May 23, 1967 J. D. DEAL, JR 3,320,919

SHIP AND METHOD OF MAKING SAME

Filed July 14, 1965 5 Sheets-Sheet 1

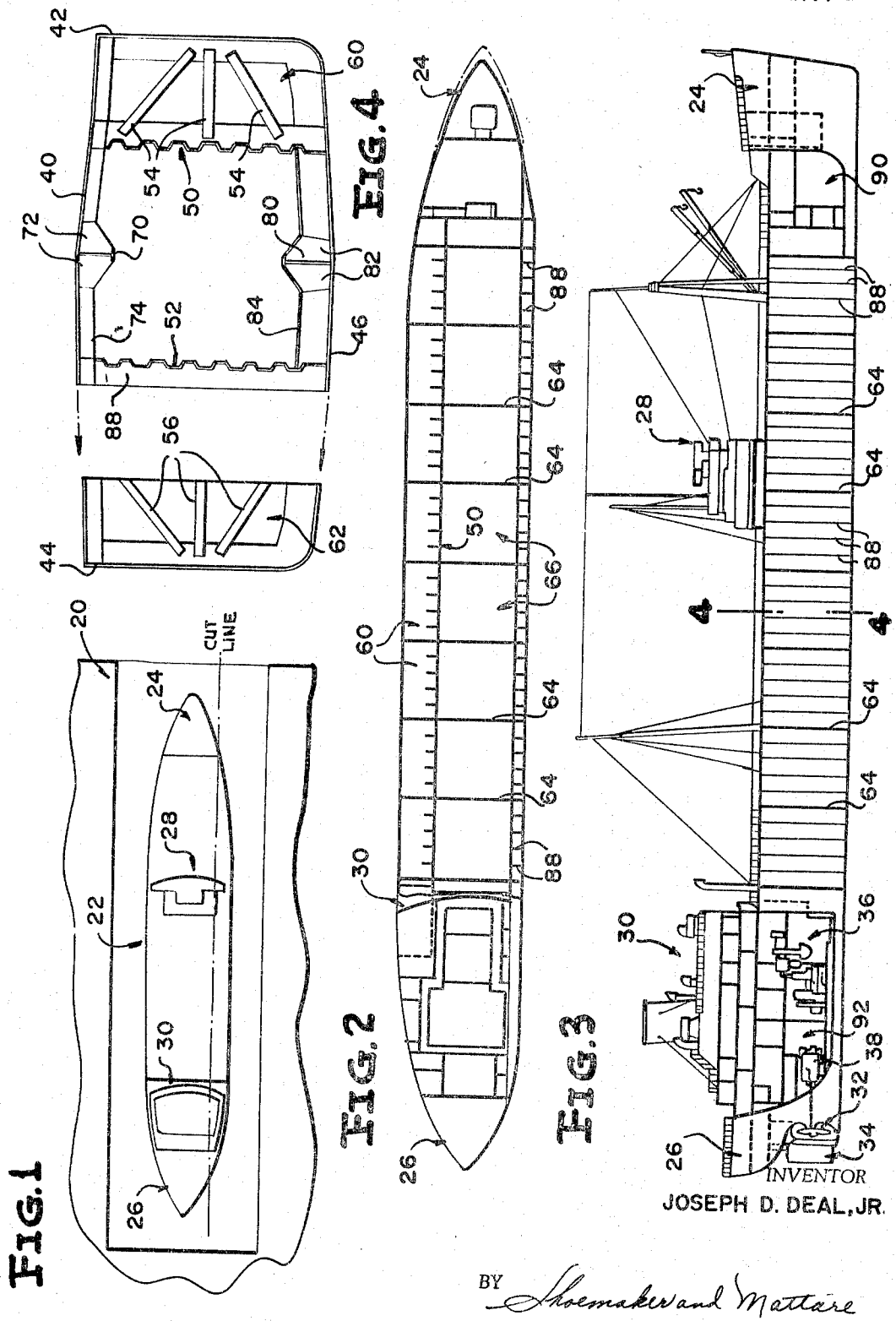


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FIG.5

