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S. S. WHIPPS.

PROPELLER FOR VESSELS.

No. 528,265. Patented Oct. 30, 1894.

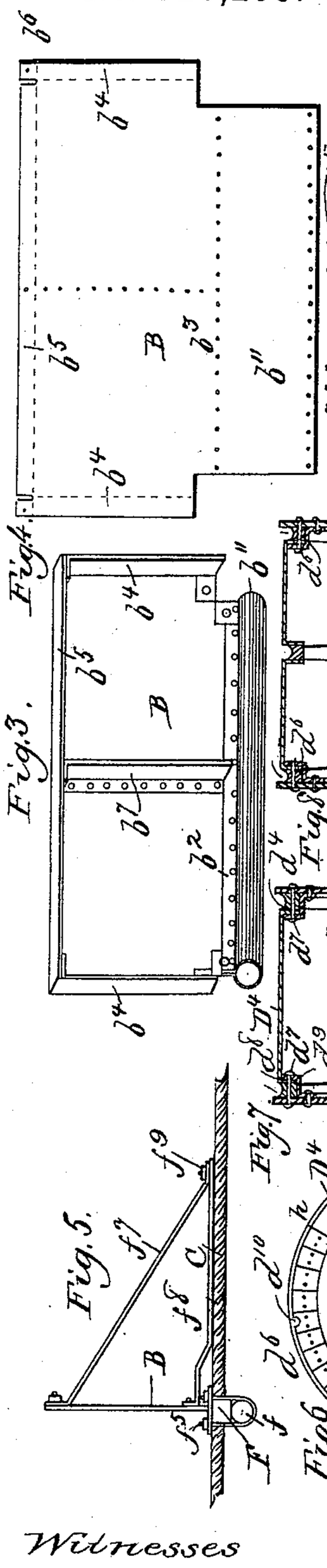

Fig. 4.

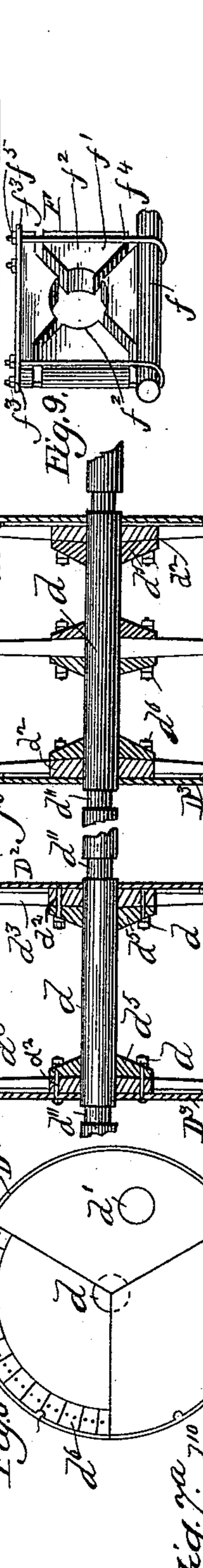

Fig. 9.

Fig. 3.

Fig. 8.

Fig. 7.

Fig. 5.

Fig. 6.

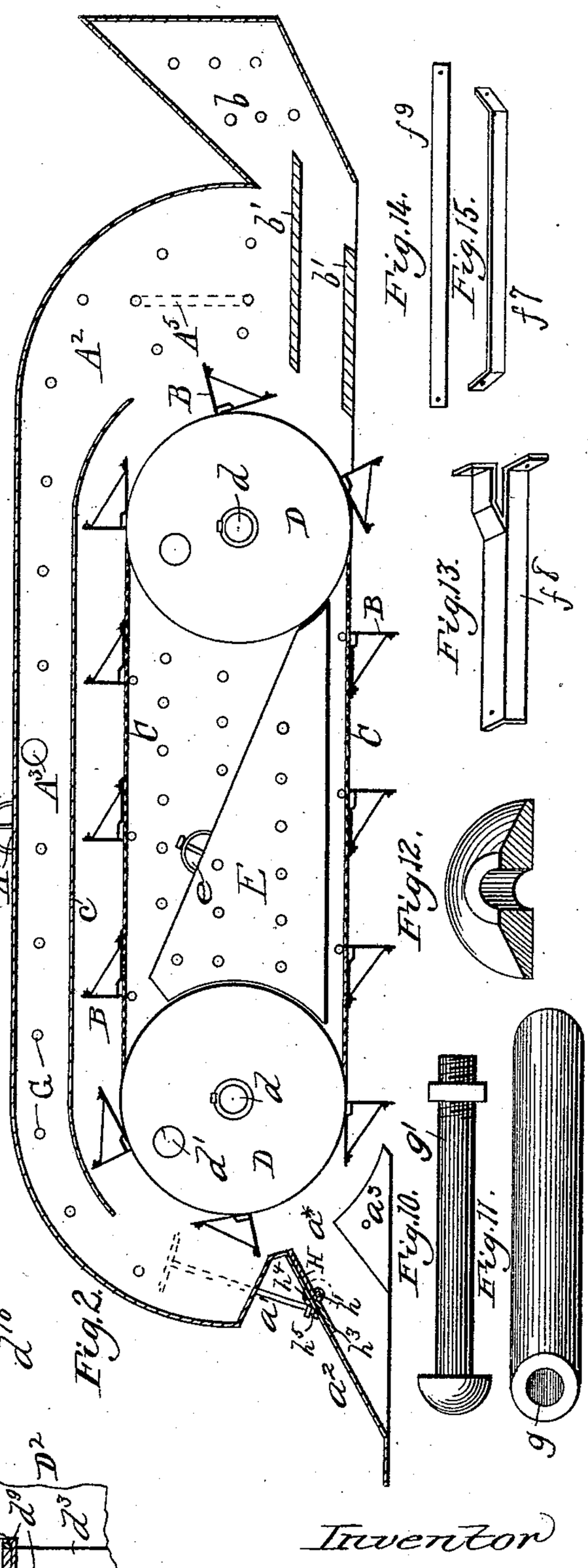

Fig. 2.

