

June 28, 1927.

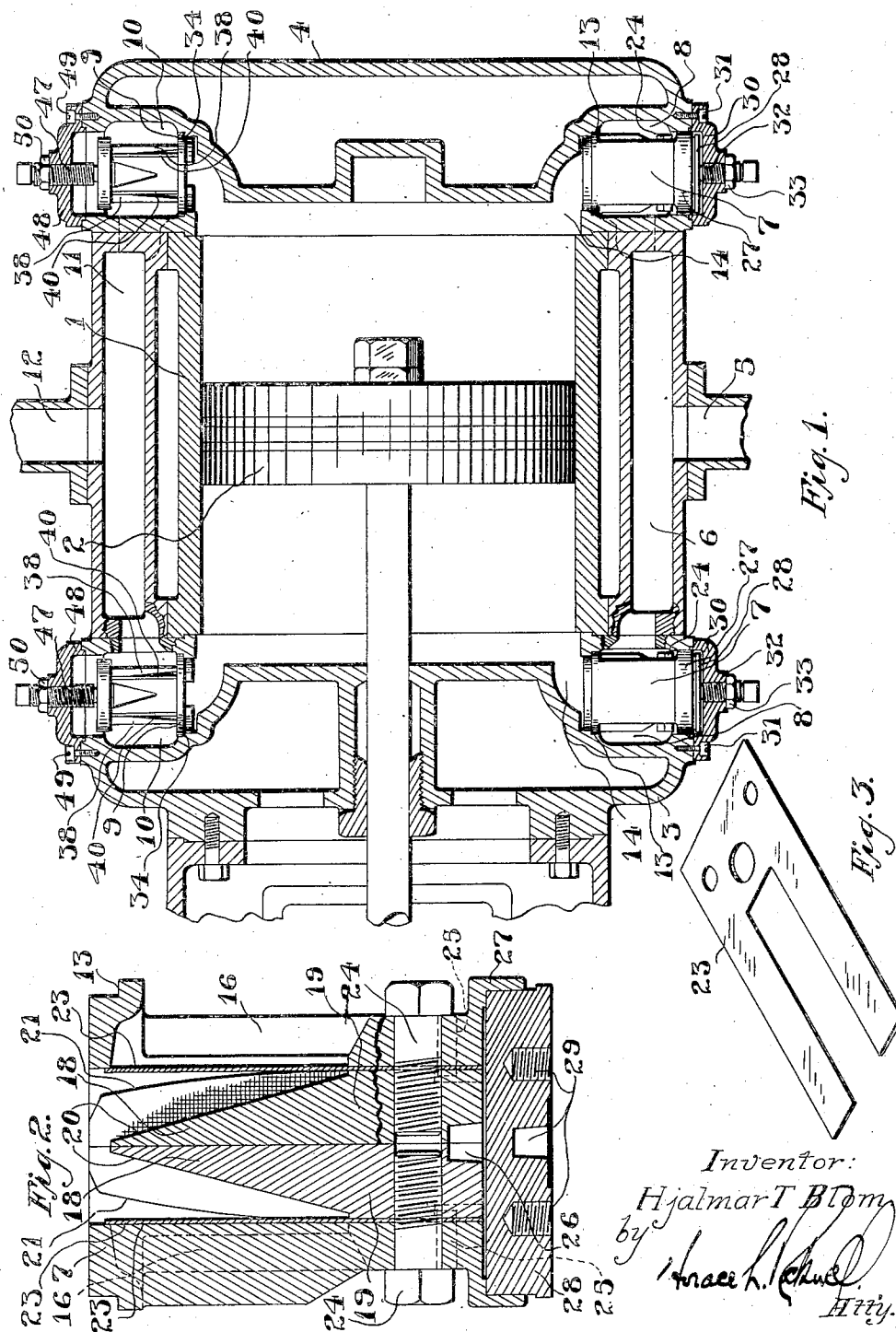
1,634,247

H. T. BLOM

COMPRESSOR VALVE

Original Filed July 31, 1917

2 Sheets-Sheet 1



Inventor:
Hjalmar T. Blom
by Isaac H. Schuch
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2 Sheets-Sheet 2

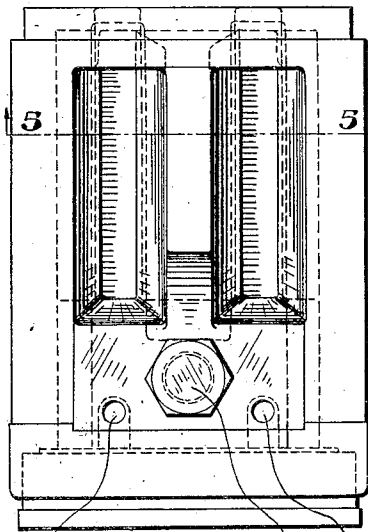


Fig. 4.

