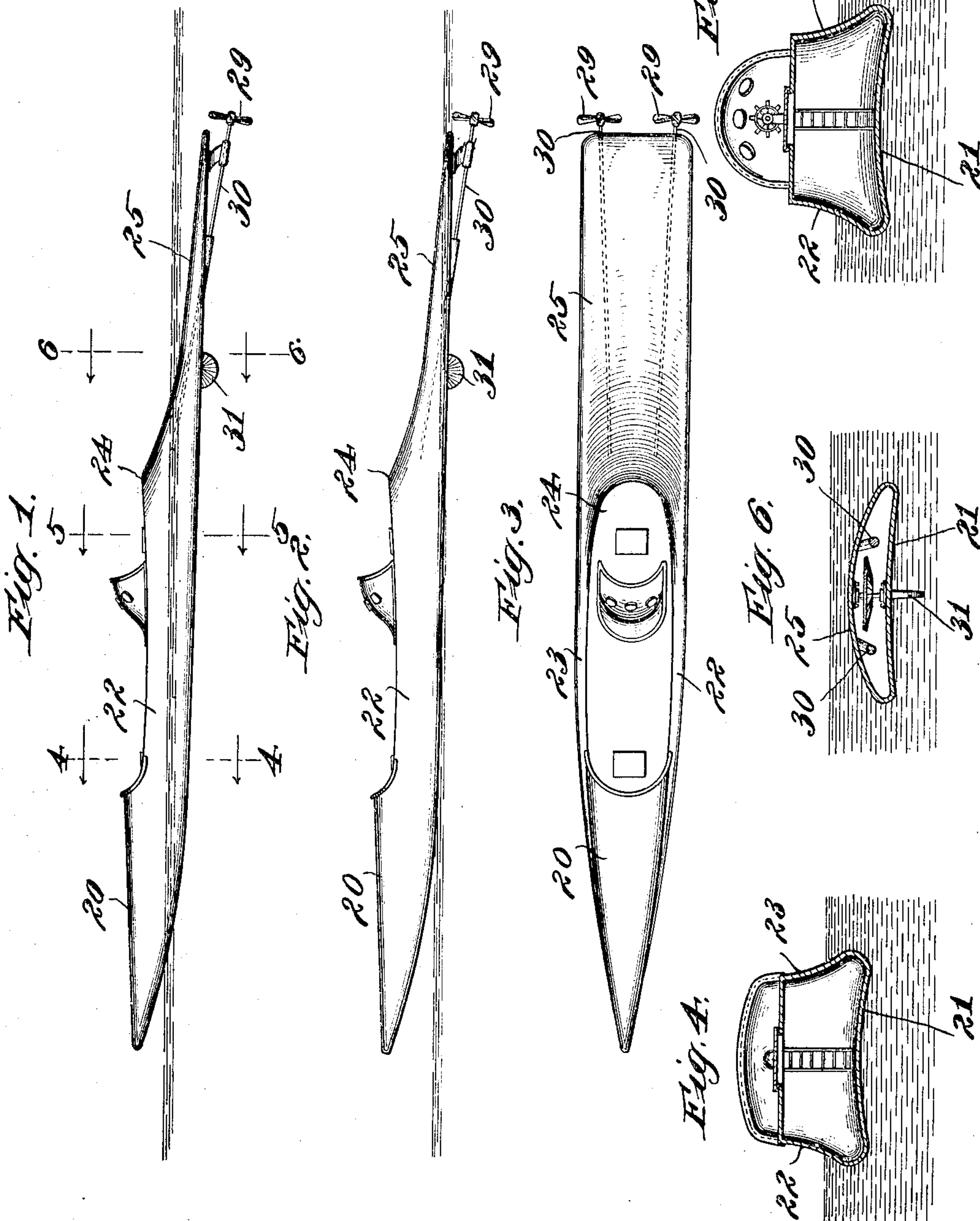


912,814.

Patented Feb. 16, 1909.

2 SHEETS—SHEET 1.



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HYDROPLANE VESSEL.
APPLICATION FILED MAY 6, 1908.

912,814.

