

G. D. GOODRICH.
 PROPULSION OF VESSELS.
 APPLICATION FILED APR. 21, 1911.

1,044,164.

Patented Nov. 12, 1912.

FIG. 1.

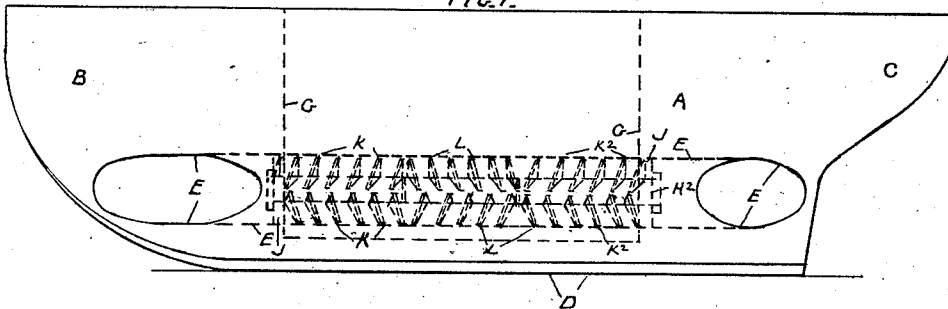


FIG. 2.

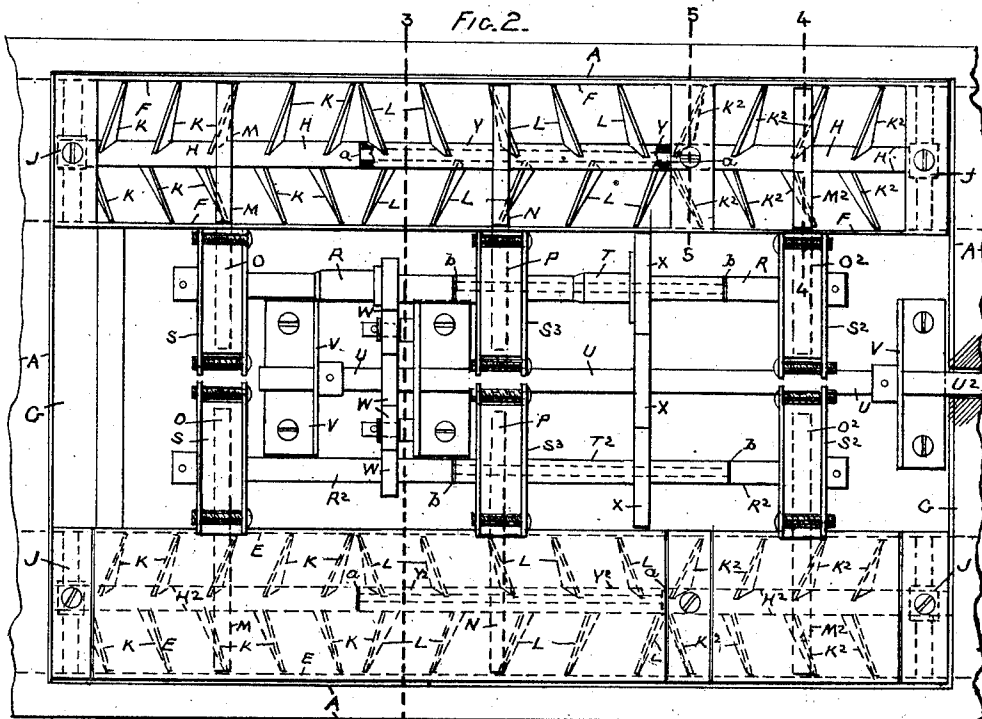


FIG. 4.

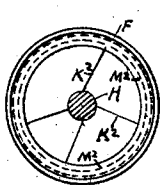


FIG. 3.