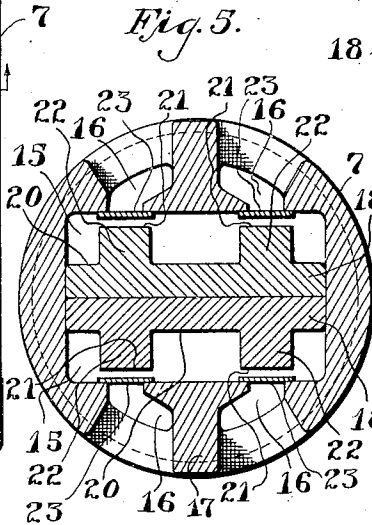


Fig. 5.

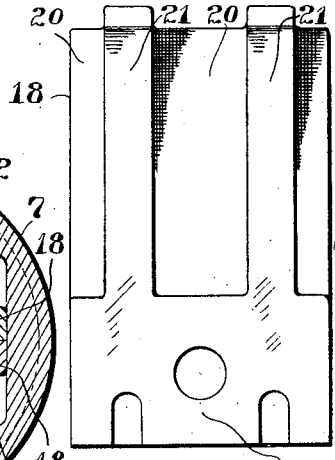


Fig. 6.

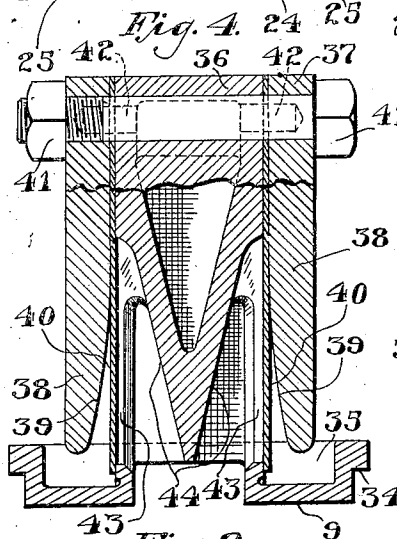


Fig. 8.

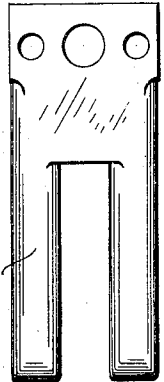


Fig. 9.

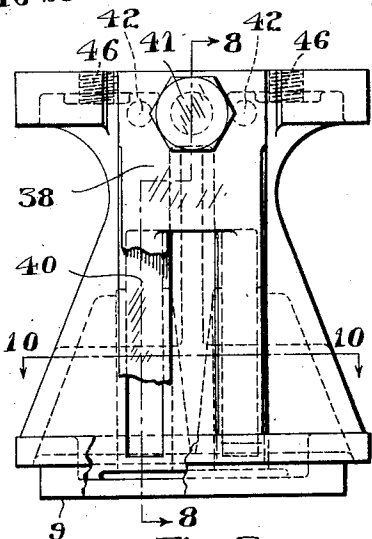


Fig. 7.

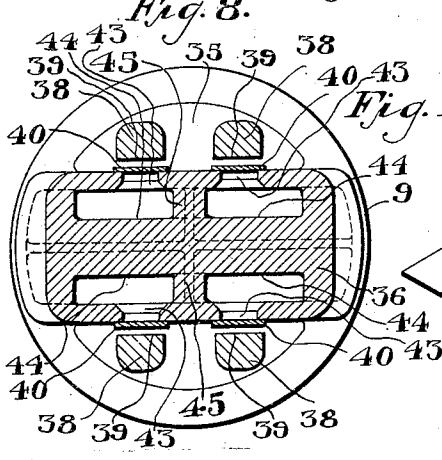


Fig. 10.