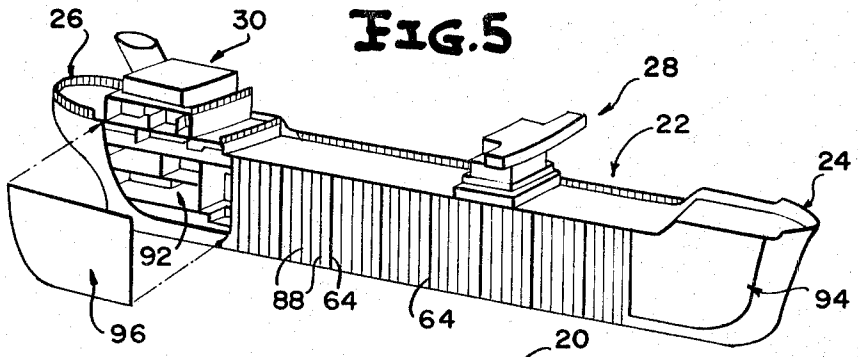



FIG.6

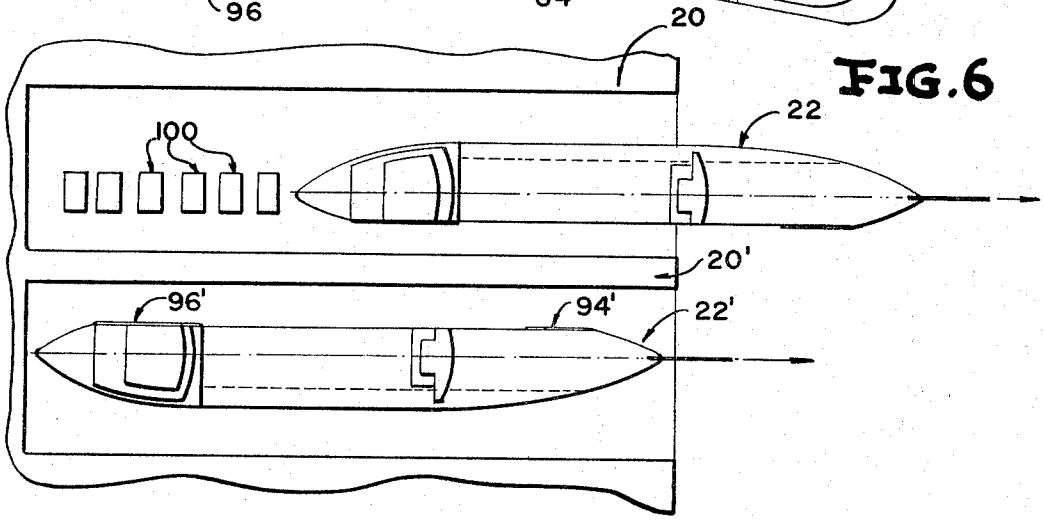
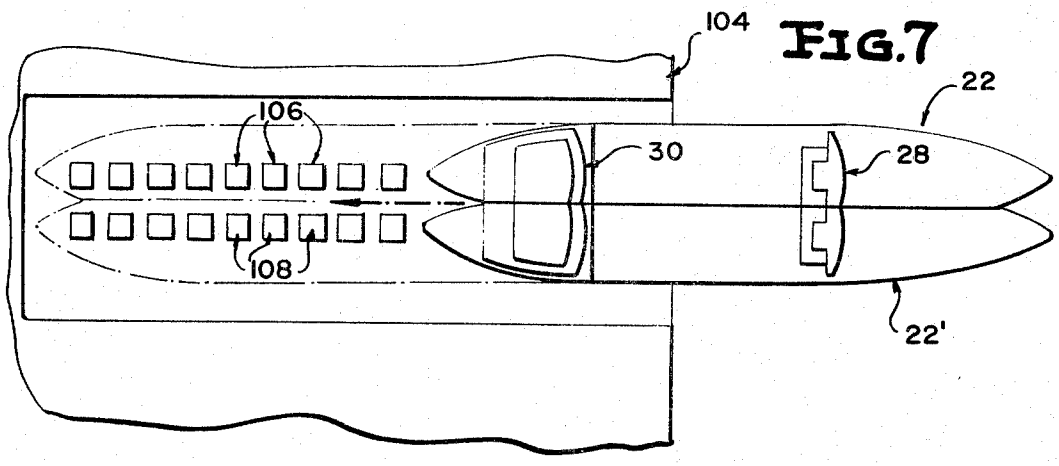



FIG.7

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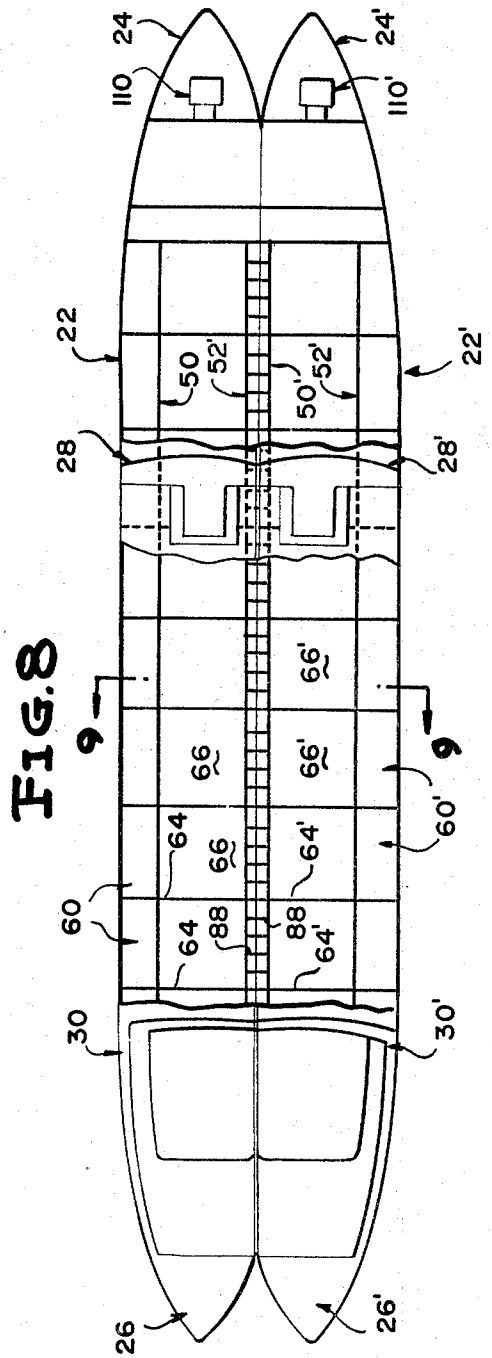


