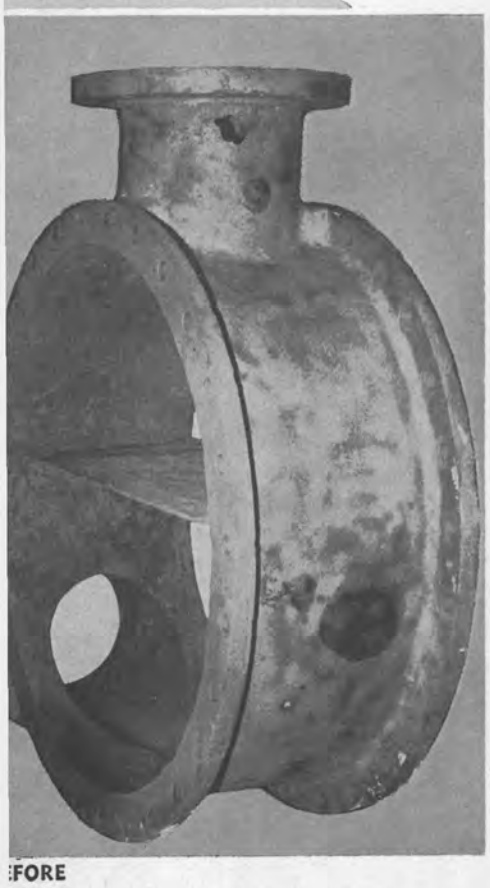
Situated on a 20-acre tract in Pearland, Texas, a suburb adjacent to Houston, the new modern plant houses the main office, engineering and drafting department, new product and design department, manufacturing-assembly and warehouse facilities. Looking to the future, adequate space has been provided for expansion and the capacity to handle any type and size contract.

Founded in the 1920s as a small machine shop doing specialty work in New York by a German tool and die maker, the firm began to grow when **Paul Pauluhn** was joined by **Sal V. Russo,** who was experienced in the marine industry. Their combined talents brought the company up to a level as a major supplier in the repair yard business.

In 1963, new personnel in an expansion program elevated Pauluhn into the new construction area.

The company is a major supplier of lighting fixtures and allied equipment on the 11 LASH vessels under construction at Avondale Shipyards, Inc., New Orleans, La.

Thousands of Repair Jobs have been completed quickly and economically with



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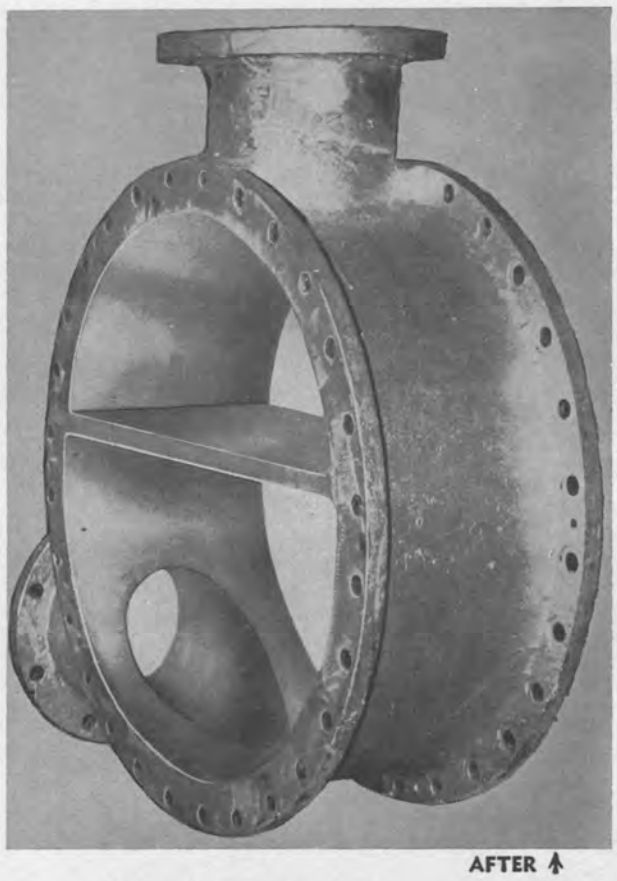

AFTER

CORDOBOND®

Strong-Back Materials

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

Water Boxes	**Ventilators**
Machinery Castings	**Stacks**
Ducts	**Pumps**
Pipes	**Sea Valves and Chests**
Condenser Covers	**Tanks, Bulkheads and Decks**
Cooler Heads	**Shell Plating Etc.**
Tail Shafts	**Frozen Pipes, etc.**

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

MARINE REPAIR KITS

STANDARD KIT For Ocean Going Vessels JUNIOR KIT For Harbor Craft

CORDOBOND REPAIR KITS CONTAIN ALL THE COMPONENTS AND ACCESSORIES FOR MAKING EMERGENCY REPAIRS AT SEA

Packed in sturdy Navy type refillable metal containers.

SEND FOR LIST OF CONTENTS AND LITERATURE

Over 5000 ocean going vessels carry our standard repair kits. Cordobond is not affected by water, oil, gasoline, etc. It does not corrode. It eliminates costly gas freeing. Cordobond is self curing, no applied heat necessary.

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CALIFORNIA—Wilmington
J.M. Costello Supply Co., Inc.
—San Francisco
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FLORIDA—Jacksonville
Weedon Engineering Co., Inc.
GEORGIA—Savannah
Southern Marine Supply Co., Inc.
LOUISIANA—New Orleans
Hubeva Marine Plastics, of New Orleans, Inc.
—Baton Rouge
Gulf Coast Supply Co.
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Seither & Ellis, Inc.
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Atlantic Port Contractors, Inc.
TEXAS—Galveston
Gulf Coast Supply Company
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Farboil Appoints De Santis For New Coatings Division

G. William De Santis

Melvin A. Hendrickson, general manager of Farboil's new powder compound coatings division has announced the appointment of **G. William De Santis** as technical director.

Mr. **De Santis** is the first staff member to join the Farboil Company's new coatings division. He was formerly laboratory manager of Development Labs for Essex Chemicals of New Jersey. He has had wide experience in research and development of exotic coatings with Eutectic Welding Alloys Corp., Mobil Oil Company, and Polymer Corp. While with Eutectic, Mr. **De Santis** designed and created the research and development laboratory for Eutoplast Coating Division, and was polymer and coatings consultant to the worldwide Eutectic Welding Alloys Corp. complex.

The Farboil Company, a division of Beatrice Foods Company, is a leading manufacturer of sophisticated industrial, marine and architectural coatings. The main plant and offices are located in Baltimore, Md.

Twin City Shipyard To Build Deck Barge

Twin City Shipyard, Inc., a subsidiary of Twin City Barge & Towing Company, Inc., St. Paul, Minn., announced it has received a contract to build a heavy-duty deck barge, 140 feet long and 50 feet wide for Bultema Dock & Dredge Co. of Muskegon, Mich.

John W. Lambert, president of Twin City Barge, said the vessel will be used to float giant cranes for marine construction projects on the eastern shores of Lake Michigan. The barge will be completed and delivered in April.

Twin City Barge & Towing Company is a publicly-owned firm which has served the Twin Cities area since 1937 and Chicago since 1961. The company provides tank-barge service, towing and barge-fleeting services around these cities.

Corps Of Engineers Awards Workboat To Seahol Contracting

The Corps of Engineers, Savannah, Ga. has awarded a contract worth about $217,000 to the Seahol Contracting Co., Charleston, S.C., for the construction of a steel workboat.

Mesco Announces New Valve For Ship Piping

Mesco Modular Valving, designed and manufactured by Mesco Tectonics Inc., Clifton, N.J., represents a new approach to shipboard piping and valving problems. Available in a wide choice of metals such as steel, bronze, stainless and cupro-nickel, selected from a corrosion aspect to satisfy the fluid being used, this product combines lightweight, high strength, and maximum hydraulic efficiency.

Mesco's patented method of manufacture is applicable to simplex or duplex manifold systems and, in larger sizes, as single angle or cross valves. They are available as stops or checks and are readily fitted with interlocks and local and remote power controls. Valves as small as two-inches in diameter to ones as large as four-feet in diameter can be accommodated.

The cylindrical design provides maximum strength and permits highest velocities and lowest frictional coefficients with turbulence virtually eliminated. The absence of pockets, corners and irregularly cast sections, insures self-cleaning and inhibits the formation of scale, sludge, residue, or corrosion attack.

SAN DIEGO SECTION DISCUSSES BOW THRUSTERS: The regular monthly meeting of the San Diego Section of The Society of Naval Architects and Marine Engineers was held at the San Diego Yacht Club on January 20, 1971. Following dinner, a technical paper entitled "A Simplified Approach to Bow Thruster Sizing" was presented by **Donald E. Ridley** of Bird-Johnson Company. The paper discussed the determination of the appropriate size of bow thrusters for specific applications. The attending members and their guests showed great interest in the subject and an extended question and answer period was conducted afterward by Mr. **Ridley.** Shown above from left to right are: **William K. Porter,** executive committee; **T.S. Hand Jr.,** vice chairman; **Charles S. Sinclair,** chairman; **D.E. Ridley,** author, Bird-Johnson Company; **F. Narbut,** Bird-Johnson Company; **G.A. Uberti,** secretary-treasurer, and **G.M. Kanable,** executive committee.

Newfoundland Refining Signs Tanker Pact

The Newfoundland Refining Company, Limited, St. Johns, Newfoundland, has announced the signing of a three-year time charter with the Sanko Steamship Co. of Tokyo for a 233,000-ton tanker.

The tanker, scheduled for service in February 1973, will transport crude purchased from British Petroleum Co. in the Persian Gulf to the new refinery now under construction at Come by Chance, Newfoundland. The vessel will be built at Mitsubishi Heavy Industries Co., Limited, in Japan. The ship will have the following approximate measurements: length, 1,053 feet; breadth, 172 feet, and draft, 65 feet. It will be powered by steam turbines with 34,000 shaft horsepower.

A contract of affreightment for the transportation of Persian Gulf crude was also concluded with the Sanko Steamship Co.

Glennon Elected President Of OSE

Willard Bascom, chairman of the board of Ocean Science and Engineering, Inc., Washington, D.C., has announced the election of **William H. Glennon** as president of the company. Mr. **Bascom,** previously both president and chairman, will turn over some of his former duties to Mr. **Glennon,** who will also be responsible for the work formerly done by the vice president and general manager, a position now deleted from the structure.

Mr. **Glennon** is a professional manager with a strong background in business and finance. He was graduated from the U.S. Maritime Academy, Kings Point, N.Y. with a B.S. degree in engineering, and from New York University in 1956 with an M.B.A. degree. He has been corporate controller for publishing and chemical corporations, a management consultant for Haskins and Sells, and until recently, president of a division of the Columbia Broadcasting System, Inc.

Ocean Science and Engineering, Inc., with headquarters in Washington, D.C., and offices and facilities in California, Florida, and Texas, is a diversified corporation with activities in ocean engineering, survey services, scallop harvesting, ship repair, dredging, mineral exploration, offshore oil production equipment, ship operations, and antipollution systems.

Costa Line Names Ottone Empoldi VP

Dr. **Ottone Empoldi** has been named vice president in charge of Costa Line Inc., for the United States, Canada and Mexico, according to Costa Armatori, Genoa-based parent company.

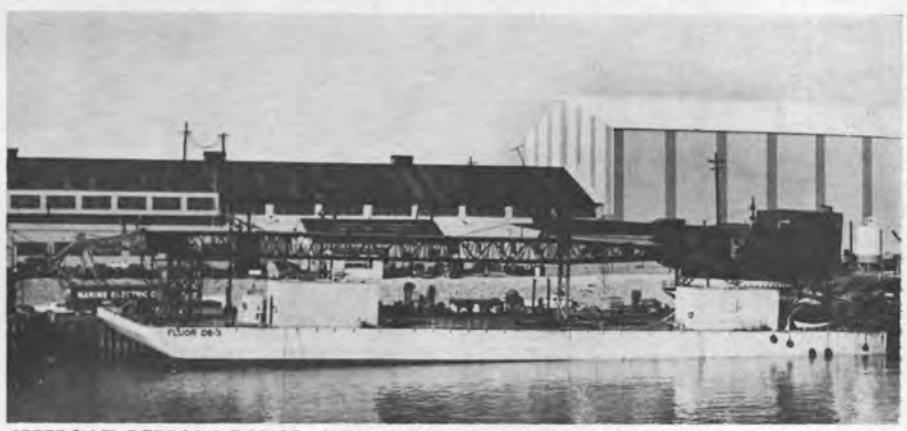
Dr. **Empoldi** will be head of the cruise operations of three Costa vessels, the Flavia, Carla C and Frederico C, as well as the monthly trans-Atlantic sailings of the Frederico C between April and November. The new vice president was formerly with Italian Line, where he was one-time general manager for the United States, Canada and Mexico.

Port Of San Francisco Publishes Handbook On Ocean Shipping

The Port of San Francisco's 1971 edition of the Ocean Shipping Handbook is off the press. The 144-page book is a compendium of port facilities, steamship lines, and agents and shipper and ship operator services on and behind the famed San Francisco Embarcadero.

In addition, the publication itemizes transportation facilities, cargo handling data and general services.

Individual copies are available on request to the Public Relations Director, Ferry Building, San Francisco, Calif. 94111.



JEFFBOAT DERRICK BARGE: Jeffboat Inc., Jeffersonville, Ind. shipyard, recently completed and delivered to Fluor Ocean Services, Inc. a class +A-1 derrick barge, it was announced by **R.W. Naye,** president of the shipbuilding firm. With principal dimensions of 250 feet by 80 feet by 16 feet, and a normal operating draft of nine feet and nine inches, the barge is to be used by Fluor in offshore and deepwater activities. The last of a four-barge series which Jeffboat has delivered to Fluor over the past year, it was designed by Schuller & Allan Inc., a Houston, Texas, architectural firm. It is equipped with a 250-ton capacity Clyde Iron Works model 37 crane. The crane carries a 190-foot boom. Housed inside the crane is a 750 horsepower boiler for use in pile driving. Below the main deck are air-conditioned quarters for a maximum of 50 men. Included in the life support equipment and systems are a complete stainless steel galley, three 300-kw generators, an 84,000-gallon potable water tank and a 582,000-gallon fresh water tank. Labeled by the owners as Fluor DB-3, the vessel is U.S. Coast Guard certified. The barge was delivered to the owners at the Jeffersonville, Ind., site on the Ohio River. Jeffboat, Inc., is part of the Inland Waterways Services Division of Texas Gas Transmission.

