

Feb. 15, 1944.

A. J. HIGGINS

2,341,866

LIGHTER FOR MECHANIZED EQUIPMENT

Filed Dec. 8, 1941

4 Sheets-Sheet 1

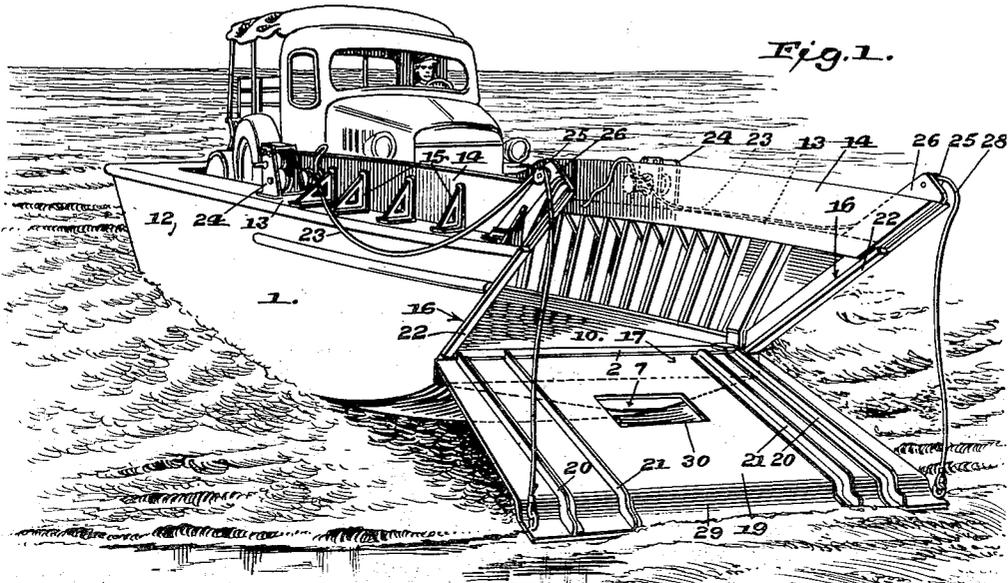


Fig. 1.

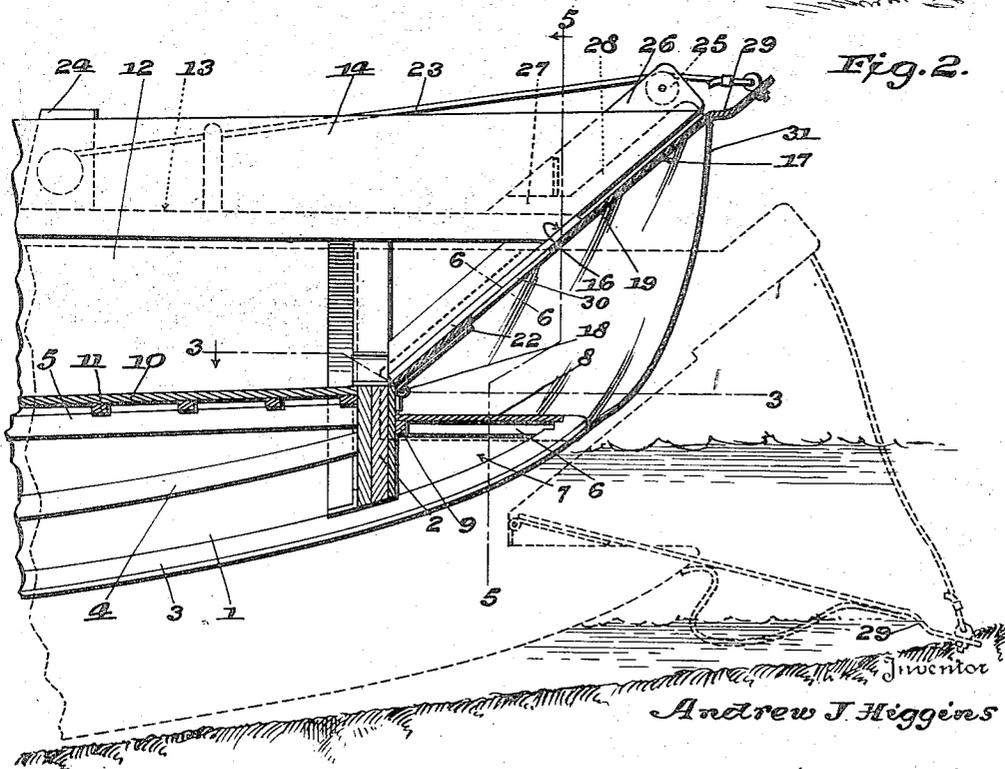


Fig. 2.

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4 Sheets-Sheet 2

Fig. 3.