Fig. 14.

Fig. 15.

Fig. 13.

Fig. 12.

Fig. 10.

Fig. 11.

Witnesses

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Patrick Haley

Inventor

Solomon S. Whipps

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S. S. WHIPPS.

PROPELLER FOR VESSELS.

No. 528,265. Patented Oct. 30, 1894.

Fig. 1

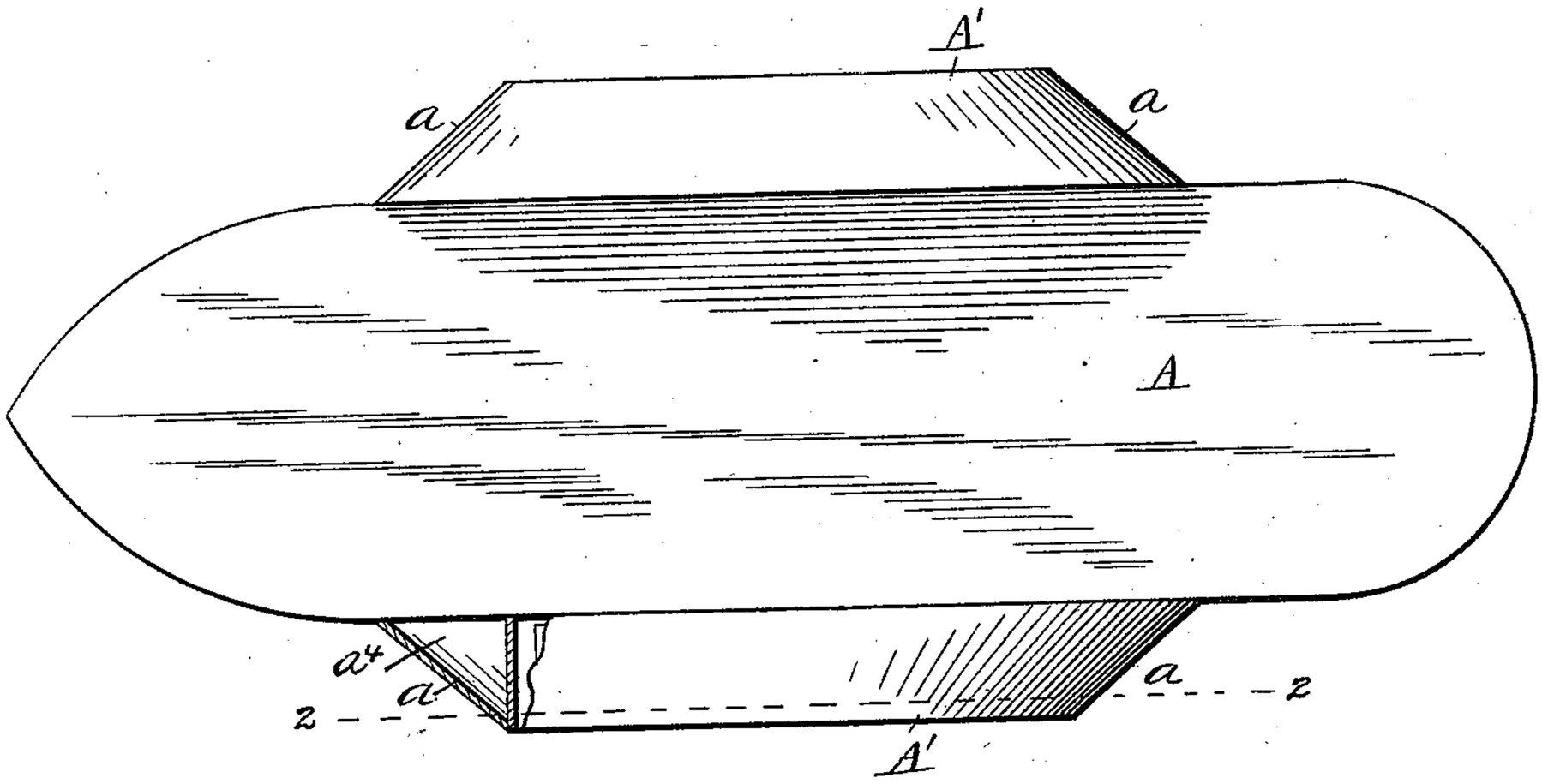


