

Nov. 18, 1924.

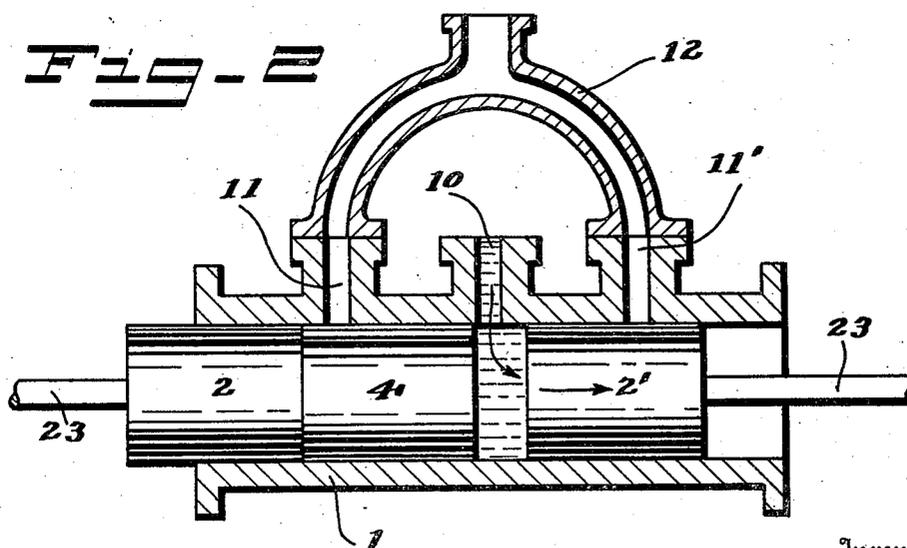
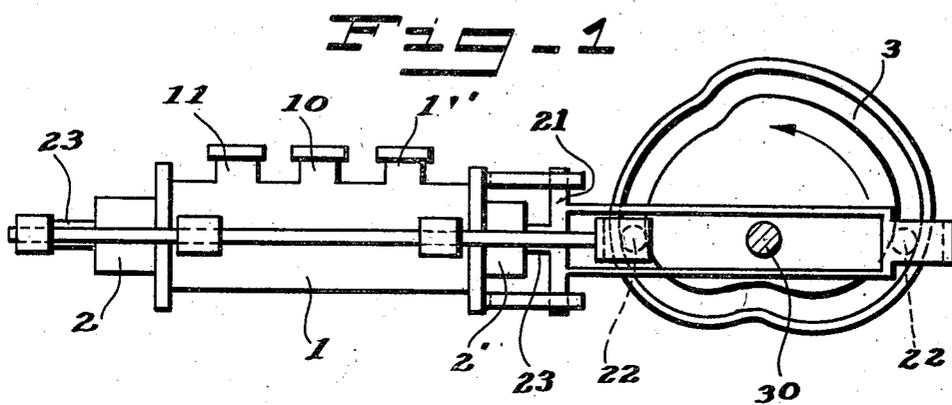
C. E. WHITE

1,516,032

PUMP

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3 Sheets-Sheet 1



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FIG - 3

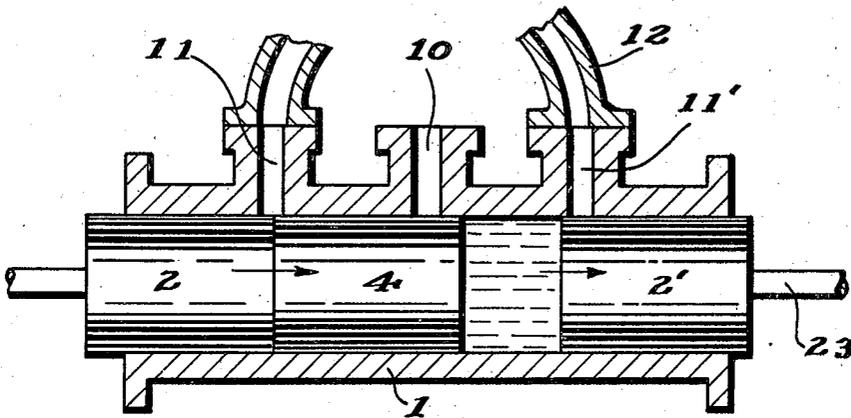
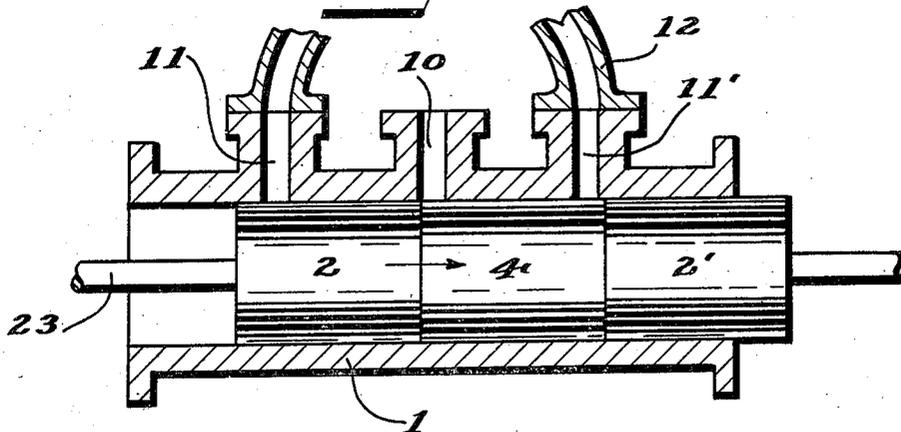


