Feb. 10, 1953 N. GAGLIANO 2,627,832

SUBMERSIBLE AMPHIBIAN LANDING CRAFT

Filed July 25, 1947 3 Sheets-Sheet 1

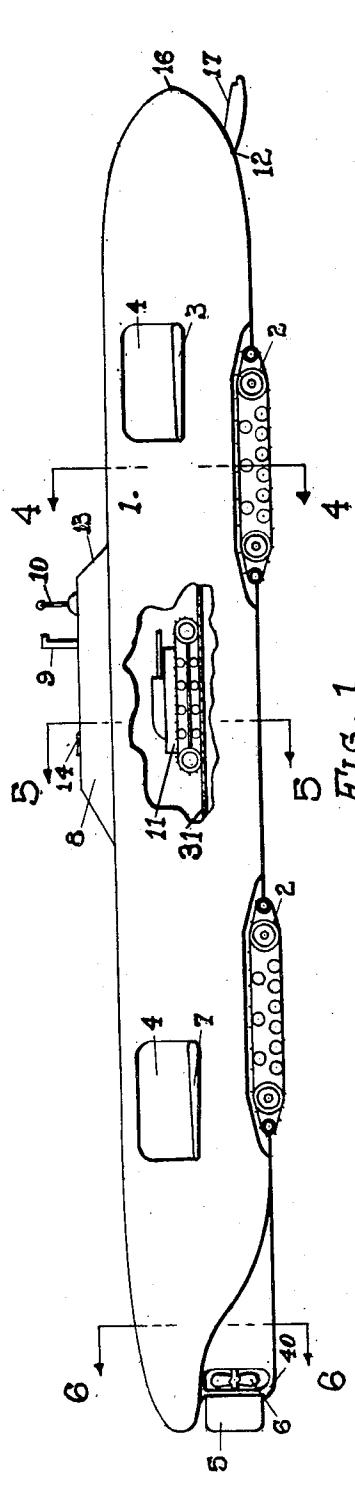


FIG. 1

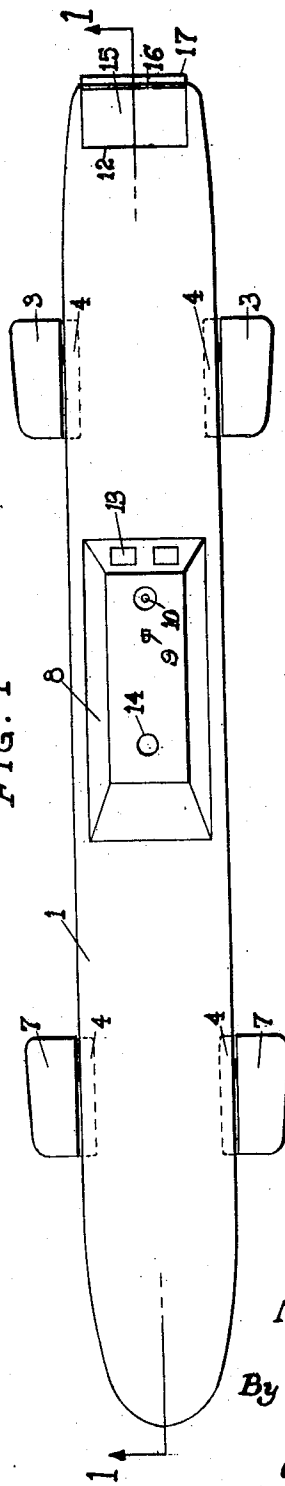


FIG. 2

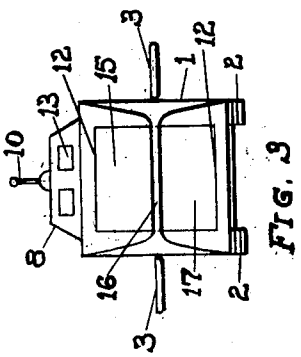


FIG. 3

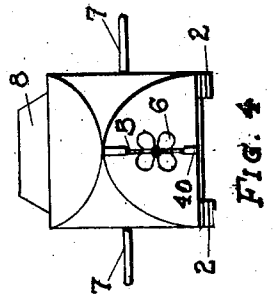


FIG. 4

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SUBMERSIBLE AMPHIBIAN LANDING CRAFT