New Navy Tugs Fitted With PSI Steering Systems

Pilothouse of the YTB-803 class tugs features a control console containing all maneuvering control and navigation components. The PSI electric steering control stand with 40-inch wheel is located at the center of the console. Auxiliary non-follow-up steering control levers are mounted at each side of the console.

Thirteen of the Navy's newest YTB class harbor tugs (YTB 803-815) are being fitted with electro-hydraulic steering systems furnished by Propulsion Systems, Inc. of Port Washington, N.Y. The tugs are being built by Peterson Builders, Inc. of Sturgeon Bay, Wis. YTB 803-808 are now in service at various Navy facilities.

The steering system is of the PSI RATE-CONN® design, providing slow and fast rates of rudder motion, depending upon the ordered change in rudder angle. This feature permits smooth steering in normal running and quick rudder response for fast maneuvering. Electric full-follow-up and non-follow-up steering control is provided from the pilothouse and aft deck control stations. A 15-hp motor-driven dual-rate main hydraulic power unit is the primary power source for the steering gear, while a smaller 2-hp motor-driven single-rate power unit is furnished as an auxiliary back-up unit. The rudder is actuated by a pair of 4-inch bore clevis-mounted hydraulic cylinders linked to the rudder stock by a yoke assembly.

U.S. Shipbuilding Technology Geared To Ocean Transport

The technical skills and know-how of American shipbuilders, which today are being used to build the world's most sophisticated ships for the U.S. Navy, will be employed in the construction of merchant ships under the Merchant Marine Act of 1970, **Edwin M. Hood,** president of the Shipbuilders Council of America, stated in a speech before the National Transportation Institute meeting held in Chicago on February 4.

Mr. **Hood** said that there is a notion that the United States is "technologically bankrupt or at best technologically backward" as concerns ships for the American merchant marine. In rebuttal, he pointed out that the containerization concept in ocean shipping was begun in America starting as far back as 1929. The new Lighter Aboard Ship (LASH) and the so-called Sea Barge vessels were noted as dramatic American technological developments. He also spoke of the progress made by American naval architects and engineers in automation, gas turbine propulsion, improved steam turbine engines, palletization, and roll-on/roll-off techniques, for commercial ship application.

Mr. **Hood** said America seems to be ahead of other shipbuilding nations in the development of tug-barge systems for ocean shipping, and that the possibilities of an articulated ship and catamaran hulls are being explored. He decried the failure of nuclear power in merchant ships to be accepted, though the United States built and operated the N/S Savannah to illustrate how atomic power could be used for peaceful purposes.

"The shipbuilding industry in the United States possesses a flexibility of capacity and a range of capabilities which can truly move ahead with transport technology," said Mr. **Hood,** but he cautioned, "labor stability, reliability of service and investor interest will, in the final analysis, compose the future of the American-flag shipping fleet."

American shipbuilders "look forward to working with our customers in the development and marketing of transportation systems which, among other things, will restore the United States as a first-rate maritime power," Mr. **Hood** told his audience.

Shipyard Welding Paper Read At Joint Meeting Of SNAME And AWS Philadelphia Sections

Shown above, left to right: (seated) **George Johnson,** U.S. Corps of Engineers, chairman of the Philadelphia Section, SNAME; **Charles L. Dooley,** Sun Shipbuilding and Dry Dock Co., author, and **Donald R. Griffith,** Gas ARC Supply, chairman of the Philadelphia Section, AWS; (standing) **William L. Neely,** Budd Co. of Philadelphia, vice chairman of the Philadelphia Section, AWS; **Samuel S. Morse,** Arco, coordinator of the Philadelphia Section, SNAME, and **Samuel D. Reynolds Jr.,** Westinghouse, past chairman of the Philadelphia Section, AWS.

The annual joint meeting of the Philadelphia Section of The Society of Naval Architects and Marine Engineers and the Philadelphia Section of the American Welding Society was held January 15, 1971 at the Philadelphia Engineers Club. As in the past, this was a very successful and informative meeting with an attendance of some 150 members and guests.

The topic of the paper presented was an abstract of welding techniques, hardware, regulatory agencies, and inspection from the year 1931 up to the present state of the art. Emphasis was placed on the shipbuilding welding application, but brief descriptions were offered of the modern day experiences of the author in the aerospace and hydrospace areas.

The title of the paper presented was "Reflections on 35 years of Shipyard Welding" written by the industry-wide authoritarian **Charles L. Dooley,** chief welding engineer with Sun Shipbuilding and Dry Dock Company. Coordinator for the meeting was **Samuel S. Morse,** naval architect with Arco.

Swann Winches Forms Subsidiary In Singapore

The directors of Swann Winches Ltd., Vancouver, B.C., have announced the establishment of a subsidiary, Swann Winches & Engineering Pte. Ltd., with general offices located at 24L Kum Hing Court, 11th Floor, Tomlinson Road, Singapore 10.

The company will be concentrating on the design and supply of deck machinery for the expanding shipbuilding industry in the Singapore area. In addition, the company is acting as manufacturers' representative for mooring ropes, air controls, hydraulic pumps and motors, and associated valves and equipment.

At present the company is under the direction of **Arthur Burgess** who is president of the Swann group of companies. **Don Howarth,** formerly of the Vancouver office, is in charge of engineering activities.

Since the formation of the company, Swann Winches & Engineering Pte. Ltd. has been successful in obtaining the order for two ship sets of hydraulic machinery. This machinery was ordered by Vosper Thorneycroft Uniteers Ltd. for two supply boats currently under construction for the Offshore Supply Ltd.

Sergio Donn Appointed Head Of Fiat In United States

Shown above at the farewell party, left to right: **Mauro Bella,** manager Fiat Marine Division; Mr. **Locatelli,** former assistant U.S. representative; Mr. **Gerevini,** assistant U.S. representative, and Dr. **Donn,** new Fiat U.S. representative.

Dr. **Sergio E. Donn** has been named U.S. representative of Fiat, S.p.A., Torino, Italy. This position has been held since 1953 by **Vincent A. Garibaldi,** who is assuming a new post with Fiat in Switzerland.

Mr. **Garibaldi** will, however, maintain in the United States the chairmanship of Fiat Motor Company, Inc., and of the executive committee of Fiat Roosevelt.

Dr. **Donn** was formerly managing director of Fiat Ireland, and previously a director of Fiat England for many years. Dr. **Donn's** new position will also carry with it the posts of vice chairman of Fiat Motor Co., Inc., and board member of Fiat Roosevelt.

Tullo Gerevini has been named assistant U.S. representative succeeding **Mario Locatelli.** Mr. **Locatelli,** who has a doctor's degree in mechanical engineering, has been with the Fiat U.S. representative office in New York since 1959. He has returned to Italy permanently and his new position with Fiat is assistant to **Niccolo Gioia,** general manager of Fiat, S.p.A. in Torino.

A farewell cocktail party was given by Dr. **Donn** for Mr. **Locatelli** at the Iperbole Restaurant in New York City.

Panocean Orders Four More Chemical Carriers From Norway —Investment Now $96 Million

Panocean Shipping and Terminals Limited, London, England, announces that it has sent a letter of intent to A.S. Horten Verft, Norway, ordering an additional four ships for delivery in 1974-75 in a vessel facilities investment program which is now in excess of $96 million.

These vessels will be similar to the four 24,000-dwt liquid parcel carriers from Horten Verft last July for delivery in 1972-73. Panocean aims to be one of the major companies carrying bulk liquid, edible oils and lubricants by the mid-1970s.

Commenting on the placing of the order for four more carriers with Horten Verft, **John Maltby,** managing director of Panocean said: "This development is in line with Panocean's stated policy that the company will operate 10 ships by the mid-1970s. It is our intention to run a worldwide service with first-class ships."

Last autumn, Panocean's capital expenditure program was estimated to be around $57,600,000—covering the cost of the first four Horten vessels, the purchase and conversion of the Postrunner and the Postrover, and the acquisition and development of Panocean's tank storage terminals at Antwerp, Rotterdam, and a new one in the United Kingdom.

Panocean Shipping and Terminals Limited is the new name adopted by the company so as to identify more clearly its sea and shore operations. A.L. Burbank & Company, Ltd., 120 Wall Street, New York, N.Y., are agents for Panocean in the United States and Canada.

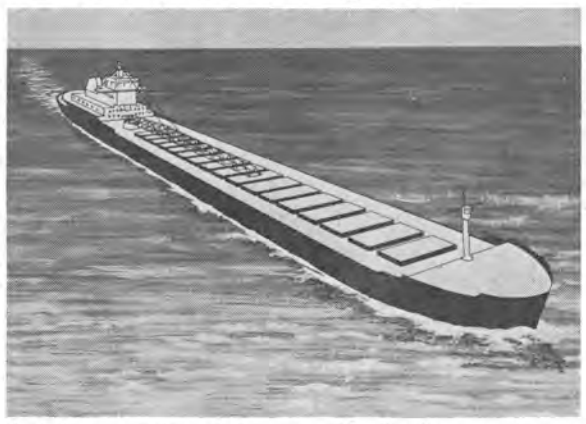
Vanmar Shipping Formed In Vancouver

Vanport Shipping Agency, Ltd. has announced the establishment of Vanmar Shipping Services, Ltd. The new firm will be located at 837 West Hastings Street, Vancouver, British Columbia.

Vanmar, in conjunction with Fearnley, Eger, Oslo, New York Delta Marketing and Shipping Corp. (N.Y.), and Vanport (Vancouver) are to provide a complete range of transportation services as ship and cargo brokers and transportation consultants.

It was announced that **A.C. Campbell Jr.,** formerly corporate director of transportation and purchasing for Columbia Cellulose Co., Ltd., has been appointed president, and **Tom Bruusgaard** will manage the chartering department.

American Ship To Construct Prototype Self-Unloading Ships To Transport Ore Up-River



Artist's conception of the new self-unloading vessels specifically designed to haul a maximum payload of iron ore to up-river terminals.

What could well become a major shipbuilding boom on the Great Lakes was set in motion recently with the announcement by The American Ship Building Co., Cleveland, Ohio, that it will start construction immediately on two new prototype self-unloading vessels specifically designed for transporting ore to up-river terminals. Cost of the two ships will be approximately $25 million.

The new vessels will be used by The Kinsman Marine Transit Company, a subsidiary of American Ship, to haul iron ore from mines on Lake Superior and Lake Michigan to the Cleveland works docks of Jones & Laughlin Steel Corporation. The two new vessels, both of which will be used to fulfill the J & L contract, will be built in American Ship's Lorain (Ohio) yards. The first is scheduled for completion by the start of the 1973 season and the second a year later.

"This is only the start of what will be a series of great years ahead for the shipbuilding industry," predicted American Ship chairman and chief executive officer, **George M. Steinbrenner III,** in making the announcement.

"We have insisted all along that inclusion of the Great Lakes in the Merchant Marine Act of 1970 would lead to a major reconstruction and new building program by Lakes fleet operators. Now, with the assistance offered by the Maritime Administration under the Act, it is fast becoming a reality. These two new type self-unloaders, for example, represents the first completely new design for a specific usage as authorized under the same Merchant Marine Act," he continued.

"The problem given our design engineers was to develop an efficient self-unloader, large enough to carry a maximum payload of iron ore pellets, yet maneuverable enough to navigate the difficult turns of up-river traffic."

The two new ships will be 630-feet long and have a beam of 68 feet. They will be rated at 19,000 dwt and be capable of carrying 15,500 tons of taconite ore. Self-unloading machinery will handle 5,000 tons an hour and empty the vessel in close to three hours as compared to a 12 to 15-hour requirement with manual methods. Continuous belts, which move the ore aft to the unloading chute, minimize degradation (loss by chipping away of the pellets through continued handling), which has reduced the quantity of usable ore under old shipping procedures.

A notable feature of the new ship design is that, by simple modification, it can be utilized to construct any size vessel up to the limitations of the Soo Locks which are 1,000 feet by 105 feet.

Most visible innovation is the elimination of the traditional forward wheelhouse. This will be positioned aft under the new design and replaced by a forward "crow's nest" for a lookout during river navigation.

Brazilian-Japanese Shipyard Plans To Expand Facilities To Build 300,000-Dwt Ships

A Brazilian shipyard, Ishikawajima do Brasil Estaleiros S.A., jointly owned by the Brazilian Government and Ishikawajima-Harima Heavy Industries Co., Ltd., of Japan, has announced plans to expand its facilities so as to have the capability of building vessels of up to 300,000 deadweight tons.

The project calls for the construction of a new dock, work on which is scheduled to begin in March with completion set for December 1972.

According to the announcement, the dock will be immediately put to use for the building of 115,000 and 160,000-ton standard type tankers and ore carriers. Designs for the ship are now under development in Japan.

The jointly owned shipyard, largest in Latin America, was established in 1959 at Rio de Janeiro. Since it began operations, the yard has constructed about 20 new vessels in the 13,000 to 23,000-ton category.

The yard presently has on order six 12,000-ton cargoliners, having recently delivered two ships of this size and type.

Escort Ship Cook (DE-1083) Thirteenth In A Series Of 27 Launched At Avondale Yard

The Cook (DE-1083), an escort ship of a new class and the 13th of 27 DEs being built by Avondale Shipyards, was launched at Avondale's Main Yard Division.

Principals of the launching, left to right: Vice Adm. **T.F. Connolly,** USN, Deputy Chief of Naval Operations (Air), as principal speaker; Rear Adm. **R.E. Henning,** USN, Deputy Commander, Production Directorate, Navy Ship Systems Command; **Mrs. Wilmer P. Cook,** sponsor of the Cook, and **William Kimble,** vice president and general manager of Service Foundry Division, Avondale Shipyards, Inc.

The sponsor of the vessel was **Mrs. Wilmer Paul Cook,** widow of Lt. Comdr. **Wilmer Paul Cook,** USN, for whom the ship is named. Principals of the launching included Capt. **R.J. Leuschner,** USN, Supervisor of Shipbuilding, Conversion and Repair, Eighth Naval District; Rear Adm. **R.E. Henning,** USN, Deputy Commander, Production Directorate, Naval Ship Systems Command; **William Kimble,** vice president and general manager, Service Foundry Division, Avondale Shipyards, Inc., and Vice Adm. **T.F. Connolly,** USN, Deputy Chief of Naval Operations (Air) Navy Department, as principal speaker.

