M. J. FLYNN & J. C. PATNODE.

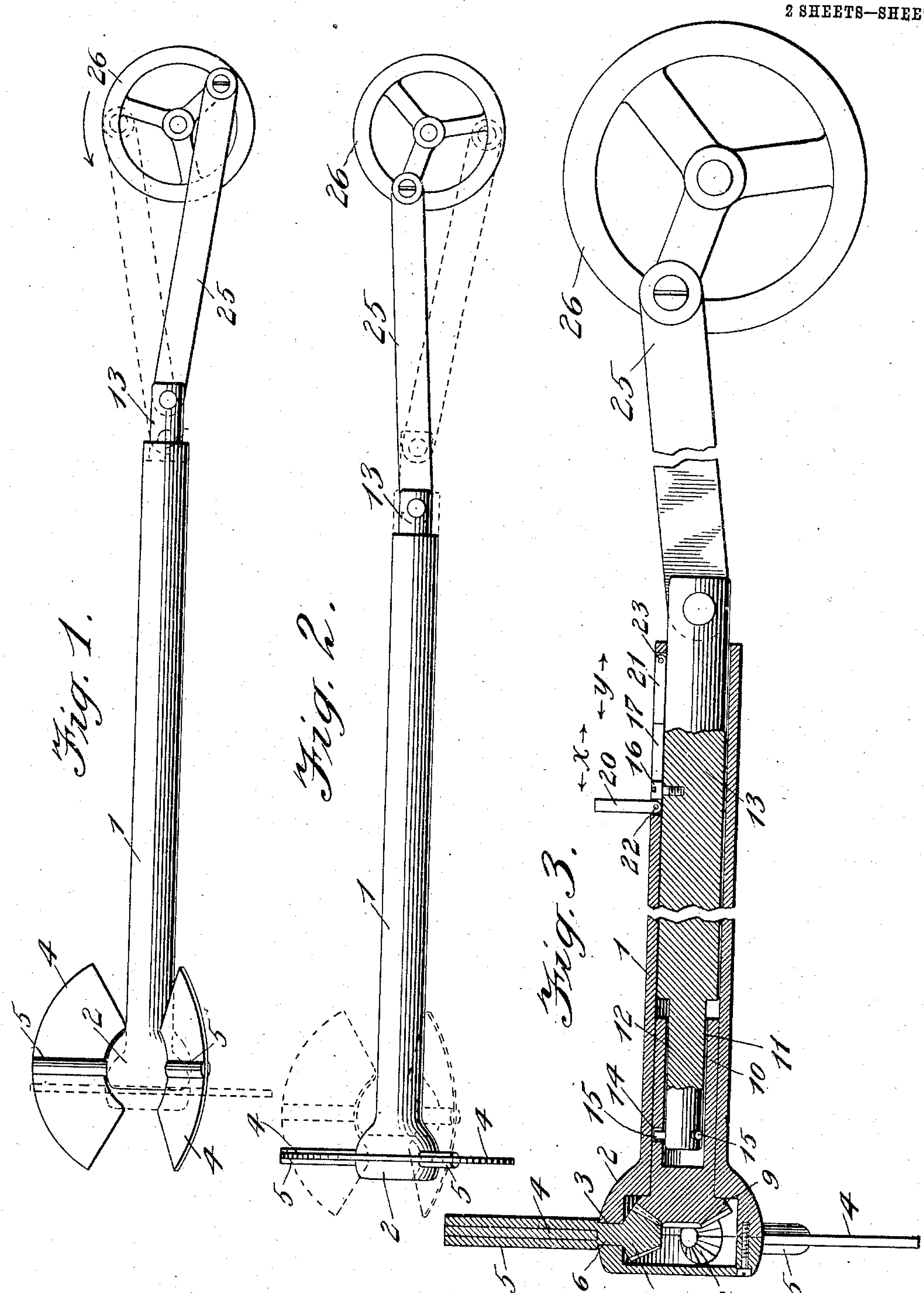
MARINE PROPULSION.

APPLICATION FILED JAN. 22, 1909.

928,035.

Patented July 13, 1909.

