

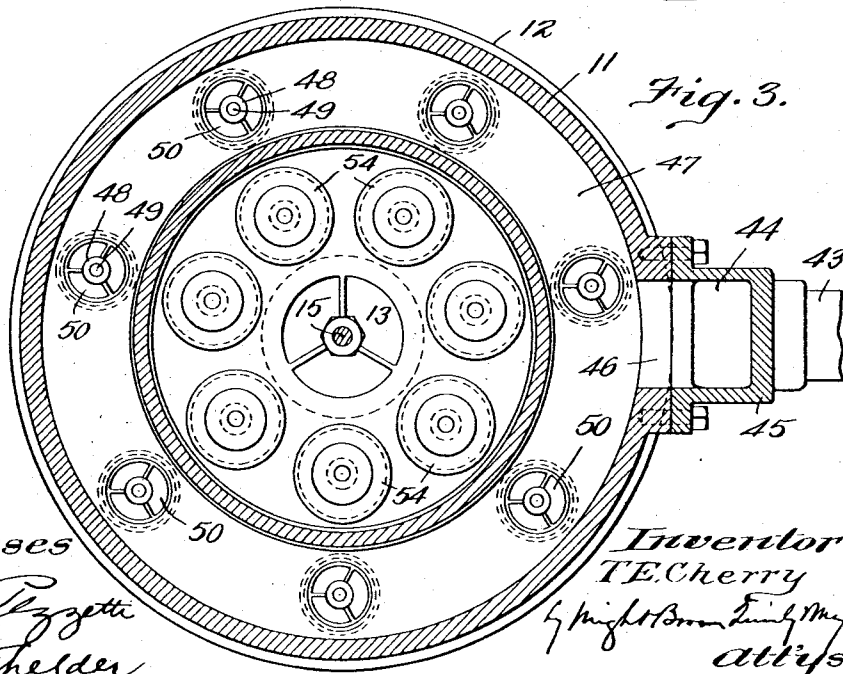
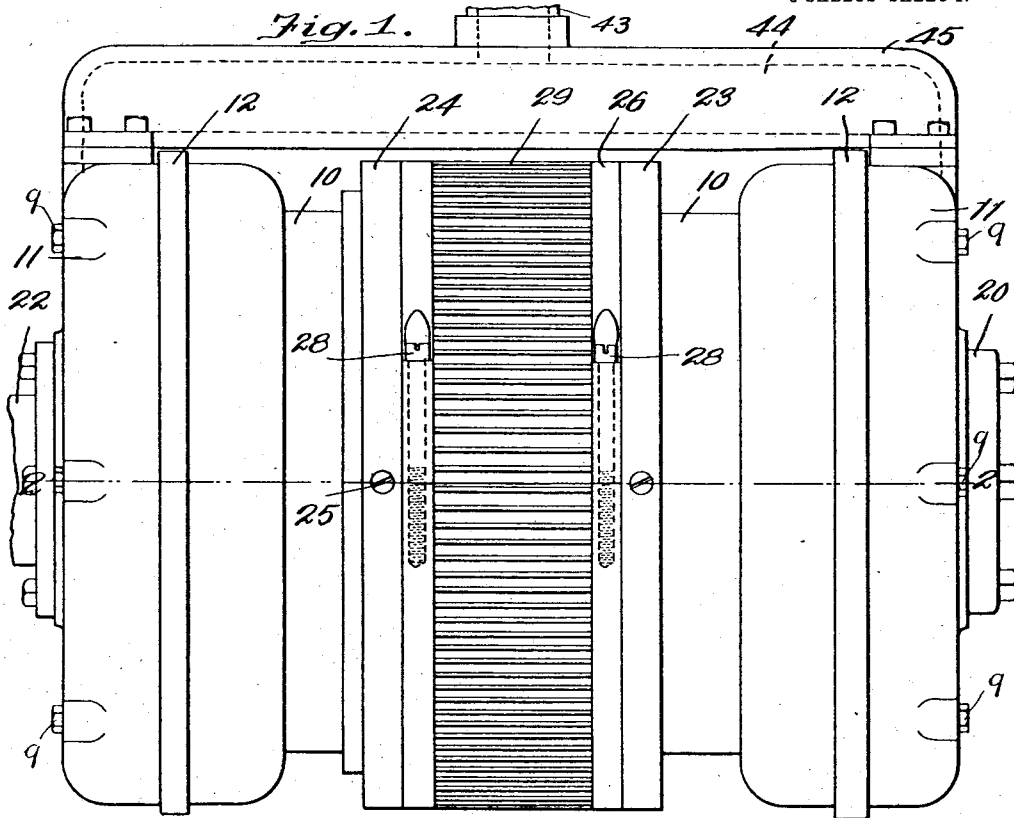
T. E. CHERRY.
MULTIPLE PUMP.

