J. G. GRACEY.

PROPELLER AND CURRENT MOTOR.

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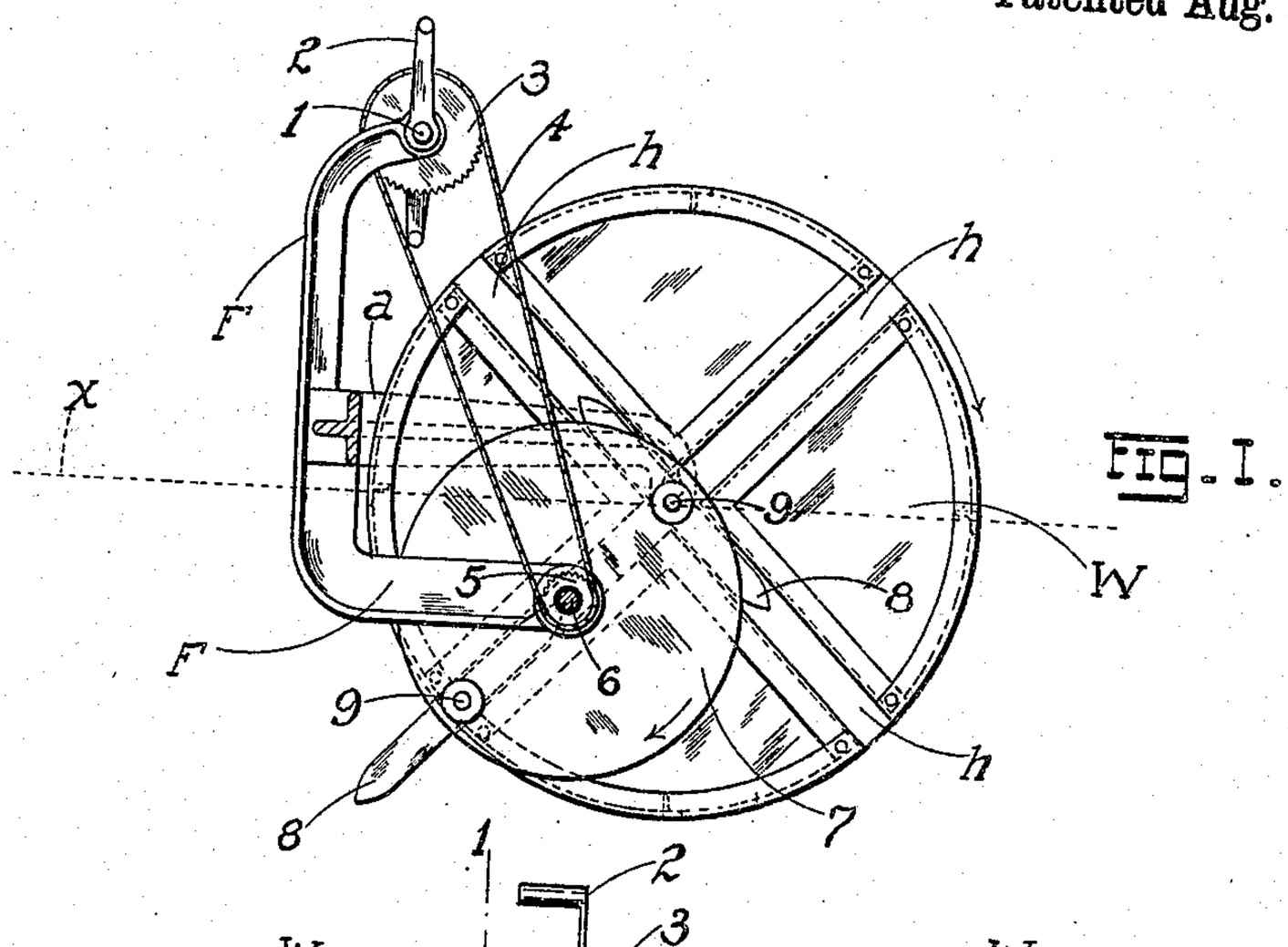



Fig. 1.

