T. O'CONNOR.

DOUBLE SPIRAL PUMP.

APPLICATION FILED APR. 15, 1912.

1,047,436.

Patented Dec. 17, 1912.

2 SHEETS—SHEET 1

FIG. 2.

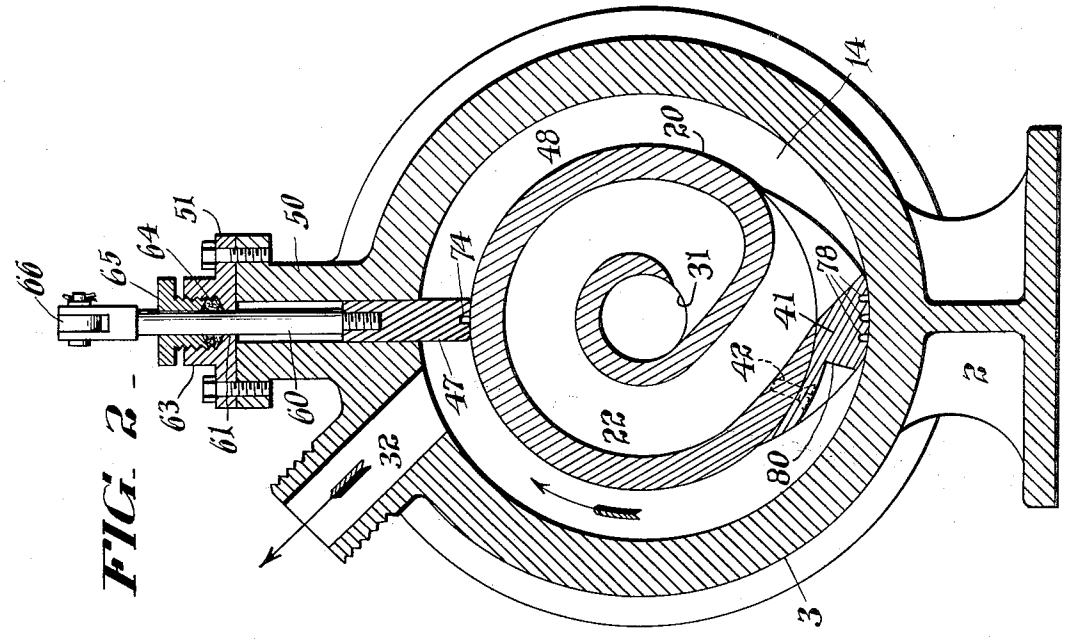
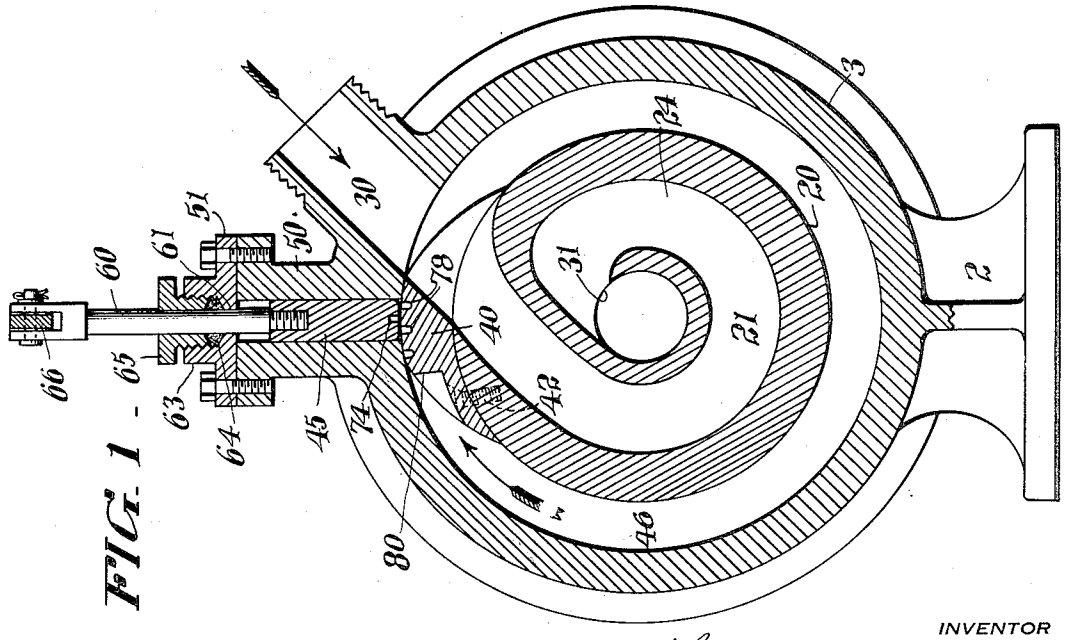


FIG. 1.



