No. 638,211. Patented Dec. 5, 1899.

H. A. BOES.

MEANS FOR PROPELLING AND STEERING VESSELS.

(Application filed July 9, 1898.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1.

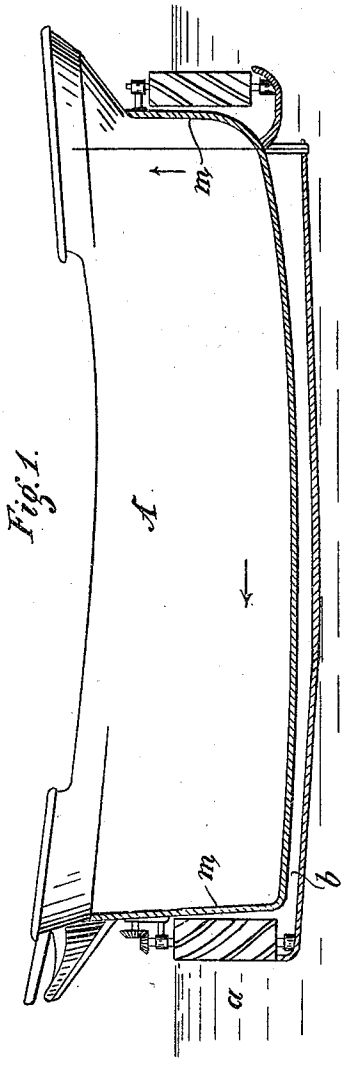
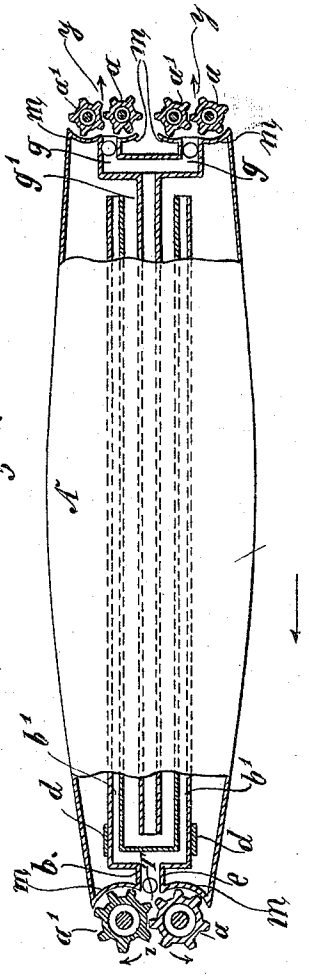


Fig. 2.



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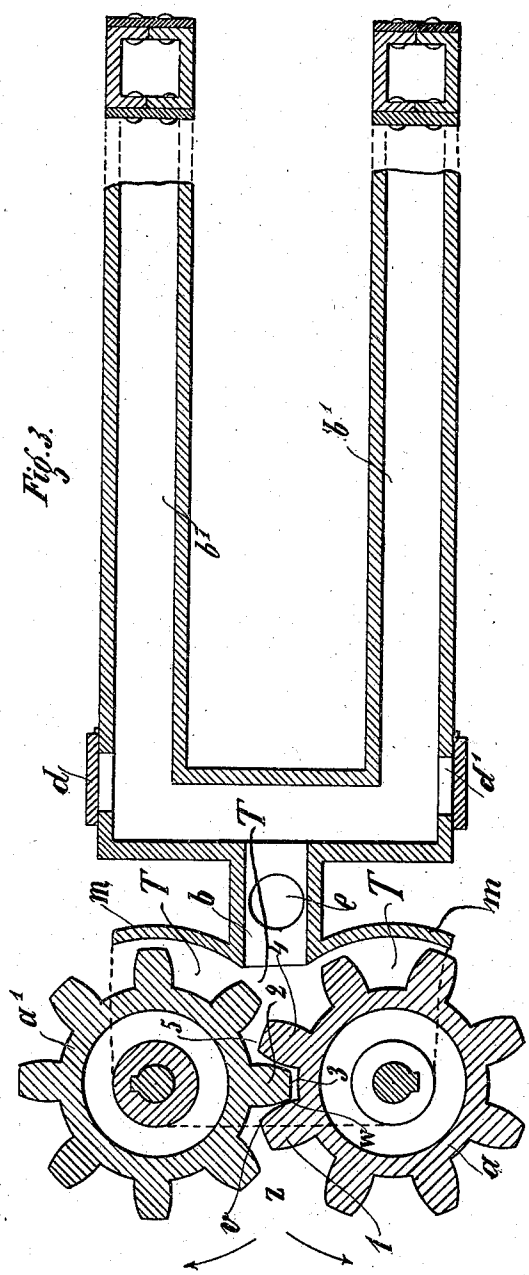
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Fig. 3.