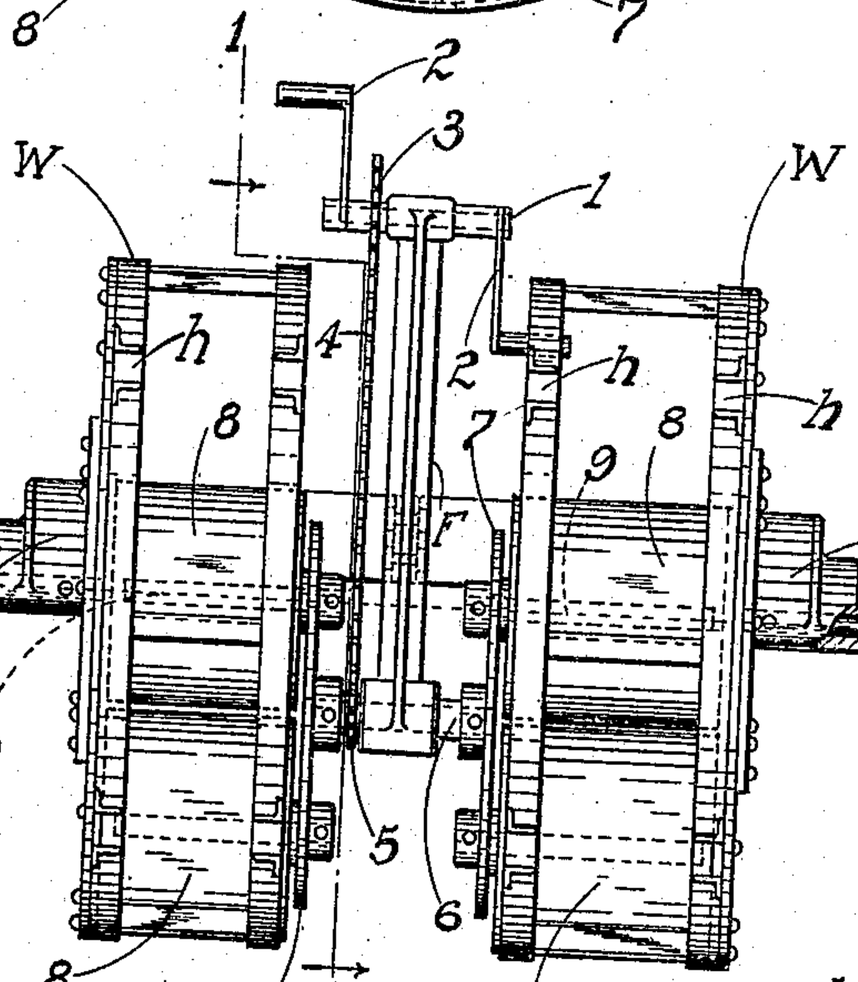



Fig. 2.

Fig. 3.

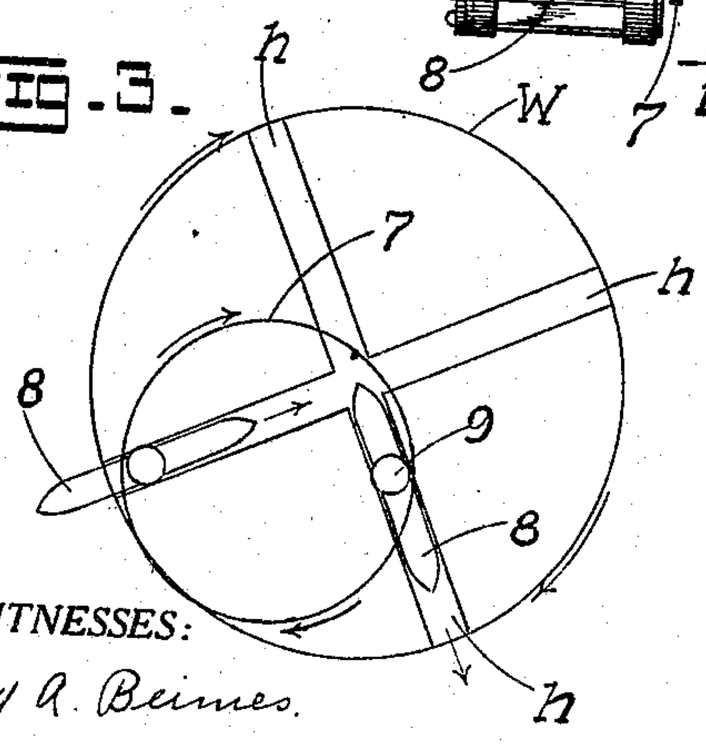
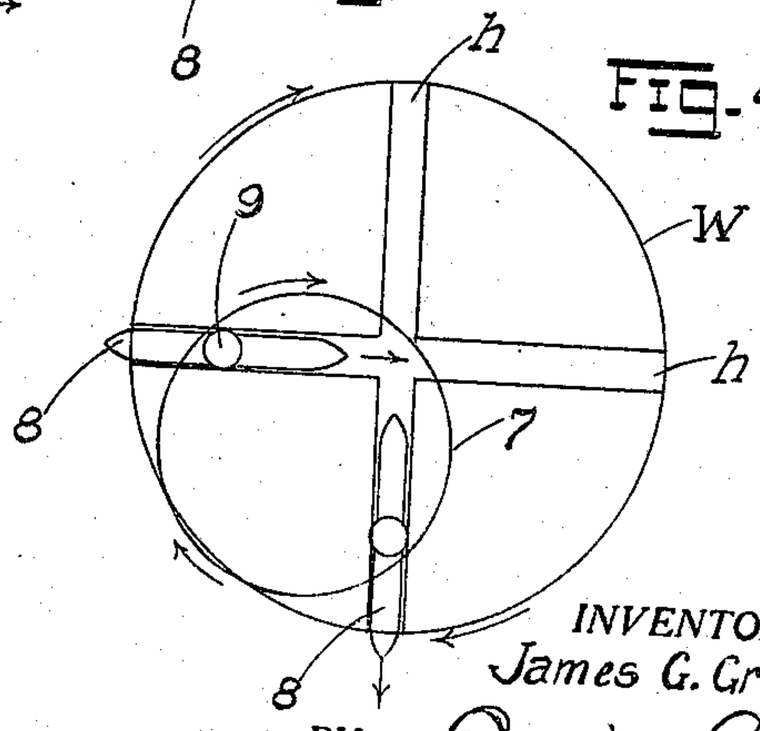



