

No. 779,473.

PATENTED JAN. 10, 1905.

C. T. FREID.
PROPELLER.

APPLICATION FILED JULY 2, 1903.

2 SHEETS—SHEET 1.

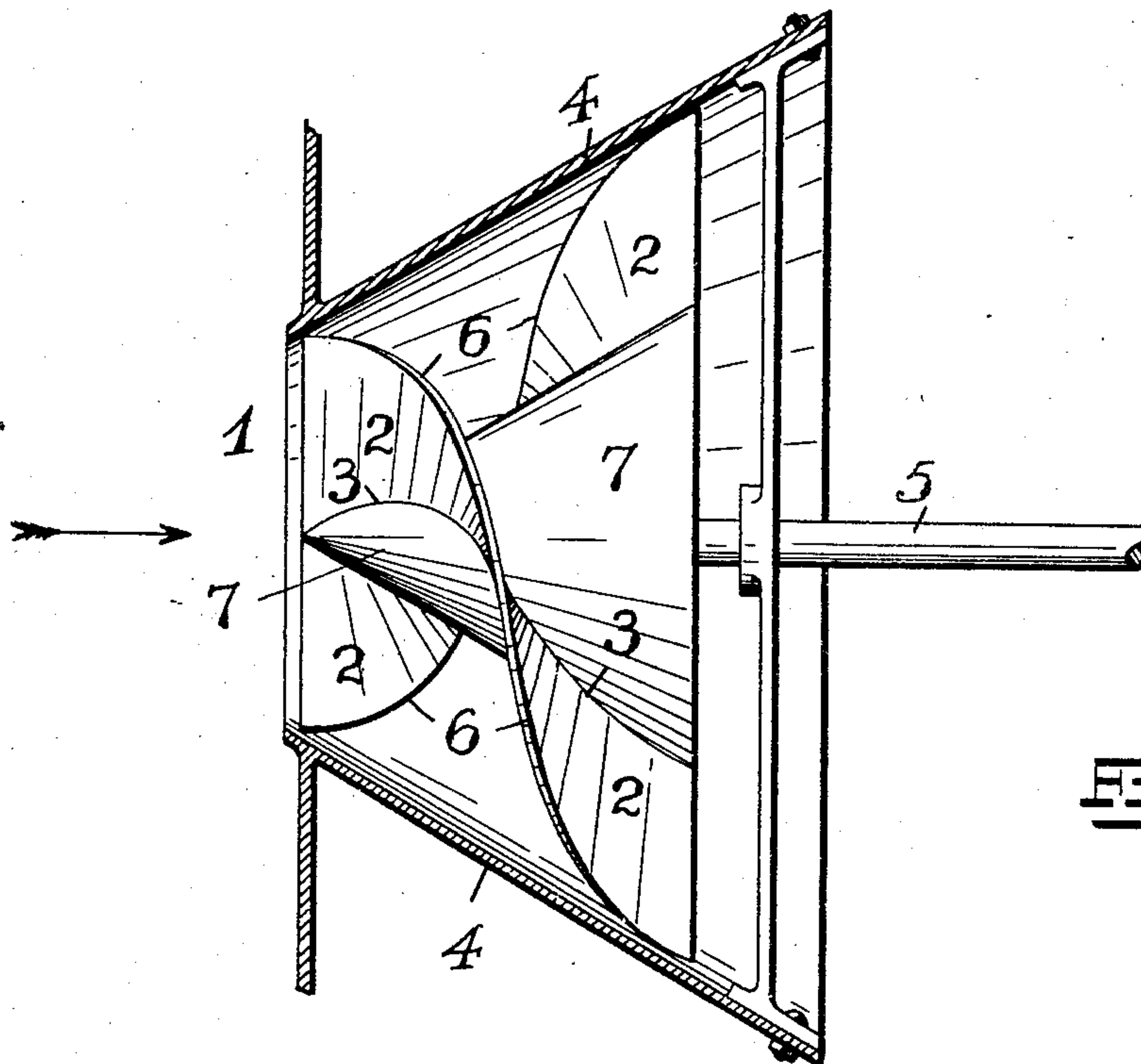
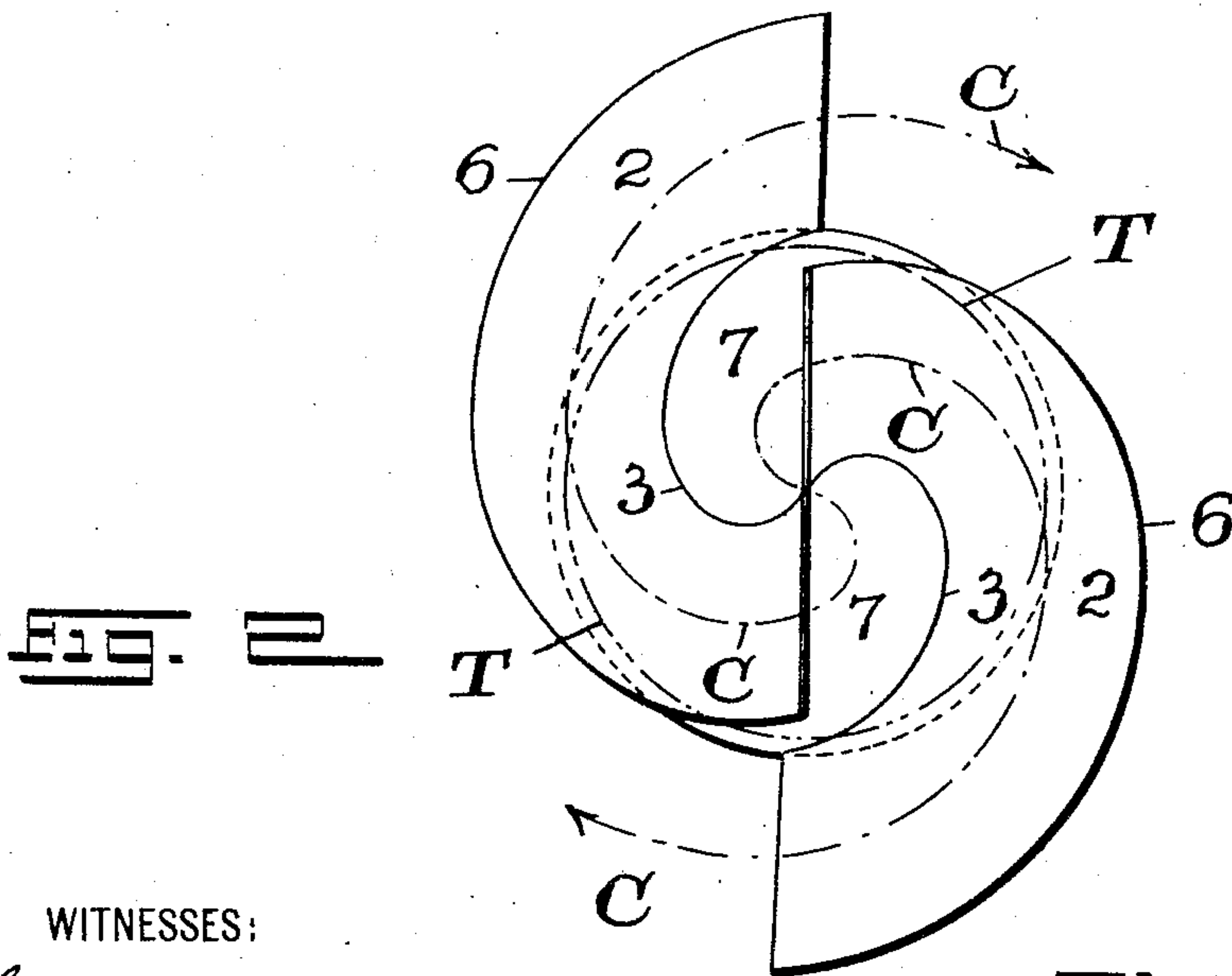


