

O. P. SMITH.
PROPELLER.
APPLICATION FILED FEB. 18, 1909.

940,743.

Patented Nov. 23, 1909.
2 SHEETS—SHEET 1.

Fig. 1.

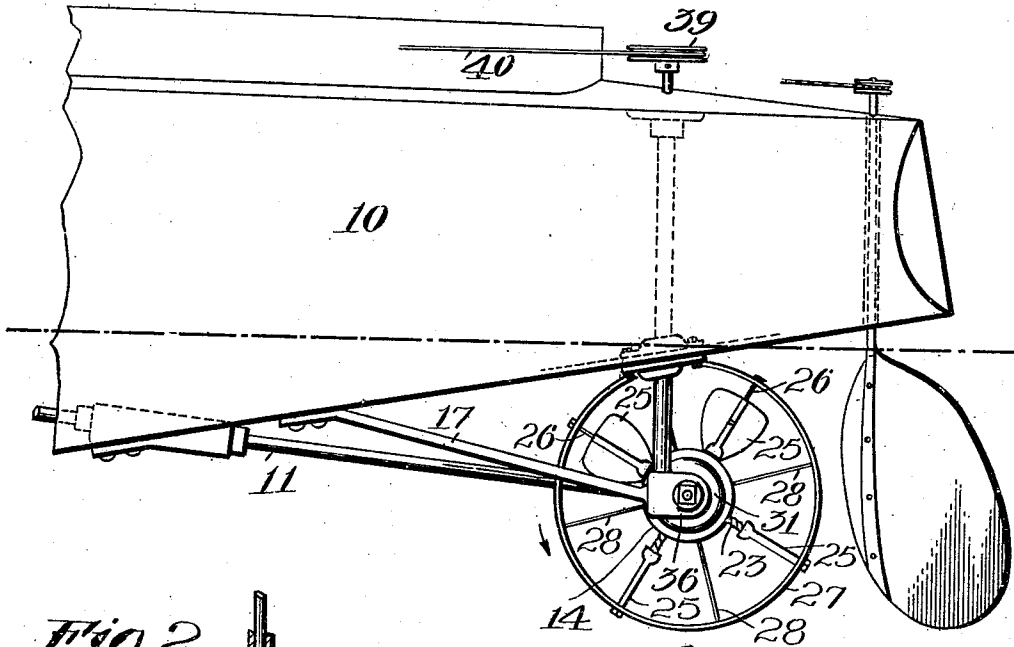


Fig. 2.

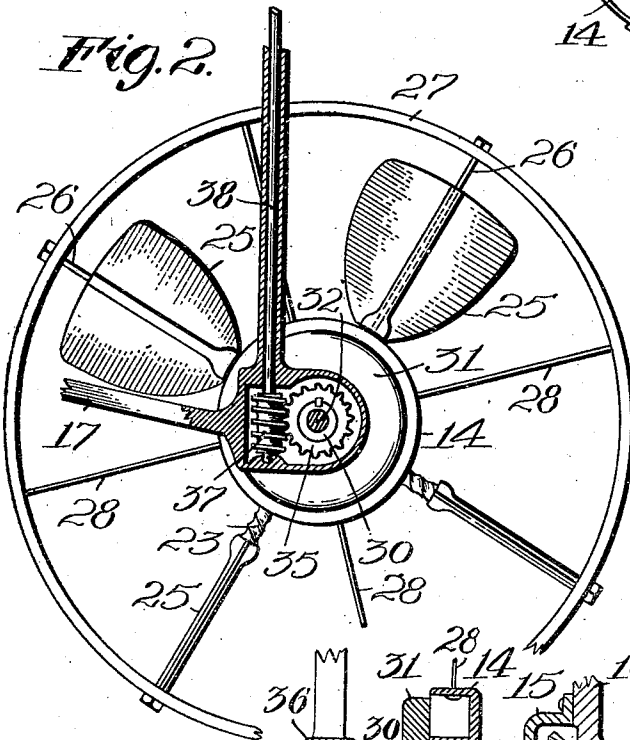
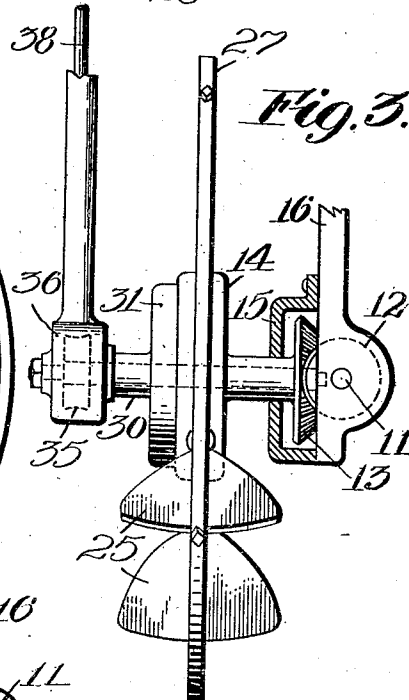