Fig. 2a

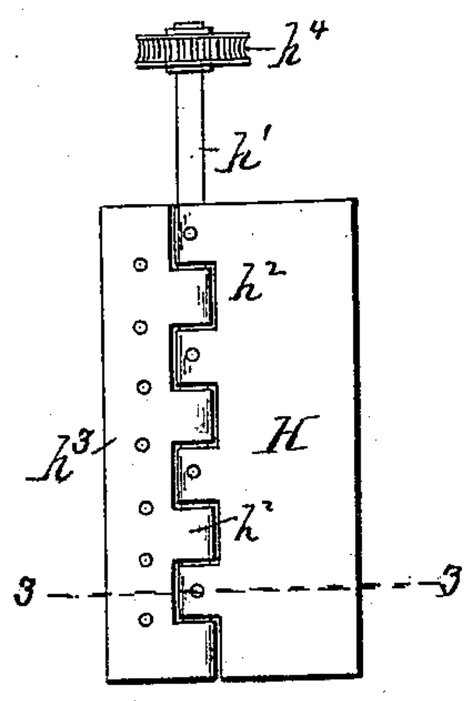


Fig. 2b

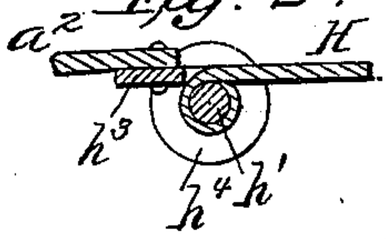
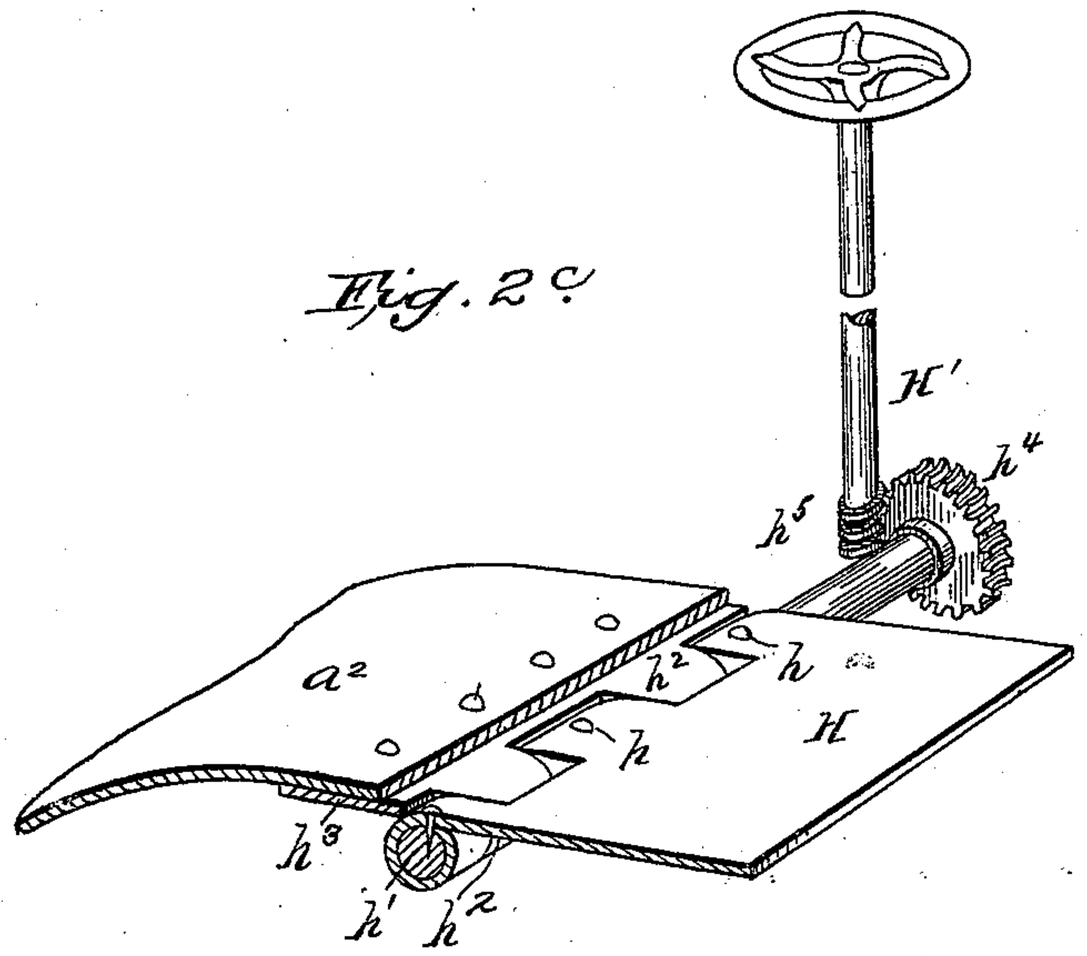


Fig. 2c



Witnesses
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(No Model.) 3 Sheets—Sheet 3.

S. S. WHIPPS.

PROPELLER FOR VESSELS.

No. 528,265. Patented Oct. 30, 1894.

Fig. 16.