2 SHEETS—SHEET 1.



Witnesses:

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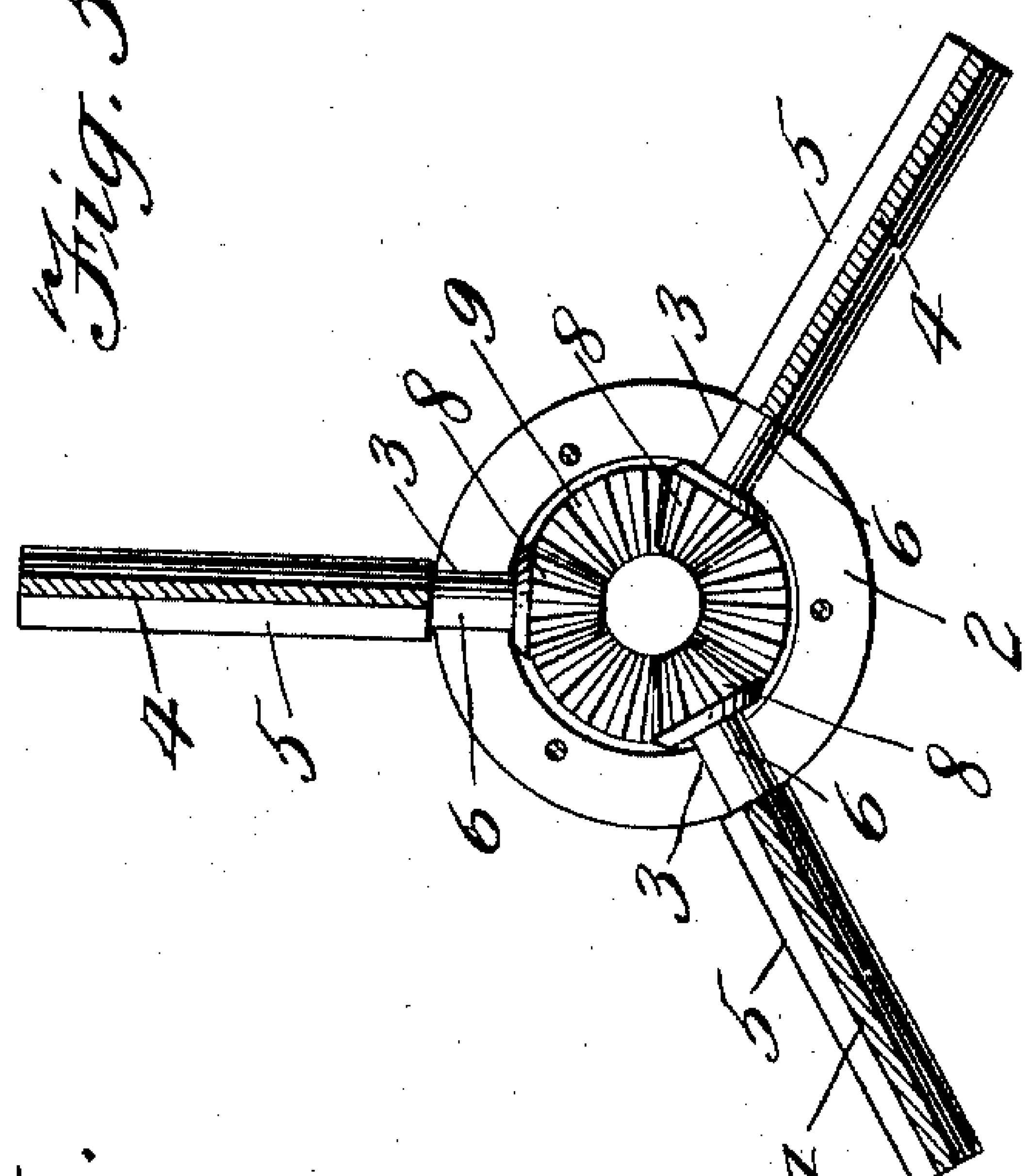

Fig. 5.

