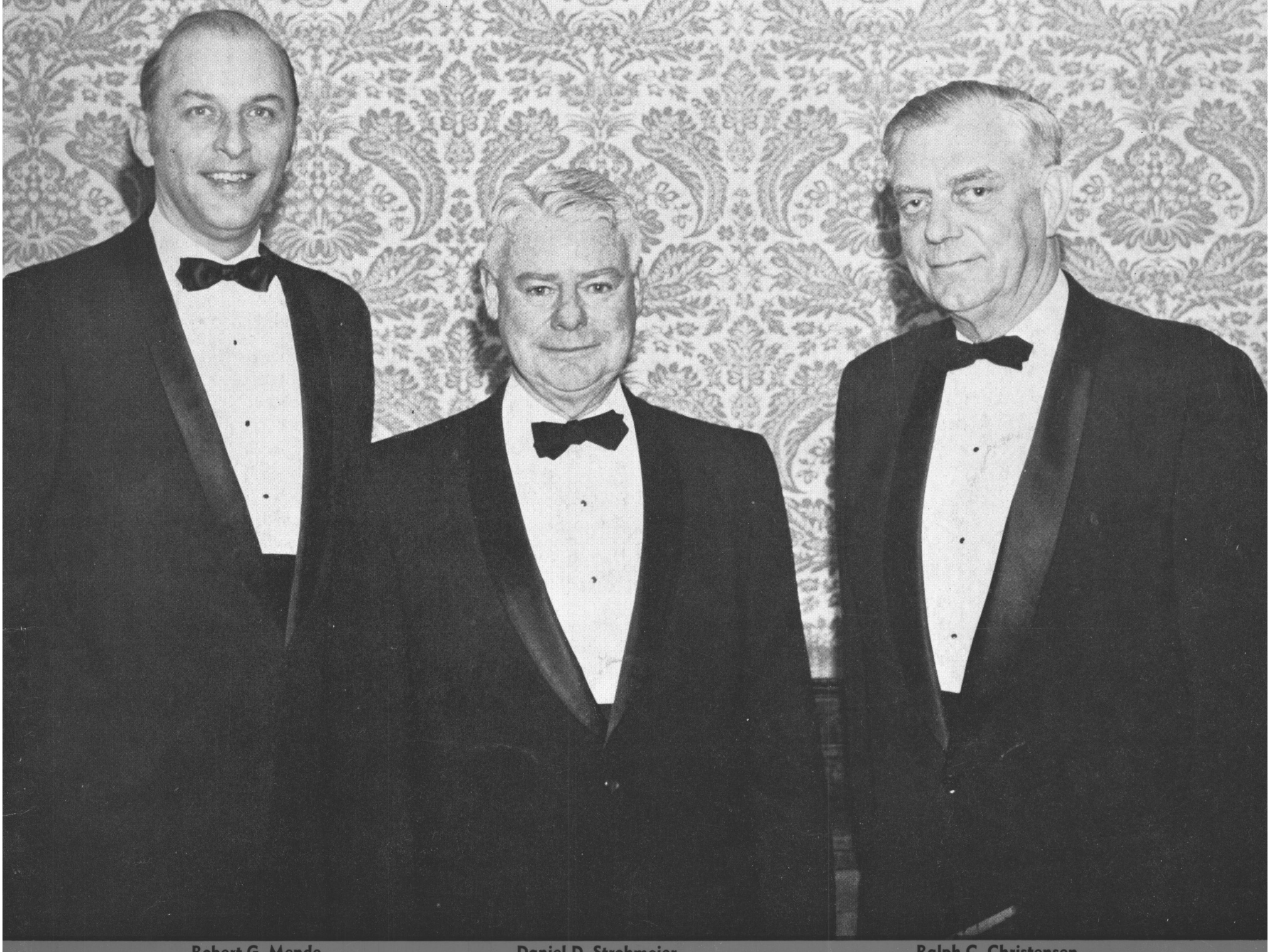
MARITIME REPORTER
AND
ENGINEERING NEWS



Robert G. Mende | Daniel D. Strohmeier | Ralph C. Christensen

78th Annual SNAME Meeting Held In New York —Daniel D. Strohmeier Elected President

(SEE PAGE 7)

DECEMBER 15, 1970

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Steuart Transportation To Build Three Tankers

A letter of intent has been filed with the Maritime Administration by Steuart Transportation Co., Piney Point, Md., applying for construction and operating subsidies to build three tankers in the 70,000-dwt to 100,000-dwt range.

These tankers, which are under consideration by the company, would be used to supply the oil terminal of its affiliate, Steuart Petroleum Co., Piney Point, Md. Discussions are presently under way between Steuart Transportation and several U.S. shipyards.

Corps Of Engrs. Asks Bids On Construction Of Two Rock Barges

The Corps of Engineers, 2nd and Chestnut Streets, Philadelphia, Pa., is to open bids on January 14, 1971, for the construction of two all-welded, steel-deck rock barges. The barges must be delivered within 210 calendar days to the U.S. Army Engineer District, Rock Island, Pleasant Valley, Iowa. They are to measure 150 feet by 35 feet by 6 feet.

Reference should be made to IFB DACW 61-71-B-0045 when bidding.

Trawler Fordam Orders Steel Trawler From Jakobson Shipyard

Trawler Fordam, Inc., Boston, Mass. has placed an order with Jakobson Shipyard, Inc., Oyster Bay, N.Y. 11771, for the construction of a steel trawler at a cost of $836,366 plus a subsidy under the terms of the Fishing Fleet Improvement Act. The trawler will measure 118 feet 6 inches.

Houma Welders Given $99,800 Contract For Three Flat Deck Barges

Houma Welders, Inc., 1100 Oak Street, Houma, La. 70360, has been awarded a $99,800 contract by the Corps of Engineers, 2nd and Chestnut Streets, Philadelphia, Pa. 19106, for the construction of three flat deck barges.

Gamage Shipbuilders Receives Contract For Steel Dragger

Dorothy M. O'Hara, Inc., Rockland, Maine, has awarded Harvey Gamage Shipbuilders, Inc. of South Bristol, Maine a $544,757 contract for the construction of a steel dragger. The vessel will have an overall length of 109 feet 2½ inches.

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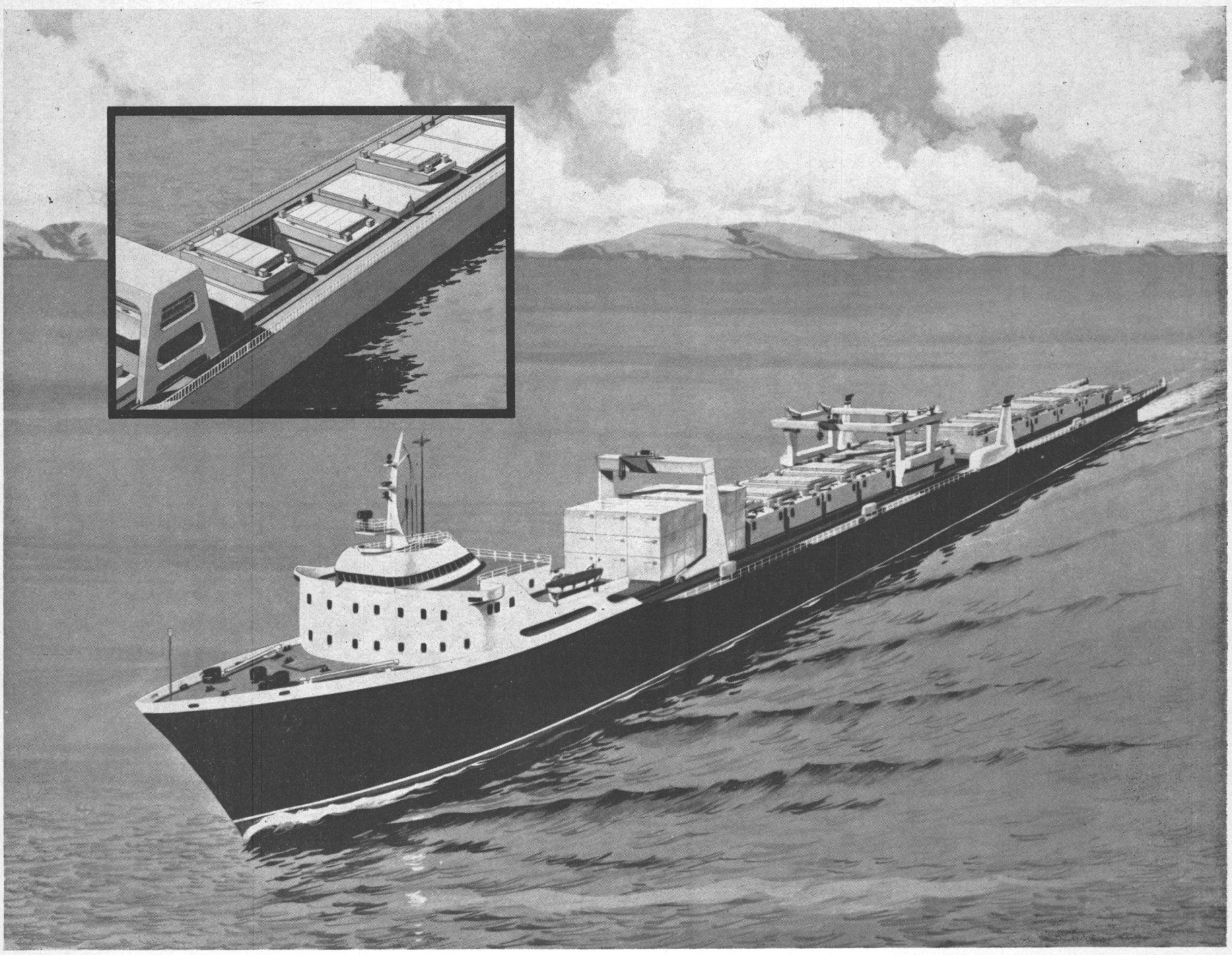

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SHELL

78th Annual Meeting Of SNAME Shows

Marine Industry's Technical Growth

ON THE COVER: Shown on the cover is the new President and Administrative Officers of the Society of Naval Architects and Marine Engineers, left to right: **Robert G. Mende,** Secretary, **Daniel D. Strohmeier,** President-Elect, and **Ralph C. Christensen,** Treasurer.

The 78th Annual Meeting of The Society of Naval Architects and Marine Engineers, held at the New York Hilton Hotel in mid-November, brought together industrial, governmental and educational leaders in the marine industry.

James J. Henry, president of the Society, opened the meetings by presenting his annual address and report to the members. He said that the Society's membership is rapidly approaching the 10,000 mark. He also advised that the finances of the Society are in excellent shape with investments holding up surprisingly well in the currently depressed market.

Speaking about the marine industry, Mr. **Henry** said that "the past year has been a most important one for our industry and our country with major events affecting naval construction as well as the United States merchant marine." With regard to the merchant marine he praised the actions of the national administration in passing the Merchant Marine Act of 1970, which provides outlays of more than three billion dollars over the next ten years for the construction of 300 merchant ships.

Urging support for this program, Mr. **Henry** said, "It appears that the ship owners' interest in new ships will tend towards large tankers, bulk carriers, and barge carriers. While more containerships are to be built, there will be few, if any more, dry-cargo liners constructed for United States ship operators.

"It is essential that the new merchant marine program be successful. Ships alone will not accomplish this objective. Providing sufficient cargo is a must. This will mean obtaining the confidence of shippers which can only be done by proving to them that their cargo will leave and arrive on time in good condition and on an assured schedule. To do this will require very close cooperation between management and labor to prevent ship delays resulting from strikes. Both parties must have as their objective the development of a strong United States merchant marine, whose main purpose is to fully serve the shipper in a manner that will attract cargo away from foreign competitors."

Mr. **Henry** also put forward a suggestion for another program. In this regard he said, "The demand for liquefied natural gas (LNG) is increasing rapidly. This is the result of a shortage of fuel in the northeast sector of the United States, as well as the antipollution drive. Large quantities of LNG are scheduled to be imported during the coming years which will require many large tankers capable of carrying methane in the liquid form. A great effort must be made to have some of these ships built in this country and operated under the American flag.

"Rather than attempt to divert any funds scheduled for the types of ships now contemplated to be built under the new 1970 Merchant Marine Act, a new funding should be developed for such a ship program. Today, it is estimated that a 120,000-cubic-meter capacity LNG tanker costs $50,000,000 if constructed in Europe. A similar ship could be built for approximately $75,000,000 in this country. A construction subsidy for this difference can more than be justified as an investment which will pay off in taxes, fuller employment and assistance rendered towards a more favorable balance of trade."

Election of Officers

Daniel D. Strohmeier, vice-president, Bethlehem Steel Corporation, Shipbuilding Division, was elected president of the Society during the business meeting. His two-year term in this widely recognized, prestigious office will commence January 1, 1971.

Mr. **Strohmeier** was graduated in 1932 from Amherst College with a bachelor of arts degree and from Massachusetts Institute of Technology in 1934 with a bachelor of science degree in naval architecture. He has spent his entire business career with Bethlehem Steel Corporation.

Mr. **Strohmeier** serves on the Board of Trustees of Webb Institute of Naval Archi-

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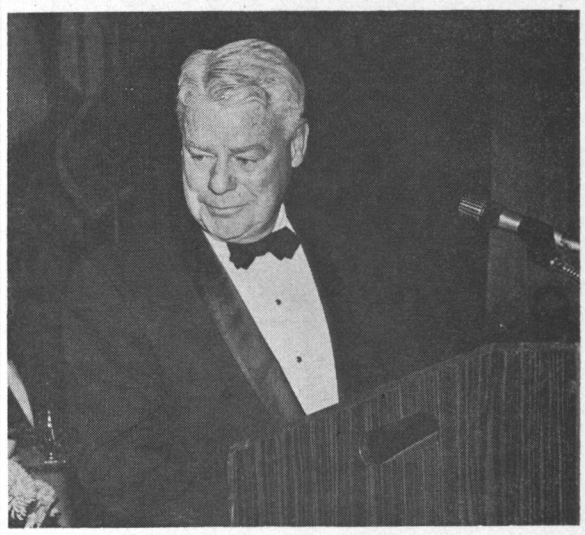
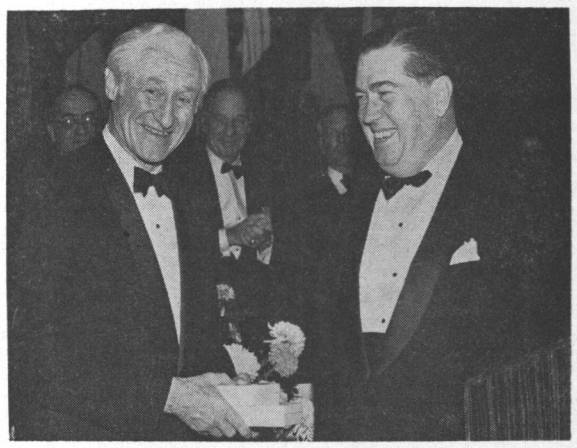
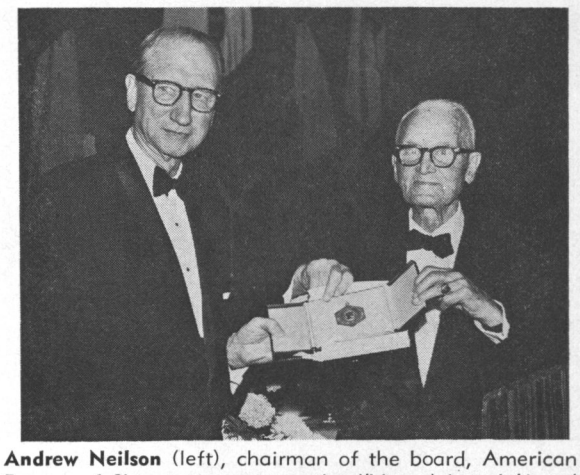


Daniel D. Strohmeier, president-elect of the Society, addressing members at the annual membership banquet.

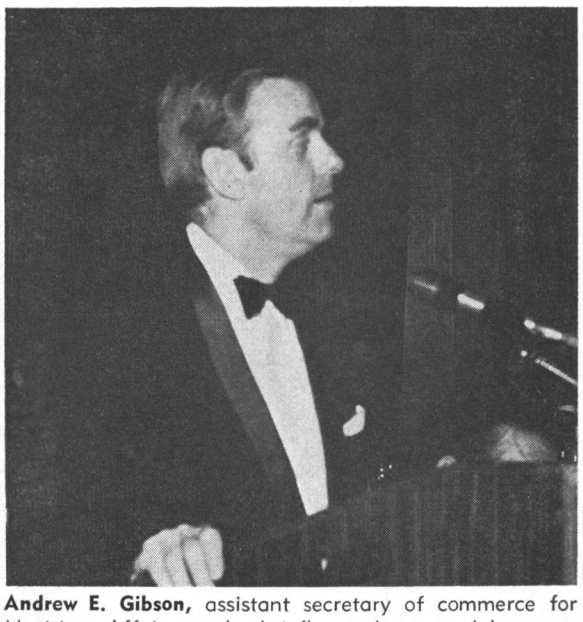


Ludwig C. Hoffmann (left), assistant administrator for operations, Maritime Administration, receiving the "David W. Taylor Medal" from Society President **James J. Henry.**



Andrew Neilson (left), chairman of the board, American Bureau of Shipping, receiving the "Vice Admiral 'Jerry' Land Medal" from Vice Adm. **Land,** USN (ret.).

Vice Adm. **Arnold F. Schade,** USN, commander, Eastern Sea Frontier, delivering the principal address at banquet.



Andrew E. Gibson, assistant secretary of commerce for Maritime Affairs, spoke briefly at the annual banquet.

James J. Henry, president of the Society and president of J.J. Henry Co., Inc., presiding at the annual banquet.

John B. Breslin (left), director, Davidson Laboratory, Stevens Institute of Technology, receives the "Vice Adm. E. L. Cochrane Award" from **Matthew G. Forrest,** past president.

B.V. Korvin-Kroukovsky (left), formerly with Stevens Institute of Technology, receives the "Davidson Medal" from Rear Adm. **Albert G. Mumma,** USN (ret.), past president.

Frank M. Lewis (right) holding the "Captain Joseph H. Linnard Prize" which was presented by **Donald A. Holden,** past president of the Society, during awards ceremony.

SNAME Annual Meeting—

(Continued from page 7)

tecture, as a director of the Shipbuilders Council of America, and as a member of the board of managers of the American Bureau of Shipping. He also is a member of the American Committee of Lloyd's Register of Shipping, the American Iron and Steel Institute, the American Society of Naval Engineers and other industry groups.

Robert G. Mende, secretary of the Society, reported the election of the following officers by the members:

Membership on the Council, representing members and associate members: **William A. Brockett, Alvin E. Cox, Lauren S. McCready** and **Stuart W. Thayer;** and representing affiliates: **Allen Cameron.**

The Council elected the following:

Honorary members for life: **James J. Henry** and **Edward V. Lewis.**

Honorary vice-presidents for life: **L.V. Honsinger** and **Andrew Neilson.**

Vice-presidents for a term of three years: **Paul E. Atkinson, John R. Kane, John B. Leatherbury** and **Arthur M. Lissenden.**

To serve on the Executive Committee for a term of three years: **Phillip Eisenberg** and **A. Dudley Haff.**

Administrative officers for a term of one year: secretary—**Robert G. Mende;** treasurer—**Ralph C. Christensen,** and assistant treasurer—**Robert Axelrod.**

Awards

At the annual banquet the following awards were made to members for notable and outstanding accomplishments in the marine field.

The 31st award of the "David W. Taylor Medal" was made to **Ludwig C. Hoffmann** "for notable achievement in naval architecture." Mr. **Hoffmann** has been a member of the Society since 1953 and is a member of many of its various committees and panels. He also is assistant administrator for operations for the Maritime Administration.

The 19th award of the "Vice Admiral 'Jerry' Land Medal" was made to **Andrew Neilson,** chairman of the board of the American Bureau of Shipping. This gold medal is given "for outstanding accomplishment in the marine field." Mr. **Neilson,** a member of the Society since 1947, is a vice-president of the Society, a member of the council, its executive committee and serves on other important committees.

The "Davidson Medal" for 1970 was awarded to **B.V. Korvin-Kroukovsky,** a member since 1952 "for outstanding scientific accomplishments in ship research." Professor **Korvin-Kroukovsky** was formerly affiliated with Stevens Institute of Technology.

The "Vice Admiral E.L. Cochrane Award" for 1970 was presented to Dr. **John B. Breslin,** a member of the Society since 1958, in recognition of his paper "Theoretical and Experimental Techniques for Practical Estimation of Propeller-Induced Vibratory Forces" delivered at the February 17, 1970 meeting of the New York Metropolitan Section.

The "Graduate Paper Honor Prize" for students for 1970 ($250 with Citation) was awarded to **Joel D. Snyder III** for his paper entitled "Investigation of Signal Averaging to Eliminate the Effect of the Ambient Sea in the Direct Determination of a Ship's Wave Resistance in the Open Ocean" delivered at the Society's Hampton Roads Section meeting on December 3, 1969.

The "Graduate Paper Award" ($100 with Citation) for students for 1970 was awarded to **Leonardo Perez Y Perez** for his paper entitled "A General Calculation of the Structural Loads on a Ship in a Seaway" delivered at the Society's Northern California Section on March 12, 1970.

The "Undergraduate Paper Honor Prize" ($250 with Citation) for students for 1970 was awarded to **T.J. Nolan** for his paper "Computer-Aided Design of Developable Hull Surfaces" delivered at the Society's Southeast Section on May 9, 1970.

Attending the reception, left to right: President **J.J. Henry, Mrs. Helen Delich Bentley,** chairman, Federal Maritime Commission, and **F.A. Nemec,** president, Lykes Bros. S.S. Co.

The "Undergraduate Paper Award" ($100 with Citation) for students for 1970 was awarded to **Thomas P. Mastronarde** for his paper entitled "A Fluid Regenerative Air Heater" delivered at the Society's Philadelphia Section on March 20, 1970.

Two Fifty-Year Membership Certificates were presented to: **Horace C. Jefferson** and **W. Harold Milne.** Six Fifty-Year Membership Certificates were presented in absentia to: **J. William Jamin, William Mulheron, Hugo F. Nordstrom, Melville W. Powers, Ivo Schiavon,** and **Inge G. Volden.**

Annual Banquet

Over 1,500 members attended the membership banquet held on Thursday evening. Mr. **Henry,** the Society's president, presided during the banquet and introduced the members who presented the awards for outstanding achievements and the principal speaker.

(Continued on page 10)

Attending the dinner-dance, left to right: **Daniel D. Strohmeier,** president-elect; **Preston H. Hadley Jr.,** dinner-dance committee chairman; **Mrs. Hadley; Mrs. Henry; James J. Henry,** president; **Mrs. Strohmeier; Mrs. Budd,** and **Wm. I.H. Budd,** committee member. Wives of the president and president-elect were presented bouquets by the Society.

Attending the banquet, left to right: **E.M. Hood,** president, Shipbuilders Council of America; Rear Adm. **Benjamin F. Engel,** USCG; **W. Tilford Smith,** senior vice-president, Newport News Shipbuilding & Dry Dock Co.; Vice Adm. **A.F. Schade,** USN, and Rear Adm. **Arthur B. Engel,** USCG (ret.), superintendent, U.S. Merchant Marine Academy.

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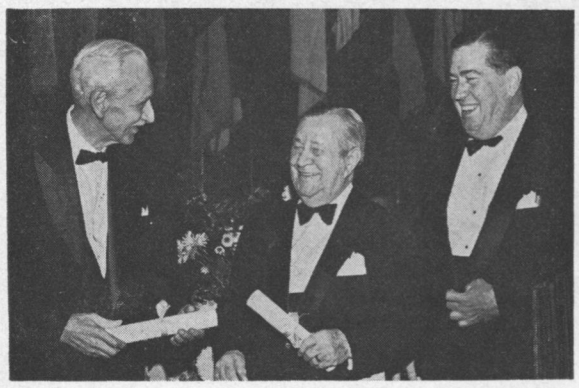
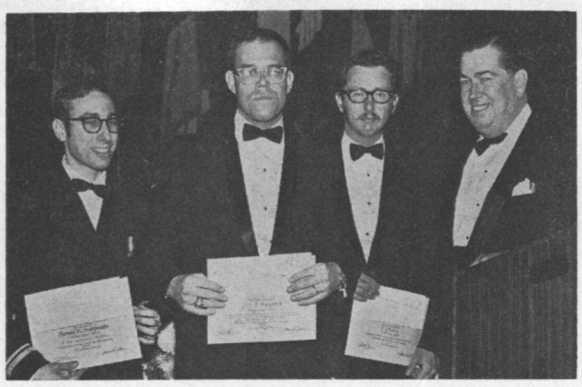


W. Harold Milne (left) and **Horace C. Jefferson** (center) holding fifty year membership certificates which were presented by **James J. Henry** during the annual banquet.



Student award recipients (left to right): **T.P. Mastronarde, Joel D. Snyder III,** and **T.J. Nolan** with President **James J. Henry,** who presented the prizes and certificates.

SNAME Annual Meeting—

(Continued from page 8)

The scheduled speaker, Admiral **Elmo R. Zumwalt Jr.,** USN, chief of Naval Operations, was unable to attend the banquet so Vice Adm. **Arnold D. Schade,** USN, commander Eastern Sea Frontier, delivered his speech, plus adding some of his own comments. He explained the national administration's plans for the Navy and what reasoning went into these plans. One important point brought out in the speech was that it was easy for the U.S.S.R. to build a navy which could counteract the U.S. Navy. The reason given was that the U.S.S.R. navy was second to the United States' Navy and therefore knew what capabilities it must nullify. However, the address noted that the U.S. Government was well aware of this condition and its short-range and long-range plans were to produce a fleet of fighting ships which would keep the United States in first position.

Seated on the dais at the banquet were seven presidents of shipbuilding firms and three presidents of steamship firms together with educators, officers of the Society and chairmen of the various Sections. **Mrs. Helen Delich Bentley,** chairman, Federal Maritime Commission, and **Andrew E. Gibson,** assistant secretary of commerce for Maritime Affairs, were among the other honored guests on the dais and each spoke briefly to the members.

Technical Meetings

Eleven top-flight papers were presented during the technical sessions of the Annual Meeting. The following brief abstracts indicate the high quality and wide scope of the papers presented:

Paper No. 1—The Influence of Hull Form on Seakeeping by **N.K. Bales,** physicist, Seaworthiness Branch, and **W.E. Cummins,** head, Department of Hydromechanics, Naval Ship Research and Development Center, Washington, D.C.

This paper outlines a procedure whereby seakeeping considerations can be rationally included in the preliminary design process. Further, it defines the limitations within which this procedure is valid.

The results presented in this paper represent an important first step in a continuing program of hull form studies being carried out at NSRDC. Direct extensions of the existing data base are now under consideration. Tentative future plans include incorporation of oblique headings and of designs with large bulbs.

Access to the Entry and Solution Program, which is the basic tool of the procedure outlined, has been made available to the profession. It can be useful and it is hoped that it will be used.

Paper No. 2—Effects on Performance in Still Water and Waves of Some Geometric Changes to the Form of a Large Twin-Screw Ship by **D.I. Moor,** superintendent and local director, Vickers Limited, Ship Model Experiment Tanks, St. Albans and Dumbarton, Great Britain.

This paper reports on the test results for 16 models of fast twin-screw ships. These tests covered virtually the full range of practical variations of the principal form factors, block and waterplane area coefficients and longitudinal position of the center of buoyancy, and of section shape, and a wide but somewhat unusual range of variation of the fourth form factor, longitudinal position of the center of flotation. The performances of the best of the models are unusually good, and throughout the results show consistent trends in terms of the four form factors and of section shape.

Paper No. 3—Designing Reliability Into Marine Steam Power Plants by **Vincent W. Ridley,** technical services manager, Construction and Design Division, Tanker Department, Esso International Inc., New York.

The goal of this paper is to show how the data presently available to the marine designer can be used in conjunction with the newer reliability methodology to improve the steam powerplants to be designed in the coming decade. The paper shows how the reliability concepts are an extension of previous thought processes and, further, how new technology can be used to increase reliability after the unreliability has been identified. Heat balances were used to emphasize the idea that reliability refers to the entire plant and not to individual components. The heat balances also emphasize that reliability does not always come freely. However, by sufficient analysis to ensure confidence, great advances in cycle arrangements and steam conditions can be made in the steam powerplants that will propel our future merchant marine.

Paper No. 4—The Occurrence and Prevention of Machining-Type Bearing Failures in Marine Steam Turbines by **G.F. Wolfe,** senior chemist, Analysis, Lubricants and Finishes, Materials and Processes Laboratory; **M. Cohen,** manager, Materials and Processes Laboratory and, **G.H. Gibb,** senior engineer, Turbine Product Design, Marine Turbine and Gear Department, General Electric Company, West Lynn, Mass.

The history, occurrence and investigations into the machining-type or wire-wool bearing damage was described. It was shown that several elements take part in causing the damage; in particular, the type of steel in the bearing surface, the type of oil, and the oil cleanliness. This damage can also occur with different bearing metals, such as babbitt and bronzes.

Several palliatives were indicated. Those for which the greatest amount of field experience exists are to avoid the use of chlorine-containing EP oils with the low-chrome steels and to sleeve the very high-chrome steels with less susceptible carbon steel.

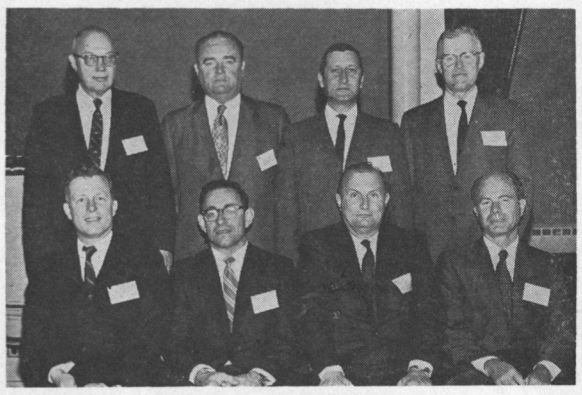
Paper No. 5—Methods for Predicting Icebreaking and Ice Resistance Characteristics of Icebreakers by **Jack W. Lewis** and **Roderick Y. Edwards Jr.,** ARCTEC, Incorporated, formerly lieutenant commanders, USCG, Icebreaker Design Section, Naval Engineering Division, Office of Engineering, U.S. Coast Guard Headquarters, Washington, D.C.

The authors have developed expressions describing the capabilities of icebreakers through theoretical analysis. Based upon their expressions, dimensionless ratios have been formed for the continuous icebreaking mode and the ramming mode.

Using full-scale data, freshwater model test data, and sea ice model test data, the dimensionless ratios were evaluated and analyzed statistically. Regression analysis was employed to determine the coefficients of the dimensionless ratios in their respective equations. The results of these normalized equations for continuous resistance and penetration were compared with full-scale and model data. The results were satisfactory. The potential for the use of the techniques presented for reducing the results of diverse icebreaking tests was clearly demonstrated.