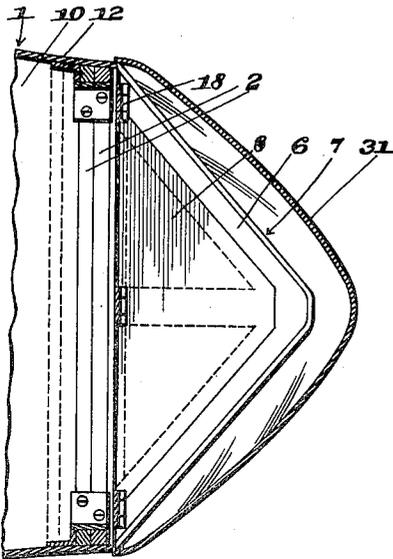


Fig. 4.

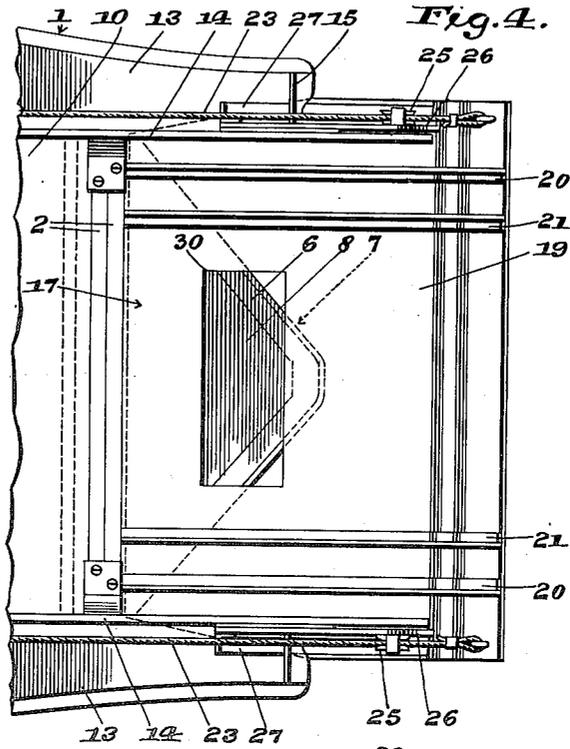


Fig. 6.

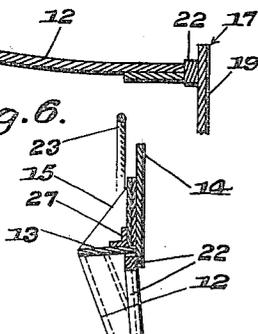
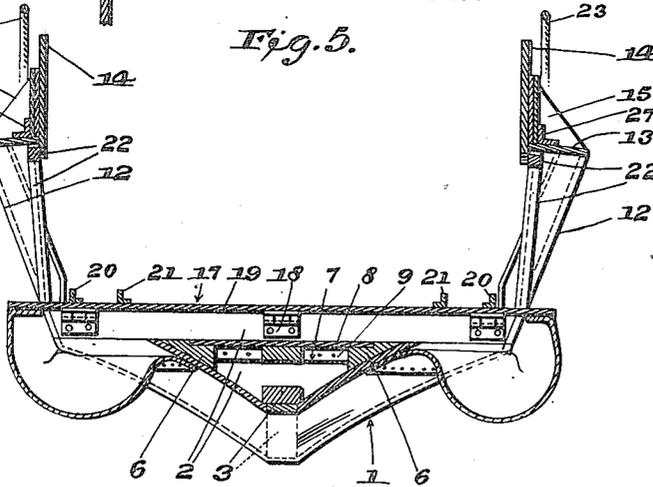


Fig. 5.



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Fig. 7.

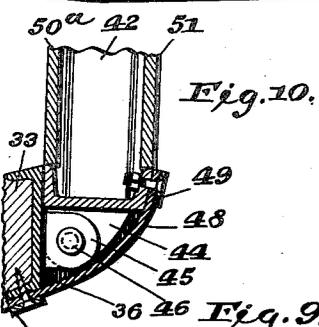
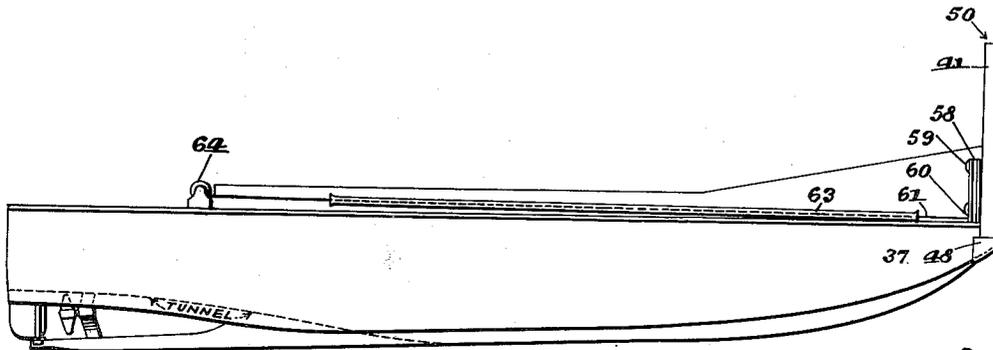


Fig. 10.

