F. M. METCALF.

PUMP.

APPLICATION FILED FEB. 18, 1913.

1,077,419.

Patented Nov. 4, 1913.

2 SHEETS—SHEET 1.

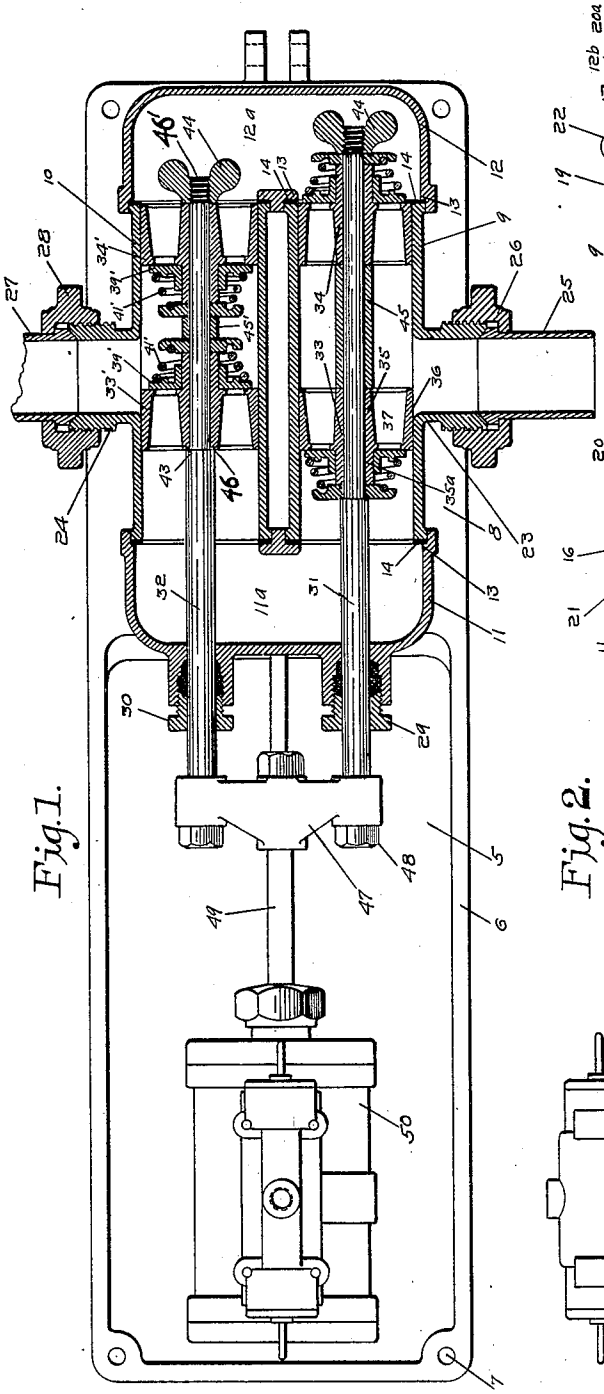


Fig. 1.