The Cook (DE-1083) is side-launched at the Main Yard of Avondale Shipyards in New Orleans, La.

The Cook, built under the multiple-year procurement contracts awarded in 1964 and 1966, is designed for optimum performance in locating and destroying submarines. Integral bow-mounted long-range sonar, variable depth sonar and gyrostabilizers provide for improved seaworthiness and increased antisubmarine warfare capabilities over previous DEs. The Cook is 438 feet in length, with a beam of 47 feet and is capable of attaining speeds in excess of 25 knots. Her total complement consists of 19 officers and 266 men.

The Cook is the first ship of the fleet to be named in honor of Lieutenant Commander **Cook.**

Wilmer Paul Cook was born October 1, 1937, at Annapolis, Md. He graduated from the Naval Academy and was commissioned ensign on June 1, 1956. He became a naval aviator October 18, 1957, serving in several attack squadrons until 1962, when he became aviation science instructor at Pensacola, where he trained fleet replacement pilots in A-4 aircraft. He joined Attack Squadron 125 in November 1965, risking his life countless times during many missions over Vietnam while embarked in aircraft carriers Constellation (CVA-64) and Coral Sea (CVA-43).

Lt. Comdr. **Cook** perished on December 22, 1967, while leading an air strike over North Vietnam. Prior to his death, he received numerous meritorious achievement awards for heroism.

Towboat And Barge Order To Big River Shipbuilding

Two vessels, a 110-foot, 2,250-horsepower towboat and a box barge, are being built for the Magnolia Marine Transportation Co., Jackson, Miss. by Big River Shipbuilding, Inc., Vicksburg, Miss.

Sperry Demonstrates

Integrated Navigation

With the trend toward more and larger vessels with reduced manpower, navigation and safety problems have become more acute. This trend has necessitated the development of new equipment and system concepts to improve navigation accuracy and increase efficiency.

At a recent demonstration held at the Seamen's Church Institute in New York City, the Sperry Marine Systems Division of the Sperry Rand Corporation demonstrated its approach to satisfying this need. The method proposed revolves around a building-block concept whereby basic elements are combined in a system configuration that permits outfitting any vessel to any level of complexity consistent with the vessel requirements with the assurance that new requirements can be met in the future by expanding the initial system.

In the area of navigation, such a systems approach involves all the navigation instruments aboard a vessel, managed in a system configuration that derives the most accurate and reliable navigation information required.

A general-purpose digital computer is employed to tie together the various navigation equipment, thereby permitting an analytical approach to optimize each piece of navigation data. By the proper use of time-sharing, cross-correction of instrument data, and the use of computer-derived weighting factors, maximum navigation accuracy can be obtained with a minimum of physical hardware.

The size of Sperry's Integrated Navigation System will vary with the vessel application and its required accuracy. Common to each system, however, are four components comprising a basic system. These components, Figure 1, are: gyrocompass, speed source (doppler), computer and interface unit. Of these components, the gyrocompass may already be onboard the ship; a suitable computer, originally installed to process routine ship operations, may also be available. Speed source, interface unit and computer software must be added to implement the basic Integrated Navigation System.

This basic system permits precise vessel navigation by continuously indicating latitude and longitude position information.

Sperry's newest gyrocompass, MK 37, is specifically designed for commercial operation.

Inputs to the system are vessel velocity, vessel heading, time, and initial conditions. The initial conditions are loaded manually into the computer via the ASR-33 Teletype. Output from the system is by means of the teletype which is controlled by the computer. The output can be simultaneously copied on paper tape.

It is possible to expand upon the basic system to integrate and manage additional navigation aids for improved accuracy and additional capability. The basic building-block concept used in expanding the Integrated Navigation System adds not only those components readily available, but accommodates future developments.

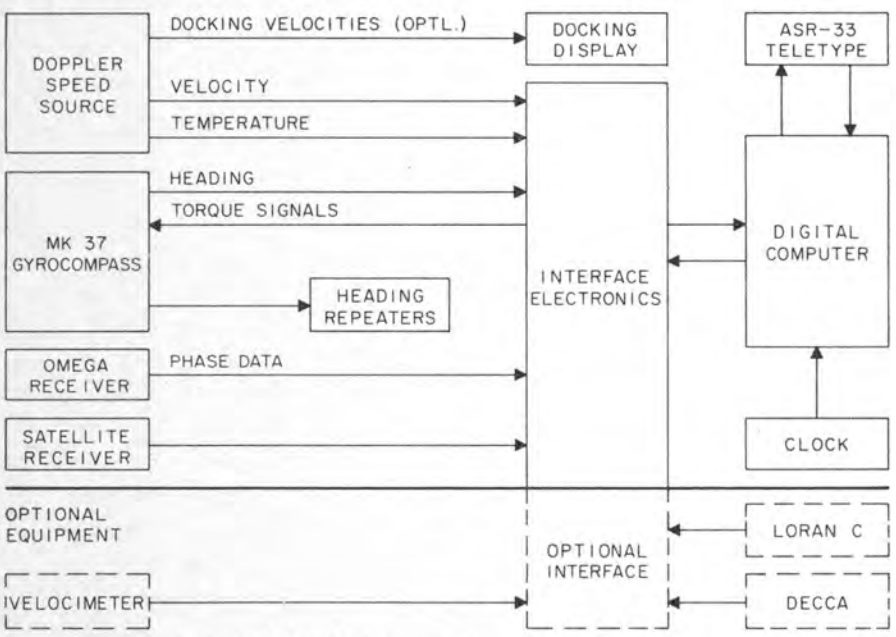


Figure 1—Sperry's basic integrated navigation system with Omega, satellite receiver and additional equipments added as desired by the ship operator to suit his needs.

SR-3000 echo sounder is a powerful wide-range system suitable for any vessel.

With the SR-500 Omega receiver a navigator can fix his position within minutes.

An Omega receiver such as Sperry's SR-500 can provide medium accuracy position data from a worldwide (by 1972) network of transmitters. The U.S. Navy Navigation Satellite (Transit) provides very accurate position data. A combination of a satellite receiver such as the Magnavox 702 together with an Omega receiver expand the basic system to obtain the most accurate worldwide system available today.

Other available equipment that might comprise an expanded Integrated Navigation System include loran; a vertical reference, used to improve the accuracy of the doppler data; a velocimeter, and a plotting table.

Bringing all the individual navigation instruments on board ship under the control of an efficiently managed system yields better information than that obtainable from any one instrument. The data is available at a central location to facilitate course planning and simplify navigation functions.

Collision Threat Radar

Together with the various navigation instruments, Sperry engineers presented a new system for the prevention of collision at sea.

For several years Sperry has been studying the collision avoidance problem with the objective of presenting a truly satisfactory solution. The result is a radar/computer/display system.

The Sperry Collision Avoidance System does not require significant modification to the existing conning procedures. Studies of the normal conning procedures show that three important processes take place during a collision avoidance maneuver. These are: detection, threat assessment, and maneuver plan formulation.

The Sperry collision threat assessment unit is provided as an attachment for standard marine radar. It has a bright display upon which can be superimposed threat assessment markers for all fixed and moving targets. The display can be used in either true or relative motion. By observing simple visual cues associated with each target, the operator notes and locks onto those targets that represent collision or close-passing situations. The lock-on operation requires that the operator manually place a special lock-on symbol over the targets of interest. Thus the conning officer plays a critical back-up role in threat assessment and is not forced to rely entirely upon the obscure workings of a computer or other "mysterious black box" for this function.

The doppler speed log provides an accurate measure of ship speed in water of any depth greater than 3 feet below the keel.

Engineers from the Sperry Marine Systems Division, Charlottesville, Va. 22901, were available at the demonstration to explain each of the new units introduced. They stressed during this presentation that they were ready to demonstrate and explain the operation of the units shown and other standard navigation equipment to ship operators at any time.

The collision threat assessment unit is provided as an attachment for the standard marine radar, true or relative motion.

Twin City Shipyard Signs Licensing Agreement With Flohr To Build And Sell Portabarges

Twin City Shipyard, Inc., a subsidiary of Twin City Barge & Towing Company, St. Paul, Minn., announced it has concluded an exclusive licensing agreement with Flohr & Company Metal Fabricators, Inc., Seattle, Wash., to manufacture and sell the firm's patented "Portabarges" in the states of Alaska, Washington, Oregon, Idaho and California.

John Buursema, executive vice president of Twin City Shipyard, explained that Portabarges are 40 by 10½-foot barges equipped with interlocking devices that enable them to be trucked into remote sites and then joined together to form a huge construction barge of almost any conceivable configuration.

Mr. **Buursema** said that Flohr is a major West Coast steel fabricator serving the marine and fishing industries. "Flohr's acceptance of the Portabarge provides further testimony to the need and desirability of this novel marine construction device," he commented.

Mr. **Buursema** said that Twin City Shipyard has sold or leased some 50 Portabarge units since they were introduced about a year ago.

Twin City Barge & Towing Company, the parent company of Twin City Shipyard, is a publicly owned firm which has served the Twin Cities area since 1937, and Chicago since 1961. The company operates towing and barge-fleeting services around these cities, tank-barge service at St. Paul and Chicago, and the only shipyard and large boat store in the St. Paul area.

Small Tanker Contract Awarded To Barbour Boat

Barbour Boat Works, Inc., New Bern, N.C., announced that it has recently signed a contract for construction of a 1,600-dwt tanker for service in South America and Central America. The twin-screw vessel will be 230 feet in length overall, with a 39-foot beam and a design speed of 12 knots at 1,700 horsepower. The vessel will be built under American Bureau of Shipping Classification and will be designed for unmanned engine room operation.

Design and engineering will be accomplished by James S. Krogen and Co., Inc. of Miami, Fla., in conjunction with Barbour Boat Works, Inc., in house engineering.

This vessel is the second for Coral Petroleum Co., Ltd., an affiliate of Jersey Standard. The 155-foot Esso Islander was delivered by Barbour Boat Works, Inc. in the spring of 1970.

ZIDELL BARGE DELIVERY: Two steel barges, each 124-feet long, were delivered by Zidell Explorations, Inc., Portland, Ore., to the Puget Sound Naval Shipyard at Bremerton, Wash., during the last week of 1970. The delivery brought to eight the number of barges built for the Navy since 1969 by Zidell's Marine Construction Division. Total price of the barges was approximately $2.7 million. During the peak of construction on the Navy barges, Zidell employed about 250 men. In addition to the Navy barges, Zidell delivered nine barges, ranging in length from 135 feet to 222 feet, to Pacific Northwest commercial customers. The latest, a 222-foot grain barge, was launched December 30 for Tidewater Barge Lines.

PROFESSIONAL

Port Of Portland Names Whyte Marine Operations Manager

Garry Whyte has been named operations manager of the marine department of the Port of Portland, according to **Keith Hansen,** department director.

Mr. **Whyte** replaces **Curtis Smith,** who held the job for 14 years under the old Commission of Public Docks. Mr. **Smith** becomes industrial marketing director of the consolidated CPD-Port agency.

The operations manager oversees all functioning of the three marine cargo terminals of the port.

Other operations changes include **Don Aspros,** formerly superintendent at Terminal 1, becoming assistant operations manager; **Carl Leach,** assistant superintendent at Terminal 1, replacing Mr. **Aspros,** and **Bob Driscoll,** assistant Terminal 4 superintendent, being named Terminal 2 superintendent.

Mr. **Hansen** also announced that **Ray Bader,** former Terminal 2 superintendent, has been named to the newly-created position of manager of the container terminal at T-2. He will be assisted by **Dick Boyle** and **Richard Artle** as superintendents of the container yard and container freight station, respectively.

Overall Terminal 2 superintendent Mr. **Driscoll** is in charge of all berthing at the five-berth Terminal 2, and will oversee handling of all cargo except containers.

Mr. **Whyte** joined the Dock Commission as a berth agent in 1951. He was superintendent of Terminals 2 and 4 before becoming assistant operations manager.

Marine Square Club Elects Officers

Shown above after recent election of officers at the Seamen's Church Institute are, left to right: **George E. Allen,** secretary; **Alfred Just,** president; Capt. **Erik A. Solberg,** first vice president, and Capt. **Otto Meyer,** treasurer. Second vice president **William Friesen** is missing from the group.

The Marine Square Club, Inc. of New York City has announced the election of the following officers for 1971: president, **Alfred Just;** first vice president, Capt. **Erik A. Solberg;** second vice president, **William Friesen;** treasurer, Capt. **Otto Meyer,** and secretary, **George E. Allen.** In addition, Captain **Solberg** will serve as chairman of the board of governors, and Mr. **Friesen** as vice chairman. Other members of the board of governors are: **F.E. Barton, W. Thorsen,** Capt. **R.G. Hunter, W.B. Stiles, A.S. Lanaker, J. Muller, A. Kusebauch, R. Geist, A. Hansen, A.K. Soberg, J.N. Drew,** and **E.A. Engebretson.**

The Marine Square Club, organized May 6, 1927, is an organization of men of the Masonic fraternity affiliated with the marine industry. Among the activities supported are M.S.C. Members Scholarships Fund, New York State Maritime College Scholarships, and Round Lake Masonic Boys Camp.

The annual dinner dance will be held this year at the Commodore Hotel, New York City, on April 17. Proceeds will assist needy cadets at the Maritime College, Fort Schuyler, N.Y.

TTT President Predicts Roll-On Shipping Will Spread To Major Trade Routes By 1980

Pure roll-on shipping may well be a "maritime life style" on a majority of world sea lanes by 1980, **R.D. Carter,** president of Transamerican Trailer Transport Inc. (TTT), predicted.

Speaking recently aboard TTT's new American-flag S/S Eric K. Holzer, the world's largest capacity roll-on trailership, Mr. **Carter** told a group of shipping editors who toured the supership as she prepared to sail on her second voyage to Puerto Rico: "We regard this 26-knot vessel as only a prototype of the kind of pure roll-on vessels that U.S. shipyards will be developing in future years under the impetus of the U.S. Merchant Marine Act of 1970."

Second generation roll-on ships can be as fast or faster than 35 knots, carry 1,200 or more vehicles and in excess of 400 forty-foot trailers, and be 1,000-feet long, or longer, Mr. **Carter** said. TTT's Eric K. Holzer is 700-feet long and carries 400 vehicles and 240 forty-foot trailers. This is about equal to the capacity of a currently operating conventional cellular containership carrying 1,000 boxes.

