C. M. STANLEY.

CRAFT ADAPTED TO TRAVEL IN A RESISTING MEDIUM.

APPLICATION FILED JULY 24, 1908.

939,344.

Patented Nov. 9, 1909.

2 SHEETS—SHEET 1.

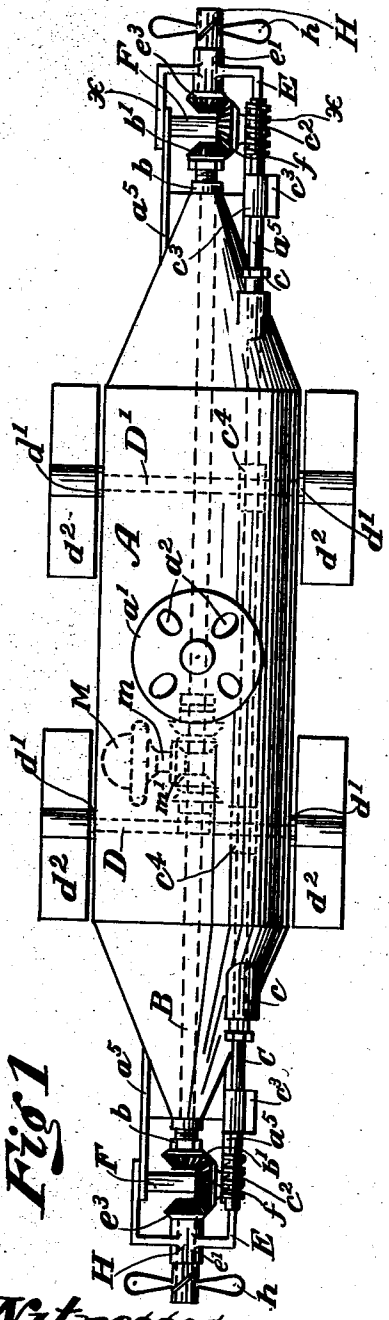

Fig. 1

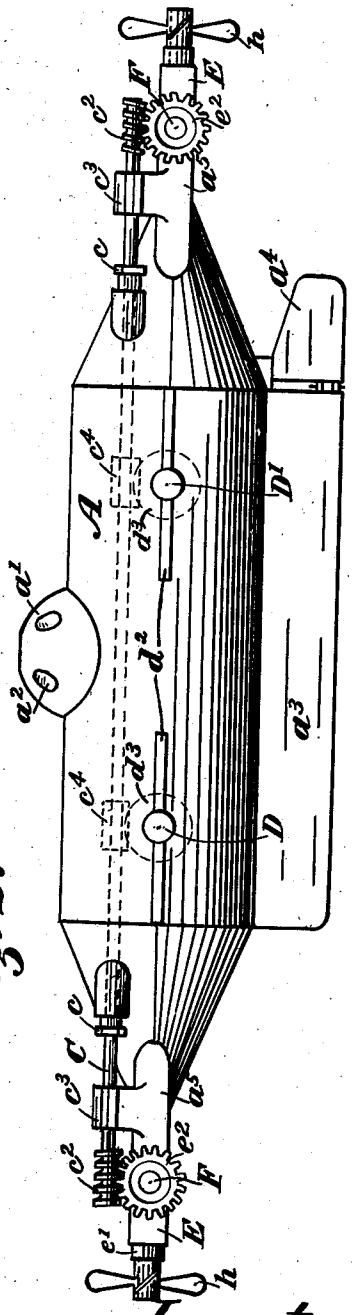

Fig. 2.

Witnesses

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Fig 3.