FIG - 4



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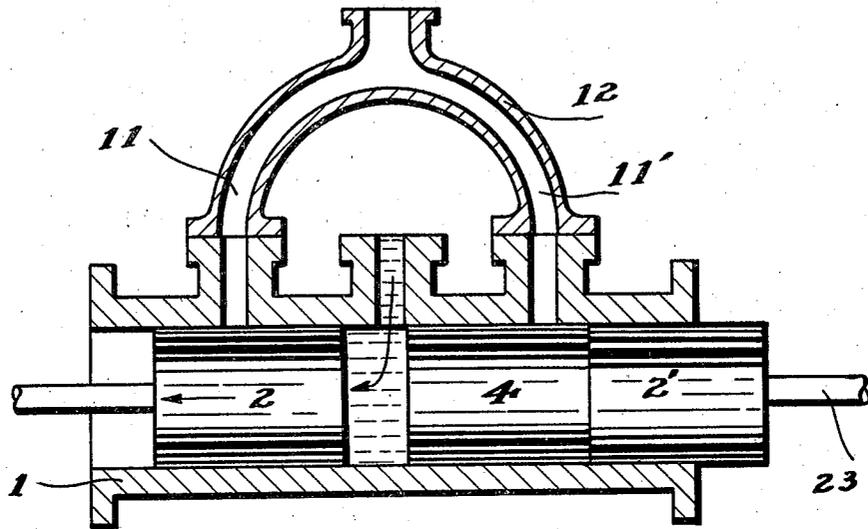


Fig - 5

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UNITED STATES PATENT OFFICE.

CHARLES E. WHITE, OF SEATTLE, WASHINGTON.

PUMP.

Application filed August 2, 1923. Serial No. 655,158.

To all whom it may concern:

Be it known that I, CHARLES E. WHITE, a citizen of the United States of America, and resident of the city of Seattle, in the county of King and State of Washington, have invented certain new and useful Improvements in Pumps, of which the following is a specification.

My invention is particularly designed as a pump which can be used for handling boiler feed water, for handling corrosive or hot substances, or, in general, for uses in which the nature of the material being handled deleteriously affects the pump itself or its packing, and prevents successful continuous operation of the pump. It is therefore an object of my invention to provide a pump which is simple and which has few working parts subject to the influence of the fluid being handled. It is also an object to provide a pump which has no packing and no valves, and one which is inexpensive.

More specifically it is my object to provide a pump which comprises opposed pistons and cam means for controlling the reciprocation of these pistons, not continuously but rather in an intermittent movement, thus to control the movement of the fluid through the pump without the use of valves.

My invention comprises those novel parts and combinations thereof which are shown in the accompanying drawings, described in the specification and particularly defined by the claims terminating the same.

In the accompanying drawings I have shown my invention in forms which are now preferred by me.

Figure 1 is a side elevation of my pump. Figure 2 is an axial section showing parts at the beginning of a cycle of operation.

Figures 3, 4 and 5 are sections similar to Figure 2, representing successive steps in a cycle.

The preferred form shown in the drawings, comprises a cylinder 1, preferably with its ends freely open and having a centrally positioned intake port 10 and two discharge ports 11 and 11', spaced lengthwise of the cylinder at opposite sides of the intake port 10. These discharge ports should be equally spaced from the port 10. They may be connected with a Y connection 12.

