W. H. EIZERMAN.

PUMP.

APPLICATION FILED FEB. 27, 1913.

1,087,160. Patented Feb. 17, 1914.

Fig. 1.

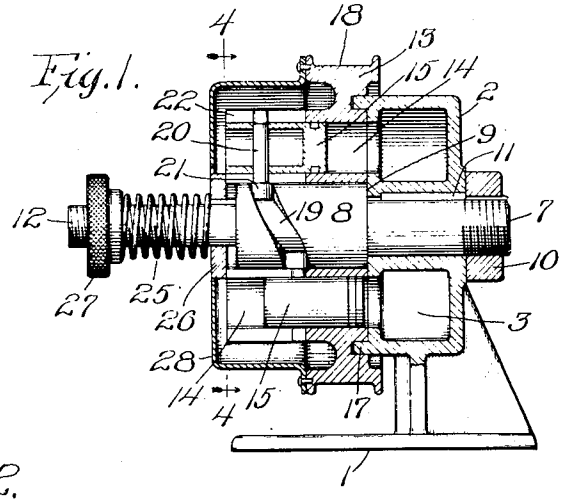


Fig. 2.

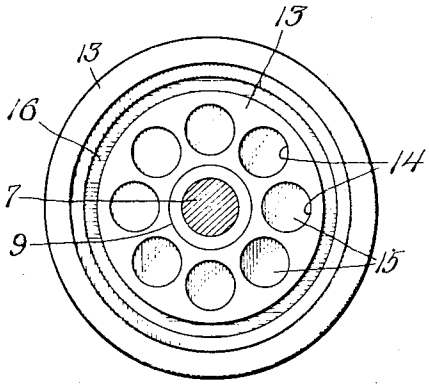


Fig. 3.

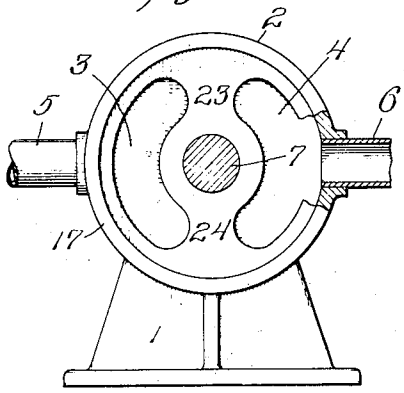
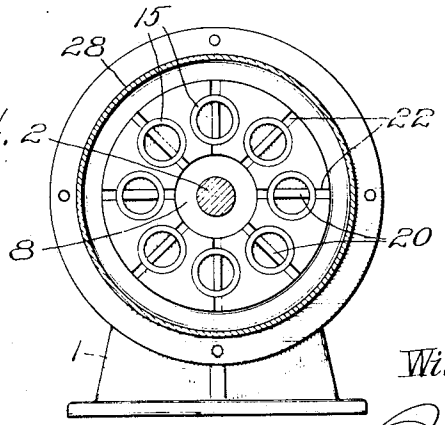


Fig. 4.



Witnesses

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PUMP.

1,087,160. Specification of Letters Patent. Patented Feb. 17, 1914.

Application filed February 27, 1913. Serial No. 751,012.

To all whom it may concern:

Be it known that I, WILLIAM H. EIZERMAN, a citizen of the United States of America, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Pumps, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to improvements in rotary pumps and its object is to provide a very simple and compact construction having very few movable parts and so arranged as to provide a relief when the pressure rises to a predetermined point.

A further object is to provide certain other new and useful features in the construction and arrangement of parts, the invention consisting in the matters hereinafter set forth and more particularly pointed out in the claims reference being had to the accompanying drawing in which—

Figure 1 is a vertical section through a device embodying the invention; Fig. 2 is an end elevation of the rotatable cylinder block detached; Fig. 3 is an end elevation of a chambered supporting member showing the same partly in section; and Fig. 4 is a transverse section on the line 4—4 of Fig. 1.

