No. 626,688. Patented June 13, 1899.

E. F. GORMAN & P. F. YOST.

SUBMERGED FEATHERING PROPELLER.

(Application filed Sept. 22, 1898.)

(No Model.) 2 Sheets—Sheet 1.

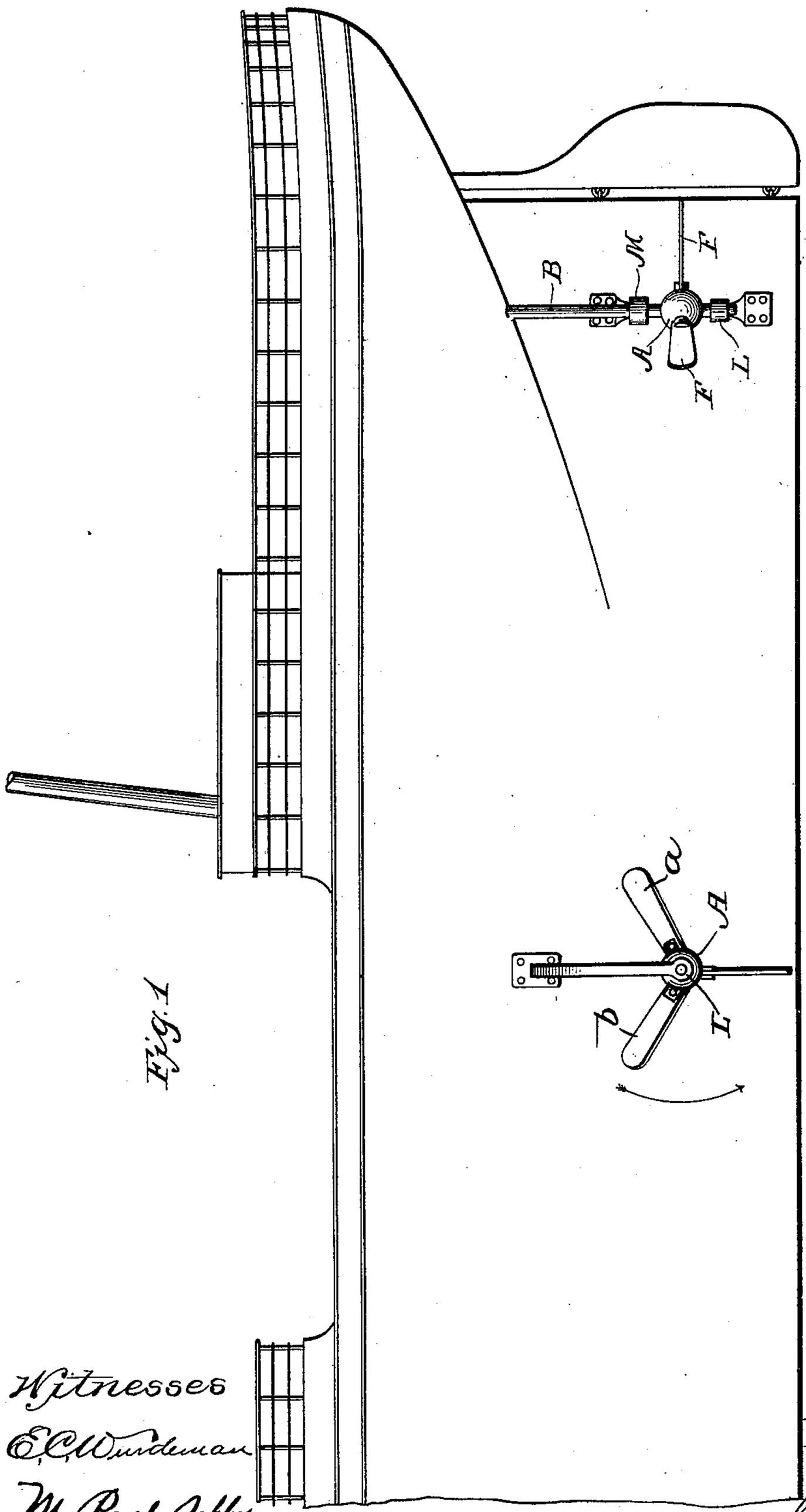

Fig. 1.