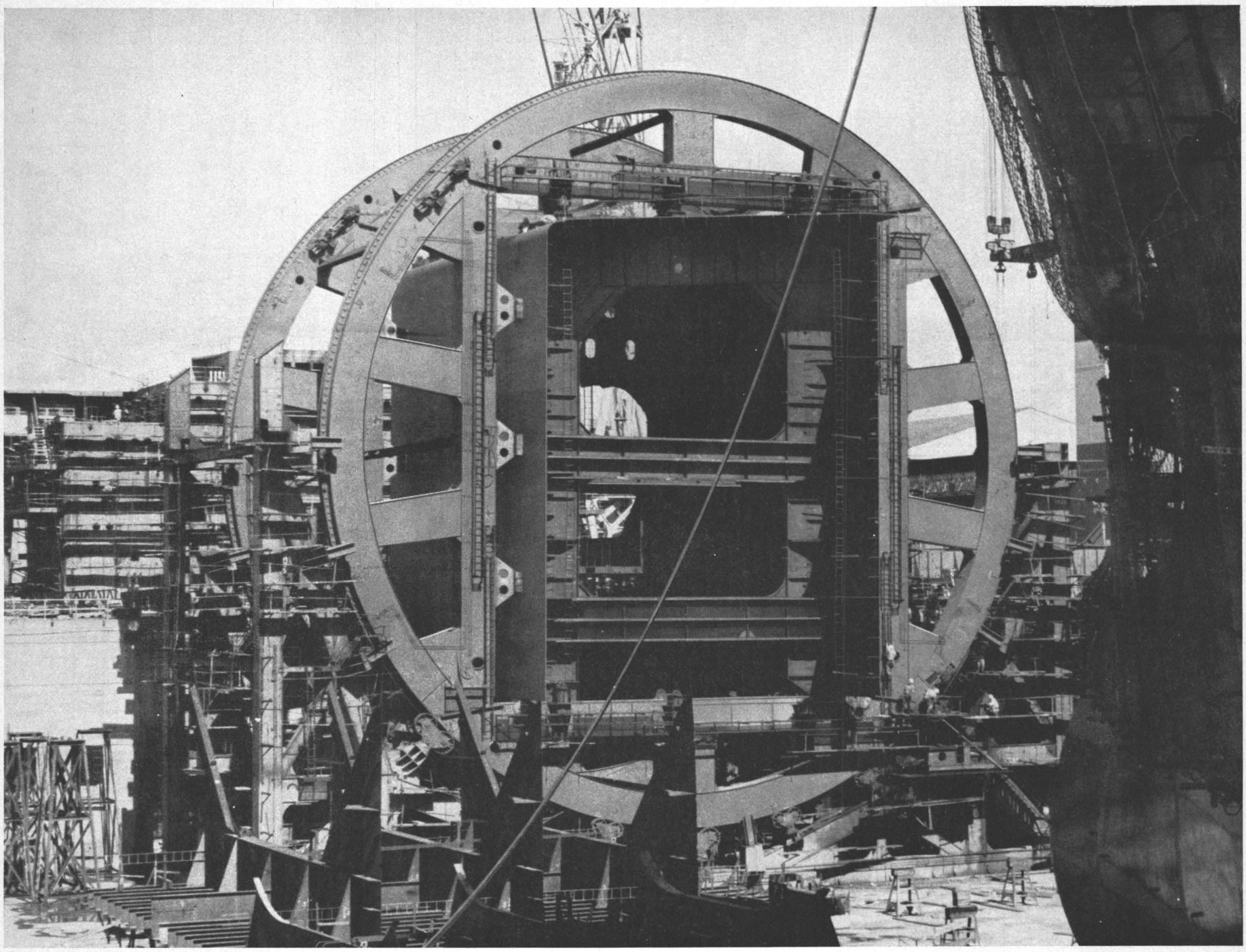
(Continued on page 12)

Papers Nos. 1 and 2, left to right: seated, authors **W.E. Cummins, N.K. Bales,** and **D.I. Moor;** standing, assisting chairman, **W.E. Zimmie;** chairman, **E. Scott Dillon,** assisting chairman, **John Vasta,** and chairman, Prof. **Richard B. Couch.**



Papers Nos. 3 and 4, left to right: seated, authors **V.W. Ridley, M. Cohen, G.F. Wolfe,** and **G.H. Gibb;** standing, assisting chairman, **W.A. Brockett;** chairman, **H.C. Downer;** assisting chairman, **F.P. Eisenbiegler,** and chairman, **J.R. Kane.**

Paper No. 5, left to right: presiding chairman, **W.J. Milne** of German & Milne; authors **Jack W. Lewis** and **Roderick Y. Edwards Jr.,** and assisting chairman, **Charles Zeien** of Sun Shipbuilding and Dry Dock Company.



In this age of computerization and containerization, how do you tell the sea-going world that you've just invented the wheel?

A welding wheel. We designed it, built it, and applied for the patents. Obviously our wheel doesn't go anywhere, it just helps us build your ships much faster, more accurately, and with greater safety for our men. With the welders stationed at ground-level, the inner rim turns the hull section into working position. Basically a simple idea, and the latest example of our belief that efficiency begins at home. And home is Mitsui in Japan, with a present shipbuilding capacity of 1,850,000 DWT annually. From hovercraft to superliners to mammoth tankers.

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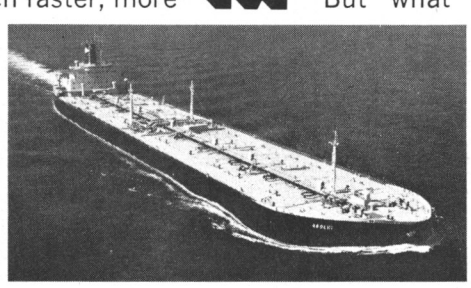

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SNAME Annual Meeting—

(Continued from page 10)

Paper No. 6—Ship Motions and Sea Loads by **Nils Salvesen,** naval architect, Naval Ship Research and Development Center, Washington, D.C., and **E.O. Tuck,** reader, Department of Mathematics, University of Adelaide, South Australia.

The computational method presented in this paper can be a valuable tool for predicting ship motions and sea loads. Similar computational schemes for predicting the heave and pitch motions and the vertical loads have already proven to be of great value to the U.S. Navy and to Det norske Veritas in hull and structural design of ships. The computer program based on this theory has been applied in concept-design studies of very large tankers at Det norske Veritas. For such large hulls the wave-induced loads are essential criteria in the evaluation of the structural feasibility. Furthermore, the present computational method has been shown to be very useful in estimating the torsional moment and horizontal shear forces for open hull forms such as those of containerships.

Paper No. 7—On Blockage Correction and Extrapolation to Smooth Ship Resistance by **J.R. Scott,** chief physicist, Vickers Limited, Ship Model Experiment Tank, St. Albans, England.

Before model resistance data can be used efficiently to estimate smooth ship resistance, adequate blockage correction is required.

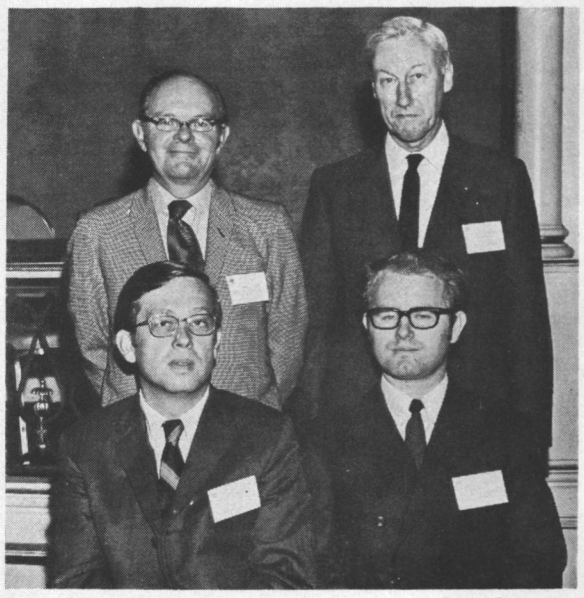
A change of size or cross-sectional shape of a towing tank is essentially the equivalent of a change of form of any ship model running in it. Dimensional argument, therefore, anticipates that the correction of any measured resistance coefficient curve to the unrestricted water expectation is a function, not only of model and tank size and form, but also of Reynolds and Froude numbers.

The six sources of variation in towing tank blockage correction anticipated by dimensional argument are equivalent to at most five independent ones. Since also one of these sources arises from the viscous property of real fluids, it is unlikely that an acceptable solution will be found without empirical aid.

Paper No. 8—Structural Performance Norms in Ship Design by **J. Harvey Evans,** professor, Department of Naval Architecture and Marine Engineering, Massachusetts Institute of Technology, Cambridge, Mass.

Both a technique and a tool are the true subjects of the discussion in this paper rather than the specific conclusions they have been used to generate; even those conclusions as to where the greatest design benefits may lie. That these particular means have already been used in industry, and with gratifying results, is most rewarding.

Many refinements are possible. In fact, the entire computer-aided synthesis program used exclusively up to this point must be considered but a preliminary round in the design process, especially with the continuing advance of computer usage in structural analysis.



Paper No. 6, left to right: seated, authors **Nils Salvesen** and **Odd Faltinsen;** standing, presiding chairman, **John V. Banks,** and assisting chairman, Capt. **Keith P. Farrell,** RCN.

Paper No. 9—Tanker Preliminary Design—An Optimization Problem with Constraints by **H. Nowacki,** associate professor, Department of Naval Architecture and Marine Engineering, The University of Michigan, Ann Arbor, Mich.; **F. Brusis,** student, Department of Ship Technology, Technical University of Berlin, and **P.M. Swift,** graduate student, Department of Naval Architecture and Marine Engineering, The University of Michigan.

The problem of preliminary design of tankers has been formulated as a mathematical optimization problem with constraints in this paper. The suitability of nonlinear programming algorithms for this task could be demonstrated.

The SUMT method has been adapted to preliminary design. It is a safe and versatile tool promising to be useful for preliminary ship design studies of many kinds.

A new variant of the Direct Search, ADS, was found to be the most efficient solution technique for the present purpose.

The study has confirmed and quantified the economic reasons for current trends to larger, fuller tankers. The sensitivity of the design to the draft restriction was demonstrated.

Paper No. 10—Probabilistic Approach to the Effectiveness of Ship Lifesaving Systems by **Michail Alexandrov,** associate professor, Leningrad Shipbuilding Institute, Leningrad, U.S.S.R. Also, visiting scholar, The University of Michigan.

The main purpose of this paper is to develop a more fundamental and more effective approach to the problem of safety of life at sea.

While new regulations concerning lifesaving can be considered only as a long-range goal, the author ventures to suggest a study of the feasibility of an approach based on comparison of statistical time factors. The Leningrad Shipbuilding Institute initiated the program presently being carried out, which involves the calculation and presentation of the necessary data on the basis of the statistical material partly described in this paper. Some intermediate conclusions were drawn from this analysis.

Paper No. 11—Supercavitating and Superventilated Propellers by **Roderick A. Barr,** senior research scientist, Hydronautics, Incorporated, Laurel, Md.

Despite some operational difficulties encountered during the past decade, it is concluded that supercavitating and superventilated propellers have good potential for high-speed craft.

During this decade the expected evolution of high-speed (40 to 100 knots) ships from high-speed craft should begin. The development of high-speed ships will, in many cases, depend on the existence of reliable and efficient supercavitating and superventilated propellers.

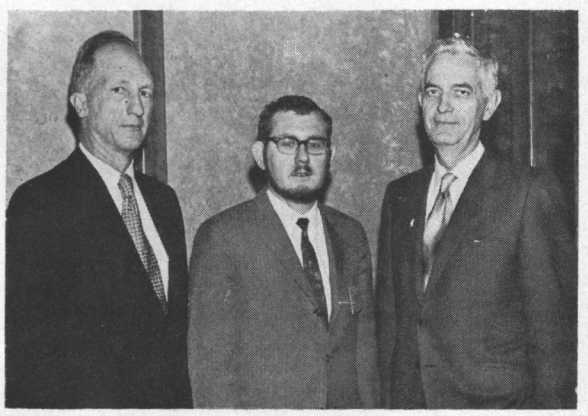
Supercavitating and superventilated propellers should continue to be prime contenders for propulsion of craft at 80 knots and above. Any conclusion that such propellers are unsuited or non-competitive at 80 knots and above seems unjustified at this time.

The members who served as presiding officers at these technical sessions were (given in order of the papers presented): **E. Scott Dillon,** assisted by **William E. Zimmie;** Prof. **Richard B. Couch,** assisted by **John Vasta; Hugh C. Downer,** assisted by **Frederick P. Eisenbiegler; John R. Kane,** assisted by Rear Adm. **Wm. A. Brockett,** USN (ret.); **W.J. Milne,** assisted by **Charles Zeien; John V. Banks,** assisted by Capt. **Keith P. Farrell,** RCN; **Phillip Eisenberg,** assisted by **Seth Hawkins; Thomas M. Buermann,** assisted by **Joseph J. Cuneo Jr.; Daniel D. Strohmeier,** assisted by Capt. **John A. Obermeyer,** USN (ret.); **Lester Rosenblatt,** assisted by Prof. **Harry Benford,** and Rear Adm. **J. Andrew Brown,** USN (ret.), assisted by Dr. **John P. Breslin.**

Paper No. 7, left to right: presiding chairman, **P. Eisenberg;** author, **J.R. Scott,** and assisting chairman **S. Hawkins.**

Papers Nos. 8 and 9, left to right: seated, authors Prof. **J. Harvey Evans, H. Nowacki, F. Brusis,** and **Peter M. Swift;** standing, chairman, **T.M. Buermann;** assisting chairman, **J.H. Robinson;** and chairman, **Daniel D. Strohmeier.**

Paper No. 10, left to right: presiding chairman, **Lester Rosenblatt,** and assisting chairman, Prof. **Harry Benford** who read the paper in the absence of the author.



Paper No. 11, left to right: presiding chairman, Rear Adm. **J. Andrew Brown,** USN (ret.); author, **R.A. Barr,** and assisting chairman, Dr. **John P. Breslin.**

TWO FOR UNION CARBIDE: The first of two 600,000-gallon pressure tank inland barges being built for the Union Carbide Corporation was launched recently from Bethlehem Steel's Beaumont, Texas shipyard. The Bethlehem-designed barge has a length of 180 feet, beam of 52 feet 6 inches, depth of 12 feet 6 inches and loaded draft of approximately 8 feet 6 inches. The two cylindrical, independent pressure tanks are equipped with hemispherical heads and are suitable for the transportation of butadiene, propane or propylene. The barge was launched from the yard's new production-line barge-building facility. Tanks and piping of both barges are being built in accordance with applicable U.S. Coast Guard regulations and under Coast Guard inspection. They are also being built in accordance with the American Bureau of Shipping rules for longitudinally framed barges for inland waterways and will be classed A-1 pressure tank barges.

Lloyd's Register Studies New Type Containership

Lloyd's Register of Shipping has recently completed a research study into a projected type of full cellular containership intended to carry 10 containers abreast underdeck and to be able to pass through the Panama Canal.

The research study was carried out in cooperation with the Dutch Nedlloyd Consortium which comprises the containership interests of Koninklijke Rotterdamsche Lloyd, Stoomvaart Maatschappij "Nederland" and Vereenigde Nederlandsche Scheepvaart Maatschappij, and it concerned two ships of the new type which Nedlloyd has ordered to Lloyd's Register class at Bremer Vulkan Schiffbau & Maschinenfabrik. In all, Lloyd's Register has so far been asked to class 17 of the new generation of ships now on order. Measuring about 940-feet overall by 106-feet maximum beam by 82-feet depth, they will be far larger than the present generation of large containerships, having a deadweight of about 40,000 tons and being equivalent in size to bulk carriers of more than 100,000 deadweight tons.

Due to the width limitation of the Panama Canal, the ships' breadth will be limited to 106 feet. The carriage of 10 containers abreast, however, requires a hatch width of more than 89 feet, leaving less than 15 percent of the ships' breadth available for deck width and double-skin side structure. This is considerably less than the already small percentage breadth available on the current generation of containerships which carry only nine containers abreast, and a very detailed analysis was required to ensure that the new ships would have sufficient structural strength. In addition, the design finally adopted resulted in a deeper ship than the large containerships currently in service, enabling more containers to be carried below deck.

Part of the study was carried out at Lloyd's Register's research laboratory by means of two plastic models. Made of "Cobex" rigid P.V.C. sheet, the models represent a projected ten-abreast and a conventional nine-abreast ship. Their structural behavior was determined by loadings applied in a steel testing frame, and various structural features influencing the torsional behavior were compared. Pure torque load was applied through weights hung from loading beams, and twisting and warping deformations were measured by deflection gages located at a number of positions along the models. By taking measurements at increments of load, the Society's research staff were able to build up a comprehensive picture of the load/distortion relationship. Distortion of the hatches was measured by internal micrometers across the hatch diagonals. By the application of standard techniques, the behavior of the projected type of containership at sea was predicted from the model.

The results of the model work showed that the projected hull, with narrow deck and side walls and with deeper draft, would be as efficient structurally as the nine-abreast ships now in service, and further, they correlated well with the results of present analytical methods. It was also shown that a two-thirds aft machinery space would reduce torsional twisting of the hull considerably, compared to the full aft configuration now popular, and that the presence of the superstructure above would reduce twisting still further. The scantlings of both machinery space and superstructure would have to be designed specifically to have this effect.

A complementary analysis using finite element techniques was made to investigate the behavior of transverse deck panels between hatches in reducing hatch corner stresses. The analysis showed that relatively narrow panels would be more effective than wide ones due to the fact that wider members, being less flexible, produce higher stress concentrations at the hatch corners. It was further found that the necessary torsional strength would be provided by the adoption of a narrow underdeck box girder between hatchways in association with corresponding bottom and side structures to form a box ring around the hold bulkheads.

The study required the use of Lloyd's Register's computer programs, L.R. 200 and L.R. 263. They are the Society's standard programs for calculating torsional properties of sections and evaluating twist, warping and stress distributions along the length of cellular containerships.

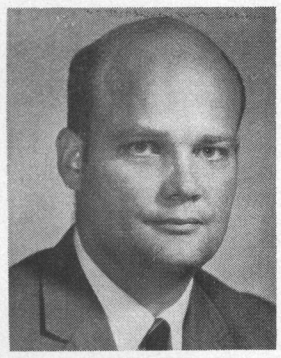
New Assignments At Northwest Marine

Arthur E. Farr, corporate vice-president, Northwest Marine Iron Works, Portland, Ore., has announced the following assignments: **W.J. Butler** as general manager of the Swan Island shipyard, will be responsible for all marine division operations and report to the corporate vice-president; **W.W. Gilmore** as assistant general manager, will be responsible for yard production and facilities and will report to the general manager; **G.R. Tuckey** as chief engineer and manager of special projects, will report to the general manager, and **N.G. Calley** as assistant to the corporate vice-president, will be responsible for finances, billing, collections, sales, marine insurance procurement, contract administration, Department of Defense security requirements, U.S. Maritime Administration E.E.O. Compliance Program, and Port of Portland leases and will report to the corporate vice-president.

Mr. **Farr** stated that these assignments are made with a view to alleviate him of the shipyard management responsibilities so that he may have sufficient time for other corporate responsibilities and research and development of future business prospects and planning, as well as labor-management relations. Mr. **Farr** will continue to direct the marine division as he has in the past.

CEREBRAL PALSY CAMPAIGN: Rear Adm. **Edmond Moran** (right), chairman of the board of Moran Towing and Transportation Company, and **Edward R. Rowley,** chairman of the board and chief executive officer of National Lead Company, discuss plans for the 1970-71 campaign of United Cerebral Palsy of New York City, at a luncheon of prominent executives in commerce and industry who will aid the drive. Mr. **Rowley** is chairman of the campaign, and Admiral **Moran** is a member of the campaign committee. The goal of the drive is $1,750,000, which will be used to support the health agency's rehabilitation, educational and recreational programs for the more than 40,000 cerebral palsied children and adults in New York City.

Booz, Allen Elects John F. Wing VP



John F. Wing

Booz, Allen & Hamilton Inc. has announced the election of **John F. Wing** as vice-president of Booz, Allen Applied Research, Inc., the firm's scientific and technical services subsidiary. He is based in the subsidiary's Bethesda, Md., headquarters.

Prior to joining the subsidiary in 1964, Mr. **Wing** was with Bethlehem Steel Co., Quincy, Mass., and Alcoa Steamship Co., New York. He received his B.S. degree in naval architecture and marine engineering from Massachusetts Institute of Technology and his M.B.A. degree from Harvard Graduate School of Business Administration.

Booz, Allen & Hamilton Inc. is a multi-national company offering a full line of management consulting services, specialized management services, and research and development services. Its clients include business enterprises, educational and health institutions, charitable organizations, and governmental bodies.

Mr. **Wing's** primary work is in marine transportation.

A new era in marine propulsion

BHP* selects GE heavy-duty marine gas turbines.

**The Broken Hill Proprietary Company, Ltd., is Australia's largest company, with a merchant fleet that has diesel and steam powered vessels.*

Now–after a thorough study of today's available propulsion systems, BHP has chosen GE heavy-duty marine gas turbines for their new class of roll-on/roll-off ships.

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Here are a few of these advantages:

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Sun Oil Company's Annual Tanker Report

The 28th Annual Report On The World Tanker Fleet Shows Liberia Still Leading The World In Carrying Capacity And Japan The Major Builder Of Tankers By Wide Margin.

The world tankship fleet at the end of 1969 numbered 3,893 vessels of 2,000 gross tons or more and totaled 146,029,000 deadweight tons, according to the Sun Oil Company's analysis of the world tankship fleet as of December 31, 1969.

During the year 1969, the fleet expanded by 118 vessels while deadweight tonnage rose by 17,901,000 dwt or 14.0 percent. For the year as a whole, 202 vessels were delivered into the fleet, and 75 vessels were scrapped.

Liberia was the leading flag of registry in 1969, as has been the situation each year since 1957, Table No. 1. With registrations at year-end of 757 vessels, the Liberian-flag fleet totaled 34,606,200 dwt. Norway remained in second place with 382 tankers and the United Kingdom held third position with 422 vessels.

The only positional changes among the 12 largest flags of registry involved Greece, Italy and the U.S.S.R. Greece moved into the eighth position. The U.S.S.R. recovered its ninth position from Italy. Thus, Italy assumed tenth position.

Again Liberia provided the greatest additions to deadweight tonnage during 1969 with a net increase of 5,293,100 dwt or 18.0 percent above the previous year. The United Kingdom added 3,072,400 dwt to its tankship fleet in 1969 and the Japanese-flag increased by 2,950,500 dwt. In combination, these three flags of registry provided a net addition of 11.3 million deadweight tons or 63.2 percent of the deadweight tonnage added to the world fleet during 1969, Table No. 2.

At the end of 1969, 23.7 percent of world tankers carrying capacity was registered in Liberia, an increase of 0.7 percent over the previous year, Table No. 3. The Norwegian flag accounted for 12.5 percent of world carrying capacity at the end of 1969, continuing its downward trend. The United Kingdom again increased its share of the world fleet to 12.4 percent in 1969 from 11.8 percent in 1968. The Japanese flag expanded to 11.4 percent of the world total in 1969, up from 10.5 percent one year earlier. Although the United States flag recorded a nominal increase in carrying capacity during 1969, its share of the world total dropped from 6.9 percent in 1968 to 6.2 percent in 1969. Ten years earlier, the United States flag had amounted to 14.7 percent of the world total carrying capacity.

The 13.8 percent increase in world carrying capacity during 1969 compares favorably with a 12.7 percent growth in the previous year and a 9.4 percent annual average gain for the ten year period ending in 1969.

The Average Tanker

The average deadweight tonnage of ocean-going tankers of 2,000 gross tons or more was 37,500 dwt at the end of 1969, and average speed was 15.8 knots, Table No. 4.

Average deadweight tonnage increased 3,600 dwt or 10.6 percent during 1969. Over the ten year period ending in 1969, the average deadweight tonnage rose 18,400 dwt or 96 percent. Average speed has advanced progressively over the past decade.

Japanese flag tankers averaged largest in the world in 1969 at 63,400 dwt. This was 4,800 dwt or 8.2 percent more than at the end of 1968 and was slightly less than three times the size of the average Japanese flag tanker at the end of 1959. The second largest average vessels, at 47,400 dwt were under the Norwegian flag, while the third largest was registered in Liberia at 45,700 dwt, Table No. 5.

Table No. 1—World Tankship Fleet at the End of 1969

1969 Rank	Flag	Number of Vessels	Deadweight Tonnage
1	Liberia	757	34,606,200
2	Norway	382	18,116,400
3	United Kingdom	422	18,218,900
4	Japan	262	16,601,800
5	United States	365	8,797,900
6	Panama	167	5,619,300
7	France	132	5,419,100
8	Greece	170	5,339,800
9	U.S.S.R.	307	4,654,900
10	Italy	134	4,409,900
11	Sweden	85	3,873,300
12	Netherlands	90	3,155,900
	All Others	620	17,215,700
	Total World	3,893	146,029,100

Table No. 2—Changes in Deadweight Tonnage December 31, 1969 from December 31, 1968

Flag	Deadweight Tons	Percent
Liberia	+ 5,293,100	+18.0%
Norway	— 372,100	— 2.0
United Kingdom	+ 3,072,400	+20.3
Japan	+ 2,950,500	+21.6
United States	+ 142,200	+ 1.6
Panama	+ 773,000	+16.0
France	+ 659,300	+13.8
Greece	+ 1,876,800	+54.2
U.S.S.R.	+ 354,000	+ 8.2
Italy	+ 178,400	+ 4.2
Sweden	+ 295,900	+ 8.3
Netherlands	— 50,800	— 1.6
All Others	+ 2,728,600	+18.8
Total World	+17,901,300	+14.0

The average speed of the world tankship fleet remained the same at 15.8 knots in 1969, Table No. 6. The French tankers joined the tankers under the United States and Italian flags as being the fastest tankers at the end of 1969 at 16.1 knots. The only other flag increasing its average speed in 1969 was Greece, up 0.3 knots from 1968. The average speed of Liberian, Norwegian, Japanese, Panamanian, and Italian tankers all declined 0.1 knots at the end of 1969. Over the ten-year period ending with 1969, the average speed of the world fleet increased 1.0 knots, ranging from 0.1 knot for Liberia to 3.1 knots for the U.S.S.R.

The average age of the world tanker fleet decreased nominally to seven years and six months at the end of 1969 from seven years and eight months one year earlier. During the past decade, the average age has ranged narrowly between a high of seven years, nine months in 1967 and a low of seven years, four months in 1960.

The youngest fleet among the major flags at the end of 1969 was the Japanese with an average age of four years, one month—one month older than in 1968, Table No. 7. The second youngest was the Norwegian flag at five years, three months—three months older than in 1968. The oldest fleet among the major flags was registered in the United States. At 16 years and 11 months, the U.S. flag fleet increased its average age one month in 1969.

Other flags displaying increased average age included the Netherlands, 11 months older, Italy,

(Continued on next page)

Table No. 4—Average Deadweight Tonnage and Speed

Year	Average Deadweight Tonnage	Average Speed (Knots)
1959	19,100	14.8
1960	20,200	15.1
1961	21,200	15.2
1962	22,100	15.3
1963	23,200	15.4
1964	25,300	15.6
1965	27,100	15.7
1966	29,200	15.7
1967	31,100	15.7
1968	33,900	15.8
1969	37,500	15.8

Table No. 3—Carrying Capacity by Major Flags of Registry

Flag of Registry	1969 Percent of World	1968 Percent of World	1959 Percent of World	Percent Increase 1969/68	Annual Average Increase 1969/59
Liberia	23.7%	23.0%	20.8%	+20.7%	+11.0%
Norway	12.5	14.6	14.5	+ 0.8	+ 7.9
United Kingdom	12.4	11.8	14.5	+20.7	+ 7.7
Japan	11.4	10.5	3.3	+21.9	+23.7
United States	6.2	6.9	14.7	+ 1.7	+ 0.4
Panama	3.9	3.8	6.4	+16.9	+ 4.1
France	3.8	3.8	4.4	+14.3	+ 7.8
Greece	3.6	2.6	1.1	+60.2	+23.8
U.S.S.R.	3.1	3.3	1.3	+ 7.7	+19.6
Italy	3.1	3.4	3.8	+ 6.2	+ 7.4
Sweden	2.7	2.8	3.7	+ 8.0	+ 6.1
Netherlands	2.1	2.5	2.9	— 0.5	+ 6.4
All Others	11.5	11.0	8.6	+19.4	+12.6
Total World	100.0	100.0	100.0	+13.8	+ 9.4

The report printed here was prepared by the Corporate Development Group of Sun Oil Company under the direction of **James S. Cross,** director, Economics and Industry Affairs.

ten months older and the U.S.S.R., six months older. Conversely, the Greek flag averaged 37 months younger in 1968, the United Kingdom flag was six months younger and Panama and France were three months younger.

A distribution of carrying capacity by year of construction for major flags of registry indicates that 72.2 percent of the Japanese flag fleet was built during the five-year period ending with 1969, and all except 7.8 percent was constructed after 1959. For the United States flag, the opposite situation applied, with only 7.7 percent of carrying capacity constructed during the most recent five-year period and 76.7 percent being built prior to 1960.

Construction

There were 570 tankers of 2,000 gross tons or more under construction or on order in world shipyards at the end of 1969, Table 8. These totaled 59,328,000 dwt and averaged 104,100 dwt per vessel. One year earlier there were 514 vessels totaling 53,729,000 dwt on order averaging 104,500 dwt per vessel.

Of the total deadweight tonnage under construction or on order at the end of 1969, more was intended for registry in Liberia than under any other flag. At 19,199,000 dwt, Table No. 9, Liberia's share represented 32.4 percent of the total under construction worldwide and was equal to 55.5 percent of the existing Liberian-flag fleet at the end of 1969. The flag intended to receive the second largest amount of new tonnage was Norway with 13.5 percent of the world total; the United Kingdom followed in third position with 11.7 percent of the world total. Among the 12 principal intended flags of registry at the end of 1969, the flag scheduled to receive the most new tonnage relative to the size of its existing fleet was France, with orders amounting to 81.6 percent of actual tonnage at the end of 1969. For the entire world, deadweight tonnage under construction at the end of the year amounted to 40.6 percent of total current tonnage. Among the 12 flags intended to receive the most tonnage under construction, Denmark was scheduled to receive the largest vessels, averaging 206,500 dwt each. The smallest tankers, averaging 14,000 dwt were scheduled to be registered in the U.S.S.R.

Of total tonnage under construction worldwide at the end of 1969, 35.6 percent or 21,108,000 dwt was being built in Japan, Table No. 10. This was 1,727,000 dwt or 7.6 percent less tonnage than was under construction in Japan one year earlier. Second place among the countries of construction in 1969 was Sweden, with 7,298,000 dwt in its yards at year end, up from 2,256,000 dwt one year earlier. Spain moved to fourth position among countries of construction in 1969, up from ninth in 1968, with 31 tankers totaling 3,897,000 dwt slated for construction. West Germany and the Netherlands fell from fourth to seventh position and from seventh to tenth position, respectively. Those principal countries of construction having more tanker tonnage under construction or on order at the end of 1969 than in the previous year were Sweden, France, Spain, Denmark, the United Kingdom, Italy and the United States.

U.S. Tanker Fleet

The report presents an analysis of the U.S.-owned tanker fleet, Table No. 11. This table varies from Table No. 1 in that it includes foreign-flag ships owned by U.S. firms. As given in Table No. 1 there are 365 U.S.-flag tankers with a total deadweight of 8,797,900 tons. To this figure must be added the ships registered in Liberia, Panama, United Kingdom and other countries, totaling 557 tankers with a capacity of 27,120,300 dwt. Thus, the U.S.-flag ships have an average deadweight of just over 24,000 tons while the U.S.-owned tankers under foreign flags have an average deadweight capacity of nearly 49,000 tons.

Tanker Logistics

The report has a section devoted to forecasting the tanker market. The following is a summary of this section.

"Tankship market forecasting has long been a hazardous occupation. Political uncertainties have dominated the scene, but more fundamental uncertainties as to how many tankers would be required under normal conditions are also highly significant.

"A simplified 'mechanical' procedure, based on regional projections of crude and natural gas liquids production and consumption, was used to forecast minimum T-2 requirements for interregion movements. The results were compared with minimum requirements calculated by the same procedure, but using actual crude and natural gas liquids production and consumption data.

"Five forecasts were made, for 1965 through 1969, and compared with the calculated 'actuals.' The Suez Canal was assumed to be closed in all cases. In the two earlier years the errors were greater than that caused by the 1967 closure of the Canal. Thereafter the percentage error was large enough to make the difference between a 'slack' and a 'tight' market. An examination of the sources of error suggests that more knowledgeable forecasts should yield better results, but that significant errors are likely to be made nevertheless."

