

No. 683,185.

Patented Sept. 24, 1901.

W. F. SINGER.  
COMPRESSOR.

(Application filed Nov. 15, 1900.)

(No Model.)

Fig. I.

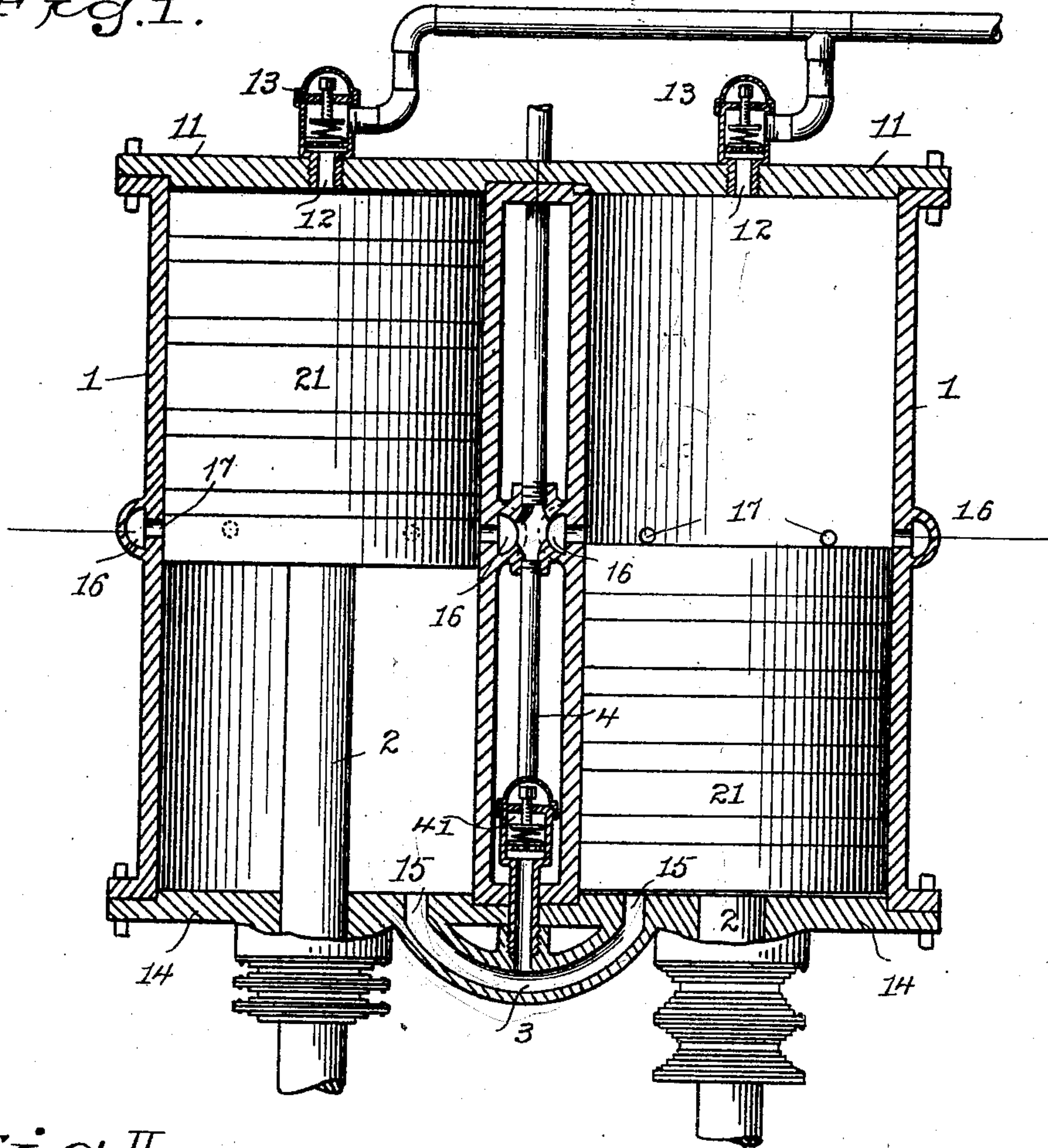
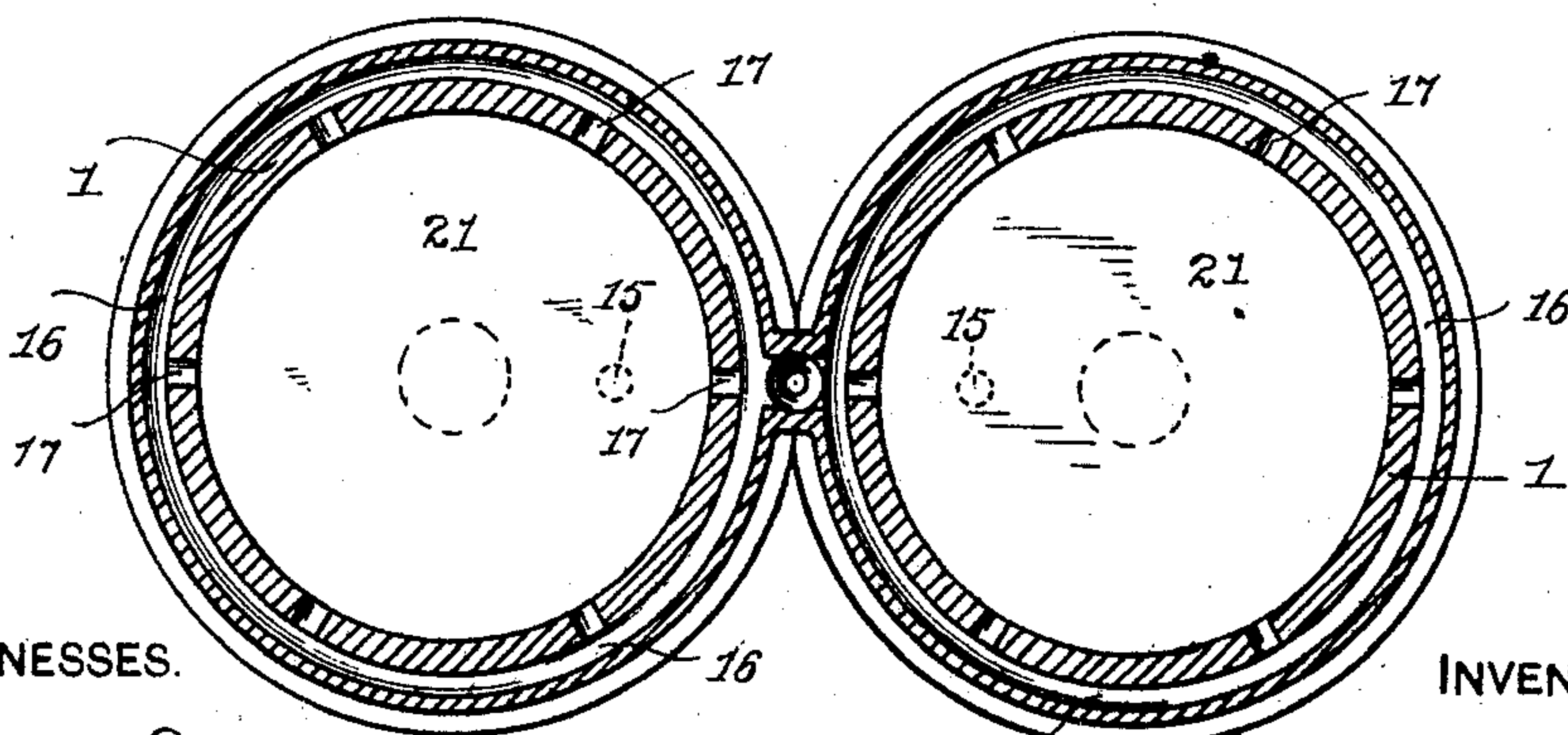