Witnesses
E. C. Wurdeman
M. Boyd Ashby.

Inventors.
Edward F. Gorman
Penfield F. Yost
by Geo. Hazelton Jr
Attorney

No. 626,688. Patented June 13, 1899.

E. F. GORMAN & P. F. YOST.

SUBMERGED FEATHERING PROPELLER.

(Application filed Sept. 22, 1898.)

(No Model.) 2 Sheets—Sheet 2

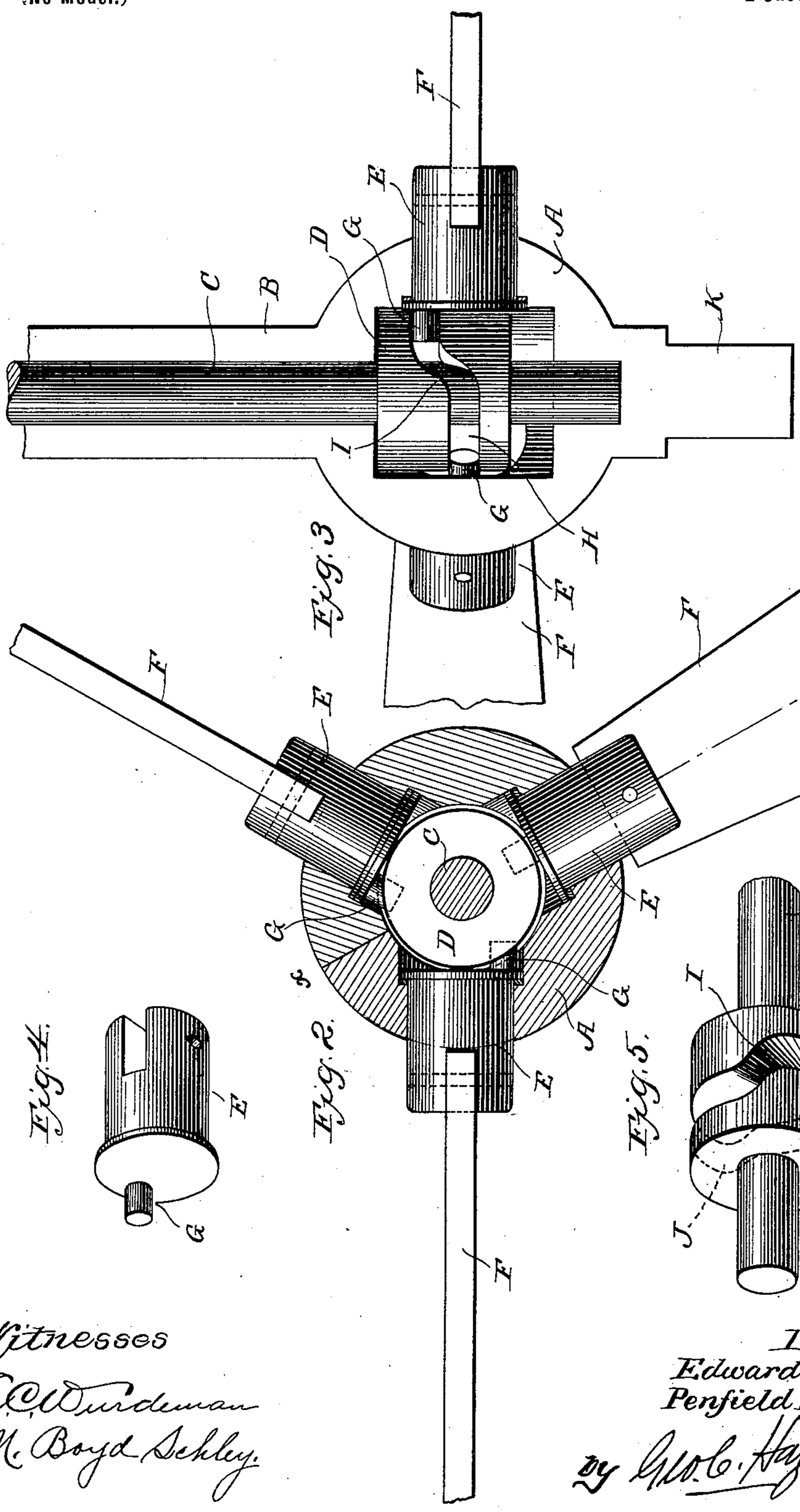

Fig. 3

Fig. 2.