FIG. 8

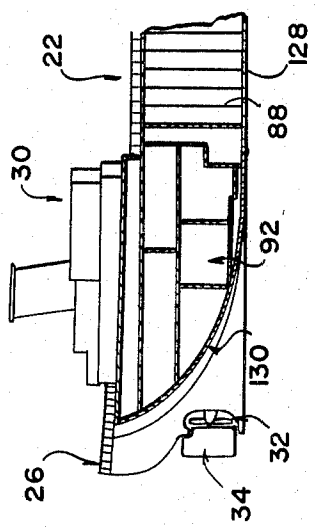


FIG. 11

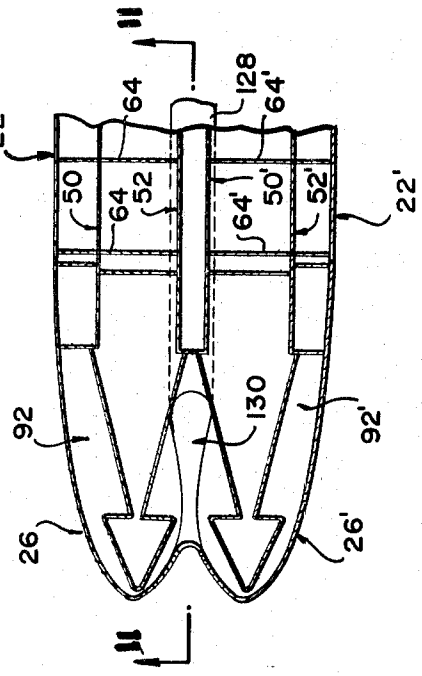


FIG. 10

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FIG. 9

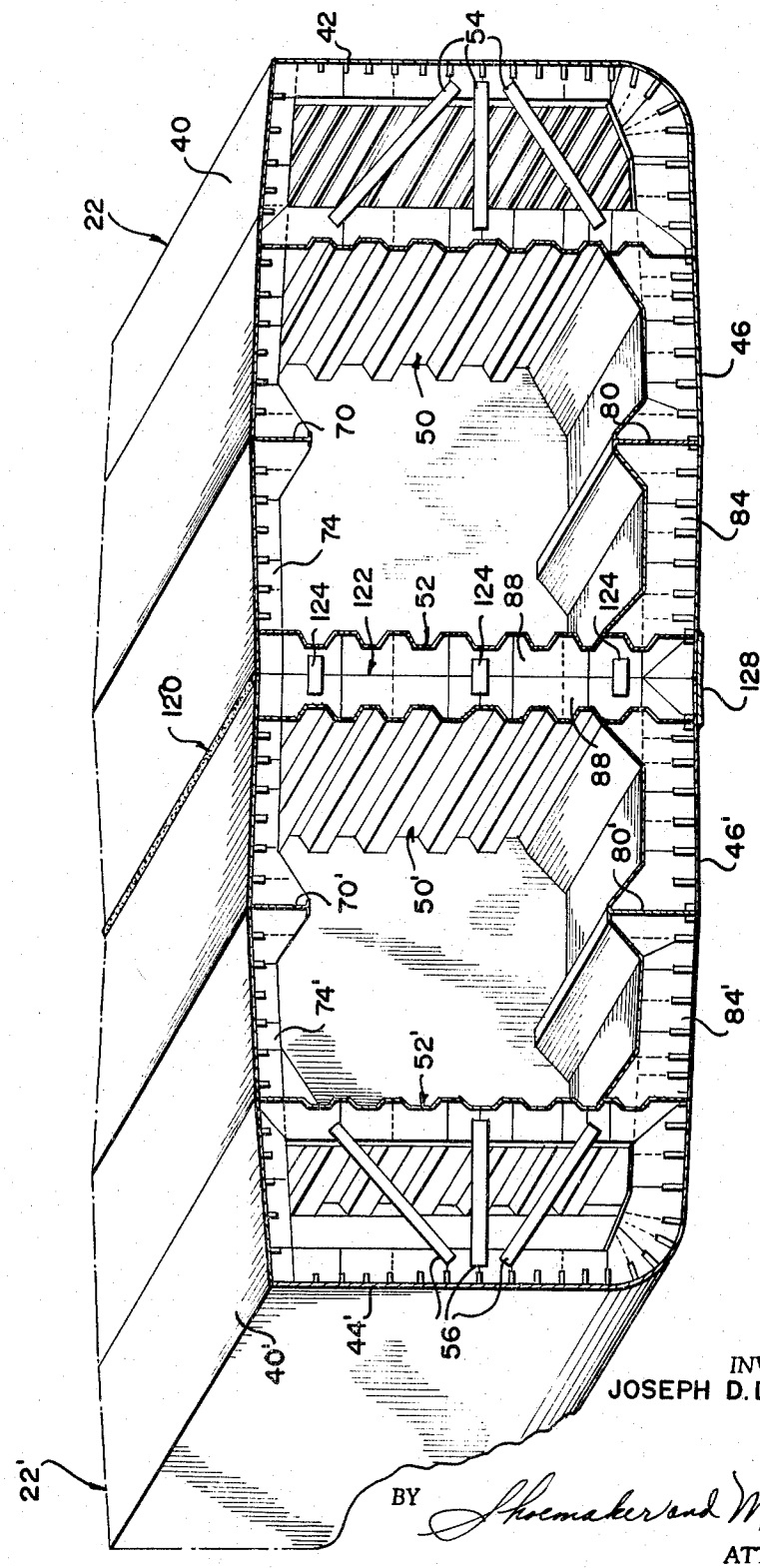


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FIG. 12

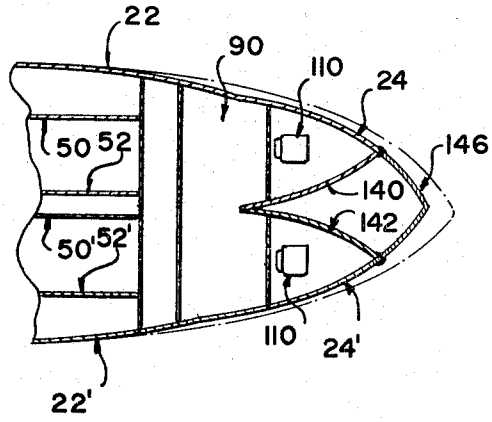



FIG. 13

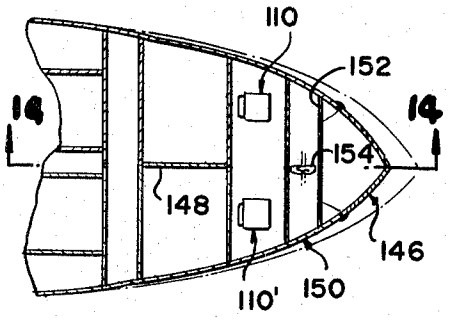



FIG. 14

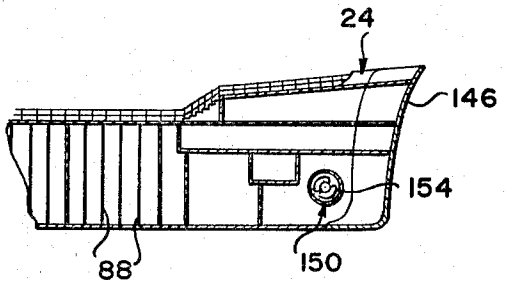
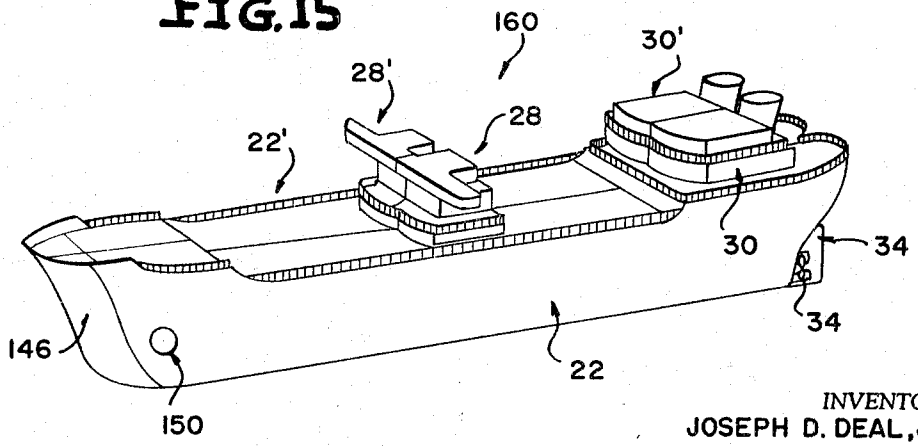



FIG. 15

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United States Patent Office 3,320,919 Patented May 23, 1967



3,320,919

# SHIP AND METHOD OF MAKING SAME

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Filed July 14, 1965, Ser. No. 471,867
10 Claims. (Cl. 114—77)

The present invention relates to a new and novel ship and method of making same, and more particularly to a seagoing type ship of very stable and readily controllable construction.

The ship of the present invention may be employed as an ordinary cargo ship, and is also particularly suited for use in applications which require a relatively stable platform when at sea as for example when carrying out underwater mining or drilling operations and the like.

The present invention contemplates the formation of a completed seagoing type ship by combining the structures of a pair of conventional ships in a unique manner. For example, a pair of relatively conventional turbo-electric tankers of the same type and class may be employed, and so arranged and interconnected with one another as to provide a completed structure which affords a number of advantages and improved results.

The two ships are each cut longitudinally in a particular manner to remove certain portions thereof whereupon the ships are then rigidly secured together along the cut portions thereof. This results in a completed structure of considerably increased beam as compared with either one of the individual ships thereby providing a very stable type of construction.

Additionally, by retaining the propellers and rudders of each of the ships, the completed ship incorporates a pair of propellers and a pair of rudders which can be operated independently of one another or in unison. In addition, a bow thruster mechanism is added to the bow structure of the completed ship, thereby affording a means for maintaining a very accurate course when underway at sea even when moving at very low speeds. This is of particular advantage when carrying out a dredging operation along the bottom of the sea.

The utilization of a pair of conventional ships which are converted in the manner of the present invention enables a great increase in cargo capacity as compared with a single one of the ships in a most economical manner and at the same time requires only a small increase in the number of crew personnel as compared with that required in a single one of the ships. It will of course be understood that a particular economic advantage of the present invention is the fact that used ships can be obtained at a fraction of the cost of constructing a new ship, and accordingly by converting a pair of used ships in the manner of the present invention, a most economical method is provided for obtaining the desired end results.

