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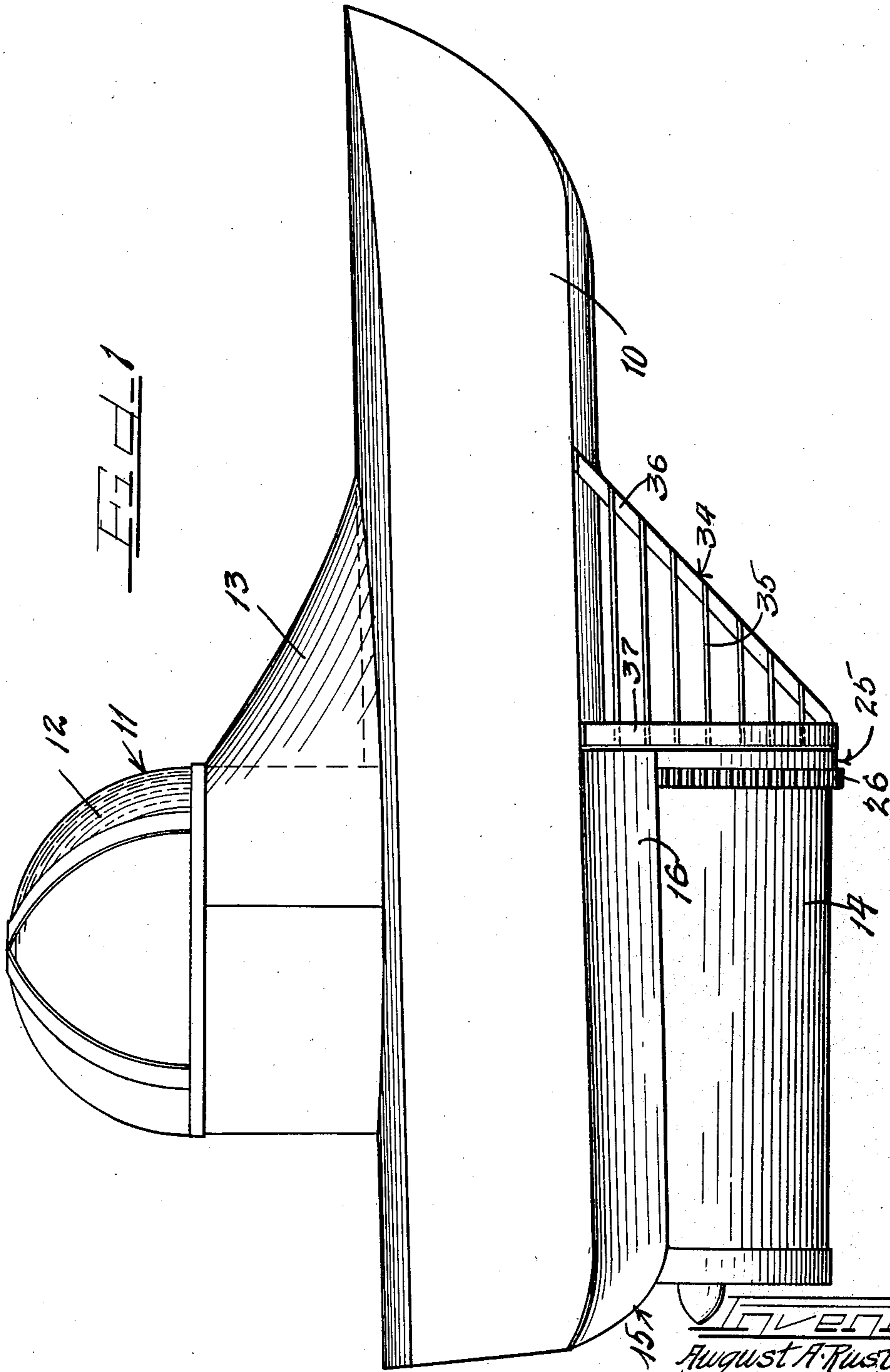
A. A. RUSTEBERG

2,343,711

WATERCRAFT

Filed April 3, 1942

4 Sheets-Sheet 1



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INVENTOR
August A. Rusteberg.
Charles Bill
ATTY.