"The important thing is that American shipbuilding technology in roll-on vessels can play an important role in helping the U.S. maintain its lead in the door-to-door shipping method of the intermodal era," Mr. **Carter** stated. He added that TTT has "gone a long way" toward proving that the pure roll-on shipping method, with "cargo flexibility" ships designed and built by Sun Shipbuilding & Dry Dock Co., is the ultimate answer to pure intermodal transport, avoiding the limitations of the lift-on container concept.

"I am confident that the much larger and faster roll-on ships which will be delivered in the second generation of intermodal shipping will be commercially feasible on long trade routes around the world, Mr. **Carter** commented. "In time TTT may emerge as a roll-on factor in the international field." He remarked that TTT's operating experience on the New York to Puerto Rico trade route has been one of the most encouraging spots of the American merchant marine in recent years.

Mr. **Carter's** fledgling company introduced the S/S Ponce de Leon roll-on trailership in April 1968, and proved so successful that an additional $20-million-plus was committed to build a virtually identical sister ship, the Eric K. Holzer, which has just returned from her maiden voyage to San Juan, Puerto Rico.

The Eric K. Holzer differs from the Ponce de Leon in that she can carry the heaviest single loads of any trailership (250 tons) and 30 more vehicles. Together, the TTT vessels are the world's fastest and largest roll-on ships, making the Staten Island based line the world's leading exponent of roll-on shipping. Both TTT ships sail to Puerto Rico in 58 hours, 40 percent faster than conventional vessels. All cargo is driven aboard on three side ramps. The complete load/discharge cycle takes only 12 hours.

The Eric K. Holzer arrives in San Juan Harbor at dawn.

Mr. **Carter** said TTT's roll-on operation is a pure intermodal system, the only one existing today. He noted, for example, that TTT is the only major ocean carrier belonging to the National Railroad Trailer Pool.

Under TTT's new twice-weekly service, the Eric K. Holzer departs New York every Tuesday and departs San Juan every Friday. The Ponce de Leon departs New York every Friday and leaves San Juan every Monday.

Mr. **Carter** stated that because of the ability of the TTT vessels to transport any cargo on wheels, they offer total flexibility, "offering all things to all shippers—from small cars to huge cranes."

The TTT executive said that TTT's giant roll-on ships require a smaller investment in capital equipment than the conventional lift-on container vessel, enjoy a more rapid turnaround time in port, eliminate the need to maintain costly interior equipment pools, and because there is no stacking on deck, offer safer carriage.

Modern terminal facilities of TTT in San Juan.

Blount To Design And Build Research Vessel For Raytheon

Raytheon Company announces the award of a contract to Blount Marine Corporation of Warren, R.I., for design and construction of an 81-foot oceangoing research vessel. The welded steel and aluminum craft will be under management of Raytheon's Submarine Signal Division at Portsmouth, R.I. for sonar development, as well as for survey and development work in oceanography and the environmental sciences.

In construction and fitting, the twin-screw vessel will be the most modern for her size and mission in the United States. Two General Motors 350-hp diesel propulsion engines will be specifically adapted for silent operation by means of a new system recently pioneered by Blount. Acoustic isolation of her two large diesel power generators will also enhance the use of underwater sound techniques for many applications, such as bottom and sub-bottom mapping and the command and control of environmental sensors.

Raytheon Company and Blount Marine Corporation sign contract for new research vessel construction. Shown above, (seated) left to right, are: **Ralph A. Martin,** vice president Raytheon Company and general manager, Submarine Signal Division, Portsmouth, R.I., and **L.H. Blount,** president Blount Marine Corporation, Warren, R.I., and (standing) left to right, **Richard A. Elliott,** purchasing department, Submarine Signal Division, Raytheon Company, and **Frank G. Crawford,** engineering department, Submarine Signal Division, Raytheon Company. The contract is for construction by Blount Marine Corp. of an 81-foot steel and aluminum craft to be bulit for operation of Raytheon Company's Submarine Signal Division.

The vessel will be provided with a spacious laboratory area to accommodate the increasing number and diversity of Raytheon's offshore activities. Typically, the seagoing lab will support the operation of the company's Ocean Systems Center under a multiyear Sea Grant program to develop survey systems and techniques for improved knowledge and use of continental shelf resources. Scientists and engineers of the Portsmouth Division will use it to conduct studies of underwater sound propagation under actual sea conditions, and evaluate experimental designs for improved submarine detection systems. The laboratory will provide facilities for investigation of the physical, chemical and biological causes of bay pollution and the development of water quality monitoring systems by Raytheon's Environmental Systems Center.

A special electronics room in the custom-designed vessel will serve to demonstrate new equipment and systems, including those developed by Raytheon's Marine Products Operation of Manchester, N.H., for commercial shipping and pleasure boats.

The vessel will operate primarily in coastal waters of the Atlantic. She will have a nonstop cruising range of 2,640 miles at 10 knots, and modern quarters for 10 people in crew and project scientists and engineers. Construction and outfitting is expected to require five months, with delivery on June 30, 1971.

Southwest Marine Invites Bids To Construct Four Purse Seiners For Ecuador

The Comision de Valores, Corporacion Financiera Nacional of Quito, Ecuador, has received a loan from the International Bank for Reconstruction and Development for the development of the fisheries of Ecuador.

As part of this program, there are to be constructed four purse seine type fishing vessels with the following characteristics: type—steel construction, two-deck tuna purse seiner, complete with net; dimensions—99.5 feet by 28 feet; capacity—180 short tons of tuna in refrigerated holds; propulsion—single-screw diesel power of 565 horsepower.

Any and all shipbuilders in countries which are members of the International Bank of Reconstruction and Development, and with experience in constructing vessels of this type are hereby invited to submit bids in accordance with plans, specifications, and pro forma contractural documents prepared for this project.

The plans, specifications, and pro forma contractural documents are available for a deposit of $100 paid by certified check to the order of Southwest Marine Architects and Engineers, Inc.

The tentative date for the bid opening is April 1, 1971. All inquiries relative to this bid solicitation should be directed to: Southwest Marine Architects and Engineers, Inc., 5055 North Harbor Drive, Suite "H", San Diego, Calif. 92106, Telephone (714) 224-3471.

Unsuccessful bidders that return their copies of the plans and specifications will receive a rebate of $50.

AWO Region 5 Reelects Von Herbulis —Directors Elected

J.W. Von Herbulis, president of Pittston Marine Corporation, New York City, was reelected vice president of American Waterways Operators in Region 5 at the recent annual meeting of members in New York. Mr. **Von Herbulis** was also reelected a director of the Association for a two-year term. AWO's Region 5 encompasses the North Atlantic area.

Two new directors of the Association were elected and three others were reelected at the meeting. The new directors were installed at the Association's annual corporate membership meeting and board of directors meeting in Washington, D.C., February 18, 1971.

Thomas E. Moran, president of Moran Towing Corporation, New York City, was elected a director for a two-year term. **Ralph W. Hooper** of Interstate Oil Transport Co., Philadelphia, Pa., was elected a director for a one-year term.

Directors whose terms are expiring, in addition to Mr. **Von Herbulis,** who were reelected to two-year terms, are: **A. Giallorenzi,** marine department, Humble Oil & Refining Company, Bayonne, N.J.; **Capt. C.V. Gearin,** manager, inland waterways operations marine transportation department, Mobil Oil Corporation, New York City, and **James P. McAllister,** president, McAllister Lighterage Line, Inc., New York City.

Two other directors in Region 5 continue in office for another year. They are: **Francis B. Bushey,** president, Spentonbush Transport Service, Inc., and **Robert J. Hughes,** president, James Hughes, Inc., both of New York City.

The business meeting of members was well attended, as was the luncheon which followed. Numerous guests were at the luncheon, including representatives of the Army Corps of Engineers and the U.S. Coast Guard.

Symposium Offered In Computer Analysis Of Ship Structures

A symposium and short course on the use of computers in analysis of ship structures will be sponsored by the American Bureau of Shipping and the University of Arizona March 29 through April 2. Cost of attending the symposium and course will be $200 each.

Registration and further information may be obtained from the Director of Conferences and Institutes, Division of Continuing Education at the University of Arizona at Tucson.

'K' Line Of Japan Awards Contract For Six PACECO Cranes

A contract for six shipboard container handling cranes of new design has been awarded PACECO, a division of Fruehauf Corporation, Alameda, Calif., by "K" Line of Japan.

The 30-ton capacity cranes will be installed aboard three modified containerships to be used in "K" Line's new container service between the United States and Southeast Asia. Each ship will be equipped with two PACECO Shipstainer cranes—one forward, and one aft, to load and unload containers. The vessels will have a capacity of 300 forty-foot containers, which the Shipstainers can load and unload at an average rate of 32 per hour. In terms of tons, the cranes will handle 800 to 900 long tons of containerized cargo per hour.

Cantilevers, on each side of the cranes, have an outreach of 23 feet to enable ship loading and unloading onto the pier from either side of the ship. When the ship puts out to sea, cantilevers are folded within the crane's gantry frame for compact stowage.

The cranes are designed to stack containers two-high on the top deck of the ship and will operate on ship's power, utilizing DC variable voltage for smooth, position container spotting.

"K" Line's new container service, which will start in October of this year, will have direct calls between Seattle, Wash., Long Beach, Calif., Keelung, Hong Kong, and Pusan. Sailings are scheduled for every 15 days.

Burrard Dry Dock And Yarrows Ltd. To Build 363-Ft. Barge

Two British Columbia shipyards, Burrard Dry Dock Co., Ltd. of Vancouver, and Yarrows Ltd. of Victoria, will jointly build a 363-foot barge. The vessel will be specially-designed to carry newsprint.

Burrard Dry Dock Co., Ltd. will construct the bow section and the stern section will be built at Yarrows Ltd. Upon completion, the two sections will be united at the Yarrows yard.

Cla-Val Catalog On Valves And Controls For Shipboard Piping

Cla-Val Co., Newport Beach, Calif., has published "A Quick Reference Catalog for Valves and Controls for Shipboard Piping Systems," which is ready for distribution to all interested parties.

This catalog has been prepared to relate Cla-Val marine products to applicable military specifications and to indicate the shipboard piping systems where they are used. This catalog shows the Cla-Val products that are available, those which are qualified by the U.S. Navy and which meet the various military specifications.

Grafton Boat Names Edgar H. Enslin Works Manager

Edgar H. Enslin

Edgar H. Enslin has been named works manager of Grafton Boat Company, Grafton, Ill., it was announced by **Edward D. Fry Jr.,** president. Mr. **Enslin** is now responsible for all production at the Grafton firm, including new boat construction and marine repairs. He retired recently from St. Louis Shipbuilding and Steel Company, St. Louis, Mo., where he was vice president and works manager since 1954.

Mr. **Enslin's** career in the marine industry began in 1933 with St. Louis Shipbuilding. From 1945 to 1954 he was manager of Paducah Marineways. He has been active in marine industry activities as a past president of the Paducah Propeller Club, and as regional vice president of the Propeller Club of America.

Mr. **Enslin** is the second well-known marine industry executive to join Grafton Boat within the past few weeks. **Arthur R. Parsons,** former president of St. Louis Shipbuilding and Steel Company, was recently appointed marketing executive by the Grafton firm, which is a wholly-owned subsidiary of Continental Boiler and Sheet Iron Works, St. Louis, Mo.

Continental vice president **Robert C. Fournie,** who is also board chairman of Grafton Boat Company, stated that the appointments of Mr. **Enslin** and Mr. **Parsons** are part of the parent company's plan to add depth and experience to Grafton's management.

Colt Bulletin Describes S.E.M.T.-Pielstick PC-2 Marine Diesel Engines

A new marine engine bulletin describing the S.E.M.T.-Pielstick PC-2 marine diesel engine is available from Colt Industries' Power Systems Division. The 16-page book is in full color and describes the PC-2 diesels now being built at the Division's Beloit, Wis. plant under license from Societe d'Etudes de Machines Thermiques, Paris, France. The engine is the world's most widely-used, medium speed, high horsepower diesel engine.

Typical marine applications are shown. A longitudinal cutaway clearly illustrates the engine's "V" type configuration, with detailed operating and dimensional data.

Copies of the bulletin may be obtained by contacting the Power Systems Division, 701 Lawton Avenue, Beloit, Wis. 53511.

Philip F. Brunner Named President Ferguson Propeller Ltd.

Philip F. Brunner has been named president of Ferguson Propeller Ltd., a division of Walter Kidde & Company, Inc., it was announced by **Bernard N. Ames,** Kidde senior vice president in charge of marine and maritime operations.

Mr. **Brunner** succeeds Mr. **Ames** in the president's position. Mr. **Brunner** has been executive vice president of Ferguson Propeller since 1967, and previously served as assistant general manager. Prior to joining Ferguson, he was director of purchasing at Maryland Shipbuilding and Drydock Company.

An associate member of The Society of Naval Architects and Marine Engineers, Mr. **Brunner** attended John Hopkins University and Baltimore Polytechnic Institute.

Ferguson, located in Hoboken, N.J., manufactures ship propellers and propulsion systems. Kidde is a diversified company with principal operations in safety, security and protection products and services. Headquartered in Clifton, N.J., Kidde operates more than 130 manufacturing plants and other facilities worldwide.

ADDSCO Launches World's Largest Barge

The I.O.S. 3301, shown at her launching in Mobile, Ala., will transport approximately 33,000 tons of clean petroleum products from U.S. Gulf ports to terminals on the East Coast of the United States.

The largest oceangoing barge in the world slid down the ways recently at Alabama Dry Dock and Shipbuilding Company, Mobile, Ala. **Mrs. Edmund L. Hukill Jr.** of New Orleans, whose husband is a vice president of Ingram Ocean Systems Inc., smashed the traditional bottle of champagne across the bow of the U.S.-flag barge I.O.S. 3301, which was constructed for Ingram Ocean Systems Inc. of New Orleans, La.

Serving as matron of honor for the sponsor was **Mrs. David B. Cobb,** whose husband is also a vice president of the company.

Prior to the christening **J.R. Maumenee,** president of ADDSCO, formally presented the vessel to the owners. Accepting the barge was **E. Bronson Ingram,** president of Ingram Corporation, the parent company. Mr. **Ingram,** a long-time resident of Nashville, Tenn., is very active in civic and educational affairs in that city and serves as a director of The Weyerhauser Company and as a member of the board of trustees of Vanderbilt University.