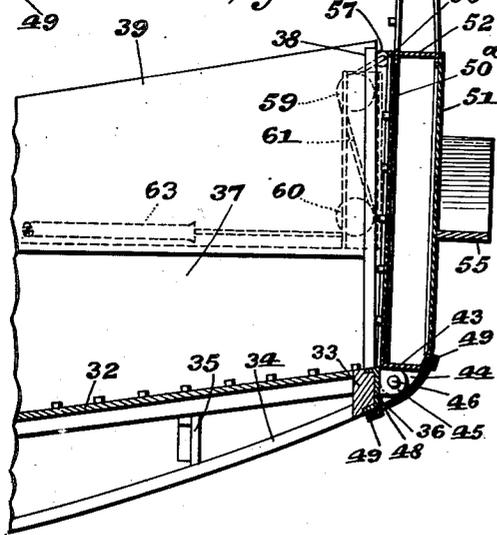


Fig. 9.

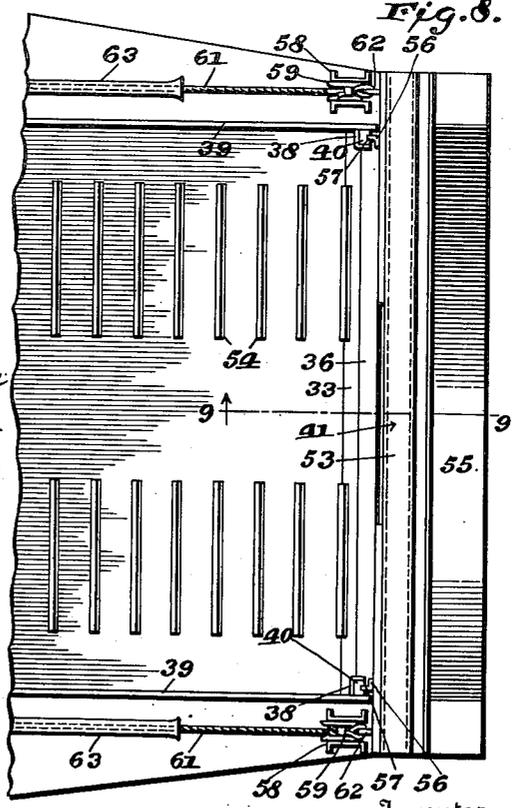


Fig. 8.

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4 Sheets-Sheet 4

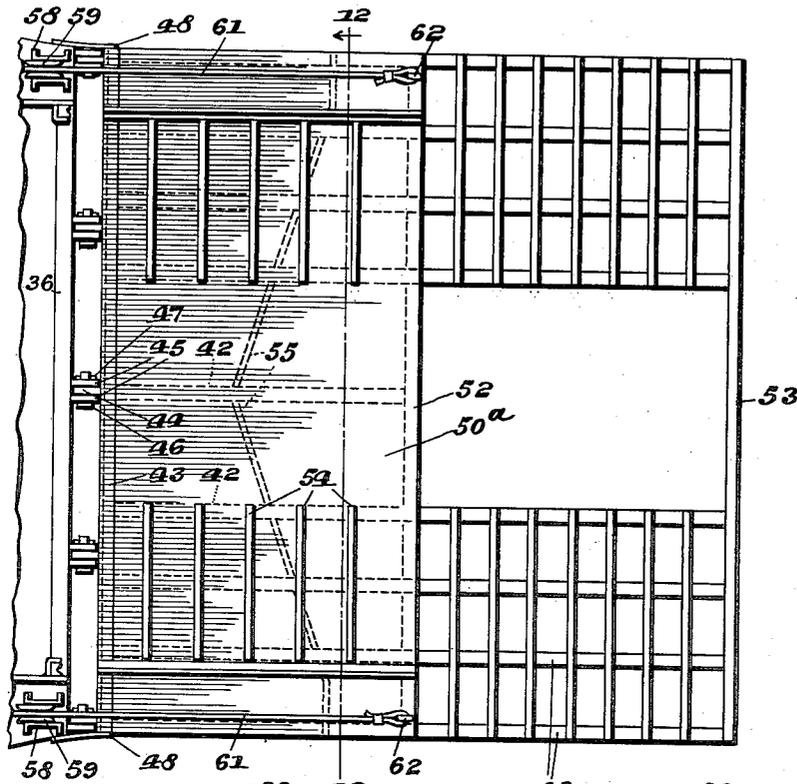


Fig. 11.