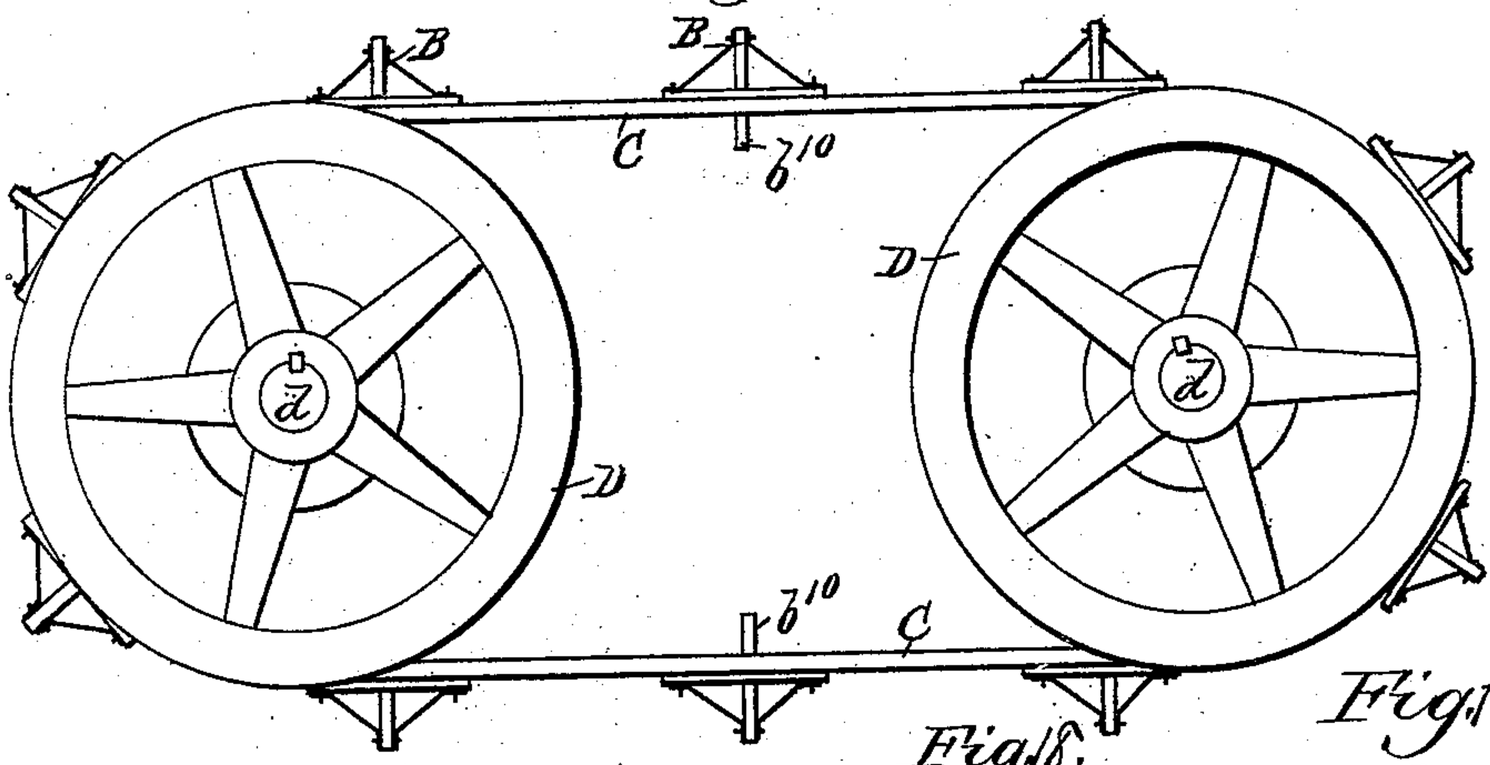


Fig. 19.

Fig. 18.

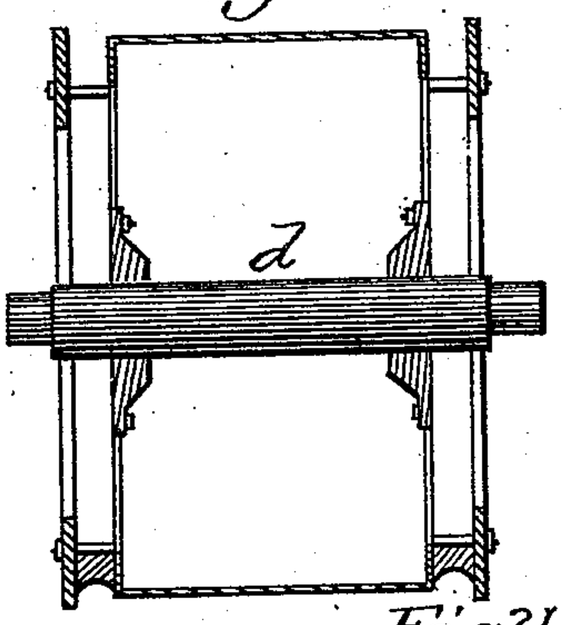


Fig. 17.

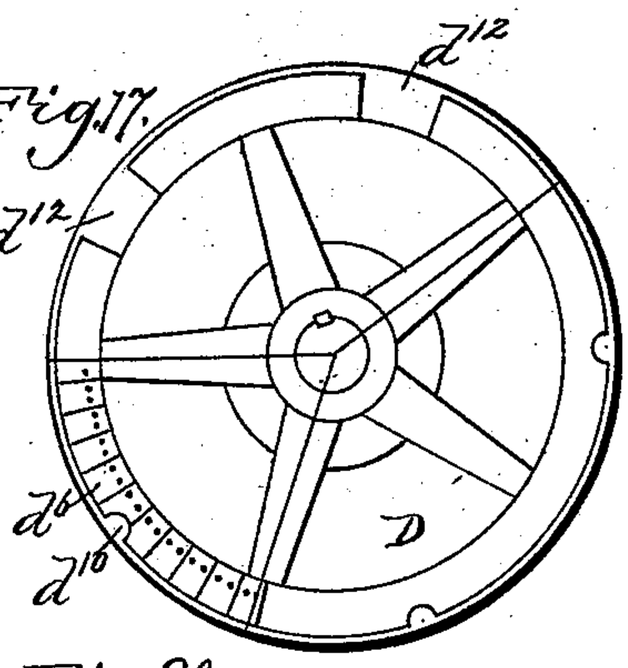


Fig. 21.

