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C. H. LEE.

SELF CLEARING PROPELLER.

APPLICATION FILED SEPT. 10, 1902.

NO MODEL.

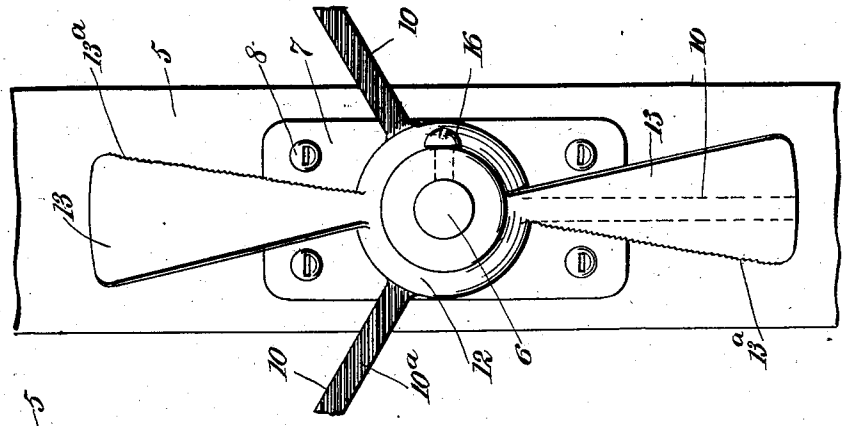

Fig. 3

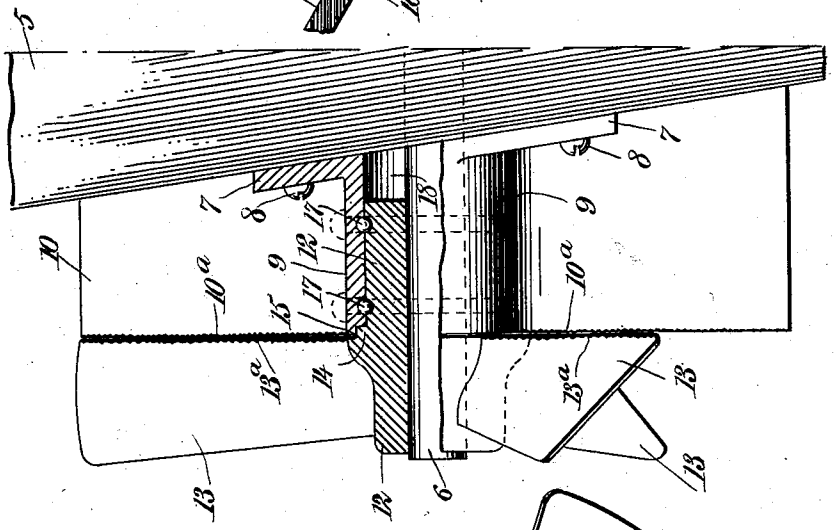

Fig. 2

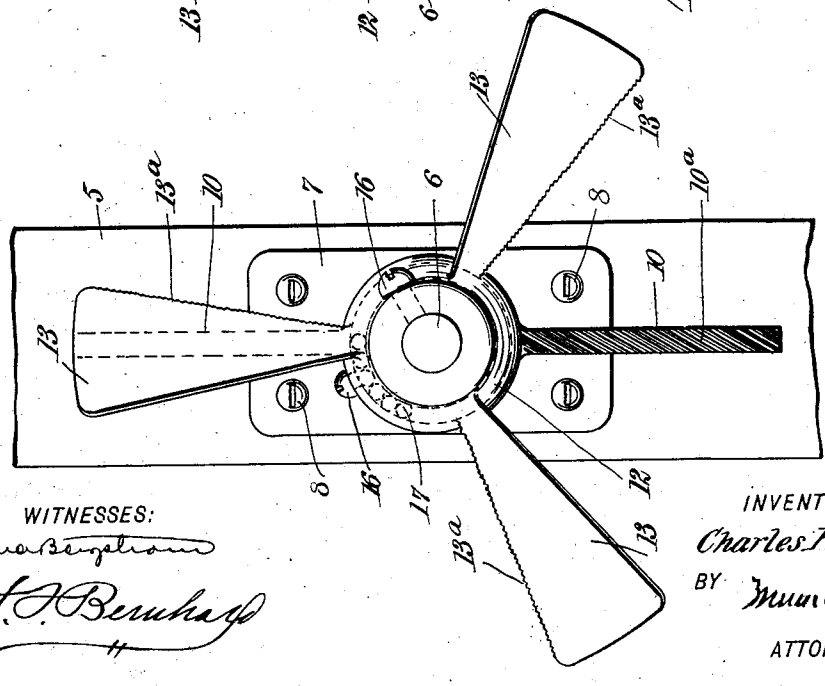

Fig. 1

WITNESSES:

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UNITED STATES PATENT OFFICE.