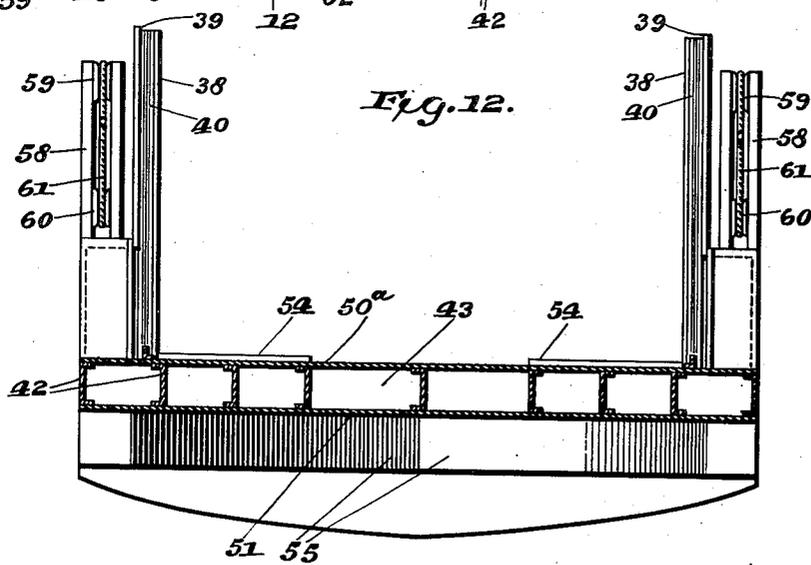


Fig. 12.

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UNITED STATES PATENT OFFICE

2,341,866

LIGHTER FOR MECHANIZED EQUIPMENT

Andrew Jackson Higgins, New Orleans, La.

Application December 8, 1941, Serial No. 422,146

14 Claims. (Cl. 114—60)

This invention relates to landing boats of particular military significance for transporting trucks, tanks, field pieces, and other equipment to a beach, and landing them on the beach without the benefit of wharves or docks.

The general object of the invention is to provide a landing boat having, insofar as they can be retained, the hull-shape characteristics of my "Eureka" hull covered by my Patent No. 2,144,111, granted January 17, 1939, which provides a stable, shallow draft speedy boat with wide transverse bow capable of being driven far up on a shelving beach and retracted from the beach under its own power.

Another object of the invention is to provide a landing boat sized to transport a single piece of heavy mechanized equipment together with its manning crew, enabling the equipment to be unloaded in the shortest possible time upon the beach, and permitting the men to land dry-shod on the shore.

A further object of the invention is to provide a landing boat with wide transverse bow, wherein the bow is hinged transversely substantially at the plane of the floor, and which may be let down on the shore forming a ramp down which the equipment may roll under its own power or otherwise, and serving as a gang plank for the landing of the men.

The invention as herein disclosed is embodied in two modifications of landing boat, one designed for lighter mechanized equipment and having its hull, below a horizontal plane above water level and beneath the hinge axis of the ramp portion of the bow, extending forwardly of said hinge axis and acting as a buffer to take the shock of contact with the shore or collisions with other bodies, protecting the ramp from abuse that might impair its watertight fit or prevent it from being properly operated.

One of the objects appertaining to this form of invention is to provide the ramp with a suitable opening, enabling the ramp to clear the projecting portion of the hull when lowered, and to provide a flexible boot on the front or lower side of the ramp secured thereto and about the periphery of the projecting portion of the hull to cover the opening in the ramp so that when the ramp is raised to bow position it forms a watertight seal for said opening and for the hinge joint between said ramp and hull.

The other disclosed modification is a boat designed for heavier equipment such as a fifteen ton tank, which may not be run up so high on the beach and which therefore requires a longer

ramp extending above the sheer of the boat when the ramp is in bow position.

One of the objects of the invention related to this form is a ramp having that part which extends above the sheer, of openwork construction, both to reduce windage and to give the steersman who stands in the stern, a substantially unimpeded view of the water or shore in front of the boat.

Another object of the invention, also relating to the ramp of openwork construction is the provision of a breakwater plate on the lower side of the ramp near its base to prevent the men or equipment being drenched by surf which otherwise would dash through the openings in the end portion of the ramp.

Other objects of the invention relate to the details of construction which are employed to make a practical craft embodying the principles as above set forth.

In the drawings which accompany and form a part of the following specification, and throughout the several figures of which the same characters of reference have been employed to designate identical parts:

Figure 1 is a perspective view of a landing boat of the type designed for the transport of lighter mechanized equipment, illustrating the principles of the invention;

Figure 2 is a vertical side section of the bow portion of the boat shown in Figure 1, the ramp being shown in its elevated or bow position in full lines and in its lowered or ramp position in broken lines;

Figure 3 is a horizontal section taken along the line 3—3 of Figure 2;

Figure 4 is a plan view of the bow portion, the ramp being shown in its lowered position;

Figure 5 is a vertical section taken along the line 5—5 of Figure 2, the ramp being down;

Figure 6 is a section taken along the line 6—6 of Figure 2 showing a detail of construction;

Figure 7 is a view in elevation of a landing boat designed for the transport of heavier mechanized equipment, the hinged bow being shown in its vertical or bow position;

Figure 8 is a plan view of the bow portion of the boat shown in Figure 7, the ramp being in vertical position;

Figure 9 is a vertical longitudinal section taken along the line 9—9 of Figure 8;

Figure 10 is a vertical section through the base portion of the ramp showing the flexible watertight hinge shield;

Figure 11 is a plan view of the ramp;

Figure 12 is a vertical section taken along the line 12—12 of Figure 11.