APPLICATION FILED DEC. 12, 1911.

Patented Feb. 11, 1913.

1,052,569.

3 SHEETS-SHEET 1.



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3 SHEETS—SHEET 2.

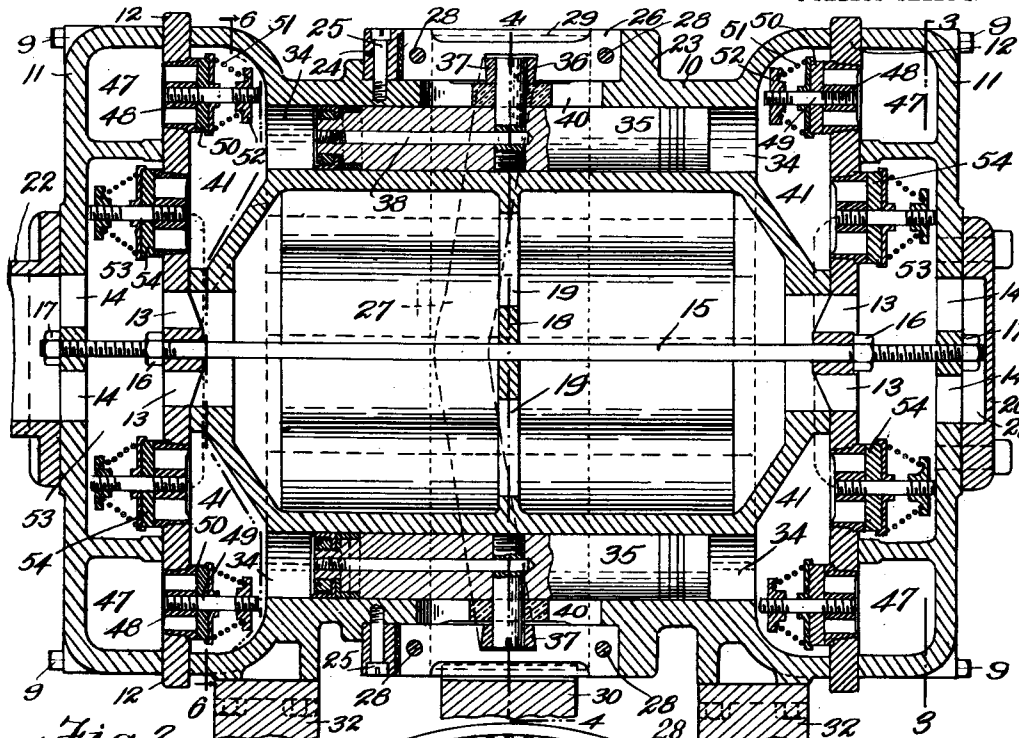


Fig. 2.

