April 5, 1938. C. S. BAKER 2,112,875

COMPRESSOR UNLOADER

Filed July 25, 1935

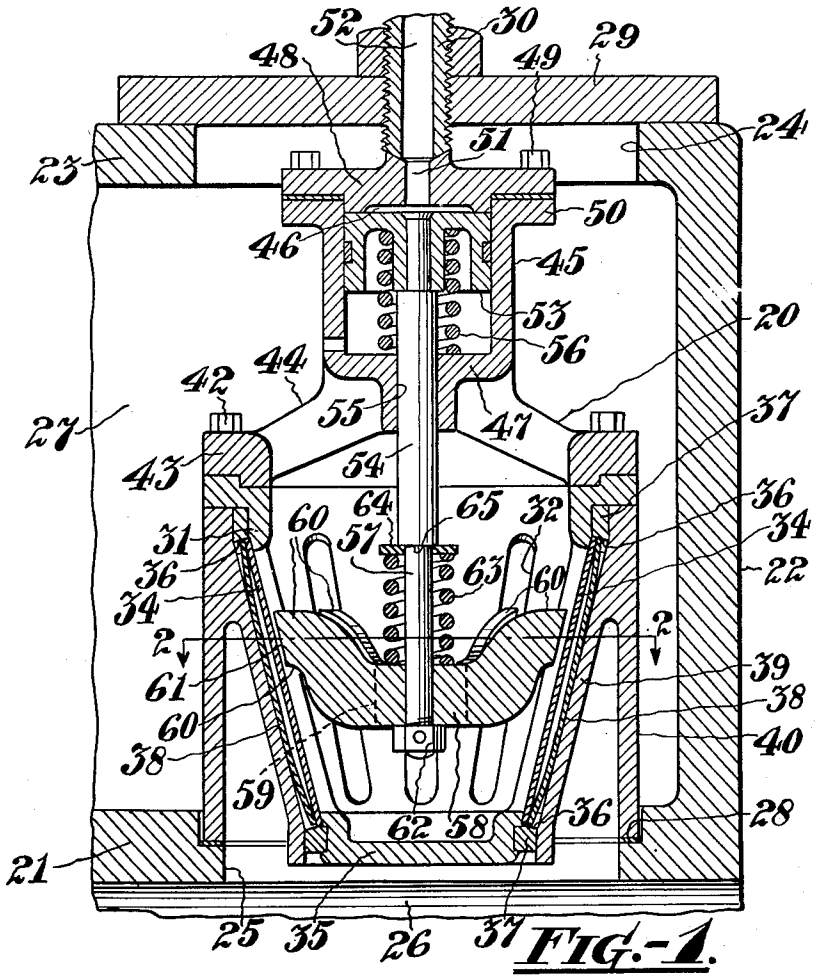
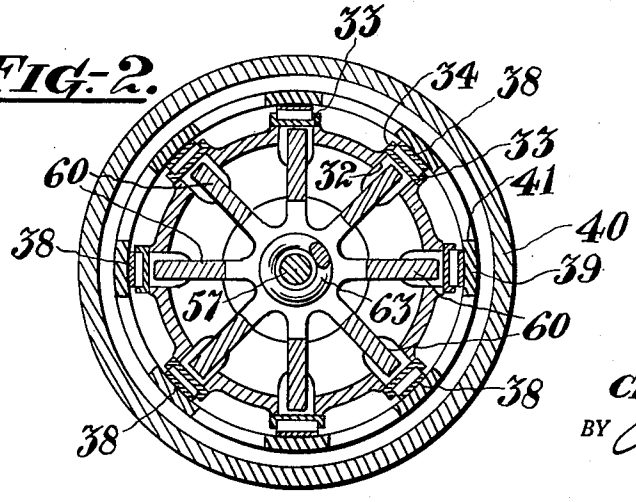


FIG.-1.

FIG.-2.



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COMPRESSOR UNLOADER

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5 Claims. (Cl. 137—153)

This invention relates to unloaders, but more particularly to compressor unloaders of the type adapted to unseat a valve plate or plates for unloading the compressor.

One object of the invention is to assure the simultaneous unseating in substantially equal degree of a plurality of valve plates.

Another object is to provide a compressor unloader of simplified construction and of which the parts are readily accessible for inspection and repairs.

