

Dec. 8, 1931.

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1,835,618

WATER CRAFT

Filed Nov. 1, 1928

3 Sheets-Sheet 1.

Fig. 1.

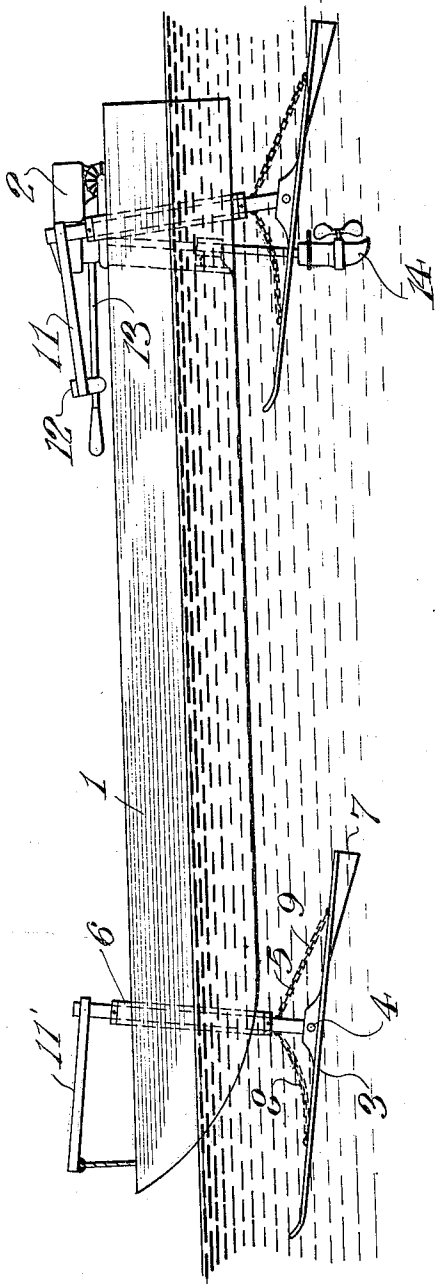
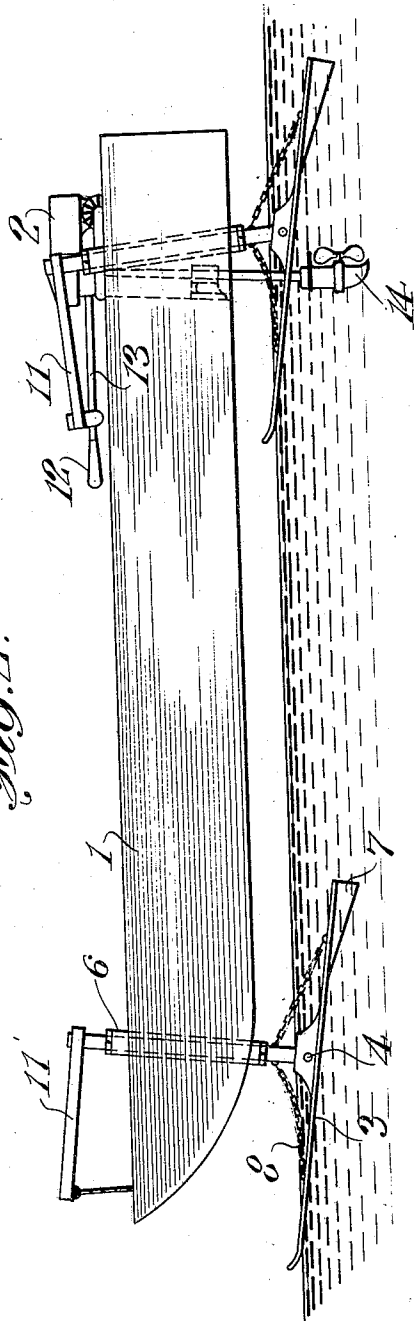


Fig. 2.



