

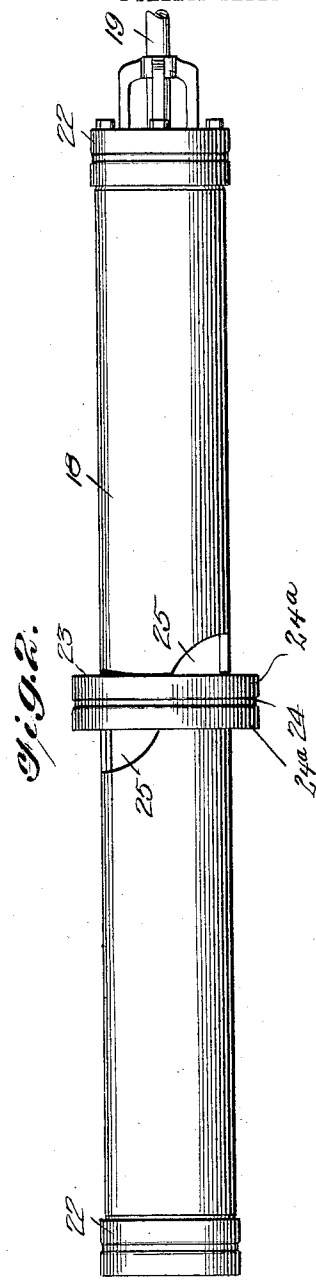
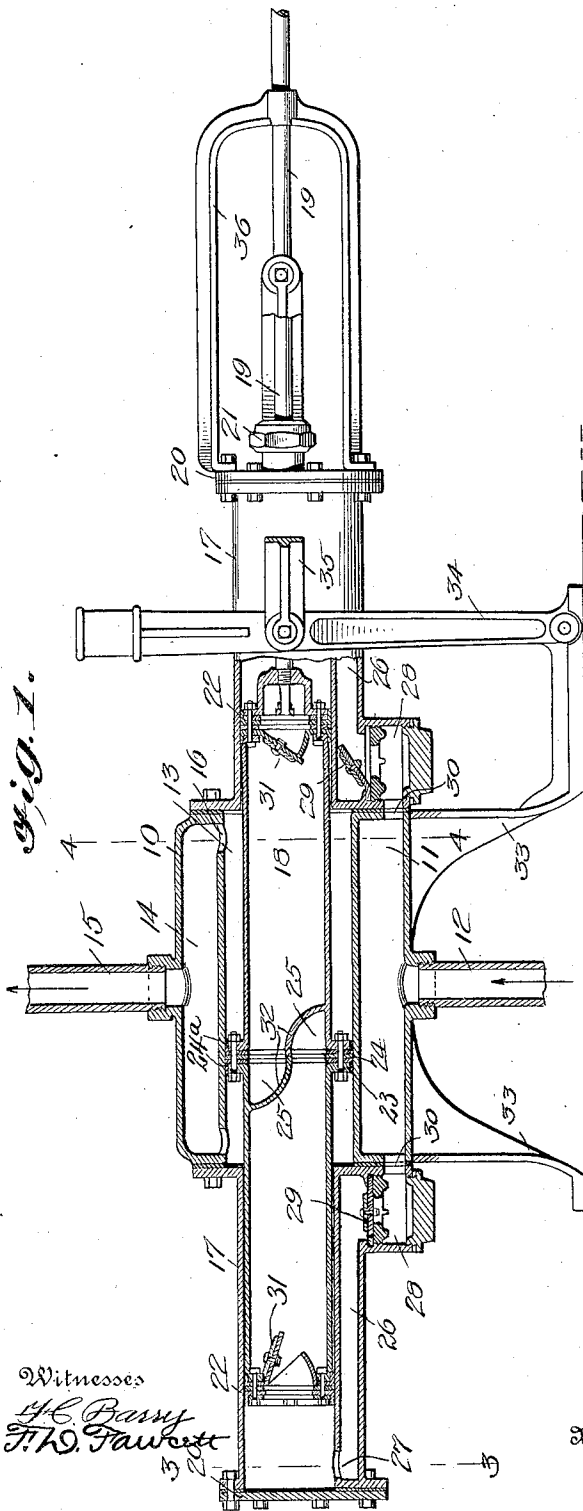
F. JOHNSON.
PUMP.