CHARLES H. LEE, OF SOUTHAMPTON, NEW YORK.

SELF-CLEARING PROPELLER.

SPECIFICATION forming part of Letters Patent No. 756,031, dated March 29, 1904.

Application filed September 10, 1902. Serial No. 122,750. (No model.)

To all whom it may concern:

Be it known that I, CHARLES H. LEE, a citizen of the United States, and a resident of Southampton, in the county of Suffolk and State of New York, have invented new and useful Improvements in Self-Clearing Propellers, of which the following is a full, clear, and exact description.

My invention relates to improvements in self-clearing propellers, the same being more especially adapted for use on that class of marine vessels known as "launches," which are usually of small capacity, although the principle of the invention may be utilized in propellers adapted for service on other styles of marine vessels.

It is well known to those skilled in the art that the propellers of vessels driven by engines of relatively small power are liable to become clogged or rendered non-available for propulsion purposes by accumulation of seaweeds, grasses, and other vegetable growths, which in some instances become so effectually wound or intertwined with and around the propeller shaft and blades as to arrest the operation of the propeller. The prevention and removal of such accumulation of vegetable matter is necessary to secure the desired efficiency of the propeller; but owing to the submersion and inaccessibility of the propeller the removal of the accumulated matter cannot be accomplished easily, besides involving delay and annoyance.

One object that I have in view is the provision of means in coöperative relation to the propeller for removing the seaweed and other vegetable matter which may lodge on the propeller-blades, thus making the propeller self-clearing and entirely overcoming the lodgment of matter to such an extent as to interfere with the efficiency of the propeller.

A further object is to mount the propeller and the clearing devices in a way to overcome any movement or displacement of the parts relative to each other, and thereby maintain the coöperating elements at all times in active relation.

A further object is the inclosure of all rotating parts outside of the boat, except the propeller, which clears itself.

A further object that I have in view is the provision of a propeller mechanism in which the parts are so related that only one blade at a time is in coöperative relation to the clearing devices, whereby a propeller of increased power is available and the clearing devices do not afford any material obstruction to the rotation and efficiency of the propeller when engaged in removing the vegetable matter.

A further object of the invention is the provision of a group of fins or ribs located forward of the propeller and effective in directing a solid column of water to the propeller in such a way as to reduce churning of the water when the propeller is in motion, and thus increase the efficiency of the propeller.

Further objects and advantages of the invention will appear in the course of the subjoined description, and the novelty will be defined by the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is an elevation, partly in section, of a propeller mechanism constructed in accordance with my invention. Fig. 2 is a side elevation of the same, parts being in vertical section; and Fig. 3 is a rear elevation of another embodiment of the invention in which I employ a two-blade propeller and a group of three clearer fins or ribs.

5 designates the stern-post of an ordinary marine vessel, and 6 is the propeller-shaft, which extends through the stern-post in the ordinary way. These parts may be of any suitable or preferred construction, and as no novelty resides therein it is not considered necessary to fully illustrate or describe them.

One of the important features of my invention resides in the means which coöperate with the propeller for the purpose of crushing or tearing the seaweeds and other vegetable growths, and in one embodiment of this part of the invention I employ a casting which embodies in its construction a plate, a sleeve, and clearing fins or ribs. This casting has a plate 7, of any suitable shape and style, said plate adapted to be applied to the stern-post 5, either flush therewith or against the rear face there-

of, and the plate may be secured in position by bolts, screws, or any other suitable fastenings, such as indicated at 8. A sleeve 9 extends rearwardly from the plate 7 for a suitable distance, and this sleeve is larger in diameter than the propeller-shaft, the sleeve being disposed in concentric relation with the shaft. The series of clearer fins or ribs 10 are disposed radially with respect to the sleeve, and they extend rearwardly from the base-plate. These fins or ribs are integral with the sleeve and the plate, and these ribs are as wide as the sleeve is long, so as to extend from the plate to the outer end of the sleeve. Furthermore, the ribs or fins extend well beyond the end edges of the plate 7, so as to correspond in length with the blades of the propeller, and the fins or ribs are made quite thick, so as to have the necessary stability and to present comparatively thick active edges in coöperative relation to the edges of the propeller-blades. I preferably employ two fins which are disposed in vertical positions and on opposite sides of the sleeve, one of said fins extending in a straight line upwardly from the sleeve, while the other fin depends vertically from the lower side of the sleeve; but I do not desire to strictly confine myself to the number of fins or ribs which may be employed nor to the particular location of these fins with reference to the sleeve and the plate.

