No. 622,474. Patented Apr. 4, 1899.

J. HOSKIN.

FLUID ACTUATED OR FLUID FORCING DEVICE.

(Application filed Jan. 22, 1898.)

(No Model.) 3 Sheets—Sheet 1.

FIG. 1.

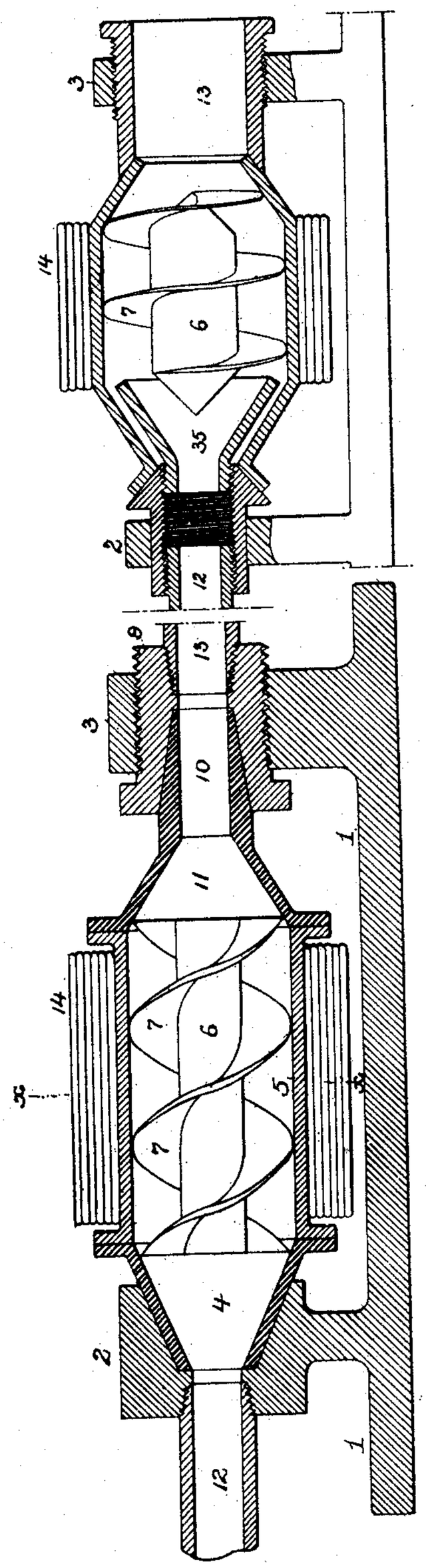
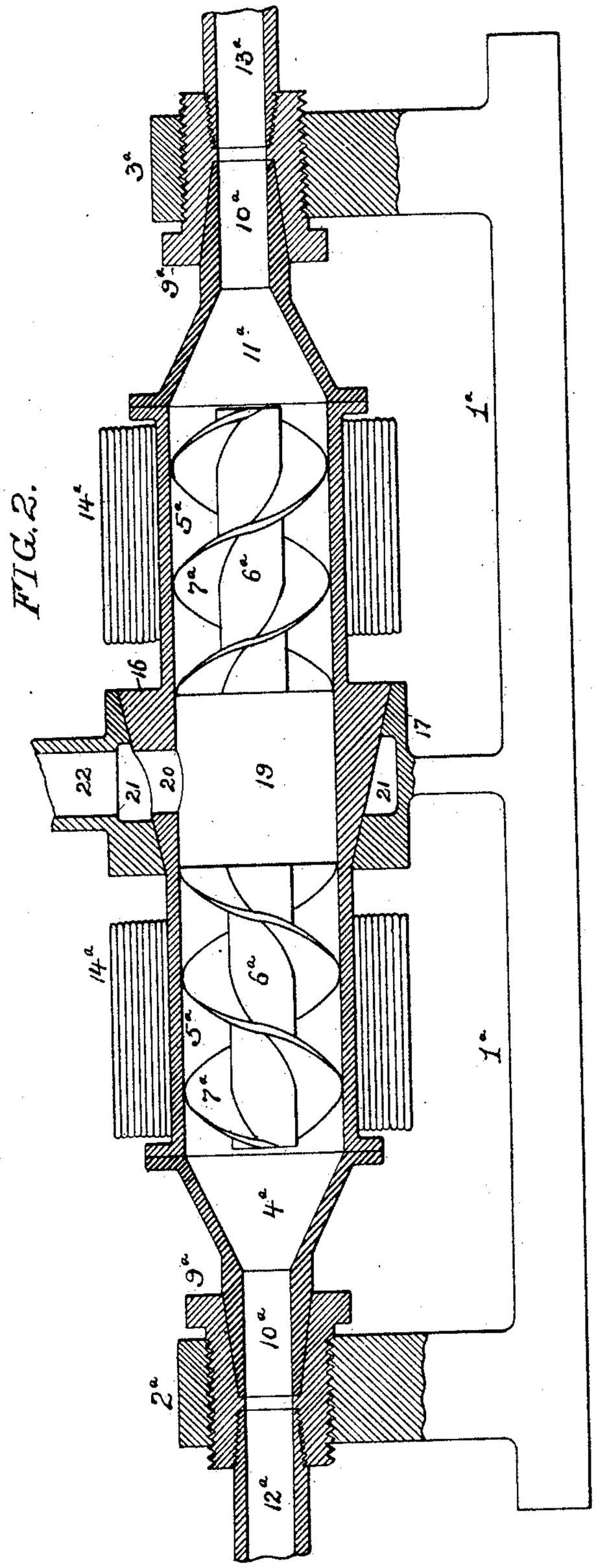