Fig. 20.

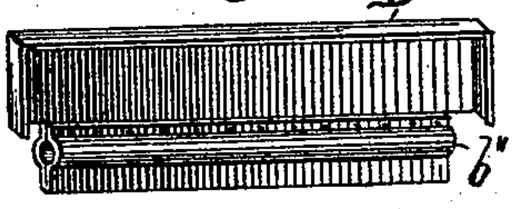


Fig. 22.

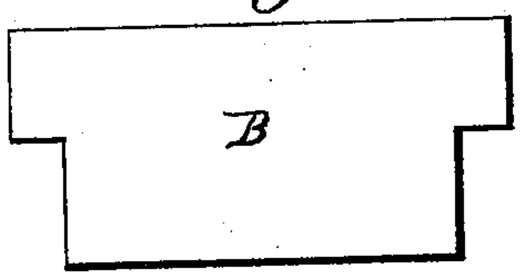
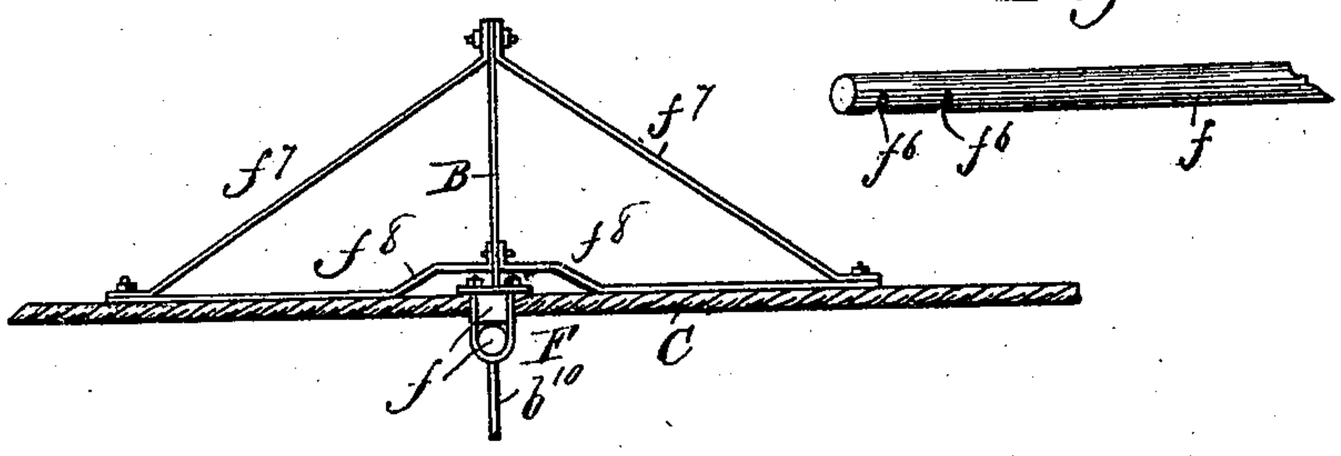


Fig. 23.



Witnesses
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Inventor:
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UNITED STATES PATENT OFFICE.

SOLOMON S. WHIPPS, OF LE SUEUR CENTRE, MINNESOTA.

PROPELLER FOR VESSELS.

SPECIFICATION forming part of Letters Patent No. 528,265, dated October 30, 1894.

Application filed September 6, 1890. Serial No. 364,207. (No model.)

To all whom it may concern:

Be it known that I, SOLOMON S. WHIPPS, of Le Sueur Centre, Le Sueur county, and State of Minnesota, have invented certain new and useful Improvements in Propellers for Vessels, of which the following is a specification.

My invention relates to that class of propellers which operate in a longitudinal direction with respect to the vessel in the manner of side wheels, and which preferably are contained in housings or wheel-houses at the sides of the vessel, though they may be arranged in other portions of the same.

The object of my invention is to obviate all lost motion occurring for example in the side or stern wheels, usually employed, and it is moreover my object to eliminate the resistance offered to the motion of the propeller and hence to the progress of the vessel by the back-water and water ordinarily caught in the wheel-houses of the side wheels, of the ordinary type of vessels. This resistance results in a great loss of power and a consequent enhanced cost of propulsion and moreover seriously interferes with the steady advance of the vessel and invariably subjects the same to shocks and jars of greater or less extent.

For the purpose thus set forth, my invention consists essentially in a longitudinally movable band or a series of cables having a series of paddles attached thereto, adapted to move longitudinally of the vessel. Preferably two series of such paddles are arranged one at each side of the vessel, though only one such series may be employed and located at a central or other suitable portion of the said vessel.

My invention also consists in arranging these paddles so that they will begin to act upon the water only at their lowermost position, and moreover in arranging them so that they will act upon the water in a rectilinear horizontal stroke, a number of paddles being in action at the same time, so that the action upon the water will be a continuous unbroken one unattended by the usual shocks or jars and one in which the full power of the engine will be utilized.

