

A. C. WEBB.
 PISTON PUMP FOR AUTOMOBILE FIRE APPARATUS.
 APPLICATION FILED FEB. 5, 1912.

1,061,511.

Patented May 13, 1913.

6 SHEETS—SHEET 1.

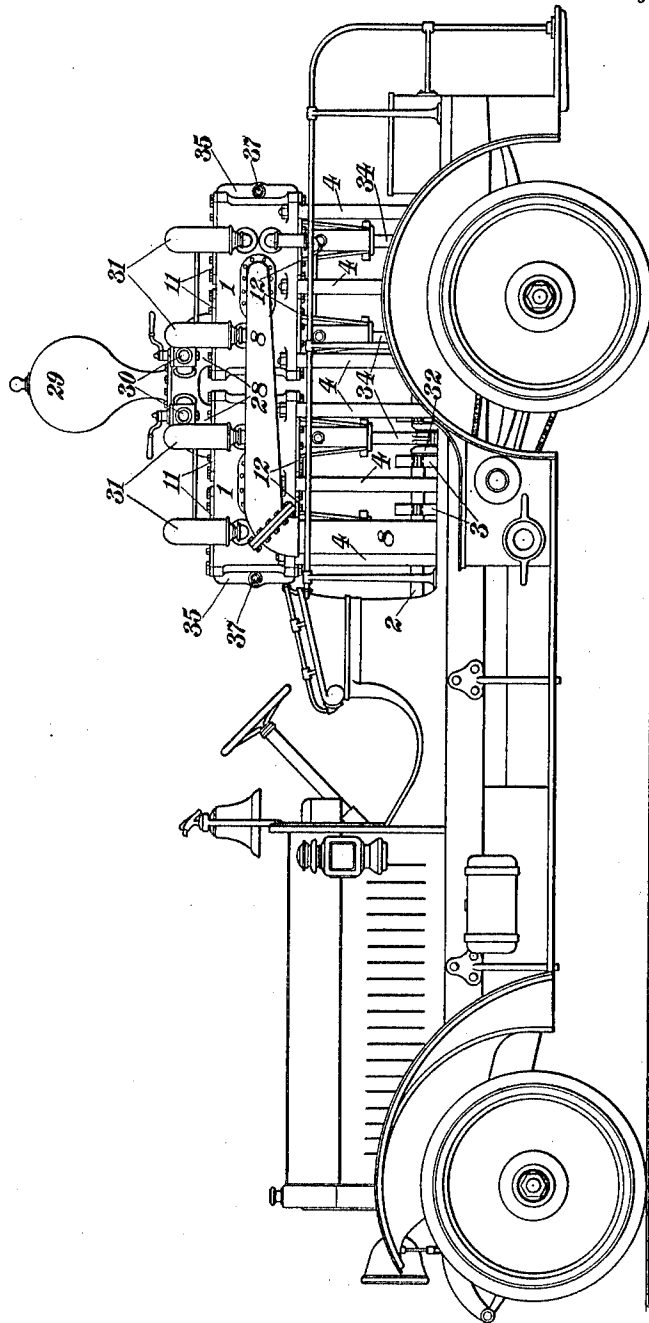


Fig. 1.

Witnesses:

George L. Anderson.
 Bertha von Behrens.

Inventor:

Albert C. Webb,
 by Hugh N. Wagner,
 His Attorney.