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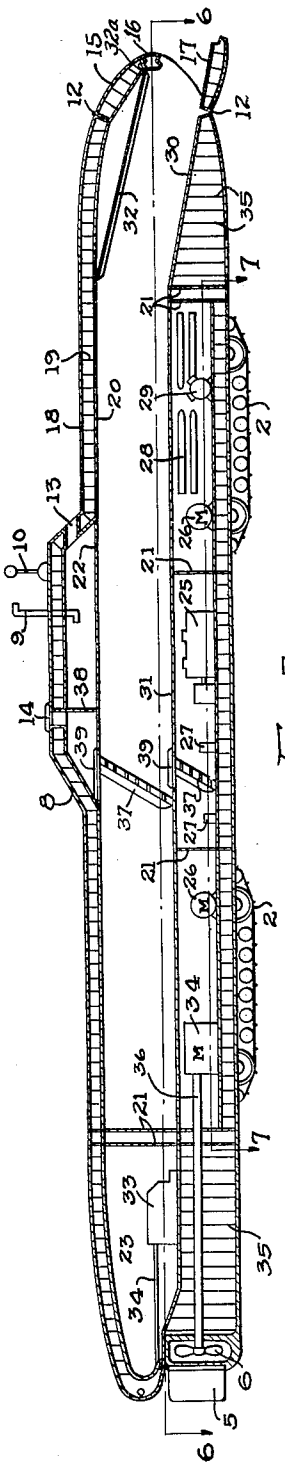


FIG. 5

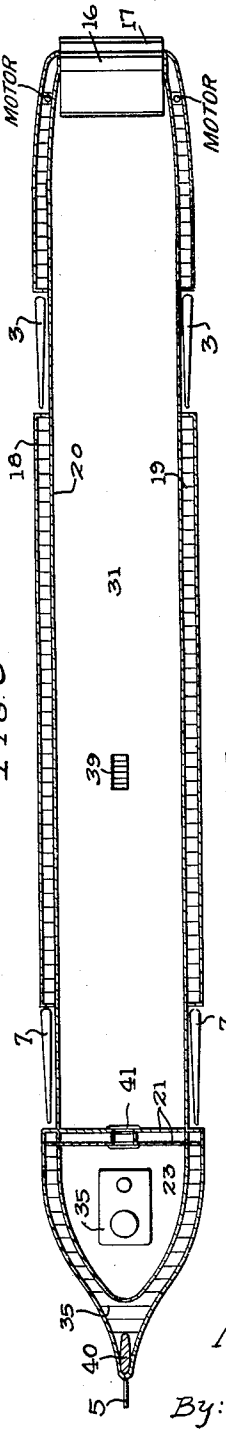



FIG. 6

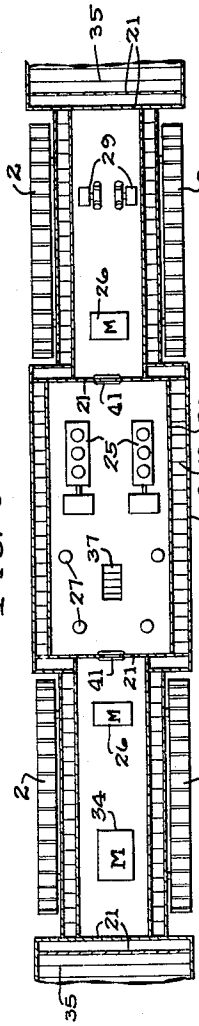


FIG. 7

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SUBMERSIBLE AMPHIBIAN LANDING CRAFT

