

J. B. VLIET.
Fluid Propeller or Motor.

No. 218,605.

Patented Aug. 12, 1879.

Fig. 1.

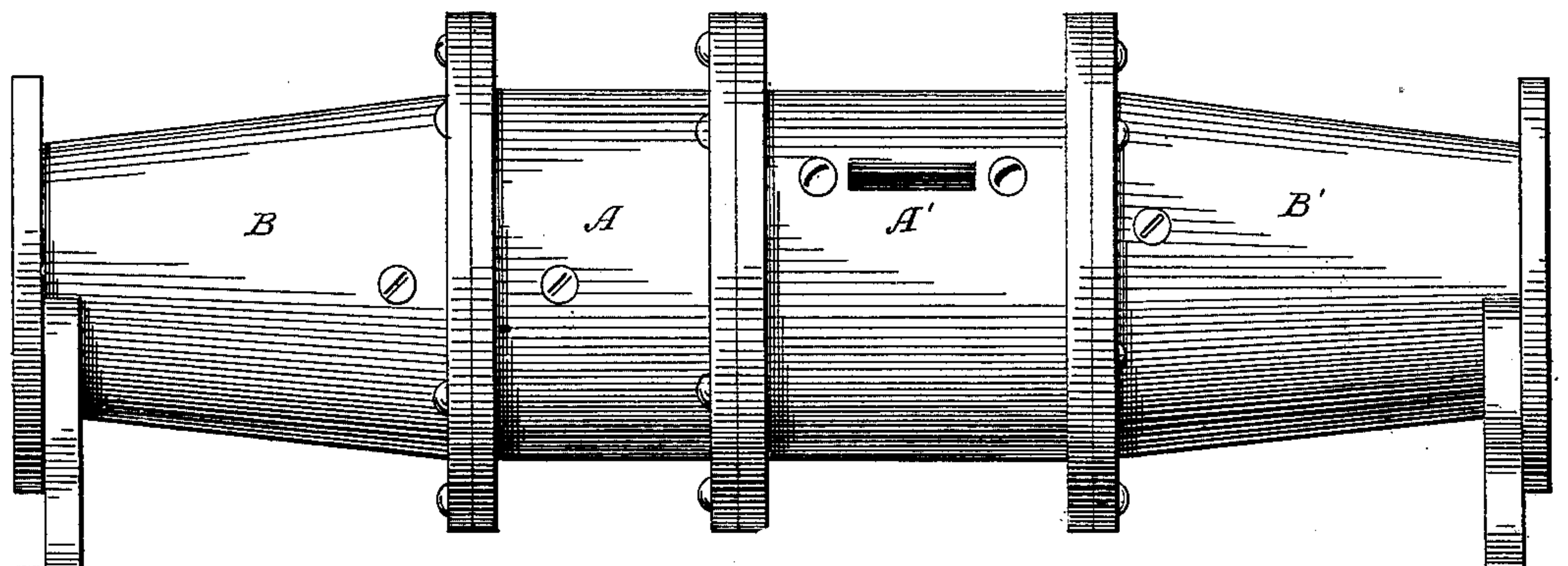
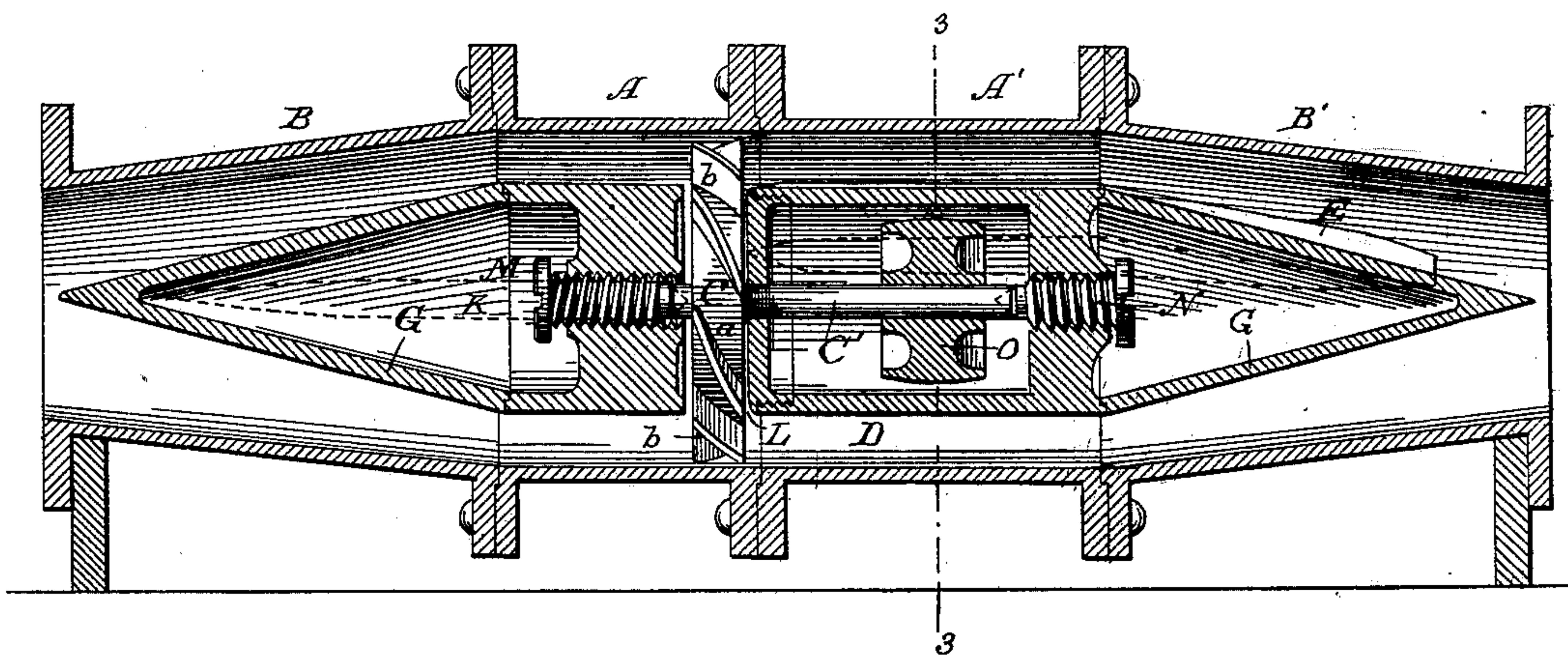