FIG. 2.



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(No Model.) 3 Sheets—Sheet 2.

FIG. 3

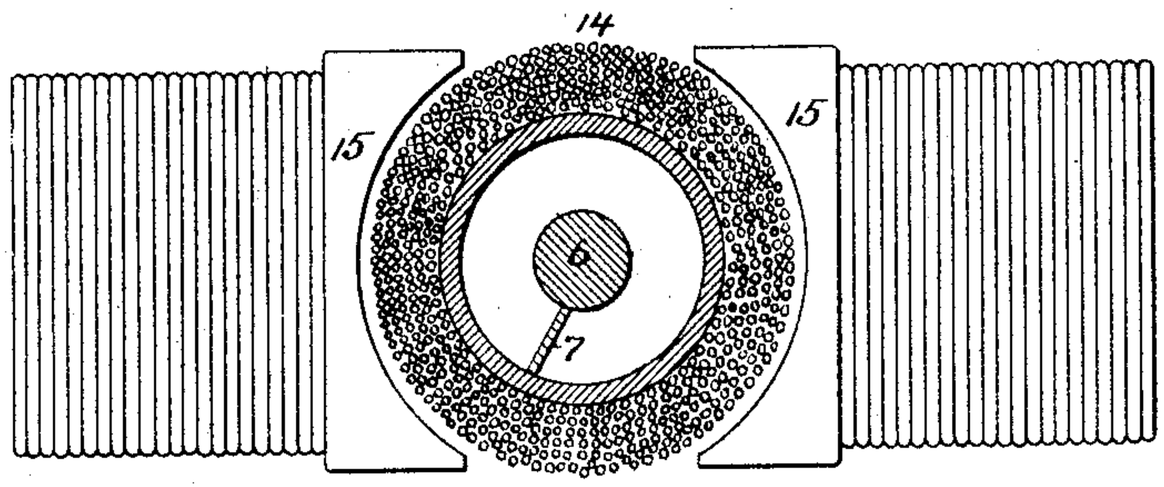

FIG. 4

