Aug. 27, 1968 T. NEILSON 3,398,716

SUBMERSIBLE TWIN HULLED TUG

Filed Oct. 30, 1967 3 Sheets-Sheet 1

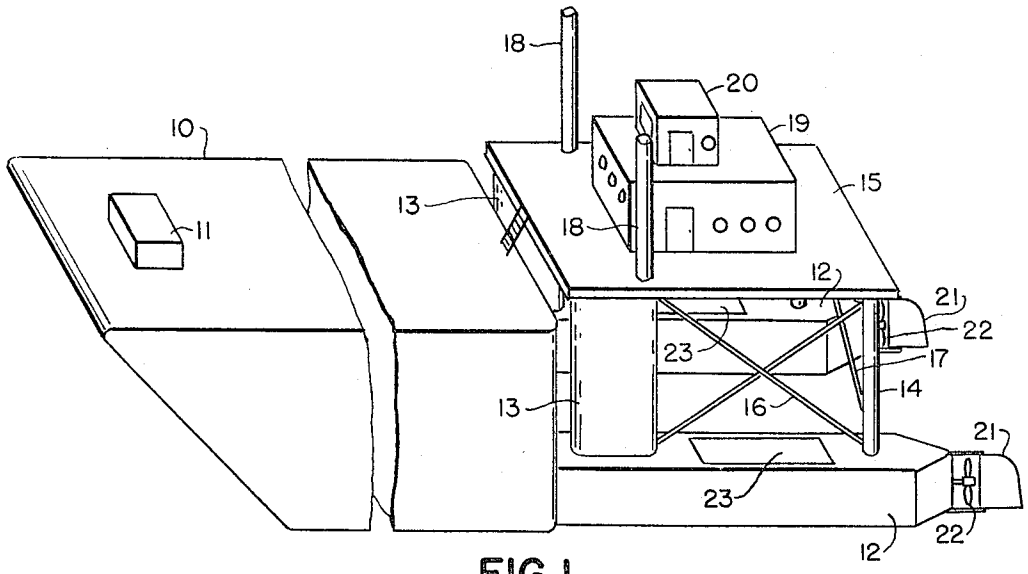


FIG. 1

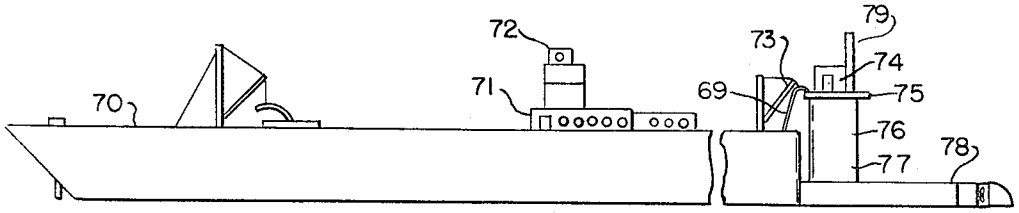


FIG. 2

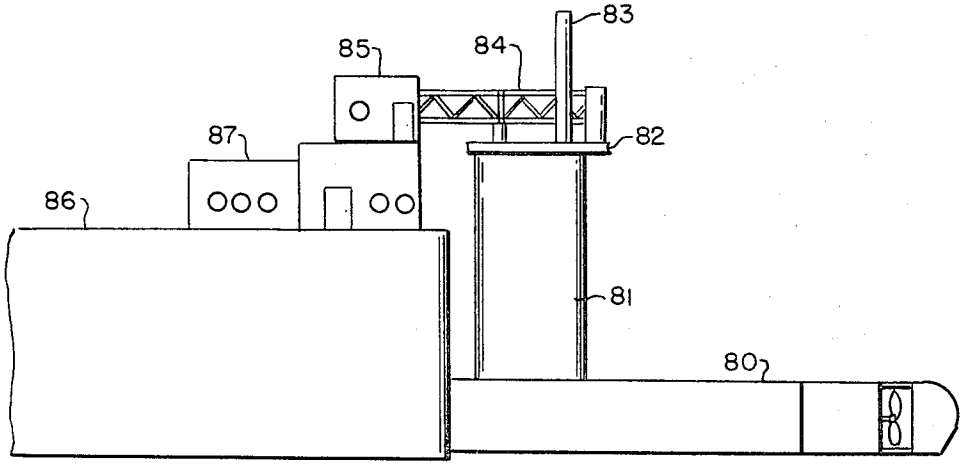


FIG. 3

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SUBMERSIBLE TWIN HULLED TUG