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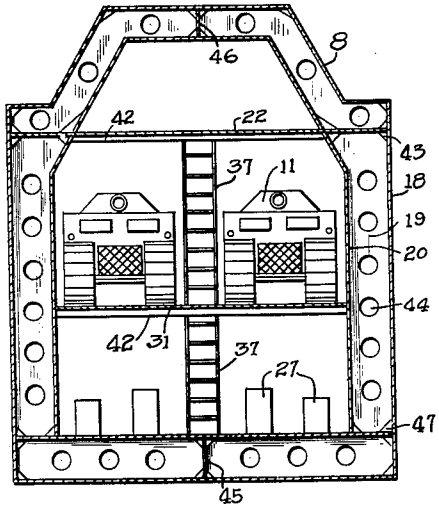



FIG. 9

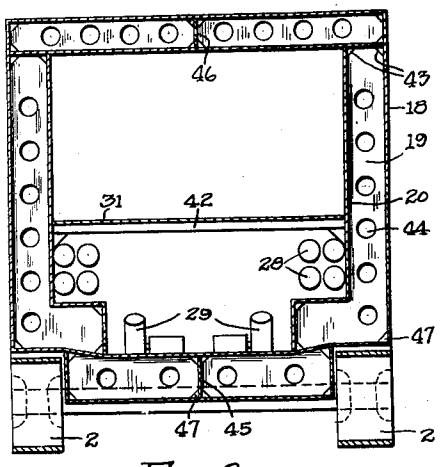



FIG. 8

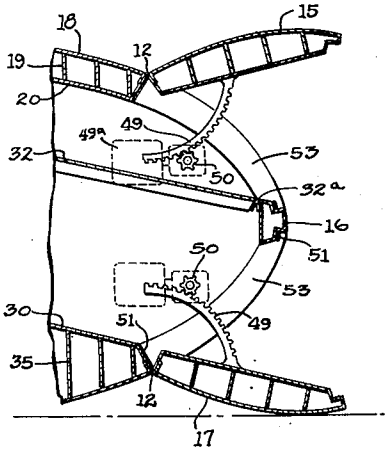



FIG. 11

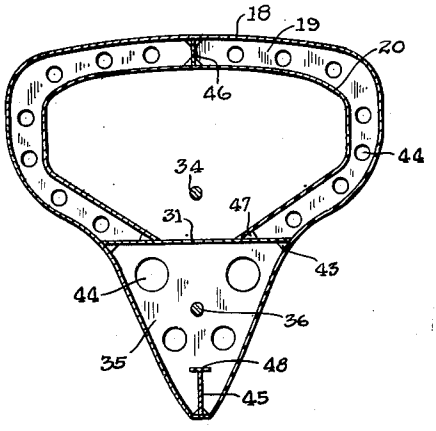



FIG. 10

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Patented Feb. 10, 1953 2,627,832

# UNITED STATES PATENT OFFICE

2,627,832

## SUBMERSIBLE AMPHIBIAN LANDING CRAFT

Nicholas Gagliano, Wauwatosa, Wis.

Application July 25, 1947, Serial No. 763,493

1 Claim. (Cl. 114—70)

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This invention relates to improvements in submersible amphibians of particular military significance for the secret transportation of tanks, trucks and other military equipment to a beach and landing them thereon without benefit of wharves or docks or the like.

An object of the invention is to provide a submersible amphibian of the type capable of sailing on the sea from its base to a field of activity, below the sea in approaching its objective, and capable of hauling itself out of the water upon shores or beaches of difficult terrain for the purpose of discharging its cargo dry shod.

Another object of the invention is to provide a craft of the character described which will be simple in construction, lending itself to mass production methods, flexible in operation, structurally adequate, seaworthy and inexpensive to construct and operate.

Another object of the invention is to provide a submersible amphibian with a bow door for the purpose of loading and unloading the craft with suitable closures to withstand great hydrostatic pressure but of such simple design to assure reliable functioning of the same under all conditions of service.

Another object of the invention is to provide a submersible amphibian with an emergency bow door similar in construction to the aforementioned bow door and an emergency ramp which may be used in conjunction with suitable manually placed gangplanks for the purpose of unloading the craft in the event the bow door became inoperative.

