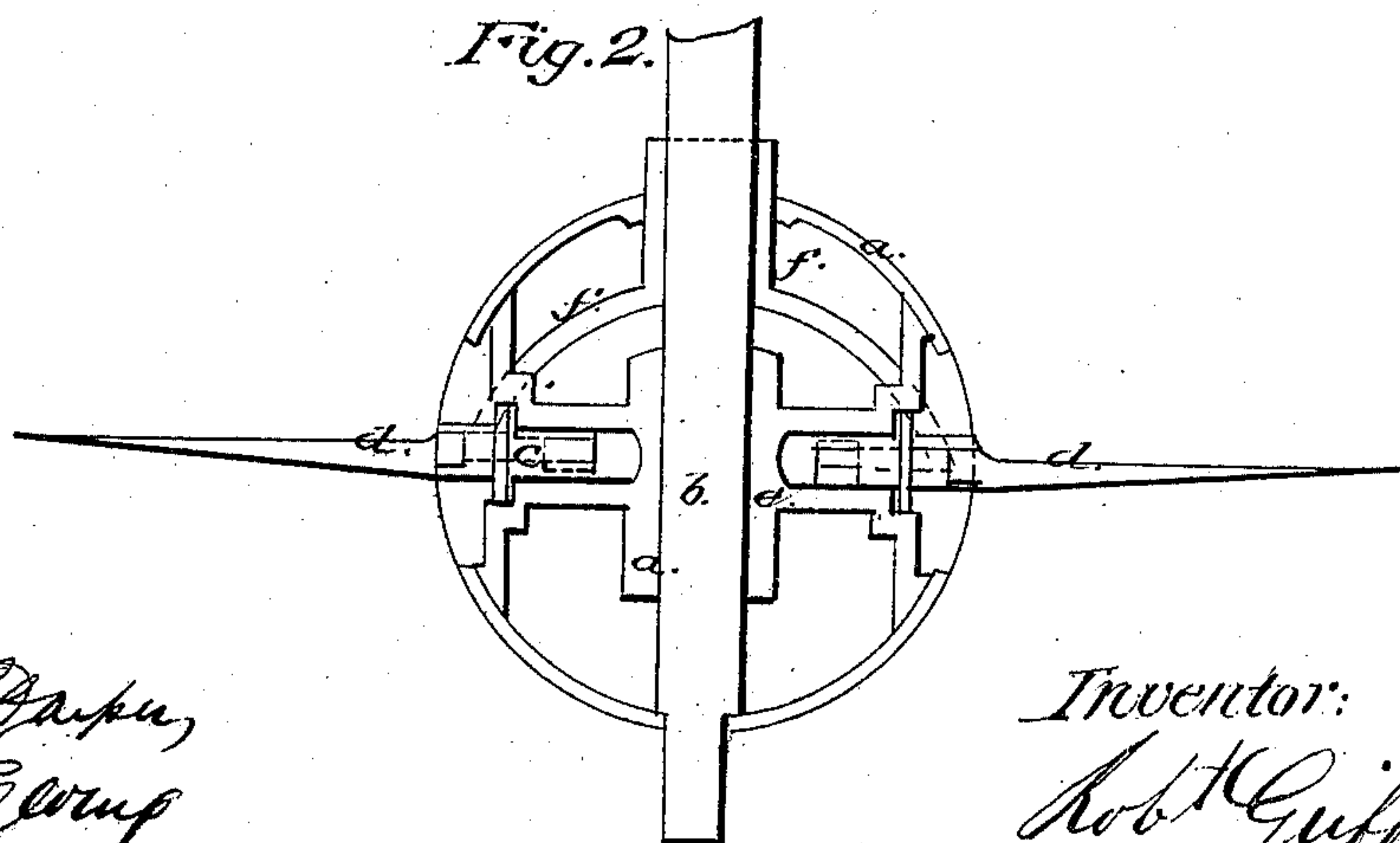
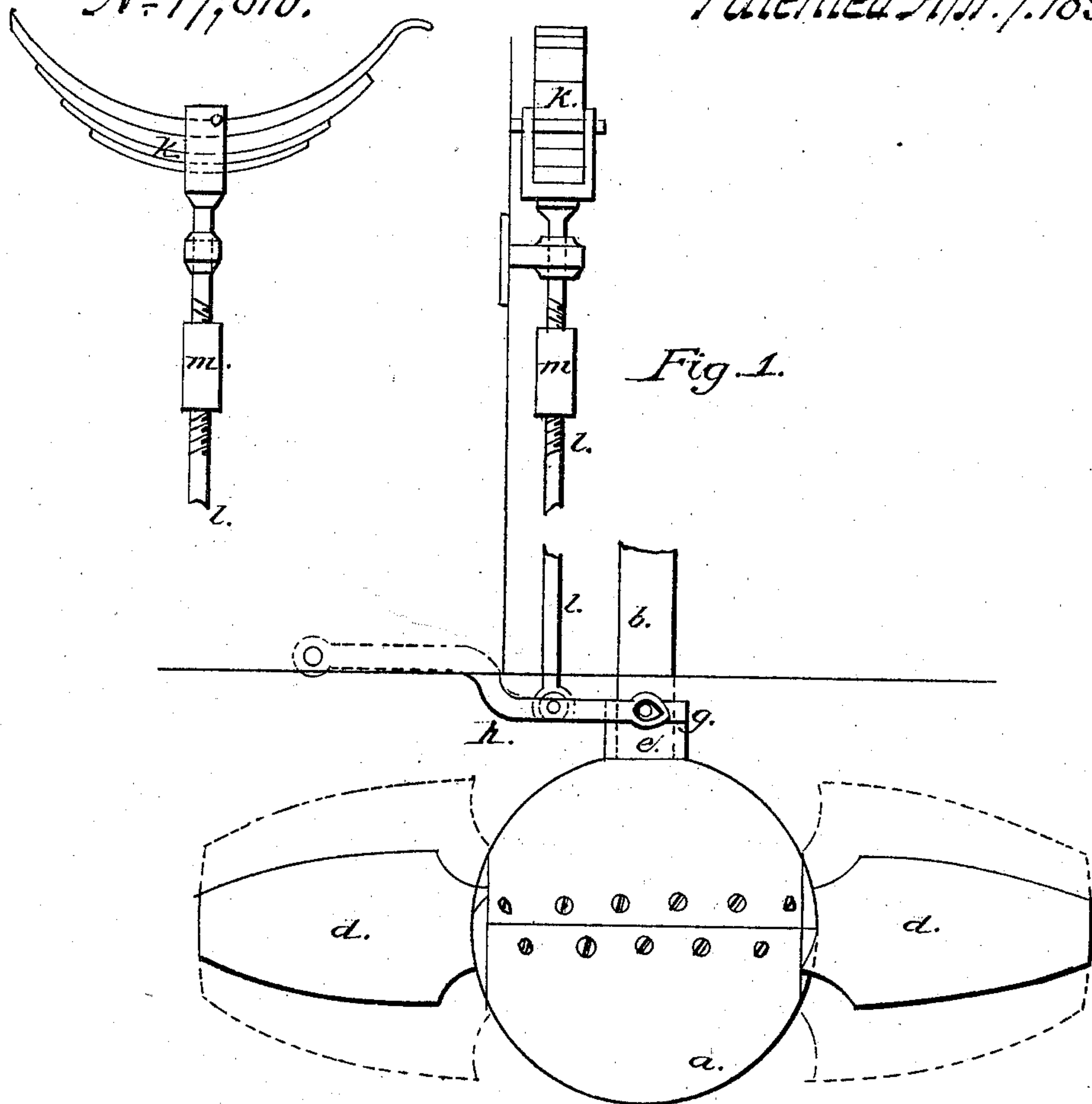