In addition to many executives from the Ingram organizations, the launching ceremonies were also attended by officials of Shell Oil Company, Phillips Petroleum Company and the Maritime Administration of New Orleans, and representatives of Breit Engineering, Inc. and the American Bureau of Shipping, both local and from New Orleans.

The launching of this mammoth barge is of special significance since it signals a pioneering coastwise service for Ingram Ocean Systems Inc. Designed by Breit Engineering Inc., the barge will carry approximately 33,000 tons of clean petroleum products, such as gasoline, kerosene, jet fuel, and diesel oil from ports in the U.S. Gulf to terminals on the East Coast of the United States.

I.O.S. 3301 measures 532 feet in length and 87 feet in breadth, and is powered by a 140-foot, 11,250-hp tug. A special slot in the stern of the barge is designed to fit the tug and permit operation as a single unit locked together by means of hydraulic rams.

Designed to operate in all weather conditions, the tug-barge will have the same capacity and operational speed as a standard cargo ship. With six pumps serving the multigrades, it is possible to discharge the barge in approximately 14 hours, thus insuring fast turnaround.

While the Ingram name has long been familiar to the inland waterways industry, this is the company's first venture into the deep-sea transportation field.

Ingram is a diversified corporation whose interests and activities virtually circle the globe. Engaged principally in offshore petroleum platform and pipeline construction, the firm also has interests in international petroleum and petrochemical trading, construction materials, books and education, insurance, and executive search and psychological consulting. Over 2,000 Ingram employees are at work on six continents around the world, and the corporation has assumed its place as a major force in offshore construction and marine transportation.

Gotaas-Larsen Names Three Top Executives

H. Irgens Larsen, president of Gotaas-Larsen, Inc. has announced the appointment of **Finn Grape** and **Max Scheder** as vice presidents, and **Patrick F. Cussimano** as treasurer.

Gotaas-Larsen, one of the world's largest independent bulk cargo fleets with three-million deadweight tons of shipping, is the ocean shipping subsidiary of International Utilities. The company has an additional million tons under construction or on order.

Alter Company Names Gardner Port Captain

Robert L. Gardner has been named port captain of Alter Company's Marine Division in Davenport, Iowa. In his new assignment, Mr. **Gardner** will supervise the operation of Alter Company's towboats on the Upper Mississippi River and will assist in the firm's barge transportation program.

Until recently, he was port captain of Cargo Carriers, Inc., and general manager of Tri-State Marine Service Company in Baton Rouge, La. Prior to that, he had served Cargo Carriers as assistant manager and operations coordinator of the company's Baton Rouge installation. Mr. **Gardner** began his river career as a summertime crew member on towboats of The Barrett Line.

A native of Smithland, Ky., Mr. **Gardner** attended Vanderbilt University and was graduated from Western Kentucky University with a degree in industrial technology.

Port Of New York Steamship Services Directory Available

The 1971 edition of the Port of New York Steamship Services Directory has been issued by The Port of New York Authority for use by importers, exporters, freight forwarders and other business organizations and Government agencies.

The 16-page Directory, published annually since 1955, lists the names, addresses, telephone numbers and pier locations of 184 steamship lines and their agents offering regularly scheduled services from the New Jersey-New York port on international, intercoastal and coastwise routes. It also contains a listing of some 300 world ports in 130 countries and an index, by country, of steamship services available from the Port of New York to those ports.

Copies of the new Directory may be obtained without charge from the Port Promotion Division, The Port of New York Authority, 111 Eighth Avenue, New York, New York 10011.

Joseph Cordaro Elected SCNO Executive VP

The board of directors of Sioux City And New Orleans Barge Lines, Inc. has elected **Joseph R. Cordaro** to the office of executive vice president.

Mr. **Cordaro** joined SCNO in February 1969 as operations manager. In August of 1969, he was elected to the office of vice president. In his new position, he will be responsible for all barge line operations and sales activities.

Mr. **Cordaro** has had 23 years of experience in the river industry. He has an associate degree in science and a bachelor of science degree from St. Louis University, and a master of business administration from the University of Louisville.

Ship Funding Listed In President's Budget For Fiscal Year 1972

Out of a total outlay of $76 billion for defense spending, President **Nixon's** Fiscal Year 1972 budget allocates $23.3 billion for the Navy. The President requested $3.3 billion to cover the construction of at least 19 vessels for Navy shipbuilding and conversion. These would include five SSN-688-class submarines, one nuclear-powered guided missile frigate and seven DD-963-class destroyers. Nine naval ships would be converted.

As for merchant ship funding, the Nixon Administration requested $504.6 million to cover subsidized operations and shipbuilding. This amount was $16 million less than that requested by MarAd, which asked for $229.6 million for construction subsidies and $219.2 million for operating subsidy funds. Eight ore/bulk/oil carriers, five general cargo/bulk vessels, five barge carriers and four containerships are listed as tentative procurements in FY '72. The operating subsidy contains no money for any of the six passenger ships laid up on the East Coast.

Star Iron To Install Third Container Crane For Port Of Seattle

Star Iron & Steel Co., Tacoma, Wash., has been awarded a contract for the construction and installation of a third Starporter container crane for the Port of Seattle, it was announced by **Charles Allen,** president of Star Iron & Steel Co. Star was awarded a contract for two of the large 40-ton capacity cranes in August of last year. Delivery of the first crane was accelerated two months by the port at the same time they made the award for the third crane.

The third crane will be identical to the first two, including some special features requested by the Port Authority. It will operate at speeds up to 300 feet per minute. This is made possible by a hoist that is driven with a 500-hp motor. The crane will be powered by a self-contained independent diesel-electric engine of 850 horsepower. The diesel engine generates AC power which is used to run all AC components. The AC power is converted to DC by static rectifiers to provide DC adjustable voltage control for all main drive motions. The engine will be located in the machine house and allow the crane to continue operation in case of power failure from outside sources.

The total reach of the crane is 193½ feet. It is 174 feet high, weighs 625 tons and is capable of operating in the back reach area with the boom stowed. Other special features include a telescoping spreader to handle all size containers and a de-tuning system to reduce radio frequency energy that could cause electrical problems if not controlled.

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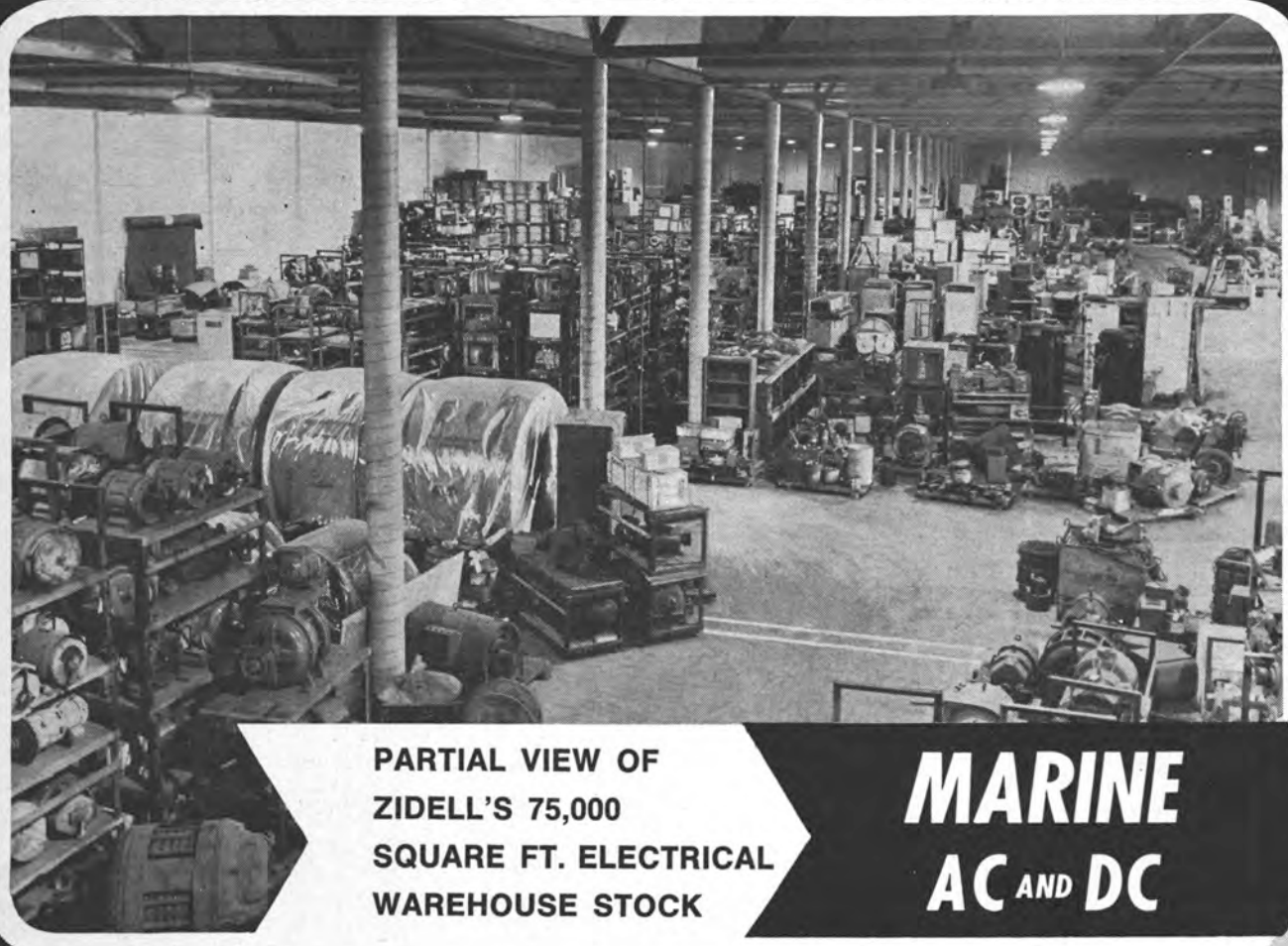

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MASTER MARINERS ANNUAL DINNER: The Council of American Master Mariners, Inc., held its annual dinner on January 18 in George's Restaurant, New York City. Guest speaker for the occasion was **William J. Keely,** vice president, marketing, United States Lines, who spoke on current maritime affairs as they affect the U.S. merchant marine industry. Officers pictured above during the dinner are, left to right: Capt. **Otto Meyer,** second vice president; Capt. **Kenneth C. Torrens,** treasurer; Capt. **Keely;** Capt. **Edward R. Downing,** past president, Capt. **Stephen M. Seledee,** newly-elected president, and Capt. **Robert J. Wall,** first vice president. Capt. **Robert Murray,** newly-elected executive secretary is not shown.

Sun Oil And Arctic Engineers To Build Air Cushion Vessel

The Houston-based firm of Arctic Engineers and Constructors announced that the Sun Oil Co. has agreed to participate in a program for the construction and testing of an air cushion transporter of 100-ton payload capacity. The two companies have also agreed to continue a program for the development of a much larger air cushion vehicle with a self-contained drilling system for use in Arctic land, sea and ice-covered areas.

Arctic Engineers and Constructors is a joint venture of Global Marine Inc. of Los Angeles and Raymond International Inc. of New York.

Arctic Systems Ltd., the Canadian subsidiary of Arctic Engineers and Constructors, has granted a contract to Dominion Bridge Ltd. of Edmonton, Alberta, to fabricate and assemble the vessel, called ACT-100.

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Speed 10 Knots DWT—690
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Refitted to Handle 23-20 containers
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Os & D RUBBER HOSE
50 — 6" size 20' long sections with flanged ends, in little used, good condition.
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De Laval	300 KW
Hendy (Terry Design)	300 KW
Westinghouse (Victory type)	300 KW
Westinghouse	250 KW
Worthington	150 KW
Westinghouse CA 20	100 HP
G.E. Main Turbine Rotor T2	6000 HP
G.E. HP & LP Turbine C2	6000 HP
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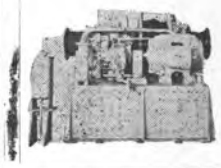
For Sale or Charter Seagoing Tugs—Ships-Barges 210' Big Tug, 3600 HP, 40' Beam 18' Draft; Tug 125' 1600 HP; Tug 74' 1200 HP; At Hawaii Tanker 1000 Tons Surplus perfect $90,000.00; Barge Seagoing 153' X 36' with Deckhouse and Repair Shop, Overhead Crane $25,000.00; Barge Seagoing 261' X 49' Two story house for Barracks and shop $90,000.00; At New Orleans Tanker 2000 Tons Twin Screw Coils and Pumps $25,000.00; Bulk Carriers 4500 DWT $125,000.00. Ocean Service Corp., 1177 Brickell Ave., Miami, Fla. Phone 358-3262.

4 SINGLE DRUM ELECTRIC HYDRAULIC WINCHES
from Navy Research Ship Liberty AGTR-5



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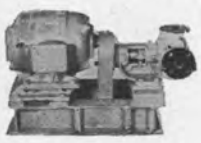

For thrust bearings, motor bearings, etc. 5 GPM @ 25 PSI—680 RPM — 1¼" suction — 1" discharge. MOTOR: Howell Electric Co.—¾ HP type K—1150 RPM — 440/3/60 — frame 204. BASE: 23" long—10½" wide.

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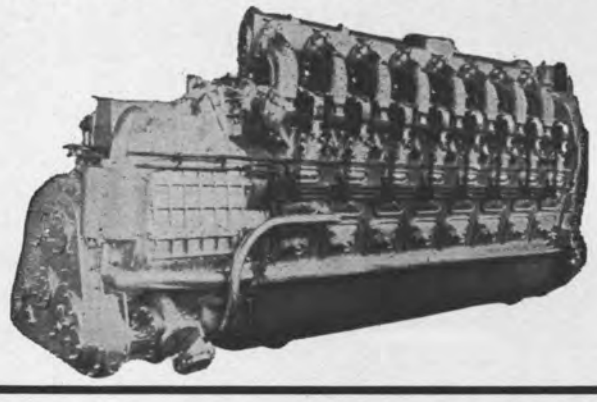

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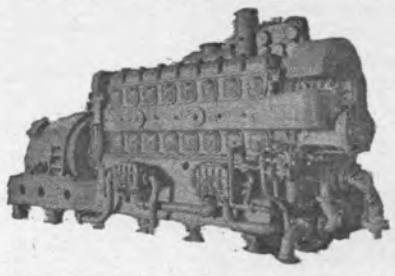

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CUMMINS A1, 30 KW, 120 DC.
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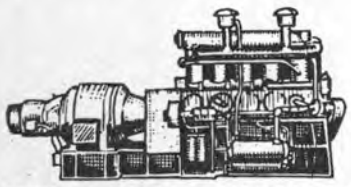
CATERPILLAR DIESEL ENGINE, Model D13000, 167 HP, 900 RPM, with Louis-Allis Generator, 85 KW, 220 AC.
LORIMER F5SS, 75 KW, 120/240 DC, radiator cooled.