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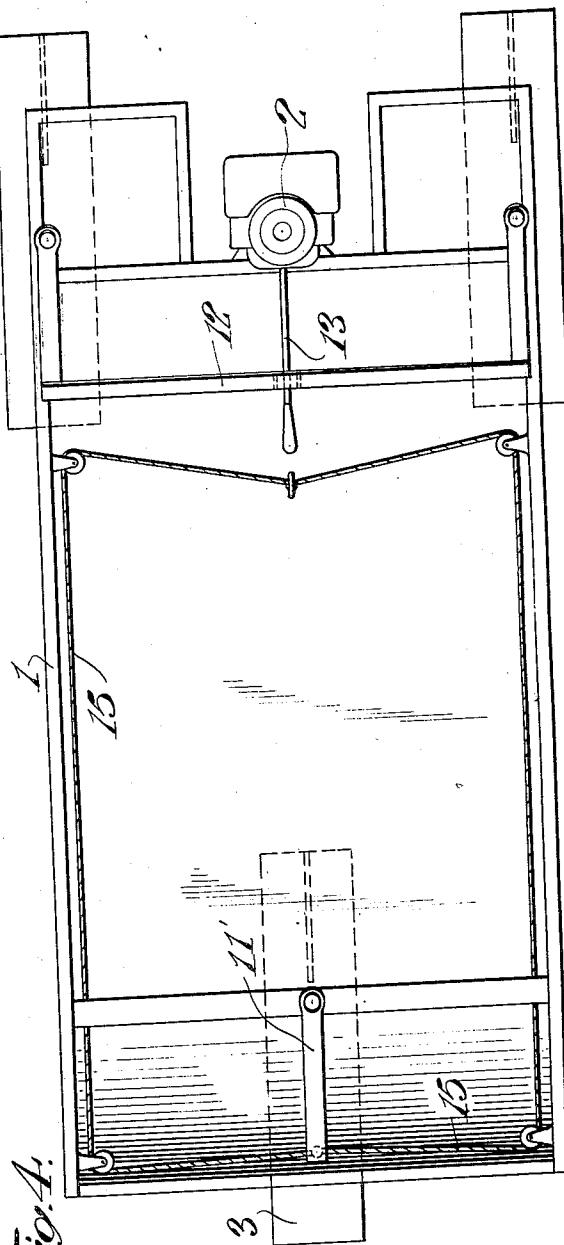
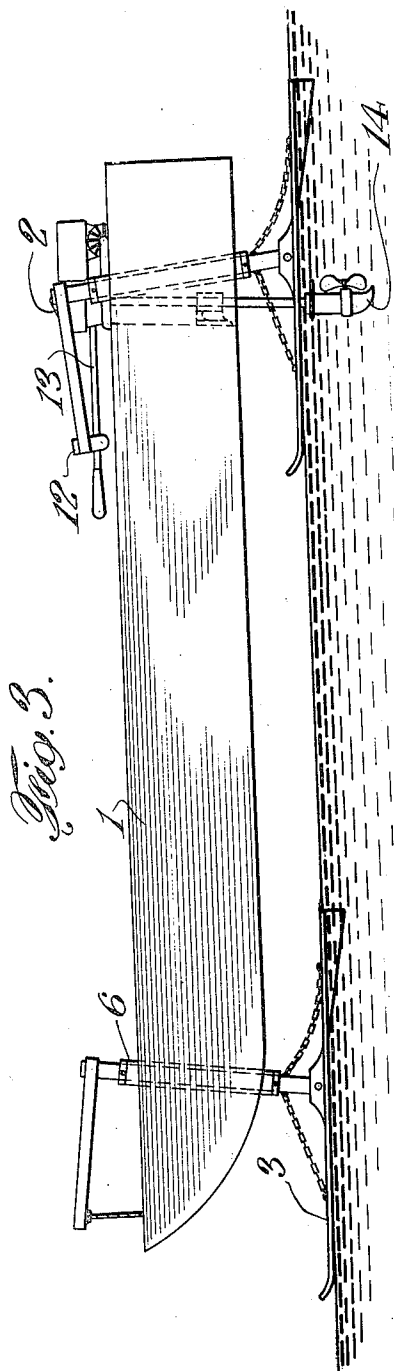
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3 Sheets-Sheet 2



