J. T. SEAMAN.

ROTARY PUMP.

APPLICATION FILED JUNE 27, 1911.

1,019,995.

Patented Mar. 12, 1912.

3 SHEETS—SHEET 1.

Fig. 2.

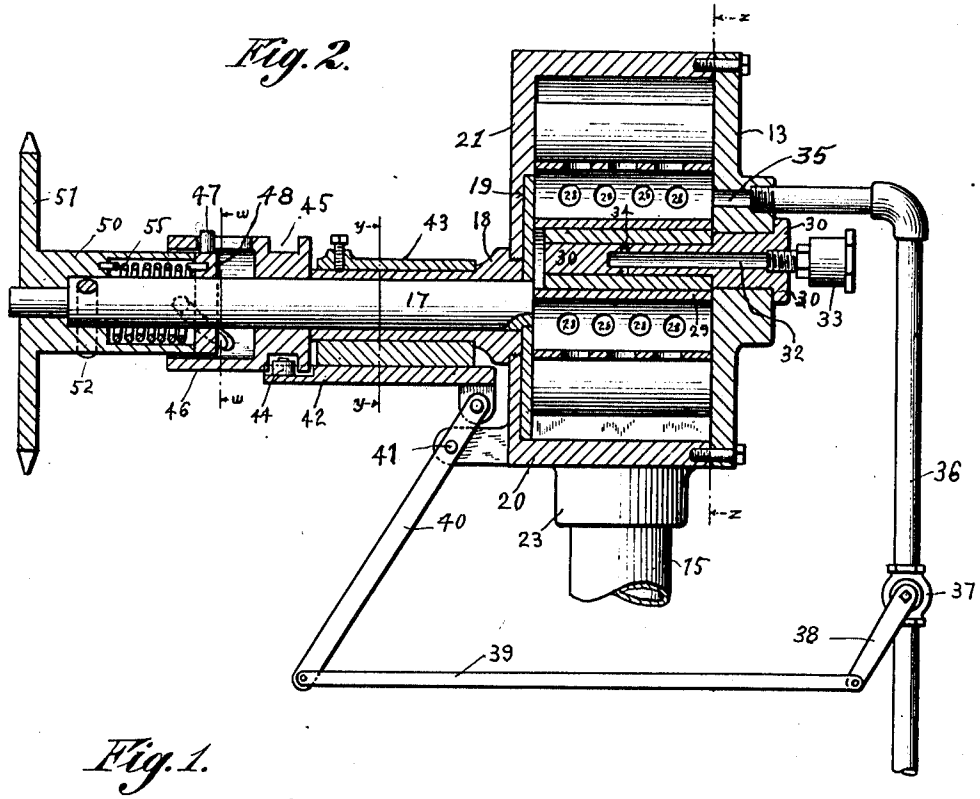
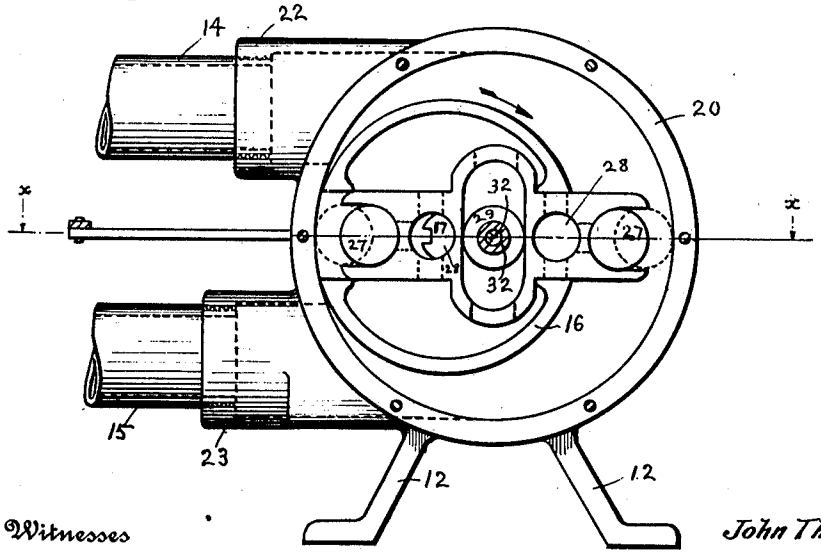


Fig. 1.