Table No. 5—Average Deadweight Tonnage

Flag	1969	1968	1959
Liberia	45,700	41,400	28,400
Norway	47,400	43,200	18,600
United Kingdom	43,200	36,000	16,800
Japan	63,400	58,600	22,000
United States	24,100	22,800	18,100
Panama	33,600	31,700	20,800
France	41,100	36,600	21,700
Greece	31,400	24,200	19,700
U.S.S.R.	15,200	15,500	11,000
Italy	32,900	33,100	18,400
Sweden	45,600	41,100	19,100
Netherlands	35,100	34,900	16,700
Total World	37,500	33,900	19,100

Table No. 6—Average Speed in Knots

Flag	1969	1968	1959
Liberia	15.8	15.9	15.7
Norway	15.9	16.0	14.4
United Kingdom	15.7	15.7	14.1
Japan	15.8	15.9	15.1
United States	16.1	16.1	15.6
Panama	15.9	16.0	15.1
France	16.1	16.0	15.1
Greece	15.4	15.1	14.6
U.S.S.R.	15.4	15.4	12.3
Italy	16.1	16.2	14.8
Sweden	16.0	16.0	14.7
Netherlands	15.6	15.6	14.3
Total World	15.8	15.8	14.8

Table No. 7—Average Age by Major Flags of Registry

Flag	Dec. 31, 1969 Years	Dec. 31, 1969 Months	Dec. 31, 1968 Years	Dec. 31, 1968 Months
Liberia	8	0	8	2
Norway	5	3	5	0
United Kingdom	6	1	6	7
Japan	4	1	4	0
United States	16	11	16	10
Panama	10	7	10	10
France	6	10	7	1
Greece	9	6	12	7
U.S.S.R.	6	10	6	4
Italy	9	1	8	3
Sweden	5	3	5	4
Netherlands	7	10	6	11
Total World	7	6	7	8

Table No. 8—Tankships Under Construction or on Order

Year	Number of Vessels	Deadweight Tonnage Total	Deadweight Tonnage Average
1959	523	19,745,700	37,800
1960	366	15,366,100	42,000
1961	352	15,736,900	44,700
1962	324	14,040,400	43,300
1963	387	19,211,500	49,600
1964	332	17,682,900	53,300
1965	403	20,590,700	51,100
1966	441	27,385,000	62,100
1967	469	41,444,000	88,400
1968	514	53,729,000	104,500
1969	570	59,328,000	104,100

Table No. 9—Tankers Under Construction or on Order December 31, 1969 by Country of Registry

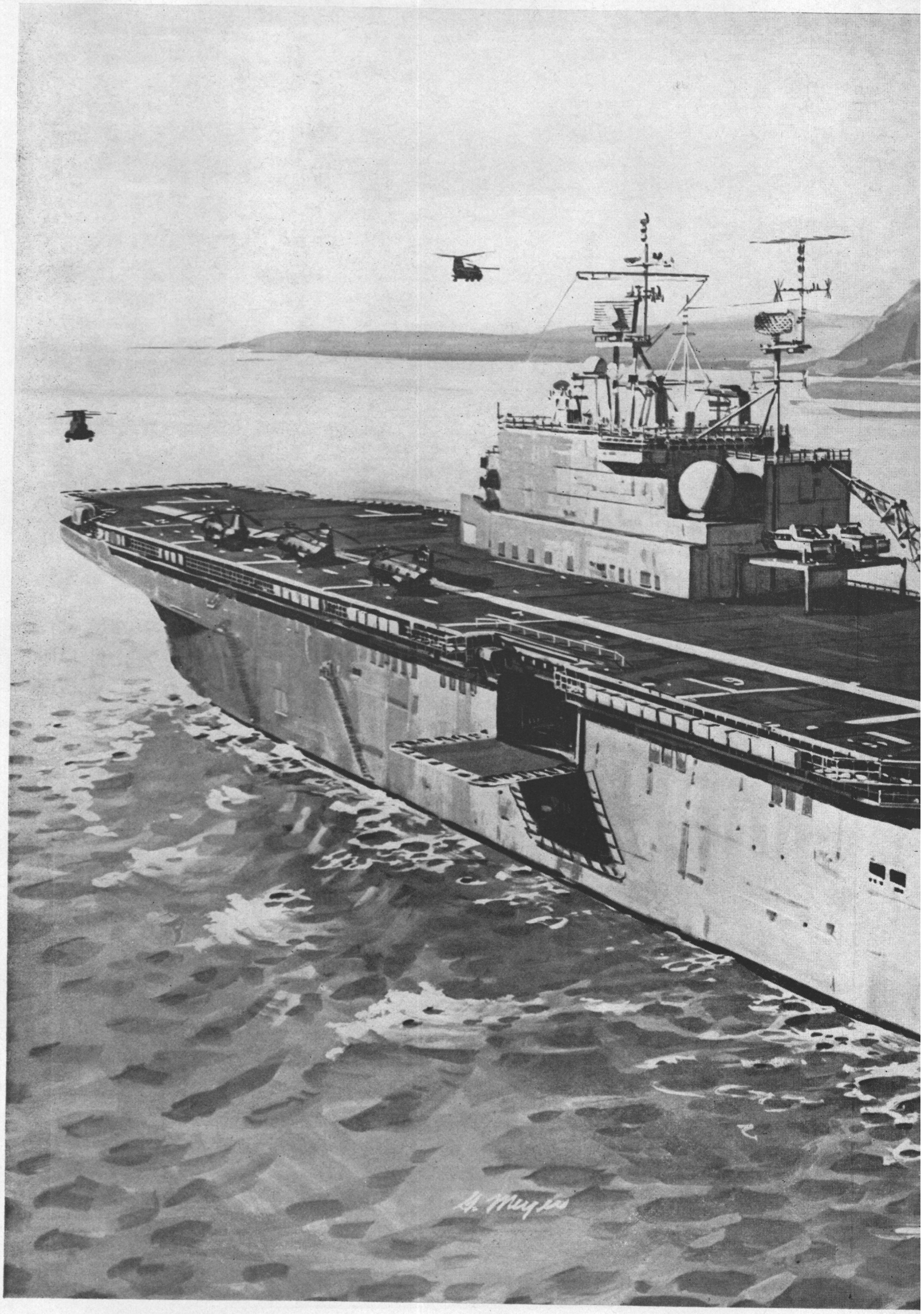
Intended Flag	No. of Vessels	Deadweight Tonnage Total	Deadweight Tonnage Average	Percent of Exisiting Fleet
Liberia	101	19,199,000	190,100	55.5%
Norway	81	8,030,000	99,100	44.3
United Kingdom	73	6,925,000	94,900	38.0
France	26	4,423,000	170,100	81.6
Japan	25	3,617,000	144,700	21.8
Italy	16	1,988,000	124,300	45.1
Denmark	8	1,652,000	206,500	66.6
Sweden	11	1,514,000	137,600	39.1
United States	22	1,458,000	66,300	16.6
U.S.S.R.	66	927,000	14,000	19.9
Spain	11	733,000	66,600	32.4
Panama	7	644,000	94,900	11.8
Netherlands	14	1,898,000	135,600	60.1
All Others	109	6,300,000	57,800	36.6
Total World	570	59,328,000	104,100	40.6

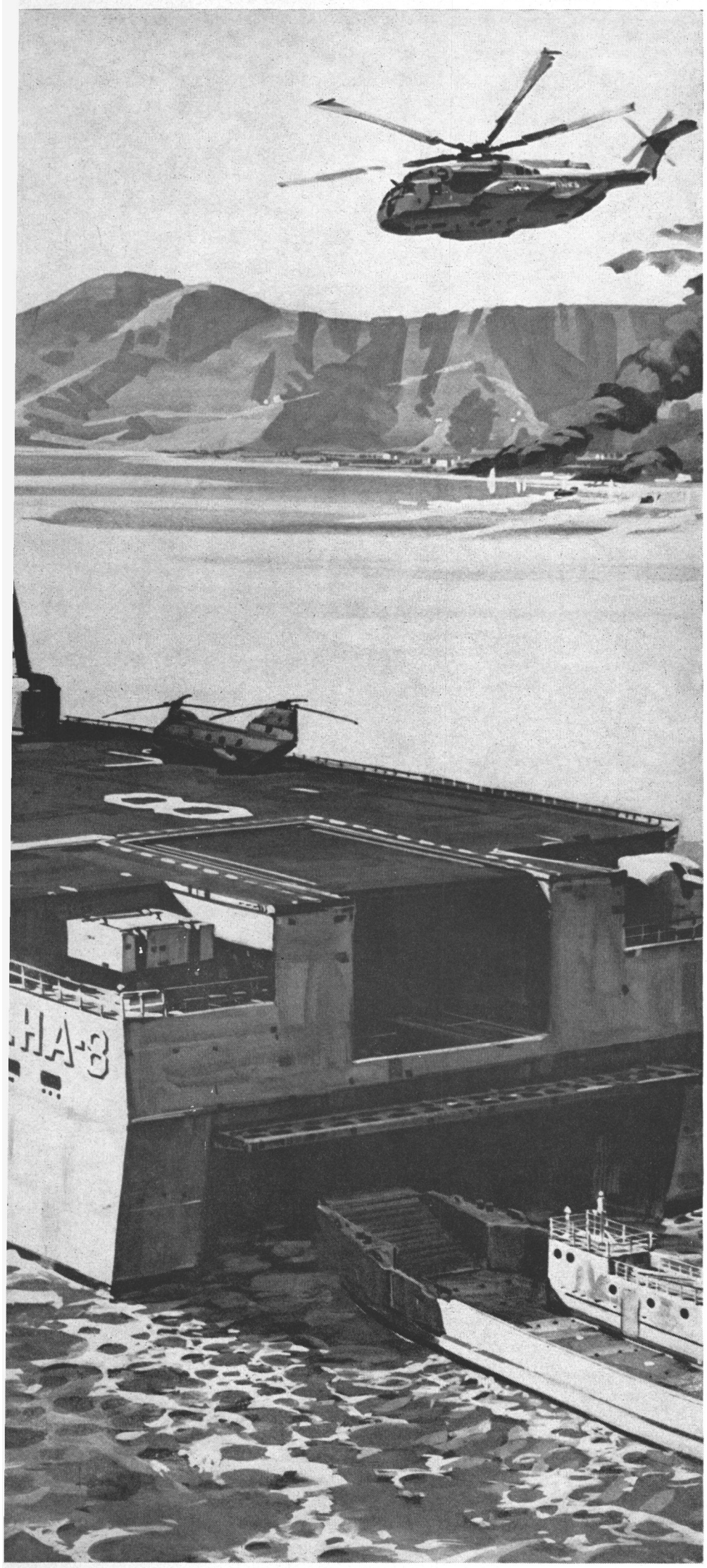
Table No. 10—Deadweight Tonnage Under Construction or on Order by Country of Construction

Country of Construction	1969	1968	1959
Japan	21,108,000	22,835,000	3,058,000
Sweden	7,298,000	5,042,000	2,806,000
France	6,091,000	4,169,000	1,506,000
Spain	3,897,000	2,164,000	533,000
Denmark	3,721,000	3,382,000	707,000
United Kingdom	3,452,000	2,873,000	3,400,000
West Germany	2,700,000	3,456,000	2,723,000
Norway	2,553,000	2,547,000	1,070,000
Italy	2,347,000	1,728,000	967,000
Netherlands	1,898,000	2,688,000	1,460,000
United States	1,458,000	966,000	909,000
U.S.S.R.	624,000	766,000	0
All Others	2,181,000	1,113,000	607,000
Total World	59,328,000	53,729,000	19,746,000

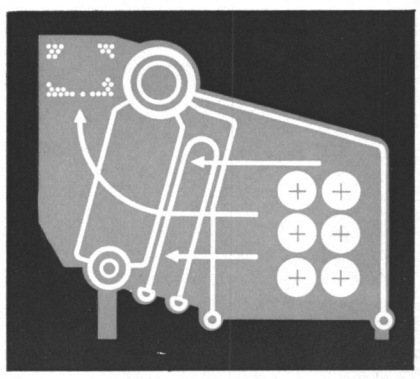
Table No. 11—Analysis of U.S. Owned Tanker Fleet Ocean-Going Vessels 2,000 GT and Over

Owner	Number	DWT
Amer. Trading and Prod. Co.	5	111,200
Atlantic Richfield Co.	11	380,000
Barber Oil Co.	10	324,600
Cities Service Co.	14	562,500
Continental Oil Co.	6	192,900
Getty Oil Co.	20	1,017,100
Gulf Oil Corp.	53	1,824,600
Hess Oil And Chemical Co.	5	143,400
Kewanee Oil Co.	2	53,800
Mobil Oil Corp.	34	1,897,000
Phillips Petroleum Co.	8	429,900
Sinclair Oil Corp.	9	331,900
Standard Oil Co. (Ind.)	9	383,400
Standard Oil Co. (N.J.)	155	7,445,700
Standard Oil Co. of Calif.	49	1,542,600
Sun Oil Co.	7	304,400
Texaco, Inc.	80	2,771,300
Texas City Refining Co.	3	66,100
Union Oil Co. of Calif.	6	260,000
Total Oil Companies	486	20,042,500
Non Oil Companies	339	14,378,000
Government		
Department of Commerce	30	357,100
Department of the Navy	67	1,140,600
Total Government	97	1,497,800
Total United States Owned	922	35,918,200





C-E's marine system capability will develop her driving power.



V2M-VS boiler

Litton Industries has awarded C-E a subcontract to supply the steam generating system for propulsion for nine LHA ships under its recent Navy "total package procurement" contract.

Why? We believe it is our total capability.

The kind that enables C-E to accept systems responsibility for the steam generating and burner system for these newest concept, general purpose assault ships.

Why C-E to integrate the steam subsystems with the ship's propulsion system?

Marine experience, for openers. Hundreds of steam systems around the world.

Advanced marine boiler designs over the years. Like the vertical superheater—now a standard in the industry. Like boiler adaptability to many fuels, from Navy Special to JP-5.

Ability to grow as the market grows. Each of the two V2Ms per ship has a capacity of 420,000 lb/hr of steam; the highest capacity naval boilers ever built.

On-time delivery. Check the record.

Systems know-how. Essential in working with other suppliers to coordinate systems.

Experience in providing shock hardened equipment dependable under combat conditions.

The Navy's assault ships must be totally capable. Nothing less will do.

From the steam generating system on up.

C-E Marine Division, Combustion Engineering, Inc., Windsor, Conn. 06095.

C-E MARINE DIVISION

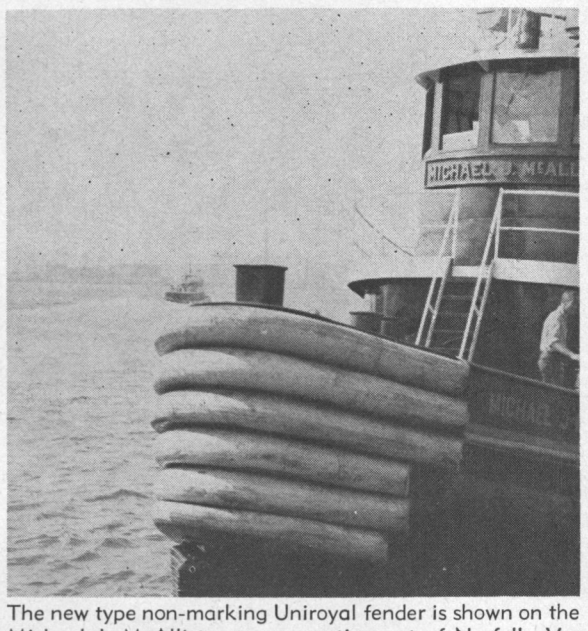
Hughes Bros., Inc. Introduces Non-Marking Tug Fender

Hughes Bros., Inc., authorized Uniroyal tug and dock fendering distributor for the past several years, has been working closely with the marine industry to offer a complete line of tug fendering systems. Recent addition to this line of fendering is the gray non-marking fender.

The first commercial use of this type fendering was recently installed on the tug Michael J. McAllister, owned by McAllister Bros., New York. This installation amounted to 82 feet of 14-inch by 14-inch D type fendering. Hughes Bros. and Uniroyal in designing the fendering system for this tug felt the D type fender would offer the maximum kinetic energy and fullest coverage. The D type bow fender, which is shaped like the letter D, is ideal in that when docking ships the line over the bow can easily slide from side to side without chafing the lines, as there are no sharp corners on which the line can catch.

The gray non-marking fender is the result of many inquiries Hughes Bros. have received as to the availability of a non-marking fender. The conventional black fendering has a tendency to leave some markings when coming in contact with the side of a ship, especially the light-colored ships. In the past, in order to overcome this marking problem, a white canvas was placed over the existing fender. However, this has proved inadequate. The gray non-marking fender is of an EPDM type rubber compound, so compounded to give the highest degree of shock absorption, resistance to high friction and a minimum of water absorption. This type fendering can easily be cleaned with household scouring powder.

Uniroyal, through Hughes Bros., has supplied the extruded rubber bow fenders for many of the tugs used in New York Harbor for the docking and undocking of ships, which have proven successful. In many cases the bow fenders have been on these tugs for eight years without being replaced. The gray non-marking bow fender is comparable to the black rubber with the added feature of non-marking.



The new type non-marking Uniroyal fender is shown on the Michael J. McAllister now operating out of Norfolk, Va.

Another recent addition to this expanding line of fendering systems was the Hughes Protecto Hull which is also manufactured by Uniroyal. The Hughes Protecto Hull is a specially-designed barge bumper.

This bumper is fully molded and uses very high-grade natural rubber which is the most durable compound for marine fendering application. It is superior to other materials in cushioning kinetic energy and providing maximum resistance to impact, gouging and abrasion. The rubber is also specially compounded to resist weathering and oxidation. The rubber section is bonded to a chemically treated one-quarter-inch steel plate during the molding process. Extreme high curing pressures are used to achieve maximum chemical adhesion and to increase density of the rubber, thus improving wear and impact resistance.

The barge bumper is currently molded in one standard size which is 3-inches by 12-inches wide by 40-inches long of rubber bonded to a ¼-inch plate 16-inches wide by 44-inches long.

Hughes Bros. Inc. is headquartered at 17 Battery Place, Suite 1107, New York, N.Y. 10004.

Jamaican Interests Awarded Panamanian Port Contract

The Matalon interests in Jamaica have been awarded a contract by the Government of Panama for the reclamation and construction of a 500-acre extension to the City of Panama, it was reported in New York by **William G. Whiting,** U.S. Director of the Jamaica Industrial Development Corporation. The new development, exclusive of later construction work, is estimated to cost $60 million, and is expected to take seven years to complete.

The Panamanian Government signed a contract for the development with Ciudad Marina (Marina City), a company put together by the Jamaicans, who are the prime contractors, with American and Dutch associates. Ciudad Marina will comprise a completely new port and extension of the commercial area of Panama City, with 150 acres of residential and resort development.

Preliminary work on the Panamanian development is now in progress and dredging is scheduled to begin in January. It will be created on the Bay of Panama on the Pacific side of the Isthmus and at the mouth of the Panama Canal.

Our sincere thanks to the National Safety Council, Marine Section.

Shell Orders 3 Large LNG Carriers From Two French Yards

Another order for three large liquefied natural gas carriers to Lloyd's Register class has been placed by Shell International Marine Limited. Like the previous Shell order for three LNG ships to the Society's class, reported in late April, the new vessels will have a cargo capacity of approximately 2,648,670 cubic feet each and will utilize membrane cargo tanks instead of the conventional independent type of tank. At the approximate measurements of 761 feet in length, 114 feet in breadth and 68 feet in depth, they will be about the same size as 87,000-dwt tankers, making them—along with the previous three ships — the world's largest LNG carriers with membrane tanks. Two ships will be built at Constructions Navales et Industrielles de la Mediterranee, La Seyne, and the third at Chantiers De l'Atlantique, St. Nazaire.

The ships that are building at La Seyne will have tanks based on a new design by Gaz Transport of France. Instead of adopting corrugated construction as in the previous Shell order, the tanks will be constructed from flat panels made of M63 steel having a high nickel content. The panel edges are to be folded inwards and edge welded so that thermally induced contraction and expansion can be accommodated by flexing of the edges about the folds, and automatic welding equipment is to be used wherever possible.

Each tank will, in fact, consist of two containers of identical construction, one inside the other to form the primary and secondary barriers, both being supported by insulation over the entire surface. The resulting two layers of insulation will consist of plywood boxes filled with silicone-treated expanded perlite powder. Joints will be made with screws, staples and phenolic glue and the boxes are to be assembled and filled in a building remote from the berth. Holes in the boxes will permit circulation of inert gas throughout the insulation space to prevent the perlite powder from settling and to facilitate monitoring the space for cargo leakage.

Apart from these three ships for Shell, Lloyd's Register class has been specified for other large LPG or LNG carriers. Of the 40 ships of both types over 10,000 gross tons under construction or on order throughout the world on September 30, there were 18 for Lloyd's Register class, including three LPG ships (capacity approximately 1,835,000 cubic feet each) and two LPG/LNG ships (capacity approximately 1,235,000 cubic feet each) to be built at La Seyne.

Lewis Named President Of Todd Subsidiary

J.T. Gilbride, president of Todd Shipyards Corporation, has announced the appointment of **Donald H. Lewis** as president and chief executive officer of Lester Engineering Company, Cleveland, Ohio. Lester Engineering, a Todd subsidiary, manufactures die casting and plastic injection molding machinery. Mr. **Lewis** succeeds **James D. Lightbody,** who has resigned but who will continue as a director and consultant.

Mr. **Lewis,** a graduate of Case Institute of Technology, has been with Lester for 11 years as a district sales manager. Prior to joining Lester, he was with the Packard Electric Division of General Motors Corporation for 10 years in various production capacities.

Lester has redesigned its plastic injection molding machines and is in the process of incorporating improvements in its line of die casting machines. These changes will place both lines of Lester machines in the forefront of the industry.

Navy Awards B&W $66,262,000 Contract

The Babcock & Wilcox Company has been awarded a $66,262,000 contract from the Atomic Energy Commission to manufacture nuclear components for the Navy. The work is to be performed at B&W's Naval Nuclear Fuel Division in Lynchburg, Va.

Arthur Farr Asks Maritime Industry For Unity And Action

"I call on all segments of Government, industry, and labor to unite, dissolve and resolve their differences; look to the best interests of their country and its citizens; and direct their efforts to implementation of the 1970 Merchant Marine Act and new maritime program to rebuild our American merchant marine!"

With these words, **Arthur E. Farr,** the new national president of The Propeller Club of the United States sounded a "clarion call" as his first action since his recent election.

"At our 44th Annual Convention and American Merchant Marine Conference in Portland, Ore., October 14-16, 1970," continued Mr. **Farr,** who is vice-president of Northwest Marine Iron Works, "the message was loud and clear. The new national maritime policy is a historic step toward revitalization of our long neglected and obsolescent merchant marine which in fact, is currently in a state of national crisis."

The convention and conference was one of the most successful in the 43-year history of The Propeller Club. Six-hundred delegates from all over the United States, representing every segment of the American merchant marine industry and associated industries, gathered to listen to over 27 speakers. Mr. **Farr** stated that only now had The Propeller Club been able to completely assess the results of its annual meeting.

"The main thrust of the 1970 American Merchant Marine Conference evolved into a clear message, which was both a warning and a challenge," stated Mr. **Farr.** "We heard from the most knowledgeable panelists in industry, labor and Government; we heard the pros and cons of labor-management problems, of Government problems, of shipping operator problems, and of shipbuilding problems. The 1970 Merchant Marine Act is only a catalyst. Now the proper ingredients, each in proportion, must be properly mixed or the results will be only continued stagnation. However, the stage has been set by overwhelming vote of Congress and the signature of President **Nixon,** who thus fulfilled his campaign pledge."

Mr. **Farr** asserted, "I intend to lead The Propeller Club into vigorously spearheading all efforts necessary to implement the 1970 Merchant Marine Act so our merchant fleet may be revitalized without delay. I am proud to be part of The Propeller Club which is the only patriotically motivated, grass roots and broad base organization truly representing all segments of our industry and country in its promotion of a strong United States merchant marine. While other organizations wavered, reorganized, and fell by the wayside, The Propeller Club of the United States remained steadfast and strong in seeking a strong merchant marine.

"The Propeller Club has been the single most effective voice we have had in our industry for over 43 years. Its effectiveness has not been the result of vast sums of money because it has been operating on a shoestring. Nonetheless, it is the only maritime organization that brings together representatives of ship operators (subsidized and nonsubsidized), shipbuilders and ship repairers, marine manufacturers and dealers, freight forwarders, marine insurance underwriters, the suppliers, bankers, lawyers, Government, a host of others and, increasingly so in recent years, labor.

"All are friends of the American merchant marine. In some parts of our country they rarely see a U.S.-flag merchant ship, but their patriotism perseveres. Many members are foreign nationals who recognize the free world importance of a strong American merchant fleet and that its carriage of 5.6 percent or less of America's trade is patently ridiculous and dangerous."

Mr. **Farr** concluded, "I want Propeller Club members everywhere in the world to know that we have played a major role in the realization of the new American national maritime program. Much remains to be done. Congress must appropriate monies and new ships must be built and put into operation as expeditiously as possible. There must be a common effort to resolve labor-management difference, and the use of American ships by American exporters and importers must increase. The Propeller Club can be a vital force in rallying all concerned to the task that lies ahead. My program objectives will be pointed in that direction."

The Propeller Club of the United States has almost 13,000 members in 53 local clubs and 13 student college clubs in the United States and 11 clubs overseas. Membership requirements are simply a "bona fide and active interest in promotion of the American merchant marine."

Lykes Announces New Staff Assignments

A series of major new staff assignments in Lykes Bros. Steamship Co., Inc., and its wholly-owned subsidiary, Lykes Lines Agency, Inc., were announced by **J.T. Lykes Jr.,** chairman of the board of directors of both companies.

W.H. Hagan Jr., Hong Kong, Far East director for Lykes, returns to the United States to become vice-president of Lykes Lines Agency, effective January 1, with headquarters in New Orleans, La. He joined the Lykes staff in 1952 and has held his Far East assignment since 1967.

Mr. **Hagan** will take over the duties of **Fred W. Riddle** when the latter retires as executive vice-president of Lykes Lines Agency after 25 years of service with the Lykes organization, nearly all of which was spent in overseas assignments.

Joseph F.A. Barnett, formerly United Kingdom director, has now arrived in Durban, South Africa, where he will take up his new post as director for South and East Africa on January 1. He succeeds **Gerald B. Smith,** who retires after having held this assignment for the past 25 years. Mr. **Barnett** has been a member of the Lykes staff since 1940. New Orleans, Liverpool and London have been among his previous assignments.

James R. Wachtel, former assistant tonnage controller in New Orleans for Lykes, has arrived in Hong Kong to replace Mr. **Hagan.** A graduate of the U.S. Merchant Marine Academy, Mr. **Wachtel** has previously held various seagoing and shore side assignments.

Michael D. Shea, another graduate of the Merchant Marine Academy, and for the past five years assigned to Lykes fleet operations, has also arrived in Hong Kong to take up his new duties as assistant operations manager.

Richard C. Colton Jr., now headquartered in Tokyo where he serves as special representative for Lykes in Japan, Korea and Okinawa, returns to the United States to take over Mr. **Wachtel's** former assignment as assistant tonnage controller in New Orleans, effective January 1. A graduate of Washington and Lee University, Mr. **Colton** has been a member of the Lykes staff since 1964, and was assigned to the Far East in 1969.

J.R. Hulcher takes over Mr. **Colton's** assignment in Japan following a tour of duty as traffic manager in Genoa, Italy, since 1966. Mr. **Hulcher** is a graduate of Springhill College in Mobile, Ala. and also attended Mexico City College and the University of Madrid. He has also previously held Lykes assignments in New Orleans and Barcelona, Spain.

Capt. **Gerald Jeane** comes ashore after assignments with the Lykes fleet and will fill Mr. **Hulcher's** former spot as traffic manager in Genoa. Captain **Jeane** is another graduate of the Merchant Marine Academy.

Navy Awards Additional $219.3 Million To Ingalls Shipbuilding

A contract for the construction of nine amphibious assault ships (LHA) was awarded Ingalls Shipbuilding Division of Litton Industries, Pascagoula, Miss. in May 1969 by the Naval Ship Systems Command, Washington, D.C. An additional $219.3-million to the contract has been awarded the division by NSSC. This award will cover the cost of two of the vessels which will be able to carry both troops and helicopters. These ships were designed by Litton's Advanced Marine Technology Division.

Tacoma Launches World's Largest Tuna Seiner

Pictured at the launching of the world's largest tuna seiner, the Apollo, are left to right: **Ed Madruga,** president of Ocean Blazers, Inc.; Representative **Floyd V. Hicks** (D-Wash.); **Mrs. Madrugo, Manuel Cintas,** one of the owners and captain of the Apollo; **Mrs. Cintas,** sponsor of the launching; Fr. **Gerard Morin; Denise Cintas,** and **Arnold Strom,** president of Tacoma Boatbuilding Company, Inc., builder of the Apollo.

The world's largest tuna seiner, the 258-foot Apollo, was launched recently at the shipyard of Tacoma Boatbuilding Company, Inc., Tacoma, Wash. **Mrs. Manuel Cintas** of San Diego, Calif., wife of one of the owners, sponsored the launching and christened the vessel. Featured speaker at the event was Representative **Floyd V. Hicks** (D-Wash.).

The Apollo will catch and carry up to 2,000 tons of tuna per fishing trip. Her capacity is almost double that of the standard size tuna boat and 600 tons greater than that of her nearest competitor. Despite this enormous capacity, however, the Apollo will carry the same size crew as any other tuna boat, and fishing methods will remain the same.

The twin Coolidge stainless steel 100-inch VP propellers are powered by twin 16-cylinder General Motors Electro Motive Division diesels of 3,900-hp total. Auxiliary power is supplied by three Caterpillar diesels, each driving a 250-kw generator. The Apollo has an overall length of 258 feet, a beam of 44 feet, a draft of 22 feet, and a cruising speed of 17 knots.

The Apollo is being built by Tacoma Boat for Ocean Blazers, Inc., San Juan, Puerto Rico. She will be based in San Juan and will deliver her catches to Star-Kist Food's cannery at Mayaguez, Puerto Rico. She is expected to bring in 6,000 tons of tuna annually on three trips into the Pacific and Atlantic Oceans.

Bethlehem Beaumont Shipyard Launches 31,000-Dwt Unmanned Oceangoing Barge

The Ocean 250 slides down the ways of Bethlehem Steel's Beaumont, Texas, shipyard. Two similar barges for Interstate Marine are on order at the Bethlehem yard.

What is believed to be the largest unmanned oceangoing tank barge ever constructed was launched on November 20 by Bethlehem Steel Corporation's Beaumont yard.

Named the Ocean 250, the huge steel barge was designed by **George Drake Jr.,** naval architect of Port Washington, N.Y., and is owned by Interstate Marine Transport Company of Philadelphia, Pa.

The Ocean 250 has a deadweight of 31,000 long tons, or about twice that of the conventional T-2 tanker, the World War II standard. The largest tank barge heretofore constructed according to available records was a 30,000 tonner.

Overall length of the Ocean 250 is 546 feet, breadth 85 feet, and depth 40 feet. It has a capacity of 255,000 barrels at a draft of 32 feet. A 40-foot-deep notch is provided at the stern of the barge together with adjustable skegs to permit either towing or pushing.

According to Interstate Marine Transport, the big barge will normally operate out of Marcus Hook, Pa., carrying refined petroleum products for the British Petroleum Company and serving Portland, Maine, Providence, R.I., Boston, and New York City.

Classed by the American Bureau of Shipping as an A-1 Tank Barge, Ocean Service, Unmanned, the Ocean 250 is also certified by the United States Coast Guard for grade A Petroleum Products, Oceangoing Service.

Bethlehem Steel's Beaumont Yard has two similar huge barges on order for Interstate Marine Transport and another tank barge, almost as large, is on order for Sabine Towing and Transportation Co., Inc., of Port Arthur, Texas. The Sabine Towing Co. is a subsidiary of Chromalloy America Corporation.

The Ocean 250 has four 4500-GPM deep-well pumps with GM diesel drives serving 12 epoxy coated tanks. A hydraulic power system will handle the anchor windlass, hose booms port and starboard, eight mooring winches and five capstans for line handling.

Each cargo pump engine is protected by weatherproof enclosures. The electric generators and hydraulic power unit are enclosed in a small engine house. An air-conditioned office is also provided.

SNAME SAN DIEGO SECTION MEETS: 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 November 18, 1970. Following dinner, a technical paper entitled "Explosion Bonded Materials for Marine Structural Applications" was presented by **Charles R. McKenney** and **John G. Banker** of DuPont De Nemours and Company, Inc. The paper, backed up by slides, discussed the problems and applications for marine use of explosion bonded material. This method of bonding aluminum to steel proved to be of great interest to the attending members and their guests. A question and answer period was conducted afterward by Mr. **McKenney** and Mr. **Banker.** Pictured at the meeting, from left to right: **Thomas S. Hand, Jr.,** vice chairman; **C. Sinclair,** chairman; **John G. Banker,** speaker, **Charles R. McKenney,** speaker; **David Rodger,** papers chairman, and **G.A. Uberti,** secretary-treasurer.

Atlantic Research Gets $223,500 Contract For Harbor Patrol Craft

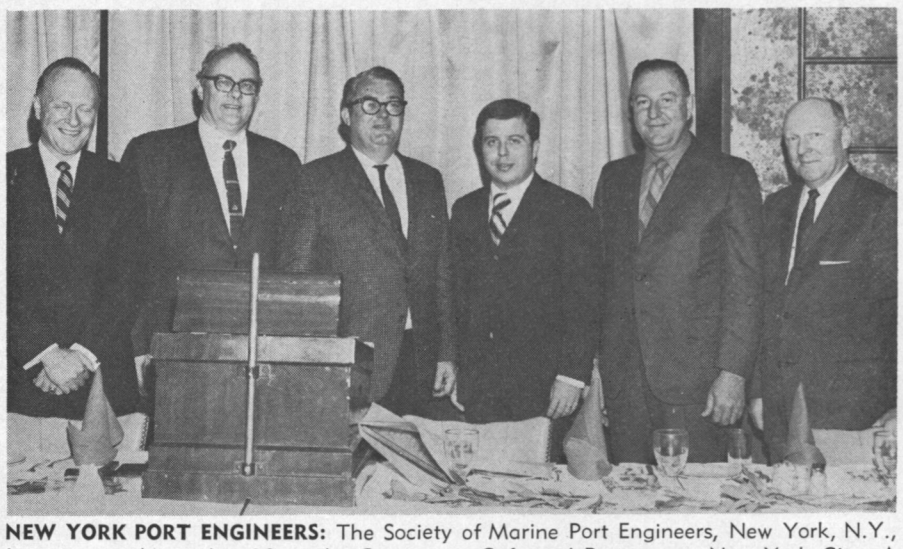
A combination fire-fighting harbor-patrol boat is to be built for the San Diego Unified Port District. The $223,500 contract was awarded the Atlantic Research Corp., a division of the Susquehanna Corp., Santa Ana, Calif.