Within the cylinder 1 are positioned two pistons 2 and 2' which are connected

through suitable means to a drive connection and governing means for controlling the timing thereof. Such drive means, as I have shown in Figure 1, consist primarily of a rotative cam or cams 3 secured upon a drive shaft 30. The piston rod 23 of one of the pistons 2 connects it through a cam follower 22 to the cam 3. The opposite piston 2 is connected through its piston rod 23, the cross head 21 and the links 20, the latter carrying a cam follower 22, to the opposite side of the cam 3. It will be understood that this is merely a convenient form of drive connection and that any suitable means for accomplishing the desired result may be substituted therefor.

Between the pistons 2, in this preferred form, I position a floating piston 4, that is, a piston which has no positive external drive connection. This piston must be of a length which will permit it to span the intake port 10 and one or the other of the discharge ports 11 or 11' so as to close both such ports while it is spanning them. The pistons 2 and 2' likewise should be at least of this length.

In operation let us assume that the left-hand piston, 2, and the piston 4 are at their extreme left positions in the cylinder 1. The righthand piston, 2', is also at the extreme left of its stroke. In these positions the piston 2 is beyond the extreme left side of the port 11, the piston 4 is in contact with its end face, and covers the port 11 but does not cover the port 10, and the piston 2' covers both the port 10 and the port 11'. The piston 2' now begins to advance to the right, as is shown in Figure 2. This causes a suction through the intake port 10.

The piston 2' advances until it approaches a point where it would uncover the port 11'. The piston 2, pushing the piston 4 before it, now begins to advance to the right until the piston 4 closes the intake port 10. This occurs just prior to opening of the port 11' by the piston 2' and the parts are then in the position shown in Figure 3. All three pistons continue their advance to the right until the piston 2' uncovers the port 11', whereupon it stops. The other two pistons 2 and 4 continue to advance, however, and by this action the fluid which has been trapped between the pistons 4 and 2' is forced out of the port 11', as is shown in Figure 4.

As the pistons 2 and 4 continue their ad-

vance, they contact with the piston 2' and the latter resumes its advance to the right together with the pistons 2 and 4, until the left or rear edge of the piston 4 uncovers the intake port 10 and its right or forward edge covers and seals the discharge port 11'. Immediately the piston 2 reverses its motion and begins to advance to the left. Parts are then in the position shown in Figure 5, which illustrates the beginning of the second suction stroke. Inasmuch as the piston 4 has sealed the discharge port 11', there is no tendency for the suction caused by the advance of the piston 2 to the left to drag the piston 4 after it. The action of the pump then continues to the left following the same cycle as described above.

It will be seen that there is an alternate movement and rest period for each of the outer pistons 2 and 2' but that the periods of movement overlap at certain times. In this manner the piston 4 is caused to act at one time as the advancing face of the rear piston and at other times as a seal or valve to close the ports in the cylinder.

With such a pump the fluid being handled comes into contact only with the cylinder and the pistons. There are no valves nor restricted passages, and all working parts of the pump can be made substantially, and of materials which will be most suitable to the fluid to be handled.

What I claim as my invention is:

35 1. A pump comprising a cylinder having an intake and a pair of discharge ports spaced lengthwise of and disposed upon opposite sides of the intake port, a piston at each end of the cylinder, a floating piston between the two outer pistons, and means for causing reciprocation of said pistons to afford alternate communication with the cylinder of the intake port and alternate discharge ports.

2. A pump comprising a cylinder having a central intake and a discharge port spaced lengthwise therefrom at each side, a piston at each end of the cylinder, a floating piston between the two outer pistons, means for reciprocating the outer pistons, said floating piston being movable as the piston behind it advances, and being operable to close the intake port during each pressure stroke and to close alternate discharge ports while the piston at the opposite end of the cylinder moves through its suction stroke.

3. A pump comprising a cylinder having a central intake port and a discharge port spaced lengthwise therefrom at each side, a piston at each end of the cylinder, a floating piston between the two outer pistons, and means for reciprocating said outer pistons to effect, in succession, advance of an outer piston to suck in fluid through the inlet port, advance of all pistons in the same direction to close the inlet port and then to open the discharge port by advance of the leading piston, continued advance of the two following pistons to eject fluid through the open discharge port, advance of all pistons in the same direction to close the open discharge port and to open the intake port by the central piston, and finally reversal of the cycle of operation.

4. A pump comprising a cylinder having a central intake port and a discharge port spaced lengthwise therefrom at each side, a piston at each end of the cylinder, a floating piston between the two outer pistons of a length to close both the intake port and either one of the discharge ports, and means for causing reciprocation of said pistons to afford alternate communication with the cylinder of the intake port and alternate discharge ports.

Signed at Seattle, King County, Washington, this 27th day of July, 1923.

CHARLES E. WHITE.