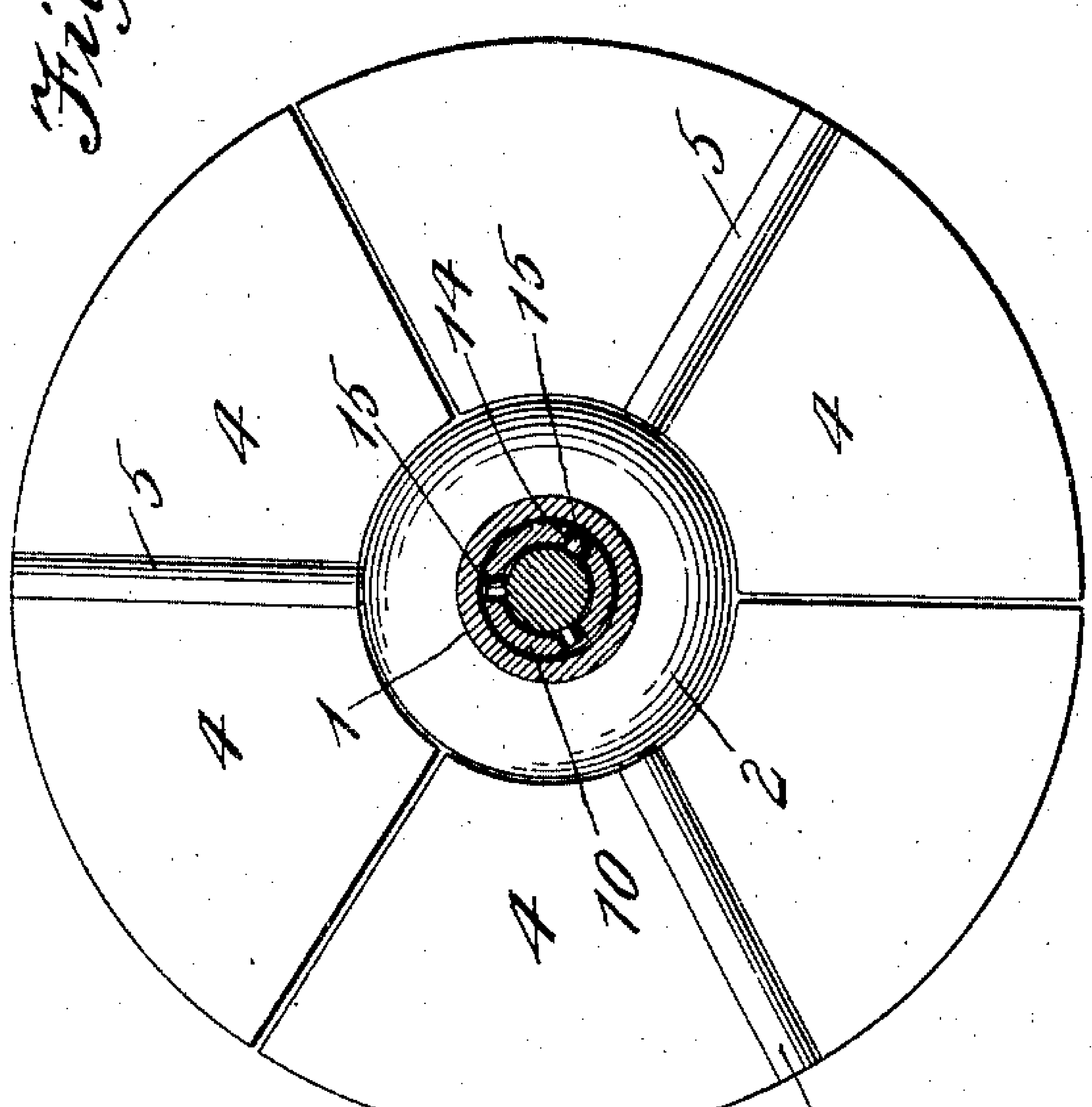

Fig. 4.