FIG. 1



WITNESSES:

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F. H. W. Fraentzel

INVENTOR:

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BY

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ATTORNEY

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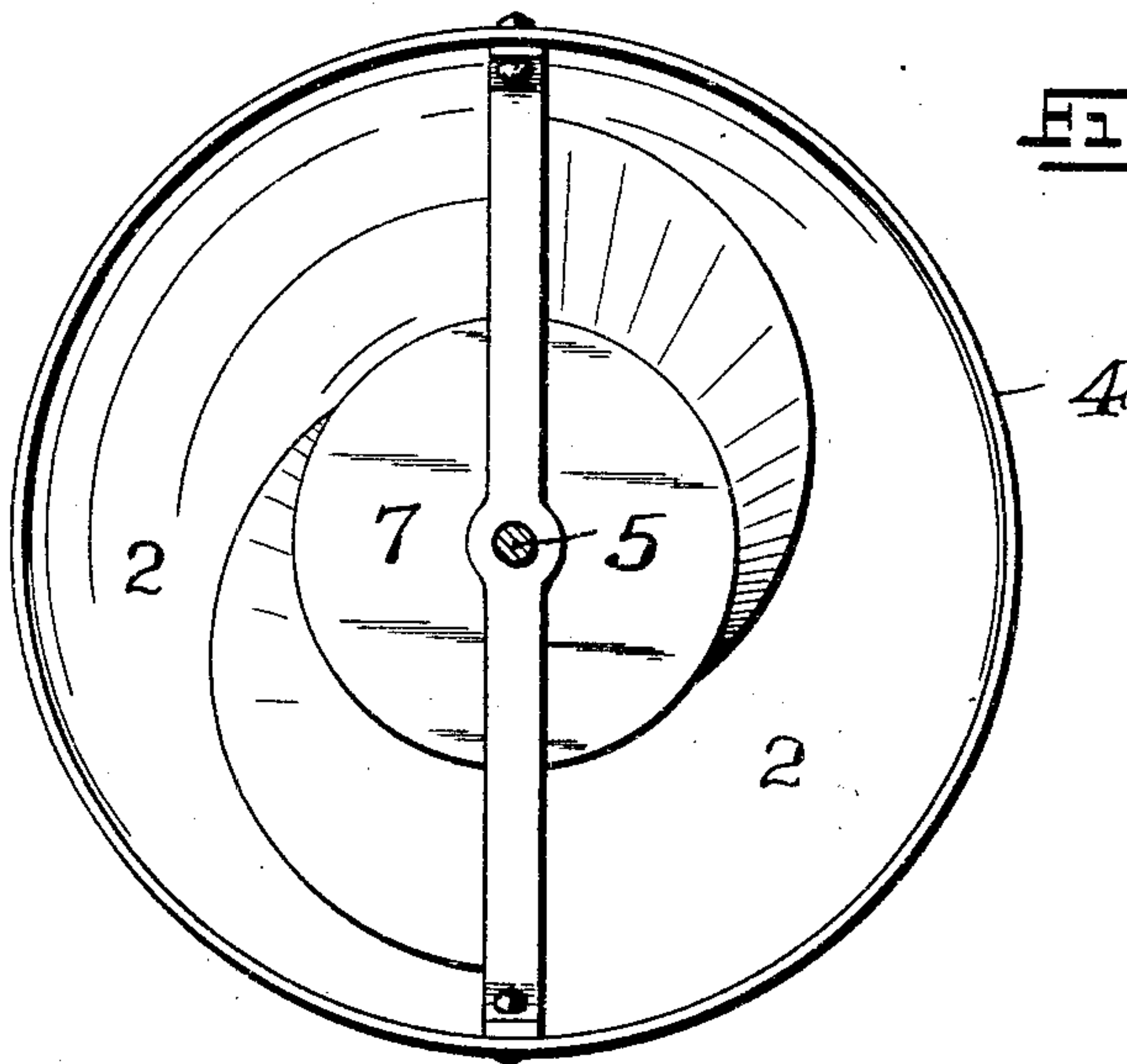