The vessel, measuring 42 feet long and 12 feet wide, will be powered by three GM diesels. Over 18,000 pounds of aluminum sheet and plate will be used in the hull, superstructure, and deckhouse. In order to create a smaller wake the hull will have an inverted "V" shape. The second quarter of 1971 is the scheduled time of delivery.

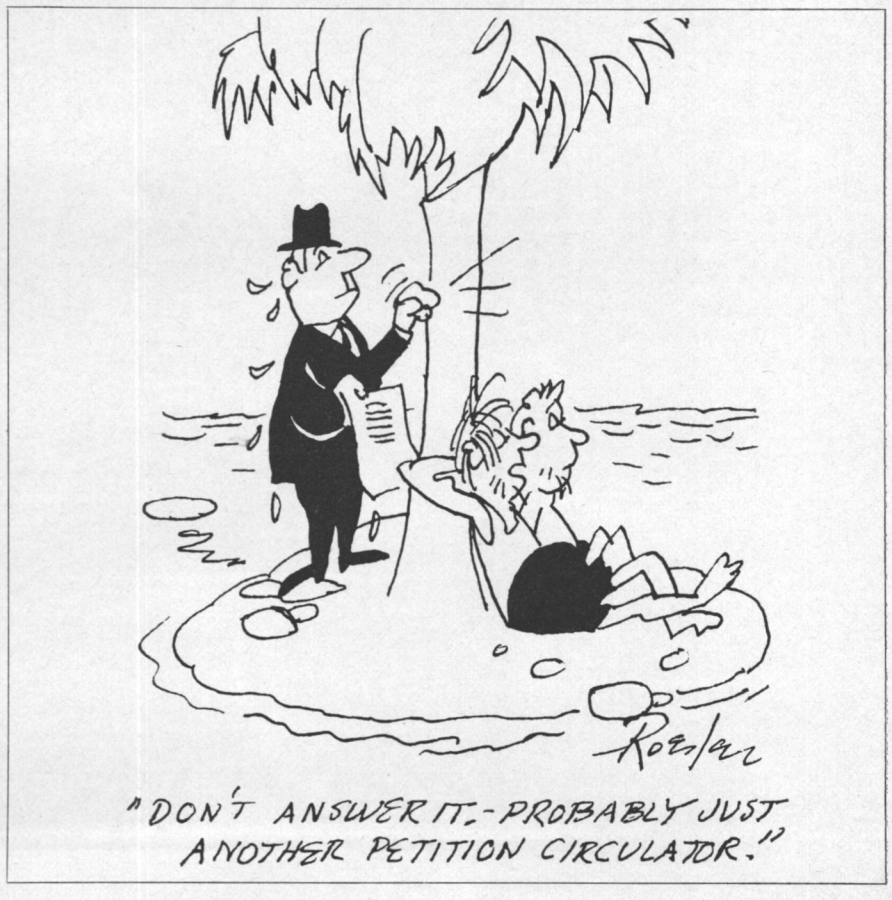
Breit Engineering Accredited To Certify Shore-Based Devices

H.E. Breit Jr., president of Breit Engineering, Inc., New Orleans, La. has announced that his firm is now accredited by the U.S. Department of Labor for certifying shore-based material handling devices, including floating cranes and derricks, anywhere in the United States. Tests and examinations will be conducted by the marine surveying staff.

Inquiries may be directed to Breit Engineering, Inc., 441 Gravier St., New Orleans, La. 70130, Attention **W.J. Galatas,** Chief Surveyor. Telephone: (504) 524-3575.



NEW YORK PORT ENGINEERS: The Society of Marine Port Engineers, New York, N.Y., Inc., met on November 18 at the Commuters Cafe and Restaurant, New York City. A cocktail hour and dinner preceded the technical session. **Lee Clark,** accounts supervisor, Texaco International, marine sales, sponsored a paper entitled "Developments in the Pratt & Whitney Aircraft FT4 Marine Gas Turbine Power Pac and its Application in Container Ships," which was presented by **Carl Merz,** of Pratt & Whitney Aircraft. Shown above, left to right: **Lee Clark, John C. Fox Jr.,** president of the Society; **Edward English,** chairman, entertainment and program committee; **Carl Merz,** author; **Joseph Thelgie,** chairman of the board of directors, and **Philip A. Donahue,** 1st vice president.



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Joint Agreement By Norwegian Operators To Transport Autos

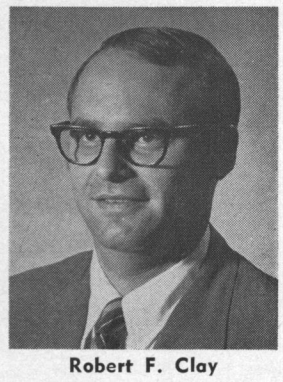
Leif Hoegh of Oslo and Ugland Management of Grimstad, Ugland, two Norweigian shipping companies, have agreed to pool their resources in the motorcar transport field, it was announced in Oslo. The two companies have contracts in hand to move Japanese cars to Europe, as well as Italian and German cars to the United States, Hawaii, Guam and Japan. Jointly, they will soon have a fleet of five special-purpose ships with a total carrying capacity of 15,400 cars.

Ugland is contributing its roll-on/roll-off vessels Laurita and Torinta, already in operation, together with a third ship, Savonita, which is due for delivery next January. Each of the Ugland ships can take about 2,800 cars.

Hoegh is contributing its Hoegh Trader, a tanker converted for car carrying, and already in service, as well as the Hoegh Transporter, another tanker now being converted and due for delivery this month. The two Hoegh ships can take about 3,500 cars each.

Between them, the two companies are already engaged in moving Volkswagens from Germany to the United States west coast, Hawaii, Guam, and Japan, as well as Fiats from Italy to the United States east and west coasts. In addition, from January 1 they will handle all Europe-bound shipments of Japanese cars for the Nissan Motor Car Carriers.

Newport News Ship Appoints Robert Clay



Robert F. Clay

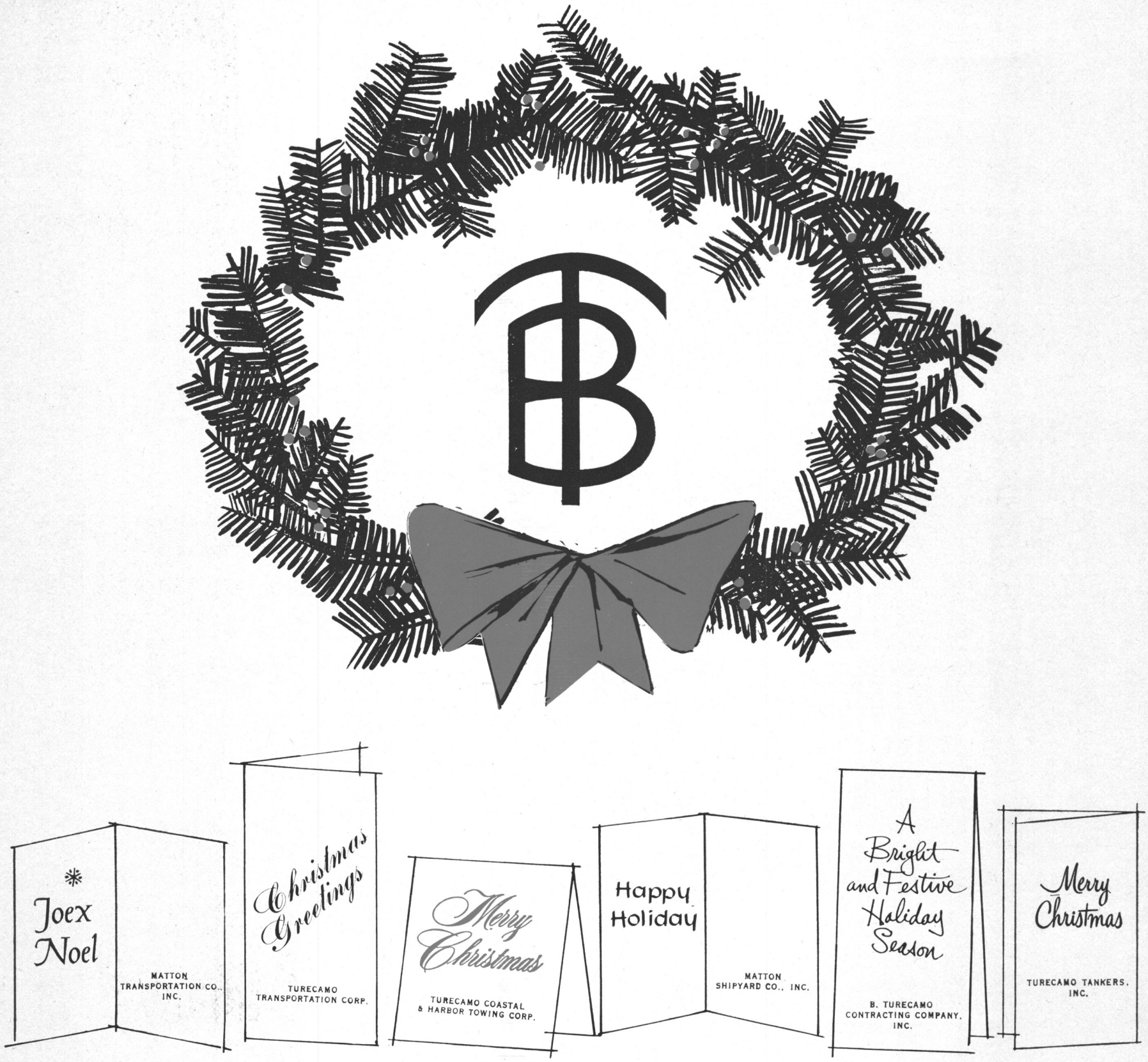
Robert F. Clay has been appointed internal auditor at Newport News Shipbuilding and Dry Dock Company, Newport News, Va. He will report to **W.F. Wilson,** vice-president for administration of the Tenneco subsidiary and will be responsible for internal controls on all phases of company operations.

Mr. **Clay** comes to Newport News from Richmond, Va., where he was staff auditor in the Richmond office of Peat, Marwick, Mitchell and Co. He had previously been associated with the Albemarle Paper Co. and the Ethyl Corp., serving in a variety of senior accounting positions.

Raised in Suffolk, Va., Mr. **Clay** earned a bachelor of science degree in accounting from the University of Richmond in 1960. He is completing master's degree work at the College of William and Mary in Williamsburg.

The new internal auditor is a member of the American Institute of Certified Public Accountants and the Institute of Internal Auditors.

ADMIRAL ENGEL HONORED: Adm. **Chester R. Bender,** Commandant of the U.S. Coast Guard, pins the Legion of Merit Medal on Rear Adm. **Arthur B. Engel,** USCG (ret.), Superintendent of the U.S. Merchant Marine Academy. The award from the President of the United States was in recognition of Admiral **Engel's** outstanding performance while he was superintendent of the U.S. Coast Guard Academy at New London, Conn., a position he held prior to being appointed Superintendent of the U.S. Merchant Marine Academy at Kings Point, N.Y.



a Multitude of Greetings

TURECAMO TRANSPORTATION CORP.
TURECAMO COASTAL & HARBOR TOWING CORP.
MATTON SHIPYARD CO., INC.
MATTON TRANSPORTATION CO., INC.
TURECAMO TANKERS, INC.

TURECAMO COASTAL & HARBOR TOWING CORP.
1752 SHORE PARKWAY, BROOKLYN, N. Y. 11214 • TEL: ES 2-5200

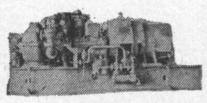
KNOWN 'ROUND THE WORLD

THE BOSTON METALS CO.

313 E. BALTIMORE ST. • BALTIMORE 2, MD.

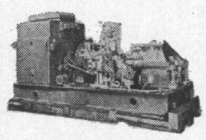
Main Office: LExington 9-1900 • Marine Dept.: ELgin 5-5050

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 

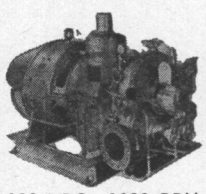
700 KW NON-CONDENSING MARINE TURBO GENERATOR SET

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 

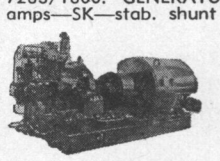
75 KW 120 VDC GENERAL ELECTRIC TURBO GENERATOR SET

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 

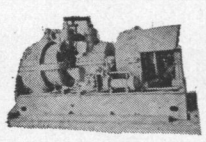
WESTINGHOUSE 60 KW 120 VDC M-20-EH

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

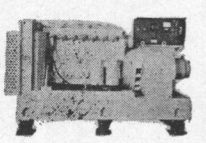
AP2 Ex-Medina Victory units. Worthington-Moore turbine—440 lbs—740°TT—28½" vac.—type S4—5-stage—6097 RPM—serial 7547 & 7548. GEAR: 14x7—6097/1200. GENERATOR: Crocker-Wheeler 300 KW 120/240 DC—1250 amps—type 102-H—compound—973643—999759 — armature flange 8¼"—bolt circle 7"—12 holes. Also new armature 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.

DIESEL GENERATOR SETS

7 

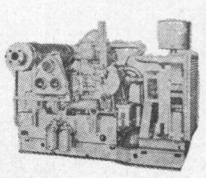
G.M. 6-71 DIESEL GENERATOR SET

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

8 

350 KW 120/240 VDC DIESEL GENERATOR SET

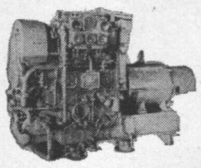
Ingersoll-Rand—heavy duty type S engine—8 cyl.—505 HP—10½ x 12. GENERATOR: G.E. 350 KW—120/240—600 RPM—switchgear. Good condition—as removed from Grace Line ships.

9 

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

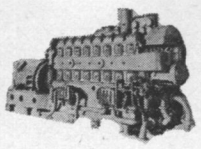
4½ x 5¾—BHP 16—RPM 1200—radiator cooled. GENERATOR: Delco 10 KW 120 VDC—83.3 amps—75" OAL—57" OAW—57" OAH.

$1695.

10 

GM 3-268A DIESEL GEN. SET

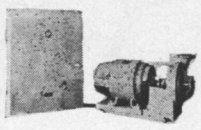
3-Cyl. diesel engine — 6½x7 — 1200 RPM — air or electric starting. GENERATOR: 100 KW—440/3/60—1200 RPM. Good condition. From U.S.N.

11 

200 KW G.M. 8-268A DIESEL GEN. SET

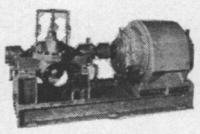
200 KW — 440/3/60/1200. 8-268A GM diesel heat exchanger cooled. Westinghouse generator.

PUMPS

12 

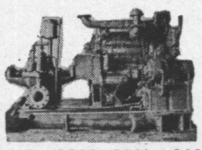
RALPH CARTER CO. 220 G.P.M. PUMP

220 GPM—3" suction—3" discharge. 230 ft. head at 220 GPM. 2600 RPM. MOTOR: 20 HP—115 volts DC—149 amps—with Allen-Bradley control.

13 

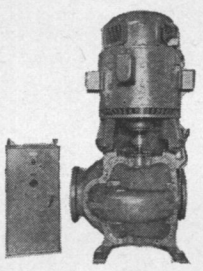
400 GPM BRONZE FIRE & FLUSHING PUMP

400 GPM at 150 lbs. 73 HP—440/3/60—3550 RPM.

14 

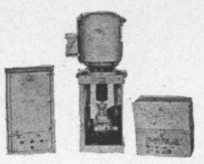
GARDNER-DENVER BRONZE DIESEL DRIVEN FIRE PUMP

6x5—1000 GPM—281' head—driven by BUDA 468-LD 6-cylinder diesel.

15 

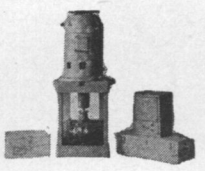
VICTORY AP2 MAIN CIRCULATOR

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.

16 

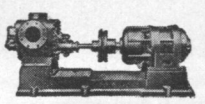
NEW BLACKMER FUEL OIL TRANSFER PUMP

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

17 

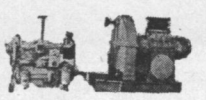
UNUSED BLACKMER VERTICAL ROTARY PUMP

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

18 

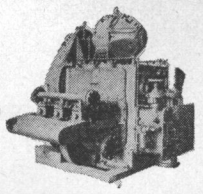
KINNEY MOLASSES PUMP

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.

19 

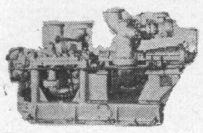
R-2418 WATEROUS CARGO PUMP

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

20 

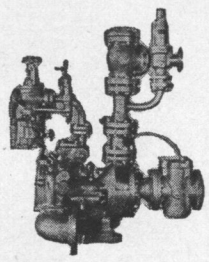
UNUSED BOILER FEED PUMP

Worthington Triplex—36.5 GPM—590 PSI—variable stroke—2¾ x 5—P₂—S₂—R₂ vessels. 40 HP—230 VDC—1800/2400 RPM.

21 

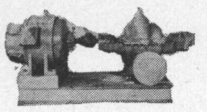
UNUSED SIZE 4 BUFFALO FEED PUMPS

Terry Turbine—BM—273 HP—5500 RPM—exhaust 15 lbs—590 PSI—superheat 0°—425 GPM Buffalo Pump—discharge pressure 750 lbs.—5" x 4"—built for USN DD destroyers.

22 

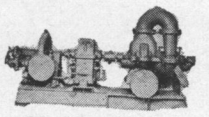
COFFIN MODEL F BOILER FEED PUMP—VICTORY OR T2

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.

23 

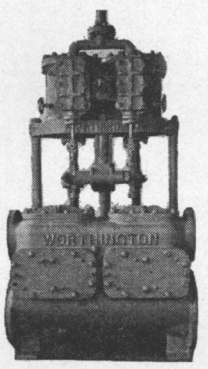
UNUSED WARREN BRONZE PUMP

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

24 

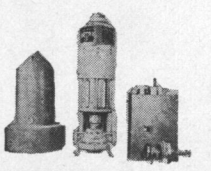
2 BRONZE I.R. 10GT CARGO PUMPS—14x12

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.

25 

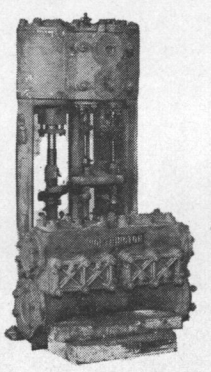
BRONZE 14x14x12 CARGO STRIPPING PUMPS

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

26 

NEW WORTHINGTON VERTICAL SUBMERSIBLE BILGE PUMP

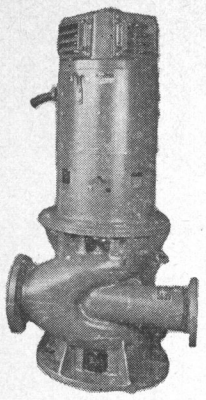
For emergency use on passenger ships, etc. PUMP. JAS—264 GPM—171' head—two 6" inlets—one 5" outlet. Motor: 40 HP—230 VDC—149 amps.

27 

T-2 TANKER BILGE, BALLAST AND FIRE PUMP

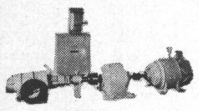
Bronze — 10x7x10 — vertical duplex. Steam pressure 150 lbs. gauge — exhaust pressure 10# gauge — discharge pressure 100# gauge —300 G.P.M.

28 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.

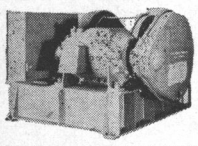
29 EXCELSIOR MOLASSES PUMP—SIZE 5½"



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

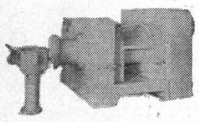
WINCHES AND WINDLASSES

30 AH&D SINGLE SPEED WINCHES



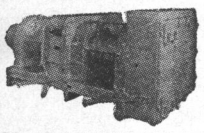
7250 lbs. @ 220 FPM—50 HP—230 VDC—with control. $1750 as is.

31 VICTORY UNIT WINCHES



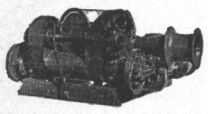
50 HP—230 VDC—U-1, U-2, U-4, U-5—reconditioned.

32 MODEL U-6 DOUBLE DRUM WINCHES WITH GYPSIES



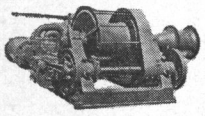
50 HP—230 VDC—reconditioned.

33 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.

34 WATERMAN STEAM DECK WINCH—SINGLE GEARED

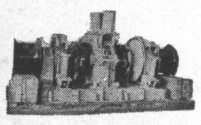


Single-geared "Valle Type"—9½ x 10—10,720 lbs. @ 238 F.P.M.

35 HYDE NO. 7 WINDLASS

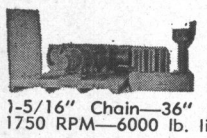
1¾" Chain—Wildcat centers 3'3"—Handles 3000 lb. anchors. MOTOR: 8.7/35 HP—440/3/60—1800/450 RPM.

36 NEW — UNUSED LINK BELT WINDLASS



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

37 IDEAL WINDLASS—UNUSED



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

38 UNUSED 70 HP McKIERNAN-TERRY WINDLASSES

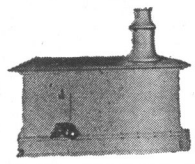
2¾" Chain and two 10640 lb. anchor & 30 fathoms chain @ 30 FPM. 70 HP—230 volts—shunt DC motors—233 amps—550 RPM—55°C rise. Wildcat centers 47½". Base 9'5" wide x 11' long. Weight 36,000 lbs.

39 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".

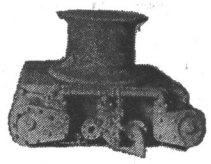
MISCELLANEOUS

40 UNUSED DOCK CAPSTAN



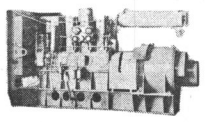
15 HP—220/440/3/60—3000 lbs @ 100 FPM. Gypsy 8"—waterproof box—floorplate.

41 HYDE 30" DOCK CAPSTAN



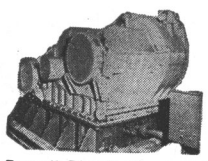
10" x 10"—reversible—W.P. 125 lbs—2½" steam—3" exhaust.

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



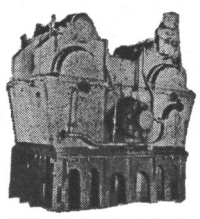
Lorimer engine FN—5 cylinder—7.5 bore—9.5 stroke —720 RPM—radiator cooled. GENERATOR: Ideal type DD—75 KW—120/240 VDC—720 RPM—313 amps—frame 350-27. CAN ALSO OFFER SAME GENERATOR WITH 75 KW 440/120/3/60 A.C. Emergency sets from T-2 tankers.

43 DOUBLE INPUT — SINGLE OUTPUT DIESEL REDUCTION GEARS



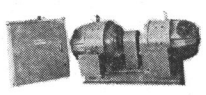
Farrell-Birmingham — 3200 SHP. Reduction gear: 1.81:1—handles two 1600 HP diesels @ 720 RPM. With hydraulic couplings & Fawick clutch. Port and starboard.

44 VICTORY AP2 — WESTINGHOUSE MAIN PROPULSION GEAR



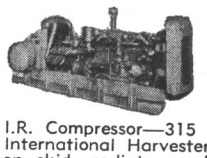
6000 SHP—Serial 4A-1620—Medina Victory.

45 GENERAL ELECTRIC LIGHTING M.G. SET



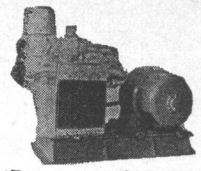
40 H.P.—230 volts D.C. input to 25KW—115 volts D.C. output—with 40 H.P. 230 volt D.C. controller.

46 DIESEL DRIVEN INGERSOLL-RAND AIR COMPRESSOR



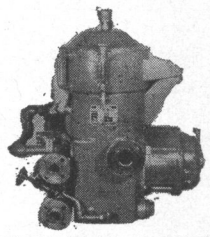
I.R. Compressor—315 cu. ft. @ 125 lbs. Driven by International Harvester UD-18 diesel. Tank mounted on skid—radiator cooled—from Corps. of Engineers salvage vessel.

47 INGERSOLL-RAND MODEL 40 AIR COMPRESSOR



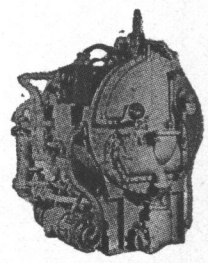
Two stage—135 CFM—7" x 6¼" x 5"—110 lbs.—870 RPM—inner cooler. MOTOR: Allis-Chalmers 40 HP — 230 VDC — 145 amps — 1750 RPM — Model EB121.

48 DeLAVAL PURIFIERS



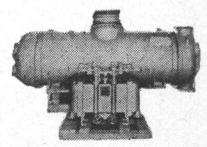
Model 55-13—225 GPM. MOTOR: L.A.—Frame 224—2 HP—230 VDC—1750 RPM. Oil inlet & outlet 1"—water discharge 1½". Also available A.C. 440/3/60.

49 GRISCOM-RUSSELL EVAPORATOR



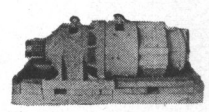
12,000 evap.—230 VDC pumps or 440 A.C. pumps. Complete with Weir automatic water valve.

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



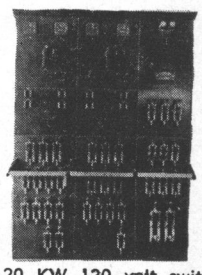
20" Ex. inlet—⅝" Cu-Ni tubes—with or without air ejector.

51 UNUSED GEARHEAD MOTORS



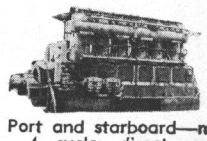
20 HP — 230 VDC — 30 RPM output.

52 UNUSED 20 KW SWITCHBOARD

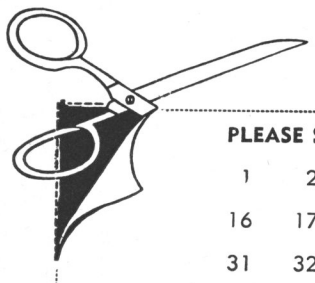


20 KW 120 volt switchboard for two generators in parallel with distribution.

53 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							

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

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

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

35 U.S. Ship Operators Favor Metric System To Provide Uniformity Of Ship Equipment

The American Institute of Merchant Shipping (AIMS) has strongly urged the Government to adopt a national policy in support of a planned transition from the English system of measurement to the internationally used metric system.

AIMS, whose 35 member companies own the preponderance of active U.S. ocean shipping, has warned that the nation is "out of step with the rest of the world" in sticking to the outmoded English measurement system, and that the future effect could be extremely costly to the American maritime industry.

In testifying before the National Bureau of Standards' National Metric Study Conference, Gaithersburg, Md., **O. Lincoln Cone** of AIMS said the United States is the "only major nation still operating on the old English or customary system of measurement." The work of U.S.-flag steamship companies, he added, would be "greatly simplified and operating economies realized if only one system of measurement was in effect throughout the world. For this reason, there is considerable support for U.S. adoption of the metric system in the interest of achieving uniformity and operating economies."

Mr. **Cone** said AIMS member companies are increasing their use of the metric system in their foreign operations and, by doing so, eliminating confusion, reducing mistakes, and saving money. "Ship's equipment can be purchased at an international market value instead of paying increased costs for equipment constructed to English measurement standards," he noted. The increasing use of the metric system throughout the world is causing a corresponding increase in problems of interchangeability between U.S. and foreign manufactured shipboard equipment and locating replacement parts in foreign ports meeting U.S. dimensional standards. Additional cost, therefore, is often involved in obtaining replacement equipment, resulting in increased ship operational expenses.

"The increasing use of the metric system has had considerable effect on cargo operations, particularly where cargo containers, gantry cranes and crane spreaders are involved," Mr. **Cone** said. "International standards based on the metric system provide for uniformity of this equipment throughout the world, thereby facilitating the handling and transshipment of cargo containers in world trade."

AIMS' companies favor a planned transition rather than a mandatory or unplanned change to the metric system. The planned transition could be accomplished in about 10 years, the AIMS representative said. A longer period of time, however, would be needed for phasing out existing equipment which requires spare parts utilizing the English measurement system. Transition to the metric system would eventually assure worldwide availability of equipment built to a universal standard of measurement.

A U.S. shipping industry shift to the metric system should be made in conjunction with a similar shift by all American industries, Mr. **Cone** pointed out, to facilitate the transition and minimize disruption of normal operations. "AIMS is convinced that it would be difficult to carry out a planned metrical changeover in the absence of a national policy by Government designed to encourage and support such a plan. Any such program should be based on cost-time studies to arrive at an optimum period in which to achieve transition to the metric system at the lowest overall cost to the U.S. shipping industry."

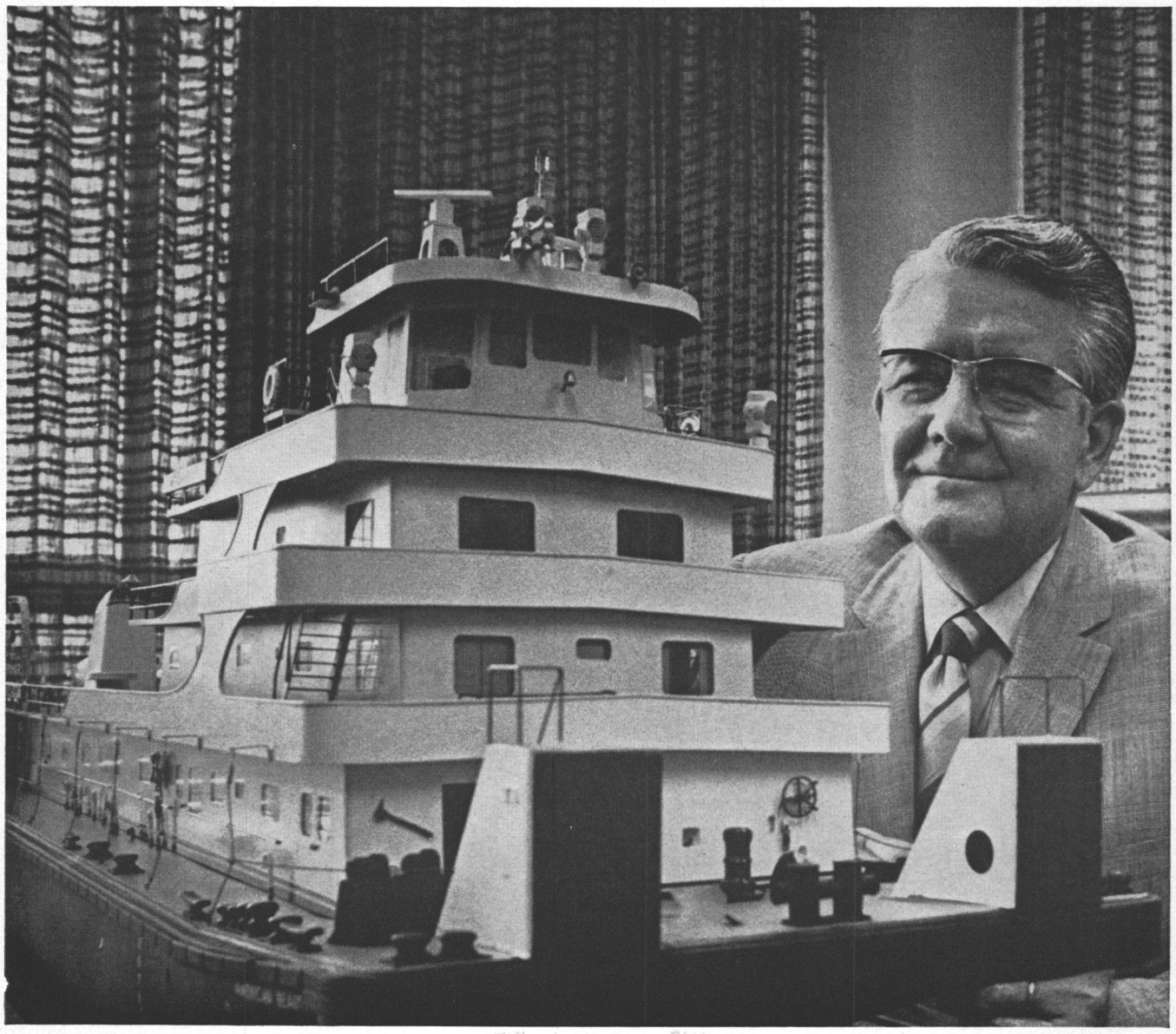
Purpose of the National Metric Study Conference is to obtain from all levels of U.S. industries and Federal, state and local governments information on the present and future effect of expanded metric system use on a worldwide basis, and what action should be taken within the United States in light of this development. Secretary of Commerce **Maurice Stans** will incorporate the information into a report with recommendations to be submitted to the Congress next year.