Fig. 3.



Witnesses:

C. F. Mason
E. M. Allen

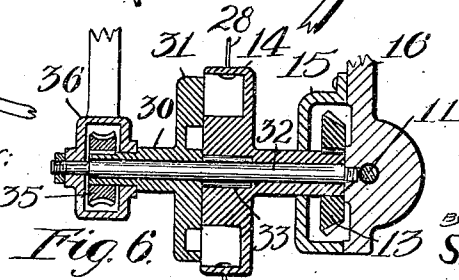


Fig. 6.

Inventor:
O. P. Smith.

By Attorneys:
Southgate & Southgate.

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Fig. 4.

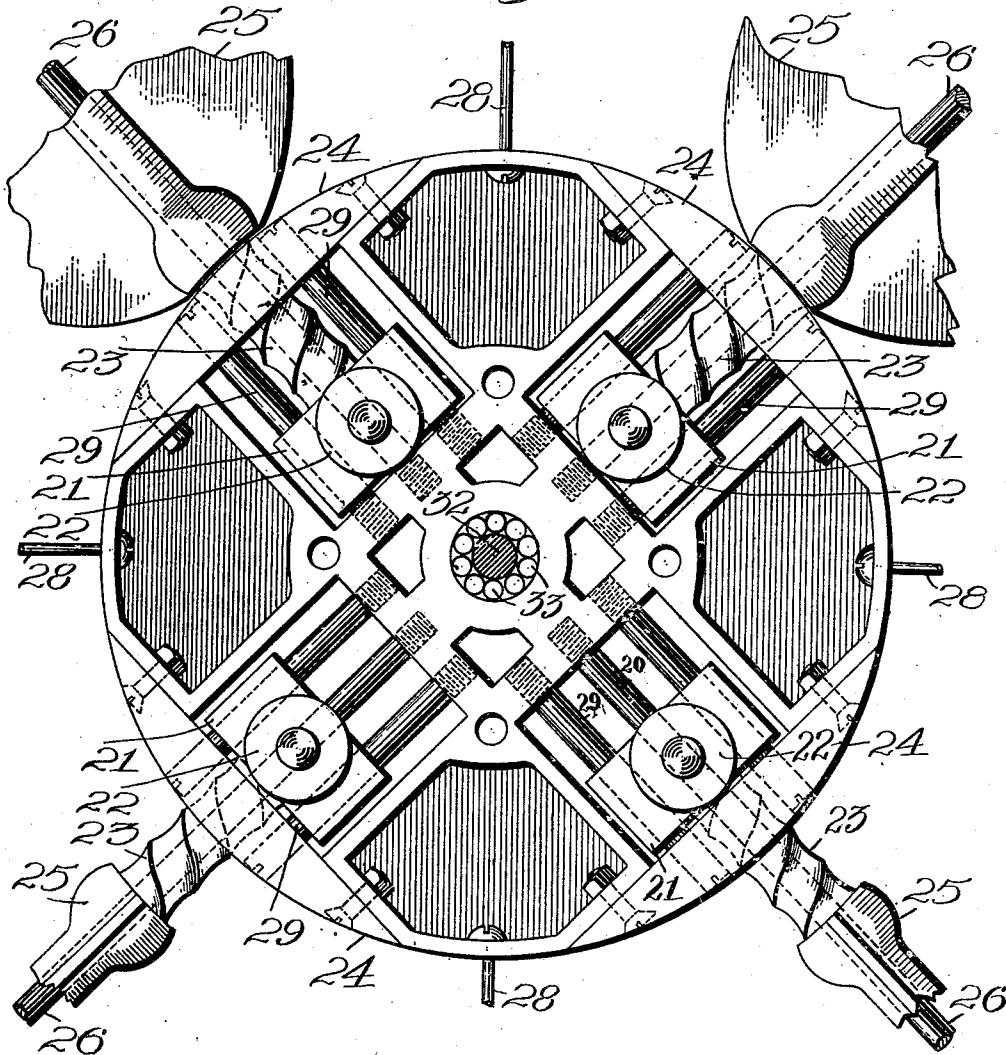
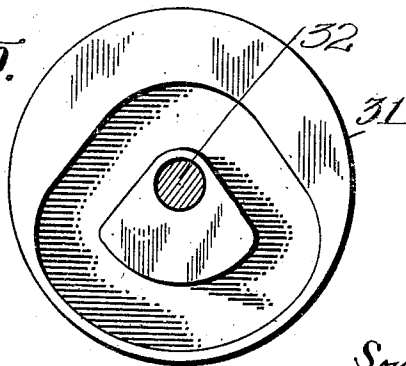