My invention further consists in the arrangement of an air-chamber, in the wheel-house or houses, surrounding the upper parts of the propeller, provided with means for forcing air into the same so as to prevent the contact of the water with the paddles which are not acting to propel the vessel, which tendency is further assisted by ports, deflectors and valves allowing the escape of back-water and eliminating its retarding action; and my invention finally consists in such further features, details and combination of parts as will be hereinafter described and covered in the claims.

In the drawings accompanying this specification, Figure 1 represents a diagrammatic plan view of a vessel illustrating a preferred embodiment of my invention; Fig. 2, a vertical longitudinal section on line 2—2, Fig. 1; Figs. 2^a, 2^b, and 2^c a plan, a transverse section on line 3—3, Fig. 2^a, and a sectional perspective, respectively of the valve controlling gate, employed in connection with my propeller; Fig. 3, a detail perspective view of one of the paddles; Fig. 4, a detail view showing a blank of sheet metal from which a paddle may be formed; Fig. 5, a side elevation of a paddle and adjacent parts. Fig. 6 is an end elevation of one of the drums. Fig. 7 is a longitudinal central section of the same; Fig. 7^a, a detail view of the propeller, showing the mode of joining the parts forming the drums; Fig. 8, a longitudinal central section of a modified form of drum; Figs. 9 to 15 detail views; Fig. 16, a side elevation of a modified form of propeller, to be used for steamboats; Figs. 17 to 23, detail views.

A represents the hull of the vessel, and A′, A′, the wheel-houses, or propeller cases, in which in the present instance, I locate my propelling mechanism. It will be noted that the end walls, *a*, of these wheel-houses are beveled or inclined so as to reduce the resistance of the water to the progress of the vessel to a minimum. These wheel-houses or propeller-cases are provided with air-tight compartments, A^2, open at the bottom for the protrusion of the propeller and furnished with a conduit, A^3, connected with an air-forcing pump, or other means to force the air into the compartments and maintain the water therein at a proper level to avoid interference with the action of the propeller and eliminate all resistance to the advance of the vessel. Each compartment moreover, is provided with a manhole, A^4, to permit ac-

cess thereto, and a water-glass, A^5, extending out to some convenient point to enable the engineer to ascertain the level of the water in the compartment and to enable him to judge whether more air should be forced into the same. Within each compartment is located the propeller proper, consisting of a series of paddles, B, attached to belts or preferably endless cables, C, as shown, which cables pass around the revolving drum, D, mounted near the ends of the compartment on transverse shafts, *d*. In order to add to the buoyancy of the vessel, these drums, D, consist of hollow water-tight compartments constructed in the manner hereinafter described and further buoyancy may be added by the arrangement of another water-tight compartment or bulk-head, E, arranged between the drums, D, as shown, which bulk-head may be provided with a man-hole, *e* and with ends, curved and in close proximity to the drums without interfering with their revolution and the passage of the paddles.

The bulkhead, E, it will be noted is preferably, wedge-shaped, its inclined top descending toward the rear drum so that any water which may be carried up into the casing will flow toward the rear of the vessel to be carried out by the gains or driving-bar grooves, d^{10}, in such a manner as not to impede, but rather to promote the progress of the paddles and vessel.

The side-walls of the bulkhead, E, are formed by the side walls of the compartment, A^2. These side-walls, as well as the walls of the compartment, drums, bulkheads, &c., are formed of stout boiler iron or similar material, capable of resisting the destructive action of the high seas, and to make the parts completely seaworthy. By this arrangement of the paddles and adjacent parts, so that only the lowermost paddles will act upon the water in a straight line longitudinally of the vessel, I am enabled to utilize in the most effective manner the power of the engine and a minimum loss of power will result.

In order to eliminate to the greatest possible extent all interference of the back-water with the stroke of the paddles, I arrange the propeller-compartments, A^2, as follows:—The forward end of the compartment is provided with an escape passage, a^*, preferably formed by first forming a recess, a', in the outer wall of the compartment, extending closely to the path of the paddles, and then extending the outer wall in a forward incline, a^2, so as to form a beak, and moreover arranging the small bulkhead, a^3, at the bottom of the compartment. A space is thus provided between the bulkhead, a^3, and the recess, a', sufficient to just permit the passage of the paddles and also an escape passage a^5, between the inclined wall, a^2, and the bulkhead, a^3, sufficient to permit the escape of any back water caused by the advance of the paddles as they pass the recess, a', which back water would otherwise interfere with the progress of the said paddle and consequently of the entire propeller. This passage a^5, also serves the purpose of letting the water in behind the paddles and prevents the stroke against the water which they would otherwise make and also prevents the air-exhausting action of the paddles which would drive the air from the air-compartment without the arrangement of the water-seal thus afforded.

As shown in Figs. 2, 2^a, 2^b, 2^c, the passage a^5, may be provided with an adjustable gate, H, adapted to close the throat of the passage more or less to increase or diminish the supply of water from the stem of the vessel. This gate, H, is hinged to the inclined wall, a^2, and may be controlled by the following means: The gate is fastened by pins, *h*, or otherwise to the pivot, *h'*, of the hinge, the pivot being journaled in the bearings, h^2, of a plate, h^3, riveted to the wall, a^2, as shown. The pivot extends inward through the side wall of the compartment, A^2, as indicated in Fig. 2^c and has a worm wheel, h^4, attached to its end, which worm-wheel engages with a worm, h^5, secured to the gate-controlling-shaft, H', which is provided with a hand-wheel or other suitable handle, extending to a suitable point in the vessel where it may be grasped and operated by the engineer.