FIG. 3

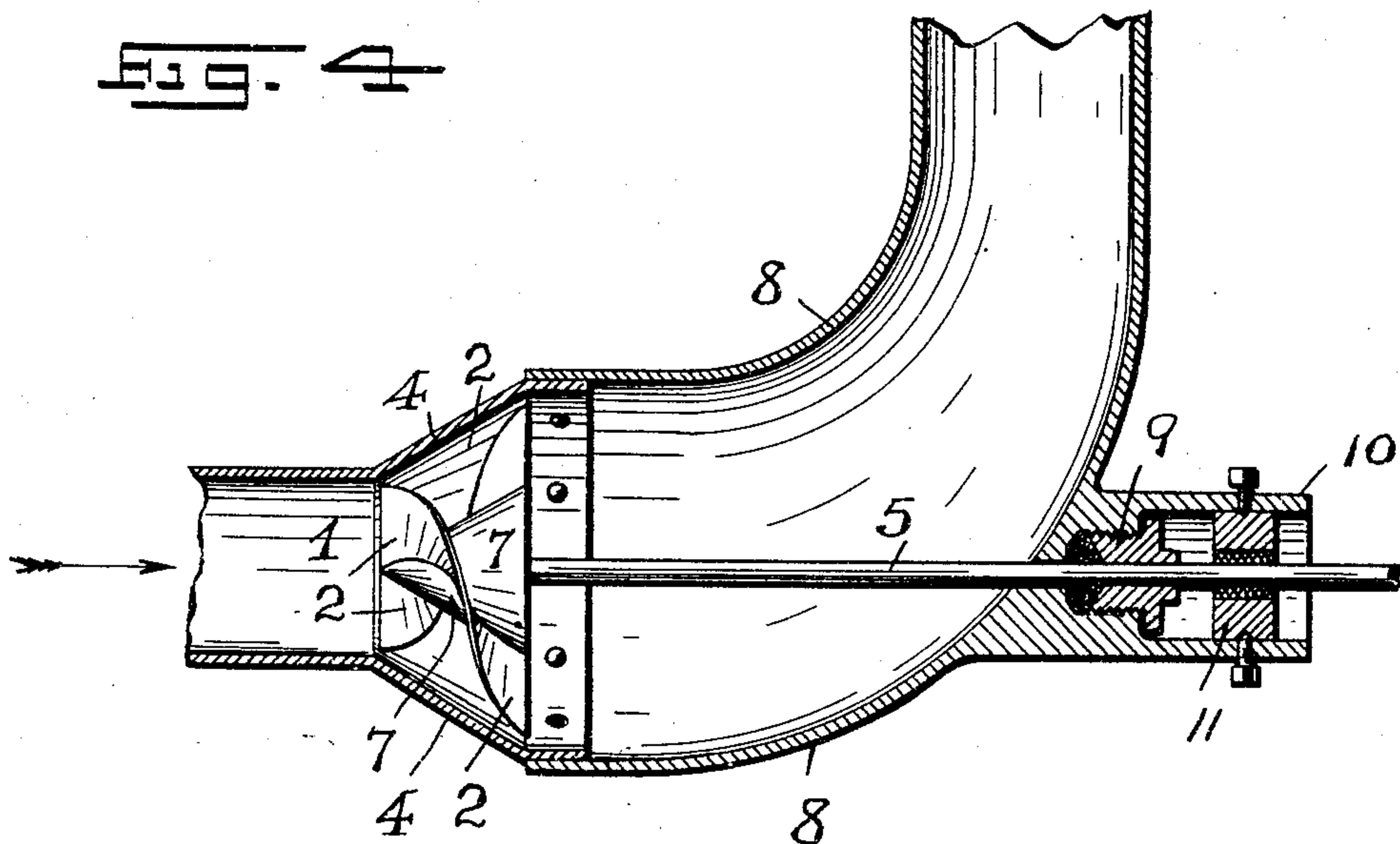


FIG. 4

WITNESSES:

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UNITED STATES PATENT OFFICE.