Fig. 5.



Witnesses:

G. F. Messers
E. M. Allen.

Inventor:
O. P. Smith.
By Attorneys:
Southgate & Southgate

UNITED STATES PATENT OFFICE.

OZRO P. SMITH, OF SOUTH FRAMINGHAM, MASSACHUSETTS, ASSIGNOR TO HIMSELF,
AND WALTER FRANCIS BLAKE, OF ST. LOUIS, MISSOURI.

PROPELLER.

940,743.

Specification of Letters Patent.

Patented Nov. 23, 1909.

Application filed February 18, 1909. Serial No. 478,749.

To all whom it may concern:

Be it known that I, OZRO P. SMITH, a citizen of the United States, residing at South Framingham, in the county of Middlesex and State of Massachusetts, have invented a new and useful Propeller, of which the following is a specification.

This invention relates to propellers, and is an improvement over the invention claimed in my previous patent No. 839,897, granted January 1, 1907.

The principal objects of the invention are to provide a propeller preferably of the general character referred to in said patent with means whereby the feathering of the blades and their reciprocating motion can be controlled while the propeller is in operation so as to vary the depression by the propeller of the stern of the boat; to provide efficient means whereby the boat, air ship, or the like can be stopped at will, or reversed, by manipulation of the propeller without stopping or reversing the engine or causing it to race; to provide additional support for the blades of the propeller at a distance from the hub; to provide improvements in the details of the mechanism of the propeller; to provide a construction which shall be useful in aerial propulsion as well as in marine; and generally to improve, strengthen, and simplify the construction of a propeller such as that shown in my above mentioned patent.

Further objects and advantages of the invention will appear hereinafter.

Reference is to be had to the accompanying drawings, in which—

Figure 1 is a side elevation of a launch showing one form of the invention applied thereto; Fig. 2 is a longitudinal sectional view of the same showing the propeller blades in elevation; Fig. 3 is an end view of the same; Fig. 4 is a side elevation of the hub of the propeller on an enlarged scale with the outer casing removed; Fig. 5 is a similar view of a cam for controlling the operation of the blades; and Fig. 6 is a sectional view taken vertically and centrally through the propeller shaft.

In my prior patent was shown a construction in which a number of propeller blades were employed revolving about an axis transverse to the length of the vessel, said blades being alternately moved away from and drawn back toward the axis of the shaft. The blades were moved out and remained

extending during the operative part of their stroke and were drawn in toward the shaft during their return or idle part, which produced a self-cleaning action to prevent the picking up of weeds and other matter. The propeller was shown as comprising four blades alternately moved from and drawn back toward the shaft and given a feathering or turning motion as they were moved in and out so that the blades during their idle or return travel stood in a plane at right angles to the shaft, and during the operative part of their stroke or travel stood in planes parallel with the shaft. The means illustrated in my prior patent for accomplishing this result was a stationary grooved cam which operated rollers connected with the blades to move them in and out and screw-threads or spiral guideways on the arms or shanks of the blades working in nuts to cause the proper turning of the blades. In order to produce a balanced effect these screw-threads or spiral guideways were shown as of right and left-hand pitch alternately so that part of the blades would be turned or feathered in one direction while the remainder were turned or feathered in the opposite direction. In operation the blades were successively thrown out away from their shaft during their operative stroke and drawn in toward the shaft while on their return or idle stroke, and the spiral guide-ways or screw-threads of each of the blade arms or shanks turned or feathered the blades as they were moved in or out so that the blades would stand at right angles to the shaft while on their idle or return stroke, and would present their broad faces to the water or air during their operative stroke, one blade being turned or feathered as it was moved out in the direction traveled by the hands of a watch while the next succeeding blade was turned or feathered in the opposite direction.