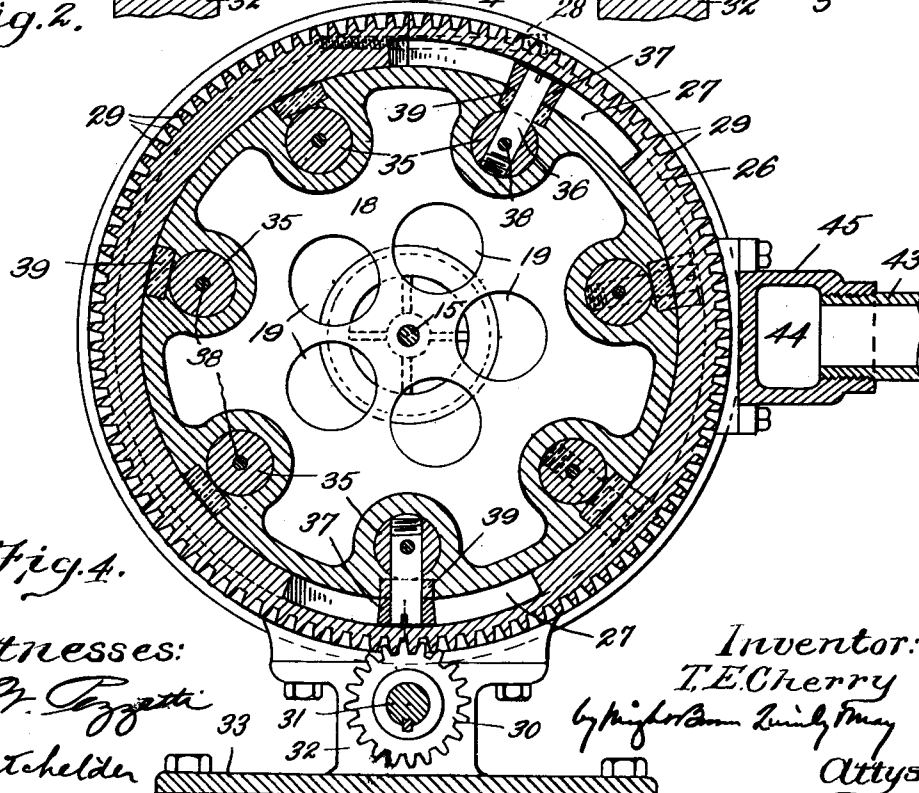


Fig. 4.

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3 SHEETS-SHEET 3.

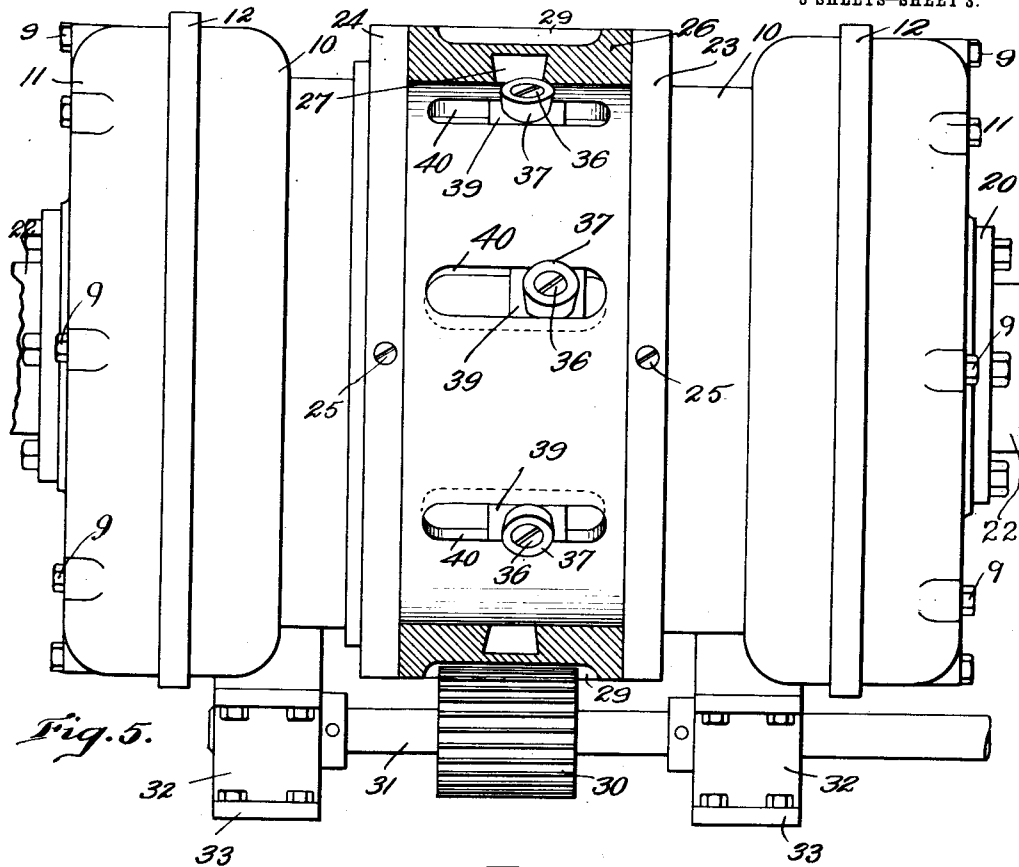


Fig. 5.