The propeller has a hub 12 and a series of blades 13, preferably three in number and disposed equidistantly with relation to the hub. I prefer to employ a three-bladed propeller having all of its parts cast in a single piece of suitable metal. The hub 12 of the propeller is quite long, so that its front part will extend a suitable distance in advance of the group of blades, and the external diameter of this hub is enlarged somewhat for the purpose of producing an annular shoulder 14, which is adapted to fit snugly in a circular recess 15, which is formed in the open rear end of the bearing-sleeve 9. The external diameter of the extended part of the propeller-hub is slightly less than the internal diameter of the sleeve 9 in order that the hub may fit properly within the sleeve and turn freely therein, said propeller-hub having a long bearing in the sleeve. The propeller-hub is fitted on the rear extremity of the shaft 6, and it is adapted to be made or secured fast thereto by any suitable means, such as the set-screws 16. (Shown more clearly in Figs. 1 and 3.)

The active crushing or tearing faces or edges of the clearer-fins are indicated at 10^a, and the propeller-blades 13 are each provided with similar active faces or edges 13^a, adapted to sweep in very close relation to the corresponding edges of the clearer-fins. In fact, the propeller-blades and the fins are mounted or disposed so as to bring the active faces or edges 10^a 13^a in very close relation, only enough space being provided between these faces or edges to secure the necessary clearance for the proper operation of the propeller.

I employ ball or roller bearings 17 between the sleeve 9 and the propeller-hub 12, and in Fig. 1 these bearings are represented in the form of two annular series of balls fitting in raceways or grooves formed in the opposing faces of the bearing-sleeve and the propeller-hub; but it is evident that roller-bearings may be substituted for the ball-bearings. The employment of the roller or ball bearings and the rib fitting in the recess of the sleeve maintains the propeller in a predetermined position at all times with relation to the clearer-fins, and this is an important feature in a propeller mechanism of this type, because the propeller is kept in coöperative relation to the clearer-fins in a manner which secures maximum efficiency in crushing or tearing seaweeds or other vegetable growths.

The clearer-fins 10 are spaced in such relation to the blades of the propeller that only one propeller-blade is in active relation to a clearer-fin at a time, and this end is secured by the employment of two fins on the plate and three blades in a propeller, the blades being spaced apart for a distance less than the space between the fins, or the same result may be obtained by the use of three clearer-fins and two blades in the propeller, as illustrated in Fig. 3, or by any other corresponding disposition of more or less fins and blades. The peculiar relation of the propeller-blades to the clearer-fins obviates any interference by the fins with the operation of the propeller, and the employment of three blades in the propeller secures a construction of increased power and efficiency. This increase in the efficiency of the propeller is due not only to the absence of vegetable accumulations on the parts, but also to the fact that the group of fins or ribs serve to direct a solid column of water to the propeller in a way to minimize churning of the water under the rotary motion of the propeller.

By reference to Fig. 2 it will be seen that the propeller-hub 12 does not extend all the way into the bearing-sleeve 9, and a chamber 18 is thus provided around the propeller-shaft and at the inner part of the bearing-sleeve. This chamber may be charged or filled with a lubricant which is adapted to be constantly supplied to the ball or roller bearings of the propeller-hub, and the presence of this lubricant not only insures freedom in the operation of the propeller, but it excludes the admission of salt water to the roller-bearings and to the spaces between the propeller-hub and its bearing-sleeve.

The operation of the device is obvious from the foregoing description. The propeller-shaft is housed or inclosed within the sleeve and is protected by said sleeve and the fins against the lodgment or winding of any seaweed, grass, or obstructing matter. On the rotation of the propeller any seaweeds or

other growth which may lodge on the blades will be carried against the fins, and the weeds or other obstructing matter will be crushed or torn easily and quickly. The blades cooperate with the fins in a manner to secure a draw or shear-crushing action on the obstructing matter, and the efficiency in the crushing operation may be promoted by the provision of teeth or corrugations on the active faces or edges of the propeller-blades or on the active faces or edges 10^a of the fins, or both the fins and the propeller-blades may be provided with the corrugations.

I do not limit myself to a propeller having its blades cast in one piece with the hub, because the propeller may be of any suitable construction, and it may be equipped with any desired number of blades.

I may dispense with the ball or roller bearings and maintain the position of the propeller and hub relatively to the sleeve by means of the set-screws 16. Also I may elongate and vary the construction of the hub as circumstances may require.