Fig. 2.



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Fig. 3.

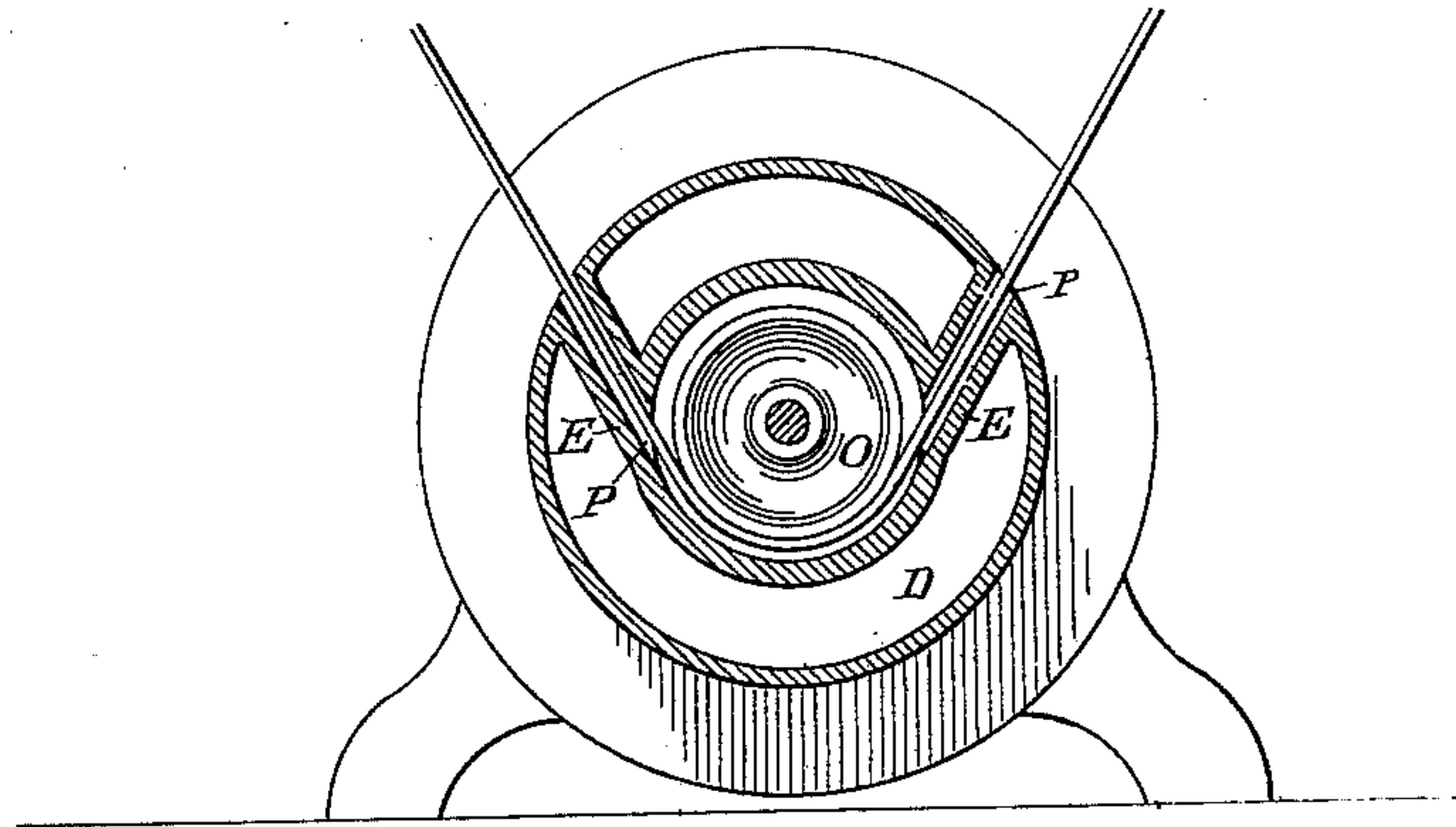


Fig. 4.