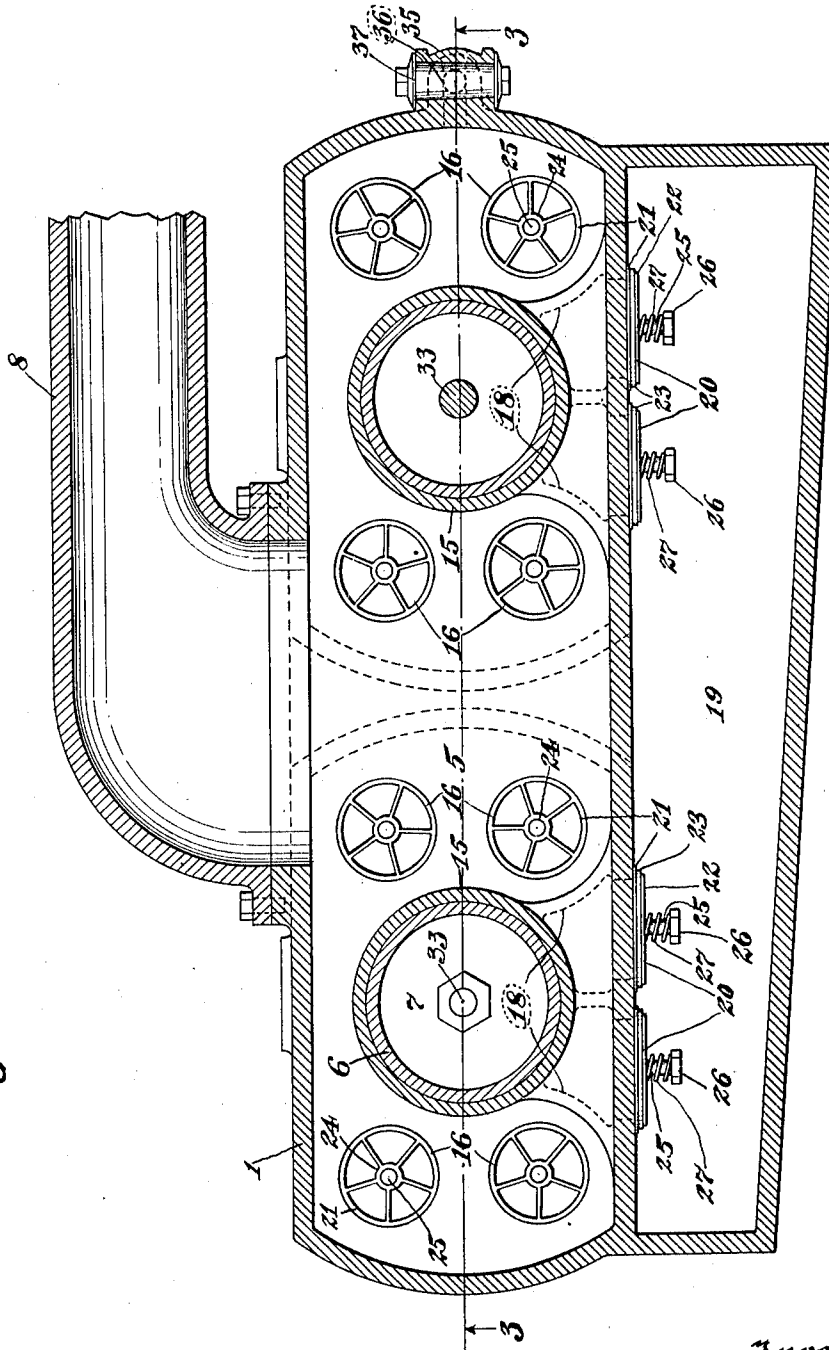
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6 SHEETS—SHEET 2.

Fig. 2.