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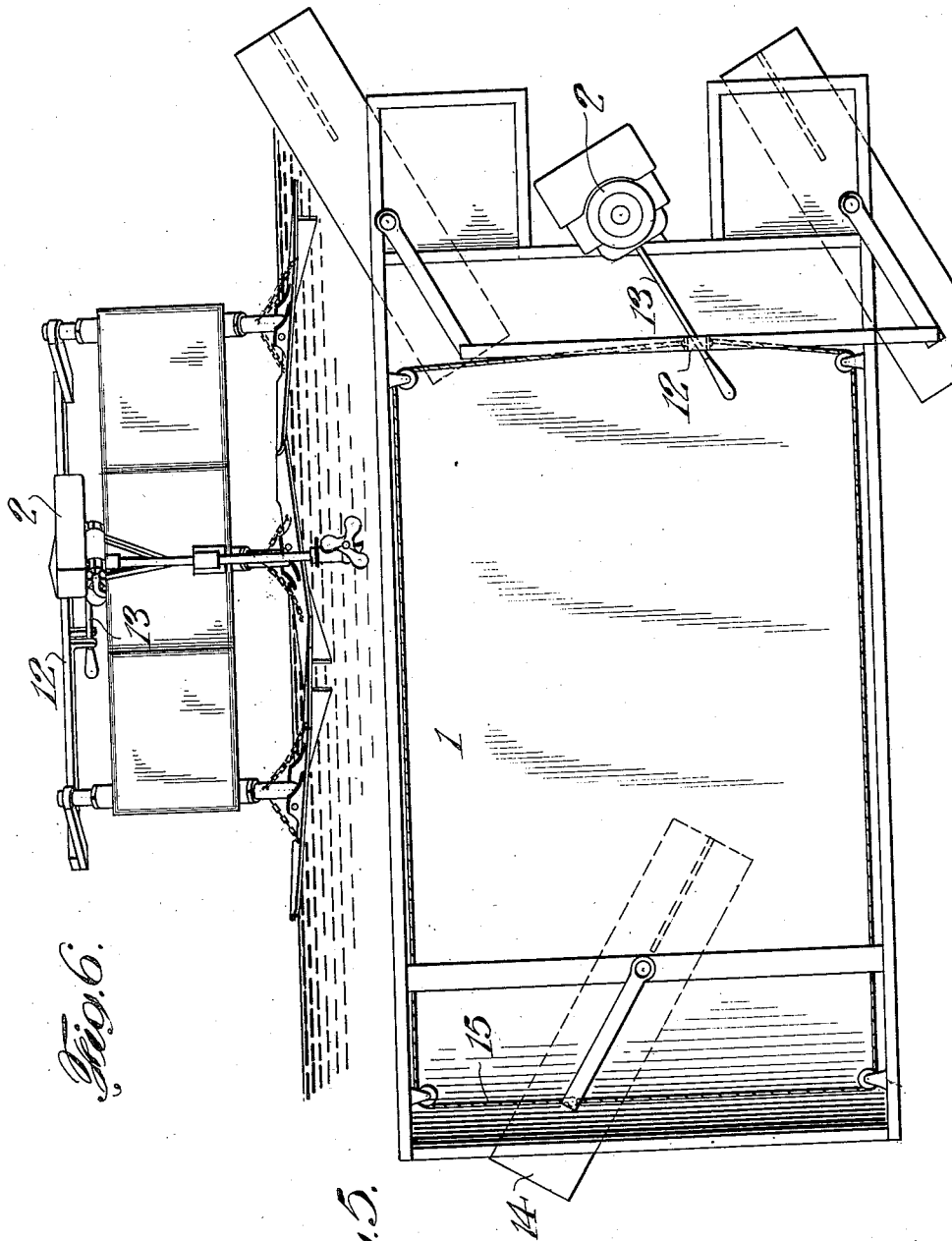


Fig. 6.

Fig. 5.

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WATER CRAFT

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This invention relates to water craft such as boats etc., and pertains more particularly to boats of the type which glide or plane on the surface of the water.