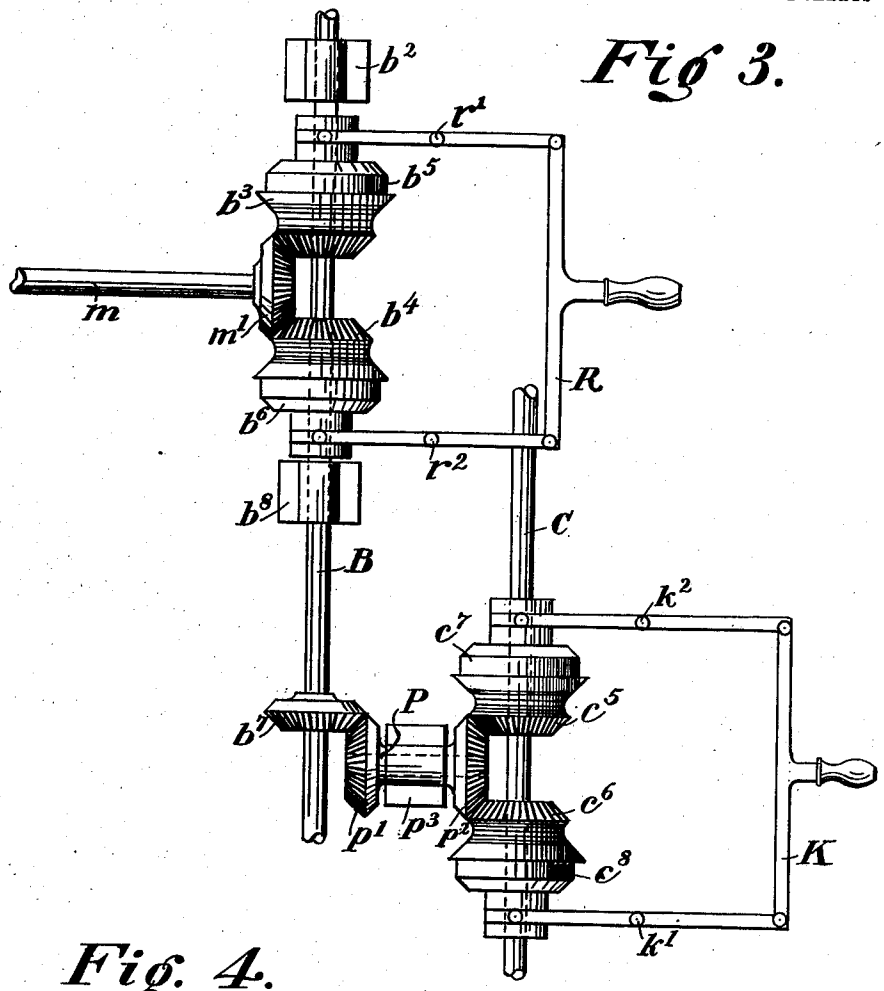
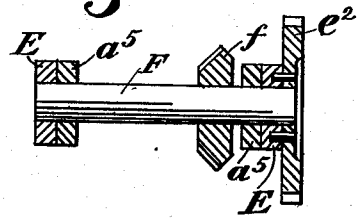


Fig. 4.



Witnesses

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CRAFT ADAPTED TO TRAVEL IN A RESISTING MEDIUM.

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To all whom it may concern:

Be it known that I, CHARLES M. STANLEY, a citizen of the United States, residing at Hamilton, in the county of Butler and State of Ohio, have invented new and useful Improvements in Crafts Adapted to Travel in a Resisting Medium, of which the following is a specification.

My invention relates to new and useful improvements in craft adapted to travel upon or in a resisting medium, and particularly to that type of craft known as submarine boats. Heretofore in such craft, it has been necessary to take on weight to assist in sinking which is a slow process, and throw off weight to assist in rising, resulting in great danger of remaining submerged in case of accident; but my invention avoids this slow, expensive and cumbersome practice. To that end I provide propelling and guiding members capable of directing the craft so equipped in any direction without resort to other agencies. The propelling means which consists of a plurality of screw propellers, each capable of 180° adjustment within the vertical plane of its axis, may be synchronized and when properly so united in action, the craft will maintain a horizontal position while being made to rise and sink and may be guided by these propellers either vertically up or down or obliquely in the vertical plane of the craft's longitudinal axis. The separate guiding members which may be dispensed with altogether, may be synchronized as to each other and with the propelling means; and when all propellers and guiding members so co-act, great accuracy and rapidity of change of position of the craft are secured.

It will be seen that a submarine boat equipped with my invention would not be encumbered with a bulky compartment to receive the water ordinarily used to assist in sinking, nor the water ejecting machinery, and being a lighter, trimmer and more readily manipulated craft may be both more effectively and more safely handled. If while submerged the boat should leak and partly fill with water, the propellers are still capable of raising it to the surface and holding it there.

I do not expect to limit the use of my invention to submarine boats, but expect to apply it to other craft, as for example airships.

In the particular embodiment of my invention selected for illustration:—Figure 1 is a top plan view of a submarine boat equipped with my invention. Fig. 2 is a side elevation of the same. Fig. 3 a detail, is a top plan view of the starting, reversing and stopping mechanism for the driving and regulating shafts of the propellers; and Fig. 4 a detail, is a longitudinal section taken along the line x, x in Fig. 1, showing the worm gear, a bevel gear and its shaft, cantalivers protruding from the rear of the boat, and a yoke in which the propeller swings.