Other objects will be in part obvious and in part pointed out hereinafter.

In the drawing forming a part of this specification and in which similar reference numerals refer to similar parts,

Figure 1 is a sectional elevation illustrating an unloader constructed in accordance with the practice of the invention and showing the unloader applied to an inlet valve mechanism of a compressor, and

Figure 2 is a transverse view taken through Figure 1 on the line 2—2.

Referring more particularly to the drawing, 20 designates, in general, a compressor unloader and a valve mechanism to which it is applied. The unloader and valve mechanism are shown arranged in an inner wall 21 of a compressor cylinder 22, and in an outer wall 23 of the cylinder is an aperture 24 through which the unloader and the valve mechanism may be inserted into the cylinder 22.

The aperture 24 is arranged coaxially with a port 25, in the wall 21, and affording communication between the compression chamber 26 and an inlet chamber 27 defined by the walls 21 and 23. In the port 25 is a shoulder 28 upon which is seated the valve mechanism, and in a cover plate 29, forming a closure for the aperture 24, is a bolt 30 which acts against the unloader for clamping the valve mechanism securely in position.

The valve mechanism selected for the purpose of illustrating a practical application of the invention is of the type forming the subject matter of my copending application for Valve assembly, Serial No. 33,980, filed July 31, 1935. The valve mechanism accordingly comprises a valve seat 31 of frusto-conical shape having a plurality of longitudinally extending radially arranged ports 32 which are encircled on the outer surface of the valve seat by raised seating portions 33 which cooperate with valves 34 for controlling the ports 32.

In its assembled position in the compressor the end of smaller diameter of the valve seat lies adjacent the port 25 and this end of the valve seat is closed by an end wall 35 which may be an integral portion of the valve seat so that all the medium intended to be compressed passes through the ports 32. The opposite end of the valve seat is open to permit free communication between the chamber 27 and the interior of the valve seat.

The valves 34 which are of the channel type are guided at their ends by notches 36 located in the confronting surfaces of rings 37 encircling the ends of the valve seat 31. The rings 37 also serve to prevent longitudinal movement of springs 38 with respect to the valves 34 and whereby the valves are held to their seats. The springs 38 are of the curved type of which the ends seat against the valve plates and the intermediate bowed portions bear against ribs 39 of a stop member 40 encircling the valve seat 31.

The ribs 39 lie in parallelism with the seating surfaces 33. They are located on the inner surface of the stop member 40 and are suitably spaced to define slots 41 through which the fluid medium passes into the compression chamber 26.

For convenience in installing the valve mechanism in the compressor, the valve seat and the stop member are securely clamped together and the valves 34 and the springs 38 are thereby retained in the correct assembled position. The means serving this function may consist as indicated of bolts or screws 42 which also extend through the flange 43 of a yoke 44 to secure this element to the valve mechanism.

In accordance with the practice of the invention the central portion of the yoke 44 is in the form of a cylinder 45 which is bored to provide a piston chamber 46. The innermost end of the piston chamber is closed by an end wall 47 and the opposite or outer end of the piston chamber is sealed by a cover 48 against which the bolt 30 acts to clamp the valve mechanism against the shoulder 28. The cover 48 is however, additionally secured in position by screws 49 which may extend through the cover and may be threaded into a flange 50 at the outer extremity of the cylinder 45. In the cover 48 is a passage 51 which registers with a passage 52 in the bolt for conveying pressure fluid into the outer end of the piston chamber 46.

The piston chamber 46 contains a piston 53 having a rod 54 affixed thereto and extending slidably through a bore 55 in the wall 47. A spring 56 disposed about the rod 54 and acting against the piston 53 and the wall 47 normally maintains the piston 53 in the retracted position,

that is, in the outermost part of the piston chamber 46.

The piston 53 and therefore, the rod 54 are arranged in coaxial relationship with the valve assembly. The rod 54 extends into the valve seat and the lowermost portion thereof is in the form of a reduced stem 57 upon which is mounted slidably a valve lifter 58 for unseating the valves 34 to unload the compressor. The central portion of the valve lifter 58 is in the form of a hub 59 having a plurality of radial arms 60 equalling in number the number of ports 32 into which the ends of the arms extend to prevent unlimited rotary movement of the valve lifter. The outer ends 61 of the arms 60, and which in the retracted position of the piston 53 lie closely adjacent the valves 34, are suitably inclined to correspond to the angle of inclination of the valves and, therefore, to cause a large area of contact between the arms 60 and the valves when the two are in engagement with each other.