In the present invention I prefer to make use of all the above mentioned principles of my prior patent. It will be readily understood however, that by the use of a stationary cam such as that described in said patent there is a tendency for the propeller to depress the stern of the vessel and that that tendency increases as the speed increases.

One of the objects of the present inven-

tion is to provide simple and effective means within the control of the operator whereby the cam may be adjusted so as to compensate for that action.

5 Referring to the drawings it will be seen that the invention is shown as applied to a launch 10. Extending outwardly at the rear is a main power shaft 11 for driving the propeller. This shaft is shown as provided
10 with a gear 12 meshing with a gear 13 which is connected with a rotary hub 14 of the propeller. The gearing above described is shown as contained in a casing 15 supported by brackets 16 extending down from the
15 bottom of the vessel and other brackets or braces 17 may be employed for further strengthening the construction. The hub 14 is shown as provided with a plurality of sets of radial guides 26 along each of which moves
20 a block 21. Each of these blocks is provided with a roller 22 and to each of them is swiveled a screw threaded or spirally grooved arm or shank 23. The connection of the arms with the blocks may be of any
25 desired kind, as for example, that shown in my above mentioned patent. Secured to the circumference of the hub 14 are a series of removable plates 24, each having a screw thread or guide therein fitting the arms or
30 shanks 23 and constituting a nut therefor for turning the latter as they move in and out. Secured on each of the arms or shanks 23 is a propeller blade 25. These arms or shanks and propeller blades have a longitudinal pas-
35 sage therethrough so that they can slide on the radial rods 26 which are fixed at their inner ends to the inner part of the hub 14 and are fixed at their outer ends by nuts or the like to a circular rim 27. This rim is
40 additionally secured in position by means of tie-rods 28 connected with the hub. The blocks 21 are guided by the rods 26 and by additional radial guide rods 29.

In order to provide for operating the propeller blades, the following mechanism is shown. Outside the rotary hub 14 is a cam
45 31 having a groove for receiving the rollers 22. This cam is similar to the cam shown in my prior patent above mentioned, but instead of being mounted in stationary position is made movable, and the following
50 mechanism is shown for operating it. The cam is shown as fixed on a sleeve 30 which turns on a stationary rod 32 passing through the hub 14 which has roller bearings 33 between it and the rod. This rod also extends
55 through the gear 13 which is hollow, and it is provided with an end resting in a bearing on the bracket 16 so that it is firmly supported on that end. At the other end the
60 rod is fixed in a hollow casing 36 that extends down from the bottom of the launch. In this casing is mounted a worm wheel 35 fixed on the sleeve 30 and meshing with a
65 worm 37 which is fixed on a vertical shaft

38 which has a wheel 39 at the top for operating it either directly or by means of a chain or other flexible connection 40.

The operation of the device will be readily understood in view of the above explanation of my prior patent. If the cam were fixed in the same position in which it is shown in the above mentioned patent, the operation of the blades would be the same as
70 therein described, and it is intended to operate the wheel 39 to bring the cam into substantially that position before the propeller is started. After it gets up speed the wheel
75 can be turned so as to shift the cam and reduce the depressing action at the stern of the vessel, and at any time the stern can be raised or lowered by this means. In addition to these advantages the blades of the
80 propeller can be so changed by operating the wheel 39 that the boat or air ship will be stopped, slowed down, or reversed without changing the speed of the engines. This is an important advantage because those who
85 have attempted to do this have been able to do it only by such a construction that the engines would race under these conditions.