To prevent the retarding action of the back-water on the paddles as they pass around the rear drum, D, I provide a rear extension, *b*, in the compartment, A^2, preferably in combination with a number of deflectors or cut-offs, *b'*, *b'*, (two in the present instance,) the lower one of which is preferably arranged at the bottom of the compartment and tangentially to the rear drum. A space sufficient to permit the passage of the paddles is left between these deflectors and the rear drum, D, and also a space between them and the walls of the extension, *b*, to allow the back-water to run out after having expended its force against the walls of the extension and the deflectors. All retarding action from undertow is thus avoided. I have found that these deflectors are best arranged in a horizontal position as shown.

To keep the air pressure and current resulting from the motion of the propellers equalized and prevent the water which may be thrown into the upper portions of the compartment from dropping upon the upper paddles on the return stroke, and impeding their action, I provide a partition, fender or current-divider, *c*, therein extending the greater portion of the length of the compartment and leaving a space between it and the propeller cables somewhat more than sufficient to permit the passage of the paddles.

The spaces, a^4, a^4, between the air and water-tight compartments, A^2, and the beveled or inclined sides, *a*, of the wheel-houses, A', are waste spaces, which may be also rendered air-tight to add to the buoyancy of the vessel.

As above stated, I preferably construct the

drums, D, in the shape of hollow water-tight compartments, each provided with a manhole, d', to permit access to its interior. In the present instance, these drums are constructed as follows, special reference being had to Figs. 6 to 8. Upon the shaft, d, are mounted two wheels, D^2, D^2, comprising the hubs, d^2, spokes, d^3 and rims, d^4. The side plates, D^3, of the drums, snugly fit the shaft, d, and are secured to the wheels, D^2, in any convenient and effective way, and two backings or enlargements, d^5, mounted inside the drum and having rivets or bolts, d^6, passing therethrough, are secured to the end plates, D^3. The plates or disks, D^3, are preferably made of boiler iron or armor plate material. The cylindrical periphery of the drums, also made of boiler iron or similar material, is also secured to the wheels, D^2, preferably together with the sides or disks, D^3, in the following manner: The disks, D^3, and the periphery, D^4, of the drums are of a greater radius than the rim of the wheels, D^2, thus forming an annular space at each end of the drums. These annular spaces are filled with wood-filling preferably consisting of wooden segments d^6, as shown, which are preferably concave at their periphery so as to accommodate the cables of the propeller. The disks, D^3, wheels, D^2, peripheries, D^4, and wooden filling blocks, are preferably secured together by rivets, d^7, passing through the flanges, d^8, on the peripheries, D^4, the flanges, d^9, on the rims, d^4, of the wheels, D^2, the blocks or segments, d^6 and the disks, D^3, as shown. The peripheries, D^4, the wooden blocks, d^6, and the disks, D^3, are provided with gains, d^{10}, at suitable intervals to accommodate the cross-bars connecting the propeller-cables, to be referred to below, and prevent any slip in the propeller-motion.

In Fig. 8, I have shown a somewhat modified form of drum, which differs from the foregoing in having three annular cable-grooves, whose construction differs merely from the above in a multiplication of the parts described.

Turning now to Figs. 3, 4, 5, 9, and 13 to 15, it will be seen that in my preferred construction the paddles, B, are formed from a blank in the form shown in Fig. 3 and stamped or cut from suitable material such as stout sheet metal. The paddles are formed from these blanks by bending the flap, b'', to form the cylindrical sleeve, Fig. 3, and riveting the edge, b^2, along the upper line, b^3, of the flap, b'', as indicated by the row of rivet holes on these lines. The lateral flaps, b^4, are then bent inward at right-angles along the lines indicated and the upper flap, b^5, is bent down and secured by riveting or otherwise to the lateral flaps, at the corner flaps, b^6. In this way the paddle, shown in Fig. 3 is formed which may be further strengthened by securing thereto the central web or rib, b^7. This paddle may be secured to the parallel cables, C, in any, but preferably the following manner: The paddle is mounted between the cables so as to stand at right angles thereto while the sleeve projects somewhat below the cables. A rod, f, forms part of and connects two clutches or clamp-boxes, F, one of which grasps a cable on each side of the paddle and passes through the sleeve, and thus forms a support for the paddles and a transverse connecting rod for the cables. The clutches, F, preferably consist of the sectoral shaped blocks, f', whose inner cheeks, f^2, are adapted to grasp the cable when the clutches are clamped. The lowermost block rests upon the rod, f, and the uppermost block is provided with a metallic plate, f^3. Staples, f^4, on each side of the cable support the rod, f and embrace the blocks, f'. Their screw threaded ends project upward and passing through the plates, f^3, are secured by the nuts, f^5. The rods, or driving bars, f, are preferably provided with gains, f^6, as shown in Fig. 23, into which the staples, f^4, fit and which prevent their slipping on the rods, f.