R. Griffiths.
Propeller.

Nº 17,016.

Patented Apr. 7. 1857.



*John R. Carpenter,
W. C. Brown*

*Inventor:
Robt H Griffiths*

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Fig. 3.

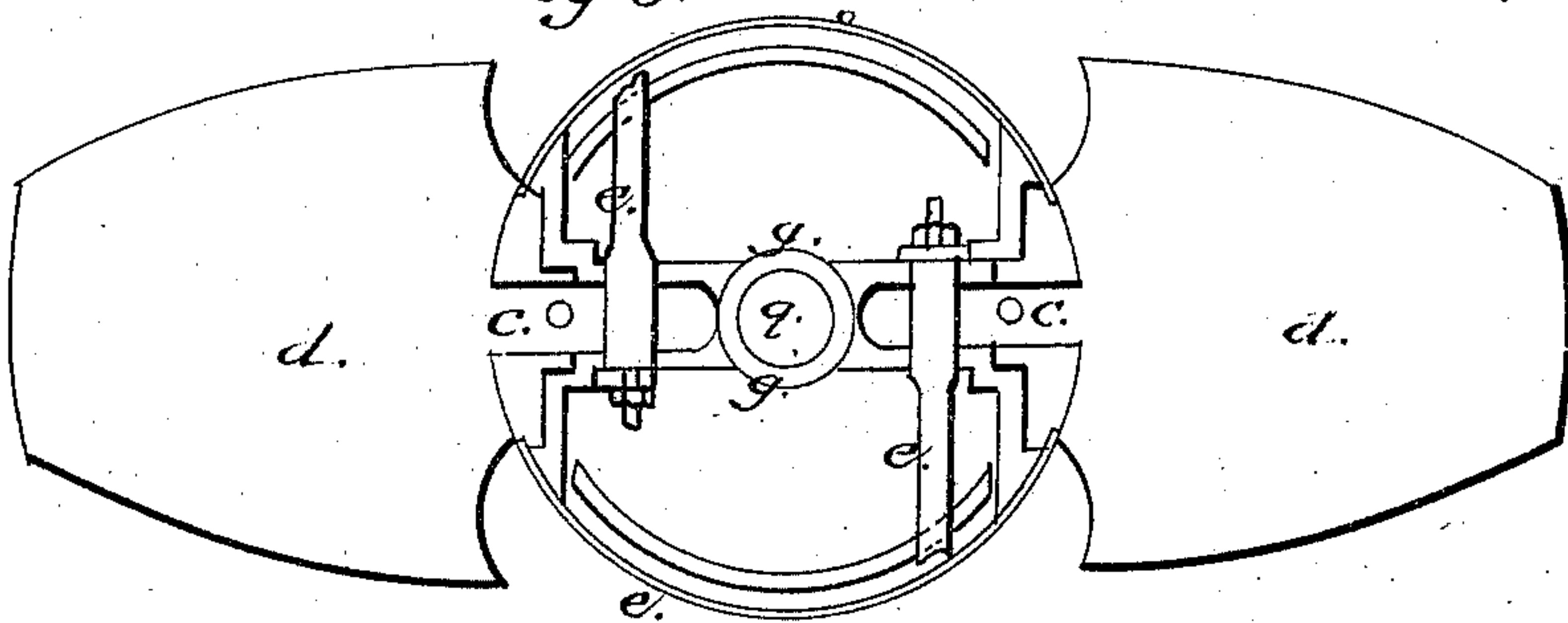


Fig. 4.