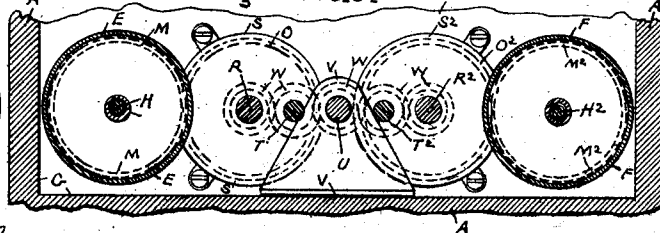
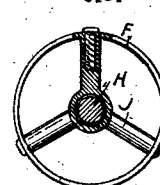


FIG. 5.



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PROPULSION OF VESSELS.

1,044,164.

Specification of Letters Patent.

Patented Nov. 12, 1912.

Application filed April 21, 1911. Serial No. 622,573.

To all whom it may concern:

Be it known that I, GEORGE D. GOODRICH, a citizen of the United States, residing at the city of Somerville, in the county of Middlesex and State of Massachusetts, have invented new and useful Improvements in the Propulsion of Vessels, of which the following is a specification.

This invention in the propulsion of vessels consists in the combination with the hull of a vessel of parallel incased tubular water-ways or passages, each running lengthwise and below the water line of the hull and at each side of and parallel with the keel, and each, at its opposite ends, open to the water, in combination with an axial rotatable shaft in each of said water-ways, and suitably supported and turning on bearings of said water-ways and each, along its length, having held thereon similar spirally running propeller blades.

Again, the invention consists in the combination with the hull of a vessel of an incased tubular water-way or passage running lengthwise and below the water line of the hull and at its opposite ends open to the water, in combination with an axial rotatable shaft, suitably supported and turning on bearings of said water-way, and along its length having held thereon or thereabout spirally running propeller-blades, in separated transverse sections as to the length of the shaft, and running in opposite directions, and preferably also adapted for rotary movement in opposite directions. And again, this invention consists in the combination with the hull of a vessel of an incased tubular water-way or passage running lengthwise and below the water line of the hull, and at its opposite ends open to the water, in combination with an axial rotatable shaft suitably supported and turning in bearings of said water-way and along its length having held thereon or thereabout spirally running propeller-blades, in three separated transverse sections as to the length of the shaft, and the blades of the middle-section running in an opposite direction to the blades of the two end-sections and, preferably, also adapted for rotary movement in an opposite direction to that of the end-sections; the blades of the two end-sections running in the same direction, as to the length of the shaft, all and otherwise substantially as hereinafter described.

In the drawings, forming a part of this

specification, this invention is illustrated in one and the most preferable manner of its combination in and with the hull of a vessel.

Figure 1 is a side view of a boat. Fig. 2 is a plan view, on an enlarged scale, at the central portion only of the hull, and showing the carrying out of this invention in its most complete and preferable form in all respects. Fig. 3 is a vertical cross section on dotted line 3—3, Fig. 2, Figs. 4 and 5 are detail vertical cross sections on dotted lines 4—4 and 5—5, respectively, Fig. 2, as will hereinafter more fully appear.

In the drawings, A represents the hull of a vessel and B is the bow, C is the stern and D is the keel of the vessel, all as well known and, as may be desired, in all respects, the same constituting no part of this invention.

E and F are two parallel and horizontal incased tubular water-ways or passages running lengthwise of the hull A and at each side of and above and parallel with the keel D, below the water-line of the vessel. Each water-way is open to the water at its opposite ends, as shown for the water-way E, Fig. 1. Each water-way E, F, extends along the chamber G, at the central portion of the hull and in that portion each consists of a metal-tube preferably having its upper side or wall removable for purposes of examination, repairs, etc., see Fig. 2, wherein the way F is shown as opened, or its top-wall removed.

H and H² are two rotatable shafts, axially arranged lengthwise in a water-way E, F, and at each of its opposite end-portions suitably supported and turning in fixed bearings J of its said water-way. Each of the shafts H, H², as particularly shown, has three series of separated segmental projecting propeller-blades K, L, and K² which are severally arranged lengthwise of the shaft and are held on and carried, the two series of end-blades K, K², by the shaft and the series of central blades L, by a concentric sleeve T, T², turning on the shaft, and each of these sleeves is held against lengthwise movement on its shaft by shoulders *a* of the shaft, at the opposite ends of the sleeve.

