Oct. 16, 1928. 1,688,027

E. H. STEEDMAN

DISCHARGE VALVE STRUCTURE FOR COMPRESSORS

Filed June 2, 1927

Fig. 1.

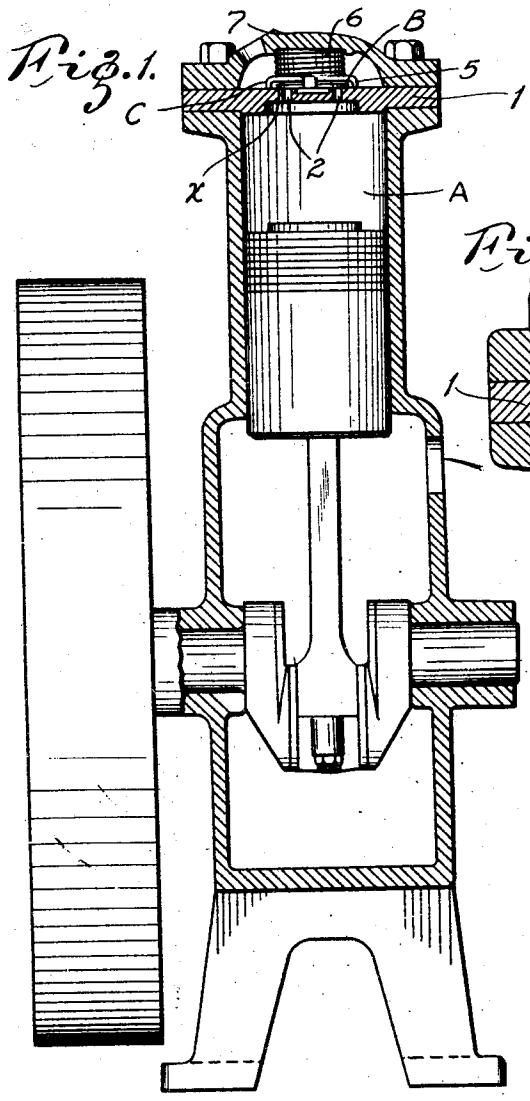


Fig. 5.

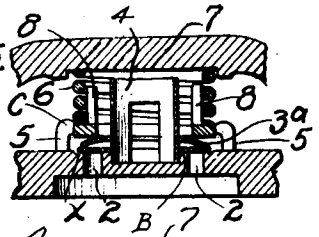


Fig. 2.

Fig. 3.

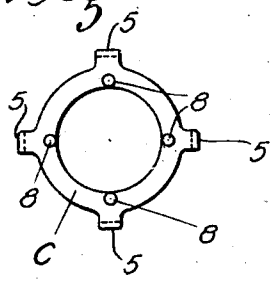
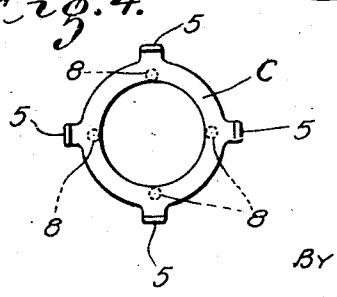


Fig. 4.



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DISCHARGE-VALVE STRUCTURE FOR COMPRESSORS.

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This invention relates to compressors of the kind that are equipped with a discharge valve that normally has a comparatively slight movement relatively to its seat, when it opens and closes, but is capable of moving a greater distance under certain conditions, as, for example, when a slug of liquid or piece of foreign matter in the medium being compressed becomes jammed between the said valve and its seat.

One object of my invention is to provide a compressor discharge valve of the general type mentioned, that is quiet in operation and of such design that the abutment member which limits the movement of the valve away from its seat will not stick or remain in a cocked or canted position after an abnormal movement of the valve, or, in other words, after the valve has moved a greater distance than its normal limit of travel to permit the passage of a substance of greater size than the space which normally exists between the valve and its seat when the valve is open.

Another object is to provide a compressor discharge valve structure that is inexpensive to construct, easy to assemble and install and reliable in operation.

Figure 1 of the drawings is a vertical sectional view of a compressor equipped with a discharge valve structure embodying my invention, showing said valve structure in side elevation.

Figure 2 is an enlarged vertical sectional view of said valve structure

Figure 3 is a top plan view of the abutment member which limits the movement of the valve away from its seat.

Figure 4 is a bottom plan view of said abutment member; and

Figure 5 is a vertical sectional view, illustrating a slight modification of my invention.

Referring to the drawings which illustrate the preferred form of my invention, A designates the cylinder of a compressor which is provided in its head or upper end wall 1 with discharge ports 2 that are controlled by an annular valve B arranged above the end wall of the cylinder on a flat valve seat x formed preferably on the top face of said end wall. The discharge valve B is held seated by a spring 3 arranged between said valve and a shoulder on a guide 4 that projects upwardly from the end wall of the cylinder through the valve B and spring 3, and an abutment member C of novel construction and arrangement is provided for limiting the movement of said valve away from its seat. The abutment member C which is preferably of annular form, as shown in Figures 3 and 4, is capable of moving laterally relatively to the valve, and said abutment member is provided with a number of downwardly-projecting lugs or legs 5 that normally bear against the top side of the end wall 1 of the cylinder.