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WITNESSES

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FIG. 3.

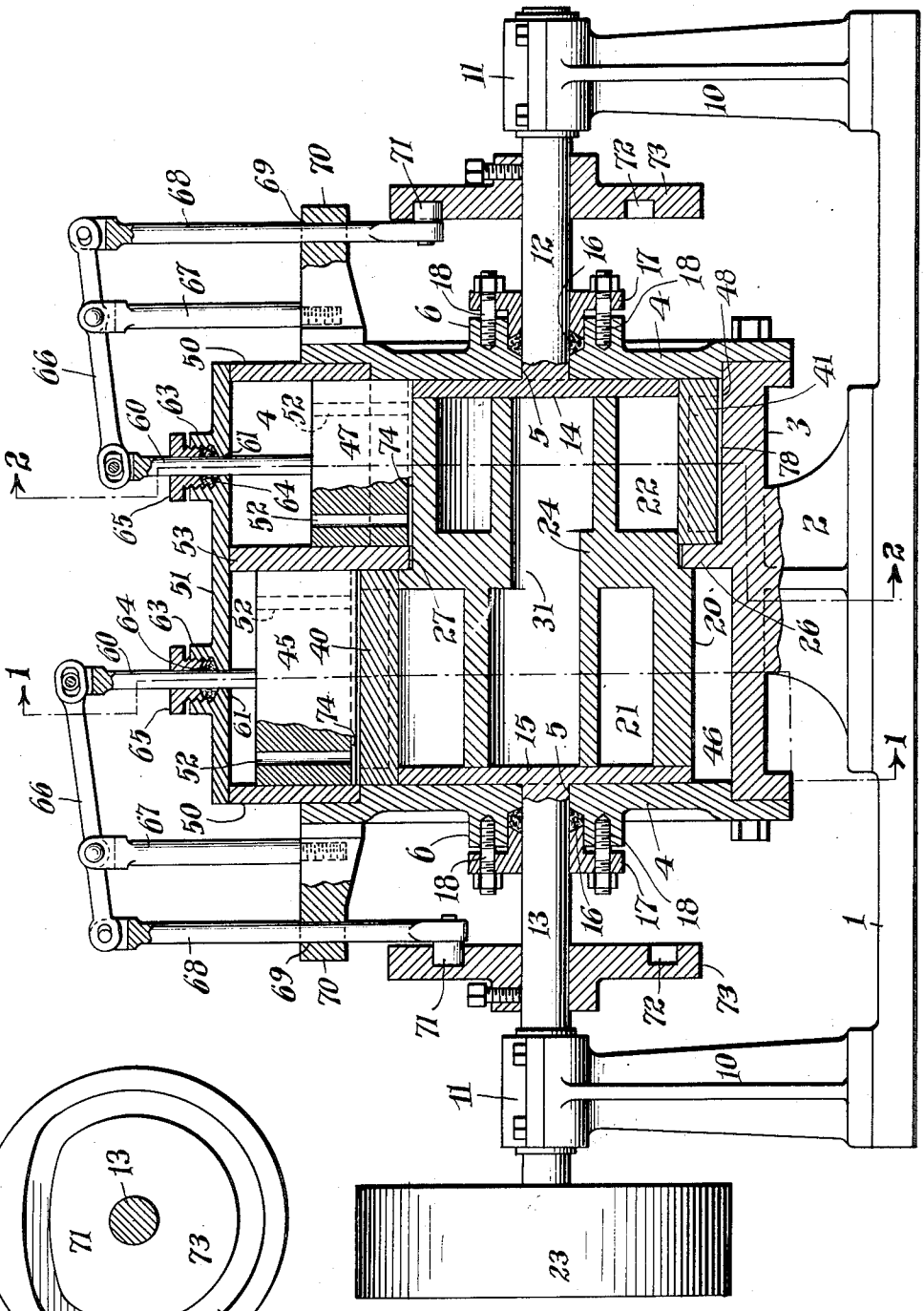

FIG. 4.