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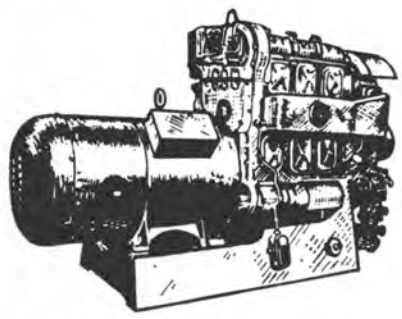
SUPERIOR, Model 1DB-8 100 KW, 450/3/60.
GM, 8-268, 300 KW, 260/345 DC.



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FAIRBANKS-MORSE, 38 E 5¼, 300 KW, 260/345 DC.

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Used condition
1800 HP, 800 RPM,
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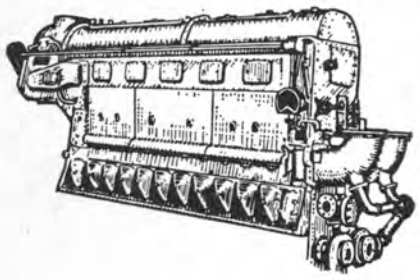
Complete with Westinghouse Reduction gears 2,216:1 ratio, with Hydraulic Coupling



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INGERSOLD-RAND, 50 CFM, 150 PSI, 20 HP, 440/3/60.
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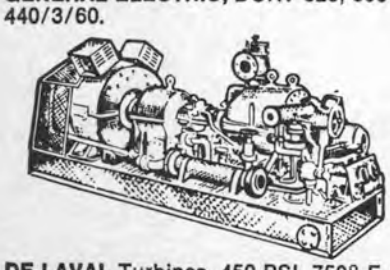
GENERAL ELECTRIC, DORV 325, 300 KW, 440/3/60.



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Lifting Rate: 25 tons @ 50 Ft. Radius @ 50 to 60 FPM.—
Boom: 80' to headblock (with 10' whip)
Whip: 10 tons @ 125 FPM—2 part line
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Motors: Each leg (4 tot.) 7½ HP, 230 DC.—
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2—220 HP, G.E., 1800 RPM, Type CDM-13485, Model 25G 339, 775 Ampere, B.B., D.P., Stab. Shunt.
4—9.3 HP, Westinghouse, 640/852 RPM, Type SK, FR. 93.

52—WESTINGHOUSE 50 HP
230 Volts DC, 600 RPM, Type CK, Frame 9, Compound Wound, 181 Amperes, Double Shaft, Totally Enclosed—Waterproof, Horizontal, Approximate Weight 2000 lbs.

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5 ton rated, steel, as removed from surplus Liberty Ships. Manufactured by Young, Draper, etc. 12" or 14" sizes, your choice

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Complete with coaming. Wheel control from above and below.

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In 440 AC, in 115 DC, and in 230 DC, and in sizes 1 HP through 20 HP. Completely reconditioned.

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NEW JANETTE 1 KVA SETS

INPUT: 2 HP 115 volts DC—3.5 amps.—1800 RPM. OUTPUT: 1 KVA—120 volts single phase A.C.—.8 PF—40°C rise.

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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 — 78 amps — 1800 RPM. OUTPUT: 5 KW—115 volts single phase A.C. 4-bearing—with 10 HP 115 volt D.C. magnetic starter.

FIRST TIME IN A LONG TIME THAT 5 KW UNITS ARE ON THE MARKET

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Mfg. by KATO Electric Co. INPUT: 25 HP—115 volts DC—160 amps—1800 RPM. OUTPUT: 12.5 KVA—120 volts single phase. Westinghouse magnetic controller. 36"x20"x18½".

230 VOLT D.C. INPUT—115 VOLT SINGLE PHASE OUTPUT

30 HP 230 VDC TO 20 KW 120/1 A.C. FIDELITY ELECTRIC MG SETS

INPUT: 30 HP—230 volts DC 120 amps 1800 RPM. OUTPUT: 20 KW—25 KVA—120 volts AC 208 amps—single phase. Excellent condition.

UNUSED CONTINENTAL MG SET

INPUT: 7½ HP 230 volts DC 36 amps 1800 RPM. OUTPUT: 5 KW 10 KVA 120 volts single phase 60 cycles AC.

440/3/60 A.C. OUTPUT

25 KW MG SETS 115 DC to 440/3/60 A.C.

INPUT: 40 HP—115 volts DC—290 amps—1800 RPM. OUTPUT: 31.5 KVA—25 KW—440/3/60. Complete with motor and generator control.

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UNUSED BITTS

Single bitts—6" diameter—24½" long—8" wide. Not shown is 90° bracket. While they last.

BUY IN QUANTITY

$19.95 EACH

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Ex-Tank Lighter Craft — 2" diameter — 66⅜" OAL.—bronze coated throughout—threaded, tapered keyway. Ex-Tanker Lighter part No. M-10151. 100 available.

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HIGH PRESSURE STARTING AIR TANKS

600 lb working pressure—1200 lb test pressure—16½" diameter—7' 3" overall length.

$269.50

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DIESEL FIRE & GENERAL SERVICE PUMP

500 PSI @ 100 lbs—with self-priming attachment

Mfg by John Reiner & Co.—DP-60—diesel engine 4 cyl. Continental—electric starting — 42 HP — 1800 RPM. PUPM: 500 GPM—100 PSI—4" suction—4" discharge. Unused.

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UNUSED 10x9x12 VERTICAL SIMPLEX FUEL OIL TRANSFER PUMPS

Furnished on some T2 tankers. 160 GPM Bunker C—viscosity 70 to 700 SSF 122°F @ 100 lbs discharge press. WP steam 150#—exhaust 10#. 1¼" Steam inlet—1½" exhaust. 4" pump suction—3½" discharge.

$1250

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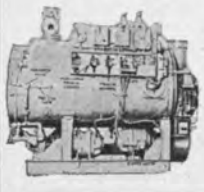
CYCLOTHERM SELF-CONTAINED AUX. BOILERS



Oil burning 0 2500 lbs/hr. Design pressure 125 lbs—WP 100 lbs—2-pass. Complete with self-contained motor-driven blower 5HP—440/3/60—Fuel Oil Service pump 3 HP—440/3/60. Burner is pressure atomizing type.

$795.00 each

YOUR INSPECTION INVITED

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HAZARDOUS DUTY DEEP WELL PUMP

4x4—for cargo oil, water, gasoline, bilge, etc. MOTOR: Westinghouse—U.L. approved for hazardous duty—3 H.P.—220/440/3/60—3450 R.P.M.—9 foot shaft. 300 G.P.M. @ 60'—4 units available.

$447.50 each

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UNUSED 10KW SUPERIOR DIESEL GEN. SETS

GENERATOR: Delco 10-KW — 120 volts DC — 83.3 amps—1200 RPM. ENGINE: Superior diesel — 2 cylinder — 4½ x 5¾—15 HP—heat exchanger cooled.

ONLY 9 UNITS LEFT

PRICED TO SELL! While They Last

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UNUSED AURORA PUMP

$877.77

300 GPM—37' head—5 HP—120 volts DC Centrifugal Pump. Bronze — size 5x4 — flanged. MOTOR: Reliance—super T.D.C. Electric Motor—5 HP—120 VDC — 36.8 amps — 1750 RPM — Frame L216A—with control by Cutler-Hammer. Excellent condition. Latest USN surplus.

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UNUSED 500 KW 120/240 VOLT D.C. BALDWIN/ALLIS CHALMERS DIESEL GENERATOR SET

ENGINE: Baldwin-DeLaverne 725 HP—12-2/3"x15½"—8 cyl.—500 RPM — air starting. Dry weight 54050 lbs. GENERATOR: Allis-Chalmers 500 KW—120/240 V.D.C.—500 RPM — 550 RPM overspeed. 60°C rise—class B insulation—3-wire—25% unbalance—2083 amps—stab. shunt—open—drip-proof—self-ventilated—8 poles.

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MODEL O-2-D M&T UNITS RECONDITIONED

Hydraulic starting, steering, raising & lowering tailfin. CONDITION: Navy reconditioned 1965—fully checked out by us. Will demonstrate running. Weight about 9500 lbs. PROPELLOR: 48" x 24"—3-blade.

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Bailey Refrigeration Co., Inc., 74 Sullivan St., Brooklyn, N.Y. 11231
Carrier Air Conditioning Co., Carrier Parkway, Syracuse, N.Y. 13201
Union Carbide Corp., Linde Div., 270 Park Ave., N.Y., N.Y. 10017

ANCHORS AND ANCHOR CHAINS
Baldt Anchor, Chain & Forge, P.O. Box 350, Chester, Pa. 19016
Lockstadt Co., Inc., 179 West 5th St., Bayonne, N.J. 07002

BEARINGS
BJ Marine Bearings, a Borg-Warner Industry, P.O. Box 2709, Terminal Annex, Los Angeles, Calif. 90054
Glacier Metal Co. Ltd., Alperton, Wembley, Middlesex, England.
Johnson Rubber Co., Marine Division, Middlefield, Ohio 44062
Lucian Q. Moffitt, Inc., P.O. Box 1415, Akron, Ohio 44309
Waukesha Bearings Corp., P.O. Box 798, Waukesha, Wis. 53186

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

BOW THRUSTERS
Murray & Tregurtha, Inc., 2 Hancock St., Quincy, Mass. 02171

BUNKERING SERVICE
Gulf Oil Trading Co., 1290 Ave. of the Americas, N.Y. 10019
Independent Petroleum Supply Co., 1345 Ave. of Americas, New York, N.Y. 10019
Refineria Panama, S. A. 277 Park Ave., New York, N.Y. 10017
The West Indies Oil Co., Ltd., St. John's Antigua, W. I.

BURNERS—Oil
Todd Products, Div. of Todd Shipyards Corp., Brooklyn, N.Y. 11231

CABLE ELECTRIC MARINE
L. F. Gaubert & Co., 700 So. Broad St., New Orleans, La. 70150

CLUTCHES, GEARS & BRAKES
Amarillo Gear Co., 517 No. Polk St., Amarillo, Texas 79105
Fawick Airflex Div. Power Transmission Systems, 9919 Clinton Rd., Cleveland, Ohio 44111
Wichita Clutch Co., Inc., Wichita Falls, Texas 76307

COATINGS—Protective
Ameron Corrosion Control Div., Brea, Calif. 92621
Carboline Co., 328 Hanley Industrial Court, St. Louis, Mo. 63144
Enjay Chemical Company, 60 West 49th St., New York, N.Y. 10020
Farboil Company, 90 West St., N.Y., N.Y. 10006
Intercoastal Corp., 2320 Edgewater Ave., Baltimore, Md. 21222
Patterson-Sargent, P.O. Box 494, New Brunswick, N. J.
Porter Paint Co., Louisville, Ky. 40201
Spee-Flo Co., 4631 Winfield Rd., Houston, Texas 77039

CONTAINERS—CONTAINER HANDLING SYSTEMS
Ameron Corrosion Control Div., Brea, Calif. 92621
Lighter Aboard Ship, Inc., 225 Baronne St., New Orleans, La. 70112
Paceco, Div. Fruehauf Corp., P.O. Drawer E, Alameda, Calif. 94501
RPC Corp., Marine Sales, 200 Park Ave., New York, N.Y. 10017
Star Iron & Steel Co., 326 Alexander Ave., Tacoma, Wash. 98421
York Trailer Ltd., Corby, Northants, England

CONTAINER LASHINGS & COMPONENTS
American Engineered Products Co., Box 74, McKees Rocks, Pa. 15136
W. W. Patterson Co., 830 Brocket St., Pittsburgh, Pa. 15233
Pro Par Div. Fruehauf Corp., 10940 Harper Ave., Detroit, Mich. 48232
Seasafe Transport AB, Torstenssonsgatan 3, S 114 56 Stockholm, Sweden

CONTROL SYSTEMS
Galbraith-Pilot Marine Corp., 600 Fourth Ave., Brooklyn, N.Y. 11215
General Electric Industry Control Dept., Salem, Virginia
Henschel Corporation, 14 Cedar St., Amesbury, Mass. 01913
Kongsberg Systems, Inc., 10 De Angelo Dr., Bedford, Mass. 01703
Sperry Marine Systems Div., Charlottesville, Va., 22901, Division of Sperry Rand Corp.

