W. H. WEDDINGTON.

ROTARY PUMP.

APPLICATION FILED MAR. 9, 1911.

1,027,091.

Patented May 21, 1912.

2 SHEETS—SHEET 1.

Fig. 4.

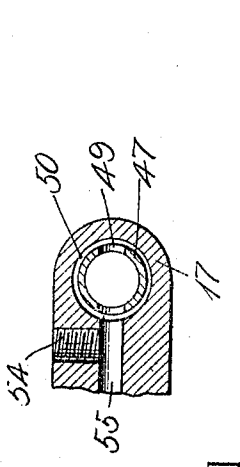

Fig. 1.

Witnesses.

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2 SHEETS—SHEET 2.

Fig. 2.

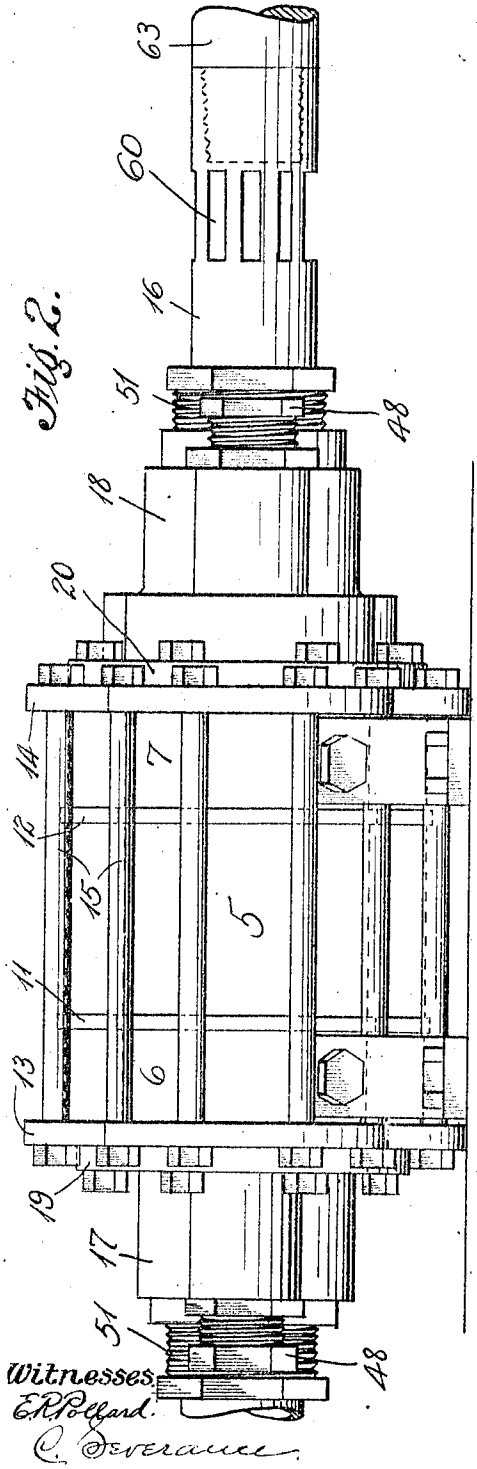
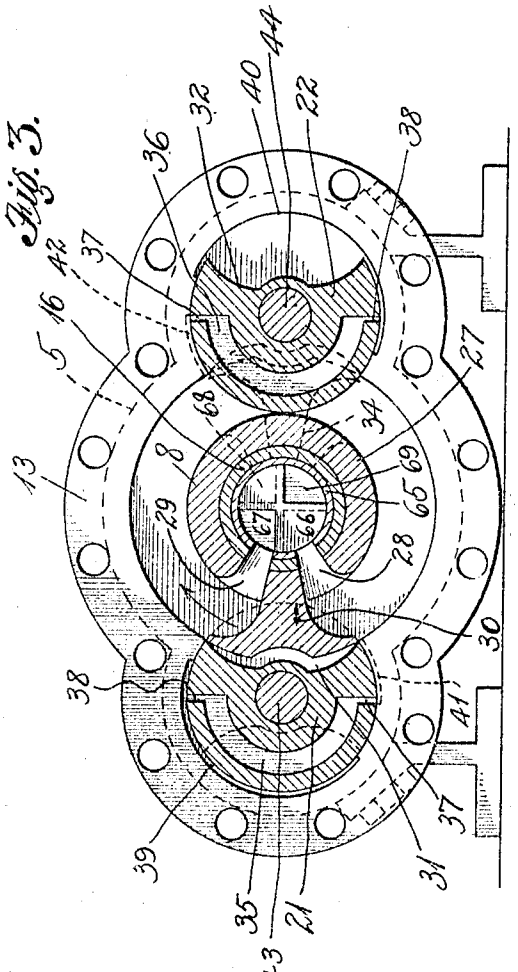


Fig. 3.



