Dec. 3, 1929. W. NELSON 1,738,309

PUMP

Filed Nov. 5, 1927

Fig. 1.

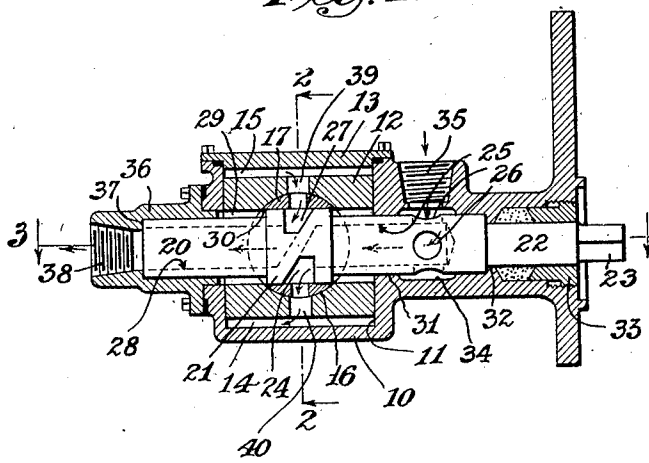


Fig. 2.

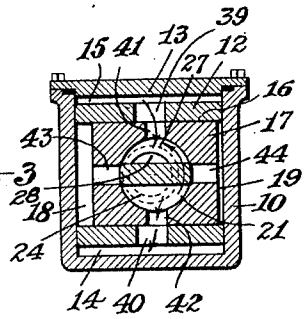


Fig. 3.

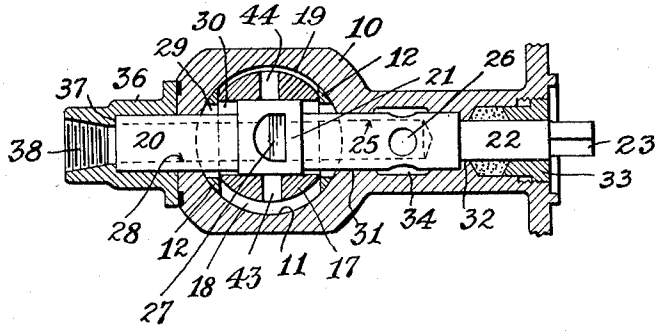
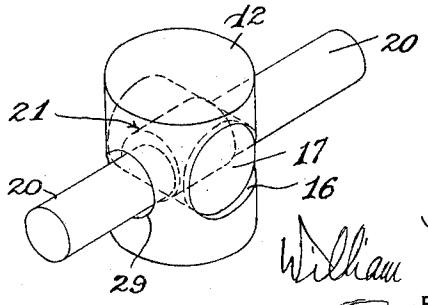


Fig. 4.



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Patented Dec. 3, 1929 1,738,309

UNITED STATES PATENT OFFICE

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PUMP

Application filed November 5, 1927. Serial No. 231,195.

This invention relates to pumps of the valveless type, and aims to provide a new and efficient pump capable of wide utility.

A particular object of the invention is to provide a positive displacement pump in which the displacement is provided by telescopically sliding members which are moved at right angles to each other by an eccentric on the operating shaft. The sliding members cause increase and decrease in the displacement chambers, and these chambers are in communication with ports in the operating shaft.

Each of the displacement chambers is formed between the end of one of the sliding members and the wall of the pump housing.

A further feature of the invention resides in the fact that the sliding members may be of cylindrical form to facilitate the manufacture of the parts with close and accurate fitting.

These and other objects and advantages of the invention will become apparent as the description proceeds.

While a preferred form of the invention has been disclosed for purposes of illustration, it should be understood that various changes may be made in the structure and arrangement of parts without departing from the spirit and scope of the invention as hereinafter set forth and claimed.

In the drawings:

Fig. 1 is a longitudinal section through a pump embodying the invention.

Fig. 2 is a section on line 2—2 of Fig. 1.

Fig. 3 is a section on line 3—3 of Fig. 1.

Fig. 4 is a diagrammatic perspective of the working parts of the pump.

In carrying out the invention provision is made for a pump housing in which the secondary pump piston fits in such a manner that it is free to slide in one direction, for example vertically, but is restrained against all other movement. The primary piston fits within the secondary in such manner that it can move only in a plane at right angles to the plane of motion of the secondary piston. The opposite ends of both primary and secondary pistons cooperate with the walls of the pump housing to form displacement chambers which may be utilized for pumping purposes. A shaft extends through the housing and through the primary and secondary pistons and carries an eccentric for operating the pistons. The pistons may be of prismatic or other suitable shape, although in the form illustrated the pistons are shown as being cylindrical, this form having certain advantages in manufacturing the parts with very small clearances.

Referring to the drawings more particularly, the reference numeral 10 indicates the pump housing, which is formed with a vertical cylindrical bore 11. The cylindrical secondary piston 12 fits closely in the circumference of bore 11, but is somewhat shorter than the vertical length of the bore, so that when the upper end of the bore is closed by the cover plate 13, a chamber 14 is formed below the piston 12 and a chamber 15 is formed above said piston.

A cylindrical horizontal bore 16 is formed through the secondary piston 12, and the primary piston 17 has a sliding fit in the bore 16. The ends of piston 17 are curved to conform to the shape of the bore 11, and the piston 17 is shorter than the diameter of bore 11, leaving chambers 18 and 19 between the opposite ends of the piston 17 and the casing 10.