Practical experience with propeller-clearing devices submerged in sea-water has demonstrated that cutters to sever weeds and grasses are not efficient because steel cutters deteriorate quickly under the action of the salt water and lose their capacity for efficient service after the lapse of a few days' submersion. In my invention this difficulty is overcome by a novel construction which contemplates the provision of crushing or tearing faces on the ribs or fins and on the propeller-blades, whereby the parts are made to coöperate in a way to crush or tear the sea weeds or grasses which are carried between their active opposing faces as distinguished from a cutting or shearing action between sharp side edges of the propeller-blades and the ribs as the blades approach and pass the ribs. In the embodiment of the crushing or tearing faces on the ribs and the propeller-blades it is preferred to make small teeth or corrugations on the edges or faces of the ribs and the blades, respectively, as plainly shown by the drawings, and the best results are obtainable by making the teeth or corrugations diagonally on the parts, the teeth of one part crossing reversely to the diagonal teeth of the other part or parts. By this peculiar construction and arrangement of the ribs or fins and the propeller it is possible to set the propeller in such relation to the ribs that clearance is provided between the parts even under the bending action of the blades when the propeller is driven at the full speed of the engine and without sacrificing the efficiency of the devices with respect to the crushing or tearing action of the parts, said propeller being set from the ribs a distance equal to one thirty-second ($\frac{1}{32}$) of an inch, more or less. Another advantage in my construction resides in the arrangement of the ribs or fins longitudinally of the sleeve, by which the ribs extend outwardly from the stern-post, thus making the ribs operate in a way to prevent wrapping or coiling of sea weeds and grasses around rotating parts, such as an exposed part of the shaft or a rotating stuffing-box if such a stuffing-box is employed, as is sometimes the case in small motor-driven vessels and launches. The employment of the ribs or fins also prevents wrapping or coiling of seaweeds around the stationary sleeve, such as shown by the drawings.

In my construction I employ a series or group of the ribs or fins as distinguished from a single blade, and these ribs are in alternate relation to the propeller-blades. This is advantageous, because the strain due to the crushing or tearing of the weeds is distributed between two or more ribs and blades and a more uniform and steady rotation of the propeller is secured, thus contributing to the efficiency of the propeller.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The combination of a rib or fin having a corrugated crushing-face, and a propeller having its blades provided with corrugated crushing-faces adapted to sweep past the face of the rib or fin.

2. The combination of a propeller, and a rib or fin adjacent to the path of the propeller, said rib or fin having a crushing-face in opposing relation to the propeller.

3. The combination of a propeller, and a rib or fin adjacent to the path of the propeller, said propeller having a crushing or tearing face in coöperative relation to the fin or rib.

4. The combination with a shaft, and a propeller, of a sleeve inclosing said shaft, and a series or group of spaced ribs close to the path and forward of the propeller, said ribs extending along the sleeve toward the propeller.

5. The combination with a stern-post, and a propeller, of a stationary group of ribs located forward of the propeller.

6. The combination with a stern-post, and a propeller, of a group or series of stationary ribs extending from the stern-post toward the propeller, and disposed in close relation to the path of the propeller-blades.

7. The combination of a propeller and clearing fins or ribs, said fins and the blades of the propeller being provided with active crushing faces or edges adapted to tear or crush obstructing matter.

8. The combination with a stern-post, and a sleeve, of a series or group of clearer-ribs extending from the stern-post and along the sleeve, and a propeller having a hub fitted to said sleeve and with its blades arranged to sweep close to the ends or active faces of the ribs.

9. The combination of a sleeve, a clearer-rib arranged longitudinally of the sleeve and extending outwardly therefrom, the rear end of

said rib having an active crushing edge or face, and a propeller mounted in said sleeve to be maintained thereby in predetermined relation to the active face or edge of said rib, the blades of said propeller being adapted to sweep close to said crushing-face of the rib.

10. The combination of a sleeve, a propeller having its hub mounted in said sleeve to be restrained from endwise movement therein, and clearer ribs or fins projecting outwardly from the sleeve and disposed longitudinally thereof, each rib being provided with a crushing-face which is adjacent to the path of the propeller-blades.

11. The combination of a series of clearer fins or ribs, and a propeller having its blades spaced apart for a distance more or less than the space between said fins or ribs.

12. The combination of a plate having a rearwardly-extending and recessed sleeve, a series of fins extending outwardly from and longitudinally along the sleeve, a propeller-hub provided with a shoulder and fitted in the sleeve, antifriction-bearings between the propeller-hub and the sleeve, and a group of blades carried by said hub and arranged to sweep close to the active edges of the fins or ribs.

13. The combination with a stern-post, and a propeller, of a sleeve, and a clearer rib or fin extending from the stern-post, along the sleeve and close to the path of the propeller.

14. The combination of a propeller, and a rib or fin adjacent to the path of the propeller, one of said parts having a crushing or tearing face.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CHARLES H. LEE.

Witnesses:
JNO. M. RITTER,
H. T. BERNHARD.