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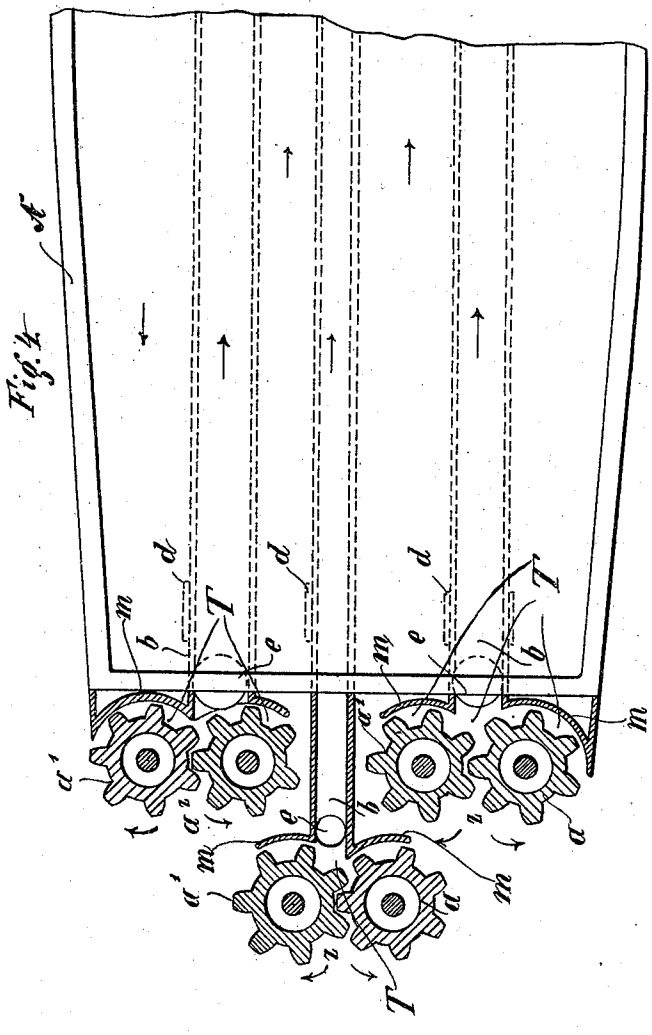
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Fig. 4.



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UNITED STATES PATENT OFFICE.

HUBERT ANTON BOES, OF KEVELAER, GERMANY.

MEANS FOR PROPELLING AND STEERING VESSELS.

SPECIFICATION forming part of Letters Patent No. 638,211, dated December 5, 1899.

Application filed July 9, 1898. Serial No. 685,568. (No model.)

To all whom it may concern:

Be it known that I, HUBERT ANTON BOES, a subject of the King of Prussia, German Emperor, residing at Kevelaer, in the Kingdom of Prussia, Germany, have invented certain new and useful Improvements in Means for Propelling and Steering Vessels, (for which I have applied for patents in Germany, dated May 27, 1898; in France, dated June 3, 1898; in Sweden, dated June 4, 1898, and in England, dated June 3, 1898,) of which the following is a specification.