The valve lifter 58 is retained on the reduced stem 57 by a nut 62 threaded on the outer end of the stem and, in order to cushion the thrust of the piston 53 employed for actuating the valve lifter 58 into engagement with the valves, a spring 63 is interposed between the valve lifter and a plate 64 abutting a shoulder 65 at the juncture of the rod 54 proper and the reduced stem 57.

Any suitable and well known valve means (not shown) may be interposed in the bolt 30 or supply conduit (not shown) leading thereto for automatically admitting pressure fluid into the piston chamber 46 for actuating the piston 53 to move the valve lifter 58 against the valves whenever the storage pressure reaches a maximum predetermined value which it may be desired to maintain, and to automatically exhaust such pressure fluid from the piston chamber 46 after the storage pressure again drops below the predetermined maximum value.

During the normal operation of the compressor and during which time, of course, the pressure in the storage receiver is below the predetermined maximum value which it may be desired to maintain the piston 53 and, therefore, the valve lifter 58 will be held in retracted position by the spring 56. The valves 34 will then be free to function for controlling the ports 32 so that upon each suction stroke fluid medium is drawn through the valve mechanism into the compression chamber 26 and during the subsequent compression stroke of the compressor piston the valves are held seated over the ports 32 by the springs 38.

The valve mechanism operates in this manner until the pressure reaches a predetermined value and at which time the valve device controlling the passage 52 in the bolt 30 will act to communicate the piston chamber 46 with the storage receiver. Pressure fluid will then flow into the piston chamber 46 and, acting against the piston 53, will actuate the piston in the direction of the valve mechanism. This movement of the piston will be transmitted by the spring 63 to the valve lifter 58 and the arms 60 will then be pressed into engagement with the valves 34 and unseat the valves by moving them in a plane inclined with respect to the plane of movement of the valve lifter, thereby maintaining free communication between the source of fluid medium and the compression chamber. No additional compressed fluid will then be delivered to the storage receiver until the pressure value of its contents has been again sufficiently lowered to permit such valve device as may be provided for controlling the supply of pressure fluid to the piston chamber 46 to exhaust the pressure fluid from the piston chamber 46.

After the piston chamber has been evacuated the spring 56 will return the piston 53 and, therefore, the valve lifter 58 to their initial positions. The valves 34 and the springs opposing their opening movement will then again be free to function normally for controlling the intermittent flow of pressure fluid through the ports 32 into the compression chamber 26.

I claim:

1. A compressor unloader, comprising a valve seat having a port, a reciprocatory automatic valve to control the port, and means reciprocable in a plane inclined with respect to the plane of movement of the valve for unseating the valve.

2. A compressor unloader, comprising a valve seat having a port, a reciprocatory automatic valve to control the port, and means within the valve seat and being reciprocable in a plane inclined with respect to the plane of movement of the valve to unseat the valve.

3. A compressor unloader, comprising a valve seat having a plurality of ports, valves to control the ports, a valve lifter in the valve seat movable in a plane inclined with respect to the valves and having arms to engage the valves for unseating the valves, pressure responsive means for actuating the valve lifter into engagement with the valves, and a spring to actuate the valve lifter out of engagement with the valves.

4. A compressor unloader, comprising a valve seat having a plurality of ports, valves to control the ports, a valve lifter in the valve seat movable in a plane inclined with respect to the valves and having arms to engage the valves for unseating the valves, pressure responsive means for actuating the valve lifter into engagement with the valves, a spring to transmit the movement of the pressure responsive means to the valve lifter, and a spring to actuate the valve lifter out of engagement with the valves.

5. A compressor unloader, comprising a valve seat having a plurality of ports, valves to control the ports, a valve lifter reciprocable in the valve seat in a plane inclined with respect to the valves and having arms to engage the valves for unseating the valves, said arms interlockingly engaging the valve seat to prevent rotary movement of the valve lifter, pressure responsive means for actuating the valve lifter into engagement with the valves, a spring to transmit the movement of the pressure responsive means to the valve lifter, and a spring to move the valve lifter out of engagement with the valves.

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