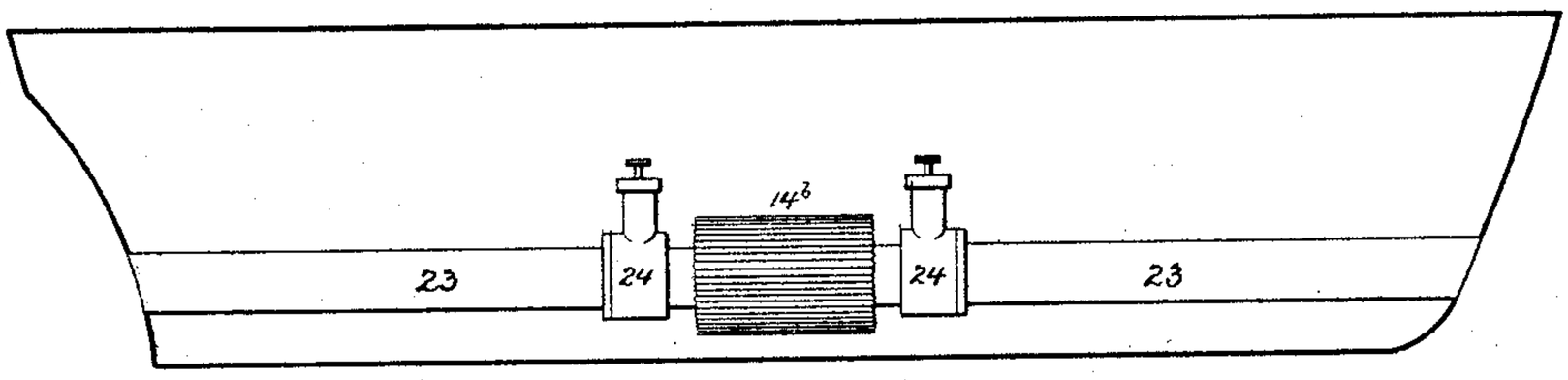

FIG. 5.

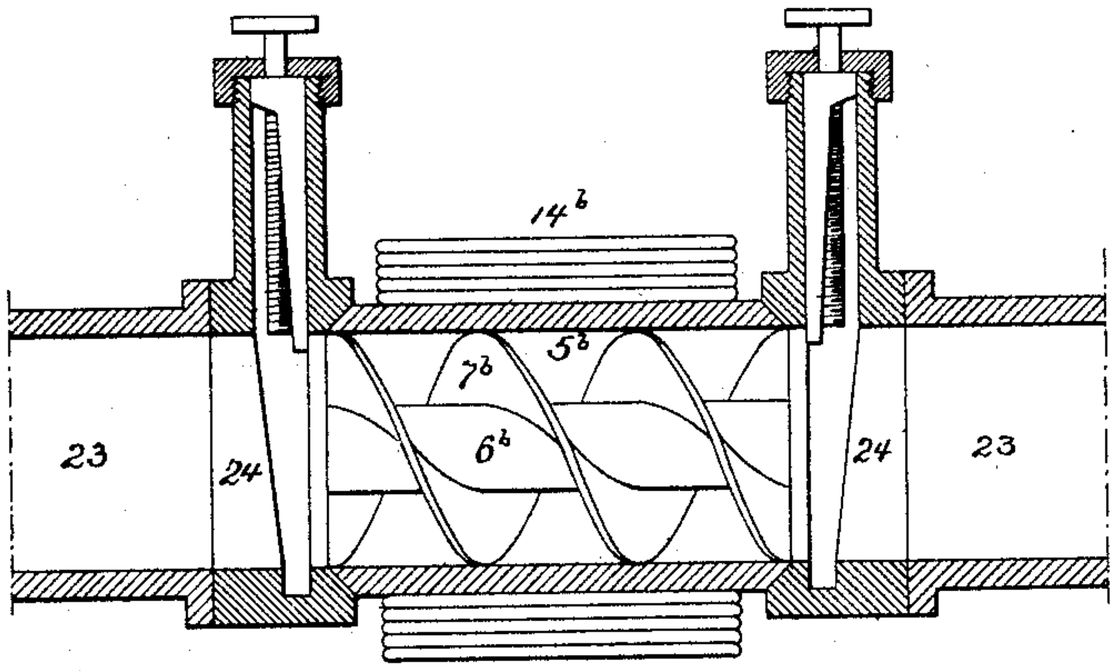

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FIG. 7.

