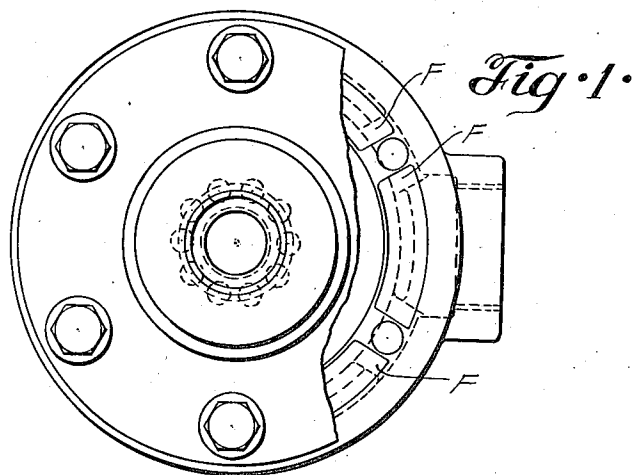
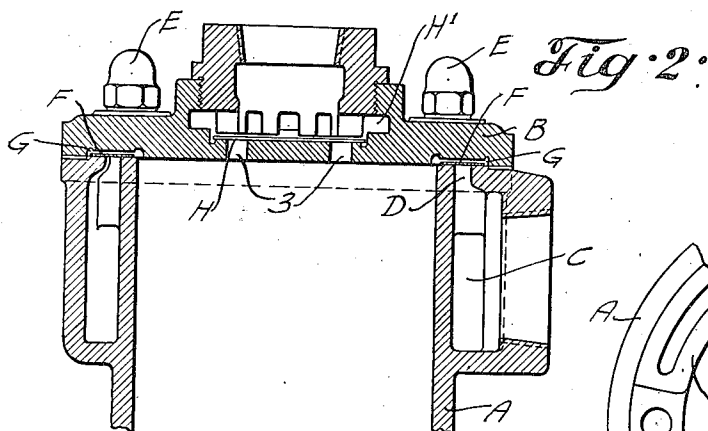
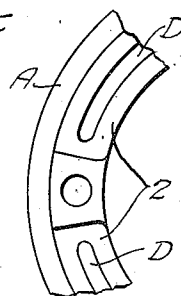
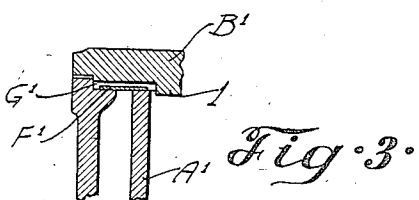


G. F. STEEDMAN.
 RECIPROCATING PUMP OR COMPRESSOR.
 APPLICATION FILED JAN. 10, 1921.

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RECIPROCATING PUMP OR COMPRESSOR.

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To all whom it may concern:

Be it known that I, GEORGE F. STEEDMAN, a citizen of the United States, residing at St. Louis, Missouri, have invented a certain
5 new and useful Improvement in Reciprocating Pumps or Compressors, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use
10 the same.

This invention relates to pumps and compressors, and particularly to the suction valves used in machines of the type that comprise a cylinder provided with a reciprocating piston.

One of the objects of my invention is to provide a machine of the general type referred to that is equipped with light, durable, inexpensive suction valves that do not
20 require springs to hold them seated, that will permit a relatively high R. P. M. of the machine and which require only a small clearance space in the chamber or chambers in which said valves are arranged.

Another object is to provide a pump, compressor or similar machine in which the suction valves are arranged between the head and end of the cylinder, and which is of such design that there is little liability of the suction valves breaking and fragments of same
30 getting into the cylinder.

And still another object is to provide a machine of the general type last referred to which is so constructed that the retaining
35 devices used to clamp the head against the end of the cylinder also serve as guides for the suction valves, thereby permitting the cylinder head retaining devices to be arranged more nearly on a line with the side
40 wall of the cylinder, and consequently, producing a machine that is more compact than one in which the cylinder head retaining devices are arranged at a point outside of the suction valves.

Figure 1 of the drawings is a top plan view of an air compressor or vacuum pump constructed in accordance with my invention, with a portion of the head of the cylinder broken away so as to more clearly
50 illustrate the arrangement of the suction valves.

Figure 2 is a vertical sectional view of the upper end portion of the cylinder and the cylinder head; and

55 Figures 3 and 4 are detail sectional views,

illustrating slight modifications of my invention.