Filed Oct. 30, 1967 3 Sheets-Sheet 2

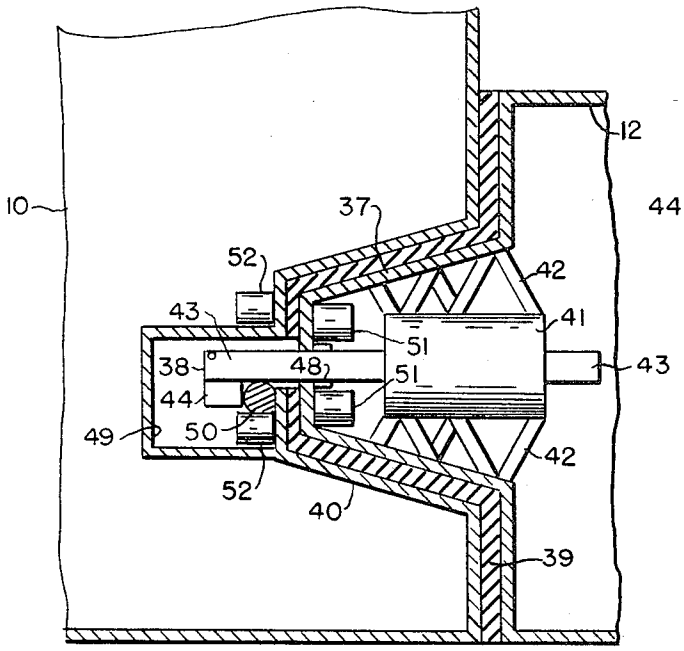


FIG. 4

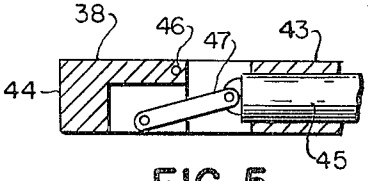


FIG. 5

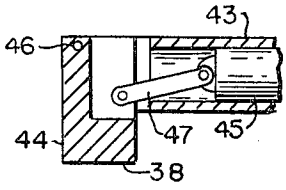


FIG. 6

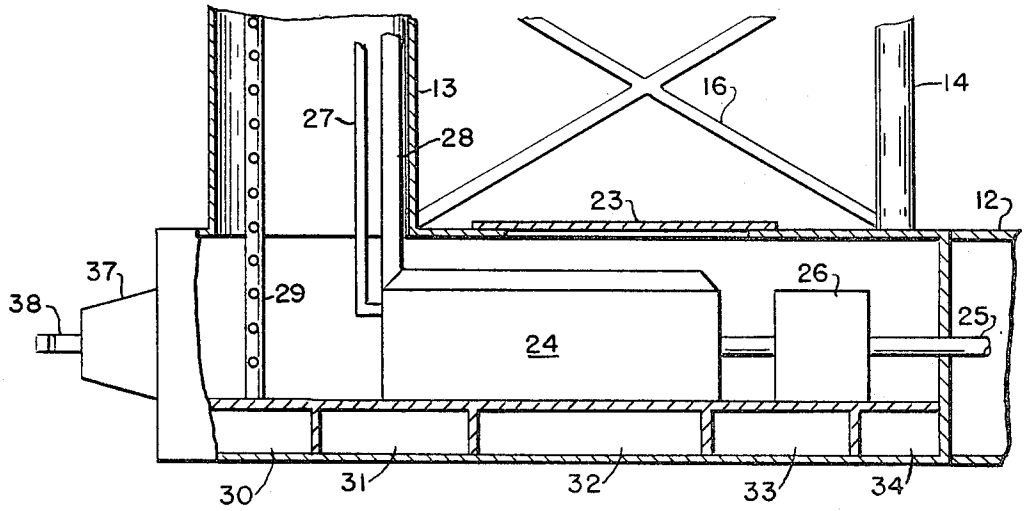


FIG. 7

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Aug. 27, 1968 T. NEILSON 3,398,716