Standard Tankers (Bahamas) To Charter Four Huge Tankers From Seatrain Lines, Inc.

Two tankers are being constructed at Seatrain Shipbuilding Corp., Brooklyn, N.Y., a subsidiary of Seatrain Lines, Inc. These vessels of 230,000-dwt will be chartered by Seatrain Lines to Standard Tankers, (Bahamas) Co., a subsidiary of Standard Oil Co., (N.J.) One tanker is scheduled for delivery in the summer of 1972 and will be chartered for three years, while the other will be delivered in the spring of 1973 and chartered for two years.

Two more tankers are being built for Seatrain Lines, Inc. by foreign yards and are also to be chartered to Standard Tankers. One vessel of 225,600-dwt will have a 1972 delivery and the other 233,200-dwt tanker will be delivered in mid-1973. Both tankers will be chartered for three years.

These four tankers will total nearly one million deadweight tons and this is considered to be one of the largest transactions between a major oil company and a shipowner concerning mammoth tanker charters, with revenues in excess of $100-million expected by Seatrain Lines, Inc. between 1972 and 1976.



Earl Rose, Chairman, Rose Barge Lines, Inc.

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"We are *convinced* that beauty of both design and appointments, *and* maximum operating efficiency, do go together.

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"INTERGARD" 2-Coat Tank Coatings System (Reactor Type): For all interiors of tanks carrying petroleum, petroleum products, edible oils, potable water, chemicals, fresh and salt water ballast. Non-hazardous in application requiring only normal precautions when painting in confined areas. Results: Tanks coated with this system can be easily cleaned at economical cost.

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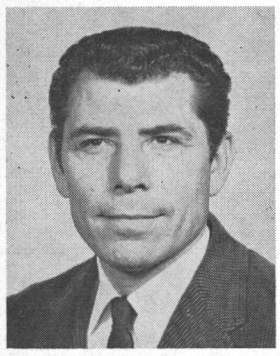
Hose-McCann Forms Research Division—Names C.H. Peterson



Calvin H. Peterson

Calvin H. Peterson has been named project engineer for a newly formed division of Hose-McCann Telephone Co., New York, N.Y.

The Research & Development Center is established within the confines of Hose-McCann's present facilities. Mr. **Peterson** will be instrumental in the development of new products for the marine industry. New concepts of instrumentation, interior communication, automation, and basic marine hardware are being considered for design and/or improvement.

A member of The Society of Naval Architects and Marine Engineers, Mr. **Peterson's** varied background has ranged from production techniques to complex ocean survey systems.

Prior to marine work, Mr. **Peterson** accumulated eight years as a designer in the missile space programs. He was lead electrical engineer at American Ship Building Company's Toledo yard, with previous experience in the same capacity at Bethlehem Corporation's Sparrows Point, Md. yard; Aerojet-General Shipyards, Inc., Jacksonville, Fla., and Puget Sound Bridge & Dry Dock in Seattle, Wash. Mr. **Peterson** will report to **Lucien J. Pihiel,** vice-president and chief electrical engineer.

E.L. Post & Co. And Kings Point Machinery Represent British Firm

The Glacier Metal Co., Ltd., through its United States sales office has announced the appointment of marine product representatives for the east coast and west coast.

Walter L. Vaughan, general manager of E.L. Post & Co., New York—one of America's oldest babbitt metal manufacturers—will be responsible for the Eastern Seaboard, and **James A. Stasek,** president of Kings Point Machinery, San Francisco, will cover the western maritime market.

Glacier products included in these exclusive appointments are marine bearings aft of the main machinery, tilting pad thrust bearing blocks, line shaft steady bearings, water lubricated stern and outboard strut bearings, and oil lubricated (babbitted) stern tube bearings, including the unique, patented Glacier/Herbert sterngear system.

In announcing the appointments, **W.P. Bardet,** vice-president, sales, for the Glacier Metal Co., Inc., U.S. sales agency of the British firm, emphasized the interest which the Glacier/Herbert sterngear system is arousing in worldwide maritime circles, particularly since the first installation (the MS Laurita—see cover story Maritime Reporter And Engineering News, March 1, 1970) has proven highly successful after almost a year of continuous service. Two sister ships are expected to be in service shortly with the same G/H sterngear arrangement. According to Mr. **Bardet,** all Glacier representatives can be expected to emphasize the company's worldwide reputation in the plain (sleeve) bearing industry. Returning from a recent visit to Glacier's main office near London, Mr. **Vaughan** reported that "Glacier holds 213 of the world patents in plain bearing technology—more than the rest of the world put together."

Further details on these Glacier marine products may be obtained by writing E.L. Post & Co., 233 Broadway, New York, N.Y.; Kings Point Machinery, 439 Bryant St., San Francisco, Calif., or the Glacier Metal Co., 116 Beacon Street, South San Francisco, Calif. 94080.

1970 State-Of-The-Art Seminars Describe

Marine Steam Powerplants

General Electric And Babcock & Wilcox Sponsored Seven Seminars Around The World Describing The Advances Made In Steam Powerplants And The Ability To Provide 200,000 SHP Plants For Ships Now.

Seven state-of-the-art seminars on marine steam powerplants were held recently in the United States and in Europe by General Electric Company and The Babcock & Wilcox Company. Over 700 shipbuilders, operators, owners, marine engineers and naval architects attended these seminars.

The day-long seminars took place in New Orleans; Washington, D.C.; New York City; San Francisco; Oslo, Norway; Bremen, Germany, and London. Sponsors were the Power Generation Division's Marine Department of B&W, Barberton, Ohio, and the Marine Turbine and Gear Department of GE, West Lynn, Mass.

The seminars were opened by **H.W. Ogilvie,** manager of marketing for GE's Marine Turbine and Gear Department who discussed the worldwide marketing of steam-propulsion equipment and **R.E. Whitam,** manager, Marine Department, B&W. Other GE Marine Turbine and Gear Department people making key presentations were **E.C. Rohde,** manager of engineering, who reviewed the state-of-the-art of marine steam plants; **M.A. Prohl,** manager of turbine engineering, who spoke on marine steam turbine engineering; **N.A. Smith,** manager of marine and naval gearing, who reviewed the latest developments in gearing; **R.O. Butcher,** manager of propulsion systems development, whose topic was steam piping systems; **H.C.K. Spears,** manager of marine propulsion systems, who described steam powerplant applications, and **R.T. Simpson,** manager of market research and marketing administration, who discussed the economics of marine steam propulsion. Also taking part was GE's Mechanical Drive Turbine Department, Fitchburg, Mass.

R. Schoen III, assistant chief engineer, B&W Marine Department, reviewed the state-of-the-art in boilers for marine uses, and **R.E. Whitam,** manager, B&W Marine Department, discussed reliability and availability of modern marine boilers.

Contributing technical papers were presented by **R.F. Paashaus,** Worthington Pump International, who talked on the application of pumps to marine propulsion and feed systems; **M.G. O'Harra,** engineer, Bailey Meter, who spoke on combustion control and feedwater regulator control as applied to marine boilers; **C.L. Bradshaw,** power industry specialist, Rockwell Manufacturing, who spoke on valves and their application in marine steam powerplants, and **J.E. Westberg,** president, and **B. W. Seille** of Bull & Roberts, who talked about boiler feedwater chemistry.

The day-long seminars were moderated in the United States by **F.P. Eisenbiegler,** manager of domestic marine sales, GE Marine Turbine and Gear Department, and **E.A. Catlin,** marine sales, B&W. **R.H. Kiefer,** manager of export marine sales, from the same GE department, moderated the seminars abroad.

Among the points discussed in the sessions were:

1. The trend toward higher ship powers up to 200,000 hp for high-speed containerships and Arctic-service tankers.

2. The ease and simplicity with which steam propulsion systems can be automated.

3. The elimination of potential pollution hazards due to the ability of steam plant burners to handle large amounts of water in the disposal of tank-cleaning residues.

4. The full-scale testing of gear teeth to determine the actual performance of new materials under conditions comparable to actual service.

5. The capability of geared steam turbine plants to transmit rated power at very low propeller rpm and to cope with frequent reversals which make it a natural application for the propulsion of the new breed of Arctic-service ships such as tankers and bulk carriers.

Mr. **Rohde** gave an overall view of the steam propulsion plant in which he outlined the problems and requirements of the marine industry for reliable power. In concluding his remarks, he said, "At the present time we see an accelerating trend towards much higher propulsion powers. You might legitimately be concerned about a degradation of reliability as these powers increase. Truthfully, as propulsion powers have doubled, within our memory, we can find no evidence of degradation in reliability. Quite the contrary seems to be true. As we look to capabilities up to and beyond 100,000 hp, we have found no state-of-the-art barriers. As support for this, we note that the electrical power-generation steam industry has gone well beyond capabilities considered for ships—up to about 270,000 hp. Only above that do we find an intimation of a state-of-the-art threshold. This point is well beyond probable marine applications."

Steam Turbines

Mr. **Prohl** reviewed the current trends in steam turbine design and construction.

"It became apparent," he said, "that the turbine designs which had been developed to cover power levels up to 40,000 to 45,000 hp would not be sufficient to meet the rapidly expanding requirements of the marine industry. Work was then initiated and has been carried forward on a new series of higher horsepower turbines covering the range from 45,000 to 120,000 hp.

"Two basic sizes of high-pressure turbines cover the power range, the smaller size handling powers from 45,000 hp to 70,000 hp and the larger size handling powers from 70,000 hp to 120,000 hp. For each of the two power ranges, designs for both non-reheat and reheat cycles are provided."

Three low-pressure turbine frame sizes are involved, the author stated, and by properly combining these high-pressure and low-pres-

INFORMAL GET-TOGETHER at one of seven General Electric-Babcock & Wilcox state-of-the-art seminars include, left to right, **J.J. Kleschick,** GE Marine & Defense facilities Sales Operation; **L.R. O'Hearne,** Mobil Oil Corp.; **G.C. Swensson,** Marine design engineer, Sun Shipbuilding & Dry Dock Co., and **E.A. Catlin,** Marine Department, Babcock & Wilcox. The seminars were held throughout Europe and the United States.

BETWEEN SESSIONS at steam powerplant seminar in New York, foursome getting together included, left to right, **F.P. Eisenbiegler,** manager of domestic marine sales, GE Marine Turbine & Gear Dept.; **H.R. Glennon Jr.,** president, Commercial Steamship Co.; **J.A. Obermeyer,** Texaco, Inc., and **H.W. Ogilvie,** manager of marketing, GE Marine Turbine & Gear Dept.

sure turbine frame sizes in the usual cross-compound arrangement and by making the correct adjustments to nozzle areas in the internal steam path, any desired amount of power from 45,000 hp to 120,000 hp can be obtained.

In this paper, the author described the steam conditions for the various sizes of plants as follows: For the non-reheat turbine in the 45,-000-70,000-hp size range, inlet steam conditions of 850 psi and 950°F. have been selected; for the higher performance reheat turbine inlet steam conditions are set at 1,450 psi and 950°F. with reheat to 950°F., and at the higher power levels, 70,000 hp to 120,000 hp, inlet steam conditions of 1,450 psi and 950°F. have been selected for the non-reheat as well as the reheat design.

Propulsion Gears

Mr. **Smith** presented a review of GE's investigation into reduction gears for the higher powers, which included gear-teeth materials, noise and dynamic characteristics.

He described reduction gearing as being remarkably flexible, having capability of trade-offs of width, length, height and the choices of single or multiple inputs and for power take-offs for driving accessories such as oil pumps, tachometers, generators, feed pumps, etc. He used Figure 1 to illustrate basic gearing arrangements which have evolved to accommodate both single and multi-cylinder steam turbines.

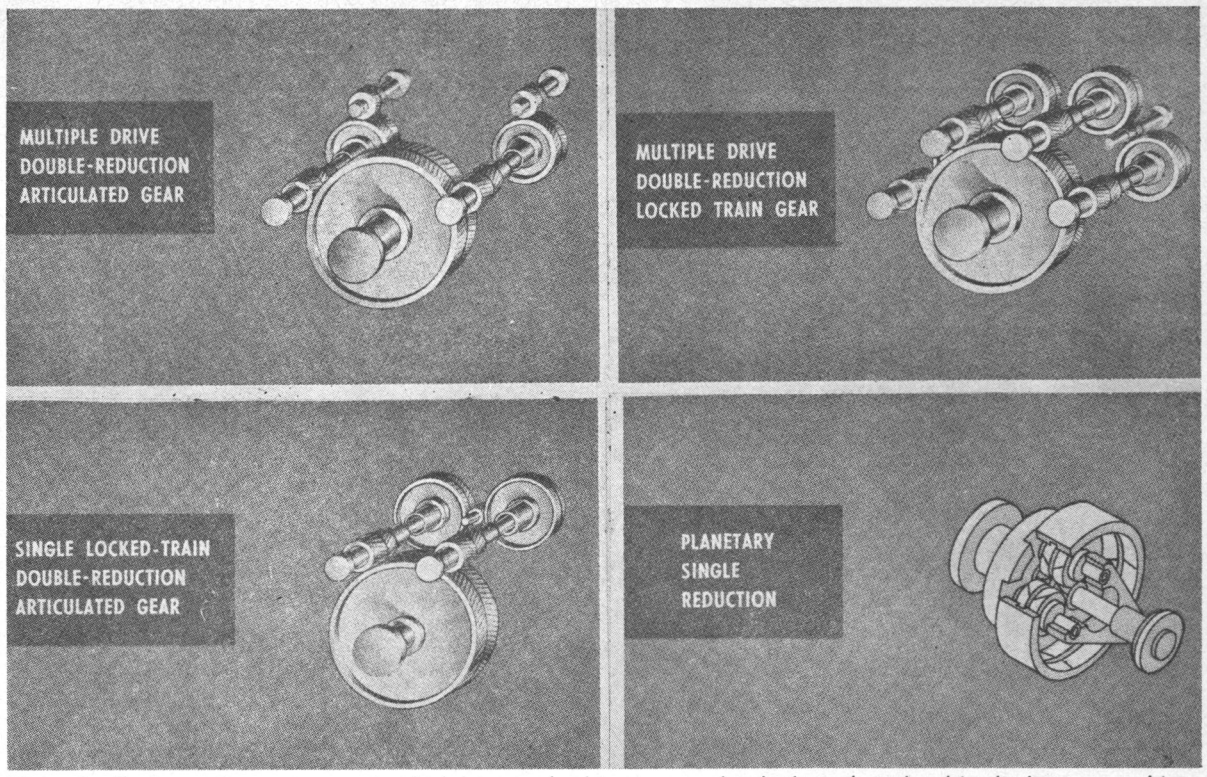


Figure 1—Basic gearing arrangements which have evolved to accommodate both single and multi-cylinder steam turbines.

Marine Boilers

Mr. **Whitam** and Mr. **Schoen** of Babcock & Wilcox reviewed boiler reliability, maintenance cost reduction and powerplant growth.

The authors reported on a study made of boiler casualties and listed the causes of failure, Table 1. Real failure causes as shown in this table can be explained as follows:

1. Waterside deposits—attributed to improper attention to the quality of the feedwater.
2. Low water/blockage—are operational and/or control problems.
3. Feedwater contamination—adequate monitoring and alarm system can significantly reduce contamination.
4. Gas laning—this has been a problem where wide openings are left between adjacent superheater tube rows at steam pass separation areas.
5. Fuel ash corrosion—over 90 percent of these failures were in the main generating bank. They are the result of sulfur-laden soot accumulations over the water drum.
6. Steam impingement—these failures more than likely result from not draining the soot-blower lines before blowing.
7. Fire or explosion—the cause can normally be traced to faulty or poor combustion, particularly at low boiler ratings.
8. Improper operation—there is no reason for failures of this nature with prudent operation.
9. Material installation—these failures are primarily due to such things as faulty welds or poor workmanship.
10. Miscellaneous—these failures are due to steam-side corrosion, water-side corrosion, oxygen corrosion and water-side or fire-side abrasion.

On the basis of this data and taking into account the acknowledged neglect, maloperation and even harmful specified procedures, a "meantime between failures" of 52,000 hours (approximately 6 years) can be expected, the authors advised.

The authors, referring to boiler growth, stated, "Reduction of fuel rate in the vicinity of 5 percent can be obtained through the use of a reheat cycle. This was not a significant number in evaluating overall life-cycle costs in the relatively low-powered ships of the past. However, in many instances, a 5 percent fuel savings can be significant in the large shipboard powerplants.

(Continued on page 38)

Table No. 1—Statistical Failure Analysis

	Cause	Percent of Total
1.	Waterside deposits	25
2.	Low water/blockage	25
3.	Feedwater contamination	10
4.	Gas laning	10
5.	Fuel ash corrosion	9
6.	Steam impingement	5
7.	Fire or explosion	5
8.	Improper operation	5
9.	Material installation	4
10.	Miscellaneous	2

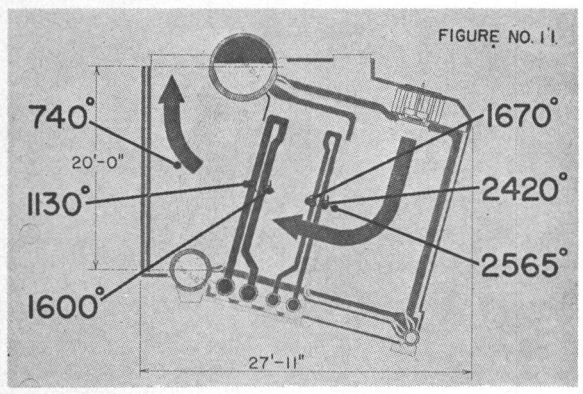


Figure 2—Elevation view of B&W P.P.R. boiler.

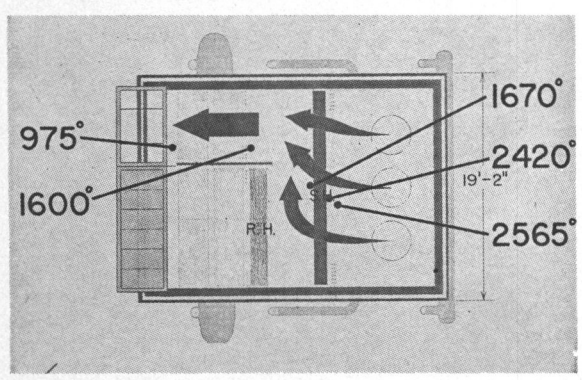


Figure 3—Plan view of boiler in non-reheat mode.

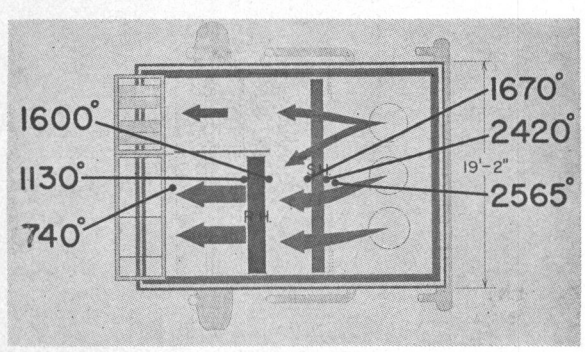


Figure 4—Plan view of boiler in reheat mode.

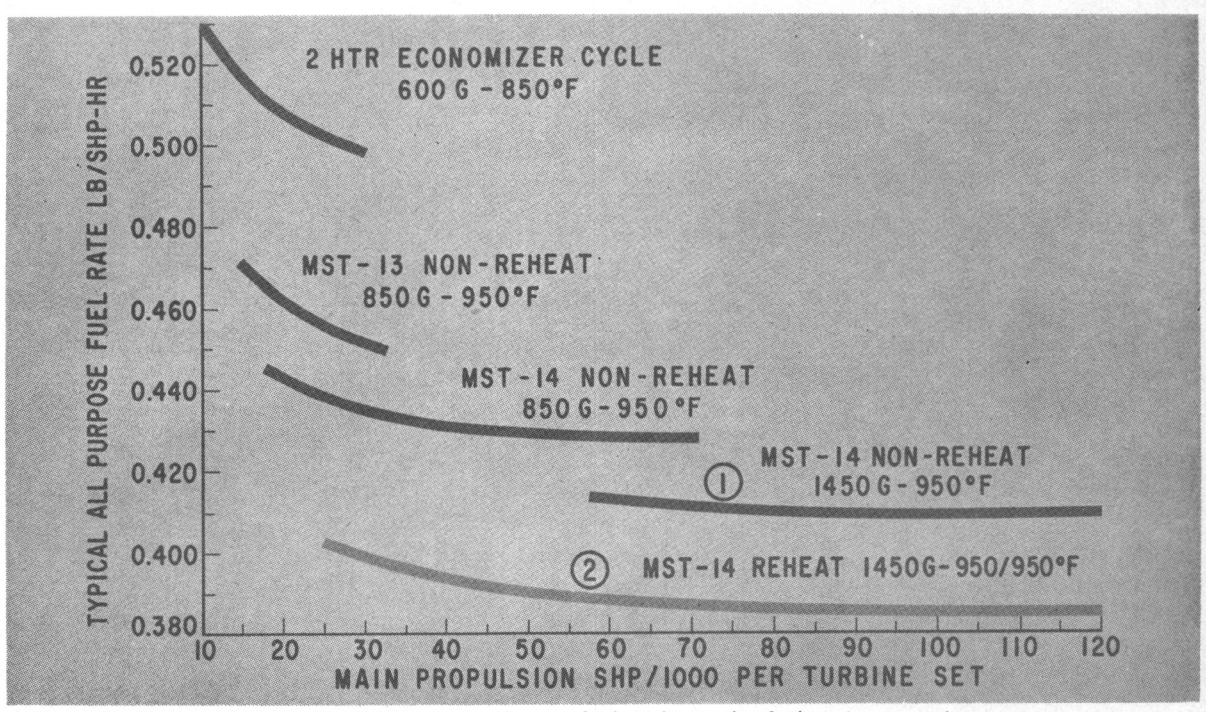


Figure 5—Fuel rates versus shaft horsepower curves which indicate the fuel savings per shp as power increases.

Marine Steam Powerplants—

(Continued from page 37)

"The PPR (Positive Protection Reheat) concept was devised," according to the authors, "utilizing means both internal and external to the boiler for protecting the reheater. The basic design features of this boiler, shown in Figures 2, 3 and 4, could be used to an operating pressure of 1,485 psig and an output equivalent to 40,000 shp per boiler."

The authors then described several boiler designs and concluded that with sound engineering and operating practice, with emphasis on oil burner and water-chemistry control technology, modern marine boilers should provide unlimited availability and designed efficiency throughout the life of the ship.

Applications

Mr. **Spears** spoke on the applications of present designs of steam propulsion systems. He said, "While there has been a general trend to higher and higher powers, the developments of the past few years have been astounding. A number of recent inquiries have considered power levels to 200,000 hp. This power has been distributed on two or three propellers. The message I want to leave is that the steam propulsion-plant designs to provide power this high, or higher, economically and reliably are available whenever you need them. Turbine and gear designs are available and good boilers are available to provide steam. The feed pumps, fans, condensers and other auxiliaries have been designed and performance data are ready.

"As an example of what has been done, the curves numbered 1 in Figure 5 show the expected fuel consumption of non-reheat steam plants up to 200,000 hp. Curve numbered 2 gives the same data for a reheat plant. You will note that in both cases the fuel performance continues to improve as the power increases."

Summary

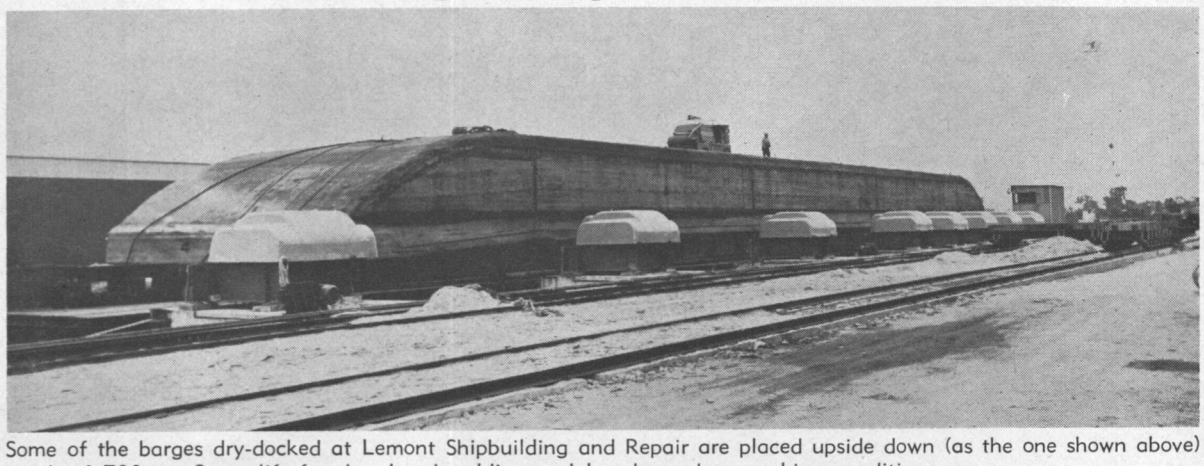
Mr. **Simpson** summarized the seminar as follows: "We find ships to be inherently complex and the environment unusually difficult. We believe that progress will result from building on what we know with hard work and good management. From that perspective, we have attempted to demonstrate that steam plants are available now for whatever application you need. Time and money-consuming developments are not needed. We all have a wealth of experience to profit by. The hardware and systems are proven in the environments."

Wilson Issues Bulletin On New Handhole Seat Grinding Kit

Thomas C. Wilson, Inc., Long Island City, N.Y., has announced publication of Bulletin TC-7007 which details their new handhole seat grinding kit for restoring boiler handhole seats. The kit described in the bulletin features a portable, air-driven motor complete with all accessories that might be required to restore to as-new condition corroded, pitted, scratched or fluid-abraded seats of virtually any size or shape in boilers or ferrous pressure vessels. Designed for use in shipyards, on board ship, and in power plants, the kit features rugged construction, rapid grinder alignment, accurate control of cutting, interchangeable roll guides and quick setup.

Copies of Bulletin TC-7007 may be obtained by writing Thomas C. Wilson, Inc., 21-11 44th Avenue, Long Island City, N.Y. 11101.

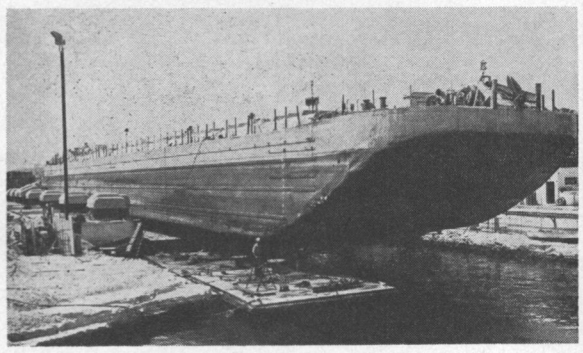
Syncrolift System Employed In Unusual Dockings At Lemont Shipbuilding And Repair Company



Some of the barges dry-docked at Lemont Shipbuilding and Repair are placed upside down (as the one shown above) on the 1,700-ton Syncrolift for downhand welding and less hazardous working conditions.

Lemont Shipbuilding & Repair Company, a modern, fully-automated shipyard located at Mile 300 on the Illinois Waterway, services dry cargo barges, tank barges, river tugs, and Great Lakes tugboats. The company has a 1,700-ton rated capacity Syncrolift dry dock designed by Pearlson Engineering Company, Miami, Fla., as the hub of their entire operation. The shipyard complex is headed by **Ken Blackburn,** and he states that they can now dry-dock every type of vessel that plys the inland waterway system. He has found their dry dock to be the most valued piece of equipment in the shipyard, and some of the best "workhorses" on the river have already been lifted on the Syncrolift platform. The Syncrolift dry dock installation was completed in October 1969, and during its first month of operation, 20 commercial vessels were dry-docked. Since then, the transfer area has been extended, and several barges and tugboats are handled simultaneously.

Barges dry-docked in the conventional upright manner can sometimes involve time-consuming preparation of high blocking to provide working space. Hazardous working conditions and overhead welding can be eliminated by inverting the barge and placing it in dry dock upside down. With this procedure no high blocking is needed,



A huge barge under repair at Lemont Shipbuilding overhangs the 220-foot Syncrolift platform by 86 feet.

and work can be carried out in a safer, more efficient manner.

It is interesting to note that although the Syncrolift dry dock platform is only 220 feet long, barges over 300 feet in length are easily handled. Read-outs on the panel of the control center indicate the actual loading at each Syncrolift hoist. Safety provisions in the control center prevent any hoist from being overloaded.

Pearlson Engineering Company, designers of the Syncrolift dry dock, supplied the hoisting equipment and electrical components. All other materials and their installation, was accomplished by Lemont Shipbuilding and Repair Company.

No. Calif. Section Discusses Design Of Special Ships To Transport Forest Products

Pictured left to right: **Graham Fraser,** past chairman, Paceco; **Vincent Van Riper,** principal surveyor, American Bureau of Shipping; **Henry Kozlowski,** Technical and research chairman, Matson Navigation, and **J.H. Troyer,** secretary treasurer, Todd shipyards.

The November dinner meeting of the Northern California Section of The Society of Naval Architects and Marine Engineers was attended by 62 members on November 12 at the Engineers Club in San Francisco.

Section vice chairman **Arthur Haskell** presided at the meeting. A paper describing the design of special ships for the Swedish Forest Products Company, Svenska Cellulosa AB (SCA), was presented by **Robert W. Herbert,** a San Francisco naval architect. The paper emphasized that the ships involved were regarded simply as a part of a new distribution system in their design and construction. The owners distribute about 800,000 tons of forest products annually, principally newsprint, from Sweden to the United Kingdom and Central Europe.

Shown at the San Francisco meeting, left to right: **Norman Thompson,** papers chairman, Marcona Corporation; **Arthur J. Haskell,** vice chairman, Matson Navigation; **Robert N. Herbert,** author; **Joseph H. Busch Jr.,** meetings chairman, H.J. Wickert Co., and **J. Randolph Paulling Jr.,** academic liaison chairman, University of California, Berkeley.

Commercial Fisheries Bureau Transferred

The functions of the Bureau of Commercial Fisheries have been transferred from the U.S. Department of the Interior to the U.S. Department of Commerce.

The Bureau is now known as the National Marine Fisheries Service of the newly organized National Oceanic and Atmospheric Administration (NOAA). Its service to the public and to the fishing industry will be unchanged.

The official new title and address are: Exploratory Fishing Gear Research Base, National Marine Fisheries Service, NOAA, U.S. Department of Commerce, Woods Hole, Mass. 02543. Telephone (617) 548-5123.

Albert Killgore Joins Santa Fe-Pomeroy, Inc.

Albert B. Killgore, former manager of offshore operations in the Gulf of Mexico for Brown & Root, Inc., Houston, Texas, has joined Santa Fe-Pomeroy, Inc., as vice-president and manager of offshore construction. He will headquarter in San Francisco, Calif.

Mr. **Killgore** has been involved in construction since his discharge from the Air Force in 1956. Since joining Brown & Root in 1964, he has served as derrick barge superintendent in the North Sea, coordinator of offshore operations in Peru, and assistant general manager of the Marine Operators Division. In this capacity, he was responsible for coordination of all platform fabrication and erection and for other marine oriented construction in the Gulf and in certain overseas operations.

Mr. **Killgore** is a 1953 graduate of Southern Methodist University, Dallas, Texas.

Santa Fe-Pomeroy is the engineering and construction subsidiary of Santa Fe International Corp., Los Angeles, Calif.

IHI Kure Shipyard Starts Construction On World's Biggest Tanker

The construction of the world's largest ship, the 372,400-dwt Nisseki Maru for the Tokyo Tanker Co., Ltd., a member of the Nisseki Group, was started on November 18 at the 400,000-dwt building dock of the Kure shipyard of IHI (Ishikawajima-Harima Heavy Industries Co., Ltd.), Japan.

Completion is scheduled for November 1971. After completion, the ship will be engaged in carrying crude oil from Ras Tanura in the Persian Gulf to the Nisseki Group's C.T.S. (a crude oil storage terminal) at Kiire in Kagoshima Bay, Japan.

When unloaded, the tanker will travel via the Malacca Straits, which is the shortest route between Japan and the Persian Gulf. However, when fully loaded with crude oil, it will run through the Lombok Straits since the Malacca Straits are too shallow for the ship to pass through.