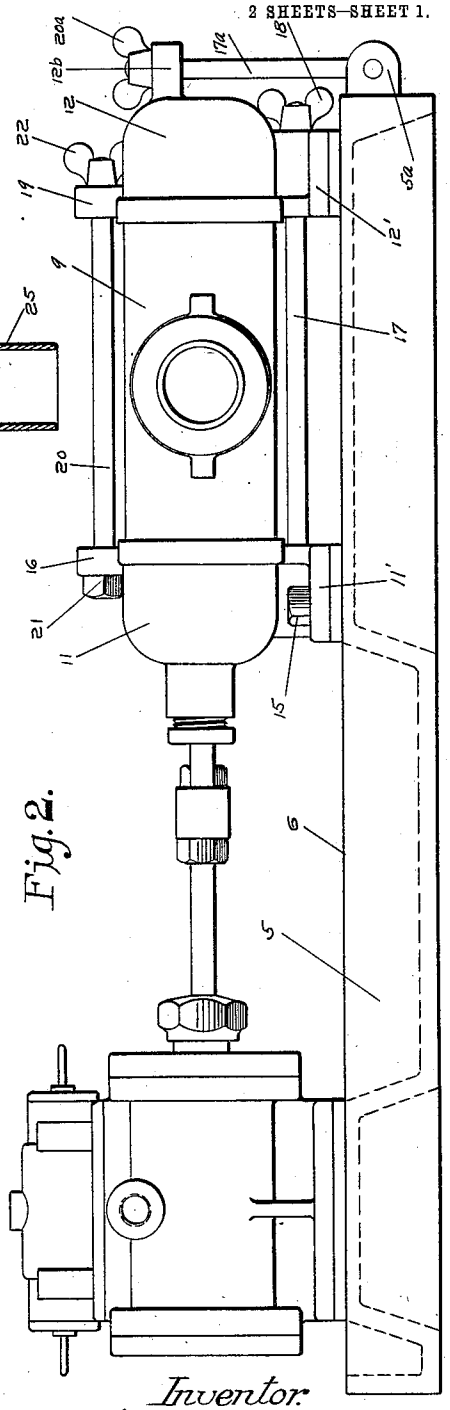


Fig. 2.

Witnesses.

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2 SHEETS—SHEET 2.

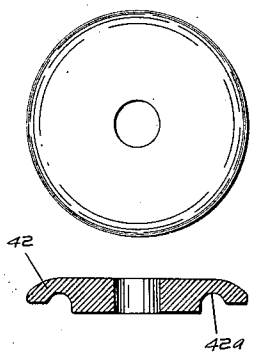


Fig. 10.

Fig. 9.

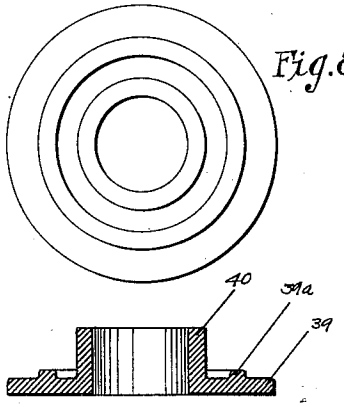


Fig. 8.

Fig. 7.

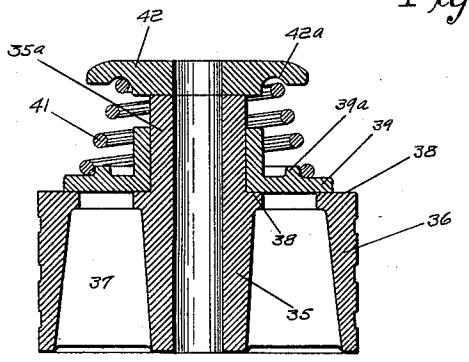


Fig. 3.

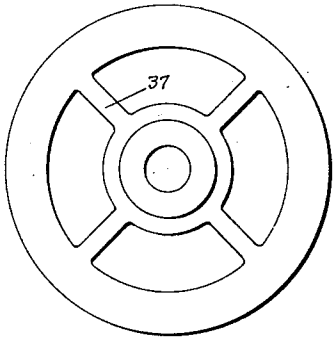


Fig. 5.

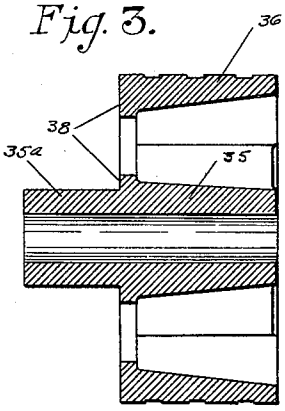


Fig. 4.

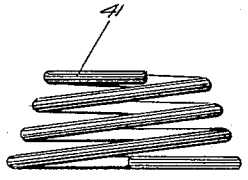


Fig. 6.

Witnesses.

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UNITED STATES PATENT OFFICE.

FOSTER M. METCALF, OF BATTLE CREEK, MICHIGAN.

PUMP.

1,077,419. Specification of Letters Patent. Patented Nov. 4, 1913.

Application filed February 18, 1913. Serial No. 749,131.

To all whom it may concern:

Be it known that I, FOSTER M. METCALF, a citizen of the United States, residing at Battle Creek, in the county of Calhoun 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 pumps and its leading object is to provide a simple pump having duplex coöperating suction pistons and duplex delivery pistons.

Another object of the invention is the construction of a pump in which the usual cause of objectionable vibrations and pulsations is eliminated.

A still further object of the invention is the provision of a pump with an efficiently operating piston adapted to be reversed to be operated for suction or for delivery.

A still further object of the invention is the provision of a pump frame or casing which may be easily assembled and easily taken down to enable the parts thereof to be readily and satisfactorily cleaned.