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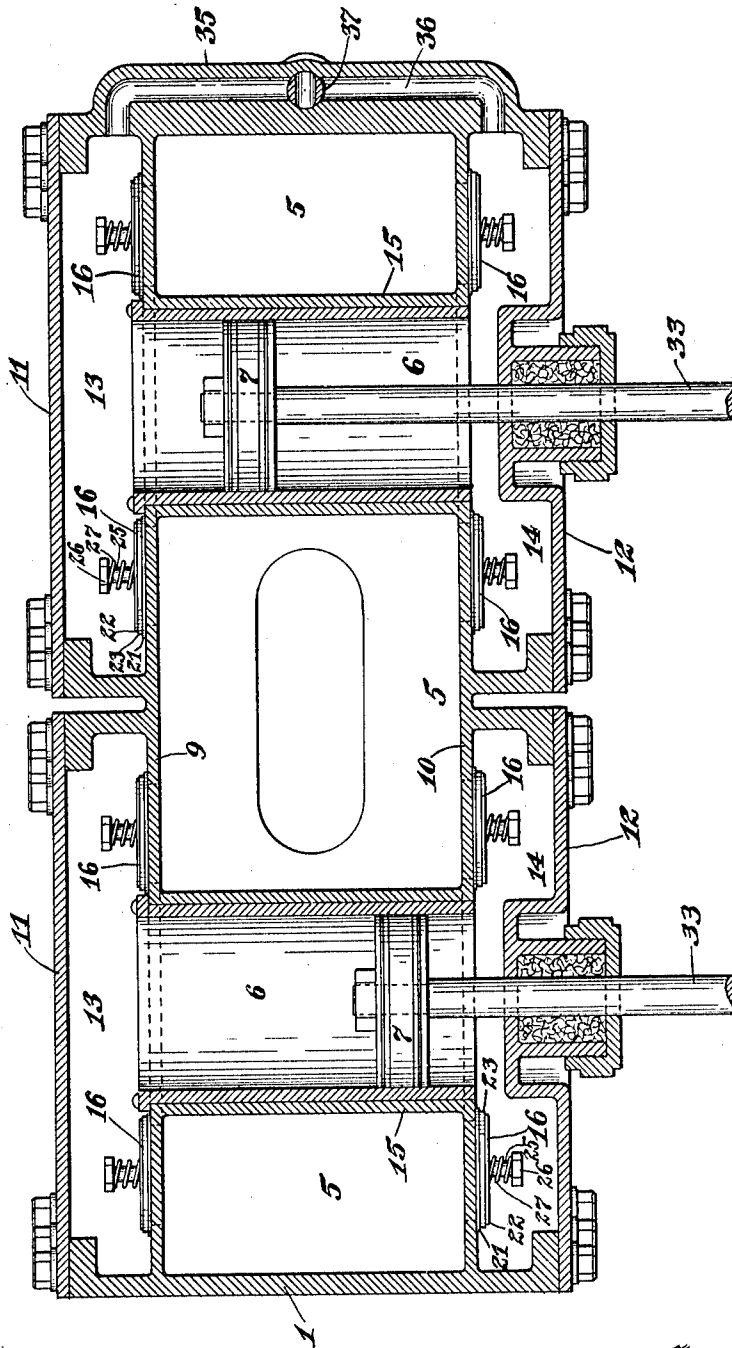
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5 SHEETS—SHEET 3.

Fig. 3.



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5 SHEETS—SHEET 4.

Fig. 4.

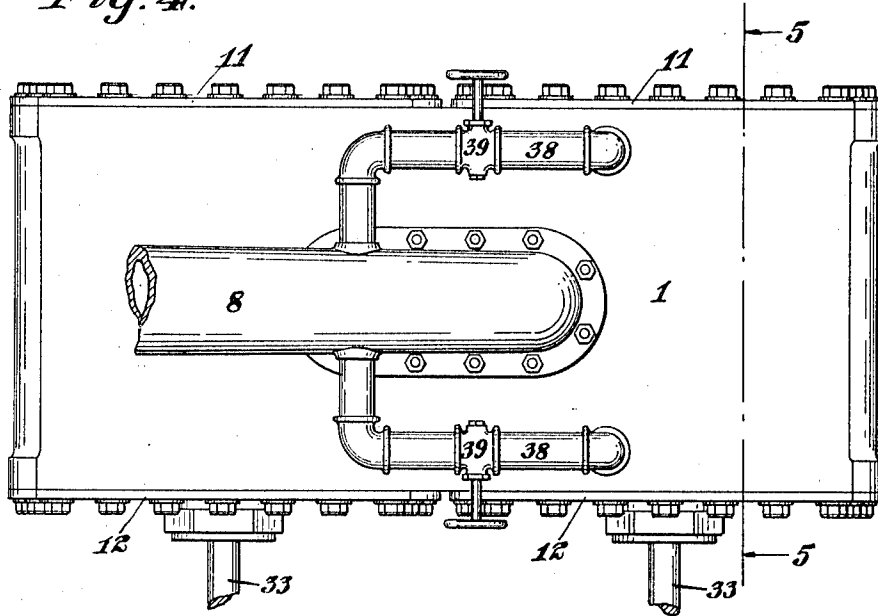
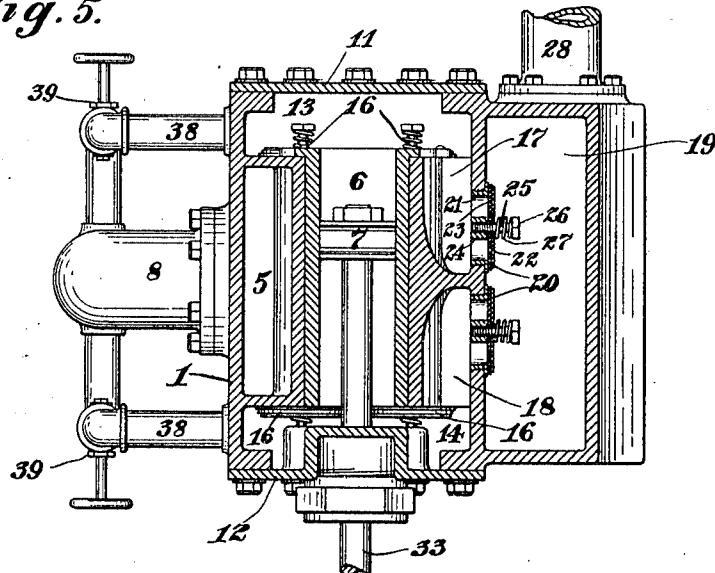