5 It is an object of the invention to provide a boat having planing or gliding members hingedly or pivotally mounted thereon in such manner that the angle of inclination of the wetted planing surface may be automati-
10 cally varied as the speed of the boat or the load carried is varied.

Other objects and advantages of the invention will appear hereinafter.

A preferred embodiment of the invention
15 is shown in the accompanying drawings, in which,

Figure 1 is a side elevation showing the boat at rest.

20 Figure 2 is a similar view showing the boat getting under way.

Figure 3 is a similar view showing the boat at planing speed.

25 Figure 4 is a top plan view showing the forward planing member secured against turning movement.

Figure 5 is a similar view showing the forward planing member connected to the aft planing members for steering purposes.

30 Figure 6 is a rear elevation with the planing members turned to one side to illustrate banking effect.

Referring to the drawings, the boat comprises a buoyant hull 1 which for purposes of illustration may be of the scow type adapted
35 to be propelled by an outboard motor 2.

Secured to the hull 1 in a manner hereinafter described are a plurality of planing or gliding members 3. In the embodiment illustrated, three such members have been provided in order to secure the desired lateral and longitudinal stability, although a greater or fewer number may be used if desired for special purposes. When three planing members are provided they may be conveniently
45 arranged to provide three point suspension, as illustrated, one being located at the bow in the median longitudinal plane of the boat, while the other two are located at the stern at sufficient distances from the median longitudinal plane to give the desired lateral sta-

bility. With this arrangement each of the planing members may travel on water which is undisturbed by the action of any of the other members, and, in view of the distance between the forward planing member and the propeller, the propeller may work in relatively undisturbed water. 55

Each of the planing members is provided with a flat or slightly curved under surface terminating preferably at its forward end in a slight upcurve to cause the forward ends of the members to lift when entering waves. The total areas of the under surfaces of the planing members must be sufficient, of course, to support the total weight of the boat on the surface of the water at normal speed. If desired, the under surfaces of the planing members may be provided with longitudinal or transverse steps, or both, in the usual manner. 60 65 70

Each of the planing members is preferably pivotally connected to the hull 1 on a horizontal axis transverse to the line of movement of the member with respect to the water. Thus, in the embodiment illustrated, the members 3 are pivotally connected at 4 to the rods 5 which extend through the sleeves 6 which are rigidly mounted in the boat. The sleeves preferably lie in vertical planes parallel to the longitudinal axis of the boat, but are inclined with respect to transverse vertical planes, the forward sleeve being tilted rearwardly, while the after sleeves are tilted forwardly. By reason of this arrangement of the sleeves, when the rods 5 and the planing members are rotated for steering purposes, the planing members are caused to bank or change their angle with respect to the surface of the water as illustrated in Figure 6. As a result, steering control is improved because skidding is considerably lessened in making a turn. 75 80 85 90

Steering control may also be improved, if desired, by the provision of longitudinal vertical fins 7. These fins are also useful to prevent leeway as they perform the same function as the keel of a sailing vessel. 95

The position of the pivotal connection between each of the planing members and the rods 5 depends on the characteristics of the 100

member and the kind of performance desired, and may be predetermined by calculation, or adjusted by test and experiment. In general, it is necessary that the center of lift of the entire planing surface be forward of the point of pivotal connection. Thus, so long as the entire planing surface is submerged and the boat is under way there is a constant tendency for the forward end of the planing member to tilt upwardly. But, as explained hereinafter, whenever the forward end of the planing member lifts out of the water, due to the decrease in wetted surface, the center of lift may shift rearwardly temporarily even to a point slightly aft of the point of pivotal connection, thus causing the planing member to tilt downwardly until sufficient surface is wetted to return the center of lift to a point forward of or substantially at the point of pivotal connection.

Preferably the position of the pivoted connection is so located with respect to the center of lift that when the boat is running at normal speed with normal load the planing surface will assume the most efficient angle to the surface of the water.