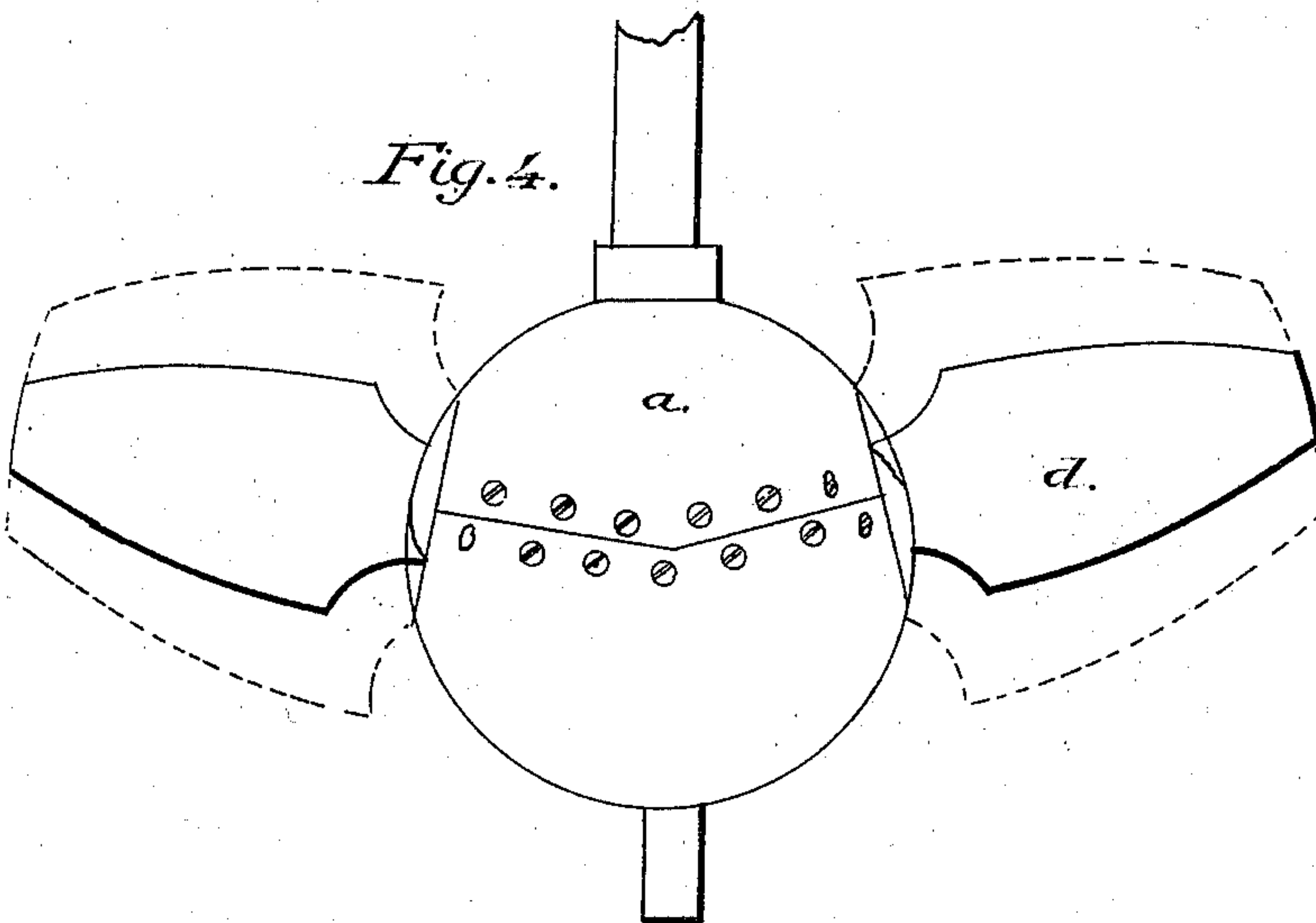
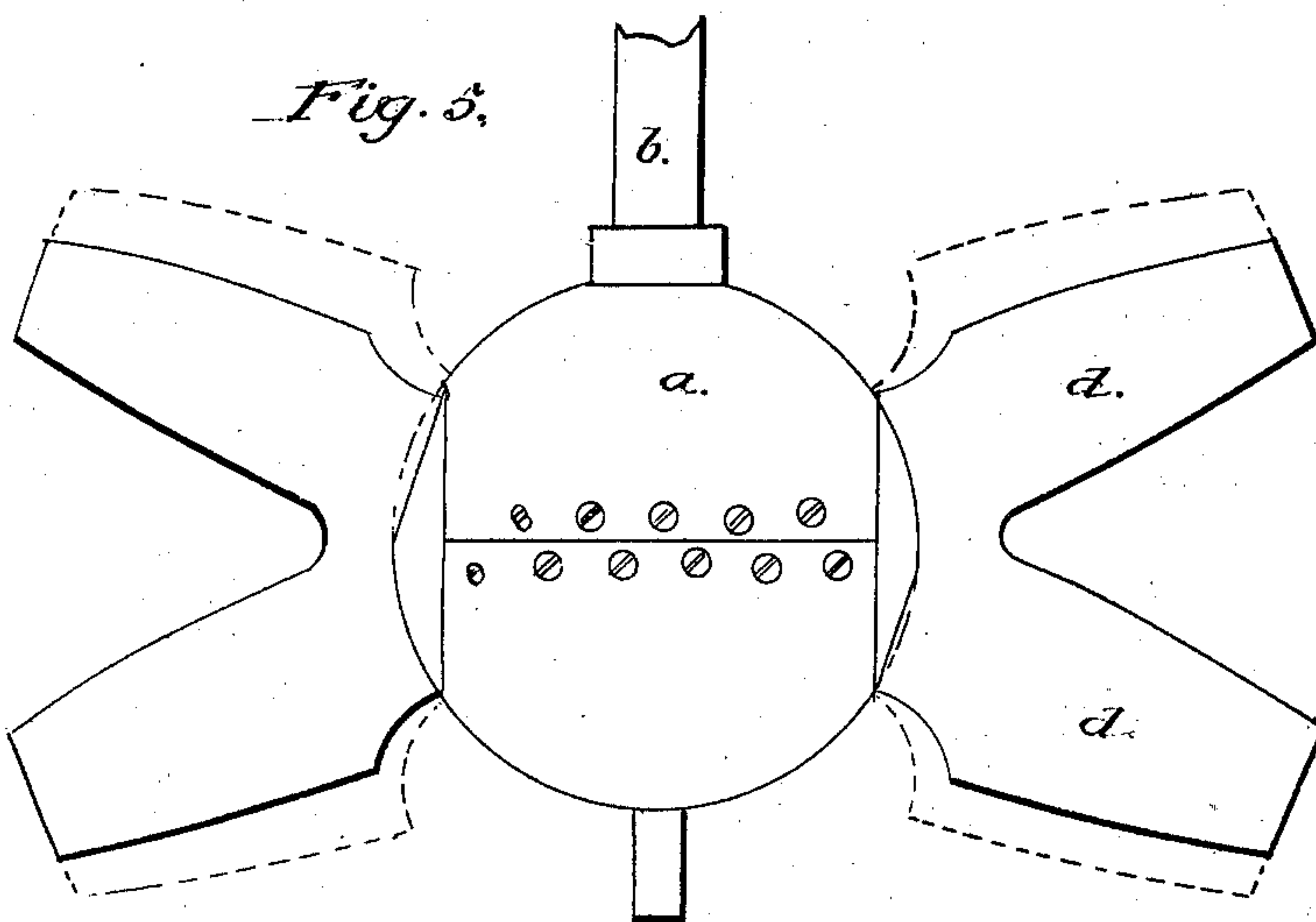