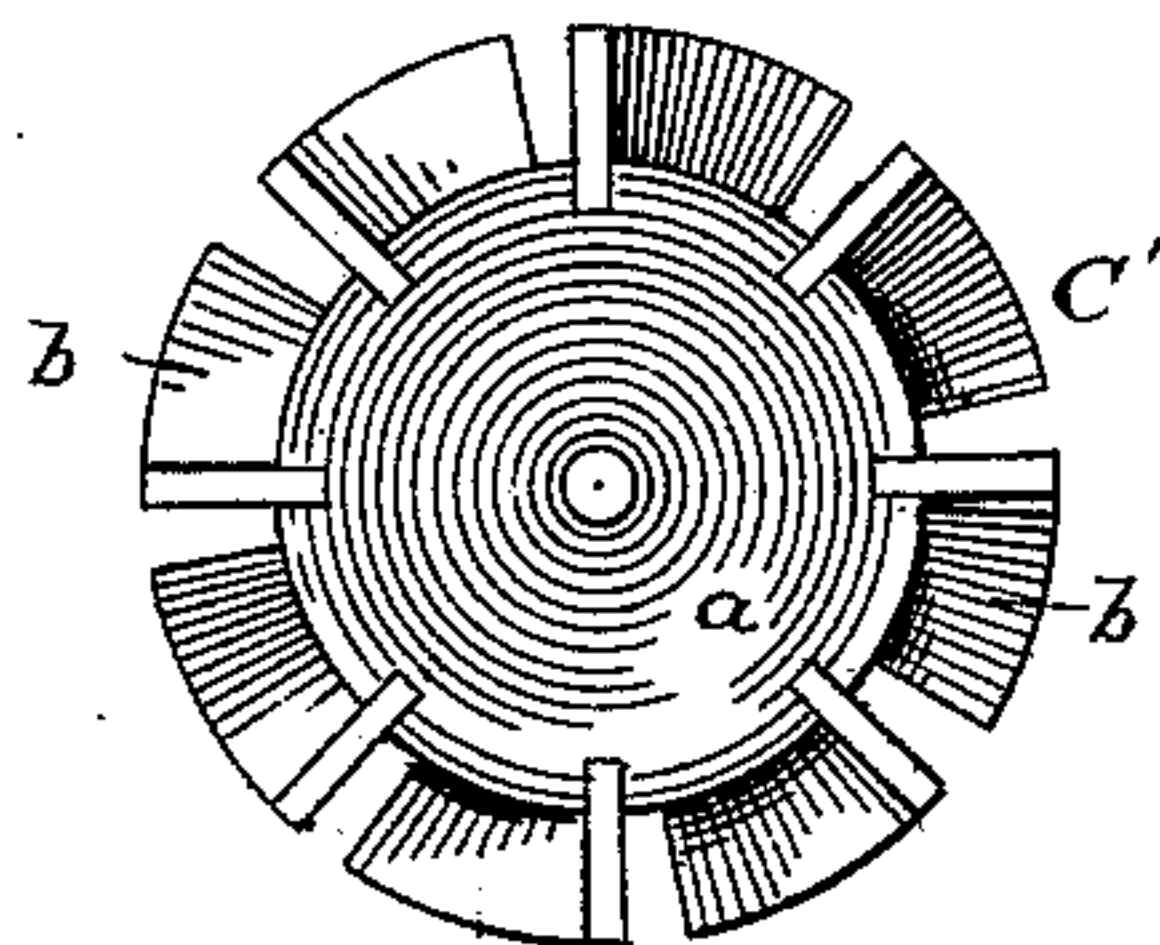
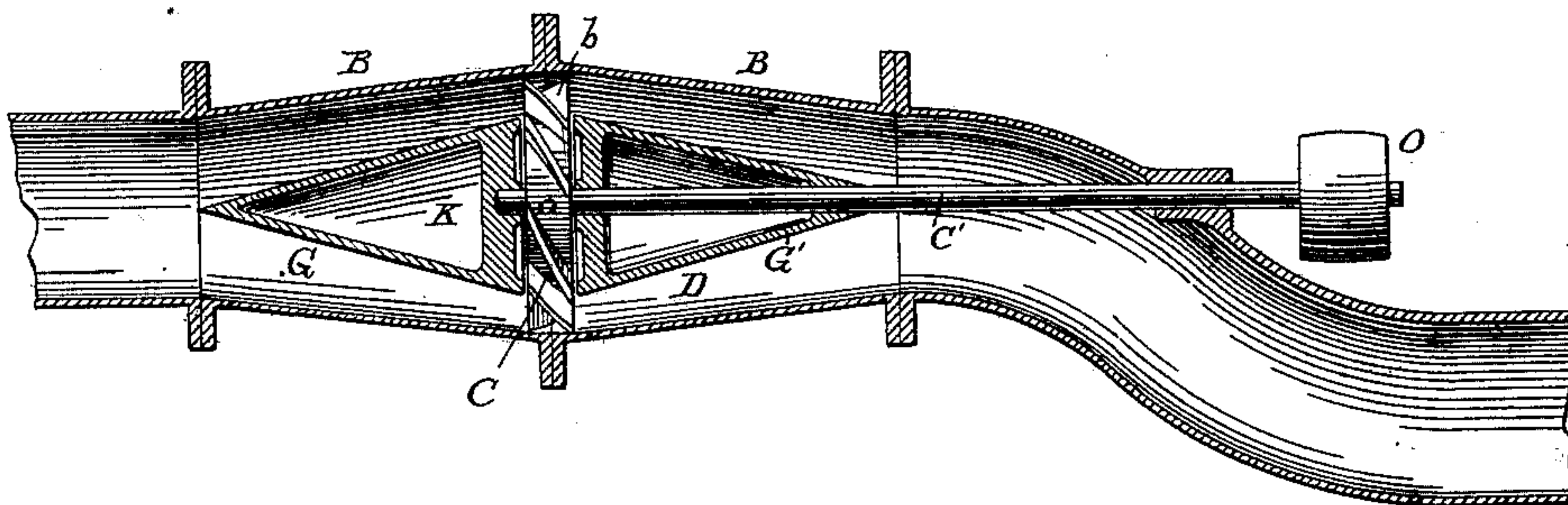