When the boat is at rest, it is desirable that the planing members tilt upwardly as illustrated in Figure 1, in order that when the boat gets under way the planing surfaces may be in proper position to exert a lift. For this purpose the center of gravity of each planing member when immersed in water may preferably be located aft of the point of pivotal connection. If the planing member does not naturally assume the proper position when at rest and immersed in water, the rear end may be weighted, or additional means such as a spring may be provided to depress the rear end of the member.

Means may also be provided to limit the pivotal movement of the planing members in a vertical plane. Thus in the embodiment illustrated, each of the planing members is provided with a chain 8 to limit pivotal movement in one direction and a chain 9 to limit pivotal movement in the other direction. As will be understood, the chains 8 are useful under conditions where, due to irregularities of the water surface or to other causes, the center of lift of a member might shift temporarily to a point aft of the pivotal connection. The chains 9 are chiefly useful to prevent the members from striking the bottom of the hull, and to prevent the members from assuming too steep an angle in starting.

For steering purposes the after planing members may be provided with tiller members 11, which said members may be connected by a cross bar 12, which in turn may be connected to the tiller 13 which operates the rudder 14 or other steering mechanism of the boat. Thus, as illustrated in Figure 4, when the tiller 13 is moved for steering purposes, the two after planing members turn

with the tiller and rudder of the boat. The forward planing member may also be provided with a tiller member 11' to which is connected a rope or other means 15 for holding the planing member in fixed position. The ends of the rope 15 may be secured conveniently to a cleat on the bottom of the boat.

As illustrated in Figure 5, however, the ends of the rope 15 may be secured to the tiller 13, if desired, in order that the forward planing member may be turned with the after planing members, although in an opposite direction for reasons which will be understood.

When at rest, the boat floats in the water in the position illustrated in Figure 1, the necessary buoyancy being provided by the hull 1, although as will be understood buoyancy might also be provided by pontoons or in any other desired fashion. Due to the fact that the center of gravity of the planing members is aft of the point of pivotal connection to the rods 5, the planing members assume an upwardly tilted position as illustrated in Figure 1, the extent of the tilting being limited by the chains 9.

As soon as the motor is started to cause the boat to move through the water, the planing members begin to exert an up-thrust, which, as the boat gathers speed, rapidly increases and eventually lifts the hull 1 completely out of the water, so that the boat is supported by planing action rather than by buoyancy.

As the hull rises as the boat gathers speed, the planing surfaces continue for a time to be tilted upwardly as far as permitted by the chains 9 due to the fact that the center of lift is forward of the point of pivotal connection to the rods 5. As the boat gathers still more speed, however, the front ends of the planing members gradually lift out of water, causing the normal center of lift to shift rearwardly, thus causing the planing members to flatten out somewhat. Thus, the planing members automatically adjust themselves to a position depending upon the speed at which the boat is driven and the load carried thereby, the members gradually approaching a position parallel to the surface of the water as illustrated in Figure 3 as the boat attains its intended speed. As the boat slows down, the reverse operation takes place, the planing members gradually tilting to the position illustrated in Figure 2 and the hull settling gradually toward the surface of the water. As will be understood, with any given load and any given area of planing surface, the distance of the center of lift from the point of pivotal connection determines the speed at which the planing members assume their most efficient planing angle.

In steering the boat, the tiller 13 is moved to the right or left in the ordinary manner, causing the after planing member 3 to also

move to the right or left as illustrated in Figure 4, or as illustrated in Figure 5 also causing the forward planing member to turn to the left or right. Due to the fact that the sleeves 6 are inclined somewhat, as the planing members are turned for steering purposes, their angle of inclination with respect to the surface of the water is changed, or, in common parlance, they are caused to bank. In this manner, the tendency to skid in making a turn is reduced, this tendency also being reduced somewhat by the vertical fins 7.

It will be observed that when the boat is traveling at constant speed the area of wetted surface remains substantially constant even though surface irregularities of the water may be encountered. For this reason the action of the boat in rough water is relatively smooth as compared with that of step hydroplanes. for example, in which the area of wetted surface may vary widely.

It will be understood that the invention may be variously modified and embodied within the scope of the subjoined claims.

I claim as my invention:

1. A boat having thereon a member providing a normally submerged planing surface pivotally mounted for free movement, the pivot pin being so near the planing surface as to divide the tilting action on the planing surface between the portions in front of and behind the pivot pin respectively.