Fig. II.



WITNESSES.

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# UNITED STATES PATENT OFFICE.

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## COMPRESSOR.

SPECIFICATION forming part of Letters Patent No. 683,185, dated September 24, 1901.

Application filed November 15, 1900. Serial No. 36,614. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM F. SINGER, a citizen of the United States, residing at the borough of Manhattan, city and State of New York, have invented an Improvement in Compressors, of which the following is a specification.

My invention relates particularly to that class of pumps employed for compressing or liquefying refrigerating-gases, the object of the invention being to simplify and to make more efficient and durable such pumps.

In carrying out my invention I employ twin cylinders placed side by side, the cylinders being provided with annular passage-ways surrounding the same and the passage-ways connected at their point of nearest approach, the cylinders at such passage-ways being provided with a plurality of openings connecting the passage-ways and the interior of the cylinders. The pistons are arranged for alternate reciprocation and adapted to uncover the aforesaid openings in one position only. The aforesaid annular passage-ways are connected to the suction, and I provide passage-ways connecting the cylinders at the rear of the pistons, the said passage-ways being connected to the suction by a pipe having interposed therein a relief-valve.

In the drawings, Figure 1 is a vertical section and partial elevation representing my improvement, and Fig. 2 a sectional plan through said annular passage-ways.

The twin or two cylinders 1 1 are placed side by side and they may, if desired, be an integral casting. They are provided with heads 11 at one end and with heads 14 at the opposite end, connected to the cylinders by bolts in the usual manner. The heads 11 are provided with outlet-pipes 12, in which are valves 13, and the heads 14 are perforated for the piston-rods 2, and the pistons 21 within the cylinders are connected to the rods 2. The cylinders are provided with annular passage-ways 16, surrounding the cylinders and connected at their point of nearest approach, and ports or openings 17 through the bodies of the cylinders connect the annular passage-ways with the interior of the cylinders. These annular passage-ways 16 are connected by a pipe to the suction, said pipe being shown in

Fig. 1 as extending upward from said passage-ways between the cylinders. I provide outlets 15 through the heads 14 of the cylinders, which merge with a connecting passage-way 3, extending from one cylinder to the other and connecting the spaces in the cylinders behind the pistons, and this passage-way 3 is provided with a relief-tube 4 and an interposed check-valve 41, the relief-tube 4 extending to an opening into the annular passage-ways 16, so that the connecting-passage 3 communicates with the suction. The pistons 21 are of such length within the cylinders that in their forward position, as shown at the left hand of Fig. 1, the openings or ports 17 are covered, while in the rearward position, as shown at the right hand of Fig. 1, the said openings or ports are uncovered, in which latter position the gases are drawn into the forward part of the cylinder to fill the vacuum created by the backward movement of the piston, and with the forward movement of the piston the gases are compressed and are forced through the outlet-pipe 12 past the rearwardly-closing valve 13, such movement compressing the gas to a marked degree and almost to the point of liquefaction. It is almost impossible to make these pistons fit the cylinders so exactly as to form a perfect seal to the refrigerating-gas. Some of the gas will leak past the pistons during the compressing movement, and such escaping gases will fill the spaces behind the pistons, and with the alternate movements of the pistons such gas will pass from one cylinder through the connecting passage-way 3 to the other, and an equilibrium will thus be maintained, and should the back pressure at any time exceed the pressure of the suction the relief-valve 41 will open and allow the excess pressure of gas to pass into the suction from the connecting passage-way 3. In a copending and concurrently-filed application I have described and shown devices adapted to care for the leak of gases around the piston-rods where the same pass through the heads 14.

I claim as my invention—

1. In a pump and in combination, twin cylinders side by side, annular passage-ways surrounding said cylinders and connected at



their point of nearest approach, a plurality of openings or ports connecting said passage-ways with the interiors of the cylinders, pistons arranged for alternate reciprocation and adapted to uncover said ports or openings when retracted and to close the same during the greater part of their stroke, a passage-way connecting the cylinders at the rear of the pistons, a relief-tube connecting the said passage-way with the said connected annular passage-ways and the suction, a valve interposed in said relief-tube, and a tube for the suction extending from said annular passage-way, substantially as set forth.

2. In a pump and in combination, twin cylinders side by side, annular passage-ways surrounding said cylinders and connected at their point of nearest approach, a plurality of openings or ports connecting said passage-ways with the interiors of the cylinders, pistons arranged for alternate reciprocation and adapted to uncover said ports or openings when retracted and to close the same during the greater part of their stroke, a passage-way connecting the cylinders at the rear of the pistons, a relief-tube connecting the said passage-way with the said connected annular passage-ways and the suction, a valve interposed in said relief-tube, a tube for the suction extending from said annular passage-way, and valves 13 in the outer surface of the cylinders communicating with apertures from the cylinder on one side and outlet or discharge pipes for conveying away the fluid under pressure, substantially as set forth.

3. In a single-acting pump and in combina-

tion, two cylinders having parallel axes, annular passage-ways surrounding said cylinders at substantially their middle points a suction-tube connected with said annular passage-ways, a plurality of ports connecting said annular passage-ways with the interiors of the cylinders, piston-heads arranged for alternate reciprocation and adapted to uncover said ports when retracted and to close same during the greater part of their stroke, a passage-way connecting said cylinders at the rear of said pistons, a relief-tube connecting said last-named passage-way with the suction and an automatic valve in said relief-tube, substantially as described.

4. In a single-acting pump and in combination two cylinders having parallel axes, annular passage-ways surrounding said cylinders at substantially their middle points, a suction-tube connecting with said annular passage-ways, a plurality of ports connecting said annular passage-ways with said cylinder, said ports forming the only fluid-inlet openings into said cylinder, piston-heads arranged for alternate reciprocation and adapted to uncover said ports when retracted and to close same during the greater part of their stroke, a passage-way connecting said cylinders at the rear of said pistons, a relief-tube connecting said last-named passage-way with the suction and an automatic valve in said relief-tube, substantially as described.

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Witnesses:

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