Witnesses

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3 SHEETS—SHEET 2.

Fig. 3.

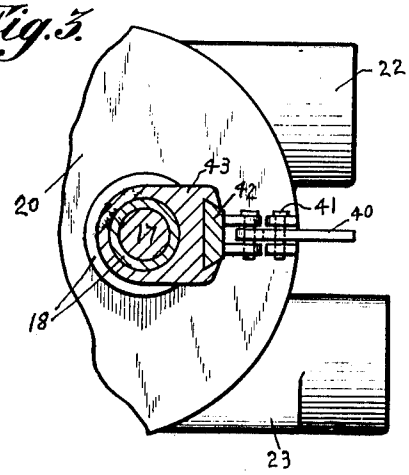


Fig. 4.

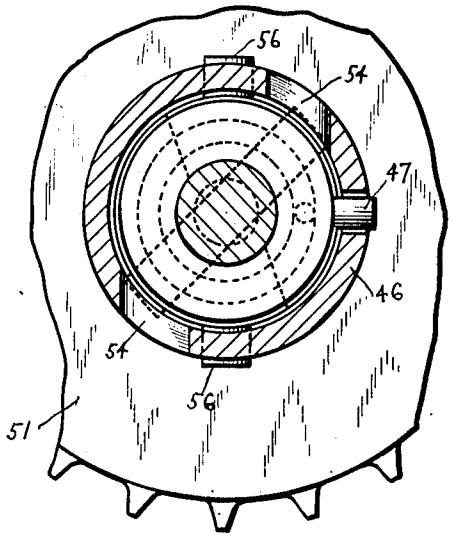
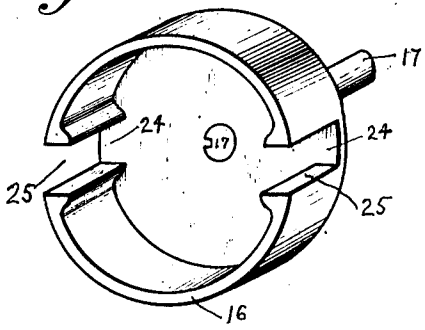


Fig. 5.



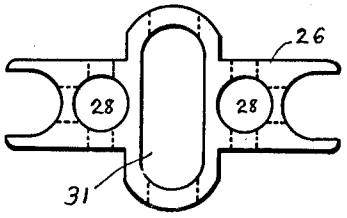


Fig. 7.

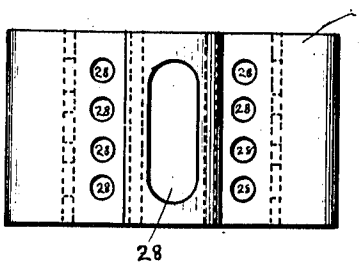


Fig. 6.

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3 SHEETS—SHEET 3.

Fig. 8.