The several blades of the two end-sections of blades K, K², run spirally in the same direction as to the axial line of carrying shafts H, H², and the several blades of the central section of blades L run in an opposite direction to that of the blades of the end-sections, and, as will hereinafter ap-

pear, the run or rotation of the propeller-blades of said end-sections are both in the same direction and in a direction to thereby force the vessel forward through the water. and the run or rotation of the propeller-blades of the middle or center section L is in an opposite direction to that of the blades of said end-sections.

Each of the several sections of propeller-blades above described carries and has held on it, a similar concentric vertical gear-wheel M, N and M² and each of these gear-wheels meshes with a similar vertical gear-wheel O, P and O², respectively, and these latter gear-wheels are severally arranged on separate common horizontal and parallel shafts R, R², each arranged, at its opposite ends, to turn in supports and bearings of casings or shells S, S², and each of these shells houses or carries a gear-wheel O, O² and each is held in proper position by attachment to the outside of the metal-tubes forming a part of the water-ways E, F, as has been explained. The opposite gear-wheels O and O² at the end-portions of the propeller-blades are held on said shaft R or R², as the case may be, and the gear-wheel P, at the middle portion of the propeller blades is held on a sleeve T, T² turning on a shaft R, R² and each of the sleeves is held against lengthwise movement on its shaft by end-shoulders b, b thereof.

U is a horizontal shaft located between and parallel with the shafts R and R², and at an equal distance from each of them. This shaft U is supported and turns, at its opposite end-portions, in suitable bearings of fixed standards or uprights V, and at its end U² it is connected to the driving power employed for driving the mechanism explained.

W is a train of vertical gear-wheels connecting the central or driving-shaft U with each of the shafts R and R². This train W of gear-wheels is such that in the rotation of the driving-shaft U, each of said shafts will be rotated in the same direction.

X is a train of vertical gear-wheels gearing the central or driving-shaft U with each of the sleeves T, T², turning on the shaft R, R², and this train of gear-wheels is such that in the rotation of the driving shaft U, each of said sleeves will be rotated in the same direction opposite to that of said shafts R, R².

All of the several gear-wheels hereinabove mentioned are shown in every instance in a blank outline. Each gear wheel P is incased by a housing S³, as explained for the gear-wheels O, O².

The several parts and mechanism above described are operated from a common rotatable driving-shaft U, and the end propeller-blades of each shaft H, H² rotate in the same direction and in a direction to

carry and force the water, entering the water passages E, F at the bow B of the hull through said passages and out of them at their open ends at the stern C of the hull and against the open water and so thereby to drive or propel the vessel forward through the open water. And again with the propeller-blades about the sleeves Y, Y² of the shafts H, H² reversed in direction relative to the propeller-blades at the two end-sections together with the rotation of said middle-sections in a reverse direction to that of each of the end-sections, the tendency of the water, in its travel through the water-passages E, F to revolve within the passages and with the blades is prevented to a practical and substantial extent, the advantages of which are obvious without particular mention.

The incasing of the propeller-blades within tubular passages or ways as described secures a compression of the water drawn into and being carried by the blades through said ways thereby insuring increased force and the exertion of a greater degree of pressure on the open water at the stern of the boat, on the escape of the so propelled water from the openings of said water-ways at the stern of the vessel.

Although this invention has been particularly described as connected with water or marine propulsion or navigation it is not to be limited thereto but is to be applied to aerial propulsion or navigation. Further this invention is not to be limited to any particular form or spiral of the propeller-blades, nor in its broadest sense is it to be limited to any particular construction and arrangement of mechanism for rotating the propeller-blades.

It is obvious from the foregoing description that this invention involves and lies substantially in the adaptation for marine or aerial propulsion of propeller blades running in opposite directions about a common axis and arranged within a suitable incasing passage or way, open at its opposite ends, and to be rotated in opposite directions.