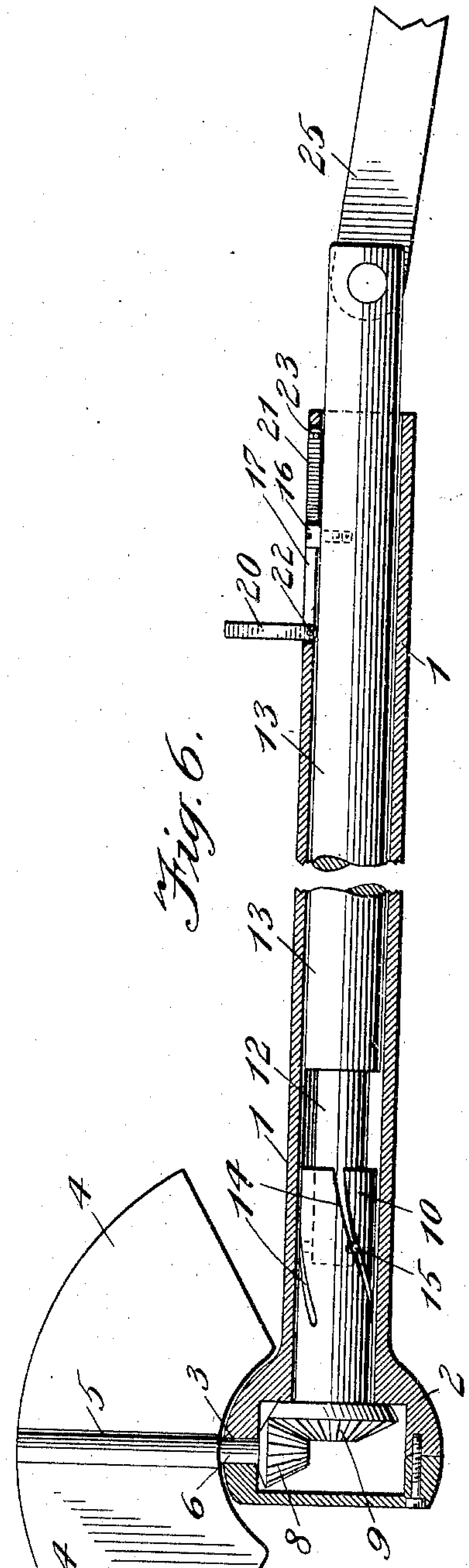

Fig. 6.

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UNITED STATES PATENT OFFICE.

MICHAEL J. FLYNN, OF NEW YORK, AND JOHN C. PATNODE, OF AU SABLE FORKS, NEW YORK; SAID FLYNN ASSIGNOR TO SAID PATNODE.

MARINE PROPULSION.

No. 928,035. Specification of Letters Patent. Patented July 13, 1909.

Application filed January 22, 1909. Serial No. 473,701.

To all whom it may concern:

Be it known that we, Michael J. Flynn and John C. Patnode, citizens of the United States, residing, respectively, at the city of New York, borough of the Bronx, and Au Sable Forks, in the county of Essex and State of New York, have invented certain new and useful Improvements in Marine Propulsion, of which the following is a full, clear, and exact description.

Our invention relates to a system of marine propulsion for vessels, to be employed in lieu of the usual screw propeller, and designed to avoid the well known defects of the screw propeller.

Among the most prominent difficulties encountered with the usual screw propeller, is the loss of power due to the propeller blades imparting a rotary or circular motion to the water, it being evident that with the usual angles, say, 45° there is as great a component of force tending to uselessly rotate the water in the plane of the wheel, as exists for useful propulsion effort. The action of the screw propeller cannot be considered analogous to a screw working in a rigid thread or nut. The loss of power is necessary and inherent in its nature.

By our present invention we overcome this inherent disability, and from a theoretical standpoint, use substantially the entire power of the driving motion in useful propulsion effort. Of course there is a slight slippage with any propelling blade where water is the sole resistance medium, but this slippage can be made a very slight factor, amounting to hardly five or ten per cent. by the principles of the present invention.

Certain other difficulties encountered with screw propellers, notably heating of the journals or bearings, and leakage, are also overcome by the present invention, as will later appear.

With these various and other objects in view, our invention consists in the features of construction and combination as hereinafter set forth and claimed.

In the drawings: Figure 1 is a side view of the prominent elements of a marine propulsion system embodying the principles of our invention; Fig. 2 is a view of the same showing a slightly different relation of the parts; Fig. 3 is a vertical sectional view; Fig. 4 is a rear face view of the propeller proper; Fig. 5 is a view of the same in its relation during its normal return stroke; Fig. 6 is a view generally similar to Fig. 3 with the parts in a different relation.