2. A boat having thereon a member providing a normally submerged planing surface pivotally mounted for free movement on a horizontal axis transverse to the line of movement of the boat, the pivot pin being so near the planing surface as to divide the tilting action on the planing surface between the portions in front of and behind the pivot pin respectively.

3. A boat having thereon a member providing a planing surface pivotally mounted on an axis lying in a vertical plane parallel to the longitudinal center line of the boat, said axis being inclined with respect to a transverse vertical plane and securely maintained in such inclined position.

4. A boat having thereon a member providing a planing surface pivotally mounted for free movement on a horizontal axis transverse to the line of movement of the boat and on an axis lying in a vertical plane parallel to the longitudinal center line of the boat.

5. A boat having thereon a member providing a planing surface pivotally mounted on a horizontal axis transverse to the line of movement of the boat and on an axis lying in a vertical plane parallel to the longitudinal center line of the boat, said axis being inclined with respect to a transverse vertical plane and securely maintained in such inclined position.

6. A boat having thereon a member providing a liquid planing surface pivotally

mounted for free movement, the point of pivotal connection being forward of the center of gravity of the member when immersed in water.

7. A boat having thereon a member providing a liquid planing surface pivotally mounted for free movement, the point of pivotal connection being aft of the center of lift and forward of the center of gravity of the planing surface.

8. A boat having a plurality of planing members separately pivoted thereon, and means for turning said members in unison for steering purposes.

9. A boat having a plurality of planing members separately pivoted thereon, and means connected with the rudder for causing said members to be turned in unison when the rudder is turned.

10. A boat having thereon a member providing a planing surface pivotally mounted on an axis lying in a vertical plane parallel to the longitudinal center line of the boat, and means for causing said member to bank when turned to either side of normal central position.

11. A water-craft comprising in combination, a central structure, a member mounted to turn about an approximately vertical axis, and a normally submerged planing member pivotally mounted on the lower portion of said member, the pivot point being so near the planing surface as to divide the tilting action on the planing surface between the portions in front of and behind the pivot point respectively.

12. A water-craft comprising in combination, a central structure, a member mounted to turn about a fixed and approximately vertical axis on said structure, and a normally submerged planing member pivotally mounted on the lower end of said vertical member, the pivot point being so near the planing surface as to divide the tilting action on the planing surface between the portions in front of and behind the pivot point respectively.

13. A device as set forth in claim 11 in which said fixed axis is disposed in a vertical plane parallel to the longitudinal center line of the central structure.

14. A device as set forth in claim 11 in which said fixed axis is disposed in a vertical plane parallel to the longitudinal center line of the central structure, said axis being inclined with respect to a transverse vertical plane.

15. A water-craft comprising in combination, a central structure, a member mounted thereon arranged to turn about a fixed inclined axis disposed adjacent a vertical line, and a planing member secured to said first member.

16. A water-craft comprising in combination, a central structure, a member mounted thereon arranged to turn about an inclined

axis disposed adjacent a vertical line, and a planing member pivoted to the lower portion of said first member.

17. A water-craft comprising in combination, a central structure, members mounted thereon arranged to turn about inclined axes disposed adjacent a vertical line, the axis at one end of the craft being inclined forward downwardly and the axis at the other end of the craft being inclined rearward downwardly, and planing members secured to the lower part of said first members whereby the craft will bank automatically in turning.

18. A water-craft comprising in combination, a central structure and a planing member pivoted thereon to turn freely about an axis transverse to the longitudinal center line of the central structure, the center of gravity of the member being aft of the point of pivotal connection and the center of area being forward of the pivotal connection whereby the member begins to assume a less inclined position as it starts to rise above the surface of the water.

19. A water-craft comprising in combination, a central structure and a planing member pivoted thereon to turn freely about an axis transverse to the longitudinal center line of the central structure, said member acting at a different angle as it begins to emerge from the water.

In testimony whereof, I have signed my name to this specification this 27th day of October, 1928.

FRED WALLER.