Fig. 5.



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Fig. 6.

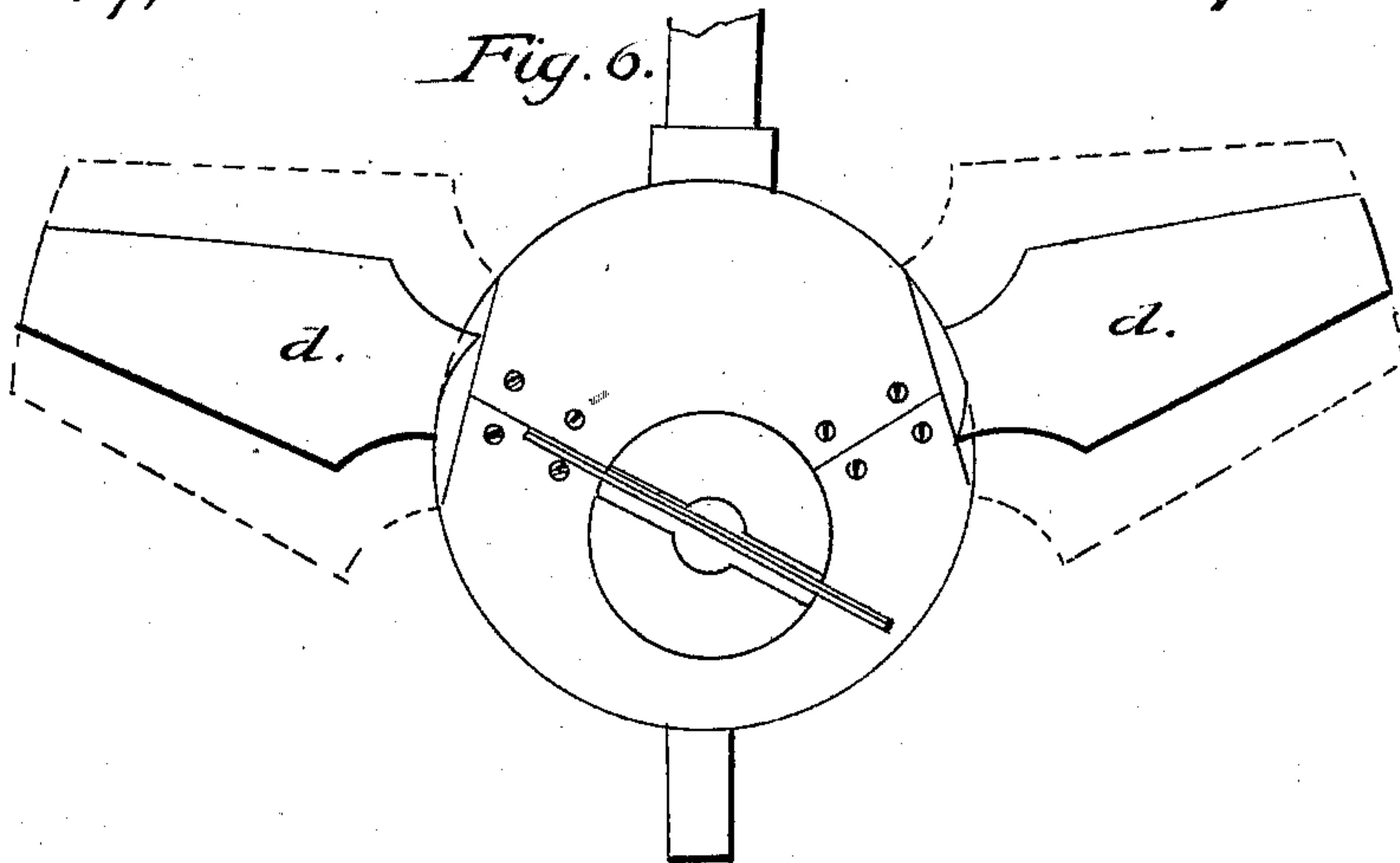
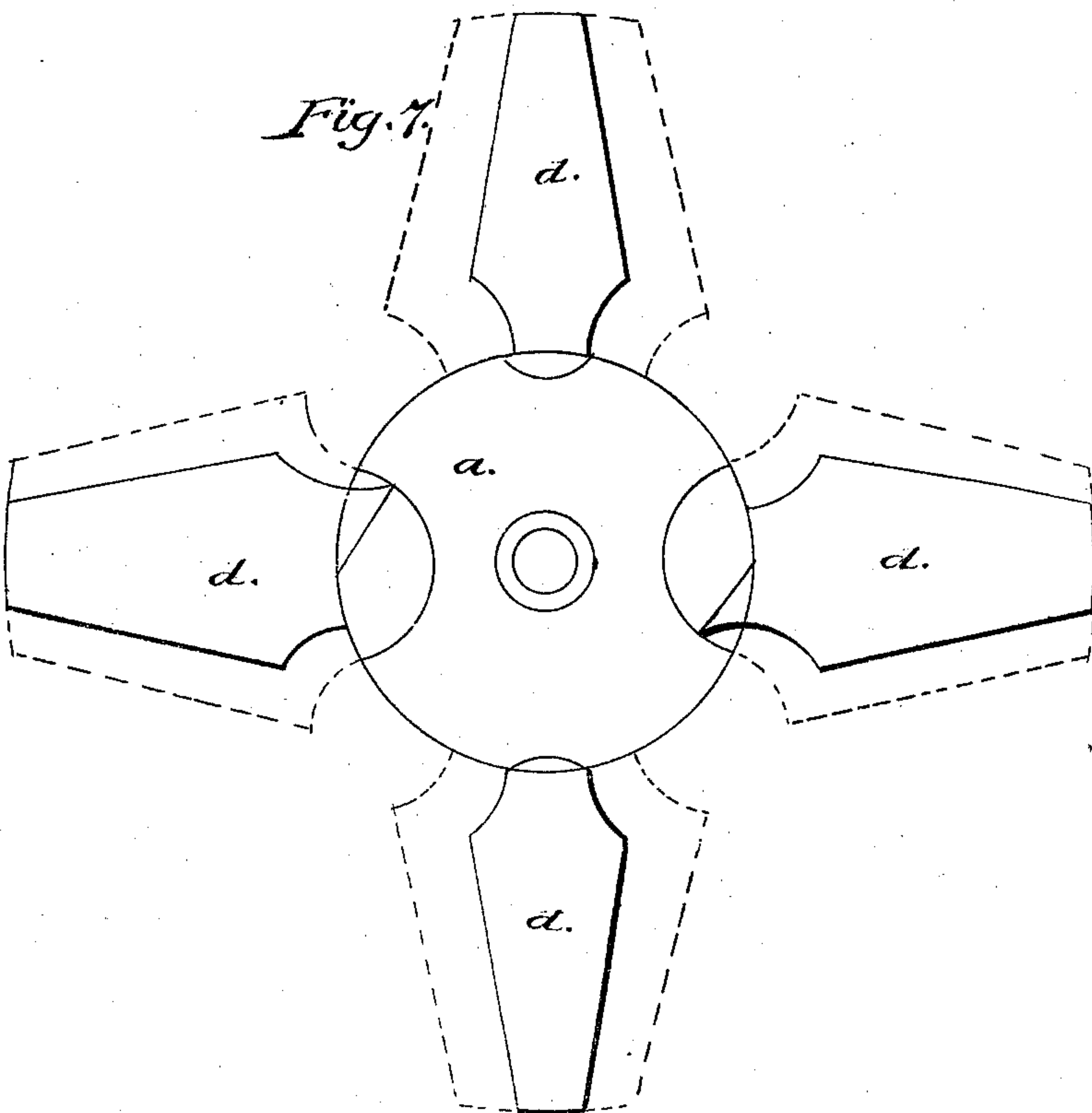