Fig. 5.



Witnesses:

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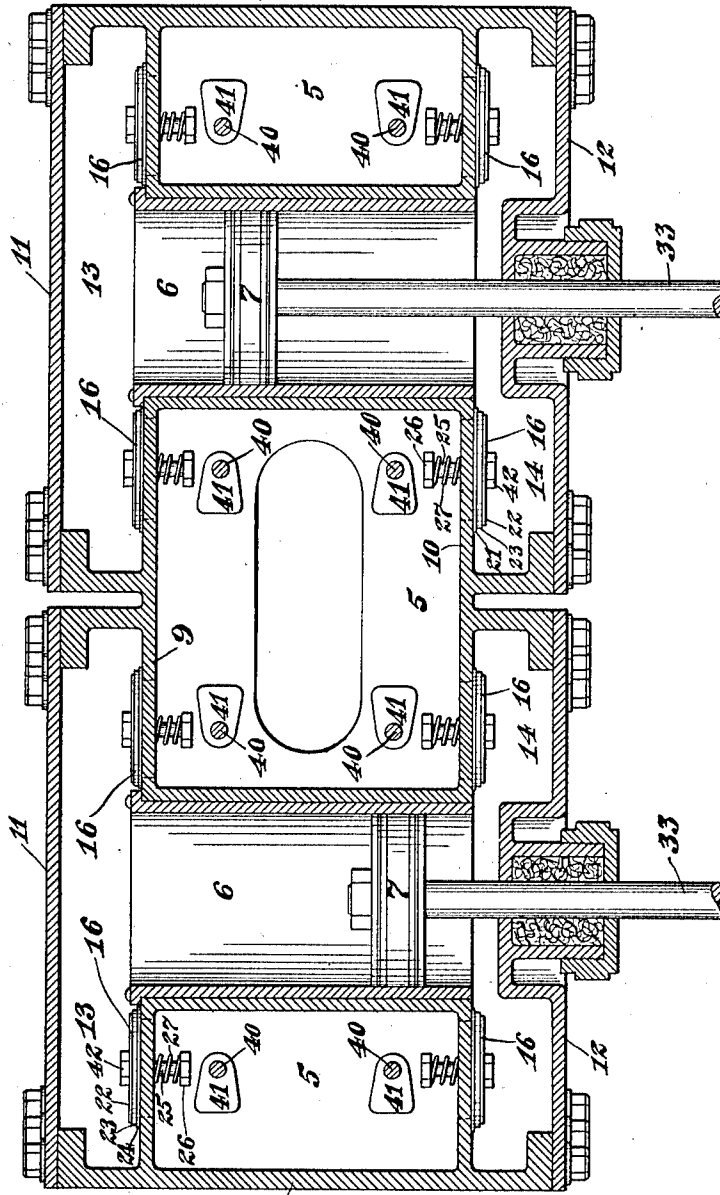
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5 SHEETS—SHEET 5.

Fig. 6.



Witnesses:

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UNITED STATES PATENT OFFICE.

ALBERT C. WEBB, OF ST. LOUIS, MISSOURI, ASSIGNOR TO THE WEBB MOTOR FIRE APPARATUS COMPANY, OF ST. LOUIS, MISSOURI, A CORPORATION OF DELAWARE.