The operating shaft 20 has an eccentric 21 formed intermediate its length and carries at one end a reduced extension 22 with an end 23 suitably formed to receive an operating device. A port 24 formed in one side of the eccentric communicates with a bore 25 in the shaft, while a plurality of apertures 26 open through the periphery of the shaft into the bore 25. A port 27 formed in the eccentric on the side opposite port 24 communicates with a bore 28 leading to the end of the shaft opposite the reduced extension 22. The pistons 12 and 17 are formed with bores 29 and 30 of a size to receive the eccentric 21 and extending at right angles to the bore 16. The casing 10 is also provided with a bore 31 receiving the shaft, and with a reduced bore 32 fitting about extension 22. A packing gland 33 prevents leakage at the driving end of the shaft. The casing 10 is formed with an in-

let chamber 34 surrounding the shaft at the apertures 26, and an inlet passage 35 conducts fluid from the source of supply into the inlet chamber. A discharge cover 36 fits over the end of the shaft and is secured to casing 10. The cover 36 has a shoulder 37 engaging the end of the shaft and a discharge passage 38 in registry with the passage 28 in the operating shaft.

The secondary piston 12 is formed with a port 39 in its upper end leading from the bore 16 to the chamber 15, and with a port 40 in its lower end leading from bore 16 to chamber 14. The primary piston 17 is pierced by ports 41 and 42 leading from bore 30 to ports 39 and 40, respectively, and by ports 43 and 44 leading from bore 30 to chambers 18 and 19 respectively.

The pump operates in the following manner:

In the position of Fig. 2 the cam is toward the right.

As shaft 20 rotates in a counter clockwise direction the primary piston 17 will be reciprocated laterally and the secondary piston 12 will be reciprocated vertically by the travel of the eccentric 21. During the first phase of the movement from the position of Fig. 2 the piston 17 will start toward the left, and the piston 12 will move upwardly causing chambers 14 and 19 to expand while the port 24 places these chambers in communication with the inlet port. At the same time the chambers 15 and 18 are contracted while they are open to the outlet port 27. In this manner expanding chambers are drawing fluid in through the inlet and contracting chambers are forcing fluid out through the outlet continuously during the operation of the pump.

I claim:

1. A pump comprising a casing, a plurality of telescopically related cylindrical pistons mounted in the casing and forming a plurality of chambers, a shaft extending through the pistons and carrying an eccentric for operating the pistons, the parts being formed with ports and passages providing inlet and outlet from the chambers.

2. A pump comprising a casing, a cylindrical secondary piston mounted for sliding in the casing, a cylindrical primary piston mounted for sliding within the secondary piston, a shaft extending through the pistons and carrying an eccentric for operating the pistons, the parts being formed with ports and passages providing inlet and outlet from the chambers.

3. A pump comprising a housing, a cylindrical secondary piston fitting in the housing in such a manner as to leave chambers between opposite ends of the secondary piston and the housing, the secondary piston having a cylindrical guideway formed therethrough, a cylindrical primary piston fitting in the guideway in such a manner as to leave chambers between opposite ends of the primary piston and the housing, the piston being formed with a shaftway extending at right angles to the guideway, and a shaft extending through the shaftway and carrying an eccentric within the primary piston.

4. A pump comprising a housing, a cylindrical secondary piston fitting in the housing in such a manner as to leave the chambers between opposite ends of the secondary piston and the housing, the secondary piston having a cylindrical guideway formed therethrough, a cylindrical primary piston fitting in the guideway in such a manner as to leave chambers between opposite ends of the primary piston and the housing, the piston being formed with a shaftway extending at right angles to the guideway, and a shaft extending through the shaftway and carrying an eccentric within the primary piston, the parts being formed with ports and passages providing inlet and outlet from the chambers.

5. A pump comprising a housing, a cylindrical secondary piston fitting in the housing in such a manner as to leave secondary chambers between opposite ends of the piston and the housing, the secondary piston being formed with a cylindrical guideway and with ports leading from the guideway to the secondary chambers, a cylindrical primary piston fitting in the guideway in such a manner as to leave primary chambers between opposite ends of the primary piston and the housing, the pistons being formed with a shaftway, and the primary piston having ports leading from the shaftway to the primary chambers, and with other ports leading from the shaftway to the ports in the secondary piston, a shaft extending through the shaftway and carrying an eccentric within the primary piston, the shaft being formed with inlet and discharge passages leading to ports on the circumference of the eccentric.

6. A pump comprising a housing, a secondary piston fitting in the housing in such a manner as to leave chambers between opposite ends of the secondary piston and the housing, the secondary piston having a guideway formed therethrough, a primary piston fitting in the guideway in such a manner as to leave chambers between opposite ends of the primary piston and the housing, the piston being formed with a shaftway extending at right angles to the guideway, and a shaft extending through the shaftway and carrying an eccentric within the primary piston.

7. A pump comprising a housing, a secondary piston fitting in the housing in such a manner as to leave chambers between opposite ends of the secondary piston and the housing, the secondary piston having a guideway formed therethrough, a primary piston fitting in the guideway in such a manner as to leave chambers between opposite ends of the primary piston and the housing, the piston

being formed with a shaftway extending at right angles to the guideway, a shaft extending through the shaftway and carrying an eccentric within the primary piston, the parts being formed with ports and passages providing inlet and outlet from the chambers.

8. A pump comprising a housing, a secondary piston fitting in the housing in such a manner as to leave secondary chambers between opposite ends of the piston and the housing, the secondary piston being formed with a cylindrical guideway and with ports leading from the guideway to the secondary chambers, a primary piston fitting in the guideway in such a manner as to leave primary chambers between opposite ends of the primary piston and the housing, the pistons being formed with a shaftway, and the primary piston having ports leading from the shaftway to the primary chambers and with other ports leading from the shaftway to the ports in the secondary piston, a shaft extending through the shaftway and carrying an eccentric within the primary piston, the shaft being formed with inlet and discharge passages leading to ports on the circumference of the eccentric.

In testimony whereof I affix my signature.

WILLIAM NELSON.