Fig. 4.

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## PROPELLER AND CURRENT-MOTOR.

No. 930,956. Specification of Letters Patent. Patented Aug. 10, 1909.

Application filed December 11, 1908. Serial No. 467,034.

*To all whom it may concern:*

Be it known that I, JAMES G. GRACEY, citizen of the United States, residing at St. Louis, State of Missouri, have invented certain new and useful Improvements in Propellers and Current-Motors, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part hereof.

My invention has relation to improvements in propellers and current motors, and it consists in the novel construction and arrangement of parts more fully set forth in the specification and pointed out in the claims.

In the drawings, Figure 1 is a vertical transverse section on the line 1—1 of Fig. 2, showing my invention applied as a propeller; Fig. 2 is a front elevation thereof; and Figs. 3 and 4 are diagrammatic views showing the motion of the propeller blades relatively to the disk or wheel actuated thereby.

The object of my invention is to construct a propeller (which can be used as a current motor) in which the blades shall have a maximum surface exposed to the water only at times when such exposure shall be most effective in affording the necessary purchase to the blades to effect the propulsion of the wheel with which they are identified, and in which the blades shall be gradually retracted out of the water in proportion as their propelling capacity is lessened, with a view of overcoming the objection of the blade lifting the water after it has performed its work, an objection necessarily inherent in which a constant area of the blade is permanently exposed to the water body.

The efficiency of a propeller constructed on my principle will be increased to the greatest possible maximum all as will be fully apparent from a detailed description of the invention which is as follows:

Referring to the drawings, F represents a frame or bracket made of angle-iron and for the purpose of the present description it may be regarded as secured to the bow or stern of a boat or vessel (not shown). At the upper end of the frame is mounted a pedal shaft 1 provided with terminal pedal arms 2, 2, the shaft carrying a sprocket wheel 3 from which leads a sprocket chain 4 to a sprocket pinion 5 on a propeller shaft 6. To the ends of this shaft are secured disks 7 along the outer faces of which are pivotally mounted the blades 8, 8, the latter being freely rotatable about the central transversely disposed pins or rods 9, which pins extend the full width of the blades.

Mounted at the ends of the arms *a*, *a*, forming part of the frame F, are the shafts 10 of the skeleton drums or wheels W, W, the said drums being composed of angle irons as shown (the details of their construction being unimportant as they may be changed to suit the builder). The drums are constructed as to afford a series of race-ways or grooves *h*, *h*, for the support and travel of the blades 8, the race-ways intersecting each other at the axis of rotation of the drum. The race-ways are open-ended, and are likewise open on the side facing the disk (or equivalent member) 7 to which the blades are pivotally secured, the disk being located contiguous to the drum as shown. The axes of rotation of the blades are near the outer edge of the disk or at such points that the arcs described by them in their rotation about the axis of the disk 7 shall intersect the axis of rotation of the drum W. The axial pins 9 are spaced apart a distance equal substantially to the radius of the drum W, so that when one of the pins 9 is at the axis of the drum, the other is near the periphery thereof, or at the outer extremity of the groove *h* (Fig. 1).