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DOUBLE SPIRAL PUMP.

1,047,436. Specification of Letters Patent. Patented Dec. 17, 1912.

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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 certain new and useful Improvements in Double Spiral Pumps, of which the following is a specification.

My invention relates to double spiral pumps in which two spiral chambers are provided in a cylinder or drum, one of which receives the water to be pumped from any suitable source and directs it to the other spiral of the cylinder or drum from which it is separated by an intermediate wall.

One of the objects of thus providing two spiral chambers in a drum or cylinder is to equalize the strains, pressures and forces and thereby cause the apparatus to operate more smoothly and with greater efficiency and with less wear and tear upon the parts.

My invention comprehends the combination and arrangement of parts as illustrated and hereinafter described and also various improvements in the details of construction.

One form of a convenient embodiment of my invention is illustrated in the accompanying drawings but it will be understood that changes in the details of construction may be made within the scope of the claims without departing from my invention.

In the drawings:—Figure 1 is a transverse sectional view taken on the line 1—1 of Fig. 3; Fig. 2 is a similar section taken on the line 2—2 of Fig. 3; Fig. 3 is a longitudinal vertical section of a double spiral pump embodying my invention; and Fig. 4 is a face view of a cam disk showing the cam groove therein.

In the drawings, 1 designates a base from which rises a pedestal 2 having a cylindrical casing 3 secured thereto and supported thereon. In the construction illustrated the casing 3 is integral with the pedestal 2 but such integrality is not necessary or essential. The opposite ends of the cylindrical casing 3 are closed by means of the end plates 4 having central openings 5 therein. The said holes are surrounded by circular flanges 6 formed upon the plates 4.

10 designates upright supports at the opposite ends of the base 1 which supports have at their upper ends bearings 11 in which the outer ends of shafts 12 and 13 are journaled. The inner ends of the said shafts project through the openings 5 and are provided respectively with integral plates 14 and 15. The shafts are surrounded with packing 16 located inside the flanges 6, the said packing being held in place by the glands 17 secured to the flanges by the screw bolts 18. The said plates 14 and 15 are secured to the opposite ends of a drum 20 provided with spiral passage ways 21 and 22 extending in reverse direction with respect to each other. The shaft 13 is provided with a driving wheel 23 by means of which the shafts 13, 12 and the intermediate drum 20 connected thereto are driven from any suitable source of power. The spiral passage ways 21 and 22 are separated from each other by an intermediate wall 24. By making the spiral passage way 21, which receives the water, longer than the spiral passage way 22, the pump is rendered more efficient.

The cylindrical casing 3 is provided with a dividing plate 26 which is located a short distance to one side of the center of its length. The said dividing plate 26 is provided with an opening 27 through which one end portion of the cylinder or drum 20 projects or extends. In order that the said drum 20 may be readily placed in position inside the casing with one end projecting through the opening 27, one end portion thereof is slightly reduced in size as is clearly shown in Fig. 3 of the drawing. Such reduction is effected by trimming off the outside of the said end portion, but the thickness of the spiral passage is not affected. The water which is to be driven by the pump is received into the casing 3 and the spiral passage way 21 through an opening 30 in the casing 3. The water which enters the passage way 21 passes through a central opening 31 in the drum 20 to the passage way 22 and then flows in reverse direction through the said passage way 22 and is driven from the casing through an opening at 32.

The cylinder or drum 20 is circular in cross section and its opposite end portions are of less diameter than the internal diameters of the corresponding portions of the cylindrical casing 3. The internal diameter of the casing 3 is greater upon the left hand side of the dividing plate 26 than upon the right hand side of such plate so that the spaces between the external surfaces of the drum upon opposite sides of the plate

and the internal opposing surfaces of the cylindrical casing are substantially the same.

The opposite end portions of the drum upon opposite sides of the plate 26 are provided with shoes 40 and 41, the said shoes being located upon diametrically opposite sides of the drum 20 from each other, one of course being located upon one end portion of the said drum and the other upon the opposite end portion. These shoes are located adjacent to the openings of the spiral passage ways 21 and 22 and close the spaces between the said opposite end portions of the said drum and the opposing internal surfaces of the cylindrical casing 3. As illustrated, the said shoes 40 and 41 are detachably secured to the said drum by means of screws 42. It is preferred that the said shoes be detachable in order that when they become worn they may be removed and replaced with new shoes.