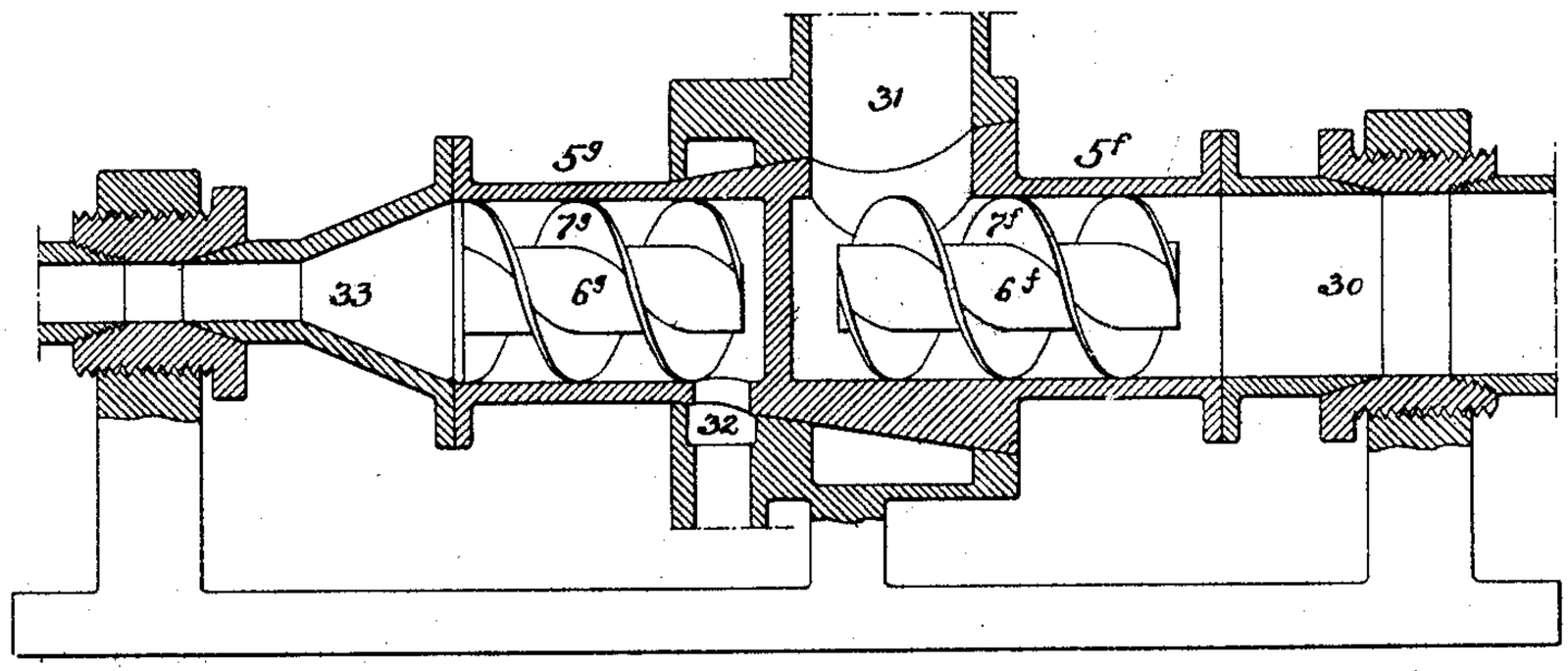


FIG. 6.