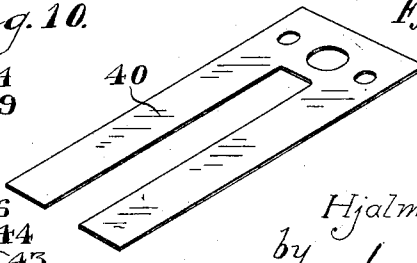


Fig. 11.

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Patented June 28, 1927.

1,634,247

UNITED STATES PATENT OFFICE.

HJALMAR T. BLOM, OF CHICAGO, ILLINOIS, ASSIGNOR TO SULLIVAN MACHINERY COMPANY, A CORPORATION OF MASSACHUSETTS.

COMPRESSOR VALVE.

Application filed July 31, 1917, Serial No. 183,810. Renewed September 9, 1922. Serial No. 587,227.

My invention relates to compressor valves.

It has for its object to provide an improved plate valve of the cage type especially adapted to air compressor service, which may be readily inserted in lieu of poppet valves and readily removed whenever desired. A further object of my invention is to produce an improved valve in which the capacity is increased and the clearance minimized, the valve also being adapted to withstand long use in service with increased efficiency and without breakage of the plate members. These and other objects of my invention will, however, hereinafter more fully appear.

In the accompanying drawings, I have shown for purposes of illustration one embodiment which my invention may assume in practice.

In these drawings,—

Fig. 1 is a longitudinal vertical sectional view of a compressor cylinder equipped with my improvement, with parts broken away.

Fig. 2 is a vertical sectional view of one of the inlet valve cages.

Fig. 3 is a detail in perspective of one of the inlet valve members shown in Fig. 2.

Fig. 4 is a side elevation of the cage shown in Fig. 2.

Fig. 5 is a transverse sectional view taken substantially on line 5—5 of Fig. 4.

Fig. 6 is a detail side elevation of one of the guard members shown in Figs. 2, 4, and 5.

Fig. 7 is a side elevation of one of the discharge valve cages, with parts broken away.

Fig. 8 is a vertical sectional view taken on line 8—8 of Fig. 7.

Fig. 9 is a side elevation of one of the guard members shown in Fig. 8.

Fig. 10 is a transverse sectional view taken on line 10—10 of Fig. 7.

Fig. 11 is a detail in perspective of one of the discharge valve members shown in Fig. 8.

In this illustrative construction I have shown my invention as applied to a compressor including a cylinder 1 having a piston 2 movable therein. The ends of the cylinder being closed by the removable heads 3 and 4. Air flows in from the cylinder intake 5 into a passage 6 communicating with valves within the inlet valve cages 7 and passing through these valves, whose cages are disposed in the enlarged cage housing

valve pockets 8, into the opposite ends of the cylinder, is discharged after compression into the discharge valve cages 9 and through corresponding valve cage housing pockets 10 into a passage 11 communicating with the discharge pipe 12 leading to the receiver.

Of these valves, we will first consider one of the inlet valves. It will be noted that the inlet valve cage 7 is substantially cylindrical in form and provided with an annular laterally disposed flange 13 on its upper end adapted to seat against a corresponding flange on the head 3 surrounding an outlet 14 of the pocket 8 and thus form an airtight fit between the cage and cylinder, the outlet of the valve, as hereinafter described, being within this flange. It will also be observed that this member 7 is provided with a substantially rectangular chamber 15 extending longitudinally thereof and provided on its opposite sides with a plurality of ports 16, herein longitudinally disposed and spaced apart by a wall 17, communicating with the chamber 15 and with the passage 6 through the pocket 8. Within the chamber 15, the valve guard members 18 are carried. As shown, these valve guard members are two in number and disposed back to back, the same being provided with bottom portions 19 adapted to substantially fill the chamber 15 and having on their opposite sides and near their upper ends sloping fluid-deflecting surfaces 20 extending from the bottom of the ports 16 to the top of the latter and tapering substantially to an apex to form a gradually enlarging outlet within the flange 13. It will be noted hereafter that maximum outlet area is found adjacent maximum width of port opening. It will also be observed that these members 18 are provided with valve engaging surfaces 21, herein shown to be formed on suitable projections 22 extending outward from the surfaces 20, the valve engaging surfaces 21 being inclined gradually backward in an arc from a point at the bottom of the ports 16 to a point at the top of the same so that normally closed resilient, and preferably bifurcated, plate valve members 23, disposed between the ports 16 and the guards, may when opened engage with the latter with a gradual rolling effect. As shown, each of these valve members 23 comprises a plurality of resilient fingers or valves proper corre-

