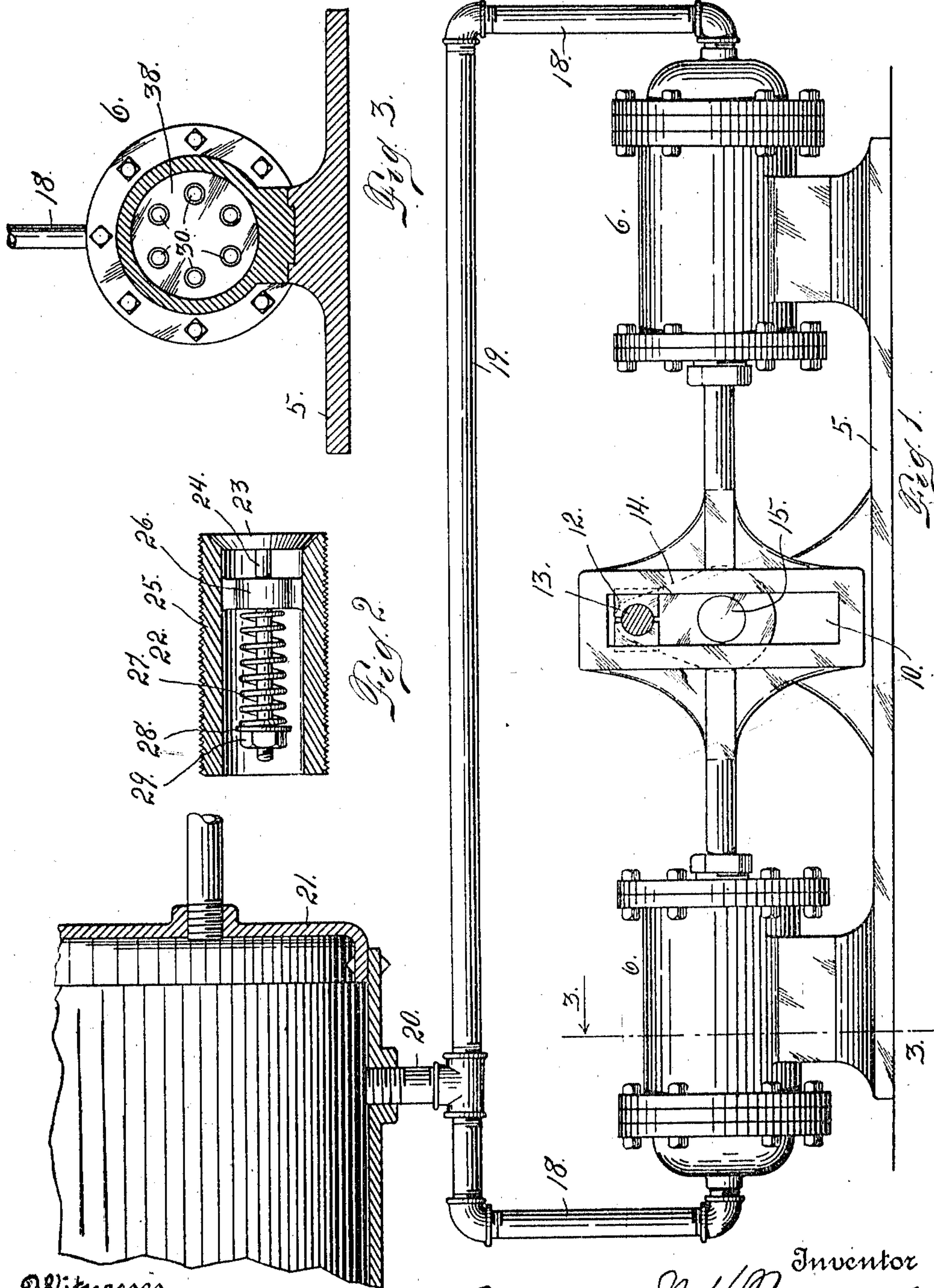


N. H. FREEMAN.
 SUCTION PUMP.
 APPLICATION FILED MAR. 15, 1909.

983,865.

Patented Feb. 7, 1911.