PISTON-PUMP FOR AUTOMOBILE FIRE APPARATUS.

1,061,511.

Specification of Letters Patent.

Patented May 13, 1913.

Application filed February 5, 1912. Serial No. 675,410.

To all whom it may concern:

Be it known that I, ALBERT C. WEBB, a citizen of the United States, residing at the city of St. Louis, State of Missouri, have invented certain new and useful Improvements in Piston-Pumps for Automobile Fire Apparatus, of which the following is a specification.

This invention relates to pumps, and particularly to multi-cylinder double-acting piston pumps for motor fire apparatus as disclosed in my pending application Serial No. 637,742, filed July 10, 1911, and contemplates novel improvements in same.

The features of improvement reside in the provision of means for by-passing one or more of the cylinders of the pump, so that the water that enters each by-passed cylinder is churned back and forth from one end to the other of the cylinder by the piston working therein.

Ordinarily, when a multi-cylinder double-acting pump is pumping against an inlet stream of water under a relatively high pressure, the speed of the engine which drives the pump is reduced by reason of the fact that all of the pistons work against the pressure of the inlet stream, but by by-passing one or more of the cylinders only the piston of each pumping cylinder works against the pressure of the inlet stream without reducing the speed of the engine.

In the drawings forming part of this specification, in which like numbers of reference denote like parts wherever they occur, Figure 1 is a side elevation of a multi-cylinder double-acting pump equipped with means for by-passing one or more of its cylinders and mounted on an automobile; Fig. 2 is an enlarged fragmental horizontal sectional view of the pump proper; Fig. 3 is a longitudinal vertical sectional view on the line 3—3, Fig. 2; Fig. 4 is a side elevation of one of the cases, showing an alternate form of means for by-passing one of the cylinders thereof; Fig. 5 is a sectional view on the line 5—5, Fig. 4; and Fig. 6 is a longitudinal vertical sectional view of one of the cases showing means for unseating the inlet valves so as to by-pass either cylinder.

The pump shown in the drawings is of the duplex double-acting type and consists, primarily, of two cases 1 each of which is provided with a plurality of cylinders wherein the pistons work, and a drive shaft 2 that is

connected with said pistons and is journaled and supported in ball-bearings of any desired type, provided in uprights 3. The cases 1, instead of being oppositely disposed and arranged substantially horizontal as in my above-mentioned application, are disposed in alinement with each other and are arranged in an upright position, being bolted or otherwise secured to the uprights or standards 4 which are secured to and supported by the chassis of the vehicle. The shaft 2 is provided at one end with a gear or gears (not shown) designed for connection in any suitable manner with the shaft of the automobile engine, but preferably by means of the mechanism described and illustrated in another pending application of mine, Serial No. 637,743, filed July 10, 1911.

Each pump case 1 contains a water inlet chamber 5 in which two cylinders 6 are located, each of said cylinders having a piston 7 working therein. The side wall of said case is provided with an opening to which the discharge end of an inlet or supply pipe 8 is fastened. The upper and lower walls 9 and 10 of the inlet chamber 5 are preferably spaced from the upper and lower cover plates 11 and 12, respectively, so that a pair of auxiliary chambers 13 and 14 are produced, the inlet chamber 5 being located intermediate the two auxiliary chambers, with which latter the open ends of the cylinders 6 directly communicate, and said cover plates being bolted or otherwise secured to the top and bottom of the case. The water entering a case through the inlet pipe 8 will, accordingly, flow into the inlet chamber 5, and thence around the sides of the tubular portions 15 which connect the upper and lower walls 9 and 10, the cylinders 6 being supported in said tubular portions.

Inlet valves 16 located in the walls 9 and 10 afford communication between the inlet chamber 5 and the two auxiliary chambers 13 and 14. These auxiliary chambers 13 and 14 have direct communication with pairs of opposed outlet passages 17 and 18 that are formed in the side wall of the inlet chambers and, in turn, lead into a main outlet or discharge chamber 19 located adjacent said side wall, the openings between said passages and the outlet chamber being normally closed by outlet valves 20. The inlet valves 16 and the outlet valves 20 are preferably identical in construction, and each com-