Supported upon a suitable base 1 by an upwardly extending bracket at one end of the base is a cylindrically shaped head 2 which is formed at one side with an inlet chamber 3 and at the opposite side with an outlet chamber 4. Leading to the chamber 3 is an inlet or suction pipe 5 and a discharge pipe 6 leads from the chamber 4. The head 2 is provided with an axial bore to receive a shaft 7 which is formed with an enlargement 8 forming a shoulder 9 to engage the end face of the head and the shaft is fixedly secured in the head by means of a nut 10 in its screwthreaded outer end and a key 11 engaging a key slot in the head and end of the shaft. By turning the nut up hard against the end of the head the shoulder 9 is drawn firmly into contact with the opposite face of the head and thus the shaft is rigidly secured in the axis of the head with its enlarged middle portion 8 extending laterally from the head and its outer end portion 12 which is reduced in diameter and screwthreaded, projecting outwardly from the end of the enlarged portion.

Mounted to turn freely upon the enlarged intermediate portion 8 of the shaft, is a cylinder block 13 which is formed with a plurality of bores 14 arranged around the shaft to receive a series of reciprocable pistons 15. The end of the block 13 is faced off accurately to fit tightly against the adjacent end face of the head 2, through which end face the chambers 3 and 4 open. The end of the block is also formed with an annular groove 16 to receive an outwardly projecting flange 17 on the head and thus when the block is held firmly against the adjacent face of the head a tight joint will be formed to prevent leakage between the block and head. The block is also formed upon its periphery to receive a belt, the block being flanged in the form of a pulley 18, for applying power to turn the block, or the same may be formed in any suitable manner to receive motion from an external driving member (not shown).

To reciprocate the pistons 15 within their cylinder ports 14, the large portion 8 of the shaft is formed with a cam groove 19 and pins 20 extending transversely through the pistons, are provided with rollers 21 on one end to engage said cam groove. The pistons are prevented from turning within their cylinders by the pins 20 which project at both the inner and outer sides of the pistons into longitudinal slots 22 cut inward from the outer end of the block 13. As the block is turned upon the fixed shaft by means of a belt or other device applied to it, the several pistons will be reciprocated in their cylinders by the engagement of the rolls upon their transverse pins with the cam slot, said slot being so arranged that as the pistons pass the chamber 3 they are drawn outwardly away from said chamber to cause a vacuum therein and draw in through the inlet pipe 5. The inflowing fluid fills the ends of the cylinders just vacated by the retreating pistons and when said pistons pass the dividing wall 23 between the chambers 3 and 4, these charges of fluid contained in the cylinders are carried past said wall and discharge into the chamber 4 as the pistons are reciprocated in an opposite direction during their travel past said chamber. As the pistons pass the dividing wall 24 between the lower ends of the chambers 3 and 4, said pistons are at the extreme inner end of their stroke and upon further turning and the bringing of

the same opposite the chamber 3 they are gradually again moved outwardly to draw in the fluid.

To hold the cylinder block firmly in contact with the face of the head 2, a coiled spring 25 is sleeved upon the end 12 of the shaft between a washer 26 keyed upon the shaft and in contact with the end of the block and a thumb nut 27 having screw-threaded engagement with the end of the shaft. The block is thus yieldingly held in contact with the face of the head to form a tight joint but should the back pressure of the pump be greatly increased owing to the stoppage of the outlet in any way, the spring 25 will yield slightly and permit the block to move away from the head, thus causing a leakage past the walls 23 and 24 so that the fluid may pass from one chamber to the other, relieving the pressure and preventing breakage of the parts. By turning the nut 27 the tension of the spring 25 may be adjusted and thus the pressure with which the fluid is forced from the pump may be accurately regulated. The outer end of the block in which the slots 22 are cut, is preferably inclosed within a sheet metal casing 28 which is secured at its outer rim to the side of the pulley 18 and extends outward and thence inward with its inner edge adjacent to the washer 26. This casing may be filled with a suitable lubricant to keep the pistons and moving parts thoroughly oiled.

A very simple and efficient construction is secured by the arrangement described and an automatic relief is provided without the necessity for valves. Further the pressure with which the fluid is discharged by the pump may be quickly and accurately regulated by means of the adjusting nut 27 and the construction is such as to provide a very compact and efficient pump.

Obviously, changes may be made in the construction and arrangement of parts without departing from the spirit of my invention and I do not limit myself to the particular form or arrangement shown.