Patented Feb. 16, 1909.
2 SHEETS—SHEET 2.

Fig. 7.

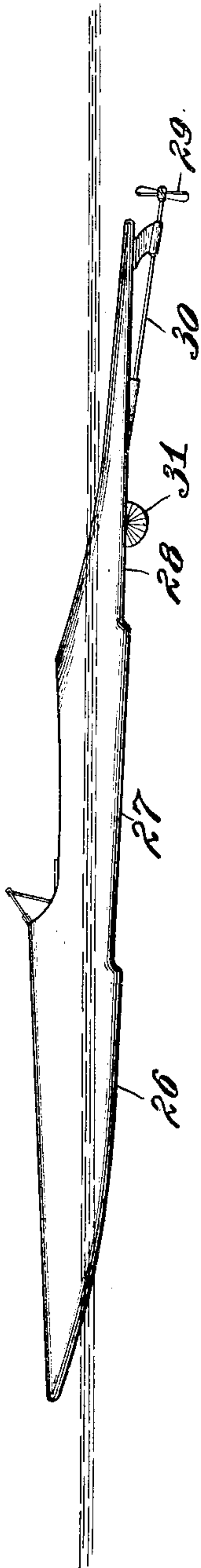


Fig. 8.

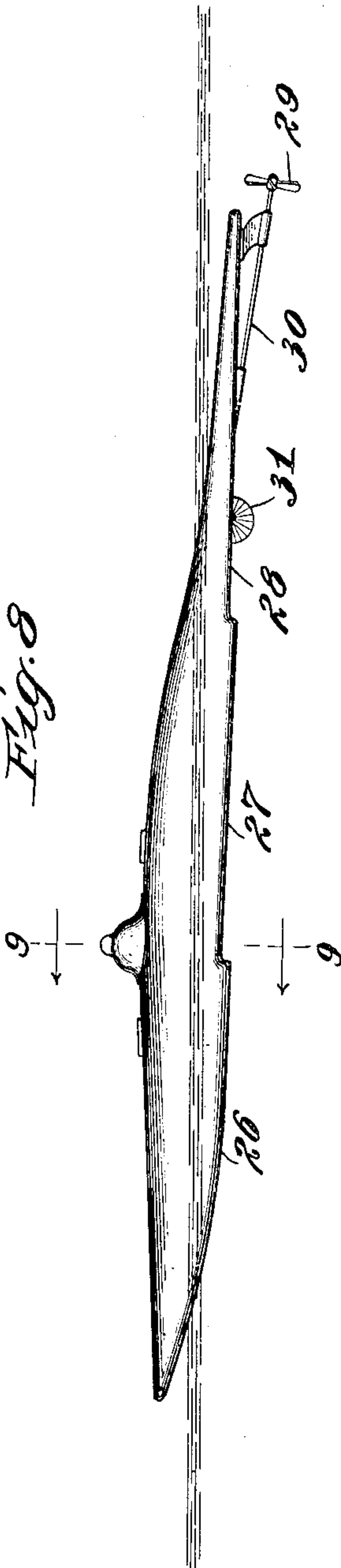


Fig. 9.