Referring to Figures 1 and 2 of the drawings, which illustrate the preferred form of my invention, A designates the cylinder of a vacuum pump or air compressor, B designates the head of the cylinder, C designates an inlet chamber in the upper end portion of the cylinder, D designates inlet ports leading from the chamber C and terminating in the upper end of the cylinder A, and E designates studs, bolts or other
60 suitable retaining devices that clamp the head B against the end of the cylinder.

The inlet ports D are controlled by suction valves F that are arranged between the end of the cylinder and the head B in such a manner that they will be unseated on the downward stroke of the piston (not shown) in the cylinder A, thus permitting air to
70 enter the cylinder, and seated so as to close the ports D on the upward stroke of said piston.

In the form of my invention shown in Figures 1 and 2 the suction valves F consist of thin segmental shaped plates or
80 segmental-shaped pieces of thin sheet material that are arranged between the cylinder head retaining devices E in an annular valve chamber G formed by an annular
85 recess on the underside of the head B, said recess being in substantially longitudinal alignment with the end of the cylinder, but extending inwardly slightly beyond the inner face of the side wall of the cylinder, so
90 as to cause the valve chamber G to always be in direct communication with the interior of the cylinder A. Accordingly, the end of the cylinder A serves as a seat for the suction valves F, the lift of said valves is
95 limited by the head B of the cylinder, the cross movement of said valves is limited by the side walls of the annular valve chamber G and the endwise movement or circumferential movement of the valves F with relation to the cylinder is limited by the cylinder
100 head retaining devices E. By constructing the machine in the manner above described I am able to arrange the cylinder head retaining devices E nearly on a line with the
105 side walls of the cylinder A, due, of course, to the fact that said retaining devices are arranged between the suction valves instead of a point outside of the suction valves, thereby materially reducing the diameter of
110

the head of the cylinder. The suction valves are light, durable, and inexpensive to manufacture; they operate successfully without the use of springs for holding them seated; they permit a relatively high R. P. M. of the machine; they require a relatively small clearance in the space in which they operate and as each suction valve is guided by or arranged in a space formed by four opposed walls or guiding portions (the two side walls of the valve chamber G and the two cylinder head retaining devices E between which the valve is arranged), there is little liability of the valve breaking and fragments of same getting into the cylinder.

While I prefer to arrange the suction valves F in the manner illustrated in Figures 1 and 2, I do not wish it to be understood that my invention is limited to the exact construction illustrated in said figures, as one feature of my invention consists of a pump, compressor or other similar piston machine equipped with a plurality of suction valves that are guided or held in operative relationship with the ports which they control in such a way that they cannot move inwardly into the piston space in the cylinder. Moreover, while I have stated that the valve chamber G is preferably formed by an annular recess on the underside of the cylinder head B, this is not essential, as the valve chamber could be formed in other ways. For example, as shown in Figure 3, the suction valve F' can be arranged in an annular valve chamber G' formed by an annular recess in the end of the cylinder A', the head B' of the cylinder being provided with a depending portion 1 of slightly less diameter than the diameter of the interior of the cylinder and arranged in concentric relation with same so as to cause the valve chamber G' to be in direct communication with the interior of the cylinder, said depending portion 1 limiting the crosswise movement of the suction valves in one direction, and the outer wall of the annular recess in the end of the cylinder limiting the crosswise movement of the suction valves in the other direction.

On account of simplicity of manufacture, I prefer to arrange the suction valves in an annular valve chamber through which the cylinder head retaining devices E pass. If desired, however, each of the suction valves can be arranged in a separate segmental-shaped valve chamber formed either by milling a segmental recess in the underside of the cylinder head or milling a segmental recess 2 in the upper end of the cylinder, as shown in Figure 4 in substantially longitudinal alignment with the end of the cylinder, but extending inwardly slightly beyond the inner face of the side wall of the cylinder, so as to establish communication between said valve chamber and the interior

of the cylinder. While I prefer to make the valve chamber or chambers in such a way that they overhang the piston space of the cylinder slightly, the essential thing is that said chamber or chambers communicate with the interior of the cylinder, but are of such form that the valves cannot move inwardly into the piston space in the cylinder. Such a structure differs from those previously described, in that the cylinder head retaining devices E are not used to prevent endwise movement or circumferential movement of the suction valves, but it embodies the other desirable characteristics of the structure shown in Figures 1, 2 and 3, namely, light, durable, inexpensive suction valves seated against the end of the cylinder and confined in such a manner that fragments of same cannot enter the cylinder in the event said valves fracture.