The propulsion generator of each of the two ships is also retained so that the completed ship incorporates a pair of propulsion generators. This enables one of the propulsion generators to be employed for propelling the ship while the other one through proper switchgear may be utilized for providing a power supply to any sort of desired auxiliary equipment while underway. This arrangement will of course be particularly advantageous for providing power supply to large equipment such as the pumps and the like which may be employed in dredging operations or underwater mining procedures.

It should be understood that the present invention is directed to a seagoing type vessel of relatively large dimensions wherein the completed ship may have an overall length of approximately 555 feet with a beam of approximately 110 feet and a depth of approximately 47 feet with a cargo capacity of about 20,000 tons.



It has been determined that substantial savings and improvements are obtained by combining two separate conventional cargo ships as opposed to converting a single cargo ship to the extent necessary to afford the same end results. In addition, not only is the completed ship of the present invention cheaper than a comparable single ship with the necessary conversions made thereto, but improved operating results are obtained with the ship of the present invention since it is more stable, can be more accurately controlled in its movements, has more power available for propulsion, and the margin on the boiler capacity when operating is greater.

An object of the present invention is to provide a new and novel ship of the seagoing type which is of very stable construction.

Another object of the invention is the provision of a ship incorporating a pair of propellers and a pair of rudders in combination with a bow thruster arrangement so as to enable a more accurate course to be maintained when in operation.

A further object of the invention is to provide a ship of increased cargo capacity which is approximately double the capacity of a single ship and which requires only a small increase in crew as compared to that required on a single ship.

Still another object of the invention is to provide a ship including a pair of propulsion generators thereby enabling operation of large auxiliary equipment while underway.

Yet a further object of the present invention is to provide a new and novel method of making a unique ship for accomplishing the above objectives in a most economical and simple manner.

Other objects and many attendant advantages of the invention will become more apparent when considered in connection with the specification and accompanying drawings, wherein:

FIG. 1 is a top view illustrating a conventional ship in a dry dock;

FIG. 2 is a top view of the ship shown in FIG. 1 after having been cut away longitudinally thereof and being partly broken away in this view for the purpose of illustration;

FIG. 3 is a side view of the ship shown in FIG. 2;

FIG. 4 is a sectional view taken substantially along line 4—4 of FIG. 3 looking in the direction of the arrows and illustrating the manner in which the portion of the ship is cut away;

FIG. 5 is a top perspective view of the ship illustrating the manner in which bulkheads are erected to seal off certain exposed spaces after the ship is cut;

FIG. 6 illustrates a further step in the method of the invention;

FIG. 7 illustrates a still further step in the method of the invention;

FIG. 8 is a top view of the pair of ships after having been welded together;

FIG. 9 is a sectional view illustrating in perspective a view taken along line 9—9 of FIG. 8 looking in the direction of the arrows;

FIG. 10 is a sectional view through the stern portion of the completed ship;

FIG. 11 is a sectional view taken substantially along line 11—11 of FIG. 10 looking in the direction of the arrows;

FIG. 12 is a sectional view taken through the bow portion of the ship illustrating a further step in forming the ship;

FIG. 13 is a view similar to FIG. 12 illustrating the completed arrangement of the bow structure;

FIG. 14 is a sectional view taken substantially along line 14—14 of FIG. 15 looking in the direction of the arrows; and

FIG. 15 is a top perspective view of the completed ship according to the present invention.

Referring now to the drawings wherein like reference characters illustrate the corresponding parts throughout the invention. FIG. 1 is a top view of a conventional dry dock indicated schematically by reference numeral **20**, and disposed within the dry dock is a relatively conventional cargo ship indicated generally by reference numeral **22**, the ship including a bow portion **24**, a stern portion **26**, midship superstructure **28** and aft superstructure **30**. The midship superstructure **28** may include the conventional bridge deck, upper bridge deck and navigating bridge, while the aft superstructure **30** may include the poop deck and the boat deck of conventional construction.

The ship includes the normal rigging for unloading and loading cargo with respect to the ship, a single propeller **32** being provided at the stern of the ship, and a maneuverable rudder **34** being provided for controlling movement of the ship. A propulsion generator is indicated generally by reference numeral **36**, this propulsion generator supplying power to a propulsion motor **38** which is operatively connected with the propeller **32** for selectively driving the propeller as required.

Referring now particularly to FIG. 4, a cross sectional view of the ship is illustrated wherein the left-hand portion of the ship as seen in this figure has already been cut away. For the purpose of understanding the general cross-sectional structure of the ship, it will first be assumed that the left-hand portion of the ship structure as seen in FIG. 4 is juxtaposed with the remaining portion of the structure so as to provide a symmetrical cross section of the ship. A deck portion **40** is provided, and the hull includes a pair of side shell portions **42** and **44**, and a bottom shell portion **46**.

A conventional port longitudinal bulkhead **50** extends longitudinally of the ship, and a starboard longitudinal bulkhead **52** also extends longitudinally of the ship. Stiffeners **54** are provided between the port longitudinal bulkhead structure and the adjacent shell portion **42**, while similar stiffeners **56** are provided between the starboard bulkhead structure **52** and the adjacent shell portion **44**. The spaces between the longitudinal bulkheads and the adjacent shell portions comprise wing tanks **60** and **62** which extend longitudinally at opposite sides of the ship, these wing tanks being separated from one another by means of a plurality of spaced transverse bulkheads **64** as seen most clearly in FIG. 2. A plurality of central mid-tanks **66** are defined between the opposite longitudinal bulkheads and the transverse bulkheads.