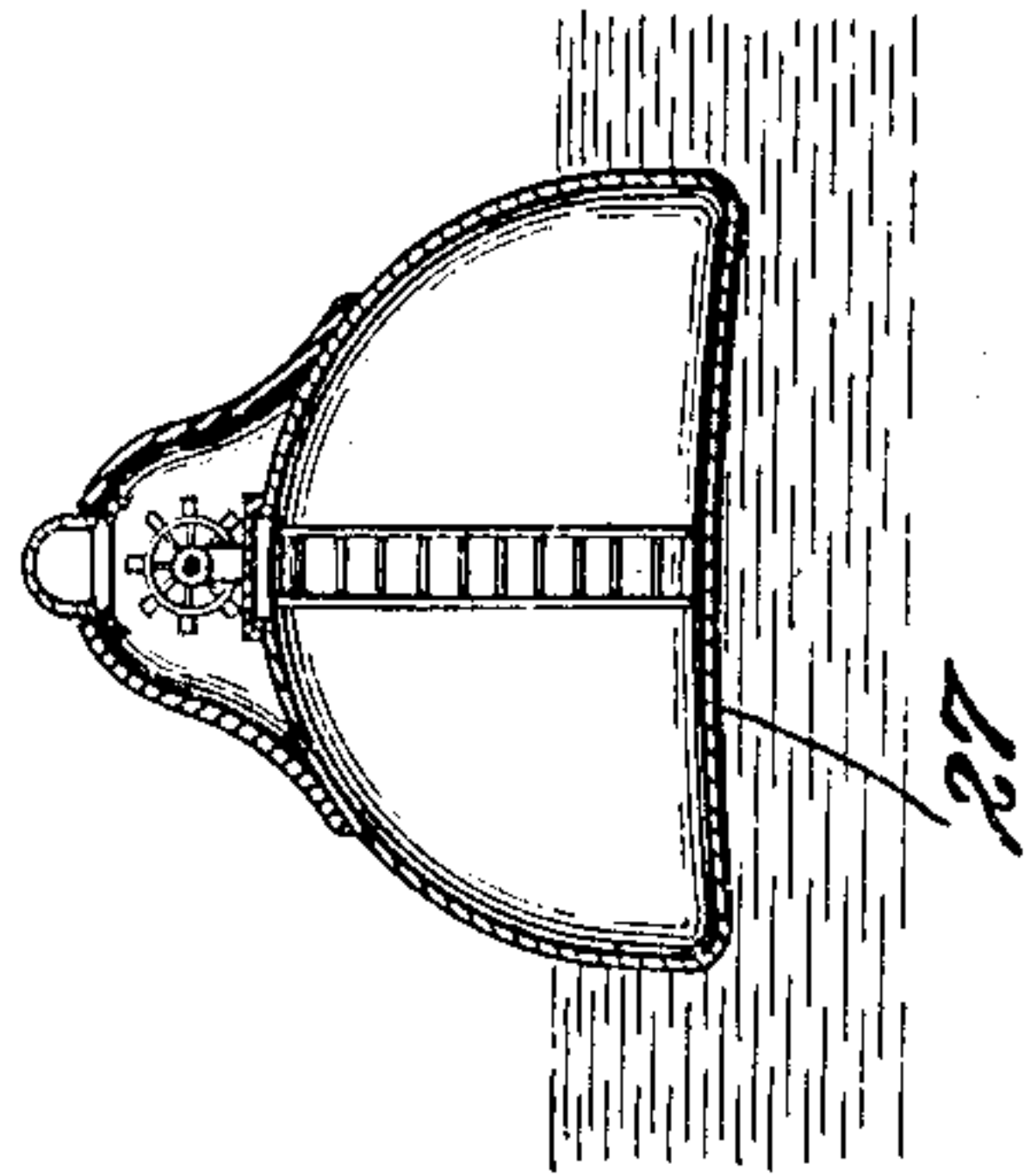


Fig. 10.