CORROSION CONTROL
Ameron Corrosion Control Div., Brea, Calif. 92621
Carboline Co., 328 Hanley Industrial Court, St. Louis, Mo. 63144
Corrosion Dynamics, 1100 Walnut St., Roselle, N.J. 07203
Intercoastal Corp., 2320 Edgewater Ave., Baltimore, Md. 21222
Radiator Specialty Co., 1400 Independence Blvd., Charlotte, N.C. 28205

CRANES—HOISTS—DERRICKS—WHIRLEYS
ASEA Marine, Rep. in U.S.A. by Stal-Laval, Inc., 400 Executive Blvd., Elmsford, N.Y. 10523
Duchess Baker Mfg. Co., Superior, Wis.
Hoffman Rigging & Crane Service, 560 Cortlandt St., Belleville, N.J. 07109
Kocks Pittsburgh Corp., Four Gateway Center, Pittsburgh, Pa. 15222
Lidgerwood Mfg. Co., (Superior Lidgerwood Mundy Corp.), 1010 Third Ave., New York, N.Y. 10021
M.A.N. Maschinenfabrik Augsburg-Nurnberg AG, Werk Augsburg, West Germany
Paceco, Div. Fruehauf Corp., P.O. Drawer E, Alameda, Calif. 94501
Hensen-Rotterdam, P.O. Box 5040, Rotterdam, Holland
Star Iron & Steel Co., 326 Alexander Ave., Tacoma, Wash. 98401

DECK COVERS (METAL)
Lockstad Co., Inc., 179 W. 5th Street, Bayonne, New Jersey 07002
Marine Moisture Control Co., 449 Sheridan Blvd., Inwood, N.Y. 11696
Pyrate Mfg. Co., Inc., 222-17 Northern Blvd., Bayside, N.Y. 11361

DECK MACHINERY—Cargo Handling Equipment
ASEA Marine, Rep. in U.S.A. by Stal-Laval, Inc., 400 Executive Blvd., Elmsford, N.Y. 10523
Blackburn Marine Equipment, 6105 England St., Houston, Tex. 77021
Duchess Baker Mfg. Co., Superior, Wis.
Lidgerwood Mfg. Co., (Superior Lidgerwood Mundy Corp.), 1010 Third Ave., New York, N.Y. 10021
Markey Machinery Co., Inc., 79 S. Horton St., Seattle, Wash. 98134
Nashville Bridge Co., P.O. Box 239, Nashville, Tenn. 37202
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

DIESEL ACCESSORIES
Golten Marine Co., Inc., 160 Van Brunt St., Brooklyn, N.Y. 11231
Kiene Diesel Accessories, Inc., P.O. Box 216, Franklin Park, Ill. 60131

DIESEL ENGINES
Bruce GM Diesel, Inc., 180 Route #17 S. at Interstate 80, Lodi, N.J. 07644
Caterpillar Tractor Co., Industrial Div., 100 N.E. Adams St., Peoria, Ill. 61602
Colt Industries Inc., Power Systems Div., Beloit, Wisc. 53511
Electro-Motive Division General Motors, La Grange, Illinois 60525
Fiat, Turin, Italy, U.S.A. 375 Park Ave., New York, N.Y. 10022
Golten Marine Co., Inc., 160 Van Brunt St., Brooklyn, N.Y. 11231
M.A.N. Maschinenfabrik Augsburg-Nurnberg AG, Werk Augsburg, West Germany.
Nohab, Trollhattan, Sweden.

DIESEL ENGINE MUFFLERS
Marine Products & Engrg. Co., 20 Vesey St., New York, N.Y. 10007

DOORS—Watertight—Bulkhead
Overbeke-Kain Co., 209 Aurora Rd., Bedford, Ohio 44014
Walz & Krenzer, Inc., 20 Vesey St., New York, N.Y. 10007

ELECTRICAL EQUIPMENT
Arnessen Electric Co., Inc., 335 Bond St., Brooklyn, N.Y.
Galbraith-Pilot Marine Corp., 600 4th Ave., Brooklyn, N.Y. 11215
L. F. Gaubert & Co., 700 So. Broad St., New Orleans, La. 70150
Merrin Electric, 162 Chambers St., New York, N.Y. 10007
Oceanic Electrical Mfg. Co., Inc., 159 Perry Street, N.Y. 10014
Pauluhn Electric Mfg. Co. Inc., P.O. Box 12805, Houston, Tex. 77017

EVAPORATORS
Aqua-Chem, Inc., 225 N. Grand Ave., Waukesha, Wis. 53186
Bethlehem Steel Corp., Shipbuilding, 25 B'way, N.Y., N.Y. 10004
Mechanical Equipment Co., Inc., 861 Carondelet St., New Orleans, La. 70130

FITTINGS & HARDWARE
hi-shear Corp., 2600 Skypark Drive, Torrance, Calif. 90509
Nashville Bridge Co., P.O. Box 239, Nashville, Tenn. 37202
Robvon Backing Ring Co., 675 Garden St., Elizabeth, N.J. 07207

FLOATING EQUIPMENT—Steel—Aluminum Pontoons
Dravo Corporation, Neville Island, Pittsburgh 25, Pa.

GALLEY RANGES
Elisha Webb & Son Co., 136 So. Front St., Philadelphia, Pa. 19106

HEAT EXCHANGES
Aqua-Chem. Inc., 225 N. Grand Ave., Waukesha, Wis. 53186

HEATERS—Ship
Todd Products, Div. of Todd Shipyards Corp., Brooklyn, N.Y. 11231
Valad Elec. Heating Co., 71 Cortlandt St., Tarrytown, N.Y. 10591

HYDRAULICS
Bird Johnson Co., 883 Main St., Walpole, Mass. 02081
Vickers, M&O Div., Troy, Mich. 48084

INSULATION—Marine
Bailey Carpenter & Insulation Co.,Inc.,74SullivanSt.,Brklyn,N.Y.11231

LININGS
Ameron Corrosion Control Div., Brea, Calif. 92621
Carboline Co., 328 Hanley Industrial Court, St. Louis, Mo. 63144

MACHINE SHOP—TROUBLE SERVICE
Golten Marine Co., Inc., 160 Van Brunt St., Brooklyn, N.Y. 11231

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

MARINE DRIVES—GEARS
Hydro Drive Corp., 4420 - 14th Ave. N.W., Seattle, Wash. 98107
Philadelphia Gear Corp., Schuylkill Expressway, King of Prussia, Pa. 19406
Western Gear Corp., Industrial Products Div., P.O. Box 126, Belmont, Calif. 94003

MARINE NAVIGATION EQUIPMENT & AIDS
Dynel Electronics Corp., 75 Maxess Road, Melville, N.Y. 11746
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
ITT Mackay Marine, 133 Terminal Ave., Clark, N.J. 07066
Marquardt Corp., 16555 Saticoy St., Van Nuys, Calif. 91406
National Marine Service, 1750 So. Brentwood Blvd., St. Louis, Mo.
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.
Tracor, Inc., 6500 Tracor Lane, Austin, Texas 78721

MARINE EQUIPMENT
Adsco Div., 34 Milburn St., Buffalo, N.Y. 14212
Beaver Tool & Machine Co., P.O. Box 94717, 525 S.E. 29th St., Oklahoma City, Okla. 73109
Nicolai Joffe Corp., P.O. Box 2445, 445 Littlefield Ave., So. San Francisco, Calif. 94080
Kearfott Marine (Div. of The Singer Co.) 21 West St., New York, N.Y. 10006
Chas. Lowe Co., 6340 Christie Ave., Emeryville, Calif. 94608
Merrin Electric, 162 Chambers St., New York, N.Y. 10007
Pacific Coast Eng. Co., P.O. Drawer E, Alameda, Calif. 94506
Stow Mfg. Co., 225 Shear St., Binghamton, N.Y. 13902
Vokes Filter Div. (Cardwell Machine Co.), Cardwell and Castlewood Rd., Richmond, Va. 23221

MARINE FURNITURE
Bailey Joiner Co., 115 King Street, Brooklyn, N.Y. 11231

MARINE INSURANCE
Adams & Porter, Cotton Exchange Bldg., Houston, Texas
Midland Insurance Co., 29 Broadway, New York, N.Y. 10006

MARINE LIGHTS
Natale Machy. & Tool Co., Box 95, Carlstadt, N.J. 07022

MARINE PROPULSION
Buehler Corp., 9000 Precision Drive, Indianapolis, Ind. 46236
Combustion Engineering, Inc., Windsor, Connecticut 06095
De Laval Turbine, Inc., 853 Nottingham Way, Trenton, N.J. 08602
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 10014
Stal-Laval, Inc., 400 Executive Blvd., Elmsford, N.Y. 10523
Western Gear Corp., Precision Products Div., P.O. Box 190, Lynwood, Calif. 90262

MARINE RADIO COMMUNICATIONS EQUIPMENT
Collins Radio Co., M/S 416-118, Dallas, Texas 75207
Hose McCann Telephone Co., Inc., 524 W. 23rd St., N.Y. 10011
ITT Decca Marine, Inc., 386 Park Ave. South, New York, N.Y. 10016
ITT Mackay Marine, 133 Terminal Ave., Clark, N.J. 07066
E. F. Johnson Corp. Waseca, Minn. 56093
Paul J. Plishner, 45 West 45 St., New York, N.Y. 10036
Radiomarine Corp., 20 Bridge Avenue, Red Bank, N.J. 07701
Raytheon Marine Products Operation, 213 East Grand Avenue, South San Francisco, California 94080
RCA Service Co., A Division of RCA, Marine Communications and Navigation Equipment Service, Bldg. CHIC-225, Camden, N.J. 08101

NAVAL ARCHITECTS AND MARINE ENGINEERS
BG Marine Services, Div. of Genge Industries, Inc., 4419 Van Nuys Blvd., Sherman Oaks, Calif. 91403
Breit Engrg. Inc., 441 Gravier St., New Orleans, La. 70130
Coast Engineering Co., 711 W. 21st St., Norfolk, Va. 23517
Commercial Radio Sound Corp., 652 First Avenue, N.Y., N.Y. 10016
Crandall Dry Dock Engrs., Inc., 238 Main St., Cambridge, Mass. 02142
Cushing & Nordstrom, 50 Trinity Place, 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
M. Mock Earle, 103 Mellor Ave., Baltimore, Md. 21228
Christopher J. Foster, 17 Battery Place, New York, N.Y. 10004
14 Vanderventer Ave., Port Washington, N.Y. 11050
Friede and Goldman, Inc., 225 Baronne St., New Orleans, La. 70112
Gibbs & Cox, Inc., 21 West St., New York, N.Y. 10006
John W. Gilbert Associates, Inc., 58 Commercial Wharf, Boston, Mass. 02110
Morris Guralnick, Associates, Inc., 583 Market St., San Francisco, Calif. 94105
J. J. Henry Co., Inc., 90 West St., New York, N.Y. 10006
L. K. Homyer, Box 408, Corona Del Mar, California 92625
C. T. Ilariucci & Associates, Tourism Pier #3, San Juan, Porto Rico 00902
James S. Krogen, 1460 Brickell 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 Applications Co., Inc., P.O. Box 167, Mineola, N.Y. 11502
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
Maritech, Inc., 38 Union Sq., Somerville, Mass. 02143
Rudolph F. Matzer & Associates, Inc., 13891 Atlantic Blvd., Jacksonville, Fla. 32225
John J. McMullen Associates, Inc., 110 Wall St., N.Y., N.Y. 10005
George E. Meese, 194 Acton Rd., Annapolis, Md. 21403
Metritape, Inc., 77 Commonwealth Ave., West Concord, Mass. 01782
Robert Moore Corp., 350 Main St., Port Washington, N.Y. 11050
Gunnar Nelson, 2185 Lemoine Ave., Ft. Lee, N.J. 07024
Pearlson Engineering Co., Inc., 8970 S.W. 87th Ct., Miami, Florida 33156
Philip L. Rhodes, Inc., 369 Lexington Ave., New York, N.Y. 10017
M. Rosenblatt & Son, Inc., 350 Broadway, New York, N.Y. 10013 and 45 Second St., San Francisco, Calif.
George G. Sharp, Inc., 100 Church St., New York, N.Y. 10007
T. W. Spaetgens, 156 West 8th Ave., Vancouver 10, Canada
Philip F. Spaulding & Associates, 65 Marion St., Seattle, Wash. 98104
R. A. Stearn, Inc., 100 Iowa St., Sturgeon Bay, Wisc. 54235
Richard R. Taubler, 44 Court St., Brooklyn, N.Y. 11201
H. M. Tiedemann & Co., Inc., 74 Trinity Pl., New York, N.Y. 10006
H. Newton Whittelsey, 17 Battery Pl., New York, N.Y. 10004
Alan Winkley, 6420 Colby St., Oakland, Calif. 94618

OIL PURIFIERS—Repair
Peck Equipment Co., 3500 Elm Avenue, Portsmouth, Virginia 23704

OILS—Marine—Additives
Esso International Inc., 15 West 51 St., New York, N.Y. 10019
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., 50 W. 50 St., New York 10020
Texaco, Inc., 135 E. 42nd St., New York, N.Y. 10017

PAINT—Marine—Protective Coatings
Ameron Corrosion Control Div., Brea, Calif. 92621
Carboline Co., 328 Hanley Industrial Court, St. Louis, Mo. 63144
Devoe & Raynolds, Subsidiary Celanese Coats Co., 224 E. Broadway, Louisville, Ky. 40201
Enjay Chemical Co., 60 West 49th St., New York, N.Y. 10020
Farboil Company, 90 West St., New York, N.Y. 10006
Intercoastal Corp., 2320 Edgewater Ave., Baltimore, Md. 21222
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

PETROLEUM SUPPLIES
Independent Petroleum Supply Co., 1345 Ave. of Americas, New York, N.Y. 10019
Refineria Panama, S. A. 277 Park Ave., New York, N.Y. 10017
Shell Oil Co., 50 W. 50 St., New York, N.Y. 10020
Texaco, Inc., 135 E. 42nd St., New York, N.Y. 10017
The West Indies Oil Co., Ltd. St. John's, Antigua, W. I.

PLASTICS—Marine Applications
Ameron Corrosion Control Div., Brea, Calif. 92621
Hubeva Marine Plastics, Inc., 390 Hamilton Ave., Bklyn, N.Y. 11231
Philadelphia Resins Co., 20 Commerce Dr., Montgomeryville, Pa. 18936
Rotocast Plastic Products, Inc., 6700 N.W. 36th Ave., Miami, Florida 33147

POLLUTION CONTROL
Enjay Chemical Co., 60 West 49th St., New York, N.Y. 10020
Hemisphere Marine Chemicals Co., Inc., 300 Main St., Orange, N.J.

PROPELLERS: NEW AND RECONDITIONED
Avondale Shipyards, Inc., P.O. Box 52080, New Orleans La. 70150
Bethlehem Steel Corp., Shipbuilding, 25 Broadway, N.Y., N.Y. 10004
Bird-Johnson Co., 883 Main Street, Walpole, Mass. 02081
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

PUMPS
Coffin Turbo Pump/FMC Corp. 326 So. Dean St., Englewood, N.J. 97631
Colt Industries, Inc., Fairbanks Morse Pump & Electric Div., 3601 Kansas Ave., Kansas City. Kansas 66110
Goulds Pumps, Seneca Falls, N.Y. 13148
Worthington Corporation, Harrison, New Jersey 07029

RATCHETS
American Engineered Products Co., Box 74, McKees Rocks, Pa. 15136

REFRIGERATION—Refrigerant Valves
Bailey Refrigeration Co., Inc., 74 Sullivan St., Brooklyn, N.Y. 11231
York Corp., Grantley Road, York, Pa. 17405

ROPE—Manila—Nylon—Hawsers—Wire
American Mfg. Co., Inc., Noble & West Sts., Brooklyn, N.Y. 11222
Cating Rope Co., 309 Genesee St., Auburn, N.Y. 13022
Columbian Rope Co., 309 Genesee St., Auburn, N.Y. 13022
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
Wall Rope Works, Inc., Beverly, N. J. 08010

RUBBER PRODUCTS—Dock Fenders, Hose, Life Preservers
Hughes Bros., Inc., 17 Battery Pl., New York, N.Y. 10004
Yokohama Rubber Co. Ltd., P.O. Box 46, Shiba, Tokyo 105, Japan

RUDDER ANGLE INDICATORS
Electric Tachometer Corp., 68th & Upland Street, Phila., Pa. 19142
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.