A still further object of the invention is the provision of a pump frame or casing having end caps or closing members and clamping bolts for holding said caps in sealed positions on the cylinder ends.

With the above and other objects in view the invention embraces certain combinations, constructions and arrangements of parts, clearly described in the following specification and clearly illustrated in the accompanying drawings, in which:—

Figure 1 is a horizontal sectional view showing the construction of the pump pistons and valves and the manner of mounting the pistons on the pump rods, which are shown in parallel arrangement, and also showing an operating motor in plan. Fig. 2 is a side elevation showing the means for clamping the end caps of the pump cylinders in position and also showing the operating motor. Fig. 3 is a central sectional view of one of the pump pistons and its valve. Fig. 4 is a sectional view of the pump piston. Fig. 5 is a plan view thereof. Fig. 6 is a side elevation of the valve spring. Fig. 7 is a sectional view of the valve. Fig. 8 is a plan view thereon. Fig. 9 is a sectional view of a spring stop collar. Fig. 10 is a plan view thereof.

Referring to the accompanying drawings illustrating the preferred embodiment of the invention 5 designates the base, which is provided with upstanding edge flanges 6, which form a catchment basin. Suitable openings 7 are formed in the base for receiving screws or other fastening devices, whereby the base may be attached to any suitable support, such as a table or the floor of the room in which the pump is to be used. One end of the base is formed with a table portion 8 on which the pump frame and mechanism rest.

The frame of the pump comprises a cylinder 9 and a cylinder 10, which are disposed in parallel relation to each other and are held in relative positions by the end caps 11 and 12. The end caps 11 and 12 are formed with circular seats 13 to receive the ends of the cylinders and suitable gaskets 14 are arranged on said seats to seal the joints between the end caps and the cylinders.

The end cap 11 is provided with feet 11′ which are secured to the base by means of bolts 15, only one of which is shown. This end cap 11 is further provided with an upstanding lug 16. The end cap 12 is provided with feet 12′ which rest on the base and a clamping bolt 17 is secured at one end to the lower portion of the end cap 11 and at the other end by the wing thumb nut 18 to the lower portion of the end cap 12. The end cap 12 is provided with an upstanding lug 19 and a clamping bolt 20 is extended through the lug 16, of the end cap 12, and said bolt is provided with a head 21 on one end and a wing nut 22 on the other end, whereby the end caps may be tightly clamped on the ends of the cylinders 9 and 10.

The cylinders 9 and 10 are made in duplicate and are provided with lateral nipples 23 and 24, respectively, and which nipples are located midway of the ends of the cylinders. A pipe 25 is secured by the coupling nut 26 to the nipple 23 and a pipe 27 is secured by the coupling nut 28 to the nipple 24.

The nipples 23 and 24 and their pipes are shown in the drawing in horizontal planes, but said nipples may be readily disposed in any plane desired by turning the cylinders on their seats in the end caps, and one cylinder may be turned one way and the other cylinder may be turned the opposite way, so that one nipple will lie in one plane or be disposed at one angle to the base and

the other nipple will lie in another plane or be disposed at another angle to the base.

The end cap 11 is provided with suitable glands 29 and 30, through which the piston rods 31 and 32 operate.

The pump rod 31 carries piston heads 33 and 34, which are duplicates of each other, and which consist of a central sleeve 35 and a cylindrical body 36, which is secured to said sleeve by the radial arms 37. A valve seat 38 is formed on end of the piston head and a disk valve 39, which is provided with a sleeve 40 slidably embracing the sleeve extension 35^a of the piston head, is held on said valve seat 38 by a helical spring 41, positioned around said sleeve 40, and which engages a circular flange 39^a formed on the disk valve 39, by its inner and larger end, and engages a collar stop 42, having the seat 42^a therein, by its outer and smaller end. The stop collar 42 is slidably disposed on the pump rod, as indicated in Figs. 3, and Fig. 1. Each pump rod is formed with a shoulder 43 which is engaged by one end of the innermost valve or piston head thereof, and its outer end is threaded to receive a wing thumb nut 44, which is adapted to hold the twin piston heads and valves of each pump rod in place. The piston heads 33 and 34 are spaced apart by means of a sleeve 45, slidably disposed on the pump rod.

The pump rod 32 carries twin piston heads 33′ and 34′, which are duplicates of the piston heads 33 and 34, and coöperating valves 39′, spring seated by the springs 41′. The pump rod 32 is formed with a stop shoulder 46 and its free end being screw threaded as at 46′.