Fig. 7.



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Fig. 8.

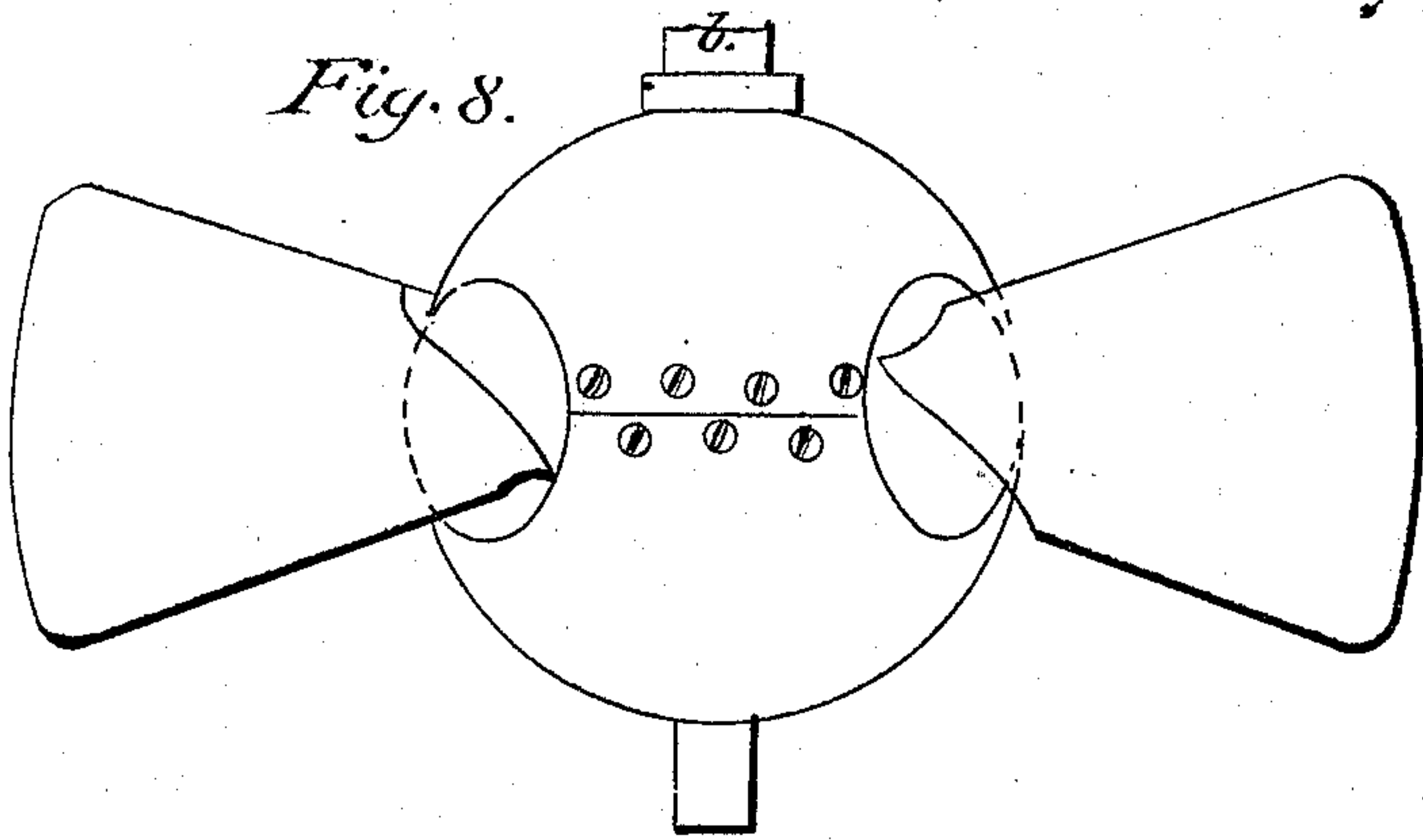