Referring now in detail to the several figures, and first adverting to that form of invention shown in the group of Figures 1 to 6, inclusive, the numeral 1 represents a boat hull which preferably has the shape characteristics of my "Eureka" boat hereinbefore mentioned which has a flat transverse spoonbill bow merging into a V-bottom which continues to the midship region, the keel rearward of the midship region having reverse curvature, as shown in Figure 7, and as described in my aforementioned patent, the bottom of the boat being transversely flat from the midship region to the stern, and having a median tunnel beginning at a point back of the midship region and increasing in cross-section as it approaches the stern, the tunnel lying above the propeller. A hull of such shape entrains aerated water beneath its forward portion and travels upon aerated film, the air bubbles continually escaping as they travel laterally up the slope of the V-bottom to the chines and the tunnel, drawing up solid water from the depths which displaces any aerated water which may pass rearwardly of the midship portion of the hull so that the propeller thrusts against a body of solid water, avoiding cavitation.

In a hull of this type, skin friction between the hull and the water is reduced to a minimum, enabling the boat to be driven at relatively high speeds and with economy in power. It also provides a shallow draft boat which is capable of being driven high upon a shelving beach and retracted therefrom under its own power. A hull of such shape has been selected as being especially adapted for the purpose of the present invention, although it is to be understood that the principles of the invention may be applied to other types of hull. In Figure 2, the hull 1 is shown as being divided transversely a short distance rearward of the bow by a vertical bulkhead 2. This bulkhead extends from the keel 3 to a point slightly above the water level. The chine logs 4 and the floor stringers 5 terminate at said bulkhead, being suitably secured thereagainst.

The keel 3 extends forwardly of the bulkhead 2, curving upwardly and terminating at a point which is slightly above the normal load water level of the boat. A substantially horizontal gunwale 6 extends from the end of the keel 3 to the bulkhead 2 substantially at the level of the forward ends of the chines 4 and the forwardly extending portion 7 of the hull is decked over by the horizontal floor 8, which as shown, seats in a rabbet in the end of the keel and in the gunwale and is supported by a cleat 9 secured to the bulkhead. The boat has a substantially flat and horizontal floor 10 supported by joists 11 which rest upon the stringers 5. The forward end of the floor 10 is at the level of the top of the bulkhead 2.

The sides 12 of the boat extend up to the deck 13 and further height is provided by the coamings 14 secured to the deck clamps 15 along the inner edge of the deck. The width of the boat between the coamings is sufficient to clear the width of the mechanized equipment which the boat is designed to transport.

The forward ends 16 of the sides of the boat slope upwardly and forwardly from the bulkhead 2 to the deck in straight lines which lie in a common transverse plane. These sloping ends serve as an abutment for the ramp 17, the latter being

hinged at 18 adjacent the top of the bulkhead 2 along a horizontal axis.

As shown in Figures 1 and 4, the ramp comprises a heavy metallic plate 19 reinforced by pairs of longitudinal angle irons 20 and 21, the upstanding flanges of which define between them guide tracks for the wheels or tractive belts of the mechanized equipment.

The width of the ramp 19 is such that when it is in its elevated or bow position its side margins abut against the forwardly sloping ends 16 of the sides of the boat.

In order to provide a watertight joint between the ramp and the edges of the boat sides against which it abuts, said edges are furnished with facings 22, Figure 6, of sponge rubber or the like, against which the ramp is compressibly held by the cables 23 which are secured at one end to the ramp and held tensioned by the winches, 24, which are preferably power operated.

The cables 23 pass over sheaves 25 which are carried at the upper ends of forwardly inclined brackets 26, each having a securing flange 27, by means of which it is secured to the deck clamp 15 and having a stiffening flange 28 overhanging the ramp and being a continuation of the slope of the ends 16 of the sides of the boat.

The ramp preferably has a stepped terminal edge portion 29 which gives it a firm hold upon the beach, as is clearly shown in Figure 2.

When the ramp is in the raised position shown in full lines in Figure 2, it forms in effect the bow of the boat engaging the sides thereof in watertight manner. The projecting portion 7 of the hull forms a buffer, first contacting the shore or any object with which the boat may collide and sparing the ramp from blows which might bend the hinge connection so that the ramp would not work, or distort the ramp so that it would not fit in watertight manner against the sides of the boat.

It is obvious that the projecting portion 7 of the hull would constitute an obstruction to the lowering of the ramp in the absence of provisions to prevent such a contingency. The ramp is therefore provided with an opening 30, preferably rectangular, and of such extent as to clear the projecting end 7 of the hull when the ramp is lowered. The projecting end 7 of the hull extends through this opening between the guide tracks, but not high enough to interfere with the movement of the mechanized equipment either up or down the ramp.