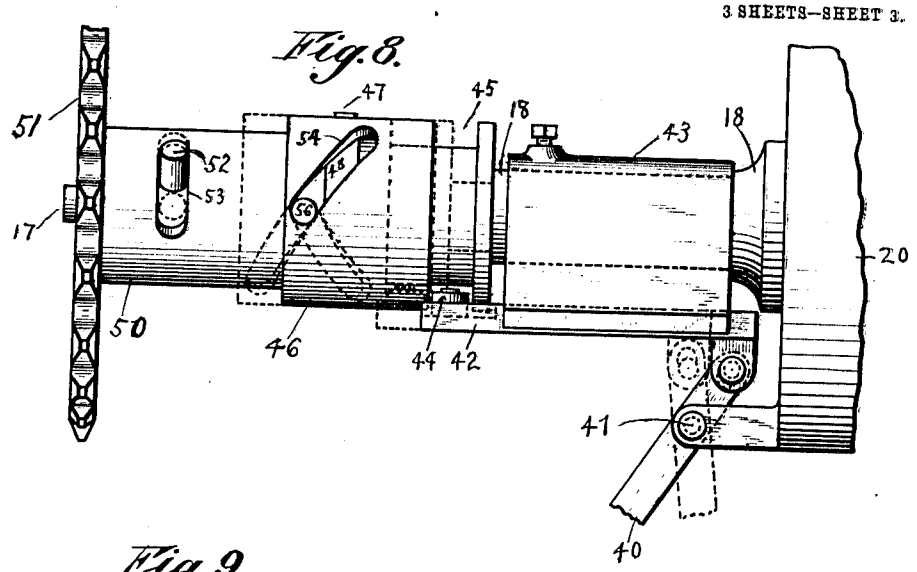


Fig. 9.

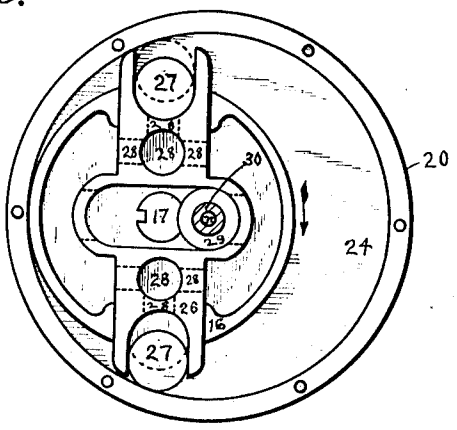


Fig. 10.

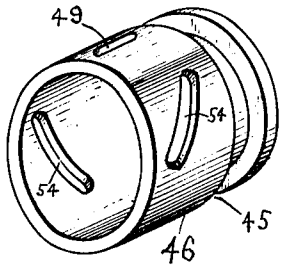
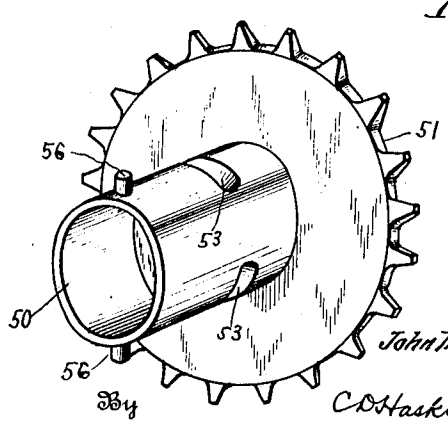


Fig. 11.



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UNITED STATES PATENT OFFICE.

JOHN THORSEN SEAMAN, OF SEATTLE, WASHINGTON.

ROTARY PUMP.

1,019,995. Specification of Letters Patent. Patented Mar. 12, 1912.

Application filed June 27, 1911. Serial No. 635,693.

To all whom it may concern:

Be it known that I, JOHN THORSEN SEAMAN, residing at Seattle, in the county of King and State of Washington, have invented a new and useful Rotary Pump, of which the following is a specification.

My invention relates to that class of rotary pumps which are adapted for causing fluids to flow in and through conduits, but more particularly it relates to rotary pumps which shall be efficient in the operation of sucking or forcing air or water or both air and water through pipes when such fluids contain and carry in suspension pieces or particles of foreign or dirty solid matter; and the objects of my invention are to provide pumps which, first, shall have a large capacity in proportion to their weight, second, shall be economically effective in their operation, third, which shall be so constructed that their wearing parts readily may be renewed, fourth, shall be strong and durable and, fifth, which can be manufactured at a much smaller cost than other rotary pumps of like capacity that have been employed heretofore. I attain these objects by constructing and combining devices in accordance with plans illustrated by the accompanying drawings in which—

Figure 1 shows my invention by an end view in elevation at broken line *z—z* of Fig. 2 with the head-plate of the cylinder removed. Fig. 2 is a plan view of same in longitudinal section on line *x—x* of Fig. 1. Fig. 3 is a view in elevation and partly in cross-section of parts of the same on lines *y—y* of Fig. 2. Fig. 4 is a view in cross-section on line *w—w* of Fig. 2 of some of the parts of my invention which view is enlarged. Fig. 5 is a reduced perspective view of another part of same. Fig. 6 is an end view in elevation and Fig. 7 is a plan view of another detail of same. Fig. 8 is a plan view of some parts of the same. Fig. 9 is an end elevation showing the relative position of parts of my invention on line *z—z* of Fig. 2. Fig. 10 and Fig. 11 are perspective views of details of my invention.