Any suitable type of discharge valve may be used, the discharge valve of the compressor shown in Figures 1 and 2 consisting of an annular-shaped member H arranged in a valve chamber H' in the cylinder head in such a manner that it controls discharge ports 3 in the head whose inner ends communicate with the interior of the cylinder, as shown in Figure 2.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A pump, compressor or similar machine, comprising a cylinder provided in one of its ends with an inlet port, a head for said cylinder that extends over said port, retaining devices for said head that secure it to the cylinder, a valve for said port interposed between the head and the end of the cylinder and arranged between a pair of said cylinder head retaining devices, and a chamber for said valve extending inwardly slightly beyond the inner face of the side wall of the cylinder and provided with an inner wall that limits the crosswise movement of the valve with relation to the cylinder.

2. A pump, compressor or similar machine, comprising a cylinder provided in one of its ends with inlet ports, a head for said cylinder, retaining devices for securing said head to the cylinder, suction valves arranged between the cylinder head and the end of the cylinder and positioned between said cylinder head retaining devices, and means for preventing said valves from moving crosswise into the piston space in the cylinder.

3. A pump, compressor or similar machine, comprising a cylinder provided with a removable head, retaining devices for securing said head to the cylinder, inlet ports in the end of the cylinder, segmental-shaped controlling valves for said ports seated on the end of the cylinder and arranged be-

tween said cylinder head retaining devices, and means on said head for preventing said valves from moving inwardly into the piston space of the cylinder.

5 4. A pump, compressor or similar machine, comprising a cylinder provided adjacent one of its ends with an inlet chamber, valve ports that terminate in the end of the cylinder, a head for said cylinder, retaining devices for said cylinder head that clamp it against the end of the cylinder, and a plurality of segmental-shaped suction valves for the ports in the end of the cylinder operated by the suction and pressure in the cylinder and arranged between said cylinder head retaining devices in an annular valve chamber that extends inwardly slightly beyond the inner face of the side wall of the cylinder and which is provided with walls that limit the cross-wise movement of said valves.

5. A pump, compressor or similar machine, comprising a cylinder, a head for said cylinder, retaining devices for said head which connect it to the cylinder, inlet ports in the end of the cylinder, controlling valves for said ports arranged in such a manner that the end of the cylinder acts as a seat for said valves, the cylinder head limits the opening movement of said valves and the cylinder head retaining devices prevent said valves from moving circumferentially with relation to the cylinder, and means on said cylinder head in proximity to the inner face of the side wall of the cylinder for limiting the cross-wise movement of said valves in one direction relatively to the cylinder.

6. A pump, compressor or similar machine, comprising a cylinder provided in its end with inlet ports, a head for said cylinder that extends over said ports, retaining devices on the cylinder that project through said head, segmental-shaped suction valves mounted on the end of the cylinder between said cylinder head retaining devices, and

an annular chamber for said valves extending inwardly slightly beyond the inner surface of the side wall of the cylinder and provided with side walls that limit the cross-wise movement of said valves, the circumferential movement of said valves being limited by said cylinder head retaining devices.

7. A pump, compressor or similar piston machine, comprising a cylinder provided in its end with ports, a head for said cylinder, an annular valve chamber between the head and the end of the cylinder that extends inwardly slightly beyond the inner face of the side wall of the cylinder so as to communicate with the interior of the cylinder, retaining devices for said head that pass through said valve chamber, and a plurality of plate valves in said annular valve chamber seated on the end of the cylinder and retained in position by the side walls of said valve chamber and the cylinder head retaining devices.

8. A pump, compressor or similar machine, comprising a cylinder provided in its end with inlet ports, a head for said cylinder extending over said ports and provided on its underside with a valve chamber and a depending concentric portion of slightly less diameter than the diameter of the interior of the cylinder, thus establishing communication between said valve chamber and cylinder, retaining devices that project through the cylinder head and secure it to the cylinder, and segmental-shaped suction valves mounted on the end of the cylinder in said valve chamber and arranged over said suction ports between the cylinder head retaining devices, said valves being prevented from moving circumferentially by means of said retaining devices and being limited in axial motion by the circumferential outer wall of the valve chamber and the depending concentric portion on the cylinder head.

GEORGE F. STEEDMAN.