March 7, 1944.

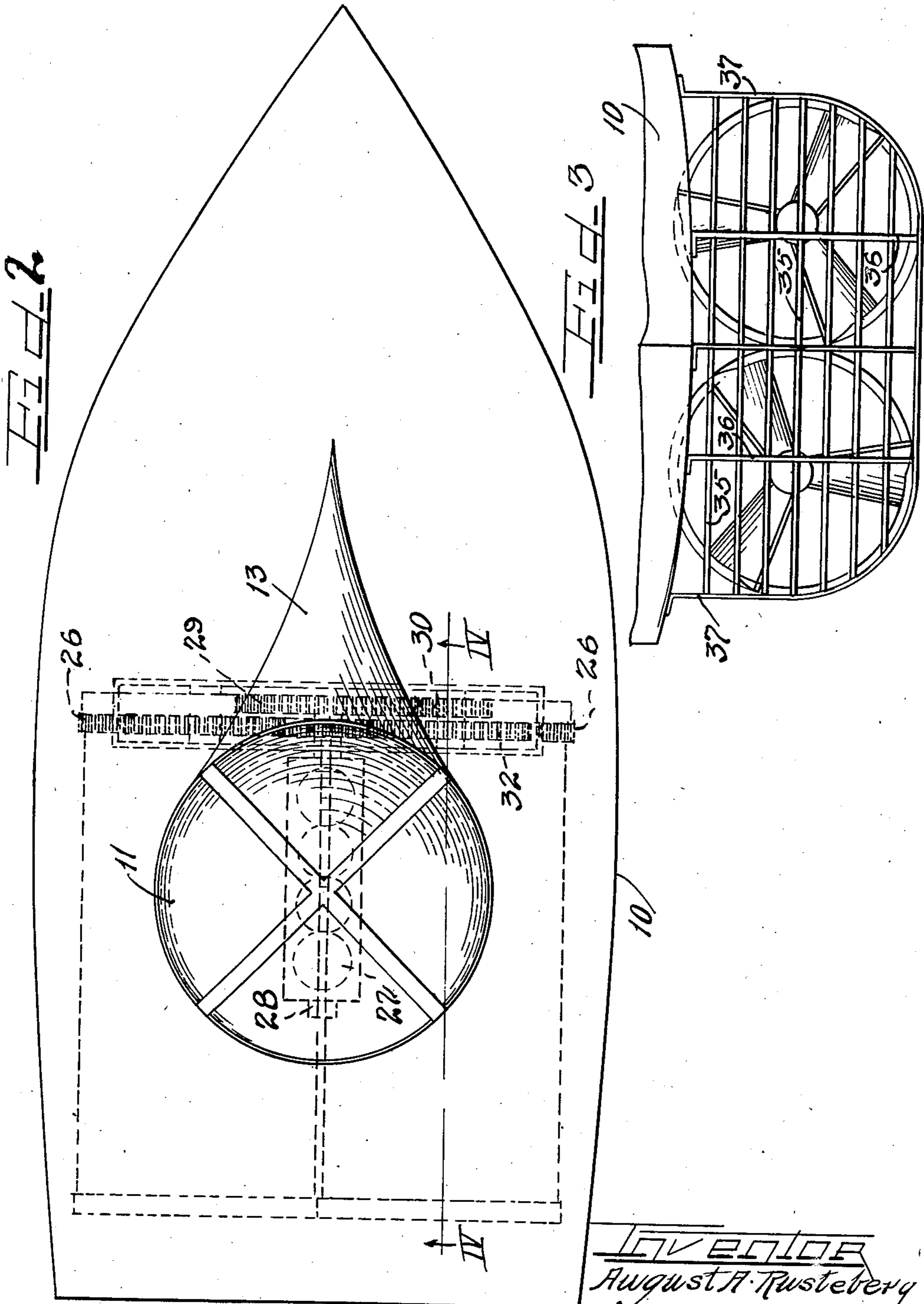
A. A. RUSTEBERG

2,343,711

WATERCRAFT

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4 Sheets-Sheet 2



INVENTOR
August A. Rusteberg

Charles Hill
ATTY.