The present invention consists of an apparatus for propelling ships which owing to the peculiarity of its construction works to greater advantage and with a greater useful effect than the propelling apparatus hitherto known, such as paddle-wheels, screw-propellers, reaction-turbines, and the like.

While known apparatus solely act by exercising a pressure on the water in the opposite direction to that of the ship's movement by means of some flat surface (paddle, screw, or oar) which is transferred to the hull of the ship, the action of this new apparatus is composed of several different constituent actions which mutually assist each other. These constituent actions, which, moreover, do not occur simultaneously, but successively, consist of, first, a sucking action—that is, a rarefaction is produced in front of the bow into which the ship is propelled partially by the outer atmospheric pressure and partially by the water-pressure on the rear part of the ship; second, a division of the water toward the side in front of the ship, this effect being assisted by that just mentioned; third, a rowing action after the division—that is, a reaction—and, fourth, a further reaction produced by the backward motion of the water.

In Figures 1 to 4 of the accompanying drawings two forms of the invention are shown diagrammatically for the purpose of better explaining the same. Fig. 1 represents a longitudinal section of a ship, showing the apparatus at the bow and stern. It will be seen that the apparatus in general resembles a rotary pump. Fig. 2 represents a plan of Fig. 1, partially in horizontal section. Fig. 3 shows a pair of pumps, as required for the present purpose, in combination with an outlet or pressure tube; and Fig. 4 represents the bow of a ship in horizontal section with a number of pumps likewise in section.

The pump at the bow of the ship, Figs. 1 and 2, the rotating parts of which, similar to the Pappenheim rotary pump, consist of two spirally-toothed rollers a and a', Fig. 3, is driven by a motor in the ship by means of suitable gearing. The rollers a a' of the pumps are not, however, inclosed on all sides, as is usual in such pumps, the greater part of the casing being removed, so that only about the width of two teeth and one space—in short, somewhat more than one tooth division—remains. At the middle of this casing m a short tube b, Fig. 3, is provided, which is connected to two branch tubes b' b', passing along beneath the bottom of the ship, which are open at the back and open at the front, but provided with valves d or slides and are closable at both the front and back ends. The rotation of the two rollers a and a', which are rigidly connected to their axles, takes place toward the outside, as indicated by the arrow, and upon the rollers being actuated the following course of operations and effects takes place.

First. The water close to the point marked z of the rollers, at which the teeth of the same after engagement are again released, has the tendency to pass between the two rollers a a', but is prevented from doing so because the teeth of the two rollers at w form a barrier. When the tooth 1 is close enough to the tooth 2, a degree of rarefaction is formed in the space 3, provided the water is prevented from entering from above or below. Inasmuch as the rarefied space is increased as the rotation proceeds, the sucking action is also continuously increased, and the space would at once be energetically filled with water from the front at the moment when the tooth 2 at the extreme position v commences to leave the tooth 3, so that a cleft is formed, but, before this can occur, the hull of the ship itself, owing to its forward movement, fills out the rarefied space—that is, the ship is advanced into the space formed before the water can enter from the front.

Second. From their line of engagement to the point at which there is a noticeable altera-

tion of their direction toward the side, the teeth of the rollers divide the water in the front, which effect has the tendency to increase and extend the space formed by the suction, and thus to make more room for the hull of the ship.

Third. The rollers then exercise a rowing action throughout their entire length until they again commence to enter into engagement, and thus assist in propelling the ship.

