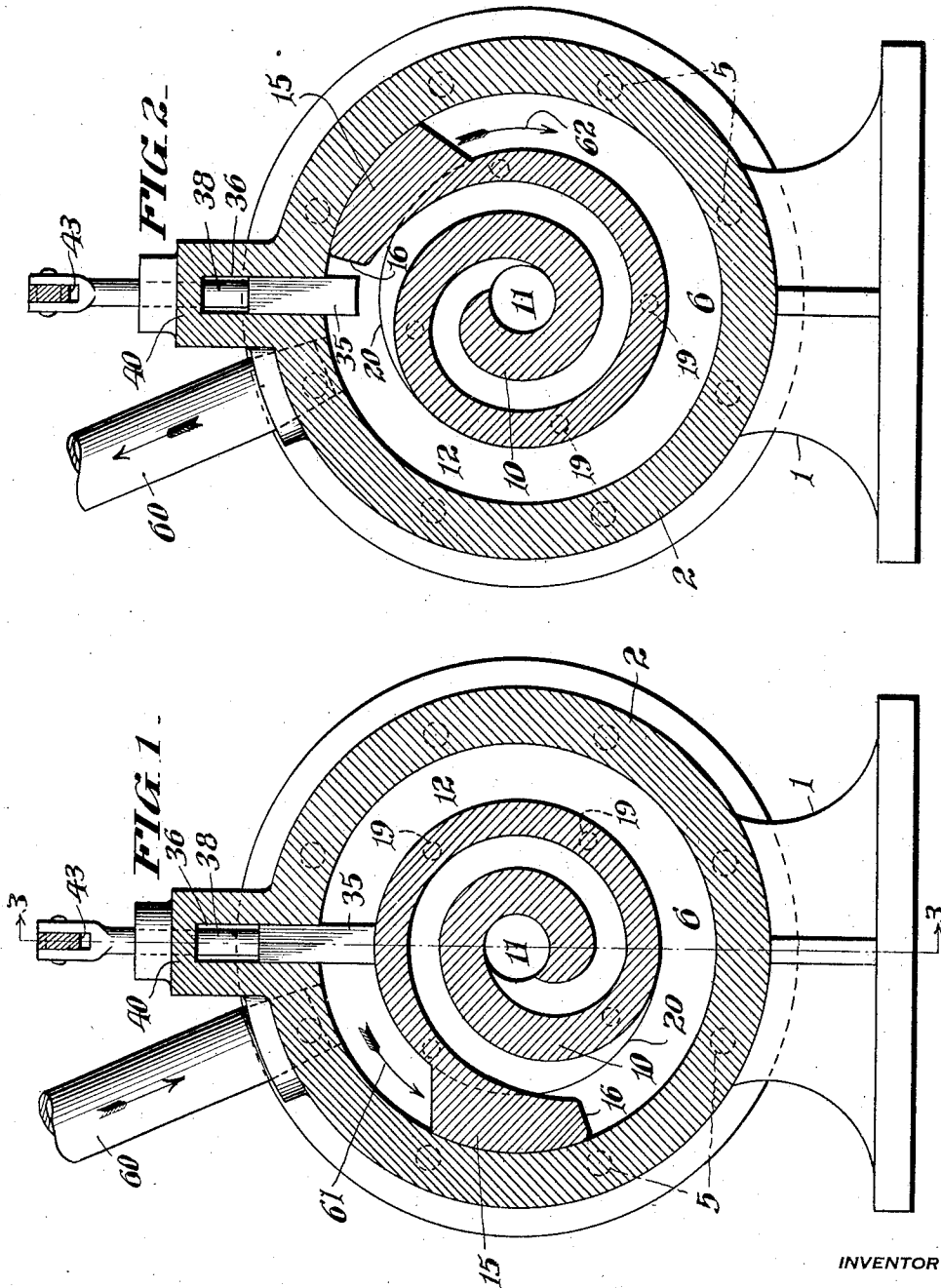


T. O'CONNOR.
 REVERSIBLE SPIRAL PUMP.
 APPLICATION FILED MAY 31, 1911.

1,056,441.

Patented Mar. 18, 1913.

2 SHEETS—SHEET 1.



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2 SHEETS—SHEET 2.

FIG. 3.