The center deck girder **70** extends longitudinally of the ship and is positioned immediately below the deck portion **40**, and face plates **72** are interconnected with this girder to reinforce the structure. Transverses **74** extend between the opposite shell portions and the center deck girder immediately beneath the deck portion, these tranverses being provided at spaced intervals between adjacent transverse bulkheads.

A center vertical keel **80** extends longitudinally of the ship along the upper central portion of the bottom shell portion, and face plates **82** are connected with this keel to reinforce the structure. Spaced transverses **84** extend between the opposite shell portions and along the bottom shell portion at spaced intervals between adjacent transverse bulkheads.

In order to describe the method of making a ship according to the present invention, reference is now made to FIGS. 1 through 4 inclusive. As seen particularly in FIG. 1, the relatively conventional cargo ship is first placed in dry dock **20** and the water removed from the dry dock. The ship is then cut longitudinally thereof along the cut line indicated in FIG. 1. This cut line in this particular instance may be just outboard of the starboard longitudinal bulkhead. The cutting will ordinarily be carried out by torches and the like which are suitable



for cutting the heavy steel plates of the ship. FIG. 4 clearly illustrates the manner in which the starboard portion of the ship is cut away to leave the right-hand portion of the ship as seen in FIG. 4. As seen particularly in FIG. 3, this longitudinal cut will extend beyond the starboard longitudinal bulkhead so as to expose certain forepeak dry cargo spaces indicated generally by reference numeral **90** and certain machinery spaces as indicated by reference numeral **92**.

As seen in FIG. 3, a plurality of vertical frames **88** are provided outboard of each longitudinal bulkhead between adjacent transverse bulkheads, it being noted that the longitudinal cut is sufficiently outboard of bulkhead **52** to allow the vertical frames outboard thereof to remain in position.

The next step of the method is illustrated in FIG. 5. A water-tight bulkhead **94** is erected to seal off the forepeak dry cargo spaces, this bulkhead being indicated by reference numeral **94**. It will be understood that this bulkhead may for example comprise one or more steel plates which are welded in place to seal off the portion of the dry cargo spaces which were exposed by the longitudinal cut.

In a similar manner, a water-tight bulkhead **96** is provided which is adapted to be welded in place so as to seal off the machinery spaces **92**. After having erected the water-tight bulkheads **94** and **96**, ship **22** is again ready to be floated out of its dry dock.

Referring now to FIG. 6, the ship **22** is illustrated as being removed from its associated dry dock **20** thereby exposing the keel blocks **100** which supported the ship in the dry dock. It will of course be understood that the dry dock is flooded and ship **22** floated out of the dry dock, the water-tight bulkheads **94** and **96** permitting the ship to readily float. In order to provide proper flotation and stability of ship **22**, it is first provided with ballast to balance the ship prior to floating it out of the dry dock. The ballast will of course be applied to the starboard side of the ship since this portion of the ship has been cut away, the ballast serving to return the ship to its normal balance condition insofar as possible.

Also as seen in FIG. 6, a second dry dock is indicated by reference numeral **20'** and a second ship is indicated by reference numeral **22'**. It is apparent that dry dock **20'** may comprise a separate dry dock, or if desired, the same dry dock may be utilized for modifying ship **22'** as that utilized in the modification of ship **22**. Ship **22'** is originally in all respects like ship **22**. The same procedures are followed in connection with ship **22'** as that discussed above in connection with ship **22** with the exception that the ship **22'** is cut longitudinally thereof just outboard of the port longitudinal bulkhead so that the opposite side of the ship **22'** is removed from that which was removed from ship **22**.

After having made the longitudinal cut in ship **22'**, suitable water-tight bulkheads **94'** and **96'** similar to bulkheads **94** and **96** previously described are erected to seal off the exposed forepeak cargo spaces and machinery spaces of ship **22'**.

Ship **22'** is then floated out of the associated dry dock after having suitably placed ballast in ship **22'** to balance it prior to floating out of the dry dock.

Referring now to FIG. 7, the next step of the method is illustrated. The two ships **22** and **22'** are brought into juxtaposition with one another along the cut sides thereof, and a dry dock **104** is provided having two sets of keel blocks **106** and **108** for the ships **22** and **22'** respectively. The two ships in side-by-side relationship are then moved into dry dock **104** as seen in FIG. 7 until the two ships are disposed over the keel blocks as indicated in phantom lines whereupon the water is removed from the dry dock, and the two ships are prepared to be fixedly secured in position relative to one another.

Referring now to FIG. 8, a top view partly broken away illustrates the manner in which the two ships **22** and **22'**

are disposed adjacent one another when placed in dry dock 104 as shown in FIG. 7. Since ship 22' is identical with ship 22 in its original form, similar parts have been given the same reference numerals primed. It will be noted that the starboard longitudinal bulkhead 52 of ship 22 is disposed adjacent the port longitudinal bulkhead 50' of ship 22' forming in essence a cofferdam between the adjoining corrugated bulkheads, the midship superstructures 28 and 28' being disposed adjacent one another, and the aft superstructures 30 and 30' being disposed adjacent one another. Chain lockers 110 and 110' are provided in the bow portions of the two ships 22 and 22' respectively.