Fig. 9.

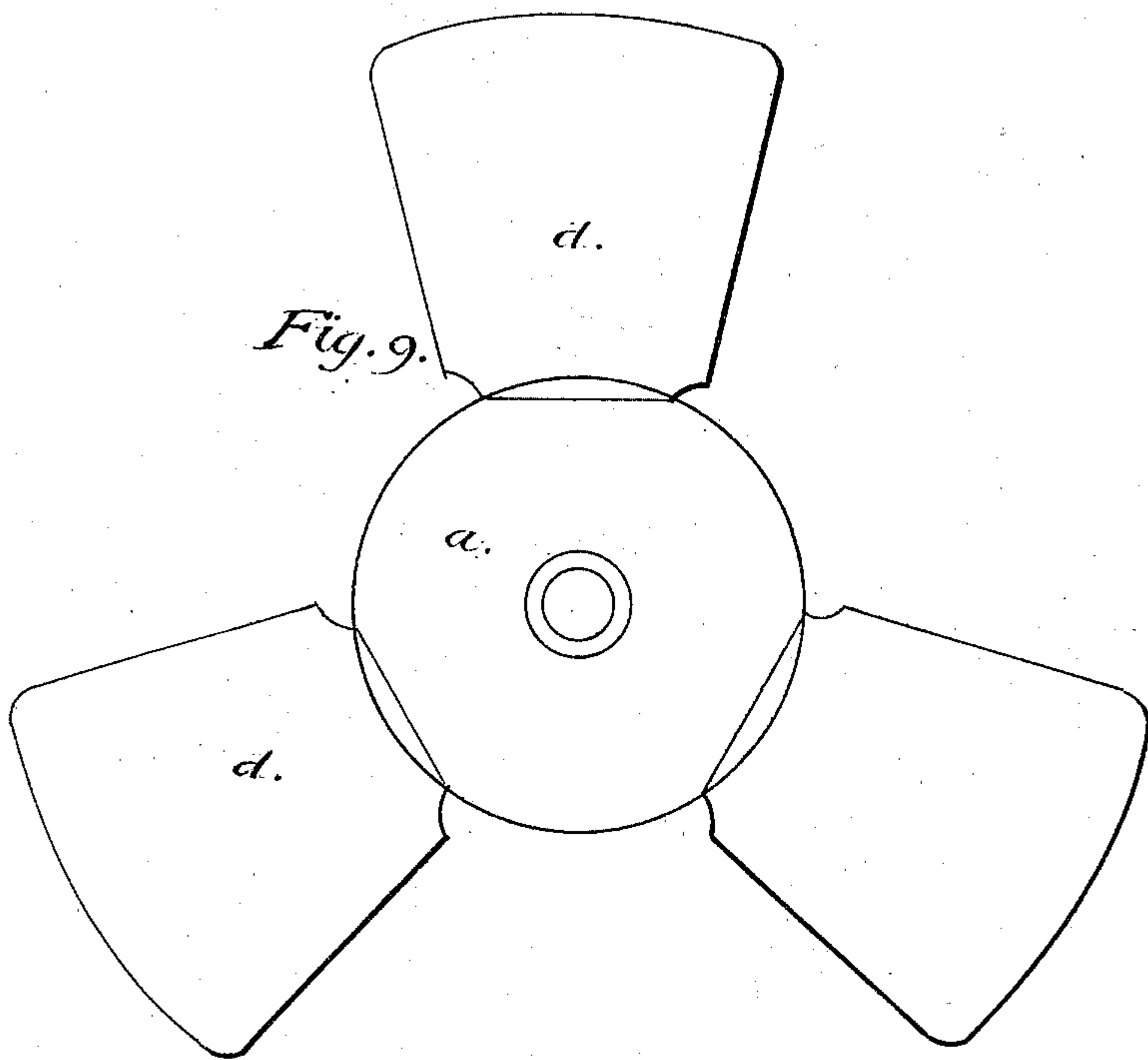
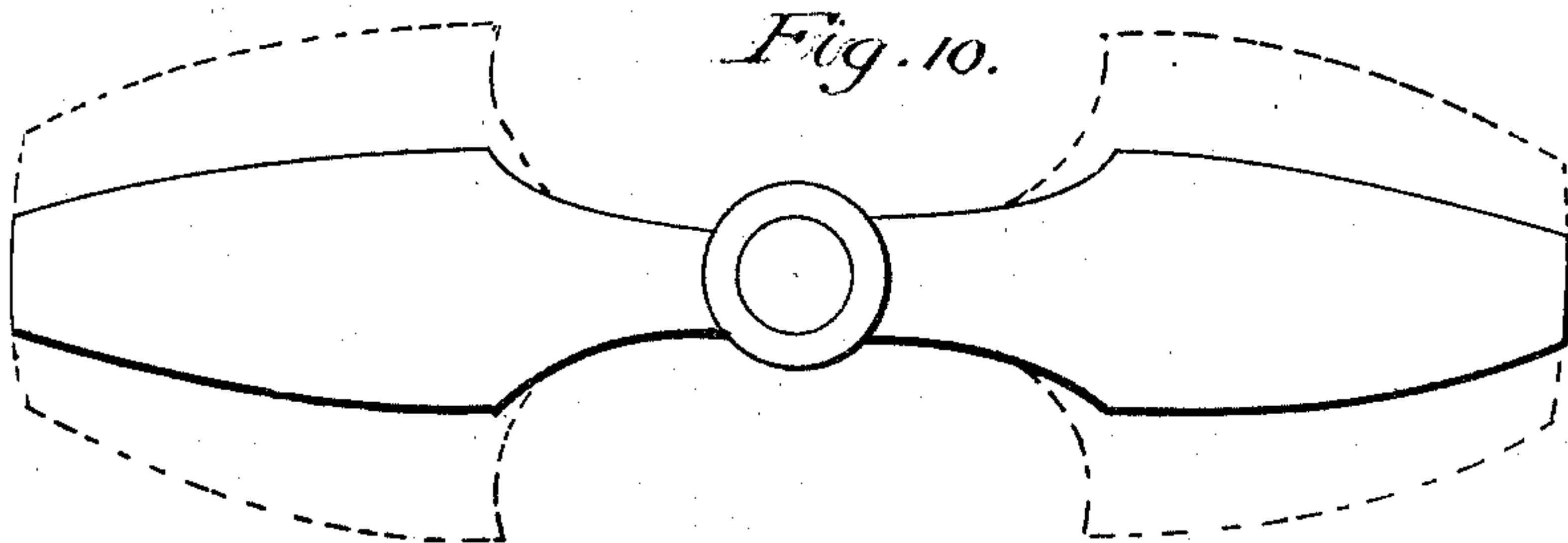


