July 26, 1927. 1,636,888

W. WISHART

COMPRESSOR DISCHARGE VALVE

Filed July 20, 1925

FIG 1

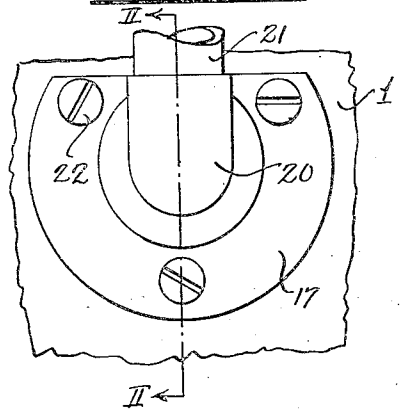


FIG 2

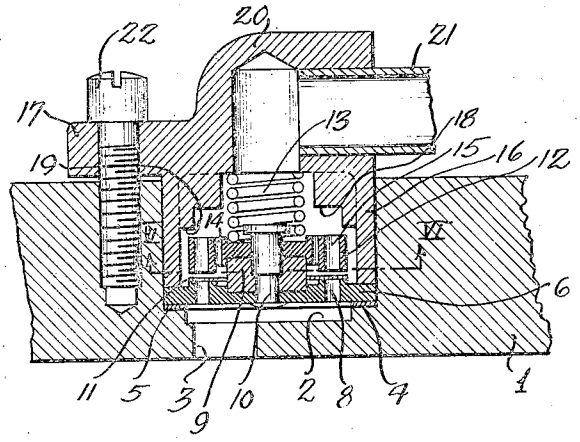


FIG 3

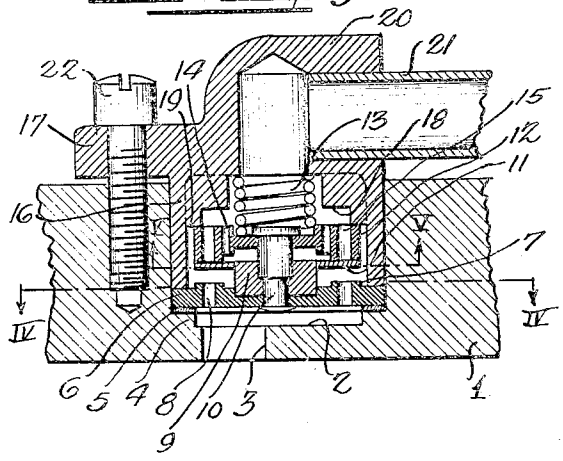


FIG 4

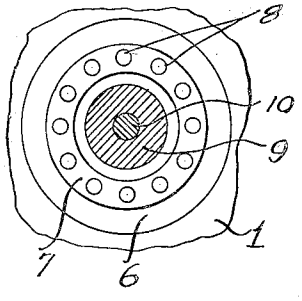


FIG 5

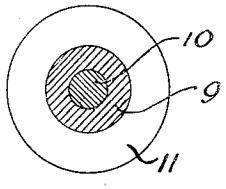
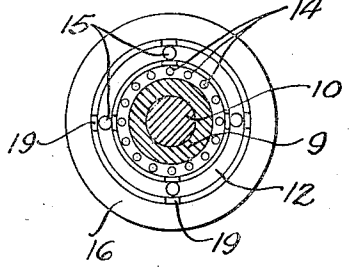


FIG 6



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UNITED STATES PATENT OFFICE.

WILLIAM WISHART, OF CLINTON, IOWA, ASSIGNOR TO CLIMAX ENGINEERING COMPANY, OF CLINTON, IOWA, A CORPORATION OF DELAWARE.

COMPRESSOR DISCHARGE VALVE.

Application filed July 20, 1925. Serial No. 44,745.

Due to the presence of liquid refrigerant and oil in compressors when starting up, considerable trouble has been experienced in starting rotary type refrigerating compressors due to the fact that excessive power is required to reach the starting torque. This condition requires the motors to pump liquid momentarily in order to empty the compressors, and the small openings in the valves tend to restrict the flow resulting in a condition equivalent of entrained water.

The invention relates more particularly to an improved discharge valve of the disk type for gas or air compressors, said valve being adapted to compensate for abnormal cylinder pressures by automatically increasing the lift of the valve during a period of abnormal pressure.

It is an object of this invention to provide an improved discharge valve constructed to permit the entire valve disk to move away from the face of the pump when excessive pressures are encountered, instead of depending on the small outlet openings in the valve disk as is done under normal operating conditions.

It is an important object of this invention to provide a compressor discharge valve of simple and improved construction wherein under abnormal pressure conditions will permit the entire disk valve to momentarily move away from its seat to relieve the pressure by allowing the entrained liquid to escape from the compressor.

Other and further important objects of this invention will be apparent from the disclosures in the specification and the accompanying drawings.

The invention (in a preferred form) is illustrated in the drawings and hereinafter more fully described.