APPLICATION FILED JULY 18, 1912.

1,056,907.

Patented Mar. 25, 1913.

2 SHEETS-SHEET 1.



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Fig. 3.

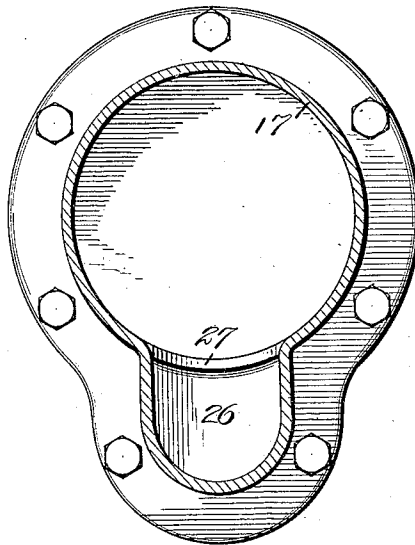
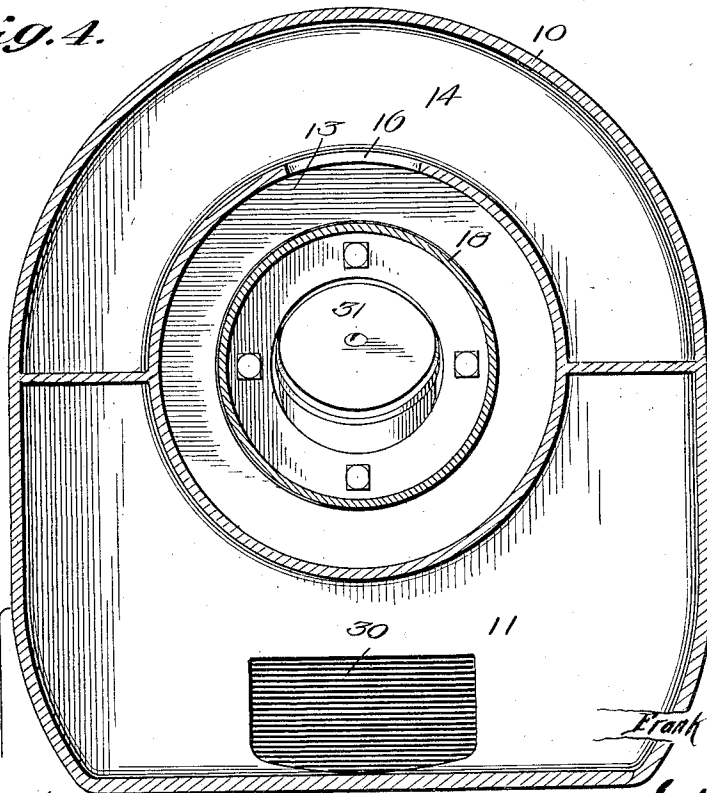


Fig. 4.



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UNITED STATES PATENT OFFICE.

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To all whom it may concern:

Be it known that I, FRANK JOHNSON, a citizen of the United States, residing at Walla Walla, in the county of Walla Walla and State of Washington, have invented certain new and useful Improvements in Pumps, of which the following is a specification.

The present invention has for its object to provide a pump having a hollow plunger through which the fluid is discharged behind a forcing head carried by the plunger.

The invention also has for its object to provide a pump having a continuous flow, and furthermore, to so arrange the parts that the pressure is equal on both sides of the forcing head, thus counterbalancing the same.

Other objects and advantages of the invention will be pointed out in the detailed description appearing hereinafter, reference being had to the accompanying drawings, in which—

Figure 1 is an elevation of the pump, partly in section. Fig. 2 is an elevation of the pump plunger removed. Figs. 3 and 4 are cross-sections on the lines 3—3 and 4—4, respectively, of Fig. 1.