64

March 7, 1944.

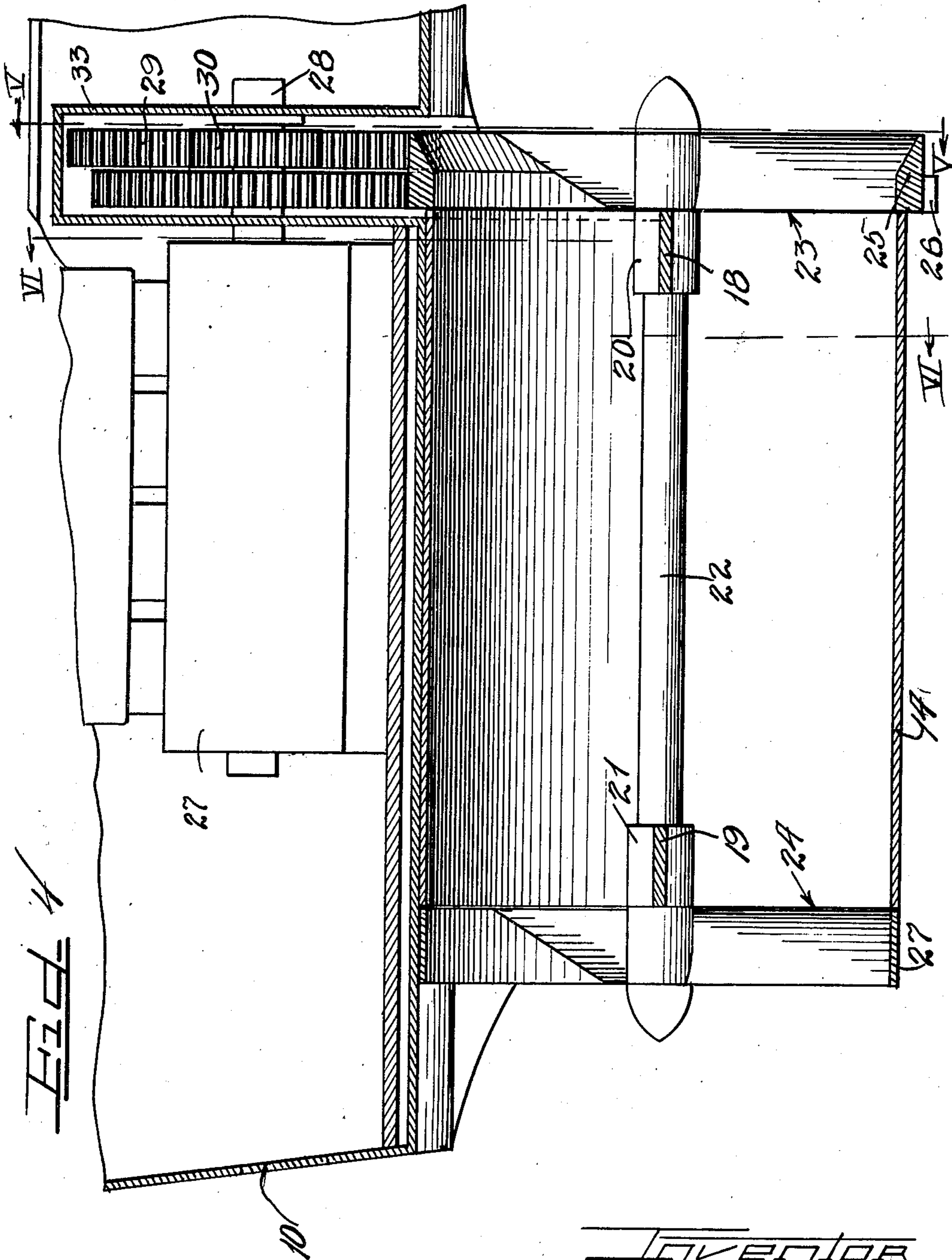
A. A. RUSTEBERG

2,343,711

WATERCRAFT

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4 Sheets-Sheet 3



INVENTOR
August A. Rusteberg.
Charles Miller
ATTY.