Fig. 5.



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Atty.

UNITED STATES PATENT OFFICE.

JOHN B. VLIET, OF DARTFORD, ASSIGNOR OF ONE-HALF HIS RIGHT TO
WASHINGTON WILKIE AND PAUL SWENSON, OF FOND DU LAC, WIS.

IMPROVEMENT IN FLUID PROPELLERS OR MOTORS.

Specification forming part of Letters Patent No. **218,605**, dated August 12, 1879; application filed
March 17, 1879.

To all whom it may concern:

Be it known that I, JOHN B. VLIET, of Dartford, in the county of Green Lake and State of Wisconsin, have invented a new and useful Improvement in Fluid Propellers or Motors; and I do hereby declare that the following is a full and exact description of the same.

In the use of the propeller-wheel as now constructed for moving water-craft much power is lost by the dragging of the arms and hub and the resistance they encounter in revolving through the fluid in which the wheel operates. On account of the great depth of the blades from the circumference toward the center of the wheel, the action of the different portions of each blade is very unequal, owing to the unequal velocities of the different parts, even to the extent that the inner parts of the blades may also drag.

When the ordinary propeller-wheel is applied to the propulsion of fluids in pipes it tends to impart a rotary motion to the fluid coinciding with that of the wheel, and a portion of the fluid driven forward by the outer parts of the blades will return through the openings near the center of the wheel, and also through the inner parts of the blades when the velocity of these parts is not sufficient to overcome the resistance to the progress of the fluid.

To obviate these difficulties various devices of cones revolving with or forming part of the wheel and revolving tapering drums with spiral blades attached have been used, the objection to which, in addition to the greater weight of the apparatus to be turned and the increased cost of construction, is the exposure of large surfaces in rapid revolution to friction with the passing fluid, causing a great waste of motive power.

The object of my invention, therefore, is to overcome these and other defects so far as is practically possible, and to construct a simple and efficient machine for imparting motion to fluids, the force thereby produced being utilized either directly, as in forcing fluids through pipes, such as sewer, water, and oil pipes, and otherwise, as in agitating and pumping fluids, or reactively, as in the propulsion of water-craft.

To accomplish this, I use a screw-wheel having blades only at and near its periphery, and revolved by belt or gear connection with the power, a cone or conoid applied on one side of the wheel, with its base toward the wheel, and its apex extending in the direction of the shaft of the wheel, so as to divide the fluid as it approaches the wheel, to divert it from the central parts, and direct it to the blades near the periphery of the wheel; a cone or conoid similarly applied on the opposite side of the wheel, to bring the fluid together again without counter-currents or tendency to create a vacuum; an annular passage-way for the fluid at the wheel, and extending either way therefrom, the said annular passage-way having about the same area as that of the pipes with which the machine is to be connected, or that of the space between the inner and outer edges of the blades of the wheel, and ribs reaching from the outer to the inner walls of the annular passage, to serve the double purpose of uniting the walls, thereby holding them in their proper relative positions, and of preventing the rotary motion of the fluid.

It is evident that without material change in construction my machine could be used as a fluid-motor, to transmit the power of water or other liquids moving through the annular passage under pressure, and for that purpose would possess many, if not all, of the advantages obtained by its use as a fluid-propeller, or it could be used as a liquid-meter.