Fig. 4.

Fig. 5.

Witnesses
E. C. Wurdeman
M. Boyd Dehley.

Inventors
Edward F. Gorman
Penfield F. Yost
by Geo. C. Hazelton Jr
Attorney

UNITED STATES PATENT OFFICE.

EDWARD F. GORMAN AND PENFIELD F. YOST, OF PHILADELPHIA, PENNSYLVANIA.

SUBMERGED FEATHERING PROPELLER.

SPECIFICATION forming part of Letters Patent No. 626,688, dated June 13, 1899.

Application filed September 22, 1898. Serial No. 691,598. (No model.)

To all whom it may concern:

Be it known that we, EDWARD F. GORMAN and PENFIELD F. YOST, citizens of the United States, residing at Philadelphia, in the State of Pennsylvania, have invented a certain new and useful Improvement in Submerged Feathering Propellers for Marine Purposes, of which the following is a specification.

Our invention relates to a new and useful improvement in submerged feathering propellers for marine purposes, and has for its object to provide a simple and effective propeller of this description the blades of which will exert the maximum force against the water in the proper direction and then be turned edgewise through one portion of their movement, which would retard the vessel.

A further object of our invention is to overcome the side thrust incident to the screw-propeller and avoid the possibility of "churning" or "racing," thereby permitting the application of a greater amount of power to a propeller of given size.

With these ends in view this invention consists in the details of construction and combination of elements hereinafter set forth and then specifically designated by the claims.

In order that those skilled in the art to which this invention appertains may understand how to make and use the same, the construction and operation will now be described in detail, referring to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a side elevation of a portion of a vessel having our improved propellers applied thereto; Fig. 2, an enlarged section of a propeller-hub, showing the blade-spindles journaled therein; Fig. 3, a section at the line *x x* of Fig. 2, illustrating the form of cam for oscillating the blade-spindles; Fig. 4, a detail perspective of one of the blade-spindles, showing the cam-pin thereon; and Fig. 5, a similar view of the cam for bringing about the oscillations of the blade-spindles.

In carrying out our invention as here embodied, A represents the hub of the propeller, which is here shown of spherical shape, but which may be of any other desirable form, and this hub is carried upon the outer end of the hollow shaft B, the latter being preferably split for facilitating the introduction of the stationary cam-shaft as well as the blade-spindles.

C represents the cam-shaft, which runs through the hollow shaft B into the hub, and upon this shaft is secured the cam D, said shaft being made stationary by suitable fastenings within the vessels, so as to prevent the cam from turning upon its axis, for the purpose hereinafter set forth.

The blade-spindles E are journaled within the hub, as clearly shown in Fig. 2, and have secured to their outer projecting ends the blades F, so that any oscillation of these spindles will bring about a like oscillation of the blades, and the oscillation of the spindles is produced by the pins G, projecting from the inner ends of these spindles into the groove H of the cam D, this groove being so deflected at the points I and J as to first cause each pin to move in one direction through forty-five degrees and then in a reverse direction through the same distance, returning it to the position from which it started, this result being brought about by the revolving of the hub while the cam remains stationary.

A journal K is formed upon the hub diametrically opposite from the shaft B, and this journal is adapted to fit within a suitable box or bearing L, which may be of any design to suit the particular requirements of the case—as, for instance, when the propeller is arranged in the position shown at the stern of the vessel in Fig. 1 this bearing will be in the form of a side bracket, whereas when the propeller is in the position shown upon the side of the vessel in Fig. 1 the bearing will be in the form of an overhanging bracket. A second bearing or box M is provided for the journaling of the shaft B, thus giving it rigidity and enabling it to sustain the strains brought to bear thereon by the action of the propeller.