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ROTARY PUMP.

1,027,091. Specification of Letters Patent. Patented May 21, 1912.

Application filed March 9, 1911. Serial No. 613,281.

To all whom it may concern:

Be it known that I, WILLIAM H. WEDDINGTON, a citizen of the United States, residing at Lankershim, in the county of Los Angeles and State of California, have invented new and useful Improvements in Rotary Pumps, of which the following is a specification.

This invention relates to improvements in rotary pumps and it is the object of the invention among other things to provide a pump having rotary pistons arranged to balance each other and rotary valves operating in conjunction therewith so arranged as to balance each other, the mechanism thus being adapted to operate with a minimum of friction.

It is also an object of the invention to provide a rotary pump in which a plurality of balancing pistons are employed and a plurality of coöperating abutments together with means for lubricating the shafting of said pistons and abutments.

In the accompanying drawing forming a part of this specification, Figure 1 is a top plan view of the improved rotary pump mechanism, portions of the same being taken away and shown in central section. Fig. 2 is a side elevation of the said pump. Fig. 3 is a transverse sectional central view through the piston of the pump, the casing therefor being shown in end elevation. Fig. 4 is a detail sectional view taken upon the line 4—4 of Fig. 1.

The features of this invention will now be more particularly described, reference being had to the accompanying drawing in which 5 indicates a central piston casing, 6 and 7 outer casings mounted end to end with respect to the central casing, 8 a central piston and 9 and 10 outer pistons coöperating therewith.

The casings 6 and 7 are separated from the casing 5 by means of partition plates or walls 11 and 12 which are made to fit between the same and may be held in place by any suitable means when the parts are connected together. The outer ends of the casings 6 and 7 are provided with heads 13 and 14 which are tightly drawn together for clamping the casing 5, 6 and 7 and the partitions 11 and 12 in place, bolts as 15 being employed for this purpose. Any required number of bolts 15 are used and placed at suitable intervals around the outside of the casings 5, 6 and 7 as clearly indicated in Figs. 2 and 3.

Extending centrally through the pump is the hollow shaft 16 to which is securely fastened the pistons 8, 9 and 10. The said hollow shaft finds bearings in the bearing casings 17 and 18 secured to the opposite ends of the pump, the said casing having flanges 19 and 20 by which they may be securely bolted to the ends 13 and 14.

The casing 5 is not only provided with the cylindrical central portion closely fitting upon the piston 8 but is provided with lateral enlarged portions having inner faces forming parts of cylinders for receiving rollers or abutments 21 and 22 which coöperate with the piston 8 in its operation. The casings 6 and 7 are also formed with correspondingly enlarged portions for receiving roller abutments 23, 24, 25 and 26 which coöperate with the pistons 9 and 10. The piston 8 is formed with a central hub portion 27 having an inlet port 28 and an outlet port 29 formed therein, the said ports being arranged upon the opposite sides of a piston head 30. The said piston head 30 is flared outwardly at its outer end and made to fit snugly the inner surface of the casing 5 as will be apparent from reference to Fig. 3. The roller abutments 21 and 22 are also provided with depressions 31 and 32 adapted to accommodate the movement of the piston head 30 whenever it passes opposite to said roller abutments. The shape of the interlocking portions of the roller abutments and the piston head is such as to maintain a close joint between the said piston and the said roller abutments during the entire revolution of the piston. The pistons 9 and 10 are likewise provided with projecting piston heads 33 and 34 made similar to the piston head 30 and the roller abutments 23, 24, 25 and 26 are also formed with depressions similar to the depressions 31 and 32 for accommodating the passage of the piston heads 33 and 34 in the rotation of the parts. The said pistons 9 and 10 with their coöperating roller abutments are preferably made exactly half the length of the piston 8 with its roller abutments so that the pressure exerted in the pumping operation by the outer nearer pistons 9 and 10 will exactly equal and balance the pressure ex-

erted by the inner wide piston 8. The action of the pistons is thus balanced and there is practically no friction brought upon the shaft which carries them. The roller abutments are also balanced in the same way so that they are not productive of friction in their action in coöperating with the pistons.