My invention therein consists in constructing such a machine with a long annular fluid-passage with stationary walls extending in the direction of the fluid current at and to or from the wheel, so that the wheel will act upon the fluid or the fluid upon the wheel near the periphery of the wheel, and the fluid will be brought to and retained in an annular form with but little friction; in the combination, with such annular fluid-passage, of a screw-wheel constructed with a central disk, and with spiral or oblique blades upon the periphery of the disk, and of the same width as the annular passage; in the combination, with a fluid propeller or motor wheel, of stationary cones or conoids applied on either or both sides of such wheel to divert the fluid from

the central portion of the wheel, and forming portions of an annular fluid-passage; in the combination, with a fluid propeller or motor wheel, of an annular passage at the wheel and stationary cones or conoids on either or both sides of the wheel; in the combination, with the fluid propeller or motor wheel, of the annular fluid-passage, and ribs uniting the walls of the passage to support such walls and to prevent the rotary movement of the water; in the combination, with the annular fluid-passage, of a chamber within such annular passage to contain the operating or transmitting apparatus of a propeller or motor wheel; in the construction of such chamber and the means for connecting the wheel to the driving power or the mechanism to be driven; and, further, in the various other combinations of the operative parts, all as fully hereinafter explained.

To enable others skilled in the art to apply my invention, I proceed to describe the same, having reference to the accompanying drawings, in which—

Figure 1 is a side elevation of the machine disconnected from the fluid-pipes; Fig. 2, a central longitudinal section of the same; Fig. 3, a cross-section on the line 3-3; Fig. 4, a separate view of the wheel; and Fig. 5, a longitudinal section of a modified form of the machine, showing a different manner of connecting the wheel with the driving power or mechanism to be operated.

Like letters denote corresponding parts.

The casing of the machine is shown as made of two central cylindrical sections, A A', and two tapering end sections, B B', bolted together by lateral flanges; but the casing may be divided longitudinally instead of laterally. The screw-wheel C is supported on a shaft, C', by an inner case, between which inner case and the outer shell is formed an annular fluid-passage, D. The inner case is divided at or near its center to give room for the projection of the wheel into the annular passage-way. The wheel C is composed of a central disk, a, whose rim forms a continuation of and connects the two parts of the inner case. Upon the periphery of the disk a are spiral or oblique blades b, of the same width as the annular passage D and revolving within such passage. The outer ends of these blades may be connected and supported by a ring, if desired. The walls of the annular passage are united by ribs E on each side of the wheel, so as to support the inner case and prevent the rotary movement of the fluid. These ribs are shown as straight; but when the machine is intended for use as a fluid-motor or as a meter, they may be bent around or curved on the receiving side of the wheel to a pitch equal to that of the wheel-blades, but in the opposite direction, so as to direct the fluid upon the blades of the wheel perpendicular to the faces of the blades.

The inner case is composed of sections F F' and G G', the same in number as the sections

of the outer case, each inner section being connected to the corresponding section of the outer shell by ribs E.

The end sections, G G', of the inner case are cones or conoids with closed apexes, so as to divert the water with as little friction as possible toward the blades of the wheel. The walls of the annular passage are concentric to each other at every point, and the cross-area of this passage is the same as the cross-area of the pipes which convey the fluid to and conduct it from the machine; but while this is the best and preferable form, still it could be changed slightly without greatly injuring the efficiency of the machine.

It will be noticed that the annular passage extends in the direction of the fluid-current, and that the body of the fluid will be divided by the cone and brought into an annular form without destroying or impeding the current, so that, in pumping or forcing the fluid, the current will assist the operation of the wheel.

The inner case is divided into two closed chambers, H I, on one side of the wheel, and a closed chamber, K, on the opposite side of the wheel, the open space L between the chambers H K, where the inner case is divided, containing the wheel C.

The wheel-shaft C' at one end extends but a short distance from the wheel and sets end-wise against an adjustable bearing, M, having screw-threads, and turning through the head to the chamber K. This bearing is provided with a head within the chamber K, by which it can be adjusted. The shaft C' on the opposite side of the wheel extends through the head of the chamber H, and at the other end of such chamber turns upon an adjustable end bearing, N, in the partition-head between the chambers H I. This bearing N is like the bearing M, and is adjustable by means applied within the chamber I.