For the purpose of compelling the water which enters the spiral passage way 21 to pass therefrom through the opening 31 into the chamber 22 I provide a cut-off 45 which is adapted to project across the annular space 46 and contact with the end portion of the drum which includes the spiral passage way 21. At the opposite end of the casing upon the opposite side of the plate 26 another cut-off 47 is shown for closing the annular space 48. Both of the said cut-offs are supported and guided between parallel flanges 50 formed upon the upper side of the casing 3. The said cut-offs are separated from each other by an extension of the plate 26 which fits between the flanges 50. The top of the bearing spaces between the flanges 50 in which the cut-offs 45 and 47 operate is closed by means of a plate 51. Any water which may find its way into the said spaces above the said cut-off may return to the chamber of the casing through holes 52 formed in the said cut-off. The opposite ends of the space between the flanges is closed by the narrow end plates 53. The mechanism by means of which the cut-offs 45 and 47 are operated consists of rods 60 which extend upwardly from the said cut-offs through holes 61 in the plate 51. The said rods are surrounded by internally threaded flanges 63 formed upon the plate 51 in which packing material 64 is placed, such material being held in position by the glands 65 having screw-threaded connection with the flanges 63. The upper ends of the rods 60 have slidable connection with the inner ends of levers 66 which levers are pivoted upon supports 67. The outer ends of the said levers have loose connection with the upper ends of rods 68 supported in holes 69 through brackets 70 secured to the plates 4.

The lower ends of the rods 68 are provided with cam wheels 71 in engagement with cam grooves 72 in the faces of cam disks 73 secured upon the shafts 12 and 13. The greater portions of the said grooves are concentric with respect to the shafts 12 and 13, but sections thereof are flattened out or are nearer to the shafts than the main portions of the said grooves. When the cam wheels 71 are in engagement with said sections of the grooves the rods 68 and the outer ends of the levers 66 are depressed raising the inner ends to lift the cut-offs 45 and 47 to permit the shoes 40 and 41 to pass. The cam disks are so provisioned upon the shafts 12 and 13 that when the low section of the cam groove in one disk is in position below the shaft the corresponding section in the other groove is in position above its shaft. By this arrangement of the cams the cut-offs 45 and 47 are alternately raised. In other words, after the raising of one cut-off the drum makes a one-half revolution before the other cut-off is raised. This arrangement is necessary because of the fact, as already stated, that the shoes 40 and 41 are located upon opposite sides of the drum 20. Each of the said cut-offs is provided with a narrow groove 74 in its inner face which is adapted to be filled with water which will act as a packing to make a substantially complete closure between the cut-offs and the periphery of the drum 20. Each of the shoes 40 and 41 is provided with transverse grooves 78 which open against the inside surface of the cylinder 3 and which when filled with water constitute a water packing. Each of the shoes 40 and 41 is also provided with a notch 80 one wall of which extends substantially at right angles to the length of the shoe, such walls acting as abutments to receive the pressure exerted by the water.

Referring to Fig. 1 and assuming that the water which enters the opening 30 is under pressure due to gravity or any other cause, the pressure thereof will, when the drum 20 has turned so that the shoe 40 is to the right of the opening 30, be exerted against the cut-off 45 and the receding end of the shoe 40 including the surface of the shoulder 80. The cut-off 45 being stationary, it will be understood that such water pressure would tend to cause rotative movement of the drum 20.

The presence of the shoulder 80 shown in Fig. 2 renders the pump more efficient in forcing the water outwardly through the opening 32 to its destination.

Having thus described my invention, I claim:—

1. A double spiral pump comprising a drum having two spiral passage ways one of which is located upon one side of the central portion of the drum and the other one of which is located upon the opposite side of said central portion, the said pas-

sage ways extending in reverse directions with respect to each other.

2. A double spiral pump comprising a cylindrical drum having two spiral passage ways one of which occupies one end portion of the said drum and the other one of which occupies the other end portion, one of the said passage ways receiving the water and directing it to the other passage way from which it is driven from the pump, the water receiving passage way being of greater width than the other of said passage ways.

3. A double spiral pump comprising a casing, the said casing having a transverse plate dividing the interior of the same into two chambers, the diameter of one of the chambers being greater than the diameter of the other, a cylindrical drum situated in the said casing and extending through the said chambers, the portion of the said drum in the larger chamber being of greater diameter than the portion thereof in the smaller chamber, and the opposite portions of the said drum being provided with spiral passage ways for water which passage ways are reversely arranged with respect to each other.