When the ramp 17 is in its raised or bow position, this opening would give access of the seas in rough weather to the interior of the boat. To prevent this, a flexible boot 31 has been provided, made of waterproofed material such as waxed canvas or the like, which is secured at its upper and side edges to the ramp and at its bottom edges about the periphery of the extending portion 7 of the hull, thus encompassing the opening 30 and also enclosing the joint of the hinge 18 in a watertight manner. When the ramp is down in the position indicated in broken lines in Figure 2, the flexible boot 31 loosely sags beneath the ramp. When the ramp is in its upper or bow position the flexible boot is tightened and substantially conforms to the contour of the hull.

Due to the relatively low position of the floor 10, the center of gravity of the loaded craft is so close to water level as to render it extremely stable even in heavy weather, and the fact that the floor is so low, permits a low freeboard which

adds greatly to the maneuverability of the vessel in a wind. The power plant, not shown, is in the extreme rear part of the boat, and the steersman stands in the stern. The height of the ramp in the form of the invention shown in Figure 1 is such that when it is in closed or bow position it presents no impediment to a clear view of the sea or shore in front of the boat.

This vessel can be driven under its own power up on a shelving beach to a point at which it will rest in a stable manner free from rolling. When the ramp is lowered the mechanized equipment can be driven off of the boat down the ramp upon the shore under its own power, and be reloaded with equal facility. The manning crew can walk dryshod down the ramp upon the beach, carrying their personal equipment. Heretofore when landing, the men have had to jump over the sides of the boat in water sometimes of considerable depth, not only wetting their clothing but also the equipment which they may have to carry.

Referring now to that form of the invention shown in the group of Figures 7 to 12, this boat is designed to transport heavier mechanized equipment, such for example as a fifteen ton tank, and Figure 9 shows that the floor 32 is dropped to the depth of the chine, sloping downwardly toward the rear to give the loaded craft as low a center of gravity as possible, in the interest of stability. The bulkhead 2 shown in the first described form of the invention is therefore dispensed with, as is also the forwardly projecting portion 7 of the hull and a transverse bow log 33 is provided to which the forward end of the keel 34 and the floor 32 are secured, the floor being supported at various transverse stations by suitable rafters, one of which is shown at 35. A transverse channel bar 36 is secured to the forward face of the bow log 33 with its web substantially in a vertical plane and the sides 37 of the boat at their forward edges also terminating substantially in this vertical plane. A pair of upright stanchions 38 of angular section are suitably secured to the sides of the boat at the inner face thereof and substantially at their front ends, said stanchions preferably extending as high as the front of the coaming 39. Said stanchions, together with the sides of the boat, form upwardly facing channels receiving a compressible strip 40 of rubber or the like to form a watertight joint with the ramp 41, when the latter is in its upright or bow position.

The ramp 41 is of heavy construction, comprising a plurality of longitudinally disposed spaced channel bars 42 having their base ends welded or otherwise secured to a transverse channel bar 43, the back of the latter being adjacent the channel bar 36 which is secured to and forms part of the bow log.

Perforated hinge plates 44 are welded or otherwise secured to the back of the channel bar 43 in line with certain of the longitudinal channel bars 42, and the transverse channel bar 36 is provided with a plurality of pairs of spaced similar perforated hinge plates 45 between which the hinge plates 44 freely fit with their perforations in alignment. Headed hinge pins 46 pass through the aligned apertures of the hinge plates and are secured by cotter pins 47.

The hinge joint between the ramp and boat is close to the water level, and to prevent leakage through said joint a transverse flexible strip 48 is provided overlapping said joint and secured to the adjacent parts of the boat and ramp by

being clamped beneath transverse battens 49. The strip 48 may be of rubber, treated canvas, etc.

Inasmuch as this boat being heavily loaded is not expected to ride up as far on the beach as that form of boat disclosed in the first described form of the invention, the ramp is considerably longer, having a portion 50 which extends above the coaming, as shown in Figures 7 and 9. To save material and weight, and to keep the center of gravity as low as possible, the longitudinal channel bars 42 are preferably tapered in this upwardly extending portion of the ramp.

The lower portion of the ramp, that is to say, the part which forms the bow when the ramp is in raised position, is imperforate, being closed both on its upper and lower sides by the sheet metal plates 50a and 51. The upper or extending portion of the ramp is left uncovered, providing an openwork construction. This not only reduces windage when the ramp is in bow position, but it also permits the steersman to see through the ramp, giving him a substantially unimpeded view of the water or shore in front of the boat.