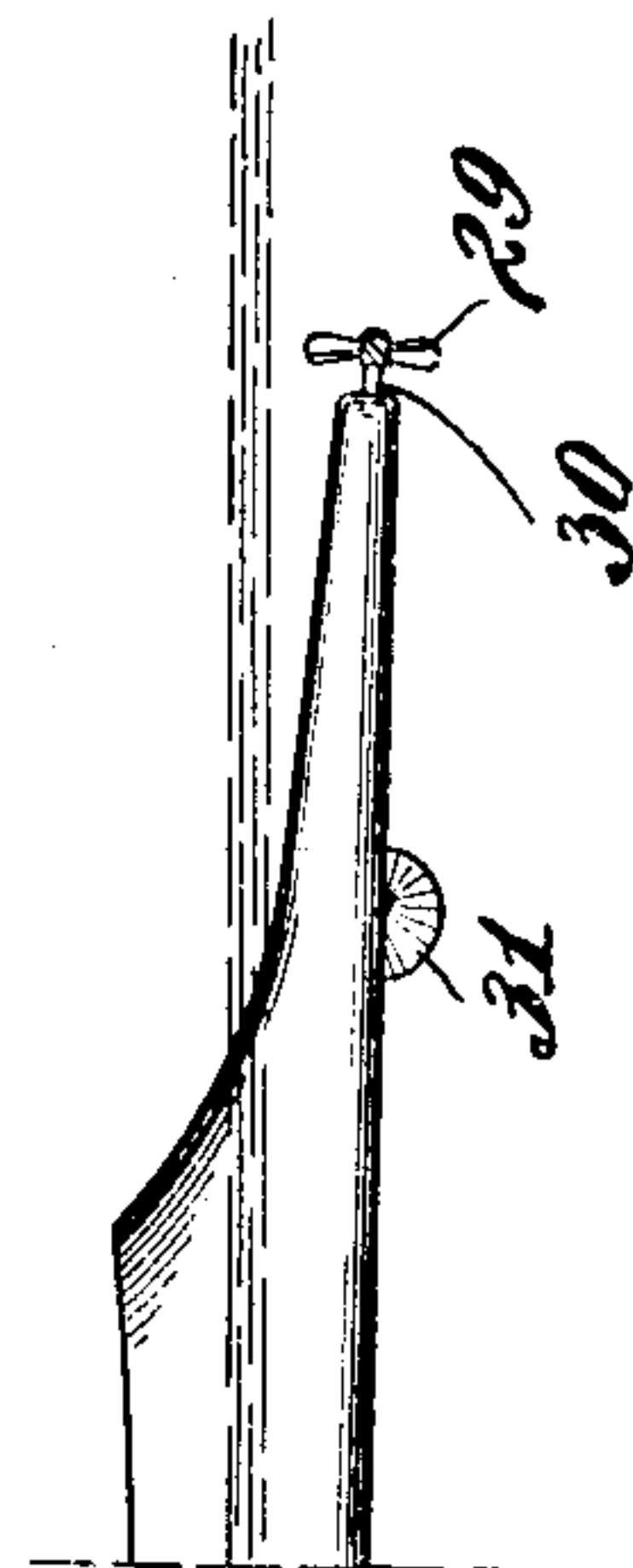
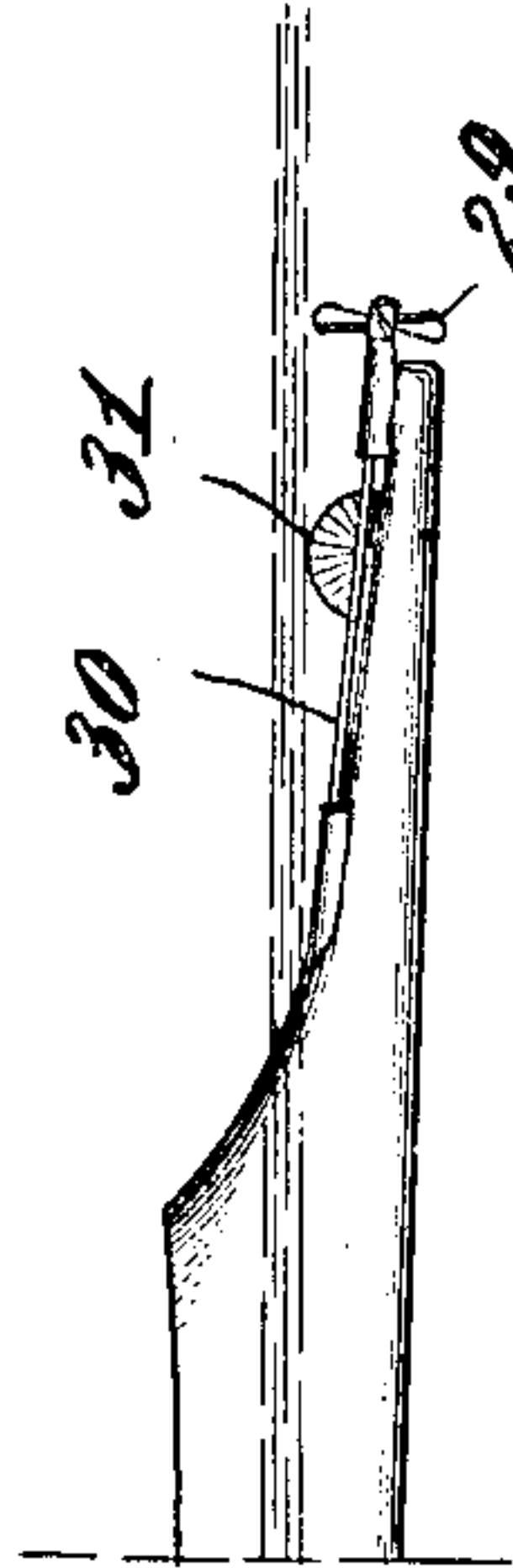