Fig. 10.



UNITED STATES PATENT OFFICE.

ROBERT GRIFFITHS, OF LONDON, ENGLAND.

PROPELLER.

Specification of Letters Patent No. 17,016, dated April 7, 1857.

To all whom it may concern:

Be it known that I, ROBERT GRIFFITHS, of London, England, have invented certain Improvements in Propellers for Vessels, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a side elevation of my improved propeller, Fig. 2 a longitudinal, and Fig. 3 a transverse section thereof. Fig. 4 is an elevation of a modification of my improved propeller with the blades inclined forward toward the vessel. Fig. 5 is an elevation of another modification. Figs. 6 and 7, end and a longitudinal elevation of another modification, with two blades inclined forward and two inclined backward. Figs. 8 and 9 represent a propeller with some of my improvements but with the blades of the ordinary form. And Fig. 10 represents a propeller with my improved form of blades secured to the ordinary boss or hub.

As propellers were made prior to my invention, the blades were either attached to a hub of a diameter simply sufficient to secure the required strength, or to the circumference of a hoop connected with the shaft or hub by arms twisted in the form of a helix. Under all the varieties of form in which these two classes of propellers have been constructed and applied, they present serious difficulties and objections. The surfaces of the blades, by their helical form or any form approximating to a helix, approach the line of the plane of the axis of the shaft, as they converge toward the axis, and when the boss or hub is made of a diameter merely sufficient for strength the blades at their junction therewith so nearly approach parallelism with the axis of the shaft, that the power exerted by them on the water at and near the surface of the boss is so nearly at right angles with the line of the vessel's motion as to be wasteful of power, and when the blades are attached to the periphery of a hoop, the arms connecting the hoop with the shaft or hub present the same difficulty, and in both classes the centrifugal action on the water near the center is known to be prejudicial to the propelling action. I am enabled in a great measure to avoid these difficulties and to attain other advantages by my invention, the first part of which consists in making a propeller with the blades attached to an enlarged and hollow boss or hub, say

of about one third the entire diameter of the propeller. This places the point of attachment of the blades with the boss or hub so far from the axis of the shaft as to avoid all the evil consequences due to attachment of the blades as are due to a small boss or hub, while at the same time it admits of the combination which constitutes the second part of my invention and which consists in connecting the blades with the enlarged hollow boss or hub by means of a stem on each blade, fitted to turn in the said enlarged boss for the purpose of adjusting the pitch of the blades to the condition of the vessel and the power of the engines. And the third part of my said invention also consists in so connecting the stems of the blades within the enlarged boss or hub with a governor to render the pitch of the blades self adjusting. And the last part of my invention consists in connection with a large hollow boss or hub in making the blades of propellers narrower toward their outer ends. By this means the serious inconveniences which have been experienced in the use of blades as heretofore made with their outer ends wider are avoided. As the angle which the face of the blades makes to the line of the keel increases toward their outer ends, it follows that when the vessel is moving exclusively under sail and the propeller is not in action, that the wider the blades are toward their outer ends, the greater will be the resistance which they will present to the sailing of the vessel. Now by making the blades narrower toward their outer ends, they will present much less resistance to the sailing of the vessel, while for the purposes of propelling the reduction of the extent of surface can be toward the outer ends and is compensated by their increased width toward their inner ends, and by increased velocity. Again, when the blades are made, as heretofore, widest at their extreme ends, but little clearance is left between them and the stern and rudder ports, the clearance being less and less when the rotative velocity is greatest. This produces a violent, injurious and disagreeable vibration at the stern of the vessel, which vibration is greatly reduced by this part of my invention, whereby the clearance is increased toward the ends of the blades when the velocity is greatest.