Since the action of each piston as 8 is productive of either pressure or suction against one side only of the roller abutments opposite thereto and it is desirable to equalize such pressure, each of the roller abutments is provided opposite to the depressions 31 and 32 therein with recesses or passageways 35 or 36 which are provided with ports 37 and 38 at their opposite extremities and the casings of the said roller abutments are formed in their inner surfaces with coöperating recesses or depressions 39 and 40, so that a pressure or suction may be communicated to the outer sides of the roller abutments to equal the pressure or suction to which the inner sides of said abutments are subjected. In order that the pressure or suction may thus be communicated to the outer sides of the roller abutments small ducts, 41 and 42 are arranged in the casing so as to establish communication between the cylinder 5 and the passages 35 and 36 formed in the said roller abutments, and through them to the recesses 39 and 40 behind the abutments. The pressure is thus absolutely equalized around the said roller abutments so that there is practically no friction upon the bearings which support the said abutments. The said roller abutments 21, 23 and 25 are carried by a shaft 43 while the roller abutments 22, 24 and 26 are carried by a shaft 44. The shafts 43 and 44 extend parallel to the shaft 16 and are mounted in bearings formed in the heads 17 and 18 of the pump casing. The ends of the said shafts are provided with packing glands as indicated at 45 and 46 in Fig. 1. These glands are held in place by adjustable heads 47 and 48 which screw into the ends of the bearing casing 17 and 18 as shown in Fig. 1. The inner edges of these heads bear upon packing material for holding it tightly around the shafts and near their inner ends, each of the said heads 47 and 48 is provided with one or more apertures as 49 for permitting lubricants to reach the shaft within. The heads 47 and 48 are also preferably formed opposite the apertures 49 with annular grooves as 50 opposite the apertures 49 so that the lubricant can travel entirely around the heads 47 and 48 and can enter either of the opening 49 provided therein. The shaft 16 is also provided with similar stuffing boxes as at 51, the threaded sleeve of which is formed with apertures 52 to permit the lubricant employed to reach the shaft. The said sleeve is also provided with an annular passage or groove 53 opposite the said apertures 52 so as to supply oil or lubricant to all of them entirely around the bearing. The casings 17 and 18 are provided with lubricant receiving openings as 54 which lead into transverse connecting passages 55 as indicated in Figs. 1 and 4. Any desired oil caps or lubricating devices may be screwed into the opening 54 for supplying oil or other suitable lubricant to the several bearings. The lubricant will be fed in opposite directions in the passages 55 so that both the shafts 43 and 44 as well as the shaft 16 will be properly lubricated.

The abutments 21, 22, 23, 24, 25 and 26 are all caused to move in exact and proper relation to the pistons 8, 9 and 10 by means of intermeshing gears as 56, 57 and 58, the gear 58 being indicated in dotted lines only in Fig. 1. These gears are readily keyed upon their respective shafts and are all the same size so that for every complete revolution of the pistons upon the shaft 16 the roller abutments carried by the shafts 43 and 44 will also make a complete revolution.

The shaft 16 is provided at a point beyond the bearing thereof in the casing 18, with a series of ports 60 which are inclosed in a casing or housing 61 surrounding the shaft 16 at this point, the said housing 61 having upon one side an inlet pipe 62. The outer end of the shaft 16 is closed by an extension shaft portion 63 which is tightly screwed into the end of the shaft 16 as will be readily understood by reference to Fig. 2.

The materials drawn into this pump by its operation may thus enter through the inlet pipe 62 and the ports 60 in the shaft 16. The materials pumped then pass through the shaft 16 toward the pistons of the pump. Within the said shaft is fastened a central sleeve 65 which is provided with elongated passageways as 66 and 67 and other passageways 68 and 69. The passage-way 66 is open at the end thereof next to the inlet ports 60 of the shaft while its other end is closed. The passages 66 and 67 are thus in position to coöperate with the ports 28 and 29 of the piston 8 while as shown in Fig. 3 the passageways 68 and 69 are adapted to communicate with similar ports in the pistons 9 and 10 as indicated in dotted lines in Fig. 3.

The passageway 67 is closed at the end adjacent to the ports 60 while its other end is opened so that as the piston 8 rotates the material to be pumped will be drawn into the casing of the piston through the passageway 66 and the port 28, the movement of the piston being as indicated by arrows in Fig. 3. A continued rotation of the piston will also force the material drawn into its casing, outwardly through the port 29 and the passageway 67 into the shaft 16 again at the opposite end of the pump from the inlet

pipe 62. The material pumped may be conducted from the end of the shaft 16 in any preferred or desired manner.