Referring now particularly to FIG. 9, the manner of securing the two ships together to provide an integral hull is most clearly illustrated. The two ships are secured together as by welding along the abutting portions thereof. The decks 40 and 40' of the two ships are welded together along the center line thereof as indicated by the weld 120. The transverse bulkheads and the vertical frames 88 outboard of the starboard and port longitudinal bulkheads 52 and 50' of ships 22 and 22' respectively are welded together along a vertical line indicated by reference numeral 122, it being understood that temporary access into the cofferdam between the adjoining corrugated bulkheads 52 and 50' can be achieved by cuts in the decks 40 and 40'. In addition, these vertical frames and transverse bulkheads are reinforced by plates 124 which span the center line of the completed integral hull and which may be welded to the adjacent vertical frames and transverse bulkheads so as to provide a reinforcement means spaced throughout the length of the ship.

In addition, a main keelson plate 128 is provided which extends along the longitudinal center line of the ship and which is welded to the undersurface of the two adjacent bottom shell portions 46 and 46' to span the center line of the ship and to reinforce the bottom shell of the ship.

Referring now particularly to FIGS. 10 and 11, the combined stern portion structure of the completed ship is illustrated. In order to provide the desired outer contour and streamlining of the completed outer shell, fairing indicated by reference numeral 130, is provided between the adjacent ship portions 22 and 22', this fairing comprising steel plates and the like which may join with the main keelson plate 128 at the lower portion of the ship. This fairing adds strength to the adjoining stern structures, but in particular ensures a smooth flow of water into the active areas of the propellers.

Referring now particularly to FIGS. 12, 13 and 14, the manner of completing the construction of the bow structure is illustrated. As seen in FIG. 12, the bow portions 24 and 24' of ships 22 and 22' respectively include inboard portions 140 and 142. A new integral single bow section 146 is welded into place so as to fair smoothly into the outboard portions of the bow portions 24 and 24'.

Referring now to FIG. 13, it will be noted that the inboard portions 140 and 142 of the original bow portions of the ships have been removed, and the new section 146 forms the finished bow for the completed ship. A longitudinally extending bulkhead 148 may also be mounted within the forepeak dry cargo spaces.

In addition, bow thruster means is mounted within the bow portion of the ship, the bow thruster means being indicated generally by reference numeral 150 and comprising a transversely extending passage 152 within which is disposed a controllable reversible propeller 154. This bow thruster mechanism is of conventional construction and is employed for controlling the head of the ship at slow speeds.

Referring now to FIG. 15, the completed ship is illustrated. It will be understood that the completed ship includes an integral hull having a single bow with a pair of stern portions, a pair of keels, a pair of separate propellers along with associated propulsion generators and motors, and a pair of rudders. The completed ship in fact may comprise a pair of water-tight units extending end to end and divided along the center line of the ship. It will of course be apparent that minor re-arrangements in the machinery spaces are required for accomodating the machinery of the two ships.

If the completed ship is to be utilized in underwater mining operations, the midship superstructure can be retained with minor re-arrangements on the main deck to permit conveyor means to pass therethrough to the forward holds and to provide loading chutes into the holds below the midship superstructure.

It is apparent from the foregoing that there is provided according to the present invention a new and novel ship of the sea-going type which is of very stable construction. The completed ship includes a pair of propellers and a pair of rudders which in cooperation with the bow thruster mechanism enables the ship to maintan an accurate course when carrying out dredging operations or when operating at relatively low speeds. The two propulsion generators enable the operation of large auxiliary equipment while underway such as a dredge pump and the like. Economical means is provided for providing increased cargo capacity as compared with a single ship with only a small increase in the number of crew personnel required to operate the completed ship of the present invention. The novel method of the present invention enables the making of this unique ship for accomplishing the above results in a most economical and simple manner.

As this invention may be embodied in several forms without departing from the spirit or essential characteristics thereof, the present embodiment is therefore illustrative and not restrictive, and since the scope of the invention is defined by the appended claims, all changes that fall within the metes and bounds of the claims or that form their functional as well as conjointly cooperative equivalents are therefore intended to be embraced by those claims.

I claim:

1. A seagoing ship comprising an integral hull having a single bow structure and including a pair of stern portions, said ship including a center longitudinal bulkhead comprising bulkhead portions welded to one another, a port longitudinal bulkhead and a starboard longitudinal bulkhead, transverse bulkheads extending between said longitudinal bulkheads for defining a plurality of cargo holds within the hull, said ship having a pair of spaced longitudinally extending keels, a main keelson plate extending along the center line of the bottom of the hull and rigidly secured thereto, said main keelson plate being disposed at an intermediate position between said keels and spaced therefrom, said ship including a deck which is welded along the center line thereof, whereby the ship is divided into a pair of longitudinally extending water-tight units, said ship having a pair of separate propellers each of which is operatively mounted within one of said stern portions, said ship having a pair of separate propulsion generators each of which supplies power to a propulsion motor which is operatively connected with one of said propellers for selectively operating one of said propellers, said ship also having a pair of separate rudders each of which is supported by one of said stern portions.

2. The method of making a ship comprising providing a pair of conventional ships, cutting each of said ships longitudinally thereof and removing the cut portions, and then rigidly securing the remaining portions of said ships together along said cut portions thereof to provide a stable seagoing construction.

3. The method of making a ship comprising providing a pair of conventional cargo ships, cutting a first one of said ships longitudinally thereof along one side thereof, cutting the other of said ships longitudinally thereof along the opposite side as compared with the cut made on said

first ship, placing said ships in abutting relationship along said cut portions and then rigidly securing said ships together to provide a completely seagoing structure.