Like reference numbers indicate like parts throughout the drawings.

Referring to Fig. 1, 20 is a cylinder, preferably of cast iron, provided with a fixed head 21 on one end, an inlet 22, an outlet 23 and supports 12 all of which are shown as being cast in one piece. Inlet 22 is connected with a conducting pipe 14 while outlet 23 connects with a similar pipe 15.

16 is a rotor, preferably made of cast bronze and of the form of a hollow cylinder with a fixed head 24 on one end and having two openings 25, each opposite the other, in its cylindrical portion, which openings 25 extend from the inner side of said head 24 to the open end of the rotor 16 as shown most clearly in Fig. 5. This rotor 16 is disposed within cylinder 20 so that its axis is parallel with the axis of the boring of said cylinder 20 while its periphery, in its rotation, is very nearly touching or perhaps may be actually in light contact with the inside of cylinder 20 at a line located (as shown in Fig. 1) at the central point between inlet 22 and outlet 23 whereby no by-path may exist at such line for the passage of fluid.

The length of rotor 16 at its periphery is equal to the length of the boring of cylinder 20 plus the depth to which the head end of said rotor 16 projects snugly into the recess 19 in the inner side of fixed cylinder head 21; that is to say, its length is equal to the distance between cylinder heads 21 and 13 plus the depth of recess 19 whereby practically no fluid can find free passage-way between the ends of rotor 16 and cylinder heads 21 and 13. The rotor 16 is securely attached to the end of a driving shaft 17, as more clearly shown in Fig. 5, which shaft 17 is disposed within, extends through and projects outwardly from, a sleeve bearing 18 which is secured to and supported by the fixed cylinder head 21 as indicated in Fig. 2. The said bearing 18 is so disposed in the fixed cylinder head 21 that the rotor 16 may rotate in the constant position which is eccentric with the circumference of the boring of cylinder 20, as shown in Fig. 1, whereby, when the head 13 is fastened in its place, all fluid passing from inlet 22 to outlet 23 must find passage through the crescent shaped space around the periphery of rotor 16.

Carried by and within the rotor 16, guided and supported by the sides of the openings 25, is a pump-flight or vane 26 of suitable material but preferably of metal having a low specific gravity, whose form is shown by Figs. 6 and 7.

The vane 26 is of a width equal to the distance between the cylinder heads 13 and 21 and, as shown in Fig. 1 and in Fig. 9,

fits within openings 25 of the rotor 16 to adapt it to move and slide in said openings 25 in either direction across the axis of rotor 16. Each end of vane 26 is slotted to a depth suitable for receiving and carrying a roller 27 made of suitable material as, for instance, hard rubber, which is of a length equal to the distance between heads 13 and 21 and whose diameter permits it to roll freely in the slot of the vane 26.

Numerous holes 28 are provided in the vane 26 to lighten its weight and in its enlarged central portion, at right angles to its length, is an elongated hole 31 whose sides are parallel and whose width adapts it to receive and freely fit a roller 29, of suitable material, which roller 29 is mounted to rotate on stud 30 which stud 30 is secured in the cylinder head 13 to project into cylinder 20 in a position concentric with the boring of said cylinder 20 whereby, when head 13 is fastened in its place, as shown in Fig. 2, both ends of vane 26 shall, at all times and at all circumferential positions of rotor 16, be equi-distant from the walls of cylinder 20 as shown in Figs. 1 and 9. Thus, by reason of the action of roller 29, when rotor 16 is in motion, at all instants of time, one end of vane 26 is exactly the same distance from the wall of cylinder 20 as its other end is while such distance will constantly vary during each revolution of rotor 16 by reason of the action on vane 26 by the sides of openings 25.