Having thus fully described my invention what I claim is:—

1. In a pump, the combination of a fixed member having an inlet and an outlet chamber opening through one side of said member, a rotatable member having a plurality of cylinder ports opening through one face of the member which face is adapted to engage the face of the fixed member through which the chambers open, said cylinder ports being arranged to register with said chambers during the turning of the rotatable member, a fixed cam member, pistons in the cylinder bores, means carried by the pistons for engaging the cam member, and means for turning the rotatable member.

2. In a pump, the combination with a fixed head formed with an inlet chamber and an outlet chamber separated by a dividing wall and opening through one face of the head, a rotatable member having a plurality of cylinder bores arranged around its axis and opening through one face of the member, said member being arranged to rotate with said face in contact with the face of the head through which the chambers open with the open ends of the cylinder bores in position to register with said chambers during the turning of the member, means applied to the periphery of the rotatable member for turning the same, a fixed cam member, a piston in each cylinder bore, means carried by each piston to engage the cam member and reciprocate the pistons during the turning of the rotatable member, and means for yieldingly holding the rotatable member with its said face in contact with the said face of the head.

3. In a pump, the combination of a fixed head formed with an inlet chamber and an outlet chamber opening through one face of the head, a shaft fixed in the axis of the head and extending from said face, said shaft being provided with a cam groove, a rotatable cylinder block mounted to turn upon said shaft and provided with a plurality of cylinder bores extending longitudinally therethrough and arranged around the axis of the shaft, said block being adapted to turn with its face in contact with the face of the head through which the chambers open with the cylinder bores arranged to register with said chambers, pistons in the cylinder bores, pins carried by the pistons to engage the cam groove in the shaft, and means applied to the periphery of the cylinder block for turning the same.

4. In a pump the combination of a fixed cylindrical head formed with an inlet chamber and an outlet chamber opening through one face of the head, a shaft fixed in the axis of the head and extending from said face, said shaft being provided with a cam groove, a rotatable cylinder block mounted to turn upon the shaft and formed with a plurality of cylinder bores arranged around the axis of the shaft and opening through the block at each end, said cylinder bores being arranged to register with the chambers in the head during the turning of the block and said block being formed with longitudinal slots extending inward from one end of the block and cutting the cylinder bores, pistons in the cylinder bores, pins carried by the pistons in engagement with the slots in the block and adapted to project into the cam slot in the shaft, means for turning the block, and means adjustably secured upon the outer end of the shaft for holding the block in contact with the said face of the head.

5. In a pump, the combination of a fixed

cylindrical head, formed with an inlet chamber and an outlet chamber opening through one face of the block, a shaft fixed at one end in the axis of the head and extending laterally from said face of the head and provided with a cam slot, a cylinder block mounted upon the shaft to rotate thereon with one face in contact with the said face of the head and formed with a plurality of cylinder bores opening through said face and adapted to register with the chambers in the head during the turning of the block, said block being also formed with longitudinal slots extending inward from its outer end and cutting the cylinder bores transversely, pistons in the cylinder bores, pins carried by the pistons transversely thereof with their ends engaging the slots in the block, rolls on the ends of the pins in engagement with the cam slot in the shaft, an outwardly extending portion on the block to which power is adapted to be applied for turning the block, and a casing secured to said outwardly extending portion and extending inwardly over the outer end of the block to inclose the outer ends of the cylinder bores and slots.

6. In a pump, the combination of a fixed cylindrical head formed with an inlet chamber and an outlet chamber divided by a wall, said chambers opening through one face of the head, a supply pipe for the inlet chamber and a discharge pipe for the outlet chamber, a shaft having an enlarged portion intermediate its ends formed with a cam groove and forming a shoulder to engage the face of the head and secured against rotation within the axis of said head with the enlarged portion projecting laterally from said face, a cylinder plug mounted to rotate upon said enlarged portion of a shaft and formed with a plurality of cylinder bores arranged around the axis of the shaft and extending through the block with one end thereof adapted to register with the chambers in the head during the turning of the block pistons in the cylinder bores, means carried by the pistons for engaging the cam slot, means for turning the block, a coiled spring sleeved upon the outer end of the shaft to yieldingly hold the block with its said face in contact with the said face of the head, and means adjustable upon the shaft for engaging the spring and varying the tension thereof.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM H. EIZERMAN.

Witnesses:
LEWIS E. FLANDERS,
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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."