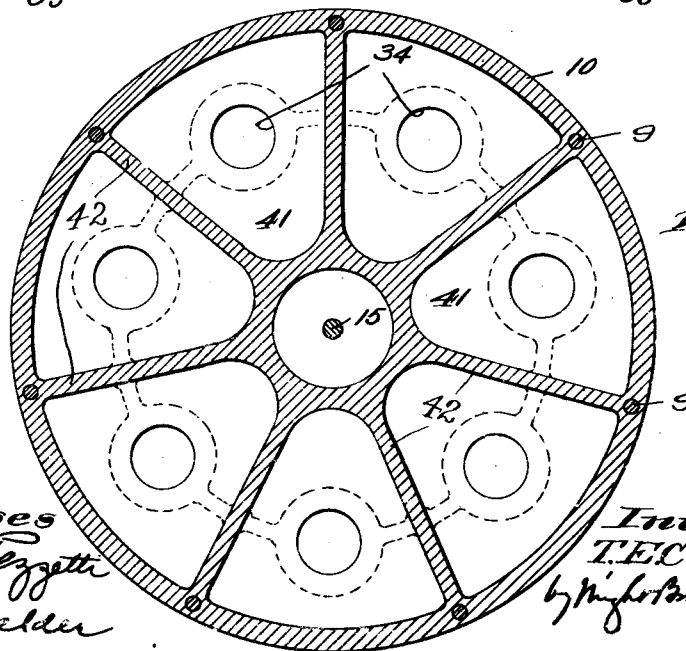


Fig. 6.

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UNITED STATES PATENT OFFICE.

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MULTIPLE PUMP.

1,052,569.

Specification of Letters Patent.

Patented Feb. 11, 1913.

Application filed December 12, 1911. Serial No. 665,260.

To all whom it may concern:

Be it known that I, THOMAS E. CHERRY, a citizen of the United States, and a resident of Revere, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Multiple Pumps, of which the following is a specification.

This invention relates to pumps of the type which employ a plurality of cylinders and pistons, and refers particularly to pumps which have a casing which is provided with a circular series of parallel cylinders and with pistons in said cylinders and having means for successively actuating the pistons.

One of the objects of the present invention is to provide a simple, compact and powerful pump which will supply a steady and continuous stream or circulation.

Another object is to provide a pump of the character described, having means for furnishing an equal delivery of fluids in opposite directions.

A further object is to provide an improved construction which enables the pump to operate with a steady suction and wherein the resistance is steady and practically uniform, the pressure of resistance being equal at both ends of the complete pump mechanism, thereby enabling a balanced driving cam to be employed for operating the pistons of the cylinders.

A further object of the invention is to provide a pump that is especially adapted for automobile fire engines, the pump being adapted to be operated by an internal combustion engine which is usually run at high speed.

A further object is to provide a structure of single plate carrying all of the valves, both inlet and outlet valves, which plate may be readily removed and the valves with it, to facilitate examination and repairs.

To these ends the invention consists in the construction and combination of parts substantially as hereinafter described and claimed.

Of the accompanying drawings, Figure 1 is a plan view of a pump constructed in accordance with my present invention. Fig.

2 represents a longitudinal section substantially on line 2—2 of Fig. 1. Fig. 3 represents a section on line 3—3 of Fig. 2. Fig. 4 represents a section on line 4—4 of Fig. 2. Fig. 5 represents a front elevation of the pump a portion of the cam ring having the external gear teeth being broken out to illustrate the slots formed in the body or casing having the cylinders formed therein, said Fig. 5 also indicating a modification hereinafter referred to. Fig. 6 represents a section on line 6—6 of Fig. 2.

Similar reference characters indicate the same or similar parts in all of the views.

The casing comprises a body or central member 10, and end members 11, valve plates 12 being clamped between the inner faces of the members 11 and the ends of the body or central member as by means of suitable bolts 9. The body or central member 10 is formed with an internal chamber which at the ends communicates with openings 13 formed in the plates 12. In alignment with the openings 13 are openings 14 formed in the outer walls of the end members 11. Running through the center of the machine is a tie-rod 15 to avoid any possible leakage due to the internal pressure when the pump is in operation. The ends of the tie rod 15 are threaded and pass through central apertures in the plates 12 and end members 11, nuts 16 and 17 respectively serving to confine the said plates and end members at their centers.

Preferably the interior of the body 10 is strengthened by a central web 18 having openings 19 to enable fluid to pass through as hereinafter described. Secured to one of the members 11 is a cap 20 having an internal chamber 21 to accommodate the end of the tie rod and the nut 17 thereon. Bolted to the other end member is a delivery pipe 22. The cap 20, however, may be removed and in place thereof another outlet or delivery pipe 22 may be secured in place of said cap 20. It is to be understood, of course, that the pipe or pipes 22 will have means for coupling thereto hose or other conduits, especially if the pump is to be employed in a fire engine. Integral with or secured to the body 10 is an annular rib 23.