SUBMERSIBLE TWIN HULLED TUG

Filed Oct. 30, 1967 3 Sheets-Sheet 3

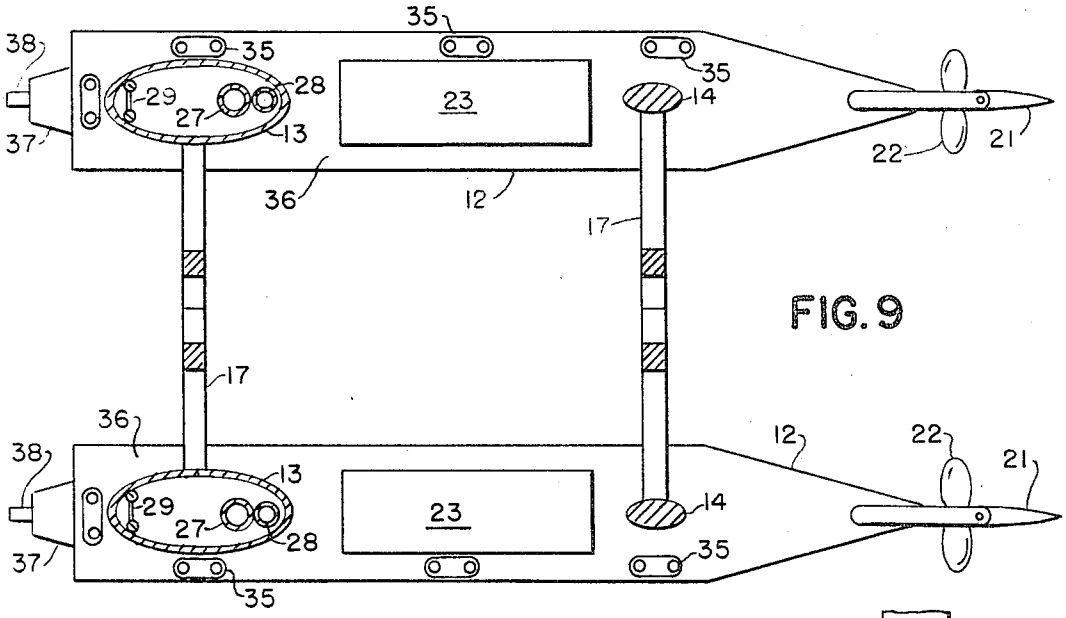


FIG. 9

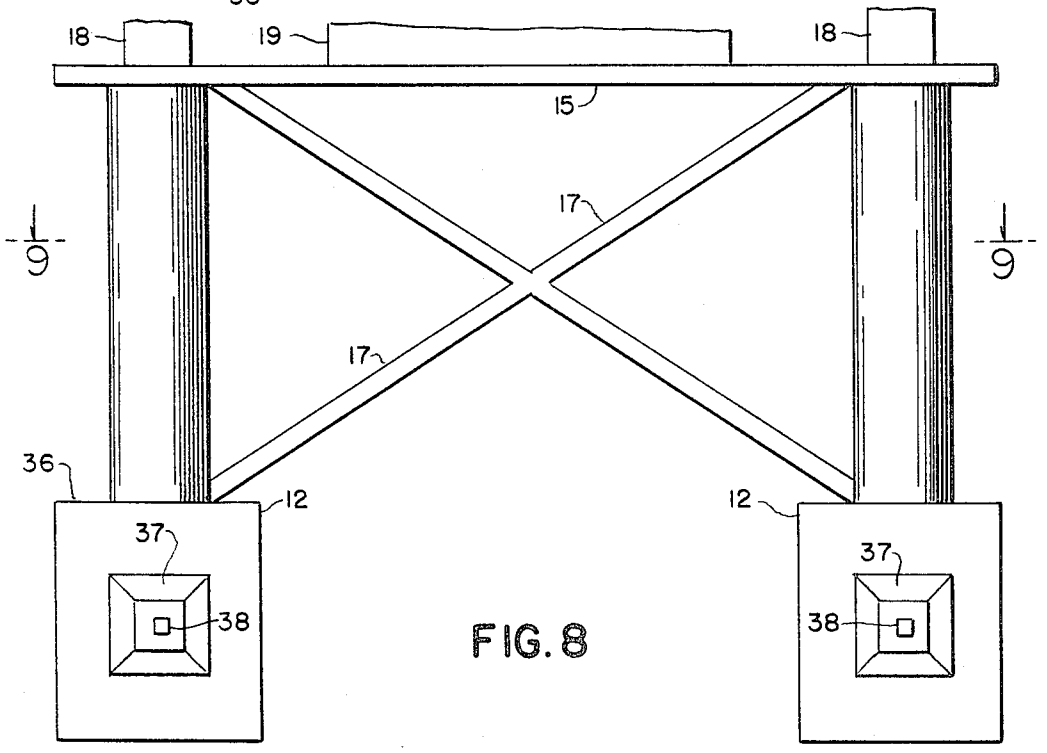


FIG. 8

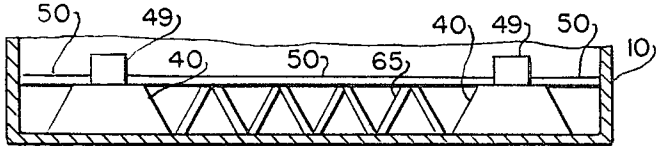


FIG. 10

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SUBMERSIBLE TWIN HULLED TUG

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10 Claims. (Cl. 114—235)

ABSTRACT OF THE DISCLOSURE

Twin submersible hulls each having a conning tower supporting a platform extending therebetween are rigidly connected to the stern of a float or barge for its propulsion. The connection of the tug to the barge is by means of an articulated hook extending from each of a pair of projections on the hulls of the tug into corresponding recesses in the stern of the barge. The connection may also be by means of electromagnets.

Background of the invention

This invention relates to tugs and barges or floats propelled thereby.

The inventor, a professional and licensed captain, who is master of a tug, has observed that, when his tug was lashed to a tow in heavy seas, if water ballast was taken on the tug to render its decks substantially awash, the effect of wave action was greatly reduced as the tug could then more easily follow the motions of the tow. This invention applies this observation to the design of a tug which is to be submergible.

Further, licensed or registered vessels of over 300 tons require a given full and large complement of licensed officers and crew. However, a tug of less than 300 tons displacement only requiring a greatly reduced complement of officers and crew, may operate very economically with a tow of great displacement. Thus the more power available in a tug under 300 tons, the larger a tow it can handle and the more it will be in demand by shipping companies.

Summary of the invention