In the accompanying drawings (a) represents the boss which is a hollow metal sphere

suitably and firmly secured on the shaft (*b*). This boss is formed with suitable sockets to receive the shanks (*c*) of the blades (*d*) so that they can turn therein. The stems
 5 have arms (*e*) fitted to an inner boss or hub (*f*) which slides on the shaft within the boss (*a*) and the outer end of these arms act on a box (*g*) which slides longitudinally in the shaft (*b*) and acts against a collar (*i*)
 10 held by the lever (*h*) which is connected to the governor spring (*k*) inside the vessel by a rod (*l*) provided with an adjusting screw and nut (*m*).

When the propeller is set to work the
 15 leading portion of the blade meets with greater resistance than the after part according to the velocity of its motion inducing the blades by the amount of this extra pressure upon their leading sides to
 20 increase the angle or pitch forward causing the arms (*e, e*) to press forward the sliding box (*g'*) which rotates against the collar (*i*). This sliding motion is controlled by the spring (*k*) placed within the engine
 25 room or other suitable position which is regulated to the proper resistance by the adjusting screw (*m*) in the rod (*l*). Now whenever the propeller blades meet with less resistance by reason of favorable winds or
 30 currents, the speed of the engine increases and the increased speed of the propeller throws a proportional increase of pressure on the leading side of the blades greater than the adjusted resistance of the governor
 35 spring (*k*) which is compressed by the rod (*l*) forced forward by the sliding box (*g'*) against the collar (*i*). Thus the pitch increases until the propeller throws a greater load on the engine and instantly reduces the
 40 number of revolutions, simultaneously with which the differential pressure between the leading and after portion of the blades is diminished, and the governor spring (*k*) forcing back the sliding box (*g'*) ad-
 45 justs the true pitch of the propeller blades to the former and proper speed of the engine, which by this means has always its full effective power made available under all circumstances of currents and winds.

50 The blades (*d*) are gradually narrower toward their outer ends and their faces of the usual twist. I prefer to have but two such blades, one opposite the other so that when the vessel is to sail alone the shaft can
 55 be turned until the two blades are in the vertical plane of the stern post, and when in disposition the blades being made narrow toward their outer ends where the plane of their surface is at the greatest angle
 60 with the line of motion of the vessel, they will present much less resistance or drag to the sailing of the vessel than when made, as heretofore, and it will be seen also that this form of blades will leave much more
 65 clearance toward their outer ends where the

velocity is greatest thus greatly reducing the vibration of the stem as before stated. The axis of the blades instead of being at right angles to the axis of the shaft may be inclined forward toward the vessel as repre- 70
 sented at Fig. 4; or if four be used, two may be inclined forward and two back as represented at Figs. 6 and 7. Or each blade may be made wider and divided toward the outer end to give the required taper as rep- 75
 resented at Fig. 5.

The mode of applying my improvements in the enlargement of the boss with the usual form of blades is represented by Figs. 8 and 9 and the mode of applying the im- 80
 proved form of blade with the usual hub is represented at Fig. 10.

Although I prefer the selfacting arrangement by which the pitch of the propeller blades is adjusted, nevertheless, this one 85
 part of my invention may be dispensed with and the other parts retained to advantage, in which case the method of connecting the blades with the hollow enlarged boss will admit of applying any suitable means for 90
 adjusting and setting the pitch of the propeller blades to the best average condition of the vessel and engine.

Although I prefer the form of a sphere the enlarged hollow boss as described and 95
 represented, I do not wish to confine myself to such special form as the same ends may be obtained by a spheroidal, conical or egg shape. Nor do I wish to be understood as limiting myself to the placing of the whole 100
 of the enlarged boss in the shaft, as the forward and rear parts may be fixtures to the dead wood and rudder post. Nor do I wish to be understood as limiting myself to the number, position or special form of the 105
 blades, so long as they are constructed and operate on the principle and accomplish the purpose I have in view under merely formal variations.

What I claim as my invention and desire 110
 to secure by Letters Patent, is—

1. Making propellers with an enlarged boss on the shaft to which the blades are secured, extending say to about one third of the entire diameter substantially as specified 115
 and this I claim in contra-distinction to the solid hub of a diameter merely sufficient for strength as heretofore employed, whereby I avoid the centrifugal or broken action of the water near the center which is known 120
 to be prejudicial to the propelling action of the blades, and by which also I avoid the resistance due to the action of the blades near the center where they otherwise would be in a plane nearly coincident with the 125
 plane of the axis of the shaft.

2. And I also claim in combination with an enlarged boss, substantially as herein described, the method of connecting the blades therewith by means of a shank or stem, on 130

the blades, fitted to and capable of being turned in the said boss to adjust the pitch of the blades, substantially as and for the purpose specified.

5 3. I also claim the adjustment of the pitch of the propeller, by the connection of the propeller blades with the enlarged hollow boss or hub, and the selfadjusting apparatus, substantially as herein specified.

10 4. And I also claim in combination with

the enlarged hollow boss or hub, the blades narrowed toward their outer ends, and the round shank attachment to the hub, as herein specified.

ROBT. GRIFFITHS. [L. s.]

Signed sealed and delivered in the presence of—

JOHN R. DARKER,
WM. EWING.