Another rib 24, preferably made in two parts each being semi-circular to facilitate assembly, is secured to the body 10 as by screws 25. Rotatively mounted on the body 10 between the ribs 23, 24, is a ring 26 having an internal cam groove 27, the outline of a portion of which is indicated in Fig. 2 by dotted lines. Said ring 26, for convenience of assembling, is made in two parts (Fig. 4), said parts being secured together and in place between the annular ribs by connecting bolts or screws 28. The ring 26 is formed with gear teeth 29 which mesh with, so as to be driven by, a pinion 30 carried by a shaft 31 (Fig. 5) said shaft being mounted in bearings formed or provided in standards 32 which latter have feet or base flanges 33 adapted to be secured to any suitable support.

Formed in the body 10 are cylinders 34, said cylinders being seven in number or more or less, and open at both ends so as to communicate with chambers presently described. The cylinders are arranged as a circular series and they are parallel with each other. Slidably mounted in the cylinders 34 are double end pistons 35, each piston having at substantially its mid-length, a pin 36 which projects radially as shown in Fig. 4 and has mounted thereon anti-friction roll 37, the rolls 37 entering the cam groove 27. Suitable means may be provided for preventing the pins from rotating such as locking pins 38, extending through one end of each piston and entering a transverse hole in the pin 36.

Each pin 36 passes through a block 39 (Figs. 2 and 5) the block being fitted to a guide slot 40 formed in the outer wall of the portion of the body 10 radially from and parallel with the axis or longitudinal center of the cylinder.

The body 10 as shown in Fig. 2 is somewhat enlarged at each end to provide chambers 41 at the ends of the cylinders, said cylinders being separated from each other by radial webs or partitions 42 (see Fig. 6). Each cylinder at its outer end communicates with or opens into an individual chamber 41.

Referring to Figs. 1 and 3, a suction pipe 43 communicates with a passage 44 in a casting 45 that is bolted to the casing. Said passage 44 communicates at each end with a port 46, which in turn communicates with an annular suction chamber 47 in each of the end casing members 11, so that each annular chamber 47 is supplied with the fluid that is to be drawn into the pump and delivered thereby.

The plate 12 is formed with two apertures for each chamber 41, and these two apertures are controlled by two valves, one of which is the inlet valve and the other the outlet or discharge valve. The valves are

alike and a description of one will suffice for all. The hole or aperture in the plate 12 receives a plug 48, which plug in turn has ports for the passage of fluid. Secured centrally in the plug is a fixed stem or guide 49 on which is slidably mounted a valve 50, said valve being pressed to its seat on the end of the plug 28 by a spring 51 confined between said valve and a collar 52 that is secured on the projecting end of the stem or pin 49. The valve just described is an inlet valve and there is one of these valves for controlling the admission of fluid from suction chamber 47 to each one of the radial chambers 41. The outlet or discharge valves 54 similar in construction and mounting to the inlet valves control the discharge of fluid from the chamber 41 to the central chamber 53, one of such chambers 53 being provided in each of the end members 11 of the case.

In operation, the cam ring is rotated as by means of an internal combustion engine driving the shaft 31 so that the pinion 30 of the latter will drive the cam ring. The walls of the internal groove of the cam ring act on the rolls 37 of the pins which project radially from the double-end pistons so as to reciprocate the pistons of the series in succession around said series. Each end of each piston, by producing a partial vacuum in the chamber 41 causes the pressure of the fluid in the chamber 47 to raise the valve 50 from its seat to admit fluid into said chamber 41. On the return of the piston, the valve 50 closes and the valve 54 is raised from its seat so that the fluid is forced into the central or assembling discharge chamber 53. If a pipe is coupled to each end of the multiple cylinder pump instead of employing the cap 20 the fluid is forced out in opposite directions. With the parts constructed as shown in Fig. 2, however, the fluid in the right hand chamber 53 escapes through the openings 13 of the right hand valve plate 12 into the internal chamber of the body of the casing and through the openings 19 of web 18 and then through the openings 13 in the left hand valve plate 12 where it mingles or assembles with the fluid that is being pumped by the left hand ends of the pistons, and finally will escape through the delivery pipe 22.

The central chamber within the body member 10 provides space for the forming and preservation of an air cushion whether two streams are being delivered or, both are combined in one as described. The space for such air cushion will be all of that above the level of the tops of the openings 13. The air which is confined above this level renders the stream or streams steady instead of being jerky or throbbing. Since no external air cushion needs to be provided, the entire pump is compact and enables the

operating or driving devices to be located outside of the generally cylindrical form of the outside of the pump casing.