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March 7, 1944.

A. A. RUSTEBERG

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WATERCRAFT

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Fig. 5

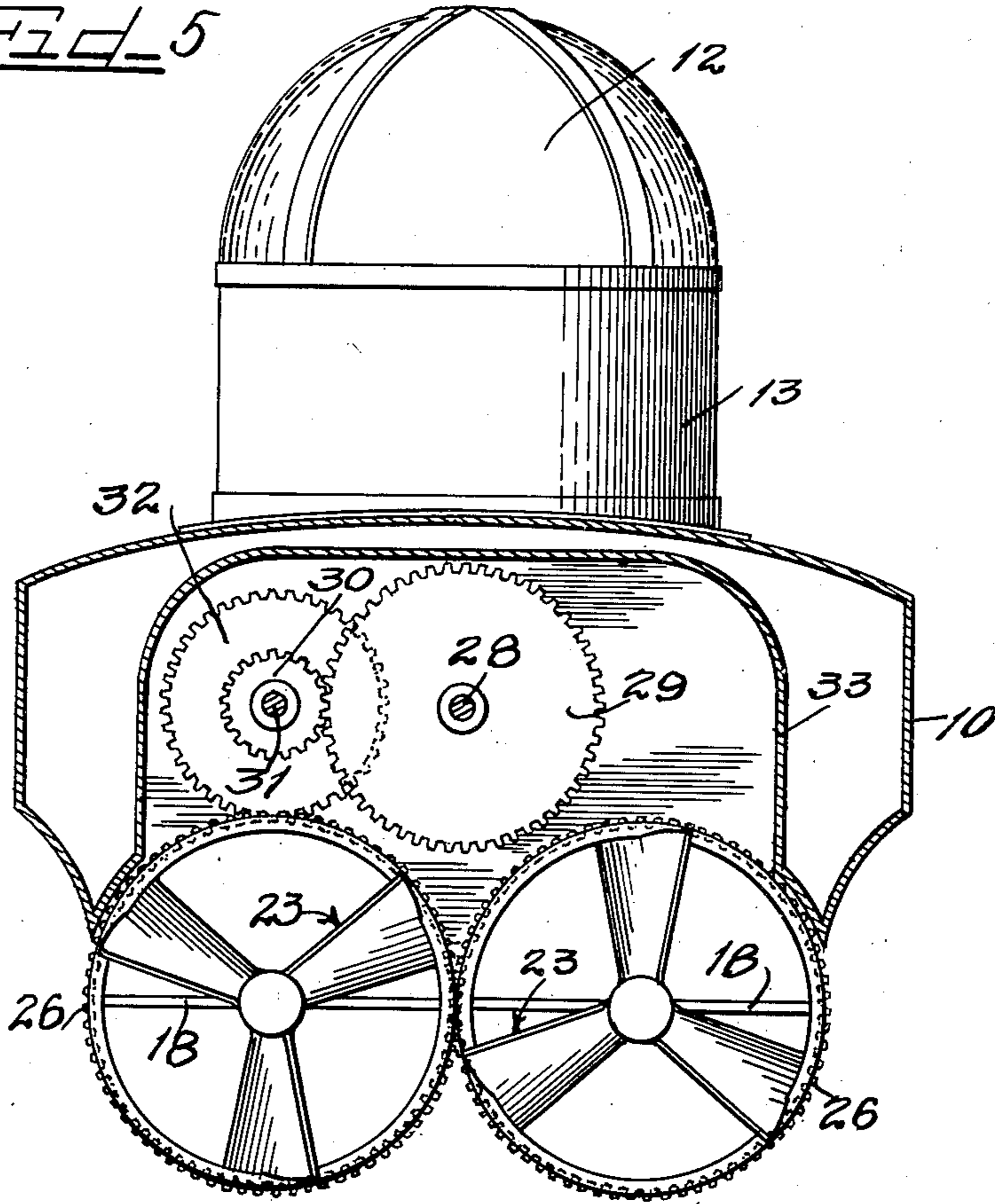
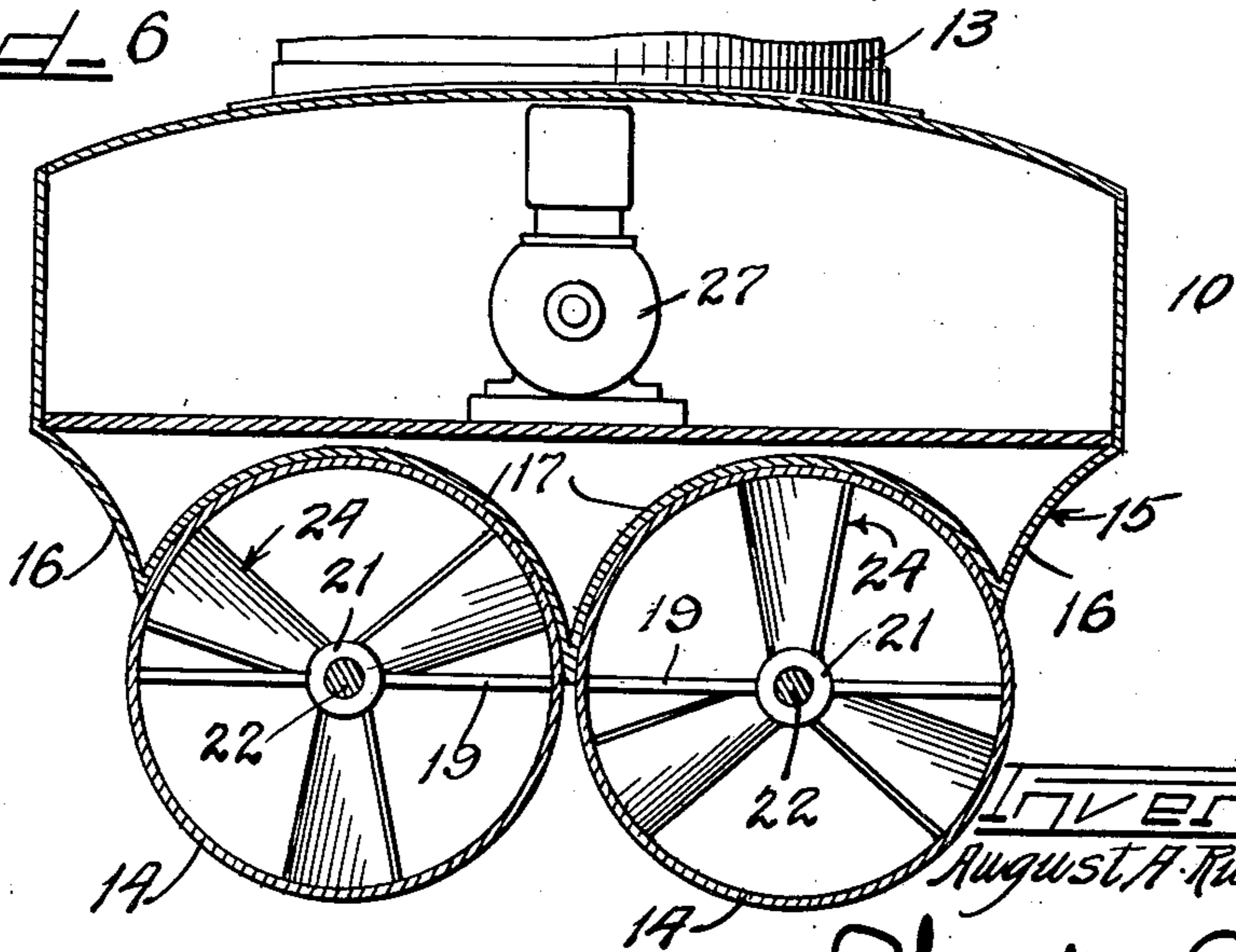


Fig. 6



INVENTOR
August A. Rusteberg.