While the piston 8 is drawing materials as just described through one set of passageways in the sleeve 65, the other pistons 9 and 10 will also be pumping materials through the passageways 68 and 69 their action being thus arranged to exactly balance the action of the piston 8. The pumping action produced by these pistons is of course against the surfaces of the coöperating rotating abutments 21 to 26.

The operation of the pump has been partially described with reference to the description of the parts and will be readily understood.

The pump is operated preferably by rotating the shaft 16 which is generally accomplished by a pulley secured to the solid extension of said shaft 63, the said pulley not being shown. The pulley is of course connected with any desired or suitable source of power for rotating the shaft 16. The rotation of said shaft 16 carries with it the pistons 8, 9 and 10 and the coöperating abutments 21 to 26 which are actuated in correspondence therewith through the agency of the intermeshing gears 56, 57 and 58 and the shafts 43 and 44. The action of the piston heads 30 33 and 34 within the piston casings is such as to force the materials within the pump outwardly through the passageways 67 and 69 as heretofore described, a suction being thus caused to draw in more material to the hollow shaft 16 from the inlet 62 and through the passageways 66 and 68. The pump action is practically continuous because of the exact fitting of the roller abutments upon the parts of the pistons and their accommodation to the passage of the piston heads 30 33 and 34. The outer oppositely acting pistons 9 and 10 outside the piston 8, the combined capacity of which exactly equals the capacity of the piston 8 produce an exactly balanced condition in the pumping operation performed by the said pistons, and the introduction of the pressure maintained within the pump, behind the roller abutments as heretofore described, also decreases any friction or pressure upon the said abutments in their action and all the moving parts of the pump are thus thoroughly and perfectly balanced whereby friction at any point is practically eliminated. Not only is the pump effective in producing the pumping action but it is also capable of being rotated with a minimum amount of friction. The lubrication of the parts while simple is effective and the lubricant must reach all of the bearings of the pump.

What I claim is:—

1. A pump comprising a hollow shaft, hollow pistons carried thereby, and having piston heads, the piston heads of alternate pistons extending diametrically in opposite directions with respect to each other, the said pistons having ports upon each side of the piston heads communicating with the interior of the hollow shaft and coöperating roller abutments adapted to have the pressure or suction of the pump equally distributed about them whereby friction in the parts of the pump is largely eliminated.

2. A rotary pump comprising a hollow shaft, a plurality of pistons revolving therewith, and having projecting piston heads, the said pistons having outlet and inlet ports upon each side of the said heads communicating with the interior of the said hollow shaft, roller abutments disposed at the sides of the pistons and adapted to roll upon the hubs thereof, the said roller abutments having depressions in their surfaces to permit the piston heads to pass them, and means within the shaft for directing the materials to the pistons successively.

3. A rotary pump comprising a casing, a hollow rotary piston mounted in said casing and having a projecting piston head, the said piston having ports on each side of said head communicating with the interior of the piston, a tubular shaft carrying the piston and having inlet and outlet ports opposite to the ports of the piston, means for permitting of the inflow of materials pumped to said ports, and means for receiving the discharge of materials from the same.

4. A pump comprising a hollow shaft, a piston mounted thereon having a pumping piston head, other pistons mounted outside the said piston and provided with pumping heads, the combined capacity of the outer pistons being equal to the capacity of the inner pistons, and roller abutments coöperating with the pistons for facilitating their pumping materials through the said hollow shaft.

5. A rotary pump comprising a hollow shaft having inlet and outlet ports therein for directing the passage of the fluids pumped, pistons mounted upon the said shaft and having induction and eduction ports communicating with the inlet and outlet passages of the hollow shaft, roller abutments disposed at the sides of the pistons and having capacities corresponding to the capacities of the pistons opposite which they operate, and means for causing the said abutments to operate simultaneously with the pistons.

6. A pump mechanism comprising a casing having central piston casings and outer abutment casings formed therein, a shaft extending through the pistons and having intake and exhaust passages arranged therein, and communicating with intake and exhaust ports in the said pistons, movable abutments coöperating with the pistons, and provided

with spaces opposite to the pistons for receiving pressure equal to the pressure within the piston casings whereby the action of the abutments is completely balanced.