The operation of the propeller may be described as follows:—Assuming rotation to be imparted to the disk 7 in the direction shown by the arrows (Figs. 1, 3, 4) by a manipulation of the pedals 2, 2, in proper direction, it will be obvious that the blades 8 coupled to said disk will, bearing as they do against the sides of the race-ways *h*, impart a corresponding rotation to the drum. For a position of the disk 7 as shown in Fig. 1, one of the blades will be projected beyond the periphery of the drum the full distance that can be made available for acting on the water (the level of which is indicated by the dotted line *x*) and the opposite blade will rest in its race-way and extend the same distance in either direction from the axis of rotation of the drum or wheel W. Remembering that the disk 7 and drum W rotate in the same direction, and directing our attention now to the diagrammatic views in Figs. 3 and 4, it will be seen that as this rotation continues the protruding blade will begin to

recede or be retracted inwardly into its race-way, whereas the other blade will begin to travel toward the outer right hand end of its race-way, (Fig. 3); as the rotation continues still farther, both blades will about disappear within their respective race-ways, the one blade still continuing toward the center of the drum W and the other traveling toward its periphery (Fig. 4). By the time the parts have moved to a relation corresponding to that in Fig. 1, the inner blade shown in that figure will now be the protruding blade, and the protruding blade will become the inner blade, and so on continuously. It will thus be seen that each blade passes through the water with a constantly diminishing area of exposure at points beyond the periphery of the drum, the blade being gradually drawn into the drum as it approaches the surface thus having a constantly diminishing weight of water to lift accompanied of course by a gradually diminishing force of propulsion. So too each blade enters the water progressively and only projects beyond the periphery of the drum its full available area at the moment where it can secure a maximum purchase on the water.

It is of course, obvious that the blade never leaves the particular race-way with which it is identified, and so far as that race-way or groove is concerned, the blade simply reciprocates back and forth from one extreme of the diameter of the drum to the other as clearly obvious by studying the diagrammatic views in Figs. 3 and 4. In practice the peripheries of the drums should be closed, as well as the ends, so that no water may reach any portions of the blades except the protruding portions which secure the greatest purchase on the water. Of course in the operation of the blades first one end protrudes and then the other, depending on what portion of the rotation of the disk has been reached. The drum with its race-ways serves merely as a guide for the blades, it having nothing to do with the propulsion of the boat.

In lieu of a propeller, the device may be used as a current motor. By securing it in proper position to a floating platform, and allowing the current to impinge against the blades, rotation will be imparted to the drum, from the shaft of which the power may be transmitted by belt-pulleys to any suitable point of consumption as is obvious. The number of intersecting race-ways *h*, *h*, need not be limited to two, but may be any convenient number such as three, four, or even more, a "race-way" being considered of course, the full length of the diameter of the drum W.

Having described my invention, what I claim is:—

1. In combination with a drum rotatable about its axis, and provided with a series of open ended race-ways disposed diametrically across one face thereof and intersecting at the axis, a driving member adjacent to the race-ways rotating about an axis eccentric to the axis of the drum, pins projecting from the driving member into the race-ways, and blades rotatably mounted on the pins and traversing their respective race-ways, the length of the blades being such as to project beyond the periphery of the drum for a portion of a rotation of the driving member, the blades bearing against the sides of their respective race-ways and imparting rotation to the drum.

2. A propeller comprising a drive-shaft, a propeller shaft actuated therefrom, terminal disks on the ends of the propeller shaft, pins projecting from the outer faces of the disks, blades mounted rotatably on the pins, a drum located adjacent to the blades and provided with open-ended race-ways disposed diametrically on the face of the drum and intersecting at the axis thereof, said axis being in the path of the arcs described by the pins carried by the disks, the blades being inserted in the grooves and traversing the same upon rotation of the disks, and thereby impelling the drum, the lengths of the respective blades being sufficient to project a suitable distance beyond the peripheries of the drums for each rotation of the disks.

In testimony whereof I affix my signature, in presence of two witnesses.

JAMES G. GRACEY.

Witnesses:

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