Charles D. Bell
ATTY.

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UNITED STATES PATENT OFFICE

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WATERCRAFT

August A. Rusteberg, Chicago, Ill.

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2 Claims. (Cl. 115-16)

This invention relates to watercraft and is directed more particularly to means for propelling the craft through water with increased efficiency.

An important object of the invention is to provide watercraft, either of the surface-going or the submarine type, with means which utilizes a greater percentage of the power output of the prime mover than has heretofore been utilized.

Another object of the invention is to provide propulsion means for watercraft which discharges the water engaged thereby in a confined mass to more efficiently utilize the reaction of the discharge of this confined mass against the body of water rearwardly thereof to more efficiently attain forward motion of the craft.

Heretofore it has been the practice to propel watercraft by means of the reaction obtained by the engagement of the propeller blades with the water. However, in the present instance, while the latter concept is available to obtain forward propulsion of the craft, it is augmented by the reaction created by the discharge of a concentrated mass against the solid, relatively immobile body of water rearwardly of the propelling mechanism.

A still further object of the invention is to provide a propulsion mechanism for watercraft which effectively eliminates the detrimental results of torque reaction of the craft relative thereto whereby tilting of the craft beamwise is effectively eliminated.

Many other objects and advantages of the invention will become apparent from the following specification and accompanying drawings, in which:

Figure 1 represents a side elevational view of a watercraft embodying my invention;

Figure 2 represents a top plan view of a watercraft embodying my invention;

Figure 3 represents a fragmentary front elevational view of the lower portion of the watercraft as shown in Figure 1;

Figure 4 is a fragmentary cross-sectional view taken on the line IV—IV of Figure 2;

Figure 5 is a cross-sectional view taken substantially along the line V—V of Figure 4; and

Figure 6 is a cross-sectional view taken substantially along the line VI—VI of Figure 4.

The embodiment disclosed herein is for illustrative purposes and may be varied or modified without departing from the spirit and scope of the invention as set forth in the appended claims.

Referring to the drawings, particularly Figures

1 and 2, suitable watercraft embodying my invention may include a hull 10 and any suitable superstructure 11 which, in the present instance, is shown as a turret structure having a transparent upper portion 12 and a somewhat streamlined lower portion 13.

The propulsion mechanism embodying my invention includes a pair of laterally disposed tubular members 14 which are disposed longitudinally of the hull 10 and secured therebeneath in any suitable manner. In the present instance, the hull is provided with a bottom 15 having its lateral outward portions streamlined as at 16 and its lower portion configured to provide a pair of longitudinally disposed, downwardly open trough-like receptacles 17 in which the tubes 14 may be placed and to which they may be secured, as by welding, if the hull is metal.

The tubes 14 are open at both the fore and aft ends, thereby to permit the free flow of a confined mass of water therethrough in a manner to be described presently.

Each of the tubes is provided at the fore and aft openings thereof with diametrically disposed cross pieces 18 and 19, respectively, which have their ends welded or otherwise securely attached to the wall of the tubes.

Centrally disposed on each of the cross pieces 18 and 19 are bearings 20 and 21, respectively, these bearings being aligned and being adapted to receive a longitudinally disposed shaft 22 upon which the fore and aft propellers 23 and 24, respectively, are fixedly secured. As will be seen from Figures 1, 4, and 5, the blades of the forward propellers 23 have their outer tips secured to a ring 25, each of which has its forward inner surface beveled outwardly to more efficiently cut through the water and each of which is provided on the aft portion of its outer surface with gear teeth 26 for engaging the motivating mechanism as will be seen presently. The tips of the blades of propellers 24 are likewise secured to ring members 27 which constitute, in effect, extensions of the respective tubes 14.

From the foregoing, it will be seen that the tubes 14 are provided fore and aft with propeller assemblies which are securely mounted for free rotation within the tubes.