Fig. 11.



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HYDROPLANE VESSEL.

No. 912,814.

Specification of Letters Patent.

Patented Feb. 16, 1909.

Application filed May 6, 1908. Serial No. 431,274.

To all whom it may concern:

Be it known that I, GEORGE RONSTROM CLIFFORD, a subject of the King of England, and resident of Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Hydroplane Vessels, of which the following is a specification, and which are illustrated in the accompanying drawings, forming a part thereof.

The object of the invention is to so improve upon vessels of this type as to increase their efficiency by reducing the wave resistance and providing against lateral drifting. These and other advantages are secured by means of the structure hereinafter described, and which is illustrated in the accompanying drawings, in which—

Figures 1 and 2 are side elevations of the vessel showing positions assumed in the water at different speeds; Fig. 3 is a plan view of the same; Figs. 4, 5 and 6 are sectional views on the lines, respectively, 4—4, 5—5 and 6—6 of Fig. 1; Figs. 7 and 8 are side elevations of the vessel showing a modified form of construction; Fig. 9 is a sectional view on the line 9—9 of Fig. 8; Figs. 10 and 11 are detail side elevations of the after part of the vessel showing modifications of construction.

The most serious obstacle to the rapid movement of a vessel through the water is the so-called wave resistance, by which is meant that agitation of the water which results from its displacement as the hull advances. It is the common purpose of the hydroplane type of vessel to reduce this resistance, but heretofore the effort has been limited to the raising of the vessel in the water as its speed increases, and this has been accomplished by unduly increasing the width or beam of the vessel, and there has been involved a loss of control in steering.

In the present invention the prow and rear end of the vessel are so shaped that both the initial displacement of the water and its return at the back of the vessel are effected gradually, and by movements along lines which cause a minimum of agitation and surface or skin friction upon the vessel sides. The vessel is provided with a stern body extension inclined downwardly below the water line, its lower surface forming a continuation of the bottom of the hull and its upper surface tapering to form easy in-

clines over which the water may travel in seeking its level.

The invention is designed for all kinds and sizes of high speed vessels. The drawings are simplified by showing only the hull of the vessel; the deck arrangement and upper rigging generally being but conventionally indicated.

The prow 20 of the vessel is substantially cigar shaped. As the hull widens, proceeding backwardly on the prow, the bottom is flattened and given a concave form, as shown at 21, and the sides are also slightly concave, as shown at 22, 23. The hull is extended backwardly a very considerable distance beyond the after deck 24, as shown at 25, this stern extension preferably being of substantially uniform width or beam and being inclined downwardly, its lower surface being a continuation of the plane of the bottom throughout a greater part of its extension, while its upper surface is more sharply inclined, thereby giving the extension a tapering form, and is transversely rounded, as shown in Fig. 6. The hull is rounded at the after deck, and the line of the upper surface of the stern extension is downwardly curved from this point. The main hull of the vessel expands downwardly and transversely; which, together with the said stern extension, furnishes required area of hydroplane, and insures stability under high speed.