Fourth. In the same manner as the tooth 1 produces a sucking action in the space 3 the tooth 4 produces a compression in the approaching space 5—that is, during the rotation of the rollers a and a' the water in the space 5 is forced, inasmuch as it cannot escape, upward toward the back of the ship through the tube b and tubes b' b', Figs. 1 to 4. The tubes or channels b' being open at the back, (see Fig. 2,) the water fills the pressure-chamber T completely—that is, the water forced out of the space 5 by the tooth 4 will chiefly pass into the chamber T and from thence through the wide openings b into the channels b'. As the rotation continues each tooth, in consequence of the tightness with which it bears against the next tooth, will completely, or at least almost completely, force out all the water in the tooth-space in question, and a continuous flow of water toward the back will accordingly take place through the channels b', the velocity of which, in consequence of the speedy rotation of the rollers a a', will be greater than the velocity of the water flowing along on the outside of the ship and will accordingly assist in the propulsion of the ship. A pumping action is thus exercised by the teeth at the part covered by the casing m, and the water driven into the tube b exercises a pressure on the exterior water at the back ends of the tubes b', thus tending to advance the ship. One can, in short, distinguish four different actions during the rotation of the rollers a and a'—viz., first, a sucking action; second, a cleaving action; third, a rowing action, and, fourth, an ejecting action. The sucking and cleaving actions serve solely for the purpose of removing the water opposing the advance of the ship, thus to create an empty space in front of the ship, into which the latter can advance, whereas the rowing and ejecting actions serve, on the one hand, for advancing the ship—thus, for example, to replace paddle-wheels and the like—and, on the other hand, to drive the water to the back of the ship to fill out the cavity formed by the advance of the same. Owing to the oblique spiral position of the teeth the special advantages are obtained that the cleavance of the water is more easily effected and that when exercising the rowing action the teeth always act on fresh water.

Of course in practice it is not necessary to restrict the application of the apparatus to the bow of the ship; but it may also be applied to the back, Fig. 2. The water would then be introduced to the hind pair of rollers through two special suction-tubes g', which would preferably be arranged between the tubes b' of the front pair of rollers, pass along the bottom of the ship, and open out into a common connecting-tube g just before the line of engagement of the hind rollers. The hind pairs of rollers when rotating in the same direction as those at the back act analogously to the latter. First a sucking action and then a rowing action arises. In this case, however, instead of a dividing action a compression is exerted on the water between the teeth at the point marked y and the water is compelled to flow toward the back with great force, so that it has the tendency to advance the ship.

For large ships instead of one pair of rollers a number of the same may be arranged in a suitable manner, as shown in Fig. 4, at both the front and back ends of the ship. These rollers need not be solid, but hollow. Both the suction and the force pipes consist of angle or I irons, (see Fig. 3,) which are riveted to each other and to the bottom of the ship. By suitably arranging these irons and by the provision of a second bottom inclosing the same these pipes serve as supports for the frame of the ship and safely protect it against fracture.

A ship provided with rollers in accordance with this invention can be conveniently steered without special steering mechanism being necessary. If, for example, the water compressed into the pipes b or b' be allowed to escape at the front end of the ship on the left-hand side and at the back on the right-hand side, a reaction of this water against that without the ship arises and the ship will be turned. By suitably regulating the valves and the outlet-tubes the ship can be propelled in any desired direction, and the apparatus can be so constructed that the ship can be rotated about its center of gravity even when not in motion. This advantage, which may often be of great use, was not possible with the propelling apparatus hitherto used. By reversing the direction of rotation of the rollers the ship will be propelled in the opposite direction; also, by arranging suitable valves, which in Figs. 2, 3, and 4 are represented by a simple circle e, a part of the water in the tubes can be allowed to escape without exercising any special action. Further, a ship provided with this apparatus when the principal chamber of such ship was cut off from the others and suitably connected with the outlet-tubes could be kept above water for days by actuating the roller-pumps in case of leakage arising from a collision or any other cause. In this case of course the ship would not advance.

In conclusion it should be mentioned that this invention can not only be used for water vessels, but also for aerial navigation. Moreover, the rotating cylinders can of course be

arranged horizontally and would in this case act in an analogous manner to that described above.

Having described my invention, what I claim is—

The combination with a vessel having a longitudinal duct or passage open at its opposite ends and extending throughout the length of the vessel, of rotary spirally-toothed rollers arranged adjacent to one end of the open ends of said duct or passage, the said spiral teeth intermeshing with each other, substantially as shown and described and for the purpose specified.

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

HUBERT ANTON BOES.

Witnesses:

N. MEWARD,

WILLIAM A. MADDEN.