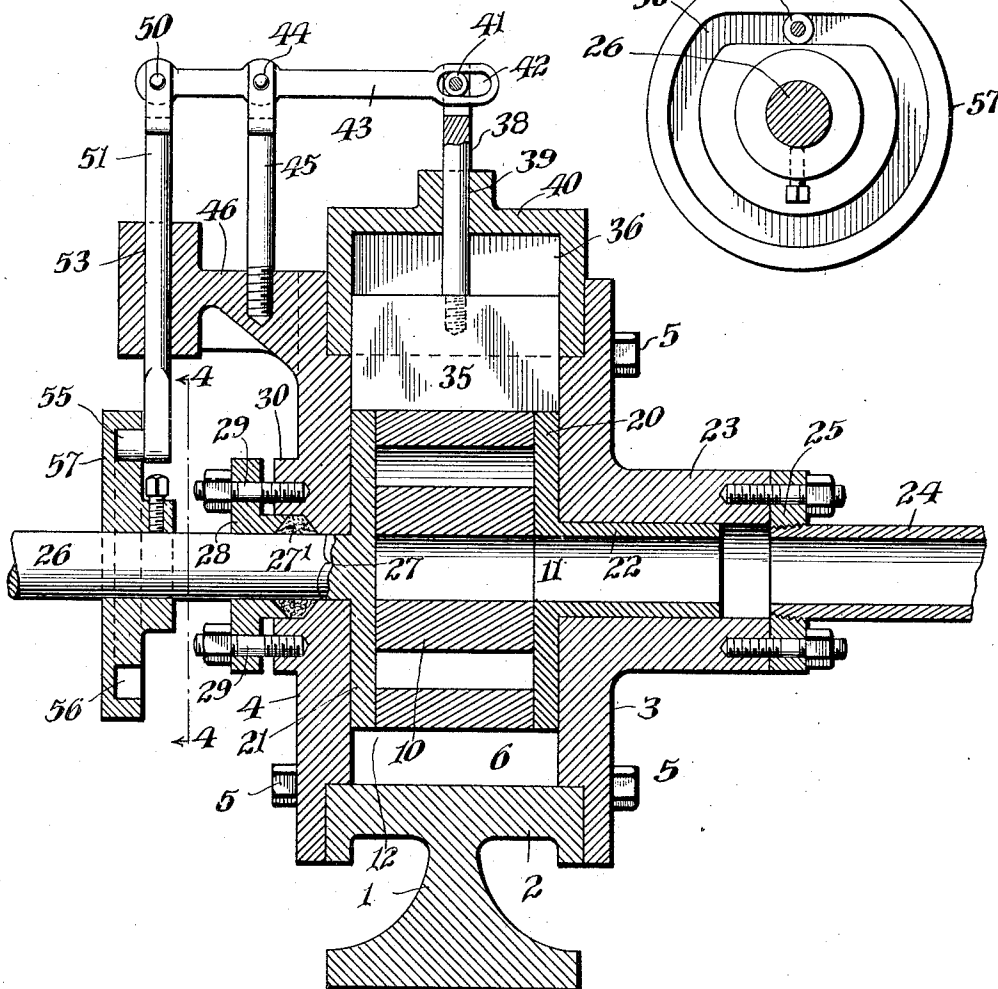
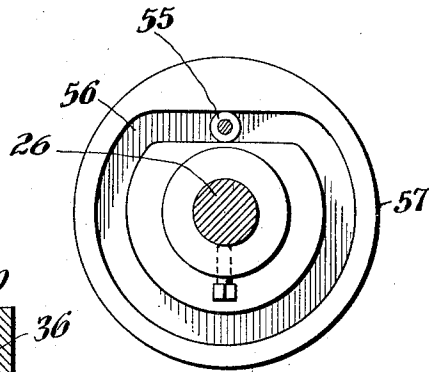


FIG. 4.



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REVERSIBLE SPIRAL PUMP.

1,056,441.

Specification of Letters Patent.

Patented Mar. 18, 1913.

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To all whom it may concern:

Be it known that I, THOMAS O'CONNOR, a citizen of the United States, residing in the city of Philadelphia, county of Philadelphia, State of Pennsylvania, have invented a certain new and useful Reversible Spiral Pump, of which the following is a specification.

My invention relates to spiral pumps, and has for one object the construction of a pump which is reversible, that is to say, which will operate whether the rotatable driving or operating member is revolved in one direction or the other.

My invention also has for its object the construction of a pump of this character which shall be simple in construction as well as efficient in operation.

Other objects and advantages of my invention will be hereinafter referred to in the detailed description thereof or will become apparent therefrom.

One form of a convenient embodiment of my invention is illustrated in the accompanying drawing forming a part of the specification, but it should be understood that changes in the details of construction within the scope of the claims may be made without departing from my invention.

In the drawings: Figure 1 is a transverse vertical sectional view of a spiral pump embodying my invention; Fig. 2 is a similar view with the spiral revoluble member in a different position; Fig. 3 is a vertical section taken along a line 3—3 of Fig. 1; and Fig. 4 is a view taken along the line 4—4 of Fig. 3.

Referring to the drawings, 1 designates the base and pedestal and 2 designates the cylindrical wall of the casing of the pump chamber. If desired, the said part 2 of the casing may be made integral with the pedestal or separate therefrom and secured thereto in any convenient manner. Practically the said casing would probably be constructed separately from the pedestal and thereafter secured thereto or otherwise supported in any suitable manner.