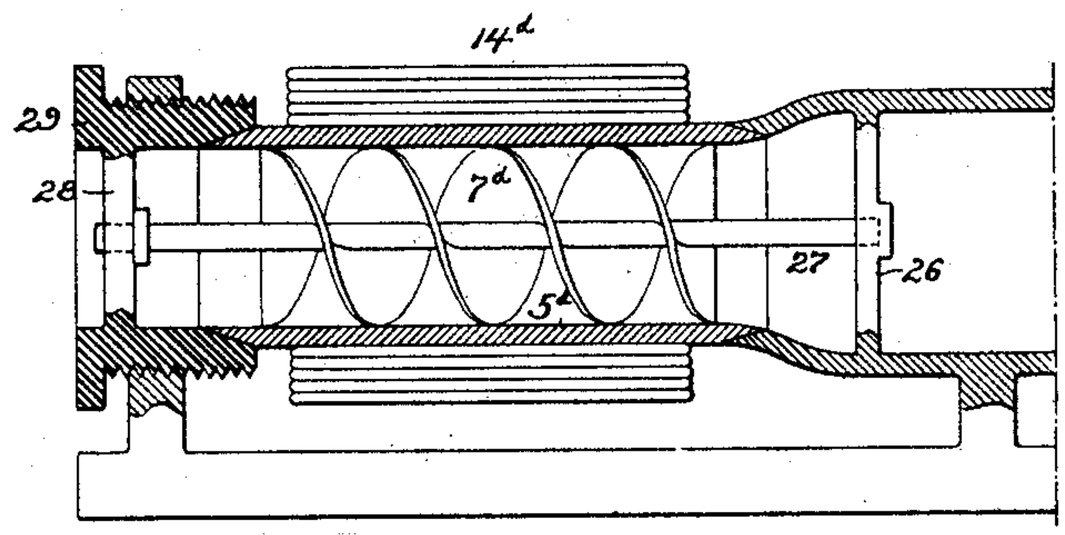
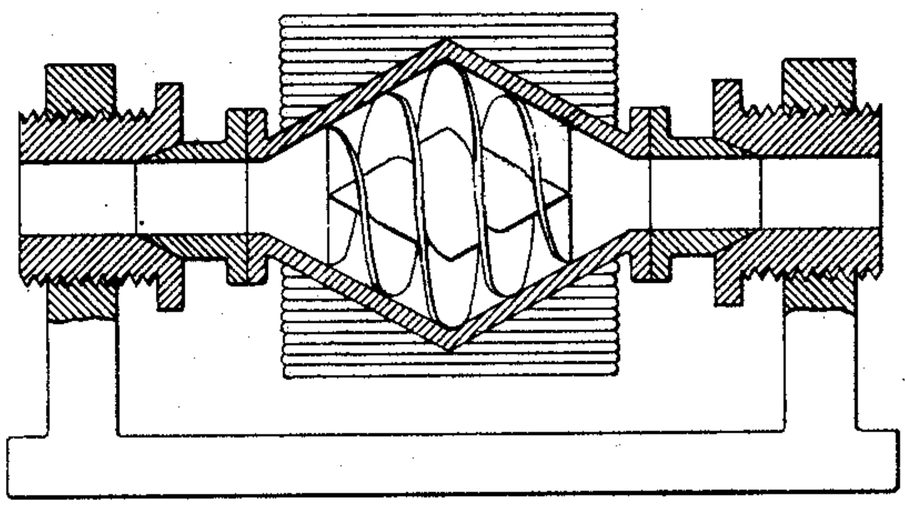


FIG. 8.



Witnesses:
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UNITED STATES PATENT OFFICE.

JOHN HOSKIN, OF PHILADELPHIA, PENNSYLVANIA.

FLUID-ACTUATED OR FLUID-FORCING DEVICE.

SPECIFICATION forming part of Letters Patent No. 622,474, dated April 4, 1899.

Application filed January 22, 1898. Serial No. 667,620. (No model.)

To all whom it may concern:

Be it known that I, JOHN HOSKIN, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain Improvements in Fluid-Actuated or Fluid-Forcing Devices, of which the following is a specification.

One object of my invention is to provide an efficient and compact form of rotary device for causing a flow of fluid or for being driven by such flow, or both, a special adaptation of said device being for the propulsion of vessels.