This invention provides a tug with twin submersible hulls each having a conning tower supporting a single platform extending therebetween. The platform and any required bracing position the two hulls. Both hulls are mainly engine compartments with only such displacement as to barely float the hulls at the water's surface. The twin hulls may be submerged when attached to a loaded barge so that the tug of this invention easily follows any wave motion imparted to the barge. The tug of this invention also provides greater maneuverability and maximum possible engine weight and thereby power for a tug of under 300 tons displacement.

The connection between the tug and a barge is made by means of tapered projections extending from the front of each hull into corresponding tapered recesses formed in the stern of a barge. To lock the tug hull projections into the recesses of the barge, articulated hooks may grasp a transverse member welded across the stern of the interior of the barge. In addition, corresponding electromagnets may be used in connection with the articulated hooks or independently to secure the tug to a barge.

Brief description of the drawing

FIGURE 1 is a perspective view of a barge having a central portion broken away and of a tug according to a first embodiment of my invention;

FIGURE 2 is a side view of a barge and a tug according to a second embodiment of my invention;

FIGURE 3 is a side view of a barge having its front portion broken away and of a tug according to a third embodiment of my invention;

FIGURE 4 is a longitudinal vertical section through a broken away bow fragment of a tug hull and a corresponding stern fragment of a barge;

FIGURES 5 and 6 are longitudinal vertical sections through the articulated hook used to connect each tug hull with a barge, the hook being shown in the open and the closed position;

FIGURE 7 is a side view of a tug hull with its rear portion and with the platform broken away and with the center portion shown in longitudinal vertical section;

FIGURE 8 is a front view of a tug according to my invention with its deck house and stacks broken away;

FIGURE 9 is a horizontal section taken on line 9—9 of FIGURE 8; and

FIGURE 10 is a horizontal section taken through the broken away stern of a barge.