7. A pumping mechanism comprising a cylinder casing having central cylinders formed therein, and outside cylinders arranged upon each end thereof, a pump piston occupying the central cylinder, other pump pistons occupying the outer cylinders, each of said pistons having radial projecting piston heads, the piston head of the inner piston projecting diametrically opposite to the piston heads of the outer pistons, coöperating roller abutments arranged in the cylinder casing upon opposite sides of the piston cylinders and adapted to fit upon the surface of the pistons, the said casings being provided with recesses extending partially around the roller abutments, and having passages leading thereto from the piston cylinders, the roller abutments being also provided with passages for insuring the delivery of pressure from the piston cylinders to the recesses beyond the roller abutments, and means for operating the roller abutments in correspondence with the movement of the pistons.

8. A pump mechanism comprising hollow pistons, a hollow shaft extending through the same and adapted to have the materials pumped forced longitudinally of said shaft, rotary abutments operating in conjunction with the rotary pistons, the said pump being provided with means for directing the pressure from the piston cylinders around the said roller abutments, and means within the hollow shaft for directing the materials pumped by the pistons.

9. A pump mechanism comprising a hollow pump shaft, a central piston, and outer balancing pistons mounted upon said shaft, and having ports communicating with the interior of said shaft, the combined capacity of the outer pistons equaling that of the centrally arranged piston, piston heads arranged to direct the materials pumped through the ports of said pistons, coöperating roller abutments having the same relative proportions as the relative proportions of the piston, the said roller abutments being also provided with means for admitting equalizing pressure behind them from the piston casings whereby the pistons and the roller abutments of the pump will balance each other and operate with a minimum of friction.

10. A pump mechanism, comprising a hollow shaft, rotary pistons carried thereby, and having ports communicating with the interior of said shaft, a member mounted within the hollow shaft having passages opening in opposite directions and capable of directing the inflow and outflow of materials pumped through the said shaft, and roller abutments arranged opposite the pistons for accommodating themselves to the movement of the pistons and facilitating the pumping action thereof.

11. A rotary pump mechanism having cylinders, comprising a casing having bearings formed therein for shafting, and having cylindrical casings, a central pump shaft extending through the casing, a piston mounted thereon having piston heads projecting in opposite directions, the said pistons having inlet and outlet ports formed upon the opposite sides of the piston heads and communicating with the interior of said hollow shaft, a fluid directing member mounted within th hollow shaft and having elongated passages formed therein and extending opposite the ports of the pistons, the passages which are opposite the inlet ports of the pistons being closed at one end while the passages opposite the outlet ports of the pistons are closed at the opposite end whereby the materials will be forced to pass through said hollow shaft, roller abutments coöperating with the pistons and facilitating their action, bearings for the shafts and the roller abutments, the casing having inter-connecting passages for directing lubricating material to all of said bearings.

12. A pumping mechanism comprising a casing, a hollow pump shaft extending through the same, hollow pistons mounted thereon and having ports communicating with the interior of the shaft, a fluid directing member mounted within the shaft and communicating with said ports for directing the materials pumped, roller abutments cooperating with the pistons, bearings in the said casings for the said hollow shaft and the shafts of the roller abutments, and adjusting means for maintaining all of said shafts properly centered and in true alinement.

13. A pump mechanism comprising a hollow shaft having ports formed therein opposite an inlet, the said shaft also having a sleeve mounted within the same which is provided with inlet and outlet passages the inlet passages being open near the inlet ports of the shaft while the outlet passages are open at their opposite ends, pistons mounted upon the said hollow shaft and having induction and eduction ports communicating with the inlet and outlet passages of the sleeve in the said shaft, roller abutments cooperating with the pistons for maintaining the proper pressure within the device, and yet accommodating the movement of the pistons, and means for moving the roller abutments in correspondence with the movement of the pistons.

14. A pump mechanism comprising a hollow pumping shaft, means for connecting the interior thereof with a source from which materials which are to be pumped,

pistons mounted on said shaft and having piston heads oppositely arranged with respect to each other, each piston having induction and eduction ports arranged upon opposite sides of the piston heads, and communicating with the interior of the shaft, a sleeve mounted in the shaft and having inlet passages arranged opposite the induction ports of the pistons and outlet passages extending opposite the eduction ports of the pistons, roller abutments mounted adjacent to the pistons and coöperating therewith, intermeshing gears of the same diameter for moving the roller abutments in exact correspondence with the movement of the pistons, and means for rotating the hollow shaft for operating all the parts of the pump.

In witness that I claim the foregoing I have hereunto subscribed my name this 27th day of February, 1911.

W. H. WEDDINGTON.

Witnesses:
CASSELL SEVERANCE,
EARLE R. POLLARD.