4. A double spiral pump comprising a cylindrical drum having a spiral passage way formed in one end portion and a spiral passage way in the other end portion, the said passage ways extending in reverse direction with respect to each other, and a passage way concentric with the drum connecting the two spiral passage ways.

5. A double spiral pump comprising a casing having a plate extending transversely thereof and dividing the casing into two sections of unequal length, a cylindrical drum situated in the said casing and having one end portion thereof reduced which extends through the said plate and the opposite end portions of the said spiral drum each being provided with spiral passage ways extending in reverse directions with respect to each other, the said passage ways being in communication with each other through a passage way concentric with the said drum, and the said casing being provided with inlet and outlet openings for the passage of water into and from the said casing.

6. A double spiral pump comprising a casing having a plate extending transversely thereof and dividing the same into two chambers, a cylindrical drum in the said casing extending through an opening through the said plate, the diameters of the opposite end portions being less than the diameters of the respective chambers of the casing on opposite sides of the said plate whereby annular spaces are provided surrounding the said drum and the opposite portions of the said drum being provided with spiral passage ways extending in reverse directions with respect to each other, the said passage ways being in communication with each other, means carried upon the opposite end portions of the said drum for closing the said annular spaces, and means extending across the said annular spaces to close the same, the said means being adapted to be reciprocated at intervals to open the said annular spaces to permit the passage of the closing means carried by the said drum.

7. A double spiral pump comprising a casing having a plate extending transversely of the said casing and dividing the same into two chambers, the said casing having openings therein which permit the passage of water thereinto and therefrom, a cylindrical drum situated in said casing and extending through the said plate, the said drum being provided with spiral passage ways upon opposite sides of the plane of the said plate which passage ways are arranged reversely with respect to each other and the portions of the said drum upon opposite sides of the plane of the said plate being of less diameter than the corresponding portions of the casing, whereby annular spaces are formed in the said casing surrounding the said portions of the drum, shoes at the opposite ends of the said drum and in diametrical relation with respect to each other for closing the said annular spaces, and cut-offs operating across the said annular spaces to compel the passage of water from the said pump as the drum is rotated.

8. A double spiral pump comprising a casing having a plate extending transversely thereof to divide the interior of the said casing into two chambers, a slot formed in the upper side of the said casing and having flanges on opposite sides thereof, the said flanges forming guide ways, a cylindrical drum situated in the said casing and having one end projected through an opening in the said plate, the portions of the said drum on opposite sides of the plane of the said plate being of less diameter than the corresponding portions of the said cylinder whereby annular spaces are provided around the said drum, detachable shoes secured to the opposite end portions of the said drum in diametrical relation with respect to each other, the said shoes extending across the said annular spaces, cut-offs operating in the guide ways formed by the said flanges, the said cut-offs extending across the said annular spaces and coöperating with the said shoes to cause the expulsion of the water from the said drum, and automatically acting means for alternately lifting the said cut-offs to open the said annular spaces to permit the passage of the said shoes thereunder.

9. A spiral pump comprising a casing having a plate extending transversely thereof and dividing the casing into two chambers, the said casing having openings through one of which the water to be pumped enters the pump casing and through the other of which the water leaves the pump, a cylindrical drum situated in the said casing and having one end portion extended through an opening in the said plate, the diameters of the portions of the said drum upon the opposite sides of the plane of the said plate being less than the diameters of the corresponding portions of the said casing whereby annular spaces are provided around the said portions of the drum in the chambers thereof in the opposite sides of the said plate, cut-off devices extending transversely of the said annular spaces to close the same, the said devices preventing the travel of the water in a circular direction around the said drum and the said drum being provided with shoes connected to its opposite ends in diametrical relation with respect to each other and each of the said shoes having notches therein whereby walls are provided which extend substantially at right angles to a plane tangent to the circumference of the interior of the said casing at any point, which walls constitute abutments against which the water in the said annular spaces exerts pressure.

In testimony that I claim the foregoing as my invention, I have hereunto signed my name this 12th day of April, A. D. 1912.

THOMAS O'CONNOR.

In the presence of—
CYRUS N. ANDERSON,
SAMUEL C. MILLNARD.