Referring to the drawings, A is the body of the boat, the mid portion of which is cylindrical in shape, while the ends are in the form of cones. At the top of the boat and near the center of its length is a rounded dome a^1, provided with windows a^2 from which the operator has a view of his surroundings in any direction and is thus enabled to steer and operate the boat with precision. At the bottom of the boat is a keel a^3 forming a ballast for the craft. Near one end of the keel is a rudder a^4 used in guiding the boat laterally. This rudder may be connected with any of the common types of steering apparatus.

Two shafts B and C continuous throughout the length of the boat, pierce the boat longitudinally. Shaft B is the driving shaft and pierces the end of the boat at the apex of the cones, and passes through stuffing boxes b, b. Shaft C is the regulating shaft; regulates the angle the axis of the propellers make with the axis of the driving shaft and pierces the boat and passes through stuffing boxes c, c located on the sides of the conical ends. Both of these shafts are connected to the power generator employed to propel the boat, and are connected by a train of mechanism hereafter explained in detail, that allows them to be reversed or stopped at will without attention being given the power generator.

Projecting from each end of the boat are cantaliver bars a^5, which are loosely pierced at their ends by shaft F. Shaft F also pierces both sides of the yoke E, which affords journals e^1 for the shaft H of the propeller h. Rigidly attached to yoke E is gear e^2, loosely pierced at its center by shaft F. The yoke and gear are free to oscillate about shaft F.

The driving shaft B carries at each of its ends bevel gears b^1, which mesh with the bevel gear f, loose on shaft F. Bevel

gear f in turn meshes with bevel gear e^3 rotatively attached to the shaft H of the propeller h. It is obvious that power would be transmitted to the propeller h in any position relative to the driving shaft as long as gears b^1, f and e^3 meshed properly.

Shaft C carries at each of its ends worms c^2 and c^2 and near its mid portion worms c^4 and c^4. Near the worms c^2 and c^2 are journals c^3 and c^3 rigidly attached to two of the cantaliver bars a^5 and affording journals for shaft C. Worms c^2 and c^2 mesh with gears e^2 and e^2 while worms c^4 and c^4 mesh with gears d^3 and d^3 indicated by dotted circles.

The worm gears d^3 and d^3 are rotatively attached to shafts D and D^1, which pierce the boat transversely in stuffing boxes d^1. These shafts D and D^1 carry at their outer ends hydroplanes d^2, d^2, d^2, and d^2, used to aid in guiding the boat, particularly when traveling vertically, or at any angle to the horizontal. It is obvious that the pitch of the worms and sizes of the gears can be so calculated that any variance of the angle between the axis of the propellers and the horizontal will be equal to the variance of the angle between the hydroplanes and the horizontal and that the movement to so vary will be synchronous.

The propellers at each end of the boat are so constructed that they exert their forces on the boat in the same direction. One propeller exerts a push on the boat, while the other exerts a pull. The push and pull are interchangeable, and whether a propeller is pushing or pulling depends upon the direction in which the driving shaft B is rotating.

Fig. 3 disclose the mechanisms designed to control the shafts E and C. The shaft m is the shaft leading from the power generator M and carries at its end a bevel gear m^1, which meshes with bevel gears b^3 and b^4, having rigidly attached to them the female member of a friction clutch and normally loose on shaft B. Rotatively attached to shaft B are male members b^5 and b^6 of a friction clutch and these members are adapted to be thrown into contact with the female members of the clutch gears b^3 and b^4 by means of lever R pivoted at r^1 and r^2. As was afore stated, the gears b^3 and b^4 are normally loose on the shaft B, but may be connected to and rotate with the shaft B, by causing one of the male members b^5 or b^6 to be thrown into contact with its female member. Both clutches could not be in contact at the same time, and it is evident that each clutch transmits motion to the shaft D in a direction opposite that of the other. In this manner, the direction of the rotation of the propellers can be reversed and hence also the direction of the travel of the boat.

Just beyond the outer ends of the male members b^5 and b^6 are suitable journals b^2 and b^8, to journal the shaft B, and just beyond journal b^8 is a bevel gear b^7 rotatively attached to shaft B, and meshing with a bevel gear p^1. Gear p^1 is rotatively attached to a shaft P journaled in a suitable journal p^3 and carrying another bevel gear p^2.

Bevel gear p^2 meshes with bevel gears c^5 and c^6 normally loose on the regulating shaft C and carrying female friction clutch members. Male members c^7 and c^8 of a friction clutch are rotatively attached to shaft C and may be caused to contact with the female members of the clutch by means of lever K pivoted at k^1 and k^2. This mechanism is identical with that attached to shaft B for starting, reversing and stopping and performs a similar function in respect to shaft C.