In operation the shaft B is revolved, carrying with it the hub A, in which the blade-spindles are journaled, and during the revolving of this hub the pins G will travel in the cam-groove H, and as these pins are set to one side of the centers of the spindles they will act as cranks and hold the spindles, and consequently the blades, in a given position

so long as the pins are traveling in the straight portions of the groove; but when each of these pins reach the deflected portions of the groove they will be given a sidewise movement sufficient to oscillate the spindle upon its axis through forty-five degrees, and, as is obvious, this will cause the blade to make a quarter-turn. Now assuming that the blade is in the position shown at *a* in Fig. 1 and the propeller revolving in the direction indicated by the arrow this blade will have its maximum effect upon the water in the direction which will tend to force the vessel forward; but when its blade reaches the position indicated at *b* the pin of its spindle will have traveled through the deflected portion of the cam-slot, turning the blade edgewise to the direction of its movement, which will permit it to pass through the water with a minimum resistance until again reaching the other deflection in the slot, which must be so located as to again bring the blade into action at a point of its travel, which will effect the forward movement of the vessel. Of course it is obvious that the reverse movement of the shaft B will bring about the backing of the vessel.

In practice the propellers may be either placed upon the sides of the vessel or in the stern thereof, or both; and it is our intention in the case of large vessels to place two propellers in the stern of the vessel, one upon each side thereof and one or more upon the sides of the vessel at different points. The result of this would be that the vessel may be readily turned within nearly its own length, since the propellers upon one side may be backed while the propellers upon the opposite side run forward.

One of the principal advantages in the use of our propeller is that when a number thereof are arranged upon the sides of a vessel in action they will prevent to a large degree the rolling of the vessel by their positive action upon the water along the sides.

The fact that the hub is entirely closed permits the introduction of oil thereto through a suitable hole in the shaft B and the retention of said oil, there being no waste, while the actuating parts may be entirely submerged in oil, thus reducing the tendency to heat and causing the propeller to run smoothly and with little friction.

Our improvement is especially applicable to war vessels, since by the use of a number of these propellers along the sides of the vessel the latter may be maneuvered to much greater advantage than when only screw propellers are used at the stern, and, further, the strains upon the vessel and its machinery will be more evenly distributed, thereby reducing the liability of accident to the propelling mechanism, and by this distribution of the propellers the vessel would not be thrown out of action, even though one or more of said propellers were injured, as the remaining propellers would continue to perform the work.

The cam-shaft C instead of ending in the hub and the hub having an extension K for journaling in the bracket the cam-shaft may extend through the hub and be secured in the bracket, so as to prevent its turning, and when this construction is used it will not be necessary for this shaft to extend entirely through the hollow shaft B, since the necessity for securing the cam-shaft within the vessel would be obviated.

It is obvious that our invention is applicable to wind-motors, as the blades will feather when traveling toward the wind and will present their full surface when traveling therefrom, and it is only necessary to add a vane to the cam-shaft to cause the feathering of the blades at the proper point relative to the direction of the wind, as will be readily understood.

Having thus fully described our invention, what we claim as new and useful is—

1. A submerged feathering propeller consisting of a hub, a hollow shaft carrying said hub, a stationary shaft located within the first-named shaft and hub, a series of blade-spindles journaled in the hub, blades carried by said spindles, crank-pins projecting from the inner ends of the spindles, a grooved cam secured upon the stationary shaft so arranged as to actuate said pins for the oscillation of the blade-spindles, as specified.

2. In a propeller of the character described, a hollow shaft, a hub carried thereby, a stationary shaft projecting through the first-named shaft and into the hub, a grooved cam secured upon the stationary shaft, a series of blade-spindles journaled in the hub, pins set off the centers of the spindles and projecting into the groove of the cam, blades carried by the spindles and means for revolving the hollow shaft, as specified.

3. The herein-described combination of a hollow shaft and hub divided longitudinally, a stationary shaft journaled within the first-named shaft and hub, a grooved cam secured upon the stationary shaft within the hub, the groove in said cam being deflected, a series of spindles journaled in the hub and projecting therethrough, blades carried by said spindles, pins set off the center of the spindles and projecting into the cam-groove whereby when the hub is revolved the travel of these pins in the deflected slot will cause an oscillation of the spindles and blades, and means for revolving the hub, as specified.

In testimony whereof we have hereunto affixed our signatures in the presence of two subscribing witnesses.

EDWARD F. GORMAN.
PENFIELD F. YOST.

Witnesses:
W. H. JOHNSON,
JNO. MCGAW.