CALVIN T. FREID, OF WEST ORANGE, NEW JERSEY, ASSIGNOR TO FREID ENGINEERING COMPANY, A CORPORATION OF NEW JERSEY.

PROPELLER.

SPECIFICATION forming part of Letters Patent No. 779,473, dated January 10, 1905.

Application filed July 2, 1903. Serial No. 163,986.

To all whom it may concern:

Be it known that I, CALVIN T. FREID, a citizen of the United States, residing at West Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Propellers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to characters of reference marked thereon, which form a part of this specification.

My present invention relates to improvements in that class of propellers which are commonly termed "fixed" propellers and which according to the direction of rotation of the propeller-blades may be used as exhausters or blowers for forcing the medium with which the blades are brought in contact directly through an inclosing shell or casing of the propeller.

This invention has for its principal objects to provide a simply-constructed and efficient propeller of the character hereinafter more particularly described and one that is a propeller which comprises a shaft having a cone-shaped body and a propeller blade or blades so arranged on said cone-shaped body that each blade is not more than a one-half turn of the pitch or advance of the propeller, each blade following said cone at the root of the blade, the cone-body being planned and constructed so that its taper coincides with the theoretically-correct line of centrifugal force created by the propeller in moving in the element when the propeller is fixed parallel to the thrust obtained, due to the resistance of the element wherein the propeller is caused to revolve, said line of centrifugal force being in direct ratio to the mass with which the blade comes in contact, the torque of said contact and the velocity of said torque in feet all substantially as hereinafter more fully specified and as will be clearly understood and whereby a perfectly-balanced and non-cavitating propeller of exhaust-fan has been produced.

This invention consists, therefore, in the novel propeller hereinafter set forth, the blades thereof being equal to a one-half turn and not more in length on the pitch or advance of the propeller, for the reason that the working face of any helicoid cannot obtain thrust on the element while said element is being resisted by the back of the preceding blade when the blades are of a greater length than a one-half turn; and the invention consists, furthermore, in the various arrangements and combinations of parts, as well as in the details of the construction thereof, all of which will be more fully described in the accompanying specification and then finally embodied in the clauses of the claim which are appended to the said specification.

The invention is clearly illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation of the propeller embodying the principles of my present invention, the inclosing casing or shell of the propeller being represented in longitudinal vertical section. Fig. 2 is a front view of the propeller and the cone-shaped body on which the propeller-blades are spirally arranged and are planned to follow the line of centrifugal force which is created by the mass moved, the torque on which said mass moves, and the velocity in feet of the average torque on which the said mass is moved, each blade in length being equal to a one-half turn on the pitch or advance of the propeller. Fig. 3 is a rear end view of the said propeller, its cone-shaped body, and the surrounding casing or shell. Fig. 4 is a side elevation of the propeller and a longitudinal vertical section of a casing and ducts constructed and arranged for use with the propulsion of liquids.

Similar characters of reference are employed in all of the said above-described views to indicate corresponding parts.

Referring now to the said drawings, the reference character 1 indicates the complete propeller made according to the principles of my present invention and the same comprising the propeller-blades 2 2, which are of such design

and construction that the length of each blade is equal to a one-half turn on the pitch or advance of the propeller and that the root 3 of each blade 2 is a spiral curve which is plotted so as to commence at the center of the rotary motion or upon the central axial line of the shaft 5 of the propeller and continues on the line of centrifugal force, due to the mass moved, the torque on which it moves, and the velocity in feet of the average torque on which said mass is moved. The outer marginal edge 6 of the propeller-blade is a spiral curve, at all its points parallel to the root of the blade and is the tip-diameter of the propeller at any and all diameters of the taper of the cone-body, whereon the said blades are mounted. The reference character 7 indicates this cone-shaped body arranged upon and connected with the end portion of the propeller-shaft, the said cone-body having a taper which coincides with and to the increase of the spiral curve C, which curve represents the line of centrifugal force.