In the chamber H the shaft C' has a pulley, O, fixed thereon, and openings P are made through the ribs E, joining this section of the inner case with the outer case, such openings allowing a belt to be passed around the pulley O for connection with the power if the machine is used for propelling or forcing a fluid, or for connection with the mechanism to be driven if the machine is used as a fluid-motor.

In Fig. 5 is shown a different manner of connecting the wheel-shaft with the power, the shaft being extended through the side of the casing, which is bent down for that purpose. This form, however, is not so compact as that before described, and the bend necessary to be given to the casing injures to some extent the efficiency of the machine.

With either form of the machine the annular passage need have no cylindrical portion, and could be limited in length to the thickness of the wheel added to the length of the cones.

The machine in use is connected, by the flanges of its end sections, to pipes or other

vessels containing any fluid, which shall be on a level with or higher than the wheel, and the wheel being turned by means of the belt and pulley, the fluid will be driven by the blades of the wheel, one way or the other, through the annular passage, according to the direction in which the wheel is turned.

In the propulsion of water-craft, pipes attached to the inside or outside of the vessel would extend to the water fore and aft of the machine, and the vessel would be propelled by the reactive force of the water driven through the pipes by the wheel. As a motor for transmitting power, or as a meter, the fluid under pressure passes through the annular passage and through the blades of the wheel, turning the wheel and the mechanism connected therewith. Thus it will be seen that my machine has three distinct modes of usefulness: first, for the propulsion of vessels through liquids; second, for moving or forcing liquids; and, third, for transmitting the power or motion of liquids.

I do not wish to limit my invention to any of the details of construction shown, since it is evident that the same principle could be applied and the same combinations employed in a somewhat different form by any skillful mechanic.

Having thus fully described my machine and explained some of its advantages, what I claim as new therein, and desire to secure by Letters Patent, is—

1. In a fluid propeller or motor having a screw-wheel, a long annular fluid-passage with stationary walls extending in the direction of the fluid-current, whereby the body of fluid is brought into an annular form without impeding the current, substantially as described.

2. In a fluid propeller or motor, the combination, with an annular fluid-passage extending in the direction of the fluid-current, of a propeller-wheel, constructed with a central disk, and blades on the periphery of the disk of the same width as such annular passage, substantially as and for the purpose set forth.

3. The combination, with a fluid propeller or motor wheel, of stationary cones or conoids,

situated on either or both sides of the wheel, and forming the entire or part of the inner wall of an annular fluid-passage extending in the direction of the fluid-current, substantially as described.

4. In a fluid propeller or motor, the combination of a propeller-wheel, an annular fluid-passage with parallel stationary walls extending in the direction of the fluid-current, and cones or conoids forming the inner wall of either or both ends of the annular passage, substantially as described.

5. The combination, with the wheel and long annular fluid-passage extending in the direction of the fluid-current, of ribs uniting the walls of such annular passage, substantially as and for the purpose set forth.

6. In a fluid propeller or motor, the combination, with the wheel and annular fluid-passage, of a chamber within the annular fluid-passage to contain the devices for transmitting the power, substantially as and for the purpose set forth.

7. In a fluid propeller or motor, the combination, with the wheel and annular passage, of the chamber H within the fluid-passage, the ribs E, and the openings P through such ribs, substantially as and for the purpose set forth.

8. In a fluid propeller or motor, the combination of the inner and outer casings, forming the long annular fluid-passage, the wheel, and the open space L in the inner casing to contain such wheel, substantially as described and shown.

9. In a fluid propeller or motor, the combination, with the screw-wheel, of an annular horizontal fluid-passage on both sides of said wheel, the inner walls of such passage terminating in cones, and horizontal fluid supply and exit passages of substantially the same cross-area as such annular passage.

This specification signed and witnessed this 12th day of February, 1879.

JOHN B. VLIET.

Witnesses:

O. T. WILLIAMS,
N. C. GRIFFIN.