A team of women crew members will be aboard the ship for the first time on a Japanese oceangoing vessel. The team will consist of four women—a nurse and three women to be engaged in other jobs. The team will work on a shift basis for comparatively short duty periods.

The world's largest ships now in service are the six 326,000-dwt tankers including the Universe Ireland, which were delivered to National Bulk Carriers Inc., of the United States by IHI's Yokohama shipyard and MHI's Nagasaki shipyard during the period from September 1968 to July 1969.

IHI also has a 477,000-dwt-tanker even larger than the Nisseki Maru on order by Globtik Tanker Limited, England. Its construction will begin at the Kure shipyard in February 1972 with completion scheduled for February 1973. The ship will be chartered by the Tokyo Tanker Co.

Grafton To Build Two Survey Boats

The Corps of Engineers, Foot of Prytania Street, New Orleans, La., has awarded Grafton Boat Company, Inc., Grafton, Ill. 62037, a $150,000 contract to build two all-welded-cabin, all-welded-steel-hull survey boats. The vessels are to be not less than 40 feet long and will have diesel engines.

Transocean Gateway Names William Clark

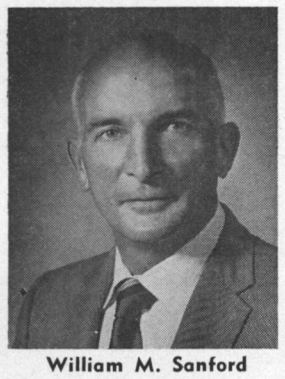
William F. Clark has been appointed general sales manager, Transocean Gateway Corporation, New York, N.Y., according to an announcement by Capt. **I. Mandic,** executive vice-president. In his new position Mr. **Clark** will be responsible for sales and marketing for all marine terminals operated by Transocean Gateway Corporation.

Mr. **Clark** has an extensive background in freight transportation, having served as general sales manager, American Export Freight, Inc. for three years, and with Sea-Land Service, Inc. for nine years. Prior to that he had been with Eastern Motor Express and the Pennsylvania Railroad.

Mr. **Clark,** a native of New Jersey, graduated from Rutgers University, and did graduate work in transportation at the University of Baltimore.

Transocean Gateway Corporation, a wholly-owned subsidiary of American Export Industries, Inc., operates all container and break-bulk facilities throughout the world for American Export Industries, Inc., with terminals located in Stapleton, Staten Island, Long Beach, Calif., and Leghorn, Italy. Transocean Gateway Corporation, part of the Inter-Freight system, will also operate the new distribution center presently under construction in Howland Hook, Staten Island.

W.M. Sanford Named Director Of Engineering For Hatteras Yacht Div.



William M. Sanford

William M. Sanford has been appointed director of engineering for the Hatteras Yacht Division of North American Rockwell Corporation, according to an announcement by **David R. Parker Jr.,** president of the North Carolina-based power boat manufacturing firm.

Mr. **Sanford** has over 20 years of experience in the marine industry. An engineering graduate of the University of Minnesota, he began his career in 1948 as chief experimental engineer for the Martin Outboard Motor Company. A year later he joined the Gale Products Division of Outboard Marine Corporation as a quality engineer.

A succession of key engineering and manufacturing assignments with the Chris-Craft Corporation began in 1950. These included chief engineer of the Outboard Motor Division and chief inspector and assistant chief engineer for the boat divisions. From 1955 to 1957 Mr. **Sanford** was production manager of the Minnetonka Boat Works, Wayzata, Minn. Mr. **Sanford** returned to Chris-Craft in 1957. He served as plant manager of the Roamer Yacht Division, and prior to joining Hatteras, he established and was general manager of the Chris-Craft plant in Edenton, N.C.

The Hatteras Yacht Division of North American Rockwell Corporation builds fiber glass yachts and shrimp trawlers, ranging from 31 feet to 74 feet, in their High Point and New Bern, N.C., plants.

More Operators Show Interest In MarAd Standard Design Ships

Interest in standard design ships has been expressed to MarAd by three more U.S. ship operators, as follows: Atlantic Maritime Enterprises, Inc., one tanker; Penn Transportation Co., two Crescent class ore/bulk/oil (OBO) carriers, two Nomad class bulk carriers and one 120,000-dwt tanker; and Western Agency, Inc., two or three OBO vessels.

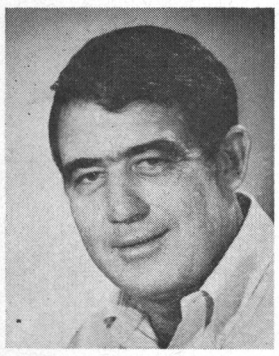
According to Washington sources, ship operators now have expressed interest in nearly 150 ships.

Union Dry Dock Appoints R.J. Burke President And Director

The board of directors of the Union Dry Dock & Repair Company, Weehawken, N.J. has announced the appointment of **Robert J. Burke** as president and a director of the company. Mr. **Burke** succeeds **George C. Dreyer,** who will continue as chairman of the board.

Mr. **Burke** was formerly associated with Marine Clearing House, Inc. of New York, Hughes Bros., Inc. of New York, and most recently, with New York Trap Rock Corporation where he served first as manager of the Hudson River Shipyard Division, Newburgh, N.Y., and for the past six years as marine superintendent.

Hawaiian Dredging Promotes Robison



Donald L. Robison

Donald L. Robison was promoted to construction manager-waterfront division of Hawaiian Dredging & Construction Co., a Dillingham affiliate. In his new position, Mr. **Robison** is responsible for waterfront construction as well as pile driving in Hawaii. He replaces retired vice-president **Albert C. (Bert) Croze,** who acts as a consultant to the firm.

Mr. **Robison** graduated from the University of Wyoming in 1953 with a B.S. degree in agriculture, served two years with the U.S. Army in Japan and Korea, and returned to his alma mater to earn a B.S. degree in general engineering.

He joined Dillingham in 1957 as a cost engineer, progressed from field assistant to assistant superintendent, and reached supervisory rank in 1964. His Hawaiian Dredging & Construction Co. experience includes many projects in Hawaii —dry docks, ship berths, the Sand Island Seatrain facility and the Oceanic Institute pier near Sea Life Park. Mr. **Robison** has worked in heavy and building construction as well as on Johnston Island shoreline protection. He also worked in waterfront construction on Wake Island, in Singapore and Indonesia.

Just prior to his appointment, Mr. **Robison** was general superintendent for the Dillingham-Al Johnson joint venture for Pearl Harbor Drydock Two improvements, a $2.3-million contract which will be completed this month.

Anixter-Normandy Breaks Ground For New Office/Warehouse

Anixter-Normandy, Brooklyn, N.Y., a pioneer distributor of electrical cable, has broken ground for a new building in Elmsford, N.Y. **John Myers,** president of Anixter-Normandy, said that the new facility, which will be located at 300 Executive Boulevard, includes a 55,000-square-foot warehouse and a 5,000-square-foot office. The Eastern regional offices of Anixter Bros., Inc., will be located in the same building and will include an office for **Ed Ryan,** newly appointed Anixter vice-president. They expect to move to the new location in January.

Anixter-Normandy is one of the 22 facilities in the Anixter Wire & Cable Group and is a part of Anixter's nationwide network of cable specialists.

Anixter-Normandy specializes in providing electrical cable for shipyards and industrial plants. Serving customers in the East Coast area, they stock over 5,000 types and sizes of electrical cable, including all types of shipboard cable, coaxial cables, electronic wire and selected special industrial cables.

John A. Livingston Receives W. Selkirk Owen Award At Webb Annual Banquet

Officers and principals at the annual alumni banquet shown above with the award recipient, left to right: (seated) **Donald L. Caldera,** first vice-president, Webb Alumni Association; **Victor W. Bethge,** second vice-president; **Owen H. Oakley,** member executive committee; **Winston B. Sutter,** secretary-treasurer; (standing) Rear Adm. **W.A. Brockett,** USN (ret.), president of Webb Institute of Naval Architecture; **Thomas M. Curran,** past president of Webb Alumni Association and former dean (ret.) of Webb; **John A. Livingston,** recipient of the W. Selkirk Owen Award, and **Robert G. Mende,** president of Webb Alumni Association.

The Webb Institute of Naval Architecture Alumni Association held its annual banquet recently at the Hotel Warwick, New York, N.Y. A reception and dinner preceded an especially interesting program which featured the presentation of the W. Selkirk Owen Award to **John A. Livingston.**

The W. Selkirk Owen Award is given in recognition of outstanding achievement and service to the marine engineering and naval architectural profession and to the alma mater. The recipient represents those qualities esteemed in a graduate of Webb Institute of Naval Architecture.

A brief talk was presented during the program by Rear Adm. **William A. Brockett,** USN (ret.), president of Webb Institute.

Ocean-Oil Intl. Engineering Announces Model Test Services

Hector V. Pazos, president of Ocean-Oil International Engineering Corporation of New Orleans, La., has announced that a towing tank facility with a wave maker and modern recording equipment is now available on the Gulf Coast.

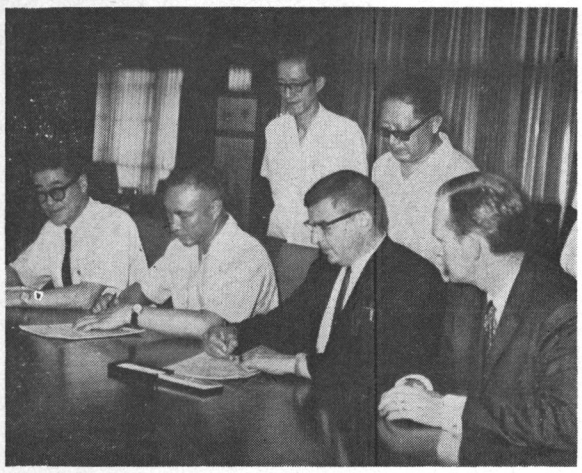
The towing tank has a useful length of approximately 110 feet, is 13 feet four inches wide, and can be filled with fresh water to a depth of 48 inches. The tank is fitted with observation windows, a wave generator, and a towing carriage. The carriage includes a six-component strain gage balance capable of measuring and recording on an eight-channel strip chart recorder.

In addition to this towing tank, Mr. **Pazos** stated that his firm will have available a wave tank equipped with current and wind simulation by early 1971. A complete model shop is being set up, and a wind tunnel equipped with smoke generators for flow visualization is in the planning stage.

LeTourneau Awarded Contract For Mobile Drilling Platform

A contract to build a mobile offshore platform for Penrod Drilling Co., Dallas, Texas, has been awarded LeTourneau Offshore, Inc., Houston, Texas, 77019. The unit will be assembled and launched at LeTourneau's Vicksburg, Miss., facility and will be capable of operating in depths to 300 feet.

Star Iron & Steel Wins Taiwan Container Crane Contract



Shown at the contract signing, seated from left to right: **Andrew T.H. Wang,** senior specialist and chief of section 3, purchasing department, Central Trust of China; **C.C. Shen,** sub-manager, purchasing department, Central Trust of China; **P.D. Boyce,** executive vice-president and general manager of Star Iron & Steel Co., and **L.H. Harlson,** vice-president, machinery sales engineering, Star Iron & Steel Co. Other officials of Central Trust of China and Southeast Engineering Corporation look on.

Star Iron & Steel Co., Tacoma, Wash., recently signed a contract with the Central Trust of China purchasing department for the design, manufacture, delivery and erection of two Starporter container handling cranes at the Port of Kaohsiung on Taiwan, Republic of China, according to **Charles Allen,** president of Star. The Central Trust of China is the Government bank and procurement agency that is responsible for the purchase of all equipment.

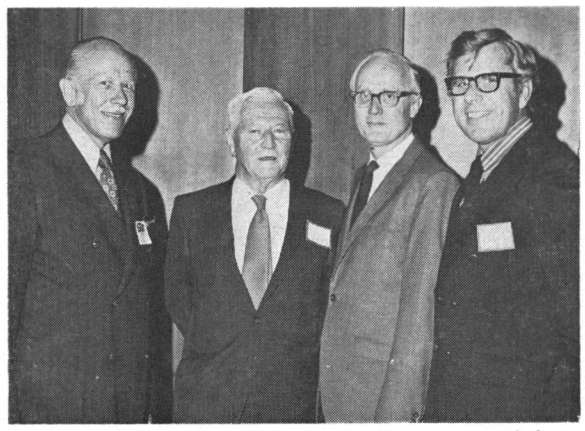
Kaohsiung Harbor Bureau will receive delivery of the cranes approximately October 1971. They will be shipped from the United States on August 15, 1971 and erected under the direction of Star upon arrival. Both cranes are scheduled for final turnover to the Kaohsiung Harbor Bureau approximately January 1972. Kaohsiung is one of two major port cities in Taiwan and is about the size of San Francisco. It is located on the southwest end of the island.

The two cranes are identical and equipped to handle every existing type of container. They also have some unique features not found on most cranes of their type. One is a special arrangement of hoists and spreaders that allows each crane to lift two 20-foot containers simultaneously side by side. They are also capable of lifting individual standard containers of 20, 30 and 40-feet in length, as well as 25-foot Matson type and 35-foot Sea Land type containers. Other special items are the tie-down devices to secure the cranes for typhoon conditions. The equipment will be designed and manufactured to United States standards. Portions of the work will be performed in Taiwan under subcontract to Star Iron & Steel Co.

Both cranes will have a capacity of 45 tons and will be powered by an electrical conductor system from the dock. Hoist speeds will be 120 feet per minute with full load, and 240 feet per minute with spreader only. Trolley speeds will reach 500 feet per minute, while the gantry speed will be 120 feet per minute. The reach of the cranes will be 110 feet. The operating height will be 175 feet and 213 feet with the boom stowed.

The Southeast Engineering Corporation, managed by **T.Y. Hu,** is Star's Taiwan representative.

The University Of Michigan Naval Architectural Alumni Hold Annual Reunion In N.Y.



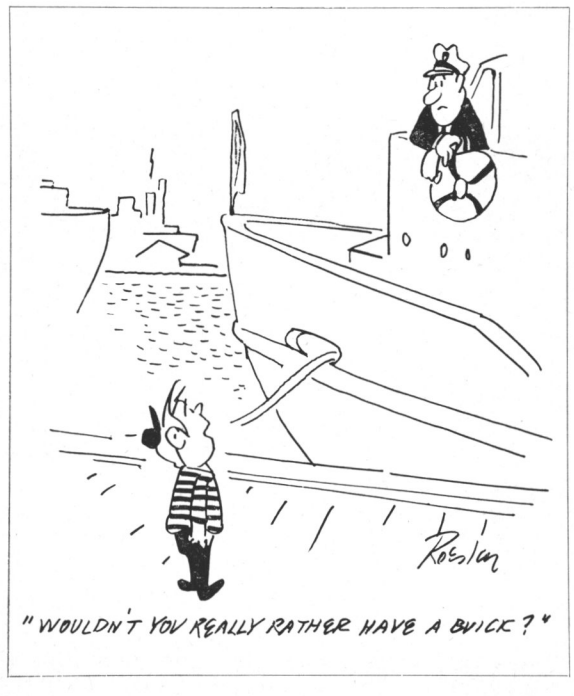
Pictured at The Brass Rail during the reunion, left to right: Prof. **R.B. Couch,** University of Michigan; **John R. Reilly,** chief engineer, Disneyland; Prof. **Harry Benford,** chairman, department of naval architecture, University of Michigan, and **William E. Zimmie,** president, W.E. Zimmie, Inc.

The annual reunion of the naval architectural alumni of the University of Michigan was held in New York City recently in conjunction with the annual meeting of the Society of Naval Architects and Marine Engineers.

Following dinner, a slide-lecture was presented by **John R. Reilly,** chief engineer of Disneyland, which outlined the many engineering problems unique to such a vast recreational facility.

Brief talks were also given by Prof. **Harry Benford,** and **William Zimmie,** who acted as toastmaster.

Lester Rosenblatt was chairman of the annual University of Michigan Naval Architectural Committee.



J.D. Deal Jr. To Head Market Development At Newport News Ship

Newport News Shipbuilding, a Tenneco company, has set up a market development division to carry out its intention to capture the lead in new United States merchant ship construction and named **Joseph D. Deal Jr.** to head this activity.

In making the announcement, **L.C. Ackerman,** president, said the potential market for all elements of the nation's commercial shipbuilding during 1971-80 could total $13 billion.

The Tenneco subsidiary, winner of a U.S. Maritime Administration contract to design the 300 ships called for in the recently signed Merchant Marine Act of 1970, is the world's largest private shipyard. Mr. **Deal,** head of the project team that won the contract, is a leading specialist in systems engineering studies.

Mr. **Ackerman** said the new marketing effort stemmed from favorable response from ship owners to the Maritime Administration program. Key to the Newport News study was four basic designs characterized by interchangeable midbodies and standardized bows, sterns and deckhouses. The objective was to provide flexibility to meet ship operators' changing needs and to effect construction savings through series production of standardized modules.

Joseph D. Deal Jr.

Newport News is conducting intensive studies of new shipbuilding methods and facilities needed to capture a substantial share of the market for new merchant ship construction. To implement these plans, Mr. **Ackerman** said multi-ship, multi-year contracts are "absolutely essential to justify the investment risk Newport News must take to provide the modern, mechanized facilities for series production of standardized ships."

In the MarAd study headed by Mr. **Deal,** Newport News projected U.S.-foreign trade to 1982. These forecasts, together with ship characteristics, operational costs, trade routes and state-of-the-art technology, were fed into computers to generate more than 100 ship designs ranging from 10,000 to 500,000 deadweight tons.

From a final optimization process, Newport News' proposal called for four basic designs:

- A 28,000-dwt multipurpose ship, designed for general cargo or dry bulk cargo.
- An ore, bulk and oil carrier (OBO) of 74,000-dwt suitable for passage through the Panama Canal.
- A 120,000-dwt tanker designed to enter the major U.S. oil ports.
- A 20,000-dwt containership, convertible for combination break-bulk or roll-on/roll-off cargoes, with a service speed of 23 knots.

The scope—and the cost—of the yard's study went far beyond the $500,000 MarAd contract award because it "served the long-range objective of Tenneco to develop profitable manufacturing operations," Mr. **Ackerman** said.

In organizing the new market development division, which will include major commercial ship conversions, such as jumboizing, and new merchant ship construction, Mr. **Ackerman** said the principal tasks will be to provide primary contact with customers, coordination of all inquiries and evaluation of competition. In addition, the division will analyze market data, develop objectives and strategy, and also be responsible for advanced systems development, including concepts of total transportation and new ship systems.

Mr. **Deal,** holder of S.B. and S.M. degrees in naval architecture and marine engineering from the Massachusetts Institute of Technology, has been serving as Newport News' manager of advanced systems design.

Newport News Shipbuilding, founded in 1886, was acquired by Tenneco in 1968. It employs more than 18,000 and currently is building the nuclear-powered aircraft carriers Nimitz and Eisenhower. Its backlog includes several nuclear submarine overhauls and construction of two new nuclear submarines and two nuclear-powered frigates for the Navy. The company also has design contracts for the Navy's new "fast" sub and DLGN-38, a new class of frigate.

In preparation for its future commitments to large ship construction, Newport News Shipbuilding recently completed construction of one of the largest gantry cranes in the world. The 19-story-high crane spans two shipways, travels on tracks 440 feet apart and is capable of loads in excess of 310 tons. The crane effectively handles materials in a 16-acre area serving the yard's new steel handling and fabrication facilities, as well as extending 150 feet into the James River.

APL Mails Invitations For Bids To Convert Five C-4 Freighters

Invitations have been mailed to United States yards by the American President Lines, San Francisco, Calif., for bids to convert five C-4 freighters into containerships. The opening date for the bids is scheduled early in January 1971.

Western Gear Awarded $1.1 Million Contract

Western Gear Corporation has received a contract valued at $1.1 million from the U.S. Navy for special sealed transmissions that will backstop the fleet's replenishment-at-sea capability.

The contract award, announced in Washington, D.C., by Senator **Henry Jackson** (D-Wash.), calls for 24 of the heavy transmissions as spare parts supply for the large winches installed by Western Gear aboard specially equipped vessels.

The winches are part of a major hydraulically-operated Western Gear-built system which permits fast transfer of men, material, fuel, and ammunition between ships while under way. Some 700 of the winches have been supplied to the Navy by Western Gear's Heavy Machinery Division in Everett, Wash., in a program that began in fiscal year 1965. Shipment of the spare transmissions to the Naval Supply Center at Mechanicsburg, Pa., is scheduled to begin next spring.

Shipboard Furniture Brochure Available From Wilson & Hayes

Wilson & Hayes, supplier to the shipbuilding industry for 25 years, has issued a new brochure on its line of metal shipboard furniture.

Over 300 items are manufactured according to the United States Navy Bureau of Ships hull-type drawings and specifications — or, to custom manufacturing requirements, including non-magnetic furniture.

Wilson & Hayes is primarily a contractor to the U.S. Navy, and subcontractor to the private shipyard industry around the world.

Copies of the brochure may be obtained by contacting the company at 1601 Eastlake Avenue East, Seattle, Washington 98102.

TransOcean Oil Names Mayon And Suhor VPs

As a result of an expansion of TransOcean Oil Inc.'s petroleum operations on the North American continent, the Houston-based subsidiary of Swift & Co. has completed a major restructuring of its corporate organization.

R.E. Bennett, president, stated, "The move is designed to provide for more effective coordination of our expanding exploration and development activities, particularly in the Gulf of Mexico and in Canada."

The restructuring includes the appointment of two new vice-presidents—**Garrett A. Mayon** and **A.J. Suhor.**

The company's Canadian and offshore Louisiana exploration divisions have been consolidated into a single unit, the North American exploration division. **Stormy F. Smith,** a vice-president, is chief operating officer for all exploration operations.

The company's domestic division, which has been responsible for drilling and production operations in the United States, is now the North American producing division.

Mr. **Mayon,** as vice-president, production, is the chief operating officer for TransOcean's activities in this field. He was formerly domestic division manager.

Mr. **Suhor,** formerly secretary and treasurer, has assumed the additional title of vice-president. He is the firm's financial officer.

TransOcean Oil, formerly a part of the J. Ray McDermott & Co. organization, became a Swift subsidiary last April when the company, a leader in the meat packing industry, purchased 51 percent of the company's stock in a $83-million transaction.

Swift also has interests in insurance and chemicals.

Gladding-Hearn To Build Three Deck Cargo Barges For Corps Of Engineers

Gladding-Hearn Shipbuilding Corporation, 1 Riverside Avenue, Somerset, Mass. 02725, has been awarded an $82,998 contract for the construction of three deck cargo barges for the Corps of Engineers, 2nd and Chestnut Streets, Philadelphia, Pa. 19106.

NASSCO Launches LST-1192 And Lays Keel For Sister Ship

Principals at the launch/keel-laying ceremony included, left to right, the Honorable **Strom Thurmond,** (R) South Carolina, main speaker; **Mrs. Thurmond; J.E. Hughes,** vice-president and assistant general manager, Kaiser Engineers Division and National Steel vice-president and director; **Neville Holcombe,** attorney at law; Vice Adm. **Nels C. Johnson,** USN, Commander, Amphibious Forces, U.S. Pacific Fleet; **Miss Frances Holcombe,** maid of honor; **Mrs. Neville Holcombe,** sponsor; **John V. Banks,** National Steel Executive vice-president; Rear Adm. **John W. Dolan,** USN, representing Naval Ship Systems Command; Capt. **H.A. Gerdes,** USN, Supervisor of Shipbuilding, Conversion and Repair, 11ND, San Diego; **R.E. Bernard,** group vice-president, Kaiser Engineers Division, and National Steel Director, vice-president-treasurer, and assistant secretary; and Capt. **Henry T. Lavin,** CHC, USN, Senior Chaplain, Naval Amphibious Base, Coronado, Calif.

The Spartanburg County (LST-1192) was launched from the ways of National Steel and Shipbuilding Company, Harbor Drive at 28th Street, San Diego, Calif. 92112, on November 7, 1970, followed by the keel-laying of the Harlan County (LST-1196).

The Spartanburg County was sponsored by **Mrs. Neville Holcombe.** Her daughter, Frances, served as maid of honor.

Following the launch of the Spartanburg County, Rear Adm. **John B. Davis,** USN, Commander, Amphibious Training Command, U.S. Pacific Fleet, laid the keel of a sister ship, the Harlan County (LST-1196).

The main speaker for the launching was the Honorable **Strom Thurmond** (R), U.S. Senator from South Carolina. Others who participated in the dual ceremonies included Rear Adm. **John W. Dolan,** USN, representing Naval Ship Systems Command; Capt. **H.T. Lavin,** USN, Senior Chaplain, Naval Amphibious Base, Coronado, Calif.; Capt. **H.A. Gerdes,** USN, Supervisor of Shipbuilding, Conversion and Repair, USN, 11ND, San Diego, Calif.; **John V. Banks,** National Steel executive vice-president, and **John M. Murphy,** National Steel vice-president, sales.

The Spartanburg County is one of a new class of tank landing ships having a greatly increased combat vehicular lift and landing capability over those of World War II. Ships of her class afford the swiftest and most efficient means of landing tanks, artillery, and assault vehicles under combat conditions. The normal method of unloading will be over the ramp, to a pontoon causeway, and then to the beach. A stern ramp is also provided for loading and unloading amphibian vehicles in deep water.

The Spartanburg County has an overall length of 522 feet 3 inches, an extreme beam of 69 feet 6 inches, full load displacement of 8,000 tons, a mean draft of 14 feet 8 inches, and a speed in excess of 20 knots.

The main propulsion for each of the 17 tank landing ships built or under construction at National Steel and Shipbuilding consists of six Alco diesel engines 16-cylinder Model 251-C rated at 2,755 bhp at a nominal 1,000 rpm. The three ship service engines are Alco 8-cylinder Model 251-E driving General Electric generators. The 17 sister ships are twin-screw equipped with KaMeWa CP propellers furnished by Bird Johnson. Bird Johnson also supplied the 800-hp bow thrusters for all the vessels.

Approximately 2,000 spectators witnessed the colorful dual ceremonies.

Robert G. Stone Jr. To Head States Marine International

States Marine International, Inc., New York, announced that **Robert G. Stone Jr.** has been named its board chairman and chief executive officer. Mr. **Stone,** who has been serving as president of the company, succeeds **Henry D. Mercer,** who founded the unsubsidized steamship line in 1931 and who retired effective December 1.

States Marine owns 37 American-flag ships and charters a number of others, some of which sail under foreign flags.

Succeeding Mr. **Stone** as president will be **Douglas D. Mercer,** a 1957 graduate of the United States Merchant Marine Academy and vice-president since 1966.

A director of Chase Manhattan Bank, Republic Steel Corporation and Magnavox Company, Mr. **Stone** long has been a yachting enthusiast. In 1957, he headed the syndicate that built the yacht Weatherly, which successfully defended the America's Cup.

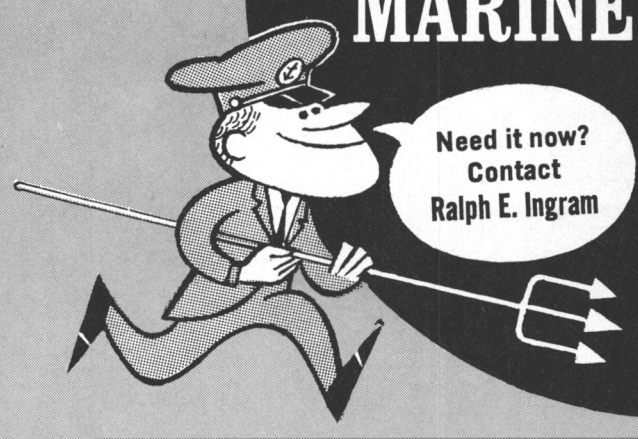
Mr. **Stone** is a board member of various businesses and educational institutions. He is chairman of Harvard University's Corporate Relations Committee.

Holland America/Hapag-Lloyd Plan To Start Joint Service

Holland America Line and Hapag-Lloyd A.G., to promote efficiency and achieve economic operation, have agreed to combine their activities between Europe and the U.S. Gulf and South Atlantic. Subject to approval by the U.S. Government authorities, they will start the joint service in April 1971, under the name of "Twinco Services." This service will offer frequent sailings with modern vessels equipped to also handle a sufficient amount of containers to adequately serve the trade. This will be supplemented in 1972 by two LASH vessels presently under construction in Belgium.

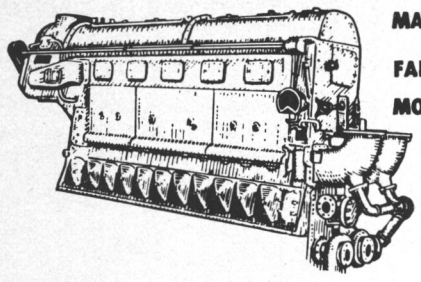
RED HOT BUYS from ZIDELL EXPLORATIONS, INC.

MARINE EQUIPMENT



(503) 228-8691
3121 S.W. Moody
Portland, Ore. 97201
Telex: 36-701

MARINE DIESEL ENGINES



MATCHED PAIR . . .

FAIRBANKS-MORSE

MODEL 38D8-⅛

1 Port;

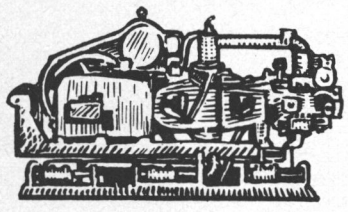
1 Starboard

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

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

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

AIR COMPRESSORS



JOY CLASS WG82

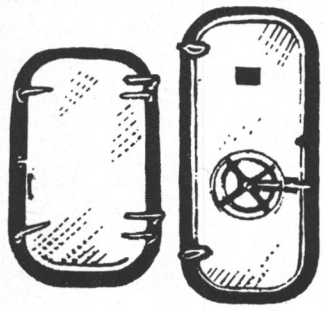
JOY, Class WG82, 2-stage rated 100 CFM at 300 PSI, water cooled, size 7"x3⅜"x7" with Reliance motor, 30 HP, 220/440/AC/3/60.

INGERSOLL-RAND, 50 CFM, 150 PSI, 20 HP, 440/3/60
INGERSOLL-RAND, 150 CFM, 600 PSI, Model 75, with Westinghouse Motors, 75 HP, 230 DC.
INGERSOLL-RAND, 50 CFM, 600 PSI, Model 30, with Westinghouse Motors, 15 HP, 230 DC.
CHICAGO-PNEUMATIC, 161 CFM, 100 PSI, 40 HP, 230 DC.
WESTINGHOUSE Air Brake, 246 CFM, 140 PSI, with 50 HP Motors, 440/3/60.
WORTHINGTON, 175 CFM, 125 PSI, with 50 HP Motors, 440/3/60.

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

WATERTIGHT DOORS

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



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

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

Other sizes and prices quoted on request.

REDUCTION GEARS . . .

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

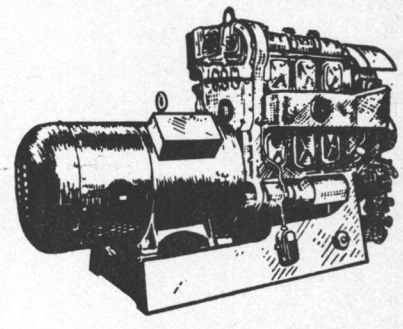
WESTINGHOUSE, as orig. used on two 1375 HP electric motors, in submarine, 2 pinions, single output gear, Pinion RPM 1302, Gear RPM 280; ratio 4.65:1.

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

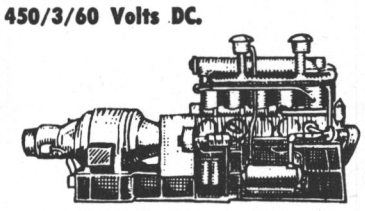
FALK REDUCTION GEARS . . . Port and Starboard, interchangeable with T-3 Tanker Gears, Falk No. 148-300. Also interchangeable with Falk Gears on A051 Class Tankers (14 ships). Also on A097 to A0100 Tankers.

MARINE DIESEL GENERATORS

SUPERIOR, 10 KW, 120 Volts DC.
HERCULES, D00C, 10 KW, 120 DC, Radiator cooled.
CATERPILLAR, radiator cooled, 15 KW, 120/240 Volts DC.
GM 4-71, 60 KW, 220/440 AC.
HERCULES DJXC, 25 KW, 120 DC.
CUMMINS A1, 30 KW, 120 DC.
MURPHY, Model ME 66, radiator cooled, 75 KW, 120/240 Volts DC.
CATERPILLAR DIESEL ENGINE, D13000, 85 KW, 220 AC.
LORIMER, F5SS, 75 KW, 120/240 DC, radiator cooled.
COOPER-BESSEMER, JS-5, 250 KW, 240 DC.
FAIRBANKS-MORSE, 38E5¼, 300 KW, 260/345 DC.
GM 8-268, 300 KW, 260/345 DC.