The stud 30 is provided with a lubricating duct 32 leading from a grease-cup 33 to lubricating holes 34 whereby grease or oil may find access to the bearing surfaces of roller 29 and stud 30 as shown in Fig. 2.

By my invention, constructed as thus far described, when rotary motion is communicated through shaft 17 to rotor 16 in the direction indicated by the arrow in Fig. 1 and in Fig. 9 centrifugal force causes rollers 27 to hug the walls of the boring cylinder 20, as indicated by broken lines in Fig. 1, throughout each revolution of rotor 16 whereby fluid may be constantly sucked into the crescent shaped space through inlet 22 and be constantly forced out of such space through outlet 23 by reason of vane 26 as it is carried by rotor 16 and guided by roller 29 on the stud 30.

My invention when constructed as described thus far has a very high degree of efficiency when the fluid pumped is of the form of liquid as, for instance, water, but when a gaseous fluid like air is to be pumped, then such form of device requires the following additional features in order that the same high efficiency may be realized.

In the cylinder head 13 is a hole 35 into which leads a pipe 36 for conducting water as shown in Fig. 2. A valve or cock 37 may control the flow of water, from a source of supply not shown, through pipe 36 into the cylinder 20.

With such devices added, a pump of the form described becomes of the highest efficiency for pumping air or other gaseous fluids.

In its operation rotary motion is communicated through shaft 17 to rotor 16 and thereupon cock 37 may be turned to admit water into the cylinder 20 through pipe 36 whereupon the water acts to pack or fill up the minute spaces that may exist between the moving parts and the cylinder of the pump, whereby the gaseous fluid can find no passage way between inlet 22 and outlet 23 except in the direction of the rotation of the rotor 16 and the surplus water is forced out of the cylinder 20 through outlet 23. Thus, if the inlet 22 should be connected with a closed chamber by means of inlet pipe 14 and the pump then be put in operation nearly a perfect vacuum would speedily be attained within such chamber. Obviously if pieces of foreign matter were drawn into the cylinder 20 such pieces would mix with the water and be immediately ejected through outlet 23 and if such pieces fail to move as fast as the vane 26 then the rollers 27 would simply roll over them till they could be ejected.

In order that the pump may be started and stopped without manually turning the water cock 37 I have devised automatic means for controlling said cock 37 which means comprise devices associated with the driving shaft of the pump and the water cock 37 whereby when motive power is applied to the pump such power incidentally opens cock 37 before the shaft 17 commences to rotate and such cock 37 incidentally closes upon interruption of such power.

Referring to Fig. 2 these devices consist of a crank 38 attached to the stem of cock 37, a connecting rod 39 extending from crank 38 to the long end of lever 40 which is fulcrumed at pivot 41 and whose short end is articulated with one end of a shifter 42. The shifter 42 may move or slide in a dovetailed groove of a support 43 which is fastened on and surrounds the sleeve bearing 18 as shown in Figs. 2 and 3. A small roller 44, rotatable on a stud disposed on the end of the shifter 42 and on that side thereof facing shaft 17, projects into a groove 45, of rectangular cross-section, encircling a sleeve 46 near one of its ends as shown in perspective by Fig. 10. The sleeve 46 is slidably movable lengthwise on the shaft 17 but its circumferential position is fixed with relation thereto by means of a stud 47 which is fixed in a collar 48 that surrounds and is fixed to revolve with shaft 17 as shown in Figs. 2 and 4 and which stud 47 projects outwardly from said collar 48

into a longitudinal slot 49 made in sleeve 46 as shown in Fig. 2. Slot 49 is most clearly shown in Fig. 10. Thus a lengthwise movement of sleeve 46 acts to move shifter 42 which, through lever 40, connecting rod 39 and crank 38, controls the cock 37.