2 SHEETS-SHEET 1.



Witnesses
 J. I. Thornburgh
 Otto E. Hordelick

Inventor
 N. H. Freeman.
 By *[Signature]* Attorney

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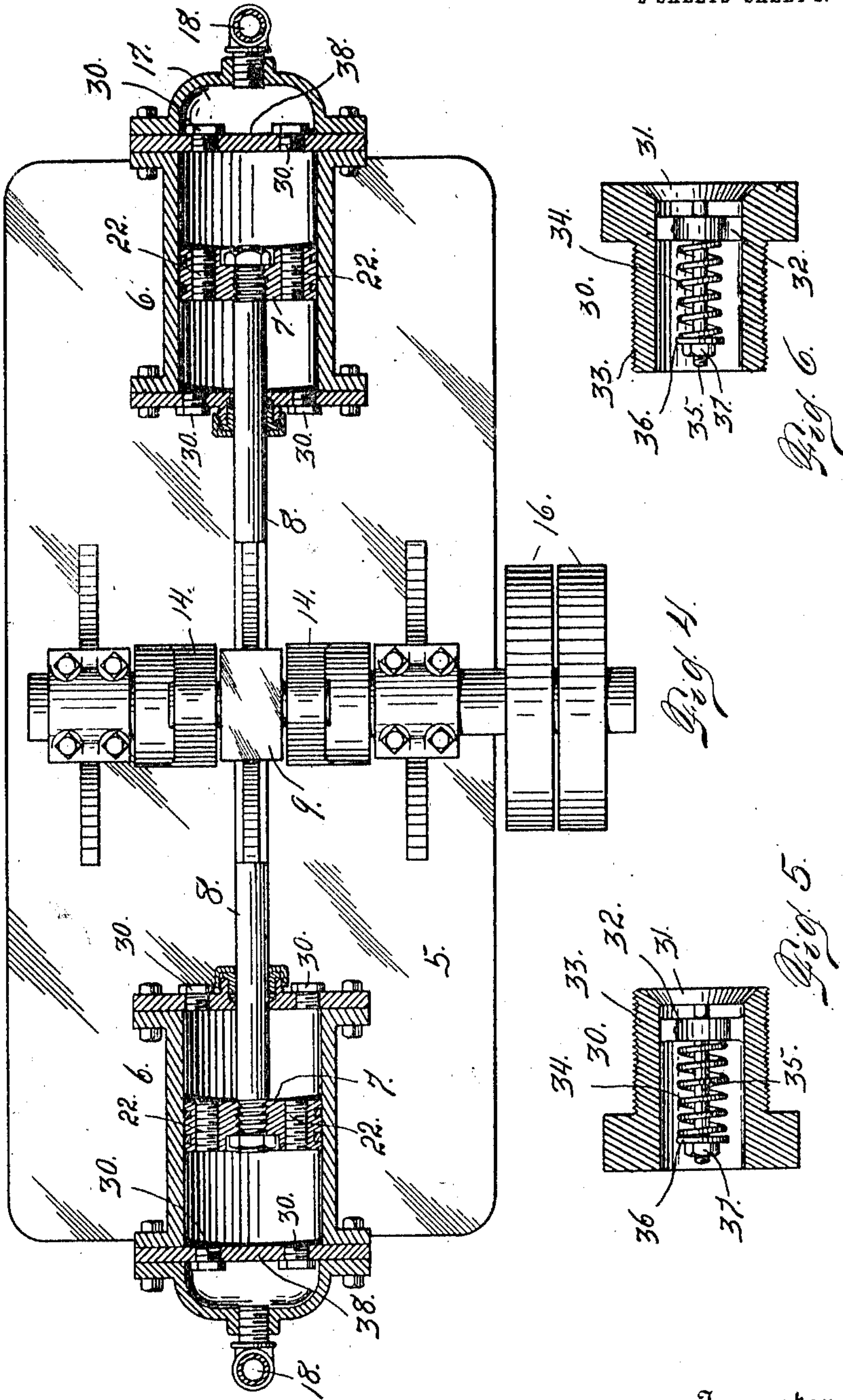
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UNITED STATES PATENT OFFICE.

NAT H. FREEMAN, OF BOULDER, COLORADO.

SUCTION-PUMP.

983,865.

Specification of Letters Patent.

Patented Feb. 7, 1911.

Application filed March 15, 1909. Serial No. 483,624.

To all whom it may concern:

Be it known that I, NAT H. FREEMAN, a citizen of the United States, residing at Boulder, in the county of Boulder and State of Colorado, have invented certain new and useful Improvements in Suction-Pumps; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

My invention relates to improvements in air pumps, my present invention being more especially intended for use in connection with my improved apparatus for elevating liquids, and also in connection with my apparatus for the purification of liquids, disclosed in simultaneously pending applications. It is evident, however, that it may be employed in other relations where a similar function is to be performed.

My improved pump is provided with two cylinders, whose pistons are actuated by rods connected with a centrally located yoke having a slot in which the crank-pin of an operating shaft travels. The outer extremities of the two cylinders are in communication with a suction chamber from which the air is continually exhausted for the use of suitable check valves arranged in the pistons, and also at the opposite extremities of the cylinders.

Having briefly outlined my improved construction, I will proceed to describe the same in detail, reference being made to the accompanying drawing, in which is illustrated an embodiment thereof.

In this drawing Figure 1 is a side elevation of my improved suction pump. Fig. 2 is a section of one of the check valves located in the piston, the said valve in this view being shown in detail and on a larger scale than in Fig. 1. Fig. 3 is a cross-section taken through one of the cylinders on the line 3—3, Fig. 1. Fig. 4 is a top plan view of the pump, showing the cylinders in longitudinal section. Figs. 5 and 6 are sections illustrating the check valves located in the opposite extremities of the cylinder heads.