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

SEALS
Golten Marine Co., Inc., 160 Van Brunt St., Brooklyn, N.Y. 11231
Syntron, Div. FMC Corp., 398 Lexington Ave., Homer City, Pa. 15748

SEARCHLIGHTS
Snelson Oilfield Lighting Co., 1201 E. Doggett St., Fort Worth, Texas 76104

SEWAGE DISPOSAL
Seapax, Inc., 3645 Warrensville Center Rd., Cleveland, Ohio 44122
Youngstown Welding & Engineering Co., 3708 Oakwood Ave., Youngstown, Ohio 44509

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

SHIPBREAKING—Salvage
The Boston Metals Co., 313 E. Baltimore St., Baltimore, Md. 21202
National Metal & Steel Corp., 1251 New Dock St., Terminal Island, Cal. 90731
Northern Metal Co., Minor & Bleigh Sts., Philadelphia, Pa. 19136
Peck Equipment Co., 3500 Elm Ave., Portsmouth, Va. 23704
Zidell Explorations, Inc., 3121 S. W. Moody St., Portland, Ore. 97201

SHIP BROKERS
Hughes Bros., Inc., 17 Battery Pl., New York, N.Y. 10004
Mowbray's Tug and Barge Sales Corp., 21 West St., N.Y., N.Y. 10006
Oaksmith Boat Sales, Inc., Fisherman's Terminal, Seattle, Wash. 98119

SHIPBUILDING STEEL
Aluminum Co. of America, 1501 Alcoa Bldg., Pittsburgh, Pa. 15219
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

SHIPBUILDING—Repairs, Maintenance, Drydocking
Armco Steel Corp., 703 Curtis St., Middletown, Ohio 45042
Astilleros Espanoles, S.A. Zurbano, 70, Madrid 10, Spain
Avondale Shipyards, Inc., P.O. Box 52080, New Orleans La. 70150
Beliard 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
Conrad Industries, P.O. Box 790, Morgan City, La. 70380
Dillingham Corp., P.O. Box 3288, Honolulu, Hawaii 96801
Dravo Corporation, Neville Island, Pittsburgh 25, Pa.
Equitable Equipment Co., Inc., P.O. Box 8001, New Orleans, La. 70122
General Dynamics, Electric Boat Division, 99M Eastern Point Road, Groton, Conn. 06340
General Dynamics, Quincy Division, Quincy, Mass. 02169
Gotaverken American Corp., 39 Broadway, New York, N.Y. 10006
Grafton Boat Co., Inc., Grafton, Ill. 62037
Groignard Shipyards, P.O. Box 829 Colbert, Marseilles, France.
Gunderson Bros. Engrg. Corp., 4700 N.W. Front St., Portland, Oregon 97208
Halter Marine Services, Inc., Route 6, Box 287H, New Orleans, La. 70126
Harbor Boat Building Co., 258 Cannery St., Terminal Island, Calif.
Havre de Grace, Havre de Grace, Md.
Hillman Barge & Construction Co., Grant Bldg., Pittsburgh 19, Pa.
Hitachi Shipbuilding Co.,25 Nakanoshima2-chomeKitaku,Osaka-Japan
Industrial Steel & Mach. Works, Inc., P.O. Box 2217, Gulfport, Miss. 39501
Ishikawajima-Harima Heavy Industries Co., Ltd., 15 William St., New York, N.Y. 10005
Jacksonville Shipyards, 644 E. Bay St., Jacksonville, Fla. 32203
Jeffboat, Inc., Jeffersonville, Ind. 47130
Kawasaki Dockyard Co., 8 Kaigan-dori, Ikuta-ku, Kobe, Japan
Kelso Marine, Inc., P.O. Box 268, Galveston, Texas 77550
Kockums Malmo, Fack, Malmo, Sweden
Levingston Shipbuilding Co., P.O. Box 968, Orange, Texas 77630
LISNAVE, P.O. Box 2138, Lisbon, Portugual
Litton Industries, 9920 W. Jefferson Blvd., Culver City, Calif. 90230
Lockheed Shipbuilding and Construction Co., 2929 16th Avenue, S.W., Seattle, Wash. 98134
Matton Shipyard Co., Inc., P.O. Box 428, Cohoes, New York 12047
Mitsui Shipbuilding & Eng. Co., Ltd., Nihonbashi-Muromachi, Chuo-ku, Tokyo, Japan
Nashville Bridge Co., P.O. Box 239, Nashville, Tenn. 37202
National Steel & Shipbuilding Corp., San Diego, Calif. 92112
Newport News Shipbuilding and Dry Dock Co., Newport News, Va.
Nippon Kokan Kabushiki Kaisha, 2, 1-chome, Otemachi, Chivoda-ku, Tokyo, Japan
Northwest Marine Iron Works., P.O. Box 3109, Swan Island, Portland, Oregon 97208
Nuclear Service & Construction Co., Inc., 9296 Warwick Blvd., Newport News, Va. 23607
O.A.R.N. (officine Allestimento e Riparazioni Navi) Genoa, Italy
Paceco, Div. Fruehauf Corp., P.O. Drawer E, Alameda, Calif. 94501
Pearlson Engineering Co., Inc., 8970 S.W. 87th Ct., Miami, Fla. 33156
Perth Amboy Dry Dock Co., Perth Amboy, N.J. 08862
Rodermond Industries, Foot of Henderson St., Jersey City, N.J. 07302
St. Louis Shipbuilding—Federal Barge, Inc. 611 East Marceau, St. Louis, Mo. 63111
Sasebo Heavy Industries Co., Ltd., New Ohtemachi Bldg., Chiyoda-ku, Tokyo, Japan
Sumitomo Shipbuilding & Machy. Co., Ltd. 2-1 Ohtemachi 2-chome, Chiyoda-ku, Tokyo, Japan
Teledyne Sewart Seacraft, P.O. Box 108, Berwick, La. 70342
Todd Shipyards Corp., 1 Broadway, New York, N.Y. 10004
Transportation Technology, Inc., 3210 Conflans Rd., Irving, Texas 75060
Zigler Shipyards Inc., P.O. Box 492, Jennings, Louisiana 70546

SHIP MODELS
Boucher-Lewis Precision Models, Inc., 36 E. 12 St., N.Y., N.Y. 10003

SHIP MODEL BASIN
Arctec, Inc., 2834 Belair Drive, Bowie, Md. 20715
Hydronautics, Incorporated, Laurel, Maryland 20810

SHIP ROUTING
Bendix Commercial Services Corporation, Owings Mills, Md. 21117
Weather Routing, Inc., 90 Broad Street, New York, N.Y. 10004

SHIP STABILIZERS
Duchess Baker Mfg. Co., Superior, Wis.
Lidgerwood Mfg. Co., (Superior Lidgerwood Mundy Corp.), 1010 Third Ave., New York, N.Y. 10021
Maritech, Inc., 38 Union Sq., Somerville, Mass. 02143
John J. McMullen Associates, Inc., 110 Wall St., N.Y., N.Y. 10005
Sperry Marine Systems Div., Charlottesville, Va., 22901, Division of Sperry Rand Corp.

STEAM GENERATING EQUIPMENT
Combustion Engineering, Inc., Windsor, Connecticut 06095

STEVEDORING
Luckenbach Steamship Co., 120 Wall Street, New York, N.Y. 10004
M. J. Rudolph Corp., 8 Sackett St., Brooklyn, N.Y. 11231

SWITCHBOARDS
Hose McCann Telephone Co., Inc., 524 West 23 St., N.Y., N.Y. 10011

TANK CLEANING MACHINES
Pyrate Sales, Inc., 222-17 Northern Blvd., Bayside, N.Y. 11361

TOWING—Lighterage, Transportations, Barge Chartering
American Waterways, 1250 Connecticut Ave., Washington, D.C. 20036
M. J. Batty & Co., P.O. Box 2316, Singapore, 1
Bay-Houston Towing Co., 805 World Trade Bldg., Houston, Texas 77002
Curtis Bay Towing Co., Mercantile Bldg., Baltimore, Md. 21202
G & H Towing Company, 509 Texas Building, Galveston, Texas 77550
Henry Gillen's Sons Lighterage, 140 Cedar St., New York, N.Y. 10006
James Hughes, Inc., 17 Battery Pl., New York, N.Y. 10004
Jackson Marine Corp., P.O. Box 1087, Aransas Pass, Texas 78336
McAllister Bros., Inc., 17 Battery Pl., New York, N.Y. 10004
McDonough Marine Service, P.O. Box 26206, New Orleans, La.
P. F. Martin, Inc., Mall Bldg., 325 Chestnut St., Philadelphia, Pa.
Moran Towing & Transportation Co., Inc., 17 Battery Place, New York, N.Y. 10004
L. Smit & Co., 11 Broadway, New York, N.Y. 10004
Suderman & Young Towing Co., 329 World Trade Center, Houston, Texas 77002
M. & J. Tracy, Inc., 1 Broadway, New York, N.Y. 10004
Turecamo Coastal and Harbor Towing Corp., 1752 Shore Parkway, Brooklyn, N.Y. 11214

VALVES AND FITTINGS—Hydraulic—Safety Flanges
Empire Machinery & Supply Co., 3550 Virginia Beach Blvd., Norfolk, Va. 23501
Hubeva Marine Plastics-Lining, 435 Hamilton Ave., Brooklyn, N.Y. 11231
Hydrasearch Co., Inc., Riva Rd., Annapolis, Md. 21401
Marine Moisture Control Co., 449 Sheridan Blvd., Inwood, N.Y. 11696
Mechanical Marine Co., 45-15 37th St., Long Island City, N.Y. 11101

WINCHES
Skagit Corp., Box 151, Sedro Woolley, Wash. 98284

WIRE ROPE
Armco Steel Corp., 703 Curtis St., Middletown, Ohio 45042
Bethlehem Steel Corp., Bethlehem, Pa. 18018
United States Steel Corp., P.O. Box 86, Pittsburgh, Pa. 15230

ZINC
Smith & McCrorken, 153 Franklin St., New York, N.Y. 10013

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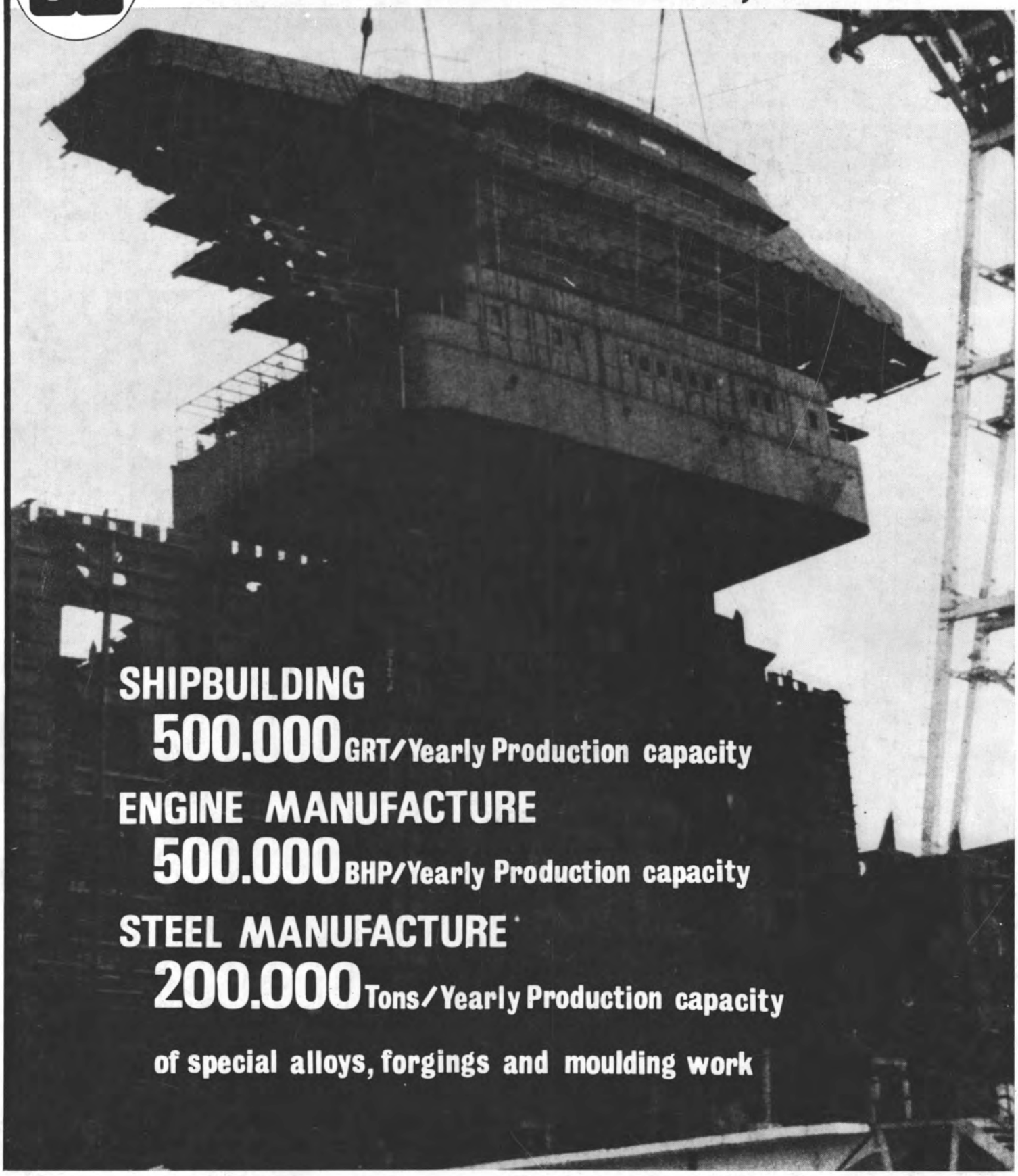

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