The outer ends of the pump rods 31 and 32 are connected to each other by means of a coupling rod crosshead 47 and nuts 48. The crosshead 47 is connected to a motor shaft 49, which may be operated by any suitable motor mechanism 50, a steam motor being shown as merely a convenient form of motive power.

In the drawings the piston heads and valves of the pump rod 31 are shown to be arranged for suction action, that is with their open ends disposed in confronting relation. The piston heads 33′ and 34′ and their coöperating valves are disposed with the valves in confronting relation. The piston heads of the pump rod 32 and their coöperating valves may be arranged as the piston heads and coöperating valves of the pump rod 31, and those of said pump rod 31 may be arranged as those of the pump rod 32.

When the shaft 49 is operated to drive the pump rods 31 and 32 the valve of piston head 33 will be unseated during the inward movement of the pump rod 31 and the valve of piston head 34′ will be unseated during the simultaneous inward movement of the pump rod 32. During the outward movement of said pump rods the valve of piston head 34 of the rod 31 will be unseated and the valve of piston head 33′ of the rod 32 will be unseated. The liquid will be drawn into the cylinder 9 by the reciprocated pistons 33 and 34 forced through the valve closed openings thereof into the passages 11^a and 12^a, formed by the end caps 11 and 12. In other words, on the outward stroke of the piston rod 31 the piston head 34 will draw the liquid into the cylinder 9 and the valve of the piston head 33 will unseat to allow the liquid to pass through said piston head. On the inward stroke of said rod 31 the piston head 33 will draw liquid into the cylinder 9 and the valve of the piston head 34 will unseat to allow the liquid to flow through said piston head 34. When the valve of the piston head 33 is open or unseated the valve of the piston head 34′ is also open and when the valve of the piston head 34 is closed the valve of the piston head 33′ is closed. By this construction one of the valved piston heads of the rod 31 will draw at each stroke of said rod and one of the valved piston heads of the rod 32 will act to force the liquid to delivery. As the valved pistons are made alike any one of the valved piston heads can be substituted for any of the others, and as the cylinders and their nipples are interchangeable the inlet valved piston heads of one of the pump or piston rods may be placed on the other pump or piston rod, to change the direction of flow of the liquid through the cylinders. The movement of the valved piston heads of one rod balances the movement of the valved piston heads of the other rod, so that the conflict of forces which takes place in the usual pumping operation is avoided, and a uniform inflow and outflow of the liquid is maintained. On each stroke two of the piston heads are closed and two are open, and the opening and closing of the piston heads does not involve a fluid reaction or a mechanical disturbance.

When it is desired to clean the interior of the pump, which is particularly designed for use in connection with pumping milk, the end cap 12 is removed by unscrewing the thumb nut 20^a, which holds the bolt 17^a clamped to the end lug 12^b, and which bolt is pivoted to the lug 5^a of the base 5, and the thumb nuts 18 and 22 are unscrewed from the ends of the clamping bolts or rods 17 and 20, thus permitting the end cap 12 and the two cylinders 9 and 10 to be withdrawn. After the end cap and the cylinders have been removed from their normal positions the piston heads of both of the piston or pump rods may be removed by unscrewing the thumb nuts 44 from the ends of said rods and thereby releasing said piston heads

and their coöperating valves. It will be seen, therefore, that the connecting bolts permit the cylinders and the operating parts to be separated and easily sterilized or cleaned.

The nipples and their pipes are readily adjustable without interfering with the clamped end caps. Mason jar washers may be employed as gaskets.

Having described my invention I claim:—

A pump comprising companion communicating cylinders, each cylinder having a nipple, piston rods working in the cylinders, valved piston heads on one of the rods with outwardly opening valves, valved piston heads on the other piston rod with inwardly opening valves; each piston head consisting of a central tube adapted to be secured to the piston rod, a cylindrical body adapted to slide against the cylinder wall, a perforated end wall connecting said cylindrical body and tube, a sleeve projecting outwardly of the end wall, a valve collar seatable on the end wall and slidable on the sleeve, a coiled spring bearing against the valve collar to hold the same seated, and a stop collar for holding the spring in place.

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

FOSTER M. METCALF.

Witnesses:
HOWARD H. METCALF,
THOMAS GALLOWAY.

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