On the drawings:

Figure 1 is a top plan view of a valve embodying the principles of this invention;

Figure 2 is an enlarged detail section taken on line II—II of Figure 1 showing parts in elevation and illustrating the disk valve in its lower normal position;

Figure 3 is a similar vertical section showing the disk valve in raised position;

Figure 4 is a detail view taken on line IV—IV of Figure 3;

Figure 5 is a sectional view taken on line V—V of Figure 3; and

Figure 6 is a sectional view taken on line VI—VI of Figure 2.

As shown on the drawings:

The reference numeral 1 indicates the upper portion of a compressor cylinder or cylinder head having a valve chamber or recess 2 formed therein. The valve chamber 2 communicates through a port 3 with the compression chamber of the compressor cylinder. Seated on a shoulder 4 in the bottom of the chamber 2 is a washer or gasket 5 to prevent leakage of gas past a valve seat 6. The valve seat member 6 is positioned upon the gasket 5 and consists of a circular member having a ring boss 7 forming the valve seat proper. The ring boss or valve seat proper 7 is provided with a series of openings or ports 8. The center of the valve seat member 6 is recessed to receive a valve pilot or guide 9 and a rivet 10.

Surrounding the pilot or guide 9 and normally seated on the valve seat 7 is a ring disk valve 11 which covers the ports 8 in said valve seat. Also slidably engaged on the valve guide 9 is a circular valve stop 12 which is resiliently held in contact with the guide block 9 by means of a coiled spring 13. The rivet 10 serves to rigidly hold the guide block 9 seated against the top face of the valve seat member 6. The valve stop 12 is provided with a ring of small openings 14 and with a plurality of spaced larger openings 15.

Projecting into the upper portion of the chamber 2 is a circular flange 16 formed on a valve cover plate 17. The cover flange 16 affords a chamber or recess 18 within which the coiled spring 13 seats. The cover flange 16 is formed with stop shoulders 19 for limiting the upward movement of the valve stop 12, as clearly illustrated in Figure 3. Formed on the cover plate 17 is an elbow 20 into which a discharge pipe 21 projects. The flange 16 of the valve cover plate 17 acts to hold the valve seat member 6 clamped in position against the gasket 5 within the chamber 2 of the compressor cylinder head 1. Retaining screws 22 serve to clamp the valve cover plate 17 and the entire valve assembly in position on the cylinder head.

The operation is as follows:

Under normal conditions, as the air or gas in the compressor cylinder is compressed, it is forced through the outlet port 3 and

the chamber 2, thence through the ports 8 in the valve seat 7 thereby causing lifting of the valve 11 until its movement is arrested by the valve stop 12. The compressed air or gas is thus permitted to escape into the chamber 18 from which it passes out through the elbow 20 and the discharge pipe 21.

When the pressure in the discharge pipe 21 equals or exceeds the pressure in the compression space of the compressor, the valve disk 11 drops back onto the valve seat 7 thereby sealing the ports 8 and preventing the gas from returning into the compressor cylinder. In case an abnormally high pressure occurs in the compressor cylinder, the gas is forced through the ports 3 and 8 in the usual way and the disk valve 11 is lifted against the valve stop 12 thereby causing both the valve 11 and the valve stop 12 to be lifted against the pressure of the spring 13 thereby compressing said spring until the valve stop 12 contacts the stop shoulders 19. The distance between the valve seat 7 and the disk valve 11 is thus increased to allow a freer escape of the highly compressed gas into the discharge pipe 21. After the pressure returns to normal, the spring 13 acts automatically to return the valve stop 12 back into engagement with the pilot 9 and the valve 11 drops back into contact with the valve seat 7 to resume normal operation.

I am aware that many changes may be made, and numerous details of construction may be varied through a wide range without departing from the principles of this invention, and I therefore do not purpose limiting the patent granted hereon, otherwise than necessitated by the prior art.

I claim as my invention:

1. A compressor discharge valve comprising a gasket, an apertured valve seat member seated thereon, a valve guide in said valve seat member, a rivet for holding said valve guide secured to said valve seat member, a disk valve slidable on said valve guide and normally adapted to seat on said valve seat member, an apertured valve stop slidable on said rivet for limiting the movement of said valve, a spring controlling the movement of said valve stop, and a cover member for holding said valve seat member, said gasket and said spring in place.

2. The combination with a compressor cylinder head having an outlet port and a recess therein, of a compressor discharge valve in said recess comprising a gasket, an apertured valve seat member on said gasket, a passaged cover on said cylinder head, means for holding said cover in place, a flange on said cover projecting into said recess for holding said gasket and valve seat member secured in place, a guide, means for holding said guide on said valve seat member, a valve slidable on said guide and normally adapted to rest on said valve seat member, an apertured valve stop slidable on said holding means, and resilient means held in position by said cover for resiliently holding said valve stop seated on said guide in position to limit the normal movement of said valve.

3. The combination with a recessed compressor cylinder head, of a cover closing said recess, an apertured valve seat in said head, a guide thereon, a rivet member securing said guide to said valve seat, a valve slidable on said guide adapted to seat on said valve seat, and means in said cover and slidable on said rivet member adapted to afford a stop for said valve under normal operating conditions and further adapted to move with said valve under abnormal operating conditions to allow a freer escape of gas under high pressure through the cylinder head and cover.

In testimony whereof I have hereunto subscribed my name.

WILLIAM WISHART.