3 and 4 designate the sides of the casing which are secured to the sides or edges of the cylindrical wall 2 by means of screw bolts 5. When the cylindrical part 2 and the sides 3 and 4 are secured together in the manner indicated, a pump chamber 6 is formed in which the spiral member 10 is located. The form of the said spiral member is clearly shown in Figs. 1 and 2 in which

the spiral may be said to begin at a point somewhat removed from the center so that a space 11 is formed which may serve either as an effluent or an influent space, as will be hereinafter set forth. The diameter of the spiral member 10 is less than the diameter of the chamber 6 by reason of which a space 12 is provided between the outer periphery or perimeter of the said spiral member and the interior surface of the cylindrical part 2 of the casing of the chamber 6. The space 12 is interrupted by means of a block 15 which is secured to the outer end of the spiral 10, as is clearly indicated in Figs. 1 and 2 of the drawings. The member 15 may be made integrally with the spiral part 10 or separately therefrom and secured thereto by any suitable attaching means. Preferably what may be termed the outer end of the interrupting block 15 is blunted off as is indicated at 16.

By inspection of Figs. 1 and 2 of the drawings it will be noted that the space 12 intermediate the peripheral outer surface of the spiral member 10 and the inner surface of the part 2 of the casing is not continuous so that there is not, therefore, a continuous passage-way entirely around the said member 10 in the chamber 6 for the passage of water, air or any other fluid which may be operated upon by the pump. The said space 12 is also adapted to be interrupted by additional means to be hereinafter described.

The sides or ends of the spiral spaces between the spirals of the spiral member 10 are closed by means of the side plates 20 and 21 which are secured to the edges of the spiral 10 by means of screws or similar fastening means 19. The plate 20 is provided with a journal 22 which is supported in a bearing 23 which consists of a sleeve-like flange which projects laterally from the central portion of the side plate 3 of the casing.

24 designates a pipe which constitutes in effect a continuation of the opening through the bearing 23, the said pipe being connected to the bearing 23 by coupling or connecting means 25. The plate 21 is provided with a driving shaft 26 which is journaled in a bearing 27 formed in the central portion of the side plate 4 of the casing. The said shaft extends through a stuffing box provided with stuffing or packing 27' which is held in place by means of a gland 28 secured in position and adapted to be tightened by means of screws 29 which are secured into a

flange-like portion 30 formed upon the side of the plate 4. The shaft 26 in the construction shown is integral with the plate 21 but it will be understood that if desired the said plate 21 and shaft 26 may be made separately and thereafter secured together in any suitable manner. The shaft 26 is driven by any suitable power and in any suitable way, the power and the manner of driving the said shaft, however, not being shown.

35 designates a cut off which is slidably supported upon what may be termed a guide box or frame 36 secured to the casing of the pump. The purpose of the cut off 35 is to open and close the space 12 in the chamber 6. The said cut off extends transversely of the said space and from side to side thereof and normally is in closed position as is shown in Fig. 1 of the drawings.

38 designates a supporting rod to which the cut off 35 is connected. The said rod is adapted to slide through a hole 39 formed in a plate 40 which closes the outer end of the guide box 36 of the cut off. The outer end of the said rod 39 is provided with a roller 41 which is situated and works in a slot 42 formed in one end of a lever 43 which is pivoted at 44 upon a support 45 which rises from a bracket 46 which is connected to some part of the pump structure,—being connected, in the construction shown, to the side 4 of the pump casing. The opposite end of the lever 43 is pivoted at 50 to a link or rod 51 which extends through a hole or opening 53 provided in the bracket 46. The said link or rod at its inner end is provided with a cam roller 55 which is seated in the groove 56 of the cam disk 57. The construction of the cam is such that the pivotal movements of the lever 43 are so timed and regulated as to open and close the cut off 35 at the proper times and intervals and hold the same in opened and closed position for the proper periods of time.

60 designates a pipe having communication through the part 2 of the casing with the casing chamber.

In a pump constructed in accordance with my invention, the spiral pumping member 10 may be rotated in both directions, that is, either to the right or to the left, as is indicated in Figs. 1 and 2 of the drawings. In Fig. 1 the arrow 61 indicates that the spiral pumping member 10 is rotated to the left and the said member is shown in such position that the block 15 has just passed under the cut off 35 the same having been lifted at the proper time by the mechanism described for that purpose and said block 60 also just having passed beyond the inner end of the pipe 60. As the spiral member 10 rotates the cut off 35 is held against the periphery thereof so that the water, air or other fluid which has entered through the pipe 60 into the space 12 in the chamber 6