Description of the preferred embodiments

Referring to the drawing in detail, FIGURE 1 shows a barge **10** which may be of any type, dry cargo, bulk cargo, or tanker. To aid in its maneuverability, it may have a bow thrust unit **11** mounted thereon. Connected to the rear of barge **10** are the twin hulls **12** having the upstanding conning towers **13** mounted on them. Towers **13** and columns **14** support platform **15** which extends above and bridges between the hulls **12**. Longitudinal and lateral bracings **16** and **17** may be provided if required.

Combined air intake and stacks **18** extend upward from platform **15** over the towers **13**. A deck house **19** and a pilot house **20** are built on platform **15** as if it were a conventional deck. The deck house **19** provides complete crew's quarters, galley, etc. A rudder **21** and a propeller **22** are disposed at the stern of each hull **12**. A large access hatch **23** should be provided on the deck of each hull **12** for engine maintenance and major repairs.

FIGURES 7, 8, and 9 show the construction of the hulls **12** of the tug in greater detail. As may be seen in FIGURE 7, a large power plant, such as a diesel engine **24**, drives a propeller shaft **25** through a transmission or reduction gear **26**. An air intake tube **27** extends down tower **13** and an exhaust line **28** extends up it. A ladder **29** is provided for access to engine **24** at all times. It is assumed that constant attendance of the engines **24** will not be required as all controls will be automatic. Hull **12** also contains a number of compartments **30–34** which may be disposed as shown or where desired. Some of the compartments **30–34** are used for fuel and the remainder are used for water ballast to submerge the hulls **12** to a desired depth.

If desired, some of the compartments **30–34** may be gravity ballast tanks fed by the free inflow of water when a valve (not shown) is opened. This will allow a tug to be conneected to a barge in an unloaded condition. As the barge is loaded, it will submerge the tug and water may be allowed to run into the ballast tanks according to the load in the barge. If the ballast tanks are properly located, the water ballast may be allowed to flow out as a barge is discharged. Conventional pumps (not shown) may also be provided to feed and discharge the tanks **30–34** to trim the tug as desired or required.

As may be seen in FIGURE 9, bits **35** may be provided on deck **36** of each hull **12**. FIGURE 8 is a front view of the tug. FIGURES 7–9 also show the tapered projections **37** which extend from the bows of the hulls **12**. An articulated hook **38** extends forward from each projection **37**. The projections **37** may be truncated pyramids as shown, they may be tapered ovals, they may be truncated cones, or they may be any other desired tapering shape. The articulated hooks **38** may be square or round in section as desired.

Referring now to FIGURE 4, the bow and the projection **37** of each hull **12** is covered with a layer of rubber

39. The stern of a barge 10, as is also shown in FIGURE 10, has two tapered recesses 40 formed in it to receive the projections 37. Each projection 37 has a hydraulic cylinder 41 mounted in it by means of the bracings 42. Cylinder 41 may extend and retract rod 43 which has an articulated hook 44 at its end.

As may be seen in FIGURES 5 and 6, rod 43 may be hollow and have a shaft 45 slidably disposed within it. Hook 44 is pivotally secured to rod 43 by a pin 46 and a link 47 connects rod 45 to hook 44 as shown. Thus retraction of rod 45 from the position shown in FIGURE 5 to that shown in FIGURE 6 activates the articulated hook 44 to assume a grasping position.

Referring again to FIGURE 4, rod 43 extends through a packing 48 into a watertight compartment 49 disposed at the end of each recess 40. Extending across each compartment 49 and across the width of the barge 10, as shown in FIGURE 10, is a transverse member 50 engaged by hook 44. Electromagnets 51 and 52 may be provided to assist hooks 44 in securing a tug to a barge or they may be used in place of the hooks 44 for this purpose. The adjacent poles of magnets 51 and 52 should be oppositely polarized to attract each other. The rubber layer 39 may be reduced in thickness between magnets 51 and 52 to reduce the effective air gap therebetween.