The vessel is so designed that when at rest in the water the prow is tilted upwardly and the stern downwardly, thereby giving its bottom a gradual incline from the one point to the other. As the vessel advances through the water it is thus bodily raised by a wedging action, in proportion to its speed. The water is displaced by a gradual lateral movement which avoids violent agitation, and closing in at the stern of the vessel flows smoothly along the sides thereof and over the rounded surface of the stern extension, also without agitation, thereby saving the power which is usually absorbed by the creation of laterally moving and following waves. This action of the water is substantially the same at all speeds and as, in vessels as heretofore constructed, the wave or displacement resistance has increased with the square of the speed, the saving effected by the herein-described construction is very great. A further impediment to high speed

in vessels as heretofore constructed has been what amounts practically to a suction action at the stern. As a vessel has advanced it would tend to leave a trough behind it. 5 The same force which impels the water to rush in to fill this trough has a retarding effect upon the vessel. By the curved and inclined form of the stern extension of the vessel herein described, inward movement 10 of the water is lateral and the reaction consequently is transverse to the direction of travel and hence not retarding in its effect. The lifting action may be augmented by giving the bottom a greater incline from the 15 horizontal, and this is secured by forming the bottom as a plurality of sections, as shown at 26, 27, 28, in Figs. 7 and 8.

The vessel may be propelled in any suitable manner; as shown it is provided with 20 screws 29 located beyond the end of the stern extension 25. The shaft 30 may project from the hull at any desired point, but preferably through the bottom, as shown in Figs. 1, 2, 7 and 8, or through the extreme 25 end, as is Fig. 10, or through the upper face of the stern extension, as shown in Fig. 11, this location depending upon the extent it is proposed to have the vessel merged in the water at high speed.

30 The rudder 31 is preferably located below the stern extension 25, though as shown in Fig. 11, where the vessel is intended to be more deeply merged, it may be above this extension. The rudder may, of course, take 35 any desired form and may be controlled in any ordinary or usual manner.

The invention is applicable to either merchant or naval vessels and torpedoes; and as illustrated in Fig. 8 is applied to a sub- 40 marine craft.

I claim as my invention—

1. A hydroplane-vessel, the entire bottom of which inclines backwardly and downwardly and forms the hydroplane, having a 45 pointed prow, a transversely rounded hull and a rearward, vertically tapering main body extension of considerable length, extending below the water line, the under surface of which extension forms a continuation 50 of the vessel's bottom.

2. A hydroplane vessel, the entire bottom of which is inclined backwardly and downwardly and constitutes the hydroplane, having a pointed or cigar-shaped prow, a trans- 55 versely rounded hull and an unbroken rearward, main body extension of considerable

length, extending below the water line, the upper surface of which extension is transversely rounded and inclined backwardly and downwardly from the hull of the vessel, 60 the under surface of said extension being a continuation of the vessel's bottom.

3. A hydroplane-vessel the bottom of which constitutes the hydroplane, having a cigar-shaped prow, a rounded hull and stern, 65 a transversely concave main bottom surface, and a rearward body extension of uniform width extending below the water line, the upper surface of which extension is transversely rounded and inclined downwardly 70 and backwardly from the hull, and the under surface of which forms an unbroken continuation of the vessel's bottom or hydroplane.

4. A hydroplane-vessel, the bottom of 75 which constitutes the hydroplane, having a cigar-shaped prow, a transversely concave main bottom surface and an unbroken rearward, vertically tapering main body extension, extending below the water line, the 80 upper surface of which extension is transversely rounded and the under surface of which forms a continuation of the vessel's bottom, said bottom being divided into series of backwardly and downwardly inclined 85 surfaces.

5. A hydroplane vessel, the bottom of which constitutes the hydroplane, having a cigar-shaped prow, a rounded downwardly expanding hull and an unbroken rearward, 90 vertically tapering main body extension, extending below the water line, the upper surface of which extension is transversely rounded and inclined backwardly and downwardly from the hull of the vessel, and the under 95 surface of which extension forms a continuation of the vessel's bottom.

6. A hydroplane-vessel having its prow cigar-shaped, its hull expanding downwardly and transversely from top to bottom, 100 with a longitudinally channeled main bottom surface, and in continuation thereof an unbroken rearward body extension of substantially uniform width extending below the water line, the upper surface of which 105 extension is transversely rounded, and inclined downwardly and backwardly from the hull.

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