Under normal operating conditions the abutment member C remains at rest or in fixed relation with the valve seat x so that the annular portion of said abutment member will act as a stop that limits the upward movement of the valve away from its seat, but under certain conditions said abutment member is capable of moving upwardly relatively to the seat of the valve, so as to permit the valve to move away from its seat a greater distance than its normal limit of travel, so as to take care of an abnormal condition, as, for example, the jamming of a slug of liquid or piece of foreign material in the space between the valve and its seat. In the form of my invention herein illustrated this result is attained by using a strong spring 6 of greater force or tension than the valve spring 3 to hold the legs 5 on said abutment member pressed tightly against the end wall 1 of the cylinder, said strong spring 6 being interposed between the abutment member C and a stop which may be formed by a hollow cap 7 or other part that serves as a housing for the valve structure and which is attached to the upper end of the cylinder. With such a valve structure the valve B will normally reciprocate back and forth between the valve seat x and abutment member C without exerting sufficient upward pressure on said abutment member to raise the legs 5 of same out of engagement with the end wall 1 of the cylinder, but if a slug of liquid or a piece of foreign matter of greater dimensions than the height of the normal opening between the valve and its seat strikes the valve and forces its way into the space between the valve and its seat, the spring 6 will yield, and thus permit the abutment member C to move upwardly sufficiently to permit said slug of liquid or piece of foreign matter to pass the valve.

In order that the abutment member C will be maintained in concentric or approxi-

mately concentric relation with the valve, and will be effectively prevented from remaining in a cocked or canted condition after it has moved upwardly to permit or provide for an abnormal movement of the valve, I combine the abutment member C with the spring 6 in such a way that said spring not only acts to normally hold the abutment member stationary or in fixed relation with the seat of the valve, but it also acts as the sole means which holds said abutment member centered with relation to the valve. One convenient way of accomplishing this result is to provide the abutment member C with guides 8 that project upwardly into the spring 6, as shown in Figure 2, thus forming a guiding means for the abutment member that has sufficient flexibility to permit the abutment member to cock upwardly at one side when the valve is subjected to an abnormal pressure without liability of remaining in a cocked or canted condition. As shown in the drawing, there are no co-operating guiding portions on the valve and abutment member that prevent said parts from moving laterally relatively to each other, and there are no co-operating parts on the abutment member and cylinder head which have a sliding fit with each other, other than the guides 8 on the abutment member which project upwardly through the spring 6. Accordingly, the abutment member is effectively prevented from remaining in a cocked or canted position.

Instead of using a coiled spring 3 to hold the discharge valve B seated, as above described, said valve can be held against its seat by means of a spring that consists of a relatively thin member 3^a of annular, or substantially annular, form, bent so as to impart some resiliency to same and arranged between the valve B and abutment member C, as shown in Figure 5. In such a structure the part 4 that projects upwardly from the end wall of the cylinder acts as a guide for the valve B and the valve spring 3^a, the abutment member C being so arranged that the valve spring 3^a is confined between the valve B and the annular portion of said member C.

A discharge valve structure of the kind above described is quiet in operation, as the valve B is held seated by a spring and normally has a comparatively slight movement relatively to its seat when it opens and closes; it permits a slug of liquid or a piece of foreign matter of greater size than the normal space between the valve and its seat to pass the valve without liability of interfering with the subsequent operations of the valve; such a valve structure is inexpensive to manufacture; it is reliable in operation and it is easy to assemble and install.

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

1. In a compressor, a discharge valve, an abutment member for limiting the movement of said valve away from its seat, arranged so that it is capable of moving laterally relatively to the valve and a resilient means that normally maintains said abutment member at rest or in fixed relation with the valve seat, and which co-operates with a portion on the abutment member to constitute the sole means for holding said abutment member centered with relation to the valve.

2. In a compressor, a discharge valve, an abutment member for limiting the movement of said valve away from its seat, arranged so that it is capable of moving laterally relatively to the valve, a coiled spring that acts on said abutment member and normally holds it at rest or in fixed relation with the valve seat, and a guide on said abutment member that projects into said spring and co-operates with same to maintain the abutment member centered with respect to the valve.

3. In a compressor, a part provided with discharge ports, a spring-actuated valve for controlling said ports, an abutment member for said valve arranged in opposed relation to the seat of the valve and provided with legs that bear upon said part, said abutment member being capable of moving laterally relatively to the valve, a strong spring of greater tension than the valve spring that acts on said abutment member and normally holds the legs of same pressed tightly against said part, and a means on said abutment member that co-operates with said strong spring to hold said abutment member centered with relation to the valve.

4. In a compressor, a part provided with discharge ports, an annular valve that controls said ports, a guide on said part that projects through said valve, a spring for holding said valve seated, an annular abutment member arranged in opposed relation to the valve seat and provided with legs that bear upon the part in which the ports are formed, said abutment member being capable of moving laterally relatively to the valve, a strong spring of greater tension than the valve spring combined with said abutment member to normally hold it at rest or in fixed relation with the valve seat, and guides on said abutment member surrounded by said strong spring and co-operating with the same to constitute the sole means for holding the abutment member centered with relation to the valve.

5. In a compressor, a cylinder provided with an end wall equipped with discharge ports, a flat valve seat on the outer face of said wall, a flat annular valve for controlling said ports adapted to contact with said

valve seat, a housing at the upper end of the cylinder, a guide for the valve projecting upwardly into said housing from the end wall of the cylinder, a spring interposed between said valve and a shoulder on said guide for holding the valve seated, an annular abutment member arranged above the valve in opposed relation to the valve seat and provided with depending legs that bear on the end wall of the cylinder, said abutment member being capable of moving laterally relatively to the valve, a strong spring of greater tension than the valve spring interposed between said abutment member and said housing, and guides on said abutment member that project upwardly into said strong spring and co-operate with the same to constitute the sole means which holds the abutment member centered with relation to the valve.

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