A sleeve 50, on which is mounted a driving sprocket wheel 51, as shown in Fig. 11, is movably disposed on and near the end of shaft 17, as shown in Fig. 8, where a lengthwise movement on shaft 17 is prevented by a pin 52 which extends diametrically through shaft 17 and projects from each side thereof through an elongated hole 53 in sleeve 50 which hole 53 permits sleeve 50 to move circumferentially about shaft 17 for a distance which is limited by the length of holes 53.

As seen in Fig. 8 the sleeve 50 projects within the annular space between the sleeve 46 and shaft 17 and a stud or pin 56 projects outwardly from each side of sleeve 50 through an elongated diagonally disposed hole 54 in each side of sleeve 46 which holes are shown more clearly in Fig. 10.

As seen in Fig. 2 there is an annular recess or space between shaft 17 and the sleeve 50, and within such space a suitable spiral spring 55 is disposed around shaft 17, one end of which is attached to sleeve 50 while its other end is fastened to collar 48 whereby its torsional tension may be set to cause a cam-like action between the sides of the holes 54 and pins 56 which cam-like action serves to cause the longitudinal motion of sleeve 46 which controls cock 37 through shifter 42, rod 39 and crank 38.

Obviously, a pump embodying my invention as described may efficiently be employed for pumping various liquids or gaseous fluids. For instance, such pump is particularly adapted to serve as a vacuum pump in the work of cleaning or sweeping carpets, rugs and floors by the vacuum process well known. In such instance the hose pipe, to which a cleaning tool is connected, would be connected with pipe 14 leading to inlet 22 of the pump, and outlet 23 would be connected with a waste pipe or sewer while pipe 36 would be connected with a source of water supply, whereupon motive power would be applied to sprocket drive wheel 51 to turn shaft 17 in a direction indicated by arrow in Fig. 1 which would cause the force of spring 55 to be overcome, whereupon sleeve 46 would move shifter 42 to operate cock 37 thereby letting water into cylinder 20, some of which water would fill up and pack any crevice existing between the surfaces of rotor 16 and the wall and heads of cylinder 20, then the continued rotation of rotor 16 with its vane 26 would suck the dusty air through inlet 22 from a cleaning tool, which dusty air would mix with the water from pipe 36 and then be ejected through outlet 23 into the waste pipe or sewer. Obviously quite large pieces of foreign matter might be drawn into the cylinder through inlet 22 without affecting the proper operation of the pump since rollers 27 may repeatedly roll over obstructions until such obstructions are ejected through outlet 23.

Having thus described the construction and operation of my invention what I claim is:

1. In a rotary pump of the class described, the combination with a rotary pump cylinder, whose circumferential wall is provided with an inlet passage for air and with an outlet passage for air mixed with liquid, of a hollow cylindrical rotor one end of which is open, said rotor being adapted to rotate within said cylinder and disposed therein with its axis parallel with the axis of the boring of said cylinder to restrict the passage of fluid between the periphery of said rotor and the circumferential wall of said outlet at a longitudinal line located between said inlet passage and said outlet passage, an inlet passage for liquid disposed in one of the heads of said pump cylinder to admit liquid into the open end of said rotor, a vane associated with said rotor and adapted to move endwise across said rotor's axis said vane being provided with a slot in each of its ends, a roller of suitable material disposed in said slot of each of said ends of said vane, said vane being provided with longitudinal holes leading from the bottom of said slots to passages communicating with the interior of said rotor whereby liquid may find passage from said interior to said slots to force said roller to hug the circumferential wall of said cylinder during rotation of said rotor, and means for maintaining an equal distance between the axis of the boring of said cylinder and each end of said vane.

2. In a rotary pump of the class described, a cylinder having suitable inlet and outlet passages, a vane within said cylinder and associated with a driving shaft whereby it is adapted to revolve, said vane having yielding extensions on each of its ends which are adapted normally to hug the wall of said cylinder during the revolutions of said vane, a stop-cock which controls the flow of water into said cylinder through an inlet, in combination with automatic means associated with said stop-cock and said driving shaft whereby said stop-cock is operated in response to the starting and stopping of the operation of the pump.

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Witnesses:
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