The operation of the craft is as follows:— Suppose the boat to be on the surface of the water and the operator is desirous of sinking beneath the surface, the power generator operating, he would cause shaft B to rotate by means of lever R throwing in one of the clutches on shaft B, then by means of lever K throwing in one of the clutches on shaft C and causing that shaft to rotate and transmit its rotation to the worms c^2 and c^2, and c^4 and c^4. The worms c^4 and c^4 would cause the gears d^3 to rotate which would rotate shafts D and D^1 and their hydroplanes. Worms c^2 and c^2 would cause gears e^2 and e^2 to rotate, which in turn would cause the yokes E to rotate on the shafts F and carry their propellers with them. When the propellers were in a vertical position, one turned upward and the other downward, the hydroplanes would also be vertical. At this point shaft C should be stopped from rotating, which could be accomplished by throwing out the contacting clutch by means of lever K. One of these propellers would exert a pull downward on one end of the boat while the other would exert a corresponding push downward on the other end. These two parallel and equal forces would cause the boat to sink and keep its horizontal position at all times. After the boat had reached a suitable submergence, the shaft C can be rotated in an opposite direction to the direction of the rotation in the first case and the propellers rotated through an angle of the boat 180° when the boat could be made to rise vertically to the surface. Or the direction of the rotation of the driving shaft may be reversed and the boat caused to rise vertically without any change in the position of the propellers. But if the operator intends to navigate his boat under the surface, he has but to set his propellers at such an angle to the driving shaft as will cause the vertical downward component of the force of the propellers to overcome the

force of buoyancy of the boat and the horizontal component would then be the force propelling the boat. When the propellers are set at the just described angle, and the boat is navigating in a horizontal direction, the rudder a^4 is employed to do the steering from side to side. However, it must also be remembered that when the boat is traveling in a horizontal direction under the surface, and the propellers are at an angle to the horizontal, the hydroplanes should also be set at an angle to the horizontal and aid in keeping the boat under water.

The hydroplanes are used in guiding the boat upward and downward, and also aid in holding it under water, while the rudder guides the boat when traveling in a horizontal direction. It is obvious that by the aid of mechanical skill, mechanism controlling the operation of the propellers, and the hydroplanes could be changed and they could operate independently instead of synchronously. While this is not desirable in submarine practice, it might be advantageous to crafts operating in other media.

The boat normally seeks the surface, and when its mechanism is not exerting any force on it to send it in a downward direction or hold it down, it rises to the surface, but only a small part of it extends above the surface.

What I claim as my invention, and desire to secure by Letters Patent of the United States, is:—

1. A submarine boat having in combination a body or hull, driving shaft terminals extending through the ends of the body in a common longitudinal axis thereof, screw propellers connected with each of said terminals in constant driving relation, and adjustable while maintaining such connection to opposite vertical and any intermediate radial positions of a semi-circle in the vertical plane of the propeller axis.

2. In a sub-marine boat, the combination of a body, screw propellers at the ends of said body and in the longitudinal central plane thereof, said propellers being mounted upon horizontal axes arranged at right angles to their axes of rotation, means for operating the propellers, and unitary means for adjusting the angle of the propellers relatively to said body.

3. In a submarine boat, the combination of a propeller at each end of the boat, whose shaft is journaled in a yoke pivoted to a fixed portion of the boat, said yoke, a shaft and trains of gears to supply power to said propellers, a worm gear fixed to each of said yokes, a worm meshing with each of said worm gears and fixed to an adjusting shaft, said adjusting shaft, and means for rotating the adjusting shaft.

4. In a submarine boat the combination of a body; driving shaft terminals extending fore and aft through the body in a common longitudinal axis thereof; yokes pivoted transversely to the axis of said terminals in a horizontal plane; means applied to said pivots to adjust said yokes to varying radial relations with said terminals and screw propellers journaled fore and aft in said yokes in constant driving connection with said shaft terminals in any adjusted position of the yokes.

5. In a submarine boat in combination with fore and aft screw propellers adjustable in their vertical axial planes, a pair of horizontal guides at opposite sides near the bow of the craft and a similar pair near the stern—said guides being adjustable to various angles upon their horizontal axes, and with connecting mechanism whereby said guides may be operated in synchronism with the adjustment of the propellers.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

CHARLES M. STANLEY.

Witnesses:
WALTER A. KNIGHT,
LEWIS M. HOSEA.