

W. F. RUWELL.
DISCHARGE VALVE.
APPLICATION FILED FEB. 11, 1914.

1,120,545.

Patented Dec. 8, 1914.

Fig. 1.

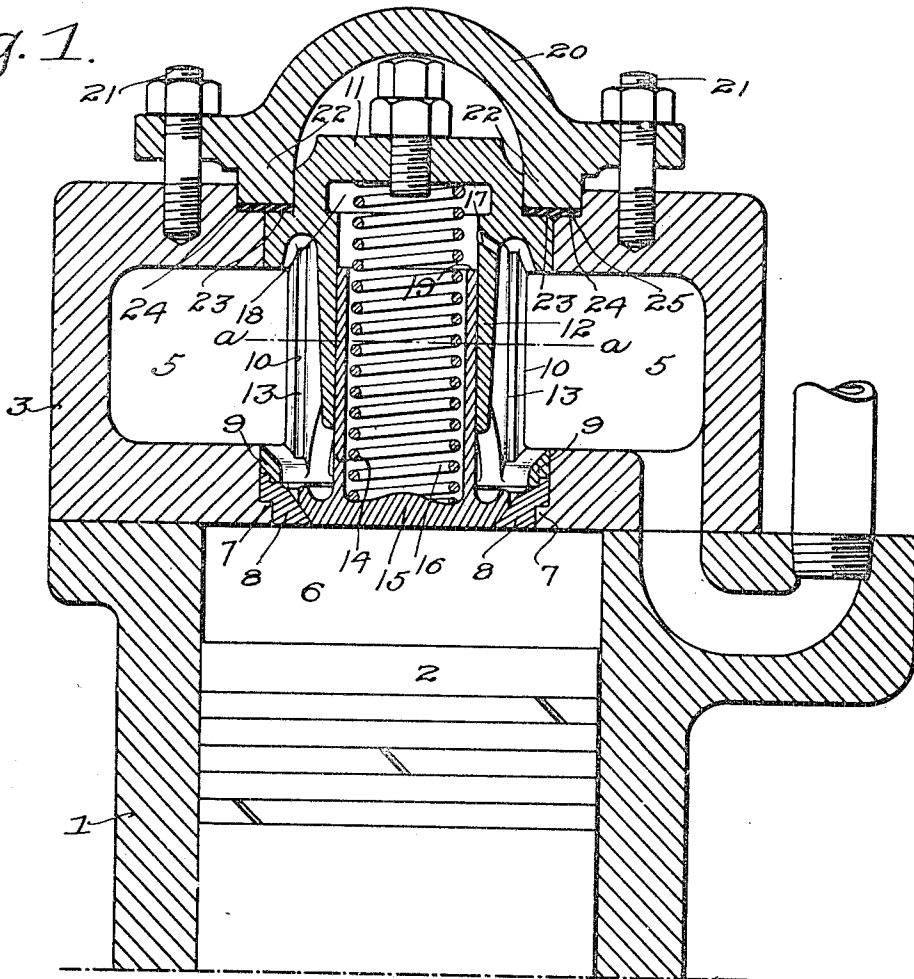


Fig. 3.

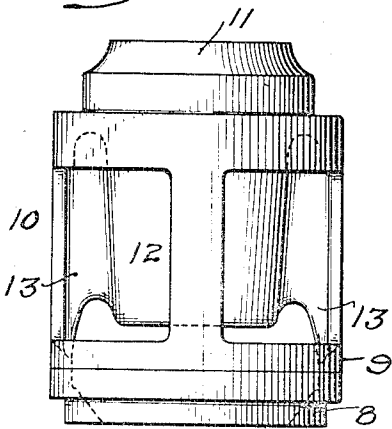


Fig. 2.

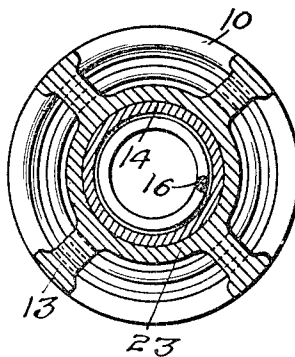
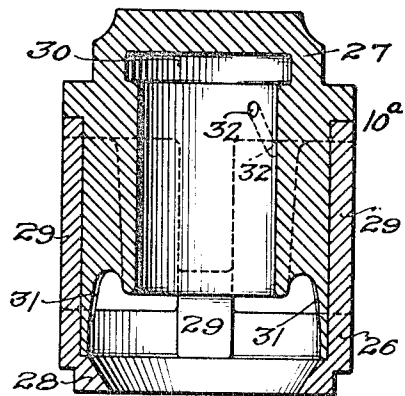


Fig. 4.



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UNITED STATES PATENT OFFICE.

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DISCHARGE-VALVE.

1,120,545.

Specification of Letters Patent.

Patented Dec. 8, 1914.

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To all whom it may concern:

Be it known that I, WILLIAM F. RUWELL, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain Improvements in Discharge-Valves, of which the following is a specification.

My invention consists of an improved form of a discharge valve and is particularly designed for use in gas compressors for refrigerating machines.

One object of my invention is to make a discharge valve of the above described type, which will freely open to allow sufficient space for the proper discharge of the gas from the compressor cylinders; another object being to prevent "pounding" or rattling which is ordinarily caused by the vibration of the valve.