The paddles are preferably braced by the diagonal braces f^7, shown detached in Fig. 15, which are bolted or riveted to the paddles at their upper ends and to longitudinal braces, f^8, of the form shown in Fig. 13, *i. e.*, having an L-shaped cross-section and forked and bent over at their one end to be attached or riveted to the paddle. These braces are attached to the paddles in the manner shown in Fig. 5 and are further sustained in position by the stay-rod, f^9, (see Fig. 14) extending horizontally across between two cables and connecting the two braces, f^8, being secured thereto by the rivet, which passes through the ends of braces, f^7 and f^8, as shown.

The sides of the air-chambers or compartments, A^2, and bulkheads are preferably braced and strengthened by the transverse stay-rods, whose preferable positions are indicated at G, Fig. 2, and whose parts are shown in Figs. 10, 11 and 12. In these figures, g designates a hollow stay-rod or sleeve, whose length is equal to the space between the sides of the compartments and g' a bolt or rod which passes through the rivet holes in the sides of the compartment and through the sleeve, g, which is secured at its ends on the outside of the compartment by heads and nuts as shown, or by any other suitable means.

Of course, all openings and bearings for the passage of shafts, stay-rods, &c., and all joints are suitably packed or sealed so as to form preferably air-tight joints. The shafts, d, are provided at their journal-portions with grooves, d'', for the reception of preferably lead-packings, arranged into the grooves so as to form an effectual water-tight joint between the bearings in the side of the wheel-house and the shafts, d.

The cables are preferably made of copper wire to resist the corroding action of the water and all other parts of the propellers

are made of metals best adapted to resist the strains and the destructive action of the water.

Instead of being located at the sides of the vessel, as shown, the wheel-house or propeller case may be built in at the center of the stern, or in any suitable and convenient portion of the vessel.

The drums are adapted to be taken out of the propeller-casing and for this purpose the key slots are cut the entire length of the shaft, so that the drums may be keyed on from their inside for which purpose I have provided the manholes, A^4, and d', in the compartments, A^2, and the drums. To facilitate the removal of the drums, the front bulkhead, a^3 and the deflectors, b', b', as well as a small section of the main bulkhead, E, are made removable.

My propeller is adapted to run under the water, as well as partly under water.

The construction thus far described is intended for steamship-propellers.

For steam-boat propellers, I modify the construction somewhat as shown in Figs 16 to 23. By referring to those figures it will be noted that the drums, D, in this case are open at the sides while the faces of the drums are only partly closed, the driving bars, f, having their bearings only in the end-disks, or side plates, D^3, while in the ship-propeller they have their bearings across the entire face of the drums. The paddles, B, it will be noted are here provided with downwardly projecting tongues, b^{10}, which enter the openings d^{12}, in the drums. These paddles are, moreover, braced from both sides, so as to permit the propeller to work backward as well as forward. When three or more cables are used the drums are furnished with as many grooves for wood-filling, d^6, for the cables to run on. The paddles are in this case also furnished with braces, arms and cross ties and are connected to the cables by clamp-boxes, F, and drive rods, f in the same way as in the case of the ship-propeller.

It is obvious that my construction may be modified very widely and in many particulars, without departing from my invention, and the propeller shown and described herein is to be considered merely as the best form in which I at present conceive this, my said invention may be carried out. I do not therefore desire to be confined to the exact details set forth, but

What I claim, and desire to secure by Letters Patent, is—

1. The combination, with an open-bottomed air-tight casing, and a propeller located therein, of a current divider within the casing, and a conduit arranged to conduct compressed air to the interior of the casing, substantially as set forth.

2. The combination, with a propeller compartment having a rear extension, of a number of deflectors, b', arranged in advance of the said extension, substantially as set forth.

3. The combination, with a propeller compartment having a rear extension, and a propeller located in the compartment, of a series of horizontal deflectors between the propeller and the said extension, substantially as set forth.

4. In a drum for propellers, the combination with the drum shaft, of supporting wheels mounted thereon, outer disks secured to the supporting wheels, cylindrical walls, and annular fillings interposed between the disks and the cylindrical walls of the drums, substantially as set forth.

5. In a drum for propellers, the combination with the drum shaft and the supporting wheels mounted on the shaft, of outer disks, cylindrical walls, and annular wooden fillings between the disks and the cylindrical walls, all riveted to the rim of the supporting wheels, substantially as set forth.

6. A propeller paddle consisting of a single piece of sheet metal flanged, and provided with a loop or sleeve, substantially as set forth.

7. In a propeller, the combination, with a plurality of cables, and a series of paddles arranged at right angles to the cables and provided with sleeves, of a series of driving rods passing through the sleeves, and a series of clamping boxes for securing the ends of the driving rods to the cables, substantially as set forth.

8. In a propeller, the combination, with a plurality of cables, and a series of paddles arranged at right angles to the cables and provided with sleeves, of a series of driving bars passing through the sleeves in the paddles and connected to the cables, a series of longitudinal braces extending along the cables from the paddles, and a series of transverse braces and diagonal braces connecting the longitudinal braces with the paddles, substantially as set forth.

9. In a propeller, the combination, with a plurality of drums having annular and transverse grooves or gains, of a plurality of cables running in the annular grooves, and a series of paddles connected to the cables and provided with sleeves arranged to enter the transverse gains in the drums, substantially as set forth.

SOLOMON S. WHIPPS.

In presence of—
F. F. CLIFFORD,
FRED PEPPER.