It is to be noted that during propulsion by the tug the projections 37 will be forced into their corresponding recesses 40 so that, when underway, connecting means will not be strained and may not even be needed. Also, since the tug hulls 12 will be awash when a barge 10 is unloaded and submerged when a barge 10 is loaded, wave action on the tug will be minimized and the tug will easily follow any motions of a barge 10 with little resistance and resulting strain on their connections. While the hulls 12 have been shown to be rectangular in section, they may be constructed in any hydrodynamically desired shape.

FIGURE 2 shows a second embodiment of this invention in which a barge 70 has a complete deck house 71 and a pilot house 72 built on it. A boom 73 secures control lines to the secondary pilot house 74 mounted on platform 75 of tug 76 which has two conning towers 77 on the hulls 78. Stacks 79 extend upward from platform 75. Thus tug 76 has minimal structures extending upward from and supported by its hulls 78. Tug 76 may be operated independently from a barge 70 if desired. All structures not vital to the operation of tug 76 are located on barge 70 such as the crew's quarters, the galley, etc. which are in deck house 71. Even main fuel tanks (not shown) may be located on barge 70 with this fuel being pumped through line 69 to tug 76.

FIGURE 3 shows a third embodiment of my invention in which the tug has hulls 80 supporting conning towers 81 with a platform 82 extending therebetween. Stacks and air intakes 83 extend upward from platform 82. A retracting mechanism 84 supports a pilot house 85 which may rest on platform 82. Barge 86 has a deckhouse 87 built on its stern to contain crew's quarters, a galley, etc. When the tug is connected to a barge 86, pilot house 85 may be moved by mechanism 84 to rest on either side of deck house 87 as desired.

I claim:

1. A tug and a barge for propulsion by said tug comprising, in combination,

(a) twin tug hulls each containing a power plant and having propulsion means driven thereby, said hulls floating substantially awash,

(b) a conning tower extending upward from each of said hulls,

(c) a platform fixed to and extending between said conning towers above said hulls,

(d) ballast tanks in said hulls for submerging said hulls,

(e) connecting means in the bow of each hull of said tug, and

(f) corresponding connecting means in the stern of said barge receiving said connecting means of said tug.

2. The combination according to claim 1 wherein said connecting means in the bow of each hull of said tug is a tapered projection, wherein said corresponding connecting means in the stern of said barge is a pair of tapered recesses receiving said projections, and with the addition of means locking said projections in said recesses.

3. The combination according to claim 2 wherein said means locking said projections in said recesses comprises a watertight compartment disposed in front of each recess in the stern of said barge, a transverse member extending across said barge through said watertight compartments, and a hydraulically activated articulated hook extending from the front of each tapered projection of said tug entering a corresponding one of said compartments hooking said transverse member therein locking said tug to said barge.

4. The combination according to claim 3 wherein said means locking said projections in said recesses also comprises electromagnets on said tug and said barge energized with opposite polarity.

5. The combination according to claim 4 with the addition of exhaust stacks and air intakes extending upward from said platform over said conning towers, and exhaust and air intake pipes and tubes extending from said power plants through said towers and said stacks and intakes.

6. The combination according to claim 5 with the addition of a pilot house on said platform.

7. The combination according to claim 6 with the addition of a deck house on said platform, said pilot house being on said deck house.

8. The combination according to claim 7 with the addition of a column extending upward from said hulls behind each of said conning towers supporting said platform, and with the addition of lateral and longitudinal bracing extending between said columns and said towers below said platform.

9. The combination according to claim 6 with the addition of a deck house on said barge and a second pilot house on said barge operably connected to said tug.

10. The combination according to claim 6 with the addition of a deck house on the stern of said barge, and a retracting mechanism on said platform of said tug supporting said pilot house selectively on said platform and said deck house of said barge.

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T. M. BLIX, *Assistant Examiner.*