prises a stationary annular flanged body member or seat 21, which is threaded in an opening in the particular wall supporting the same, and a movable member or valve proper adapted to seat against said body and consisting of an outer metal disk 22 and an inner rubber disk 23. The body member 21 is in the nature of a spider, and its hub 24 is provided with a threaded axial opening to receive the threaded end of a bolt or stem 25. Said bolt or stem 25 extends through central unthreaded openings in the disks 22 and 23 and terminates in a head 26, between which latter and the metal disk 22 there is interposed an expansible coil spring 27 that encircles said bolt and normally holds the proper valve in closed position against its seat. Both the inlet and outlet valves open outwardly. Two main discharge chambers 19 are preferably employed, one for each case, these chambers extending the entire length of the cases and having discharge openings to which the adjacent ends of the outlet pipes 28 are connected, the latter leading directly to the air chamber 29 of the pump. From the last-mentioned chamber the water is discharged through the controlling valves 30 into the hose sections (not shown). Each case 1 has two auxiliary air chambers 31 connected thereto, one for each inlet chamber 5.

The several pistons 7 are individually connected with the main drive shaft 2 as hereinabove stated, said shaft being provided with a separate crank 32 for each piston and each crank being connected in the usual manner to the piston-rod 33 of its co-operating piston by means of a pitman 34. The cranks 32 have the same angular arrangement as in my above-mentioned application Serial No. 637,742, so that the beginning of the stroke of each piston will overlap the end of the stroke in advance thereof; that is to say, each stroke of each piston ends just after the stroke of another piston has started, so that there will be no interval between successive strokes. For this reason, a continuous stream of water will be forced through the hose sections when the pump is in operation and there will be no appreciable vibration of the same.

When the pump is in operation, the pistons 7 draw the water from the inlet chambers 5 into the auxiliary chambers 13 and 14 through the inlet valves 16 and then force the water out of the auxiliary chambers into the discharge chambers 19 through the outlet valves 20. From the discharge chambers 19 the water passes through the outlet pipes 28 to air chamber 29 and thence through the valves 30 into the hose sections connected with the latter. When, however, the pressure of the inlet stream is relatively high, the speed of the engine is thereby reduced for the reason that all of the pistons

7 work against the pressure of the inlet stream. This objectionable feature is obviated by by-passing one or more of the cylinders, so that the load is upon only the piston of each pumping cylinder, while the piston of each by-passed cylinder merely churns the water back and forth from one end of the latter to the other end thereof. To accomplish the by-passing of one or more of the cylinders, each case 1 is provided with a rib 35, the latter being preferably cast integrally with said case and being arranged to extend substantially vertically on one end thereof. A by-pass passage 36 extending longitudinally in the rib 35 communicates with the upper and lower auxiliary chambers 13 and 14 of one of the cylinders 6 and has a valve 37, preferably of the plug type, located therein. When the valve 37 is closed, the piston in said cylinder works as usual and causes the water that is drawn thereby from the inlet chamber 5 into the auxiliary chambers 13 and 14 to discharge into the discharge chamber 19, as hereinabove described, but when the valve 37 is opened, the action of the piston causes the water that is drawn from the inlet chamber 5 into the auxiliary chambers 13 and 14 to flow through the by-pass passage 36 directly from the chamber 13 to the chamber 14 and vice versa. While each case 1 has a by-pass for one of its cylinders, so that either one or two of the cylinders of the pump may churn the water from one end thereof to the other and, also, that the other two cylinders may pump, yet it should be understood that a by-pass may be provided for each cylinder, in order that only one cylinder may pump and the others may churn the water as hereinabove described.

In the alternate form of the invention depicted in Figs. 4 and 5, the by-passing of one of the cylinders in a case 1 is effected by means of the pipes 38, one of which pipes 38 connects the auxiliary chamber 13 of one cylinder with the inlet pipe 8 and the other pipe 38 connects the auxiliary chamber 14 of said cylinder with said inlet pipe. Each pipe 38 is provided with a valve 39 and, when both valves 39 are opened, the water flows through the pipes 38 into the auxiliary chambers 13 and 14 of one of the cylinders in the case 1, and the piston which works in said cylinder causes the water to flow back and forth through the pipes 38.