sponding in number to the ports 16 and connected by a marginal portion, the marginal portion of the several valve members being securely clamped over a relatively large area 5 between the outer surfaces of the portions 19 and the adjacent walls of the chamber 15 by means of a plurality of oppositely disposed bolts 24, which extend through the bottom of the valve casing and into the members 18, 10 thus serving the double function of clamping the valve members 23 in place, at the same time retaining the members 18 in position. Obviously, if desired, however, additional means may be provided to hold the 15 several parts in assembled relation, such for instance as a plurality of dowel pins 25 disposed on opposite sides of the bolt connection.

Thus, it will be noted that an entirely unitary construction is produced which is adapted to be bodily inserted in the pocket 8 formed in the head 3. If desired, this may be ground in position in the pocket, and for convenience in grinding the surface 13 again 25 the corresponding surface of the seat, I have provided a suitable wrench engaging socket 26 in the bottom of the members 18. It will also be noted that I have provided the cage member 7 with a suitable flange 27 upon its 30 lower end adapted to confine a suitable plate 28 having suitable apertures 29 therein adapted to facilitate the insertion or removal of the member 7. As in the usual construction, it will be noted that a suitable valve 35 cover 30 is provided herein, the same being shown to be bolted to the head by means of bolts 31 and to carry an adjusting screw 32 which is engageable with the plate 28 and is 40 adjustable from the exterior of the cover, the same being provided with a lock nut 33 to hold the same in the desired positions of adjustment.

Having thus described one of the inlet valves, we will now consider one of the discharge valves. This valve, like its companion, constitutes a unit bodily insertable in or removable from a pocket formed in the cylinder heads. In this instance, it will be noted, however, that although the valve cage 50 9 is provided with a flange 34 corresponding to the flange 13 and adapted to engage with a corresponding seat in the head and be ground into position thereon, the same is of materially different shape from the member 7. As shown in Fig. 8, this member 9 is 55 provided on its cylinder end and at each side with a substantially segmental grooved or chambered portion 35 and an upstanding tapered portion 36 of substantially rectangular cross section disposed between these portions 35. As shown, this portion 36 carries 60 clamped to its opposite surfaces inwardly disposed guard members 37 each preferably bifurcated and having a plurality of downwardly extending spaced guard fingers 38 thereon provided with valve engaging surfaces 39 thereon corresponding to the surfaces 21 and adapted to engage with valve members 40, similar to the valves 23 and clamped between the guard members 37 and 70 the member 36 by any suitable means, herein by transversely extending bolts 41 and dowels 42 located on the opposite sides of the bolts. It will also be noted that the portion 36 is provided with elongated longitudinally 75 disposed ports 43 and that an inlet similar to the outlet of the inlet valves is formed by chambering out the center of the portion 36 and providing it with sloping fluid-deflecting walls 44 similar to the surfaces 20, the 80 several branches being spaced apart by walls 45. As in the inlet valve construction hereinabove described, it will also be noted that the upper end of the member 36 is provided with openings 46 adapted to facilitate the 85 grinding of the valve cage upon its seat, and that this cage is held in clamped position by means of an adjustable setscrew 47 threaded in a removable cover plate 48 suitably attached to the head, as by means of 90 bolts 49, the screw 47 being located in any desired position of adjustment by means of a lock nut 50.

Through the use of my improved construction, it will be noted that it is possible to 95 replace a poppet valve with a cage type plate valve of rugged form having a large effective area and which at the same time maintains the clearance within the desired limits. It will also be observed that either 100 the inlet or discharge valve may be inserted or removed as a unit, and that when it is desired to remove the valve members per se from the cages, these members are readily accessible, the parts going to make the several units being readily separable whenever 105 desired. Attention is also directed to the fact that through the use of my improved construction it is possible to utilize two sets of valves on a single cage, thereby greatly 110 increasing the valve area. It will also be noted that it is possible to receive or deliver the air at the end of the cage so that the latter may be disposed immediately adjacent the cylinder, and that through my improved 115 fluid-deflecting surfaces the clearance is reduced at the same time that it is made possible to utilize the full area of the parts. Obviously, through the use of my improved guard members the lift of the valve members is also increased without danger of 120 breakage, and, in the inlet valve construction, the clearance is further reduced. These and other advantages of my improved construction will, however, be clearly apparent 125 to those skilled in the art.