It will be readily understood that, upon rotation of the fore and aft blades simultaneously in a tube construction such as that described above, the water will be drawn into the forward end of the tube as it comes within the influence of the forward propeller and, thereafter, forced back-

wardly and finally expelled as a concentrated mass traveling generally in the same sense, but opposite direction to the desired movement of the watercraft. This ejected, concentrated mass of water thereupon strikes the relatively immobile mass of water behind the tube with the result that a greatly enhanced forward motion of the watercraft is obtained because of the combined effect of the reaction of the propeller blades against the water as they strike the same and the reaction of the watercraft to the impact of the ejected, concentrated mass of water against the immobile mass thereof.

By the provision of two laterally disposed companion tubes having my propeller construction incorporated therein, two advantageous results are obtained. First, the reaction of the watercraft, which results in forward motion, is doubled and, second, a compensating torque effect is obtained.

With regard to the latter, it is found that in the use of a single tube, the water passing there-through tends to follow a screw-like path with the result that the reaction of the craft, due to the ejection of the concentrated mass of water in this manner against the immobile mass of water, results in a beamwise tilting of the craft since a torque system is thus set up.

To the end that the latter difficulty may be obviated, the laterally disposed sets of propellers shown herein are provided with opposite angles and are connected in such a manner that they revolve in opposite directions, whereby in both cases the propulsion of the water will be toward the rear of the craft. Thus, it will be seen that the screw-like path of the water through each of the tubes will be in an opposed direction, whereby the reaction of the watercraft to each is offset by the reaction thereof to the other.

In order that the opposite motion described above may be obtained, the gear teeth 26 connected to the forward propeller of each tube are intermeshed, whereby movement of one will cause opposite rotative movement of the other.

The motivating mechanism for the companion sets of propellers described above may take any suitable form and is shown herein as including an internal combustion engine 27 having a drive shaft 28 upon which is mounted a drive gear 29 having teeth adapted to mesh with a driven gear 30 fixedly secured upon a suitable shaft 31 to which is also fixedly secured a driven gear 32. Thus, it will be seen that rotation of the shaft 28 by the engine 27 will set the above described gear train in motion, whereby one of the gear rings 26 will be driven thereby to drive the companion

gear ring and the propellers associated therewith.

To the end that the above gear mechanism may be housed in such a manner that the water will not enter into the interior of the hull 10, the latter is provided with a transverse upwardly and inwardly disposed housing 33 which is aligned transversely of the hull with the gear rings 26, and in which are mounted the shafts 28 and 31 by means of water-tight bearings. It will be understood, of course, that other mechanisms for driving the propeller assembly may be provided.

If desired, means may be provided for protecting the propellers from solid objects or from sea growth, whereby they might become clogged. To this end, a suitable grating assembly 34 is provided, this assembly including transverse grill members 35 which are suitably supported as by supporting elements 36 and 37 secured to the hull in any suitable manner.

From the foregoing it will be seen that there has been provided herein a propulsion assembly for watercraft which affords increased efficiency and the utilization of a larger percentage of the output of the prime mover than has been utilized heretofore. Furthermore, there is provided herein a propulsion mechanism so arranged and constructed that the watercraft, due to the flow of a column of water through the tubular members, retains its path of movement with increased efficiency whether this path be in a straight line or in a curve as directed by the pilot of the watercraft.

What I claim is:

1. In a watercraft, a hull, tubular means secured to a submerged portion of the hull, said tubular means having open ends fore and aft and a propeller assembly mounted in each open end, one of said propellers having a ring gear connected with the tips of the blades thereof, means for fixedly securing the propellers together, and means for engaging said ring gear for driving said propellers.

2. In a watercraft, a hull, laterally disposed open-ended tubular members secured to a submerged portion of the hull with the open ends thereof disposed fore and aft in longitudinal alignment relative to the hull, propellers in the fore end of each tube, said propellers each having a ring gear secured around the tips of the blades thereof, said ring gears enmeshing to afford opposite, simultaneous rotation of said propellers, and means for driving said propellers.

AUGUST A. RUSTEBERG.