The blade or blades 2 are mounted upon the said cone-body as represented in the drawings, and the area of the blade is plotted so as to allow the line of centrifugal force C to follow the average area of the blade. The average torque on which the element or mass is moved is represented by the radial curve T, and the blades are mounted upon the cone-surface so that the element, which flows in the direction of the arrows indicated in Figs. 1 and 4, has impact with the blades 2 on the entire diameter of the casing, shrouding, or shell 4.

The purpose of the said cone-shaped body is that the propeller-blades may be mounted thereon to thereby keep the propeller perfectly balanced and to prevent the element from cavitating, due to the centrifugal force created during the movement of the element or mass in the direction of the arrow in said Fig. 1 when the propeller is in motion, and, furthermore, the length of each blade is equal to a one-half turn on the pitch or advance of the propeller, that the working face may obtain the full thrust upon the element, which is impossible with a blade of more than one-half turn of the pitch or advance of the propeller, because the element is being resisted by the back of the preceding blade thus formed when of a length which is more than a one-half turn on the pitch or advance of the propeller.

If desired, the propeller made according to the principles of my present invention may be adapted for use in the propulsion of liquids. In that case, as will be seen from an inspection of Fig. 4 of the drawings, a duct 8 is suitably connected with the discharge end of the casing or shrouding 4 for the delivery of the fluid into said conveyer duct or pipe 8. The propeller-shaft extends through a suitable stuffing-box 9 in a tubular extension, as 10,

connected with the said duct or pipe 8, the said stuffing-box preventing any contact of the liquid element with a bearing, as 11, arranged and suitably secured in the said tubular extension 10.

Of course it will be understood that some changes may be made in the various arrangements and combinations of the parts, as well as in the details of the construction thereof, without departing from the scope of my present invention. Hence I do not limit my invention to the exact arrangements and combinations of the parts as herein described and as illustrated in the accompanying drawings; nor do I confine myself to the exact details of the construction of any of the said parts.

Having thus described my invention, what I claim is—

1. A propeller comprising a shaft, a cone-shaped body connected with said shaft, and propeller-blades on said cone-shaped body, the length of each blade being equal to a one-half turn on the pitch or advance of the propeller and said blades being spirally formed around said cone-body from the apex of the cone to its base, and the marginal spiral edges of said blades being parallel with the taper of the cone-body, and each of said edges being part of an increased spiral starting at the apex of said cone-body, and said spiral representing the line of centrifugal force of the propeller, substantially as and for the purposes set forth.

2. A propeller comprising a shaft, a cone-shaped body connected with said shaft, and propeller-blades on said cone-shaped body, the length of each blade being equal to a one-half turn on the pitch or advance of the propeller and said blades following a spiral curve at the root of the blade, and the marginal edge of the blade running spirally and parallel with said spiral curve at the root of the blade and forming the peripheral boundary of the area of the blade, substantially as and for the purposes set forth.

3. The combination, with a shaft, of a cone whereon a propeller blade or blades are arranged, said cone having a taper coinciding with the increase in the spiral curve representing the line of centrifugal force created by the mass moved on the area of the propeller-blade, and the outer marginal edge of each blade being part of an increased spiral extending from the apex of said cone, substantially as and for the purposes set forth.

4. The combination, with a shaft, of a cone whereon a propeller blade or blades are arranged, said cone having a taper coinciding with the increase in the spiral curve representing the line of centrifugal force created by the mass moved on the area of the propeller-blade, and a propeller blade or blades

on said cone, the outer edges of said blades
being part of an increased spiral around said
cone from the apex to its base, and the mar-
ginal spiral edges of said blades being parallel
5 with the taper of the cone, substantially as
and for the purposes set forth.

In testimony that I claim the invention set

forth above I have hereunto set my hand this
26th day of June, 1903.

CALVIN T. FREID.

Witnesses:

FREDK. C. FRAENTZEL,
GEO. D. RICHARDS.