While I have in this application specifically described one embodiment which my invention may assume in practice, it is to be understood that the form of the same shown 130

herein is used for purposes of illustration and that the invention may be modified and embodied in various other forms without departing from its spirit, it being my intention to include all such modifications within the scope of the appended claims.

What I claim as new and desire to secure by Letters Patent is:

1. In combination, a valve cage having a fluid opening in one of its ends and oppositely disposed ports opening through the periphery of the cage and communicating through the interior of said cage with said fluid opening, fluid deflecting means within said cage between said ports and having opposed deflecting surfaces facing said ports, and valves disposed on the opposite sides of said deflecting means and enclosing the latter between them, said valves having free ends adjacent said opening and approaching each other on opening of said valves.

2. In combination, a valve cage having a fluid opening in one of its ends and oppositely disposed ports opening through the periphery of the cage at opposite sides of the latter and communicating through the interior of said cage with said fluid opening, fluid deflecting means within said cage between said ports, and valves enclosing said means and having free ends adjacent said opening, said valves normally closing said ports and the free ends of said valves approaching each other on opening movement.

3. In combination, a valve cage having a fluid opening in one of its ends and oppositely disposed ports opening through the side of said cage and communicating through the interior of said cage with said fluid opening, fluid deflecting means within said cage having sloping surfaces intersecting adjacent said opening, and valves disposed on the opposite sides of said means and having free ends adjacent said opening and approaching each other on opening of said valves.

4. In combination, a valve cage having a longitudinally disposed chamber therein provided with an end opening and lateral ports communicating therewith, resilient valves in said chamber having free ends adjacent said opening and corresponding in number to said ports and disposable over the latter, and means disposed between said valves in said chamber for directing the fluid to the open end of said chamber.

5. In combination, a valve cage having a longitudinally disposed chamber therein provided with an opening, a plurality of members carried adjacent said chamber having ing surfaces leading toward said opening,

and resilient valves having free ends adjacent said opening and clamped between said members and the walls of said chamber.

6. In combination, a valve cage having a fluid opening in its end and an upstanding portion provided with oppositely disposed communicating lateral ports, means in said cage for directing fluid after its flow through said ports, and a plurality of valves normally disposed over said ports and clamped to said portion, said valves having free ends adjacent said opening.

7. In combination, a valve cage having an opening in one of its ends and an upstanding portion having oppositely disposed lateral ports communicating with said opening and surfaces directing the fluid after its flow through said ports, and a plurality of valves clamped to said portion and normally disposed over said ports, said valves having free ends adjacent said opening.

8. In combination, a valve cage having an opening in one of its ends and an upstanding portion having oppositely disposed lateral ports communicating with said opening, means for directing the fluid after its flow through said ports, a plurality of valves clamped to said portion and normally disposed over said ports, said valves having free ends adjacent said opening, and a plurality of guard members carried on said upstanding portion.

9. In combination, a valve cage having an opening in one of its ends and an upstanding portion having oppositely disposed lateral ports communicating with said opening, means directing the fluid after its flow through said ports, a plurality of flexible valves clamped to said portion and normally disposed over said ports, said valves having free ends adjacent said opening, and a plurality of guard members carried on said upstanding portion having curved valve engaging surfaces.

10. In combination, a valve cage having an opening in its end and a plurality of communicating oppositely disposed lateral ports surrounded by valve seat surfaces lying in parallel planes, guard means disposed opposite each of said ports, valves individual to each of said ports cooperating with said seat surfaces and having free ends adjacent said end opening, and flow directing means within said cage comprising surfaces intersecting to form a dihedral angle whose edge is parallel to said seat surfaces and adjacent the open end of said cage.

In testimony whereof I affix my signature.

HJALMAR T. BLOM.

Certificate of Correction.

Patent No. 1,634,247.

Granted June 28, 1927, to

HJALMAR T. BLOM.

It is hereby certified that error appears in the printed specification of the above-numbered patent requiring correction as follows: Page 1, line 87, for the word "chamber" read *chambers*; page 2, line 3, for the word "portion" read *portions*, and line 24, for the word "again" read *against*; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 4th day of October, A. D. 1927.

[SEAL.]

M. J. MOORE,
Acting Commissioner of Patents.