As shown in Figure 11, the closed portion of the ramp terminates in a transverse channel bar 52, to which the end of the middle longitudinal channel bar 42 is secured, the other longitudinal channel bars 42 extending to the end of the ramp and being secured to a terminal transverse channel bar 53. Traction cleats 54 are secured transversely to the floor of the boat in the paths of the treads of the mechanized equipment, and on the ramp, those cleats which are on the closed portion of the ramp being secured to the channel bars 42 through the plate 50a and those which are on the upper portion of the ramp being secured to the channel bars 42 in a lattice-like openwork formation.

The closed portion of the ramp is provided on its under side with a projecting breakwater plate 55 which prevents the surf from dashing through the openwork portion of the ramp while the men and equipment are being unloaded.

When the ramp is in its raised or bow position, as shown in Figure 9, the breakwater plate 55 forms a bow extension which prevents the waves which strike the lower portion of the ramp from traveling vertically upward along its outer surface and sloping through the openwork portion into the boat.

The ramp is provided on its inner side with the angle bars 56, the projecting flanges 57 of which press into the rubber strip 40, forming a watertight seal when the ramp is in raised position.

The boat is provided with the sheave supports 58 suitably secured to the deck outside the coaming carrying the sheaves 59 and 60 over which runs the cables 61 secured at one end to eyes 62 fast to the ramp, passing through guide tubes 63 arranged longitudinally of the decks and being windable upon power winches 64.

The landing boat illustrated in Figures 7 to 12, inclusive, and as described, has the general hull contour of my patented "Eureka" boat, as will be observed in Figure 7, the power plant, not shown, being at the rear. The heavily mechanized equipment normally rests in the intermediate part of the boat where the floor is at lowest level. When the ramp is down in unloading position the equipment is unloaded under its own power, or otherwise, rolling along the cleats on the floor and down the ramp to the shore.

It will be understood to those skilled in the art

that while I have in the above description disclosed what I believe to be preferred and practical forms of the invention, the specific details of construction as shown and described are by way of example and not to be construed as limiting the scope of the invention defined in the appended claims.

What I claim as my invention is:

1. Lighter for mechanized equipment comprising a shallow draft power boat having a floor and sides extending above said floor, a bow gate transversely hinged substantially at floor level, the forward ends of the boat sides terminating substantially in an upwardly extending plane embracing the hinge axis, said bow gate extending the full width of the boat, cooperating with the ends of the sides to form a bow when raised, and when lowered forming a ramp substantially continuous with said floor, said boat having a closed bow portion extending forwardly of said hinge axis with its sheer below the level of said axis, said bow gate having an opening providing clearance for said extending bow portion when said gate is lowered to ramp position.

2. Lighter for mechanized equipment comprising a shallow draft power boat having a floor and sides extending above said floor, a bow gate transversely hinged substantially at floor level, the forward ends of the boat sides terminating substantially in an upwardly extending plane embracing the hinge axis, said bow gate extending the full width of the boat, cooperating with the ends of the sides to form a bow when raised, and when lowered forming a ramp substantially continuous with said floor, said boat having a closed bow portion extending forwardly of said hinge axis with its sheer below the level of said axis, said bow gate having an opening providing clearance for said extending bow portion when said gate is lowered to ramp position, and a flexible boot secured in watertight manner about said opening and the joint of said hinge.

3. Lighter for mechanized equipment comprising a shallow draft power boat having a floor and sides extending above said floor, a bow gate transversely hinged substantially at floor level, the forward ends of the boat sides terminating substantially in an upwardly extending plane embracing the hinge axis, said bow gate extending the full width of the boat, cooperating with the ends of the sides to form a bow when raised, and when lowered forming a ramp substantially continuous with said floor, said boat having a closed bow portion extending forwardly of said hinge axis with its sheer below the level of said axis, said bow gate having an opening providing clearance for said extending bow portion when said gate is lowered to ramp position, and a flexible boot secured to said ramp about said opening and to the extending bow portion about the sheer.

4. Lighter for mechanized equipment comprising a shallow draft power boat having a floor and sides extending above said floor, a bow gate transversely hinged substantially at floor level, the forward ends of the boat sides terminate substantially in an upwardly extending plane embracing the hinge axis, said bow gate extending the full width of the boat, cooperating with the ends of the sides to form a bow when raised, and when lowered forming a ramp substantially continuous with said floor, said boat having a closed bow portion extending forwardly of said hinge axis with its sheer below the level of said axis, said bow gate having an opening providing clearance for said extending bow portion when said

gate is lowered to ramp position, and means forming traction paths on opposite sides of said floor and ramp, said opening being between said traction paths.

5. Lighter for mechanized equipment comprising a shallow draft power boat having a transverse bulkhead adjacent the bow end, and having a floor at the level of the top of said bulkhead and sides extending above said floor, a bow gate transversely hinged to the front of said bulkhead substantially at floor level, the forward ends of the boat sides terminating substantially in an upwardly extending plane embracing the hinge axis, said bow gate extending the full width of the boat cooperating with the ends of the sides to form a bow when raised, and when lowered forming a ramp substantially continuous with said floor, said boat having a closed bow portion extending forwardly of said bulkhead with its sheer below the level of said hinge axis, said bow gate having an opening providing clearance for said extending bow portion when said gate is lowered to ramp position.