The same reference characters indicate the same parts in all the views.

Let the numeral 5 designate a base-plate upon which are mounted two cylinders 6,

each of which has a piston 7 connected with a rod 8, the two rods being rigidly connected with a centrally located yoke 9, which is vertically slotted, as shown at 10, to receive a box 12 in which a pin 13 of a crank 14 is journaled. The crank 14 is carried by an operating crank shaft 15 provided with fast and loose pulleys 16. At the outer extremity of each cylinder an auxiliary chamber 17 is formed, which is in communication, by means of a branch 18, with a main suction pipe 19, having a branch 20 communicating with an exhaust tank 21.

Each piston 7 is equipped with a number of reversible check-valves 22 of the construction shown in Fig. 2. Each of these valves has a valve-piece 23, a stem 24, a casing 25, a guide 26 and a spring 27 interposed between the said guide and a washer 28 engaging a nut 29 screwed upon one extremity of the stem. These check-valves are so arranged in the pistons that as the latter move outwardly, their valves open and allow the air to pass inwardly or in a direction toward the operating shaft, while, when these pistons are moving in the opposite direction or inwardly toward the operating shaft, their valves remain closed and drive the air out of the cylinders into the atmosphere through reversible valves 30 located in the inner heads of the pistons, these valves being of the construction shown in Figs. 5 and 6, and being substantially of the same construction as the piston valves, each being provided with a valve-piece 31, a guide 32, a casing 33, a spring 34, and a stem 35. The spring 34 is interposed between the guide 32 and a washer 36 engaging a nut 37 screwed upon the threaded extremity of the stem. The outer head 38 of each cylinder is also equipped with valves 30. These reversible valves, however, are arranged to open as the pistons move inwardly toward the operating shaft and close as the pistons move in the opposite direction.

The valves 22 and 30 are located in an exteriorly threaded valve-casing adapted to be threaded into correspondingly threaded sockets in the pistons and cylinder casings respectively, whereby the valves may be removed and reversed by threading them into the opposite side of their sockets, thus reversing the order of their exhaust and intake, to cause the apparatus to perform the function of air compressor whenever desired. From this it will be understood that

during the operation of the pump, both pistons are moving in the same direction. One, however, is moving outwardly in its cylinder while the other is moving inwardly.

5 During this outward movement of the one cylinder the valves 30 in its outer head are closed, and the air in the outer end of the cylinder passes through the check-valves 22 into the inner extremity of the cylinder.

10 During this operation the piston in the opposite cylinder is driving the air out of the valves 30 located in the inner extremity of the last named cylinder; while, when the pistons are moving in the opposite direction,

15 their functions are reversed. In this way one piston is always acting to draw air from the suction tank while the other piston is always acting to drive air out of its cylinder into the atmosphere.

20. Having thus described my invention, what I claim is:

1. A suction pump comprising two cylinders, pistons therein, each cylinder having an auxiliary chamber beyond its outer head, a conduit in communication with both auxiliary chambers, reversible check valves located in the outer heads of both cylinders, whereby the latter are placed in communication with the auxiliary chambers, the inner heads of the cylinders having reversible check valves, whereby the latter are placed in communication with the atmosphere, the cylinder pistons also having reversible check valves, a centrally located operating yoke, and a rigid connection between the two pistons and the yoke, substantially as described.

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2. A suction pump, comprising two cylinders, pistons therein, each cylinder having an auxiliary chamber beyond its outer head, a conduit in communication with both auxiliary chambers, reversible check valves located in the outer heads of both cylinders,

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whereby the latter are placed in communication with the auxiliary chambers, the inner heads of the cylinders having reversible check valves, whereby, the said pump is adapted to cause either a suction or compression, the cylinder pistons having reversible check valves, and a suitable operative connection between the two pistons, whereby they are moved simultaneously in opposite directions, substantially as described.

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3. A pump comprising two cylinders, pistons therein, each cylinder having an auxiliary chamber beyond its outer head, a conduit in communication with both of the cylinders, reversible check valves located in the outer heads of both cylinders, whereby the latter are placed in communication with the auxiliary chambers, the inner heads of the cylinders having reversible check valves, the cylinder pistons also having reversible check valves, whereby the pump is adapted to produce either a suction or compression of fluid and means for simultaneously actuating the pistons, for the purpose set forth.

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4. A suction pump comprising a cylinder, a piston mounted to reciprocate therein, a conduit in communication with the cylinder, a reversible check valve located in the outer head of the cylinder, the inner head of the cylinder also having reversible check valves, whereby the said pump is adapted to cause either a suction or compression, the piston also having reversible check valves, and suitable means for operating the piston, for the purpose set forth.

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

NAT H. FREEMAN.

Witnesses:

A. J. O'BRIEN,

A. E. O'BRIEN