Referring specifically to the drawings, 10 denotes the main cylinder of the pump, said cylinder having a suction chamber 11 with an inlet 12, a forcing chamber 13, and a discharge chamber 14 with an outlet 15. These chambers are all separate from one another, and they are parallel and extend lengthwise of the cylinder. The forcing and discharge chambers are in communication at each end by a port 16.

To each end of the cylinder 10 is bolted an auxiliary cylinder 17 which is in axial alinement with the forcing chamber 13. In the auxiliary cylinders works a reciprocating plunger 18 which is hollow. To one end of the plunger is connected a rod 19. The length of the plunger is such that it operates in both auxiliary cylinders, and passes through the forcing chamber. The inner ends of the auxiliary cylinders open into the forcing chamber, and the outer end of one of said cylinders is closed by a head 20, the outer end of the other auxiliary cylinder having a stuffing box 21 through which the rod 19 passes. Each end of the plunger is provided with a leather or other packing ring 22. Intermediate its ends, the plunger 18 has a forcing head 23, the same

being constructed by bolting together the two ends of the plunger, with a packing ring support 24 therebetween. The forcing head works in the chamber 13, and is provided with two leather or other packing rings 24^a. The plunger also has two discharge openings 25, located respectively, on opposite sides of the head. Each auxiliary cylinder 17 has a longitudinal suction chamber 26 which is in communication at its outer end with the bore of said cylinder in which the plunger works, by means of a port 27. The inner end of the auxiliary suction chamber is in communication with a valve chamber 28 containing a check valve 29, and communicating with the suction chamber 11 through a port 30. The valve 29 opens into the chamber 26, and prevents a back flow into the chamber 11. Each end of the plunger 18 has a check valve 31 which opens inward, and prevents a back flow from the interior of the plunger into the bore of the cylinder 17. Across the intermediate portion of the plunger 18 extends a partition 32 which is so arranged that the bore of the plunger, to the left of the head 23, opens into the forcing chamber 13 through the opening 25 to the right of said head, and the bore of the plunger, to the right of the head, opens into the forcing chamber through the opening 25 to the left of the head.

The cylinder 10 is mounted on a suitable base 33 on which is fulcrumed a rocker 34 connected by links 35 to the rod 19, for operating the plunger 18. Any other suitable means for operating the plunger may be provided. The outer end of the rod is guided by a yoke 36.

The pump operates as follows: Assuming the plunger 18 to be traveling to the left, the fluid enters the chamber 11 through the inlet 12, and passes through the port 30 and valve chamber 28 into the right auxiliary suction chamber 26, and thence by way of the port 27 into the bore of the auxiliary cylinder at the right. At the same time, the left end of the plunger is discharging, through the opening 25 to the right of the head 23, into the chamber 13, from which latter the fluid is forced by the head through the right port 16 into the chamber 14, and out of the latter through the outlet 15, when the plunger is traveling to the right. When the plunger is traveling to the right, the valve 31 at the right end of the plunger

opens and lets the fluid into said end of the plunger, from which latter it is discharged into the chamber 13, through the opening 25 to the left of the head 23, and from which chamber it is forced by the head through the left port 16 into the chamber 14, when the plunger again travels to the left. The same actions, in the proper order, take place in the left hand end of the pump, and the pump is therefore double-acting, and delivers a continuous stream.

By the structure herein described the pressure is equal on both sides of the forcing head, and the plunger is therefore balanced, and the dead lift is overcome to a certain extent, thus enabling a higher speed of operation to be attained.

The pump is shown arranged horizontally, but it may be placed vertically, with slight changes in the position of the valves.

The preferred embodiment of the invention has been shown, but it will be manifest that various minor changes in the structural details may be made without a departure from the spirit and scope of the invention.