The pump is exceedingly simple and powerful as well as compact, and is steady in operation both as regards the suction and discharge, thereby enabling it to be easily operated and driven by an internal combustion engine as described. The pressure of resistance to the operation of the cam is practically equal on both sides or ends of the complete multiple pump and therefore the actuating cam is balanced in operation whether the pump is employed to discharge through two separate lengths of hose in opposite directions or if the cap 20 is in place and the discharge or delivery is entirely through but one hose.

A particular feature of my invention is that one plate at each end of the double acting multiple pump carries all of the valves for that end, and this feature of advantage would apply equally as well to a pump, the cylinders of which act in but one direction. By removing an end member 11 the plate 12 clamped thereby may be removed if necessary, said plate carrying with it all of the valves so that they may be readily examined and cleaned or repaired.

It will be understood that if the transverse web 18 were continuous, there could be no mixing of fluids pumped by the two ends of the mechanism. If then the passageway 44 were to lead to only one of the annular chambers 47, the other annular chamber being open to the atmosphere, the separate discharge pipes shown in Fig. 5 could be utilized to convey two fluids being pumped. In other words the apparatus then could be used for simultaneously pumping liquid and gas such as water and air.

I claim:—

1. A pump comprising a casing having a circular series of parallel cylinders open at both ends, an internal cushioning chamber in communication with the delivery of all of the cylinders, double-end pistons in said cylinders, and external operating means for successively actuating said pistons.

2. A pump comprising a casing having a circular series of parallel cylinders open at both ends, an internal cushioning chamber in communication with the delivery of all of the cylinders, double-end pistons in said cylinders, external operating means for successively actuating said pistons, and a valve plate opposite the ends of each series of cylinders, each of said plates having an inlet valve and an outlet valve for each cylinder.

3. A pump comprising a casing having a circular series of parallel cylinders open at both ends, an internal cushioning chamber in communication with the delivery of all of the cylinders, double-end pistons in

said cylinders, and external operating means whereby the fluid operated upon by the pump may be discharged in opposite directions from the casing.

4. A pump comprising a body having a circular series of parallel cylinders open at both ends, double-end pistons in said cylinders, means for successively actuating said pistons, end casing members, and a central tie-rod extending through from one end casing member to the other.

5. A pump comprising a casing body having a circular series of parallel cylinders open at both ends, double-end pistons in said cylinders, means for successively actuating said pistons, end casing members, and a central tie-rod extending through from one end casing member to the other, valve carrying plates being clamped between the end members and the ends of the body member.

6. A pump comprising a casing having a circular series of parallel cylinders open at both ends, an internal cushioning chamber in communication with the delivery of all of the cylinders, double-end pistons in said cylinders, each of said pistons having a radial pin, and a ring having an internal cam groove receiving the pins of the cylinders.

7. A pump comprising a casing having a circular series of parallel cylinders open at both ends, double-end pistons in said cylinders, each of said pistons having a radial pin, and a ring having an internal cam groove receiving the pins of the cylinders, the said cam ring being externally toothed to be driven by a pinion.

8. A pump comprising a casing having a circular series of parallel cylinders open at both ends, an internal cushioning chamber in communication with the delivery of all of the cylinders, double-end pistons in said cylinders, each of said pistons having a pin projecting radially from its mid-length, the cylinder pins having rolls on their outer ends, and a ring rotatable on the casing and having an internal cam groove engaging the pins of the pistons.

9. A pump comprising a casing having a circular series of parallel cylinders open at both ends, said casing having external annular ribs, a ring rotatively mounted between said ribs and having an internal groove, double-end pistons in said cylinders, and a pin carried by each of said pistons and engaging the groove in the ring.

10. A pump comprising a casing having a circular series of parallel cylinders open at both ends, an internal cushioning chamber in communication with the delivery of all of the cylinders, double-end pistons in said cylinders, each of said pistons having a transverse aperture, a pin mounted in the aperture of each piston, means for locking

said pin in place, and a cam for engaging said pins.

11. A pump comprising a casing having a circular series of parallel cylinders open
5 at both ends, said casing having a longitudinal slot communicating with each cylinder, double-end pistons in said cylinders, each of said pistons having a pin projecting through a slot of the casing, a slide

block mounted in each slot and having a 10 cylinder pin passing through it, and a cam for actuating the cylinder pins.

In testimony whereof I have affixed my signature, in presence of two witnesses.

THOMAS E. CHERRY.

Witnesses:

A. W. HARRISON,
J. M. MURPHY.