Having thus described my invention what I claim and desire to secure by Letters Patent is,

1. A tubular casing having a passage or way extending therethrough and open at opposite ends, a series of spirally arranged blades located at opposite ends of said casing, and adapted to be rotated about a common axis in the same direction, a series of spirally arranged blades located within the space intervening between said end series of blades, and adapted to be rotated about said common axis, spur gears fast on said end and intervening sections respectively, each having spokes constituting spirally arranged blades, said blades being parallel with the blades of members upon which said

gears are respectively fastened, mechanism engaging the gears on said end sections to rotate the blades thereon in one and the same direction and mechanism engaging the gear on said intervening section to rotate the blades thereon in a direction opposite to that of said first series of blades.

2. A rotatable propeller-shaft arranged within an incasing tubular way, open at its opposite ends, and having about its axial line, and at opposite end-portions thereof, spiral blades, running in one and the same direction as to said axial line, in combination with a sleeve arranged and turning on said shaft between its said opposite end-portions, and having spiral blades running in a direction opposite to that of the blades of said end-portions, and the said end-portions of the shaft and the said sleeve adapted and arranged to have rotatory movement in opposite directions, for the purpose specified.

3. A rotatable propeller-shaft arranged within an incasing tubular passage or way, open at its opposite ends, and having about its axial line and at opposite end-portions thereof, spiral blades, running in one and the same direction as to said axial line, in combination with a sleeve arranged and turning on said shaft between its said opposite end-portions, and having spiral blades running in a direction opposite to that of the blades of said end-portions, and mechanism connected with said shaft and said sleeve to rotate them in reverse or opposite directions for the purpose specified.

4. Parallel rotatable propeller-shafts, each with spirally running-blades at their opposite end-portions running in the same direction about said shafts, and rotatable sleeves on said shafts between said end-sections and having spirally running blades, running in a reverse or opposite direction to that of said end-sections, in combination with an incasing tubular passage or way for each of said shafts and its said sleeve, having supports and bearings therefor and open at its opposite ends, and mechanism connected with said shafts and their said sleeves and driven by and from a common driving-shaft for rotating each of them, the shafts, in one and the same direction, and the sleeves in one and the same direction which is reverse or opposite to that of the shafts.

5. Parallel rotatable propeller-shafts, each with spirally running-blades at their opposite end-portions running in the same direction about said shafts, rotatable sleeves on said shafts between said end sections having spirally running blades running in a reverse or opposite direction to that of said end-sections, in combination with an incasing tubular passage or way for each of said shafts and its said sleeve, having supports and bearings therefor and open at its opposite ends, shafts disposed parallel to said propeller-shafts respectively, gears fast at opposite ends of each of said shafts adapted to engage gears at opposite ends of said propeller-shafts respectively, sleeves rotatably mounted upon said counter shafts intermediate the ends thereof, gears fast to said counter shaft sleeves adapted to engage gears fast to said propeller shaft sleeves, a common driving-shaft disposed parallel with and intermediate said counter-shafts, and gears on said driving shaft adapted to drive said counter-shafts in one direction and said counter-shaft sleeves in a reverse direction.

6. The combination with the hull of a boat, of parallel tubular casings each having a passage or way extending therethrough, open at opposite ends and with their longitudinal median lines equidistant from the longitudinal median line of said hull, a series of spirally arranged blades located at opposite ends respectively of said casings, and adapted to be rotated about a common axis in the same direction, a series of spirally arranged blades located within the space intervening between said end series of blades in said casings respectively, and adapted to be rotated about said common axis in directions opposite to those of said end series of blades, means to rotate the end series of blades in said casings, and means to rotate the intervening series of blades in said casings independently of their adjoining series of blades.

In witness whereof, I have hereunto set my hand in the presence of two subscribing witnesses.

GEORGE D. GOODRICH.

Witnesses:

ALBERT W. BROWN,
SIMON W. HATHEWAY.