A further object of the invention is to so combine the rotary device with the armature of an electromagnetic motor or dynamo that one may drive the other without the intervention of gearing.

These objects I attain in the manner hereinafter set forth, reference being had to the accompanying drawings, in which—

Figure 1 is a longitudinal sectional view of an electromagnetically-driven rotary screw-pump constructed in accordance with my invention. Fig. 2 is a similar view illustrating the adaptation of the invention to a duplex pump. Fig. 3 is a transverse section on the line $x\,x$, Fig. 1. Fig. 4 is a view illustrating the application of the device for the propulsion of a vessel. Fig. 5 is a view, on an enlarged scale, of the operative portion of said propelling device. Fig. 6 is a sectional view of the device designed for use as a motor to be actuated by fluid under pressure. Fig. 7 is a sectional view of a combined motor and pump embodying the invention. Fig. 8 is a sectional view illustrating a modification, and Fig. 9 is a sectional view illustrating a special feature of the invention.

In Fig. 1 I have illustrated my invention as embodied in a pump, the bed-plate or foundation 1 having two bearings 2 and 3, and the bearing 2 having a countersunk opening for the reception of the conical end 4 of a cylinder 5, which contains a screw consisting of a central core 6 and spiral blades 7 thereon, the peripheral portions of said spiral blades being secured in any appropriate manner, preferably by means of a fluid-tight joint, to the cylinder 5, so as to be caused to rotate therewith. The bearing 3 has formed in it a threaded opening for the reception of a screw-plug 9, and in the inner end of the latter is formed a countersunk opening for the reception of a tapered stem 10, which projects from the conical end 11 of the cylinder 5. The bearing 2 has an opening extending therethrough from the countersunk recess which receives the conical end 4 of the cylinder 5, and into this opening is screwed the end of a pipe 12, which may form either the inlet or discharge pipe of the pump, depending upon the direction in which the cylinder 5, with its contained screw, is rotated, and the screw-plug 9 likewise has an opening therethrough from the countersunk recess which receives the tapered stem 10, said opening receiving the threaded end of a pipe 13, which also constitutes either the inlet or discharge pipe of the pump, depending upon the direction of rotation of the cylinder 5. Said cylinder may be rotated either by a belt directly applied thereto or by suitable gearing; but I prefer to utilize the cylinder as the hollow core for the armature 14 of an electromagnetic motor, the field-magnets for the latter being represented at 15 in Fig. 3. When the cylinder is rotated, the action of the contained screw will cause fluid of any character submitted to its action to pass longitudinally through the cylinder from the pipe 12 to the pipe 13 or the reverse, depending upon the direction of rotation of the cylinder. Preferably the pipe 13 is the inlet-pipe. Hence the back pressure of fluid upon the screw tends to counterbalance the pressure upon the conical discharge end of the cylinder, the bearings being kept tight by the adjustment of the screw-plug 9, which also provides for taking up wear.

In the construction shown in Fig. 2 a duplex arrangement is illustrated, the cylinder 5^a having a central boss or enlargement 16, which is adapted to a central bearing 17 on the base-plate, each end of the cylinder having a tapered stem 10^a, which has its bearing in a countersunk opening in a screw-plug 9^a, one of these plugs being carried by an end bearing 2^a and the other by an end bearing 3^a.

It will of course be understood that in both of the devices illustrated the end bearings of the cylinder are ground or packed, so as to form fluid-tight joints.

The cylinder 5^a carries two screws of oppo-

site pitch separated by a central chamber 19, which communicates through a port 20 with an annular chamber 21 in the bearing 17, this annular chamber communicating with a pipe 22, which may constitute either the inlet or discharge pipe of the pump, depending upon the direction of rotation of the cylinder 5^a, both of the pipes 12^a and 13^a being accordingly inlet or discharge pipes.

The pipe 22 is preferably the discharge-pipe, as in this case the centrifugal force due to the rotation of the cylinder is added to the action of the screws in effecting the flow of fluid through the pump.