Referring to the drawings in which like parts are designated by the same reference sign, 1 designates what I shall term the propeller shaft, and which is guided in any suitable manner to have a longitudinal, but not a rotative movement, through the stern of the vessel, somewhat in the location of the usual screw propeller as at present employed. A convenient guiding system makes use of a stuffing box in the hull of the vessel and an outside bearing. The propeller shaft 1, has a hub or boss 2, at its rear end with a plurality of radial holes 3 constituting bearings for blades 4. I have shown three blades each in the form of a sector subtending about 120° of angular extent so that the three blades together define a substantially complete circular disk as shown in Fig. 4. The blades 4 are thickened or ribbed on the lines of their radial support and have projecting or shaft portions 6 extending into the holes 3 described. When the shaft portions 6 turn in the holes 3, the blades 4 will be moved from a position where they form a complete disk to a position where they extend in axial directions, in which case their resistance to longitudinal movement of the propeller shaft through the water, is very slight. The inner ends of the shafts 6 have bevel pinions 8 which mesh with a common bevel gear 9 co-axially located within the hub 2 of the propeller shaft. The propeller shaft 1 is hollow throughout its entire length and the bevel gear 9 has an extension 10 which fits into such hollow portion of the shaft 1. This extension also has an interior recess or cavity 11 and constitutes a sleeve for a protuberance 12 on the plunger 13 guided within the propeller shaft 1. The sleeve 10 has one or more spiral slots 14 engaged by a pin or pins 15 on the protuberance 12, and the plunger 13 is guided in the propeller shaft 1 by a pin or screw 16 which moves in a longitudinal recess 17 of said shaft, between certain limits of throw as later described. It is evident that the longitudinal displacement of the plunger 13 within the shaft 1, produces an angular movement of the bevel gear 9 on account of the spirally threaded or virtual screw connection between the pin 15 and the inclined groove 14 of the sleeve 10. The angular movement of the bevel gear 9 within the hub 2 is accomplished by an angular displacement of the bevel pinions 8 with which it meshes and which in turn rotate the blades 4 through angles of a quarter turn. The size of the gears, the angularity of the slot 14, and the throw of the plunger 13 of the shaft 1, is designed to move the propeller blades from a position where they are exactly flat against the water to a position where they are presented exactly edgewise to the water. For forward or full ahead conditions, it is evident that the blades should be presented flat against the water during the back stroke of the shaft 1, and edgewise during the forward stroke. Conversely, during the backward or reverse conditions the blades should be presented flat during the forward movement of the plunger and edgewise during the rearward movement thereof. We provide means for accomplishing these functions.

Referring particularly to Figs. 3 and 6, it will be noted that the limits of throw of the pin 16 of the shaft 1, are defined by struts 20 and 21, respectively hinged to the shaft 1 at points 22 and 23. When one of these struts, say 20, is raised, the pin 16 has a possible displacement relative to the shaft 1 through a distance x, on the other hand, if the strut 21 is raised, and the strut 20 lowered, it has a possible displacement through the length y. These relations necessarily produce a displacement of the pins 15 through different portions of the inclined grooves 14 and the range and position of the respective engagements is such that when the strut 20 is up, the blades 4 move in accordance with forward or full ahead conditions, while when the strut 21 is up, the blades 4 move for reverse or backing conditions.

The plunger 13 is reciprocated positively by a pitman connection 25 from a crank wheel 26 and the throw of the plunger 13 is, of course, made considerably in excess of the range of its movement relative to the propeller shaft 1. By these means the impulses of the plunger 13 are first effective to position the propeller blades 4, after which the engagement of the pin 16 with its stops causes the entire structure to move forward or backward together, as the case may be, furnishing the propeller impulses for the ship.

What we claim is:—

1. In a system of marine propulsion, a longitudinally reciprocating shaft, sector-shaped blades pivoted thereto on radial axes, and means within said shaft and actuated by its reciprocation for deflecting said blades on their axes when said shaft is reciprocated.

2. In a system of marine propulsion, a longitudinally reciprocating shaft, a plurality of blades rotatable on radial axes each of said blades having a bevel pinion, a common bevel gear co-axial with said shaft and meshing with said pinions, and means for angularly displacing said gear at the commencement of each movement of reciprocation of said shaft.

3. In a system of marine propulsion, a longitudinally reciprocating shaft, blades rotatable on radial axes, a plunger guided within said shaft, means for positively reciprocating said plunger, and means angularly displaced within said shaft by the relative movement between said plunger and shaft for rotating said blades on their axes.

4. In a system of marine propulsion, a longitudinally reciprocating shaft, blades rotatable on radial axes, a sleeve having a spiral groove and adapted to rotate said blades on their axes, and a plunger having a protuberance with a pin entering said groove and longitudinally displaceable in said shaft to move said blades.

5. In a system of marine propulsion, a longitudinally reciprocating shaft, a plurality of blades rotatable on radial axes, a plunger displaceable in said shaft to rotate said blades on their axes, and pivoted struts for opposing varying limits of movement to said plunger in said shaft whereby the movements of said blades are altered for reverse speed conditions.

In witness whereof, we subscribe our signatures, in the presence of two witnesses.

MICHAEL J. FLYNN.
JOHN C. PATNODE.

Witnesses:
B. McNulty,
W. P. Coats.