4. The method of making a ship comprising providing a pair of conventional cargo ships each of which includes a hull having a bow, forepeak dry cargo spaces in said bow, a stern, machinery spaces in said stern, port and starboard longitudinal bulkheads, a longitudinally extending keel, a propeller and a rudder at said stern, a propulsion generator and motor for said propeller, cutting each of said ships outboard of one of the longitudinal bulkheads thereof throughout the full length of the ship, placing said ships side by side along said cut portions, and welding said ships together to provide an integral seagoing hull.

5. The method of making a ship comprising providing a pair of conventional cargo ships each of which includes a hull having a bow, forepeak dry cargo spaces in said bow, a stern, machinery spaces in said stern, port and starboard longitudinal bulkheads, a longitudinally extending keel, a propeller and a rudder at said stern, a propulsion generator and motor for said propeller, cutting each of said ships longitudinally outboard of one of the longitudinal bulkheads thereof throughout the full length of the ship to expose the forepeak dry cargo spaces and the machinery spaces of each ship, erecting water-tight bulkheads on each of said ships to seal off the exposed spaces, then placing said ships side by side along the cut portions thereof and welding the two ships together to provide an integral hull thereby completing a seagoing type ship of stable construction.

6. The method of making a ship comprising providing a pair of conventional cargo ships each of which includes a hull having a bow, forepeak dry cargo spaces in said bow, a stern, machinery spaces in said stern, port and starboard longitudinal bulkheads, a longitudinally extending keel, a propeller and a rudder at said stern, a propulsion generator and motor for said propeller, providing a dry dock, placing one of said ships in said dry dock, cutting said one ship longitudinally thereof throughout the full length of the ship outboard of the port starboard longitudinal bulkhead, thereby exposing the forepeak dry cargo spaces and machinery spaces of the ship, erecting water-tight bulkheads to close off the exposed spaces, floating said one ship out of the dry dock, placing the other of said ships in a dry dock, cutting the other of said ships longitudinally thereof throughout the full length of the ship outboard of the starboard longitudinal bulkhead thereof to expose the forepeak dry cargo spaces and the machinery spaces of said other ship, erecting water-tight bulkheads on said other ship to close off the exposed spaces thereof, floating said other ship out of the associated dry dock, providing a dry dock with two sets of keel blocks, floating both of said ships back into said last-mentioned dry dock with the cut sides thereof adjacent one another, removing the water from said last-mentioned dry dock, and then securing said two ships together along the cut portions thereof to provide an integral seagoing ship.

7. The method as defined in claim 6 wherein the step of securing said ship together includes providing a main keelson plate along the bottom of the hull structure of the two ships longitudinally on the center line of the combined ships, and wherein the decks of the two ships are welded to one another along the center line of the combined structure.

8. The method as defined in claim 6 wherein the center line longitudinal bulkhead of the combined structure is reinforced at spaced points therealong to rigidify the structure.

9. The method as defined in claim 6 including the additional steps of removing inboard portions of the bows of the two ships and forming the outboard portions of the bows into a single bow structure.

10. The method of making a ship comprising providing a pair of conventional cargo ships each of which includes a hull having a bow, forepeak dry cargo spaces in said bow, a stern, machinery spaces in said stern, port and starboard longitudinal bulkheads, a longitudinally extending keel, a propeller and a rudder at said stern, a propulsion generator and motor for said propeller, providing a dry dock, floating a first one of said cargo ships into said dry dock and removing the water therefrom, cutting said first ship longitudinally thereof throughout the full length of the ship outboard of the port longitudinal bulkhead to remove all of the structure outboard of the cuts and to thereby expose certain forepeak dry cargo spaces and machinery spaces of the ship, erecting water-tight bulkheads to seal off the exposed spaces along the longitudinal cut portion, placing ballast in the ship to balance the ship, then floating the ship out of the dry dock, placing the other of said ships in a dry dock and removing the water therefrom, cutting the other of said ships longitudinally thereof throughout the full length of the ship outboard of the starboard longitudinal bulkhead thereof to remove all of the structure outboard of the cut to thereby expose certain forepeak dry cargo spaces and machinery spaces of said other ship, erecting water-tight bulkheads to close off the exposed spaces of said other ship, placing ballast in said other ship to balance the ship, then floating said other ship out of the dry dock, providing a dry dock with two sets of keel blocks, floating both of said ships into said last-mentioned dry dock with the cut sides thereof touching one another and removing the water from said last-mentioned dry dock so that said ships will rest on said two sets of keel blocks, and then rigidly securing said two ships together by welding them along the center line of the completed structure, reinforcing the center line longitudinal bulkhead of the finished structure, welding in place a main keelson plate extending longitudinallly of the center line of the completed structure and being secured to the undersurface of the hulls of the two ships, removing inboard portions of the bows of the two ships and forming the outboard portions thereof into a single bow structure, and fairing certain portions of the sterns of the two ships together to provide a pair of stern portions, whereby a seagoing stable ship is provided having an integral hull, a single bow structure, a pair of stern portions, a pair of longitudinally extending keels, a pair of propellers, a pair of propulsion generators each of which supplies power to a propulsion motor which is operatively connected with one of said propellers, and a pair of rudders for controlling movement of the completed ship.

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