In Fig. 6, an alternate form of means for rendering either cylinder idle is illustrated and consists of a plurality of shafts 40 having cams 41, or the like, mounted thereon. In this form each inlet valve 16 is somewhat modified, the opening in the hub 24 of the body member 21 being unthreaded, so as to allow the bolt 25 to reciprocate in said opening, and said bolt being threaded into the opening in the metal disk 22 and bearing a

nut 42, so as to cause said disk to move therewith, its head 26 being located on the opposite side of said body member as depicted in Fig. 6. The shafts 40 are revolvably supported by the case 1 and are arranged in sets, one set for each cylinder. Each set of shafts 40 is so arranged relative to the inlet valves 16 of its cylinder that, when all the shafts of said set are rotated through part of a revolution, the cams 41 thereon move from the positions depicted in Fig. 6 and engage the heads 26 of the bolts 25 and thereby move said bolts, so as to move said inlet valves out of engagement with their seats, whereby the piston working in said cylinder causes the water to flow from the inlet chamber 5 into the auxiliary chambers 13 and 14 and vice versa. The shafts 40 of each set may be rotated separately, or if desired, they may be operatively connected by any suitable means so that, when one is rotated, the others will rotate simultaneously therewith.

I claim:

1. In a pump of the character described, the combination of a case divided by partitions into an inlet chamber and a pair of auxiliary chambers, said inlet chamber being located intermediate said auxiliary chambers, a supply pipe opening into said inlet chamber, an outlet chamber located adjacent one of the side walls of the case, an open-ended cylinder supported by said partitions and opening at the ends thereof into said auxiliary chambers, a double-acting reciprocatory piston working in said cylinder, valve connections between said inlet chamber and said auxiliary chambers, fluid-controlled valve connections between said auxiliary chambers and said outlet chamber, a discharge pipe leading from said outlet chamber, a pair of auxiliary pipes connecting said supply pipe with said auxiliary chambers, and each of said auxiliary pipes being provided with a valve.

2. In a pump of the character described, the combination of a case divided by partitions into an inlet chamber and a plurality of auxiliary chambers, said auxiliary chambers being arranged in pairs and said inlet chamber being located intermediate the auxiliary chambers of each pair, a pair of open-ended cylinders supported by said partitions and each cylinder opening at the ends thereof into a pair of said auxiliary chambers, a supply pipe opening into said inlet chamber, an outlet chamber located adjacent one of the side walls of the case and extending the entire length of the case, valve connections between said inlet chamber and each

auxiliary chamber, fluid-controlled valve connections between said inlet chamber and each auxiliary chamber, fluid-controlled valve connections between each auxiliary chamber and said outlet chamber, a discharge pipe leading from said outlet chamber, a pair of auxiliary pipes connecting said inlet pipe with the auxiliary chambers of one of said cylinders, and each of said auxiliary pipes being provided with a valve.

3. In a pump of the character described, the combination of a case divided by partitions into an inlet chamber and a pair of auxiliary chambers, said inlet chamber being located intermediate said auxiliary chambers, a supply pipe opening into said inlet chamber, an outlet chamber located adjacent the side wall of the case, an open-ended cylinder supported by said partitions and opening at the ends thereof into said auxiliary chambers, a double-acting reciprocatory piston working in said cylinder, inlet valves between said inlet chamber and each auxiliary chamber, fluid-controlled valve connections between each auxiliary chamber and said outlet chamber, a plurality of shafts revolvably supported by said case, and cams borne by said shafts for opening said inlet valves when said shafts are rocked.

4. In a pump of the character described, the combination of a case divided by partitions into an inlet chamber and a plurality of auxiliary chambers, said auxiliary chambers being arranged in pairs and said inlet chamber being located intermediate the auxiliary chambers of each pair, a pair of open-ended cylinders supported by said partitions and each cylinder opening at the ends thereof into a pair of auxiliary chambers, a supply pipe opening into said inlet chamber, an outlet chamber located adjacent the side wall of the case and extending the entire length of the case, inlet valves between the inlet chamber and each auxiliary chamber, fluid-controlled valve connections between each auxiliary chamber and said outlet chamber, a discharge pipe leading from said outlet chamber, a plurality of shafts revolvably supported by the case and arranged in sets, one set for each cylinder, and cams borne by said shafts adapted to open said inlet valves when said shafts are rocked.

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

ALBERT C. WERR.

Witnesses:

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BERTHA W. BEHRENS.