Other and further objects of the invention will appear as the description proceeds, reference being had to the accompanying drawing, in which:

Figure 1 is a view in side elevation, partly in section, showing a submersible amphibian constructed in accordance with my invention and showing a tank carried therein ready for unloading.

Figure 2 is a top plan view similar to Figure 1.

Figure 3 is a view in elevation of the bow showing the bow doors in the closed position.

Figure 4 is a stern elevation thereof.

Figure 5 is a cross sectional view taken on line 5—5 of Figure 2.

Figure 6 is a horizontal section view taken on line 6—6 of Figure 5.

Figure 7 is a fragmentary horizontal section view taken on line 7—7 of Figure 5.

Figures 8, 9 and 10 are enlarged vertical sectional views taken on lines 8—8, 9—9 and 10—10, respectively, of Figure 1.

Figure 11 is a fragmentary vertical sectional view of the extreme bow portion illustrating the bow door and emergency door and a preferred means for securing the same.

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Referring more particularly to the drawing, it will be seen that the embodiment of the invention which has been illustrated comprises a hull 1 rectangular in section for the greater portion of its length except where it is faired to an airfoil section in the bow and a gently streamlined section in the stern. Track-laying mechanisms 2 for on land propulsion are mounted on opposite sides of hull 1 at a suitable distance from the bow and from the stern.

The bow fin 3 and stern fin 7 are used to control the movements of the craft while submerged in conjunction with the rudder 5. When operating on the surface, or on land, the fins 3 and 7 may be folded upwardly into the recesses 4 in the hull 1 for their protection. Motivation while waterborne or submerged is provided by the propeller 6.

On the upper surface of the hull 1 at about the center of the craft is located the control cabin 8 having a periscope 9 for submerged operation and suitable radar 10 and other aids to navigation for surface operation. Suitable reinforced transparent portions 13 are fitted in the forward surface of the control cabin 8 to facilitate navigation. The hatch 14 is provided for ingress and egress when the bow door 17 is secured.

Figures 2 and 3 illustrate clearly the placement of the bow door 17, the emergency door 15, the stern 16, and the door hinges 12. The partial or fragmentary section in Figure 1 displays the tank 11 resting on the deck 31 within the hull 1. The deck 31 and the inner surface of the bow door 17 may be wood sheathed if desired to provide better traction for the cargo vehicles and to reduce noise.

As illustrated in Figure 5, taken with Figures 6 and 7, the hull 1 consists of the outer welded steel shell plating 18, and inner welded steel skin 20 stiffened by a plurality of steel plate frames 19. In the extreme bow deep floors 35 are employed to stiffen the shell plating 18 and a permanent steel ramp 30 is employed in place of the usual inner skin 20. In the extreme stern the shell plating 18 is again stiffened by deep floors 35 and the deck 31 is employed to replace the inner skin 20. The control cabin 8 is separated from the remainder of the hull 1 by a deck 22.

The hull 1 is further partitioned by the deck 31 and a plurality of bulkheads 21. In the extreme stern of the hull 1 separated by bulkhead 21 from the cargo vehicle compartment is the steering engine space for compartment 23. The steering engine 33 in the compartment 23 patrols through suitable mechanism 34 to movement of the rudder 5. Below the deck 31 and between the bulkhead 21 are the machinery compartments.

A preferred arrangement of the machinery would employ the forward compartment to con-

tain a motor 26 for driving the forward track-laying devices 2 by suitable means, a plurality of air compressors 29 with suitable air storage bottles 28 to supply compressed air for the purpose of exhausting water ballast when surfacing and for other uses.

The amidship machinery compartment would contain a plurality of diesel generators 25 to supply electrical current for the motivation of the craft, to operate the craft's machinery, for lighting the same, and for charging suitable batteries for underseas operation. A suitable number of pumps 27 are fitted herein for the transfer of ballast, fuel oil, etc.

The after machinery space would be employed to contain a motor 26 for driving by suitable means the after track-laying devices 2 and the main propulsion motor 34 driving the propeller 6 through a suitable shaft 36. The shaft 36 is held in position by appropriate bearings fitted in the bulkhead 21 and the stern frame 40.