is compressed against the right hand side of the cut off 35 and is therefore forced outwardly through the central effluent portion of the chamber and through the pipe 24 to such point as may be desired. It will be understood that as the block 15 continues to move toward the left it tends to create a vacuum in its rear with the result that the portion of the space 12 to the right of the said block 15 and to the left of the cut off 35 is filled with the water, air or other fluid which is drawn in through the pipe 60 and that such air so drawn in is forced by the continued revolution of the member 10 outwardly through the pipe 24. It will be understood, however, that if water is being operated upon and driven through the pump the source of supply may occupy a higher level than the pump in which case the water would flow by gravity through the pipe 60 and the pump would not be required to lift the water by suction or otherwise into the pump chamber but the only work done by it would be the driving of the water from the pump chamber to such point as might be desired. In Fig. 2, as indicated by the arrow 62 thereon, the spiral member 10 is shown as rotating in the opposite direction to that shown in Fig. 1. In the said Fig. 2 the block 15 is shown in position just after it has passed underneath and beyond the cut off 35, the latter not having yet resumed its position against the outer peripheral surface of the said spiral member 10. When rotating in such direction the water, air, or other gas with which the pipe 24 may be in communication is drawn into the pump chamber and by reason of the fact that the space between the right hand side of the block 15 and the left hand side of the cut off 35 is entirely closed, the air or fluid therein is compressed between the said block 15 and the cut off 35 by the rotation of the revoluble spiral member 10 and is forced outwardly through the pipe 60. It will thus be seen that if rotated in one direction the pipe 60 acts as an influent pipe and the pipe 24 as an effluent pipe, whereas, if the member 10 is rotated in the opposite direction, the pipe 24 acts as an influent pipe and the pipe 60 as an effluent pipe.

My invention is well adapted for use either as a water pump or as an air pump and may be particularly useful for operation in connection with mine work. In such work it might be used as a means for driving water to different parts of the mine, or, if an accident should occur in the mine, by a reversal of its operation it might be employed as an air or gas pump to withdraw foul air and gases from the mine, and it may be used also to pump water from a mine and for any similar purpose.

Having thus explained the nature of my said invention and described some of the

ways of making and using the same although without attempting to set forth all of the forms in which it may be made or all of the modes of its use, what I claim is:

5 1. In a pump, the combination of the pump casing having a cylindrical chamber, a revol-
luble cylindrical spiral member situated con-
centrically in the said casing, the diameter
of the said spiral member being less than the
10 diameter of the pump chamber of the cas-
ing, whereby a space is provided between
the outer spiral of the said revoluble spiral
member and the inner surface of the said
chamber and the said spiral member being
15 provided with means upon the outer periph-
ery of its outer spiral for interrupting the
said space surrounding the said revoluble
member, and additional means which is
adapted to open and close the said space
20 which means is adapted to be moved out
of the path of travel of the means secured
to the said spiral for closing the said pas-
sage way.

2. In a pump, the combination of a pump
25 casing having a circular portion, a spiral
member revoluble in opposite directions
situated concentrically in the chamber in
the said casing, the diameter of the said
spiral member being less than the diameter
30 of the chamber in said casing, whereby a
space is formed between the outer periphery
of the said spiral member and the inner
surface of the circular portion of said cas-
ing, means revoluble with the said spiral
35 member for closing the space between the
said member and the said circular casing,
additional means for opening and closing
the said space, and means for causing move-
ment of the said additional means to per-
40 mit the said revoluble means to pass under-
neath the said additional means.

3. In a reversible spiral pump, the com-
bination of a pump casing having a cham-

ber, a spiral member revoluble in opposite
directions in said casing, a driving shaft 45
having connection with the said reversible
revoluble member, means projecting from
and revoluble with the said reversible revo-
luble spiral member for closing the space
between the said revoluble member and the 50
said casing, means for opening and closing
the space between the said casing and the
said revoluble spiral member, and a cam
upon the said shaft having connection with
the said opening and closing means for op- 55
erating the latter.

4. In a pump, the combination of the
pump casing having bearings formed in
the opposite side plates thereof, a spiral
driving member situated concentrically in 60
the said pump chamber, the spaces between
the spirals of said spiral member being
closed by opposing side plates secured to
the said spiral, and one of the said last men-
tioned plates having a hollow sleeve-like 65
journal supported in a bearing in one of the
side plates of the pump casing and the other
of said plates having connection with a driv-
ing shaft supported in the opposite side
plate of the said casing, and the said revol- 70
ble member being of less diameter than the
said casing and having means secured to and
projecting from its periphery for closing the
space between the said revoluble spiral mem-
ber and the said casing, a cut off for opening 75
and closing the said space, and means op-
erated by the said shaft for opening and
closing the said cut off.

In testimony that I claim the foregoing as
my invention, I have hereunto signed my 80
name this 27th day of May, A. D. 1911.

THOMAS O'CONNOR.

In the presence of—
EDWARD J. FISHER,
CARRIE E. KLEINFELDER.