Mounted upon the cylinder 5^a on each side of the central bearing 17 are the armature-coils 14^a, and these armatures may be actuated either by a single field-magnet or by independent field-magnets, as desired.

In applying my invention to the propulsion of vessels the cylinder 5^a, containing the screw, will constitute a rotating section of a continuous pipe or passage 23, leading from bow to stern or extending between any other convenient point of inlet and discharge. In this case the rotating cylinder 5 is provided at each end with any suitable form of water-tight thrust bearing against the adjacent end of the pipe or conduit 23, and said pipe or conduit 23 is preferably provided with valves or gates 24, whereby said rotating cylinder 5^b and its screw may be cut off from the pipe 23 whenever it is desired to remove said cylinder or gain access to the screw or other interior parts of the same. When the valves are open and the cylinder 5^b is rotated, the action of the screw will cause the inflow of water at the forward end of the pipe 23 and its forcible discharge from the after end of said pipe, so as to effect propulsion of the vessel, the use of the cylinder as a core for the armature of an electromagnetic motor permitting the location of the propelling device in the depth of the hold, where it will always be below the water-line, and in the case of a war vessel can be readily protected from injury. This device will be found valuable, moreover, for submarine vessels, as there are no propeller-blades or other internal machinery to be injured by contact with submarine obstructions. Besides, if the outflow of water be properly directed in conjunction with the rudder greater facility in steering may be effected.

It will be manifest that by a simple reversal of the conditions attending its use the rotary screw device which I have described is available as a motor for any desired purpose. One such construction is illustrated in Fig. 6, in which the device is illustrated as operating the armature of a dynamo. The inlet-pipe 26 for fluid under pressure carries one of the bearings for the screw-shaft 27, the other bearing 28 being carried by the screw-plug 29, through which the fluid is discharged. It will be noted that in this case the supply-pipe is of greater capacity than the screw-containing cylinder 5^d, so that there will be an ample supply of fluid to act upon the screw.

In Fig. 7 I have shown a combined motor and pump structure, the motor-cylinder being represented at 5^f, with inlet at 30 and outlet at 31, and the pump-cylinder being shown at 5^g, with inlet at 32 and outlet at 33.

It will be evident also that the shape of the screw-containing casing need not necessarily be cylindrical. For instance, in Fig. 8 I have shown one which is in the form of a double cone, and the rotary screw may be constructed either with or without a core or shaft and with threads of any desired length, pitch, number, or shape.

Where the central discharge is retained it may be advisable to provide the outlet end of the casing with a fixed internal collector cone or nozzle, such as shown at 35 in Fig. 9, in order that the fluid as it enters the cone may be relieved from the rotating influence of the revolving casing, and hence from the centrifugal action, which would otherwise tend to counteract the approach of the fluid toward the axis of the casing, where the discharge-passage is located.

Having thus described my invention, I claim and desire to secure by Letters Patent—

1. A rotary screw device consisting of a casing with contained screw secured so as to rotate therewith, and fixed structures in which the ends of said casing have fluid-tight bearings, either of said fixed structures having a screw-threaded perforation, a screw-threaded sleeve adapted thereto and having an internally-tapered wall, and a tapered end on the casing fitted thereto, substantially as specified.

2. A rotary device for causing the flow of fluids, said device comprising a casing with contracted inlet at one end and contracted outlet at the other, a fixed internal collecting-cone at the outlet end of the casing, adapted to relieve the outflowing fluid from the influence of centrifugal force due to the rotation of the casing, and provision for rotating said casing, substantially as specified.

3. A rotary screw device for causing the flow of fluids, said device comprising a casing with internal screw secured to and rotating therewith, a contracted fluid-inlet at one end of said casing, a contracted fluid-outlet at the other end of the same, a fixed internal collecting-cone at the outlet end of the casing, adapted to relieve the outflowing fluid from the influence of centrifugal force due to the rotation of the casing, and provision for rotating said casing, substantially as specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHN HOSKIN.

Witnesses:
JOS. H. KLEIN,
F. E. BECHTOLD.