Access from one level to another in the craft is provided for by inclined ladders 37 with water-tight hatches 39 fitted to prevent the spread of water in case of damage. A vertical ladder 38 is used for reaching the water-tight hatch 14. Access between compartments on the same deck is provided for by means of water-tight doors 41. The emergency ramp 32 is hinged at 32a to the stem 16 and fitted with suitable hoisting and lowering cables to permit its after end to be dropped to the deck 31 to allow the passing of the cargo vehicles through the emergency door 15 and down the manually placed gangplank in the event the bow door 17 becomes inoperative.

Figure 6 shows to advantage the generous space provided for cargo vehicles on the deck 31. The fins 3 and 7 are shown in the stowed position. Figure 8 shows to advantage the manner in which the plate frames 19 stiffen the shell plate 18 and the inner skin 20. The weight of the craft is kept at a minimum by cutting adequate lightening holes as at 44 in the frame 19. Good circulation of air is assured by the air holes 43 while the limber holes at 47 provide ample drainage. The center vertical keel 45 is employed to stiffen the bottom structure while a center line girder 46 serves a similar purpose in the weather deck or top of the craft. Deck beams 42 at each frame 19 support the deck 31. The location of the track-laying devices 2 and their relation to the hull 1 is also clearly illustrated in Figure 8.

Figure 9 illustrates a typical section through the hull 1 showing the tanks 11 in place. The orientation of the shell plating 18, the frames 19, and the inner skin 20 are again clearly illustrated. The modification of the rectangular shape of the hull 1 in the stern of the craft is shown in Figure 10. The use of deep floors 35 for stiffening the shell plating 18 and the deck 31 is also clearly illustrated. A rider plate 48 is employed when the central vertical keel 45 passes into a region of deep floors 35. As is characteristic, lightening holes 44 are employed in the deep floors 35 in order to keep the weight of the craft at a minimum.

Referring to Figure 11, the means of closing the bow door 17 and the emergency door 15 will be apparent. For example, to close the bow door 17 from the open position, motors 49a mounted in the sides of the hull 1 between the shell 18 and the inner skin 20 drive the gears 50 which



engage quadrant gears 49 mounted on both sides of the door 17. When the door 17 swings up on its hinge 12 the forward lip of the door 17 fits against the stem 16. The slope on the lower edge of the stem 16 forces the door downwardly to form a seal against suitable gasket material 51. Dogs or suitable turnbuckles may then be engaged to draw the door 17 in against the gasket material 51 secured to the stem 16. The sides of the aperture 53 are inclined toward the center line of the craft from the outside inward to assure centering of the door 17 athwartship. Gasket material 51 is secured to the sloping sides of the aperture at 53 to insure water tightness. The operation of the emergency door 15 is the same. This same operation may be accomplished by a hydraulic ram mechanism in place of the gears 49 and 50 as shown.

The spaces provided between the shell plating 18 and the inner skin 20 of the hull 1 are employed for carrying diesel fuel, ballast, buoyant air, and the storage batteries required for underseas operation. Proper use of these spaces enables the craft to submerge, surface, and the like.

While I have shown and described the preferred embodiment of my invention, it is to be understood that changes in the details of construction and in the combination and arrangement of parts may be made without departing from the spirit and scope of the invention as claimed.

Having thus described my invention, what I claim and desire to secure by Letters Patent of the United States, is:

A vehicle landing craft including a hull, a deck disposed at approximate mid height in said hull short of the bow thereof, a horizontal transverse stem in said bow, a pair of doors closing oppositely on parallel horizontal axes against said stem, racked quadrants fixed to said doors, gears enmeshed with said quadrants, motors for operation of said gears adjacently disposed in said hull, a permanent forwardly downwardly inclined ramp connecting said deck with the lower of said doors, and a movable ramp hinged at its forward end to the stem and adapted when lowered to rest with its after end on the deck to permit movement of vehicles through the upper emergency door over the stem.

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