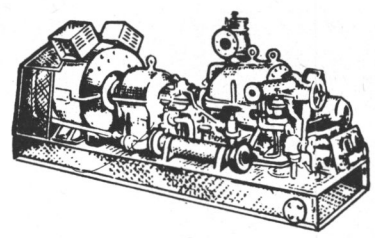


LORIMER 100 KW
450/3/60 Volts DC.



BUDA 6DHG691, 60 KW, 120 Volts DC.
GM-3-268A, 100 KW, 240/120 Volts DC.
SUPERIOR GBD-8, 100 KW, 240/120 Volts DC.
SUPERIOR, Model IDB-8, 100 KW, 450/3/60.
GENERAL MOTORS Model 3-268A, 152 BHP, 1200 RPM, with 100 KW Generators, 450 volts AC, 3 phase, 60 cycles.
GM 8-268A, radiator cooled, air start with Westinghouse Generator, 250 KW, 440/3/60, complete with switchboard.

TURBINE GENERATORS



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

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

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

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

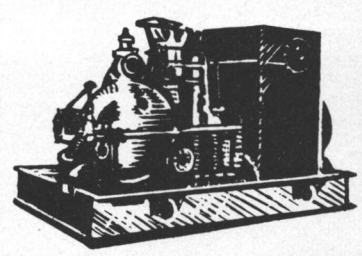
WORTHINGTON Turbines, Form S-4, 440 PSI, 740° F, with Crocker-Wheeler Generators, 300 KW, 120/240 Volts DC.

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

GENERAL ELECTRIC, DORV 325, 300 KW, 440/3/60.

GE DORV Turbines, with GE Generators, 200 KW, 440/3/60.

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



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BEST BUYS!

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MARINE PUMPS

ZIDELL

EXPLORATIONS, INC.

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Portland, Ore. 97201

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Ralph E. Ingram
(503) 228-8691
Telex: 36-701

AC PUMPS—Horizontal Centrifugal

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

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

4—Worthington, size 3UBI, 400 GPM, 280' head, 50 HP, 440 AC.

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

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

WORTHINGTON, 200 GPM, 100 PSI, 3½" suction, 3" discharge, with Wagner Motors, 25 HP, 440/3/60.

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

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

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

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

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

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

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

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

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

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

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

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

BOILER FEED PUMPS — TURBINE & ELECTRIC

4—Worthington, Vertical type, single acting, triplex, constant speed, size 2¼ x 4, 47 GPM, 525 PSI, with G.E. Motors, 20 HP, 230 Volts DC.

2—Worthington, 5" UFD, 460 GPM, 750 PSI, 5" suction, 5" discharge, driven by Sturtevant Steam Turbine, Size CC-22', Type 21, 2½" steam inlet, 5½" exhaust.

2—Aldrich Pump Co. Triplex, Vertical, Size 2½ x 4, 65 GPM, 575 PSI, with G.E. Motors, 25 HP, 230 Volts DC.

2—Ingersoll-Rand, 165 GPM, 575 PSI, with turbine drives.

TURBINE DRIVEN PUMPS — Various

2—Worthington, Size 20-LAL-18, Main Condenser, Centrifugal, 10500, 27' head, Vertical, with Whiton Turbines, 95 HP.

1—Ingersoll-Rand, Size 5UV, Centrifugal, Horizontal, 1200 GPM, 225' head, 6" suction, 5" discharge, with Elliot Turbine, 84.3 HP.

1—Worthington, Fire, Flushing & Emergency Bilge, Centrifugal, Horizontal, Rating—Fire: 500 GPM, 150 PSI, Flushing: 1000 GPM, 60 PSI, Bilge: 750 GPM, 25 PSI, 5½" suction, 4½" discharge, with Whiton Turbines, 72.9 HP.

1—DeLaval, Fuel Oil Transfer, Vertical, Rotary, 250 GPM, 150 PSI, 7" suction, 6" discharge, with DeLaval Turbine, 35 BHP.

8—Goulds Main Circulating, Vertical, Centrifugal, 3700 GPM, 13 PSI, Size 12", with Elliot Turbines, 30 HP.

2—DeLaval Fuel Oil Service, Vertical, Rotary, 50 GPM, 350 PSI, 3½" suction, 3½" discharge, with DeLaval Turbines, 14.4 HP.

4—DeLaval—IMO, L.O. Service, Vertical, Rotary, 300 GPM, 45 PSI, 6" suction, 6" discharge, with DeLaval Turbines, 14.1 HP.

8—Allis-Chalmers, Type SSC-V, 68 GPM, 114' head, 3" suction, 1½" discharge, with Carling Turbines, 7½ HP, 1750 RPM.

2—Warren, 85 GPM, 60 PSI, For Lube Oil Service, Turbine Driven.

2 — Warren, Main Circulating, 3500 GPM, 13.5 PSI, Turbine Driven.

AC PUMPS—Vertical Centrifugal

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

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

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

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

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

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

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

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

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

AC PUMPS—Horizontal Rotary

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

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

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

AC PUMPS—Vertical Rotary

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

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

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

DC PUMPS—Horizontal Centrifugal

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

DC PUMPS—Horizontal Centrifugal

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

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

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

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

DC PUMPS—Vertical Centrifugal

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

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

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

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

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

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

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

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

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

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

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

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

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

2—Worthington, Type 1½ UZS-3, 20 GPM, 75 PSI, with G.E. Motors, 5 HP, 230 Volts DC, 1800 RPM.

2—Weil, 20 GPM, 40 PSI, 1½" suction, 1¼" discharge, with G.E. Motors, 3 HP, 230 Volts DC.

DC PUMPS—Horizontal Rotary

3—Worthington, Size 5GES, 400 GPM, 50 PSI, with Westinghouse Motors, 20 HP, 230 Volts DC, 1750 RPM.

1—DeLaval, 15 GPM, 350 PSI, 2½" suction, 2½" discharge, with Diehl Motor, 10 HP, 230 Volts DC.

2—Viking, Type EKK, 60 GPM, 70 PSI, 2" suction, 2" discharge, with Diehl Motors, 5 HP, 230 Volts DC.

3—National Transit, 50 GPM, 50 PSI, 3" suction, 2½" discharge, 3 HP, 230 Volts

DC PUMPS—Vertical Rotary

6—Quimby, Size 5, 400 GPM, 60 PSI, 6" suction, 5" discharge, with Westinghouse Motors, 30 HP, 230 Volts DC.

3—Worthington, Model 4GRVS, 225 GPM, 35 PSI, with G.E. Motors, 15/20 HP, 230 Volts DC.

1—Quimby, Size 4, 175 GPM, with Electro Dynamic Motor, 7.5/10 HP, 230 Volts DC, 865/1150 RPM.

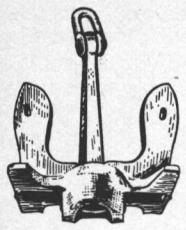
2—Worthington, Type 3GRVS, 90 GPM, 75 PSI, 2¾" suction, 2½" discharge, with Diehl Motors, 7½ HP, 230 Volts DC.

1—Quimby, Size 2, 8 GPM, with Electro Dynamic Motor, 2/5 HP, 230 Volts DC, 575/1150 RPM.

2—Worthington, Type 2GRVS, 7 GPM, 400 PSI, with G.E. Motors, 2½/5 HP, 230 Volts DC, 900/1800 RPM.

STOCKLESS ANCHORS

USED, GOOD QUALITY . . . SAVE!



2,000 pound size
3,000 pound size
8,000 pound size

ANCHOR CHAIN . . .

Used, good, with or without test certificate . . .

1″ size
1 1/8″ size
1 1/2″ size
1 3/8″ size
2 1/16″ size
2 1/4″ size

ANCHOR WINDLASS

1 LIDGERWOOD horizontal Anchor Windlass, double wildcat—for 2 1/16″ Chain, double gypsy, with 50 motors, 230 volts, DC, complete with controls.

1—Horizontal, of German Mfg., double wildcat—for use with 3″ anchor chain, double gypsy with 230 VDC motor, complete with electrical control equipment.

American Engineering, horizontal, double 2⅛″ Chain, 65 HP, 230 DC, complete.

7—American Hoist and Derrick Company, horizontal, double wildcat—for 2¼″ chain double gypsy, 70 HP, 230 Volts DC, with electric controls.

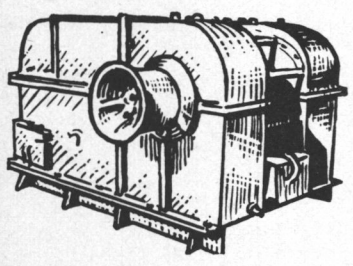
3—Hesse-Ersted, horizontal, double wildcat, 2⅛″ chain, 60 HP, 230 DC.

1—Hyde Horizontal Anchor Windlass double wildcat —for use with 2⅛″ Anchor Chain, and with General Motors Electric Motor, 60 HP, 230 volts DC, 560/1700 RPM, Type CDM 18831 AE. Complete with Contractor Panel, Resistors, and Master Switch.

ANCHOR WINCHES

2—Jaeger, single drum—capacity approximately 900′ of 1½″ wire rope, double gypsy, with 35 HP Motors, 230 Volts DC, complete with electricals.

UNIWINCHES



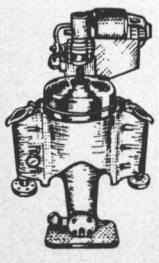
LAKESHORE UNWINCHES, with Allis-Chalmers Motors, 50 HP, 230 Volts DC, complete with Control Equipment.

Single speed, double drum, 7450 # at 220 FPM.

Single speed, single drum, 7450 # at 220 FPM.

Two speed, single drum, 7450 # at 220 FPM, 14400 # at 105 FPM.

CENTRIFUGES

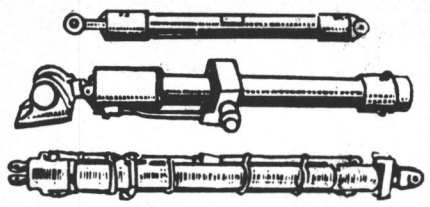


Sharples Purifiers—For Diesel Service or for Lube Oil Service.

150 GPH—440 AC, 230 DC
350 GPH—230 DC
600 GPH—230 DC

ALSO: De Laval, Size 65N131, 1½ HP, 440 AC.

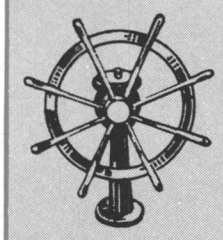
HYDRAULIC CYLINDERS



3000 PSI

Bore	Stroke	Rod Diameter	Overall retracted length	Action
10″	12″	3.75″	45½″	double
10″	26″	3.75″	58½″	single
2″	8″	1½″	20″	double
2.5″	15″	1.12″	25½″	double
3″	8″	1.37″	15½″	double
6″	8′	4″	144″	double
13″	9′7″	5½″	14′	double

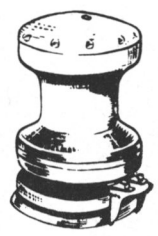
STEERING STANDS



Brass Steering Stands. Complete with angle indicator on top, used, 11″ base diameter by 35½″ high, and with 42″ overall, 8-spoke brass steering wheel.

$239.50 each

CAPSTAN WINDLASSES

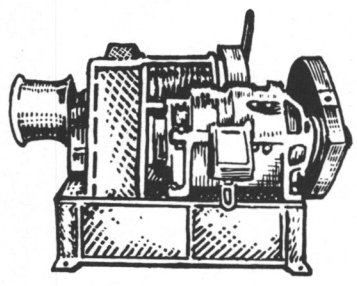


Model CWP-3, Vertical 24″ Planetary Capstan Windlasses, Single Wildcat — using 1¼″ Anchor Chain, Single Gypsy with 20 HP motor, 230 volts DC, complete with Contactor Panel, Master Switch, and Resistors.

3—Hesse-Ersted Vertical, Single Wildcat—for 1⅜″ Anchor Chain, single gypsy, with HP General Electric Motor, 230 Volts DC, complete with Controller equipment.

Hyde, Vertical, Single Wildcat, for 1⅛″ Anchor Chain, single gypsy, with 20/5 HP Motor, 440/3/60.

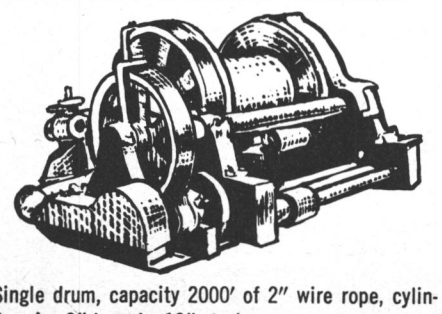
CARGO WINCHES



American Hoist and Derrick Company Winches with Westinghouse Motors, 50 HP, 230 Volts DC, complete with Contractor Panels, Master Switches, and Resistors.

Type 66—single speed, single drum.
Type 67—two speed, single drum.

STEAM TOWING WINCH



Single drum, capacity 2000′ of 2″ wire rope, cylinder size 9″ bore by 10″ stroke.

Contact Ralph E. Ingram

IMMEDIATE DELIVERY

on all your needs!

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3121 S.W. Moody
Portland, Ore. 97201
Telex: 36-701

FAIRLEADS

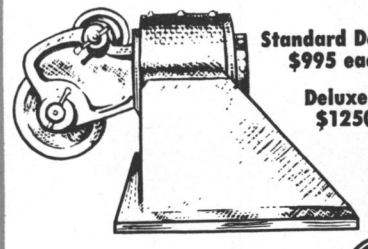
Designed and Manufactured by ZIDELL EXPLORATIONS, INC.

To Give You These Features:

One size fairlead with universal type sheave to accommodate wire rope sizes 1″ up to and including 2″.

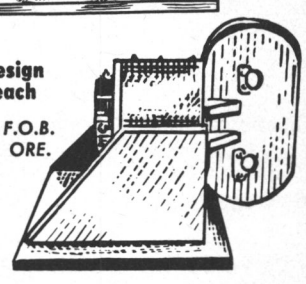
Self Aligning, Swivel Type Head.

Dependable and Ruggedly built to perform consistently year after year with minimum maintenance.



Standard Design $995 each

Deluxe Design $1250 each

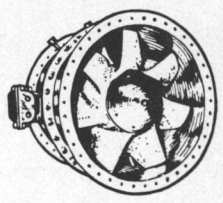


Model Design $1350 each

PRICES ARE F.O.B. PORTLAND, ORE.

AXIAL FLOW FANS

Rebuilt—Guaranteed



LaDel, STURTEVANT etc.

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

EXAMPLE LISTING:

Size A¼	Size A5
Size A½	Size A6
Size A1	Size A8
Size A2	Size A10
Size A3	Size A12
Size A4	Size A16

SPECIAL ITEMS

COUPLINGS

(Flexible Couplings betwen Turbines and Reducing Gear)

1—Set from C3-S1-A3 Vessel
1—Set from C2-S-B1 (Moore built)
1—Set from AP2 Victory Ship

PROPELLERS

From C3-S1-A3 Vessel
From AP2 Victory
From C2-S1-B1 Vessel
From Liberty Ships and LST Vessels

PROPELLER SHAFTS

From C3-S1-A3 Vessel
From C2-S-B1 Vessel (Moore built)
From AP2 Victory
From Liberty Ships

SPERRY GYRO COMPASSES

SPERRY MARK 14, Model 1 Gyro Compasses, used, good, complete with Master Compass, with Binnacle, Amplifier panel, control panel, carbon pile voltage regulator, motor generator set, alarm panel, repeater panel, and repeaters with mounts.

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Machinery and Equipment

FOR IMMEDIATE SALE

as removed from
S.S. JAMES O'HARA
(AP-179) C3-S1-A3
and **S.S. FREDERICK FUNSTON**

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EXPLORATIONS, INC.
3121 S.W. Moody
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MACHINERY AND EQUIPMENT FROM C2-S-B1 SHIPS

TURBINES, High Pressure and Low Pressure, manufactured by G.E., develop 6,000 HP (2 sets Available)

REDUCTION GEARS, G.E., 6,000 HP, RPM 6072-4048-882-92 (2 available)

MAIN CONDENSERS, Worthington, 5500 sq. ft. (2)

LUBE OIL PURIFIERS, De Laval, Model 55-13, 2 HP, 230 DC.

MAIN FEED PUMP, Worthington, Size 4 x 6, 35/50 HP, 230 DC (2)

AUXILIARY FEED PUMP, Worthington, steam, Size 11 x 7 x 24 (2)

PORT FEED PUMP, Worthington, steam, Size 9½ x 6 x 24 (2)

AUXILIARY CIRCULATING PUMP, Worthington, Size 8LS-1, 1240 GPM, 24.6' head, 10 HP, 230 DC (6)

MAIN CONDENSATE PUMP, Worthington, Size 2½-UZ-1, 120 GPM, 208 TDH, 15 HP, 230 DC (6)

AUXILIARY CIRCULATING PUMP, Worthington, Size 1½-UZS-3, 20 GPM, 208 TDH, 5 HP, 230 DC (6)

LUBE OIL SERVICE PUMP, De Laval-Imo, 250 GPM, 40 PSI, 15 HP, 230 DC (2)

LUBE OIL SERVICE STANDBY PUMP, Worthington, steam, Size 5½ x 2¾ x 6 (2)

FUEL OIL TRANSFER PUMP, De Laval, 225 GPM, 50 PSI, 15 HP, 230 DC (2)

FIRE PUMP, Worthington, Size 3-UBS-1, 400 GPM, 280' head, 50 HP, 230 DC (2)

STANDBY FIRE PUMP, Worthington, Steam, Size 12 x 11 x 18 (2)

BILGE PUMP, Worthington, Size 5LS-1, 415 GPM, 78.5 TDM, 20 HP, 230 DC (2)

BALLAST PUMP, Worthington, Size 5LS-1, 415 GPM, 78.5 TDM, 20 HP, 230 DC (2)

GENERAL SERVICE PUMP, Worthington, Steam, Size 10 x 11 x 18 (2)

SANITARY PUMP, Worthington, Size 2½ x 2, 2HP, 230 DC (4)

DRINKING WATER PUMPS, Size 2⅛ x 2, ¾ HP, 230 DC (4)

VACUUM PRIMING PUMPS, size MD537, 1½HP, 230 DC (4)

FORCED DRAFT FAN, Size 3½ AHS, 7880/5970 CFM, S.P.—6.2/14 with G.E. motors 5/25 HP, 230 DC, 1910/3120 RPM (7)

STEERING GEAR WATERBURY PUMP, Type A, Size 5, with 20 HP G.E. motor, 230 DC (4)

Also Machinery and Equipment from VC2-S-AP2 VICTORY SHIPS

CARGO HOISTER BLOCKS

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

$34.50 each

$39.50 each with pull test certificates.

We have Bull Gear and matching Pinions for C3 FALK REDUCTION GEARS

HP TURBINE, Allis-Chalmers, Impulse Reaction type, 5003 RPM, 740° F, 440 PSI, Serial #1737.

LP TURBINE, Allis-Chalmers, Straight Reaction, Type, 4289 RPM, 740° F, 440 PSI, Serial #1738.

CARGO WINCHES

Jaeger, 2 drum, 2 speed, 50 HP, 230 DC.

Parkersburg, 2 drum, 1 speed, 50 HP, 230 DC.

O.C.S., 2 drum, 1 speed 50 HP, 230 DC.

Vulcan, 1 drum, 2 speed, 50 HP, 230 DC.

American Hoist & Derrick, 1 speed, 1 drum, 50 HP, 230 DC.

LAKESHORE TOPPING WINCHES, single speed, capacity 10,000 # at 67 FPM, 5 HP, 230 DC.

ANCHOR WINDLASS, Markey, Type CWA-4, horizontal, double wildcat—for 2 5/16" anchor chain, 70 HP, 230 DC.

FUEL OIL STANDBY PUMP, Worthington, horizontal duplex, Size 5½" x 3" x 6", 13 GPM, 410 PSI.

GENERAL SERVICE PUMP, Worthington, vertical simplex, Size 12 x 14 x 18, 600 GPM, 50 PSI.

BOILER FEED PUMP, Worthington Auxiliary, vertical simplex, Size 11 x 7 x 24, 120 GPM, 550 PSI.

FRESH WATER PUMPS, 2—Worthington, Size 4x6, horizontal duplex, 100 GPM, 80 PSI, 7½ HP, 230 DC.

BALLAST PUMP, Allis-Chalmers, Type SGV, Size 5 x 5, vertical centrifugal, 600 GPM, 30 PSI, 20 HP, 230 DC.

SUBMERSIBLE BILGE PUMPS, 2—Worthington, 5", vertical centrifugal, 600 GPM, 30 PSI, 20 HP, 230 DC.

BILGE PUMP, Allis-Chalmers, Size 5 x 5, Type SGV, vertical centrifugal, 600 GPM, 30 PSI, 20 HP, 230 DC.

EVAPORATOR TUBE NEST DRAIN PUMPS, 2—Allis-Chalmers, Type SS-LH, horizontal, Size 2½ x 2, 17 GPM, 127' head, 5 HP, 230 DC.

MAIN CONDENSATE PUMPS, 2—Allis-Chalmers, Type CF-2V, vertical volute, Size 6 x 3½, 170 GPM, 208' head, 20 HP, 230 DC.

DISTILLER CONDENSATE PUMPS, 2 — Allis-Chalmers, Type SS-L, horizontal centrifugal, Size 4 x 2, 45 GPM, 2 HP, 230 DC.

AUXILIARY CONDENSATE PUMPS, 2—Allis-Chalmers, Type CF-2V, vertical volute, Size 2½ x 1½, 30 GPM, 208' head, 7½ HP, 230 DC.

DIESEL OIL PUMP, Viking, Type ZKK, gear type, Size 3 x 2½, 40 GPM, 30 PSI, 2 HP, 230 DC.

DISTILLER FRESH WATER DISTRIBUTION PUMPS, 2—Allis-Chalmers, Type SS-DH, horizontal centrifugal, Size 2½ x 2, 55 GPM, 51' head, 2 HP, 230 DC.

FIRE PUMPS, 2—Allis-Chalmers, Type B2-V, vertical centrifugal, Size 4 x 3, 400 GPM, 280' head, 50 HP, 230 DC.

MAIN FEED PUMP, Terry Turbine, Type ZS-1, 124 HP, with Ingersoll-Rand horizontal pump, Size 4 x 3½, 4 stage, 250 GPM, 1340' head.

STEERING GEAR PUMP, Waterbury, Size 5, Type K, with Westinghouse Motor, 55 HP, 230 Volts DC.

LUBE OIL SERVICE PUMPS, 2—Quimby, vertical screw, Size 5, 400 GPM, 48 PSI, 6 x 5, 25 HP, 230 DC.

FUEL OIL TRANSFER PUMP, Quimby, vertical screw, Size 4D, 225 GPM, 50 PSI, 15 HP, 230 DC.

FUEL OIL SERVICE PUMP, Quimby, vertical screw, Size 2½, 20 GPM, 400 PSI, 2½ x 1½, 10 HP, 230 DC.

ICE WATER CIRCULATING PUMP, Allis-Chalmers, Type SS-RH, 10 GPM, 81' head, 1" x ¾", vertical volute, 1 HP, 230 DC.

HOT WATER CIRCULATING PUMP, Allis-Chalmers, Type SS-HH, 35 GPM, 70' head, 1¼ x 1¼, vertical volute, 2 HP, 230 DC.

REFRIGERATION CONDENSER CIRCULATING PUMPS, 2—Allis-Chalmers, Type SJK, 180 GPM, 81' head, 2½ x 2, horizontal volute, 7½ HP, 230 DC.

MAIN CONDENSER CIRCULATING PUMP, Allis-Chalmers, Type LS-V, 12,550 GPM, 20' head, 20 x 20, vertical volute, 100 HP, 230 DC.

AUXILIARY DISTILLER CIRCULATING PUMPS, 2—Allis-Chalmers, Type SG, 650 GPM, 29' head, 5 x 5, horizontal volute, 7½ HP, 230 DC.

AUXILIARY CONDENSER CIRCULATING PUMPS, 2—Allis-Chalmers, Type SE-V, 2820 GPM, 29.2' head, 12 x 12, vertical volute, 40 HP, 230 DC.

FORCED DRAFT BLOWERS, —American Blower, Sirocco capacity 17560 CFM, 5½ SP, 75 HP, 230 DC.

FORGED STEEL LINE SHAFTING

ZIDELL has some Excellent Buys on used—Good Shafting, as shown listed below, for Re-Machining to your specific requirements.

9 Pieces Hollow, 2¼" Wall, 9" Diam, 23'-11" L.

SECTIONS LISTED BELOW ARE SOLID STEEL

11 Sections Flanged, 8⅛" Diam., 16'-6¼" Long
6 Sections Flanged, 8¾" Diam., 27'-4" Long
6 Sections Flanged, 19" Diameter, 23'-11" Long
1 Section Flanged, 19" Diameter, 23'-8" Long
3 Sections Flanged, 19" Diameter, 22'-10" Long
12 Sections Flanged, 19" Diameter, 22'-6" Long
6 Sections Flanged, 14⅛" Diam., 26'-6" Long
2 Sections Flanged, 14⅛" Diam., 18'-6" Long
2 Sections Flanged, 14⅛" Diam., 13'-9" Long
39 Sections Flanged, 13½" Diam., 22'-0" Long
9 Sections Flanged, 15¼" Diam., 12'-0" Long

OVERHAULED—TESTED

SALT WATER EVAPORATORS

Used, Davis Engineering or equal, with ABS and/or Coast Guard certification. 5 sizes available:

SIZE 48-23 **SIZE 26-8**
SIZE 36-17 **SIZE 20-5**
SIZE 36-14

PROMPT QUOTATIONS & DELIVERY

CLYDE 17-DE-90 WHIRLEY CRANE

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

Track Centers: 20′—Engine: Cummins HBIS 601, 180 HP supercharged, elec. start—

Motors: Each leg (4 tot.) 7½ HP, 230 DC.—

Power: Diesel electric (DC)

ELECTRIC MOTORS

230 VOLT D.C. MOTORS

1—250 HP, G.E., Type CY, Form HJ, Model 24G, 1200 RPM Horizontal, 2 B.B., Shunt Wd.

2—220 HP, G.E., Type CDM—1348S, Form HA, Model 25G 339, 1800 RPM, Stab. Sh. Wd. Horizontal, 2 B.B.

6—100 HP, Westinghouse, Type SK, FR. 163, Style 1B4631, 1150 RPM, Shunt Wd. Horizontal, 2 B.B.

2—55 HP, Electro-Dynamic, FR 25-SL, 550 RPM, Compound Wound, Single Ball Bearing. Originally for high pressure Air Compressor.

6—50 HP, Westinghouse, 600 RPM, Compd. Wd., Type CK, FR 9, Horizontal, 2 B.B.

1—40 HP, Allis-Chalmers, 1750 RMP, Compound Wound, Horizontal, 2 B.B.

1—65 HP, Westinghouse, 560 RPM, Type CK, Frame 10, 260 Amperes, B.B., D.P., Compound Wound.

2—220 HP, G.E., 1800 RPM, Type CDM-13485, Model 25G339, 775 Amperes, B.B., D.P., Stab. Shunt.

4—9.3 HP, Westinghouse, 640/852 RPM, Type SK, FR. 93.

120 VOLT D.C. MOTORS

1—304 HP, Westinghouse, 900 RPM, Shunt Wound, Horizontal, Pedestal Bearing.

3—25 HP, G.E., Type CDM, 1200 RPM, Horizontal, 2 B.B., unused. Removed from M.G. Sets.

6—7½ HP, Westinghouse Type SR, FR 43, Stab. Sh. Wd., 1750 RPM.

STEERING GEAR MOTORS

2—General Electric, 30 HP, 230 V, DC, 600 RPM, Stab. Sh. Wd., Type CDM, Fields Continuous Duty, Armature 1 Hr.

1—Westinghouse, 35 HP, 230 V, DC, 850 RPM, Stab. Sh. Wd., Type SK, Fr. 123, Fields Continuous Duty, Armature 1 Hr.

SHIP'S LIGHTING M-E SETS

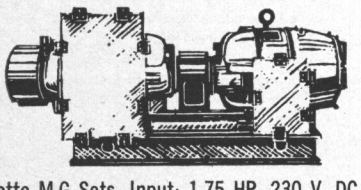
230 V, DC/115 V, DC. Ship's Lighting M.G. Sets for C3-S1-A-3 150 K.W. and Moore built C2 100 K.W.

SPECIAL D.C. GENERATORS

3—Unused, G.E., 15 KW, 100 A, 15 V, Type CDM, 1200 RPM, 2 B.B., D.P. Generators.

MOTOR-GENERATOR SETS

Unused Surplus in Original Boxes



Janette M-G Sets. Input: 1.75 HP, 230 V, DC, 7.2 Amperes, 1800 RPM. Output: 1-KVA (.85 KW), 115/1/60, 4 ball bearing, with speed regulator, and with noise filters. Navy Type CJM-21151, continuous duty. Net weight 435#, Dimensions 44″ L, 19½″ W, 18⅝″ H. Instruction book and parts list included.

D.C. MARINE CONTROLLERS

1—Cutler-Hammer, 250 HP, 230 V, DC, No. 232 793A14.

2—General Electric, 225 HP, 230 V, DC, CR 5430-B32D.

6—Westinghouse, 100 HP, 230 V, DC, Type 8585A SO-1B4636.

1—Cutler-Hammer, Unused, 50 HP, 230 V, DC, No. C280981A290, Contactor Panel for Stern Anchor Haulage Winch. Many others from ¼ HP and up—115 and 230 V.

CIRCUIT BREAKERS

2 and 3 Pole Air Breakers, 2 and 3 Pole Molded Case Navy Type Breakers, 2 and 3 Pole Trip Elements for Molded Case Breakers.

Zidell's for D.C. Generators

. . . This is a partial list of Westinghouse, General Electric, Delco, Allis-Chalmers generators . . . for every purpose . . . at the right price!

2—500 KW, 120/240 V, Westinghouse FR. CB813.7, 750 RPM, 2 Pedestal Bearing, with Balance Coils. Removed from GM 8-278 Engines.

2—250 KW, 120/240 V, Westinghouse, 1200 RPM, Single Pedestal Bearings. Balance Coils not available, Type 12S18P107PH, removed from Turbines.

2—150 KW, 120 V, G.E., Type CDM-1348-S, Form HA, Model 25G 340, 1800 RPM, Compound Wound, Horizontal 2 B.B.

1—150, 120 V, G.E., Type CDM, Form AA, Model 24G, 1200 RPM, Compound Wound, Horizontal, 2 B.B.

6—100 KW, 120/240 V, Westinghouse, Type SK, FR. 143.8, 1800 RPM, Single Ball Bearings. Balance Coils available.

3—100 KW, 120/240 V, Delco, 1200 RPM, Single Bushed Bearings, with Balance Coils. Removed from Superior GDB-8 Engines.

1—100 KW, 120/240 V, Allis-Chalmers, 1200 RPM, Single Sleeve Bearing, Shunt Wound, Type 4-14-45-13, removed from GM 3-268A Engine.

10—90/165 KW, Westinghouse, 125/400 Volt, Type SK, FR. 185, Shunt Wound, separately excited (120 V), 1200 RPM, Horizontal, 2 B.B.

4—75 KW, 120 V, G.E., Type CDM-1234, Mod. 24GA71, 1200 RPM, 2 Ball Bearing, Tapered Shaft. Removed from Motor-Generator Sets.

6—60 KW, 120 V, Westinghouse, Type SK, FR 143, Style 3B2855-PH, 1800 RPM, 1 B.B. Removed from Turbines.

6—60 KW, 120 V, Westinghouse, Type SK, FR. 153-L, Style 1B4632, 1200 RPM, Compound Wound, Horizontal, 2 B.B.

A.C. OR D.C. M-G SETS

From 250 Watts to 500 KW in 115 Volt, 230 Volt and 120/240 Volt, 3 Wire DC. Any drive including Synchronous Motor. Let us have your inquiries.

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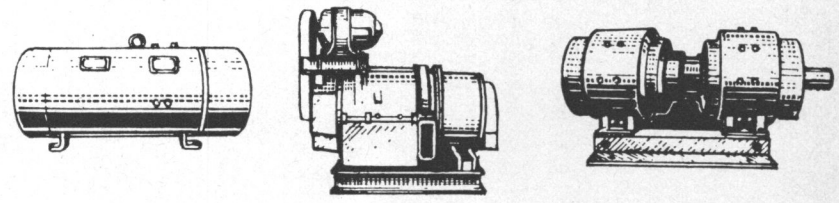
RECONDITIONED MOTOR GENERATOR SETS



MANY SMALLER UNITS IN STOCK

Bogue. Input: 230 V, DC, 57A, 15 HP. Output: 10 KVA, PF .8, 120 V, 60 cy., 1Ø.

Fidelity. Input: 15 HP, 230 V, DC. Output: 12.5 KVA, 10 KW, 120/1/60.