The rim 27 provides a firm support for the propeller blades and protects them against striking floating objects and assists to keep
90 them clear of weeds and the like, but it will be understood that the clearing action above described is retained in this construction. At the same time the parts are comparatively
95 light and simple in construction, and are of such a nature that they readily can be removed and repaired and yet are protected from the entrance of water during the operation of the device. It will be seen also that the invention is applicable to aerial propulsion as well as to marine navigation.
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While I have illustrated and described a preferred form of the invention, I am aware that many modifications can be made therein by any person skilled in the art without departing from the scope thereof, as expressed in the claims. Therefore I do not wish to be limited to all the details of construction shown and described, but
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What I do claim is:—

1. In a propeller the combination of a rotary hub, a radial blade thereon, means for moving said blade radially as the hub rotates, and means for varying the point at which said radial motion takes place during the revolution of the hub.
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2. A propelling apparatus comprising a rotatable wheel provided with movably mounted blades, means for moving said blades radially, means for swinging said blades on radial axes, and means for varying the angular position at which the blades commence their swinging operation.
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3. In a propelling apparatus, the combination of a rotatable wheel provided with movably mounted blades, means for moving
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said blades outwardly and inwardly, means for swinging said blades on axes transverse to the axis of rotation of the wheel, and means for varying the point at which the swinging operation takes place.

4. In a propeller, the combination of a rotary hub, a blade extending therefrom, means for turning or feathering the blade on a radial axis as the hub rotates, and means for varying the point at which said feathering motion takes place during the rotation of the hub.

5. In a propeller, the combination of a rotary hub, a blade extending radially therefrom, a cam for turning the blade on a radial axis as the hub rotates, and means for shifting the position of the cam independently of the rotation of the hub.

6. In a propelling apparatus, the combination of a hub, radially movable blade-carrying arms or shanks mounted on the hub, a cam for alternately extending and retracting the arms, and means for turning said cam to vary the point at which the motion of the blade carrying arms takes place.

7. In a propelling apparatus, the combination of a hub, radially movable blade-carrying arms or shanks mounted on the hub, a cam for alternately extending and retracting the arms, means for turning said cam and spirals or screw threads for feathering or turning the arms.

8. In a propelling apparatus, the combination of a hub, blade carrying arms radially movable on the hub, a cam for alternately extending and retracting said arms, manually controlled means for turning said cam to vary the point at which the movement of the arms takes place, and means for feathering or turning the arms during their radial motion.

9. In a propelling apparatus, the combination of blades adapted to turn completely around an axis transverse to the direction of motion of the device to be propelled, means for feathering or turning the blades so that each blade will be parallel to said axis and transverse to the center line of the device to be propelled during the operative part of the stroke and in a plane at right angles to said axis and parallel with said center line during the idle or return part of its stroke and for successively throwing each blade out

from the axis, increasing its distance therefrom during the operative part of its stroke, and successively drawing in said blade, decreasing its distance from the axis during the idle or return part of its stroke, and manually controlled means whereby said feathering or turning operation can be varied to come at different parts of the revolution.

10. In a propelling device, the combination of a rotatable hub, means for rotating the hub, blades movably mounted on the hub to rotate therewith, a cam mounted on the same axis as the hub and movable independently thereof and having means for controlling the motion of said blades independently of the hub, a sleeve on which said cam is mounted, a worm-wheel on the sleeve, a worm for operating said worm-wheel, and means whereby said worm can be turned manually to adjust the position of said cam.

11. A propeller comprising a hub consisting of a circular disk having a plurality of removable segments constituting a part of the disk, each of said segments having a screw-thread or spiral groove therein so as to constitute a nut, means for detachably connecting said segments to the body of the hub, guides extending through said segments into the hub and located substantially radially, blocks movable radially on said guides, propeller blade guides fitting said nuts and connected with said blocks, and means for moving said blocks out and in as the hub rotates.

12. In a propeller, the combination of a disk-shaped hub, a plurality of radial rods extending outwardly from the hub, a propeller blade having a passage therethrough located on each rod and rotatable thereon, means for simultaneously moving said propeller blades along their rods and turning them thereon as the hub rotates, and a circular rim connecting the outer ends of said rods.

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

OZRO P. SMITH.

Witnesses:

ALBERT E. FAY,
C. FORREST WESSON.