6. Lighter for mechanized equipment as claimed in claim 5, including a flexible boot secured in watertight manner to said ramp about said opening and to the extending bow portion about the sheer.

7. Lighter for mechanized equipment comprising a shallow draft power boat having a transverse bulkhead adjacent the bow end, and having a floor at the level of the top of said bulkhead and sides extending above said floor, a bow gate transversely hinged to the front of said bulkhead substantially at floor level, the forward ends of the boat sides terminating substantially in an upwardly and forwardly extending plane embracing the hinge axis, said bow gate extending the full width of the boat cooperating with the ends of the sides to form a bow when raised, and when lowered forming a ramp substantially continuous with said floor, said boat having a closed bow portion extending forwardly of said bulkhead with its sheer below the level of said hinge axis, said bow gate having an opening providing clearance for said extending bow portion when said gate is lowered to ramp position, brackets at the top of the ends of said sides, sheaves mounted in said brackets, and power operated cables passing about said sheaves and secured to said ramp.

8. Lighter for mechanized equipment comprising a shallow draft power boat having a transverse bulkhead adjacent the bow end, and having a floor at the level of the top of said bulkhead and sides extending above said floor, a bow gate transversely hinged to the front of said bulkhead substantially at floor level, the forward ends of the boat sides terminating substantially in an upwardly and forwardly extending plane embracing the hinge axis, said bow gate extending the full width of the boat cooperating with the ends of the sides to form a bow when raised, and when lowered forming a ramp substantially continuous with said floor, said boat having a closed bow portion extending forwardly of said bulkhead with its sheer below the level of said hinge axis, said bow gate having an opening providing clearance for said extending bow portion when said gate is lowered to ramp position, and a flexible waterproof boot secured to said ramp about said opening and to the extending bow portion about said sheer, said boot conforming substantially to the shape of the boat when said bow gate is in bow position.

9. Lighter for mechanized equipment compris-

ing a shallow draft power boat of small size having a floor and sides extending above the floor defining cargo space for a piece of mechanized equipment and the manning crew therefor, and a bow gate at least as high as the sides, transversely hinged substantially at floor level, cooperating with the boat sides when raised to form a watertight bow, and when lowered forming a ramp substantially continuous with said floor, and a flexible water-tight shield overlapping the hinge joint and secured to adjacent portions of said ramp and boat.

10. Lighter for mechanized equipment comprising a shallow draft power boat of small size having a floor and sides extending above the floor defining cargo space for a piece of mechanized equipment and the manning crew therefor, and a bow gate longer than the height of the forward ends of the boat sides transversely hinged substantially at floor level, that part of said bow gate adjacent the hinge being closed longitudinally a distance equal substantially to the height of the forward ends of the boat sides, said closed portion cooperating with the boat sides when said bow gate is raised to form a watertight bow, and said bow gate when lowered forming a ramp substantially continuous with said floor, the portion of said bow gate which extends above the forward ends of the boat sides when in bow position being of openwork construction to reduce windage and give forward visibility to the steersman.

11. Lighter as claimed in claim 10, the bow gate being formed of a plurality of spaced longitudinal load supporting members secured at their hinge ends and terminal ends by transverse members, said longitudinal members being closed on both sides by plates for a longitudinal distance equal to the height of the forward ends of the boat sides.

12. Lighter as claimed in claim 10, the bow gate being formed of a plurality of spaced longitudinal

load supporting members secured at their hinge ends and terminal ends by transverse members, said longitudinal members being closed on both sides by plates for a longitudinal distance equal to the height of the forward ends of the boat sides, and means forming traction paths on opposite sides of said floor and ramp, said means bridging the extending portions of said longitudinal load-bearing members.

13. Lighter as claimed in claim 10, the bow gate being formed of a plurality of spaced longitudinal load supporting members secured at their hinge ends and terminal ends by transverse members, said longitudinal members being closed on both sides by plates for a longitudinal distance equal to the height of the forward ends of the boat sides and a breakwater plate secured to said outer plate and projecting therefrom.

14. Lighter for mechanized equipment comprising a shallow draft power boat having a floor and side extensions above the floor, a bow gate transversely hinged substantially at floor level having a lower closed portion of a height substantially equal to the height of the forward ends of the boat sides and an upper portion of openwork construction, the said closed portion of said bow gate cooperating with the boat sides when raised to form a watertight bow and said bow gate when lowered forming a ramp substantially continuous with said floor, said boat being provided with channeled stanchions adjacent the forward ends of the boat sides, compressible sealing strips in said channeled stanchions, said bow gate in its closed portion being provided with longitudinal flanges registering with said channeled stanchions and pressing into said strips when said bow gate is raised forming watertight joints between the closed portion of said bow gate and said stanchions.

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