Bogue Electric. Input: 15 HP, 230 V, DC. Output: 12.5 KVA, 10 KW, 120/1/60.

Burke Electric. Input: 20 HP, 230 V, DC. Output: 25 KVA, 12.5 KW, 120/1/60.

Star Kimble. Input: 30 HP, 230 V, DC. Output: 25 KVA, 20 KW, 120/1/60.

Ideal. Input: 40 HP, 230 V, DC. Output: 31.3 KVA, 25 KW, 450/3/60.

Star. Elec. Input: 40 HP, 230 V, DC. Output: 33.4 KVA, 25 KW, 450/3/60.

General Elec. Input: 230 V, DC, 40 HP. Output: 25 KW, 480 V, 60 cy., 3Ø, 34A, 1800 RPM.

Star Elec. Input: 125 HP, 240 V, DC, Output: 93.75 KVA, 75 KW, 450/3/60.

Marathon. Input: 1 HP, 115 V, DC, Output: .500 KVA, .425 KW, 115/1/60.

Bludworth. Input: .75 HP, 115 V, DC, Output: .500 KVA, .450 KW, 115/1/60.

Century. Input: 1.5 HP, 115 V, DC. Output: .750 KVA, .600 KW, 125/1/60.

Elect. Prod. Input: 1.5 HP, 115 V, DC. Output: 1 KVA, 115/1/60.

Allis-Chalmers. Input: 14 Amp, 115 V, DC. Output: 1.250 KVA, 1 KW, 115/1/60.

Cont. Elect. Input: 6 HP, 115 V, DC. Output: 2.9 KW, 440/3/60.

Louis Allis. Input. 10 HP, 105/130 V, DC, Output: 7.5 KVA, 440/3/60.

Cont. Elect. Input: 12 HP, 120 V, DC. Output: 7.5 KVA, 440/3/60.

Continental. Input: 50 HP, 115 V, DC. Output: 50 KVA, 25 KW, 120/3/60.

Need 3 Wire 120/240 Volts DC for Shore Power? Motor-Generator Sets and Engine Driven Units from 15 KW to 500 KW . . . Let us quote.

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1800 HP. Built 1956 Price $300,000.

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270 x 39 x 10.6. Price $35,000.

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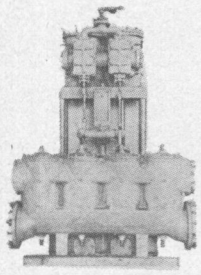

1400 G.P.M. at 110 P.S.I. —suction lift 11.5 feet— steam back pressure 15 pounds. 14" Suction—10" Discharge—2½" Steam—4" Exhaust. Overall Width 6'8"—Overall Height 9' 1½" — Depth 3'9½" — Weight approximately 10,000 pounds.

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With A.B.S. Certificates

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G.E. DS 60	300 KW
Worthington	300 KW
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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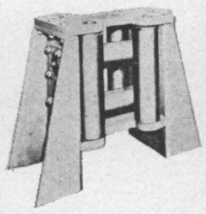

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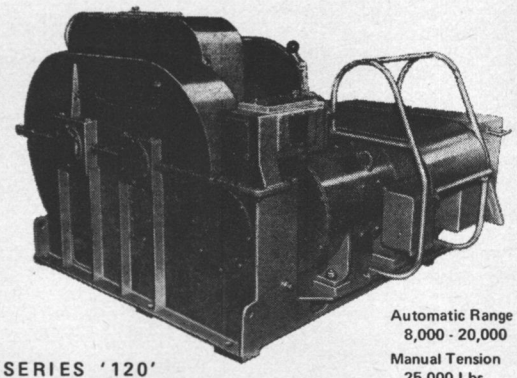
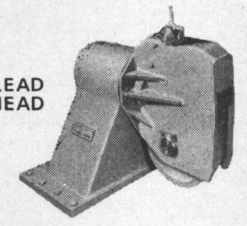
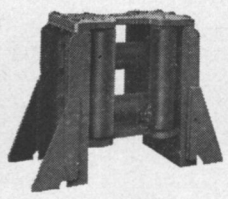


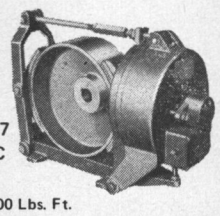
Automatic Range 8,000 - 20,000
Manual Tension 25,000 Lbs.

SERIES '120'
AUTOMATIC TENSION
MOORING WINCH

SWIVEL FAIRLEAD
BALANCED HEAD







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PRINCIPAL DIMENSIONS

Registered Length	107 feet	Depth	8 feet
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Built 1942	at West Atlantic City, New Jersey		
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Two Engines 8-268-A, 8-A, 6½"x7"			2 Cycle

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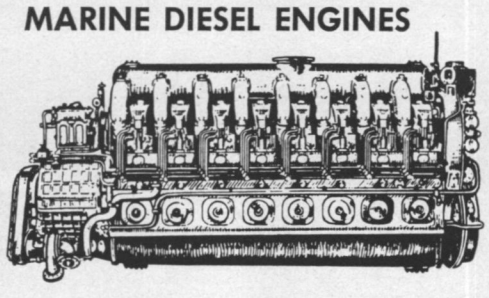
BECAUSE THE
DIESEL PRICE IS DOWN

4–General Motors
MARINE DIESEL ENGINES

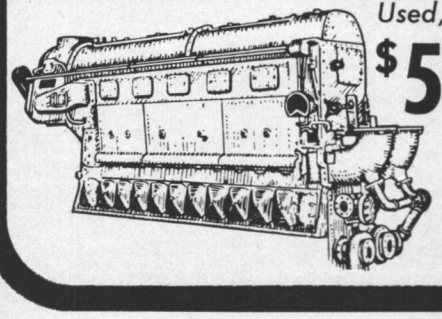


4—G.M. Model 16-278, 16 Cylinders, 1600 H.P., 750 RPM Used, Very Good **$3950 ea.**

Contact: Ralph Ingram

12–Fairbanks-Morse
MARINE DIESEL ENGINES

Model 38D8 - ⅛, 10 Cylinders, 1600 H.P., 720 RPM, 8½" Bore, 10" Stroke, Air Start. Condition:



Used, Very Good
$5000 ea.

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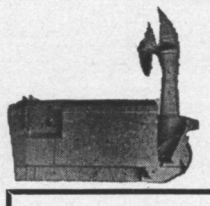
MODEL O-2-D M&T UNITS RECONDITIONED



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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Reconditioned with A.B.S. Certificate
Ingalls Hull #267

STEERING UNIT PUMPS
Hele-Shaw Pump, Size 11P12, RPM 850
Pressure 1000, Westinghouse Motor
Type CS 440 Volt, 35 HP 880 RPM
49 Amps, 3 Phase 60 Cyl.

TOPPING WINCHES
Lakeshore Type T Model 5D
Single Speed, General Electric 5 HP,
Model 5AR254960, 440/3/60,
1100 RPM

CARGO WINCHES
Single Drum, Single Speed,
General Electric, COM-1830-AEY,
230 Volt DC Motor

GENERATOR SETS
General Electric, 440 Volt AC/230 Volt DC, G.E. Model 6PC2096A1,
Motor Type K, Frame 405S, 1770 RPM

FUEL OIL PUMPS
Quimby Pump, Size 2½, RPM 1150,
GPM 15, Press 325, General Electric,
Model 5KF364PPI, 440 Volt 7½/3¾ HP,
1160/580 RPM

C-4 S1A TURBINE
Bethlehem 17,500 SHP
Low Pressure, Complete
Falk Reduction Gear, 17,500 Shaft HP,
102 RPM Output, Complete with spares

GENERAL ELECTRIC
Rebuilt Starter Boxes, 440 Volts,
From 2 HP to 50 HP

MAIN CONDENSATE PUMPS
Ingersoll Rand, Type 2 VHM, 180 GPM,
Westinghouse Motor, 440 Volts 25 HP,
1750 RPM 32-5 Amps

T-2 NEW • UNUSED
General Electric, 6000 HP, AC Motor
New-unused, Type TSM-HL-80,
Synchronous Type, 2300 Volts, 60 Cycles, 3 Phase, 1160 Amps 90 RPM

MAIN PROPULSION TURBINE ROTORS
Reconditioned with A.B.S. Certificate

C-2 SB1 BRONZE PROPELLER

C-2 SB1 RUDDERS

5, 10 AND 30 TON BOOMS

CARGO WINCHES
Nine pair, Single Drum, Single Speed,
General Electric, COM-1830-AEY,
230 Volt DC Motor

GENERAL ELECTRIC 300 KW. DC
TURBO GENERATOR
Generators: 300 KW DC, 120/240 Volts, 1200 RPM, 1250 Amps, Type MPC, Model 24G869, 3 Wire, Compound Wound
Turbines: Type DS 60-25, 5636 RPM, 440 PSI, 40 F.
Reduction Gears: Ratio: 5636/1200 RPM
Completely rebuilt, A.B.S. Certificate

GENERATOR SETS
General Electric, Seven Each,
440 Volt AC/230 Volt DC,
G.E. Model 6PC2096A1, Motor Type K,
Frame 405S, 1770 RPM

CIRCULATING PUMPS
Warren Main, Type 24 MFP,
18,000 GPM, 690 RPM, 16 Foot TDH,
Vertical with 150/38 HP
440/3/60 Motor with Spare Parts

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CONDENSATE PUMP
Warren Main, Type 4-2CVP-10,
325 GPM, 50 RPM, 180 Foot TDH,
Vertical with 25 HP, 440/3/60 Motor

SUPERHEATER HEADERS
For Port-Boiler, CE Type V2M (two each)
For Starboard-Boiler,
CE Type V2M (two each)

BOILER HEADERS
For Port-Boiler, CE Type V2M
(three each)
For Starboard-Boiler (three each)

TURBINES
Dorv 325/525 KW, G.E. 325/300 KW
Worthington 300 KW
Main Turbine Rotor for T-2 (6000 HP)

ANCHOR WINDLASS
Manufactured by Webster Brinkley Co. Model WNE-5 Vertical Type $2^{3}/_{16}$" Die Lock Chain. Two Wildcats. Two Capstans
Electric Powered 75 HP 230 Volt DC Motor with controls and motor brakes
Capstans designed for 10" circumference rope 90 FPM under load of 20,000 lbs
Each wildcat and capstan can be operated simultaneously or separately
Electrical and Mechanical spares included

Fairbanks Morse Model 38D 1/8 1600 HP diesel engines with common Farrell-Birmingham gear 2.677:(270 RPM). Complete with all accessories, including heat exchangers, air compressors, air tanks, mufflers, filters, strainers, etc. Bearings and auxiliary generator sets also available
Few hours since engines fully rebuilt at cost of approximately $125,000
Engine logs available

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C-3 with ABS
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General Motors Diesel Engine

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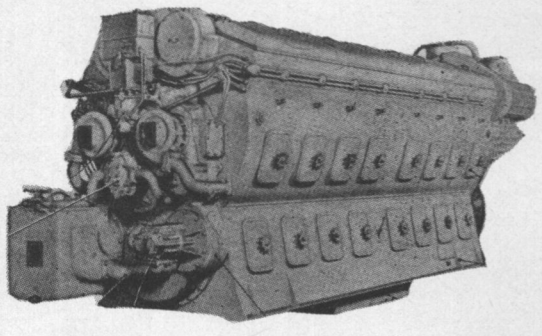

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50 — 6" size 20' long sections with flanged ends, in little used, good condition.
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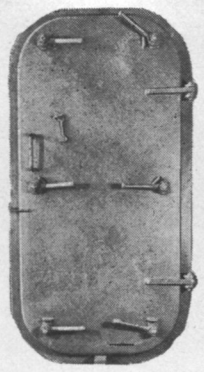

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IMMEDIATE DELIVERY

6-Dog right and left hand hinged steel doors — with frames. Built and tested to A.B.S. specifications.

SIZES:

26" x 48" **26" x 57"**
26" x 60" **26" x 66"**
30" x 60"

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UNUSED SURPLUS 1 KVA SETS

INPUT: 1.75 HP—115 Volts DC—17 amps—1800 RPM. OUTPUT: 1 KVA—115 volts—8.7 amps—60 cycle single phase—0.9 PF. Unit is self-excited and will carry load immediately on starting. Regulation ±5%. Complete with magnetic starter & spare parts. Units designed and built to rigid Navy specs. SIZE: 19.5" long—26.5" wide—16" high. Weight 285 lbs. SPARES: 85 lbs. CONTROL: 20"X15"X10"—75 lbs.

$239.50

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400 KW TURBO-GENERATORS

Turbine:
G.E. DORV 618—440 PSI—457° Superheat

Gear:
S 193 Form A—10059/1200 RPM

Generator:
400 KW—120/240 V DC—Type MPC—1200 RPM

6 Available — Excellent Condition
Suitable for Upgrading to 600 KW

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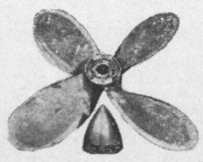

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AP3—Victory—with ABS—located Baltimore.
C-1MAV-1 — with ABS — located Beaumont, Texas

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C-3—reconditioned—with ABS—located Baltimore
C-1MAV-1—with ABS—located Beaumont, Texas

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C-1MAV-1—new—unused
VICTORY—reconditioned
T-2 As removed from vessel. Good. Subject to your survey.

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Motor Generator Sets

GENERATOR

MFR.	HP	VOLTS	RPM	TYPE	AMPS
Ideal Elec.	150	230	1200	D-28	534
Ideal Elec.	150	230	1200	D-28	534
Ideal Elec.	40	230	1800	D	145
U. S. Elec.	150	440	1200	SC	198
Reliance	93.6	115	1750	TDC	690
Burke	20	230	1880	M6115	79.6
(W)	3.5	230	1780	CC212.30B	13.8
(W)	3.5	220/440	1750	CC212.31B	10.45.2
Holtzer	2	115	1460	MG133	14
Gen. Elec.	85	440	1765	5K505Y5	108
Gen. Elec.	85	440	1765	5K505Y5	108
Ideal Elec.	40	115	1800	D	290
Ideal Elec.	40	115	1800	D	290

MOTOR

MFR.	KW	VOLTS	RPM	AMPS
Ideal Elec.	100	450	1200	160
Ideal Elec.	100	450	1200	160
Ideal Elec.	25	450	1800	40
Delco	100	120/240	1200	417
Reliance	62.8	230	1750	273
Burke	25 KVA	120	1880	120
(W)	1.4	2000	1780	0.7
(W)	1.4	2000	1750	0.7
Holtzer	190	24	1460	70
Gen. Elec.	60	110	1765	545
Gen. Elec.	60	110	1765	545
Ideal Elec.	25	450	1800	40
Ideal Elec.	25	450	1800	40

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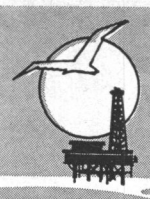
BARGES ON THE SPOT



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Hopper Barges

175' x 26' Open — 195' x 35' Open

Spud Barges

100' x 48' — 110' x 30'

Offshore Barges

120' x 32' — 120' x 40' — 120' x 45' — 140' x 34' — 160' x 50'

Oil Barges

7,000 to 10,000 Bbl.

Also available: various deck barges

FOR SALE

195' x 35' x 11' Hopper Barge

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PHONE HOUSTON 713-622-9977

T-2 WINDLASSES AND MOORING & HOSE HANDLING WINCHES

T-2 WINDLASSES — **$9750**
AH&D Model S-505—for 2 5/16" chain. Engine 12x14.

T-2 WINCHES — **$1850**
Hunt Tool Co.—mooring winches with outriggers —8¼x10.

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Turbine Generator Sets

MFR.	KW	RPM	STEAM PRESSURE	REDUCTION GEAR	RPM
General Electric	400	9977	525/575	S-172	1200
Westinghouse	500	9018	525	—	1200
Westinghouse	200	9989	410	—	1200
Terry	300	5965	440	SM	1200
De Laval	250	5650	440	—	1200
General Electric	300	5645	440	S-162	1200
General Electric	250	10,000	525/618	—	1200

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G.E. TURBINE ROTOR

For G.E. DORV —618N
Serial 70717 GEI 17716

Steam conditions: 525 P.S.I.—350°F superheat or buy complete 450 KW turbo generator set with S-193 reduction gear. Will upgrade to 600 KW.

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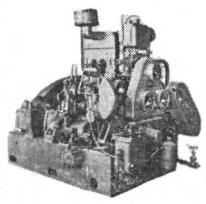
UNUSED 10KW SUPERIOR DIESEL GEN. SETS



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

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$1395

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313 E. Baltimore St. Baltimore, Md. 21202
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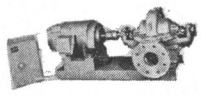
UNUSED AURORA PUMP

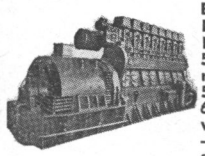


300 GPM—37' head—5 HP—120 volts DC Centrifugal Pump. Bronze — size 5x4 — flanged. MOTOR: Reliance—super T.D.C. Electric Motor—5 HP—120 VDC — 36.8 amps — 1750 RPM — Frame L216A—with control by Cutler-Hammer. Excellent condition. Latest USN surplus.

$877.77

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

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

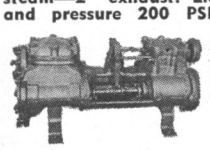


ENGINE: Baldwin-DeLaverne 725 HP—12-2/3"x15½"—8 cyl.—500 RPM — air starting. Dry weight 54050 lbs. GENERATOR: Allis-Chalmers 500 KW—120/240 V.D.C.—500 RPM — 550 RPM overspeed. 60°C rise—class B insulation—3-wire—25% unbalance—2083 amps —stab. shunt—open—drip-proof—self-ventilated—8 poles.

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

UNUSED WORTHINGTON BRONZE-FITTED HORIZONTAL MARINE DUPLEX PUMPS

Type VC—7½x5x6—4" suction—3" discharge 1½" steam—2" exhaust. Liquid pressure to 250 lbs.—steam and pressure 200 PSI. Capacity 100 GPM—100 PSI @ 80 strokes/minute. OAL 48¼" 20"x23"—weight 930 lbs. Suitable for port feed, general service, evaporator feed, fuel oil and other pressure service.



$775 each

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

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

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

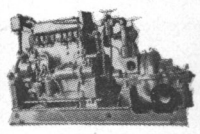
30KW MG LIGHTING SETS FOR C-3, C-4 VESSELS

Unused—62.5 HP 2 hours; 50 HP 24 hours. 230 VDC 186 amps 1750 input. Output: 30 KW 24 hours—37.5 2 hours—120 VDC—250 amps—1750 RPM. With spare armature and parts.

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

DIESEL FIRE & GENERAL SERVICE PUMP

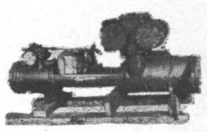
500 PSI @ 100 lbs—with self-priming attachment



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.

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

UNUSED 10x9x12 VERTICAL SIMPLEX FUEL OIL TRANSFER PUMPS

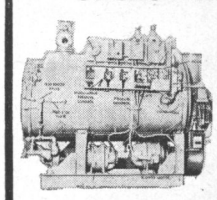


Furnished on some T2 tankers. 160 GPM Bunker C—viscosity 70 to 700 SSF 122°F @ 100 lbs discharge press. WP steam 150#—exhaust 10#. 1¼" Steam inlet—1½" exhaust. 4" pump suction—3½" discharge.

$1250

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

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

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

14" ALL-BRONZE PORTLIGHTS

with deadlights

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

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Carrier Air Conditioning Co., Carrier Parkway, Syracuse, N.Y. 13201
Union Carbide Corp., Linde Div., 270 Park Ave., N.Y., N.Y. 10017

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Lockstadt Co., Inc., 179 West 5th St., Bayonne, N.J. 07002

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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

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Anixter Bros., Inc., 8707 Skokie Blvd., Skokie, Illinois 60076
L. F. Gaubert & Co., 700 So. Broad St., New Orleans, La. 70150

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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

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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
Norton Co., Protective Div., Worcester, Mass. 01606
Patterson-Sargent, P.O. Box 494, New Brunswick, N. J.
Porter Paint Co., Louisville, Ky. 40201
Zinc-Lock Co., 6460 Hollis St., Emeryville, Calif. 94608

CONTAINERS—CONTAINER HANDLING SYSTEMS
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Dorsey Trailers, Elba, Alabama 36323
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

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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
Barber-Colman Co., Marine Prod. Div., Rockford, Ill. 61101
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
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
Zinc-Lock Co., 6460 Hollis St., Emeryville, Calif. 94608

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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

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Marine Moisture Control Co., 449 Sheridan Blvd., Inwood, N.Y. 11696
Pyrate Mfg. Co., Inc., 222-17 Northern Blvd., Bayside, N.Y. 11361

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ASEA Marine, Rep. in U.S.A. by Stal-Laval, Inc., 400 Executive Blvd., Elmsford, N.Y. 10523
Beebe Bros., Inc., 2724 - 6th Avenue So., Seattle, Wash. 98134
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
Smith-Berger Mfg. Corp., 3236 16th Ave.S.W., Seattle, Wash. 98134
A. G. Weser, Seebeckwerft, 2850 Bremerhaven 1, Germany
Western Gear Corp., Heavy Machinery Div., Everett, Wash. 98201

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Kiene Diesel Accessories, Inc., P.O. Box 216, Franklin Park, Ill. 60131

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Bruce GM Diesel, Inc., U.S. Route 46 at Savoy St., 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.

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

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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., 148 Perry Street, N.Y. 10004

EVAPORATORS
Aqua-Chem, Inc., 225 N. Grand Ave., Waukesha, Wis. 53186
Bethlehem Steel Corp., Shipbuilding, 25 B'way, N.Y., N.Y. 10004
Drew Chemical Corp., Marine Div. sub. Slick Corp., 522 Fifth Ave., N.Y. 10016
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

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
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.

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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
Thomas C. Wilson, Inc., 21-11 44th Ave., L.I.C., N.Y. 11101

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Bailey Joiner Co., 115 King Street, Brooklyn, N.Y. 11231
Wilson & Hayes, Inc., 1601 Eastlake East, Seattle, Wash. 98102

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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
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
Marine Propulsion Engrg. Inc., 2 Hancock St., Quincy, Mass. 02171
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
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
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M. Mack 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
W. R. Henderson & Co., 3611 Revere, Houston, Texas 77006
J. J. Henry Co., Inc., 90 West St., New York, N.Y. 10006
L. K. Homyer, Box 408, Corona Del Mar, California 92625
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
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
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Metritape, Inc., 77 Commonwealth Ave., West Concord, Mass. 01782
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Gunnar Nelson, 2185 Lemoine Ave., Ft. Lee, N.J. 07024
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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
The Stanwick Corporation, 1401 Wilson Blvd., Arlington, Va. 22209

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

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Ethyl Corp. Marine Div. Perolin Co., New York, N.Y. 10001
Gulf Oil Trading Co., 1290 Ave. of Americas, New York, N.Y. 10019
Humble Oil & Refining Co., Humble Building, Houston, Texas 77002
Mobil Oil Corp., 26 Broadway, New York, N.Y. 10004
Refineria Panama, S. A., 277 Park Ave., New York, N.Y. 10017
Shell Oil Co., 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
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
Zinc-Lock Co., 6460 Hollis St., Emeryville, Calif. 94608

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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.

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Ameron Corrosion Control Div., Brea, Calif. 92621
Atlas Minerals & Chemicals Div., Mertztown, Pa. 19539
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
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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
Marine Propulsion Engrg. Inc., 2 Hancock St., Quincy, Mass. 02171

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

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Frigitemp Corp., 329 Herzl St., Brooklyn, N.Y. 11212
York Corp., Grantley Road, York, Pa. 17405

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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
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
La Favorite Rubber Mfg. Co., 275 Wagaraw Rd., Hawthorne, N. J. 07507
Yokohama Rubber Co. Ltd., P.O. Box 46, Shiba, Tokyo 105, Japan

RUDDER ANGLE INDICATORS
Electric Tachometer Corp., 68th & Upland Street, Phila., Pa. 19142
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
La Favorite Rubber Mfg. Co., 275 Wagaraw Rd., Hawthorne, N. J. 07507

SEARCHLIGHTS
Portable Light ITT, 67 Passaic Ave., Kearny, N.J. 07032
Snelson Oilfield Lighting Co., 1201 E. Doggett St., Fort Worth, Texas 76104

SEWAGE DISPOSAL
Youngstown Welding & Engineering Co., 3708 Oakwood Ave., Youngstown, Ohio 44509

SHAFT REVOLUTION INDICATOR EQUIP.
Electric Tachometer Corp., 68th & Upland Sts., Phila., Pa. 19142

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
Beiliard Murdoch S. A., Kattendijkdok Westkaai 21, Antwerp, Belgium
Bender Ship Repair, Inc., 265 So. Water St., Mobile, Ala. 36602
Bethlehem Steel Corp., Shipbuilding, 25 Broadway, N.Y., N.Y. 10004
Blount Marine Corp., P.O. Box 360, Warren, Rhode Island 02885
Conrad Industries, P.O. Box 790, Morgan City, La. 70380
Detyens Shipyards, Inc., Route 2, Box 180, Mt. Pleasant, So. Carolina 29464
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
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.
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
Marine Industries, Ltd., 1405 Peel St., Montreal 2, Quebec
Matton Shipyard Co., Inc., P.O. Box 428, Cohoes, New York 12047
Melville Shipping & Towing, Ltd., P.O. Box 722, Port of Spain, Trinidad, W.I.
Mitsui Shipbuilding & Eng. Co., Ltd., Nihonbashi-Muromachi, Chuo-ku, Tokyo, Japan
Nashville Bridge Co., P.O. Box 239, Nashville 1, Tenn.
National Steel & Shipbuilding Corp., San Diego, Cal. 92112
Newport News Shipbuilding and Dry Dock Co., Newport News, Va.
Nippon Kokan Kabushiki Kaisha, 2, 1-chome, Otemachi, Chiyoda-ku, Tokyo, Japan
Northwest Marine Iron Works., P.O. Box 3109, Swan Island, Portland, Oregon 97208
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
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
Yankee Shipwrights, Route 4, Wayzata, Minn. 55391

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
Don R. Hinderliter, Inc., 1240 No. Howard, Tulsa, Okla. 74104
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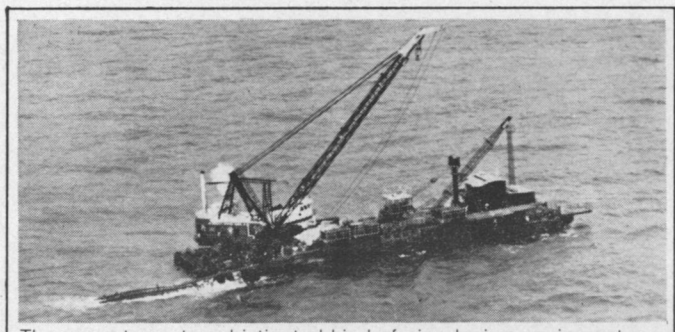

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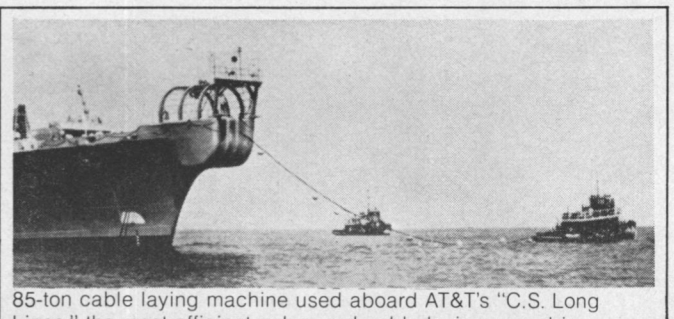

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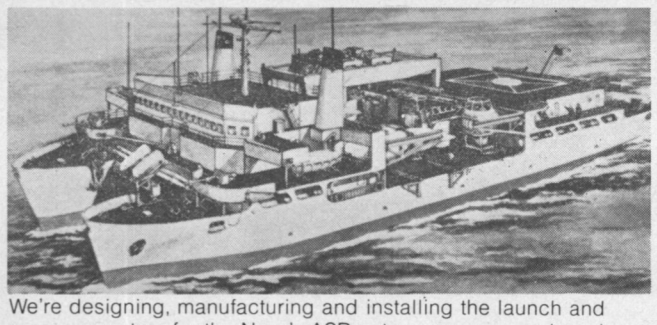

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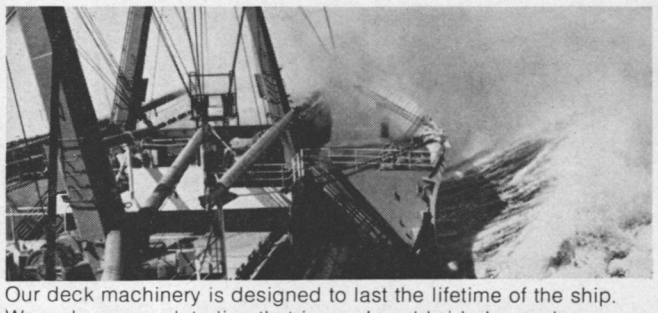

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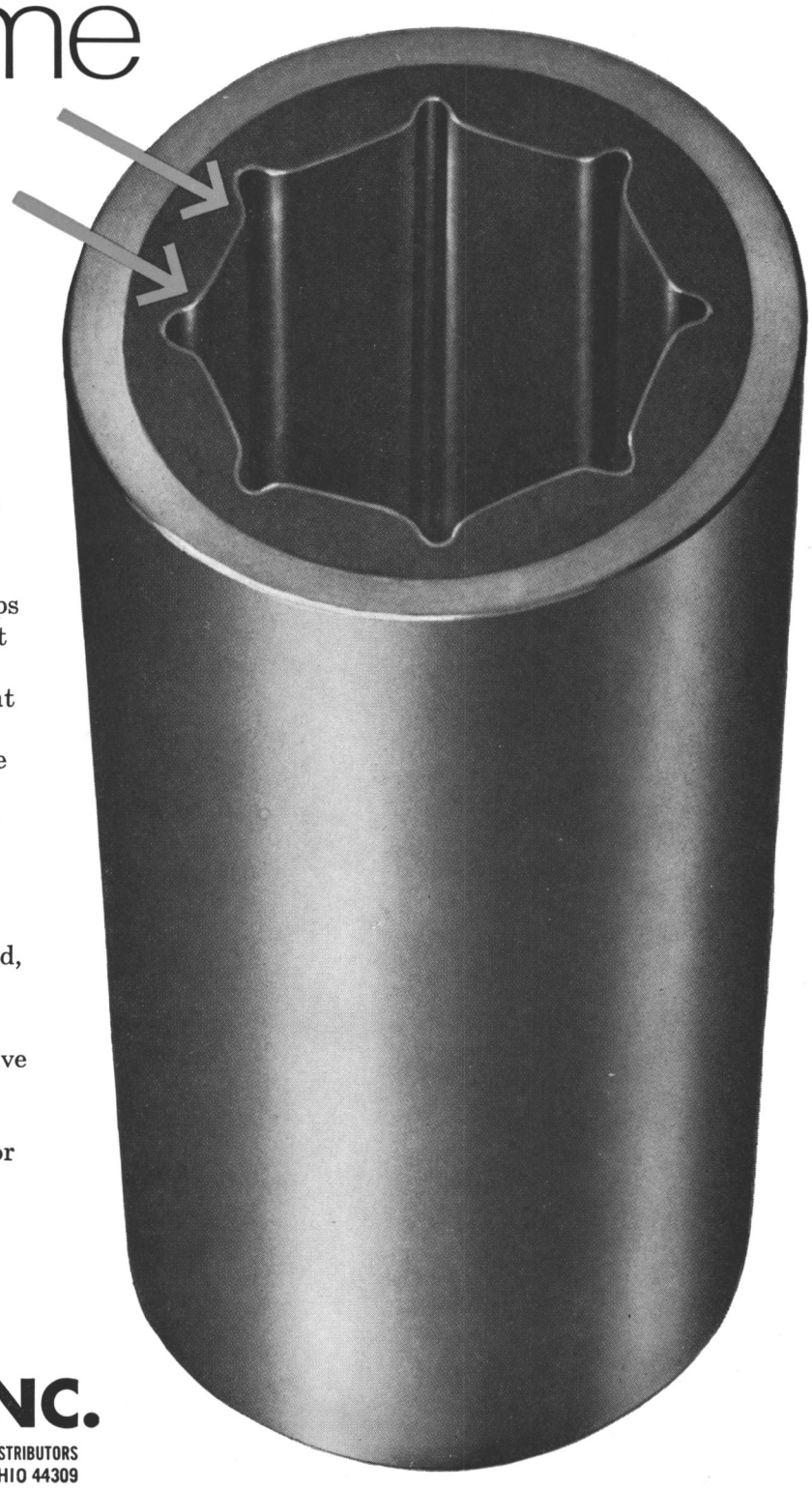

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