I claim:

1. A pump comprising a forcing chamber, suction chambers on opposite ends of the forcing chamber, a hollow plunger having a forcing head working in the forcing chamber, and the interior of the plunger having valve-controlled communication with the suction chambers, and means for discharging the contents of the plunger at the respective ends thereof into the forcing chamber on the opposite side of the head.

2. A pump comprising a forcing chamber, suction chambers on opposite ends of the forcing chamber, and a hollow plunger having a forcing head working in the forcing chamber, the interior of the plunger having valve-controlled communication with the suction chambers, said plunger having discharge openings on opposite sides of the head, the openings on the respective sides of the head establishing communication between the interior of the plunger on the other sides of the head and the forcing chamber.

3. A pump comprising a forcing chamber, suction chambers on opposite ends of the forcing chamber, a hollow plunger having a forcing head working in the forcing chamber, the interior of the plunger having valve-controlled communication with the suction chamber, and said plunger having discharge openings on opposite sides of the head, and a partition in the interior of the plunger shutting off each end thereof from the discharge opening on the same side of the head.

4. A pump comprising a main cylinder having an inlet and an outlet, and a forcing chamber in communication with the outlet, an auxiliary cylinder on each end of the main cylinder, each of said auxiliary cylinders

having valve-controlled communication with the aforesaid inlet, and a valved hollow plunger working in the auxiliary cylinders and extending through the forcing chamber, said plunger having a forcing head which works in the forcing chamber, and the plunger being provided with discharge openings on opposite sides of the head, the openings on the respective sides of the head establishing communication between the bore of the plunger on the other sides of the head and the aforesaid forcing chamber.

5. A pump comprising a main cylinder having suction, forcing and discharge chambers, the suction chamber having an inlet, and the discharge chamber an outlet, an auxiliary cylinder on each end of the main cylinder, each of said auxiliary cylinders having valve-controlled communication with the suction chamber, and a valved hollow plunger working in the auxiliary cylinders, and extending through the forcing chamber, said plunger carrying a forcing head which works in the forcing chamber, and the plunger having discharge openings on opposite sides of the head, the openings on the respective sides of the head establishing communication between the bore of the plunger on the other sides of the head and the forcing chamber.

6. A pump comprising a main cylinder having suction, forcing and discharge chambers, the suction chamber having an inlet, and the discharge chamber an outlet, an auxiliary cylinder on each end of the main cylinder, each of said auxiliary cylinders having a suction chamber communicating with the bore of said cylinder and with the first-mentioned suction chamber, a check valve between said suction chambers, and a valved hollow plunger working in the auxiliary cylinders, and extending through the forcing chamber, said plunger carrying a forcing head working in the forcing chamber, and the plunger having discharge openings on opposite sides of the head, the openings on the respective sides of the head establishing communication between the bore of the plunger on the other sides of the head and the forcing chamber.

7. A pump comprising a main cylinder having an inlet and an outlet, and a forcing chamber in communication with the outlet, an auxiliary cylinder on each end of the main cylinder, each of said auxiliary cylinders having a valve-controlled communication with the inlet, a valved hollow plunger working in the auxiliary cylinders and extending through the forcing chamber, said plunger having a forcing head working in the forcing chamber, and the plunger being provided with discharge openings on opposite sides of the head, and a partition in the bore of the plunger shutting off each

end of said bore from the discharge opening on the same side of the head.

8. A pump comprising a forcing chamber having outlets at its ends, suction chambers
5 at opposite ends of the forcing chamber, a hollow plunger having a forcing head working in the forcing chamber between the outlets thereof, said plunger having outlet
10 ports on opposite sides of the forcing head, and the interior of the plunger having valve-controlled communication with the suction chambers, and a partition extending diagonally across the interior of the plunger to intersect the forcing head and ter-

minating on opposite sides thereof, one of 15 the plunger outlets being between one side of the forcing head and the corresponding side of the partition, and the other plunger outlet being between the other side of the plunger and the corresponding side of the 20 partition.

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

FRANK JOHNSON.

Witnesses:

ALLEN H. REYNOLDS,
G. S. BOND.

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