A still further object is to so construct the parts of the valve as to prevent them from dropping into the compressor cylinder if they should become broken.

These and other objects and advantages which will be described hereinafter I attain in the following manner, reference being had to the accompanying drawings in which,

Figure 1, is a sectional elevation of sufficient of a gas compressor illustrating my invention as applied thereto; Fig. 2, is a sectional plan taken on the line *a-a* Fig. 1; Fig. 3, is an elevation view of the casing which I employ; and Fig. 4, is a sectional elevation showing a modified form of my invention.

Referring to the drawings, 1 is a compressor cylinder having the plunger 2 operable therein in the ordinary manner. The cylinder head 3 is secured to the cylinder 1 and has a passage therein which connects a chamber 5 and the compression chamber 6. An annular shoulder 7 forms a support for a valve seat ring 8 which in turn, forms a support for an undercut ring 9 in the present instance cast integral with the valve casing 10.

The valve casing 10 which forms a very important part of my invention has a closed top 11 and a sleeve or annular flange 12 depending therefrom. A series of radial ribs 13 extend from the top and flange to form legs which connect with the ring 9 at different points. The sleeve 12 forms a housing for the upwardly projecting hollow valve stem 14 of a valve 15 and a coiled

compression spring 16; which acts between the upper part of the valve casing and said valve to keep the latter seated. A port 17 is formed in the depending sleeve 12 to connect the back pressure chamber 5 and the cushion chamber 18 in the casing 10. This port 17 is so positioned that, when the valve 15 is seated, its inner end enters the cushion chamber 18 between the top 19 of the valve stem and the top of the cushion chamber (Fig. 1). A bonnet 20 is secured to the cylinder head 3 by bolts 21 and has an annular depending flange 22 which rests partly on a shoulder 23 of the valve casing and partly on a shoulder 24 of the cylinder head. I preferably place a lead or other suitable gasket 25 under the flange 22 to permit the proper assembly of the parts. By this construction the valve casing is rigidly secured and cannot be tilted or distorted even though one of the bolts 21 is set up more tightly than the others. By having the sleeve 12 and hollow valve stem 14 of large diameter relatively to the diameter of the valve, as illustrated, a long spring 16 of proper dimensions to insure durability may be employed and the area of the valve exposed to back pressure, will be reduced to a minimum, which features are advantageous in a valve of this type. The ribs or legs 13, which connect the rim 9 with the other portion of the valve casing, join the sleeve 12 at points adjacent the bottom thereof and at such a distance away from the valve seat ring 8 that if the valve stem should break it would be impossible for the valve proper to be thrown by the action of the compressor very far out of its proper position, since such action would be effectually prevented by said ribs. The advantage of this construction will be appreciated by those skilled in this art, since valve stems frequently break and the broken valves are forced entirely from the seat while the stems drop into the compression cylinders causing considerable damage.

The operation is as follows: Gas having been admitted into the compression chamber 6, by means of a suction valve (not shown) is compressed by the upward movement of the plunger 2 until its pressure becomes greater than the downward pressure exerted on the valve 15, at which time the valve 15 will be moved quickly off its seat until the portion 19 of the stem has passed

and thereby closed the port 17. A cushion is thus formed within the casing 10 and the interior of the valve stem 14 which will prevent the pounding or vibration of the valve and determine the proper distance the latter should open. After the plunger 2 has discharged all the gas from the chamber 6 the valve 15 is quickly seated, under the action of the spring 16, the back pressure of the valve, and the pressure of the gas which is cushioned in the chamber 18. It will thus be seen that by constructing the valve as described it freely opens under operating conditions until the portion 19 of the valve stem cuts off the port 17 and will thereafter quickly close when all the gas been discharged from the compression chamber. Also by having the rim 9 secured to or made integral with the legs 13 which extend from the upper portion of the valve casing, it is practically impossible for the valve to get out of proper relation to its seat even when the stem breaks.

By providing the valve casing with the port 17 so placed as to be closed by the valve stem after the valve has opened it is unnecessary to use an additional cushion spring such as is required by other valves of the same general class.

In Fig. 4 I have shown a construction in which the valve seat is formed by a portion integral with the valve casing. The valve casing 10^a being made in two sections 26 and 27. The section 26 has a ring portion 28 providing the valve seat, and has arms 29 projecting upwardly therefrom. The section 27 provides the cushion chamber 30 and has downwardly projecting arms 31 immediately adjacent the arms 29. This casing has a port 32 and performs the functions of the casing 10 and the valve-seat ring 8 combined.

I claim:—

1. The combination of a valve casing having a downwardly projecting annular flange; a ring positioned below the bottom of the annular flange; ribs connecting the flange and ring; and a valve having a stem

slidable within the flange and having its head movable through said ring.

2. The combination of a valve casing having a downwardly projecting annular flange forming a chamber; a ring positioned below the bottom of said flange; ribs extending downwardly from the flange and connecting the flange and ring; and a valve having a stem slidable within said chamber.

3. The combination of a valve casing having a downwardly projecting annular flange forming a chamber; a ring positioned below the bottom of said flange; ribs extending downwardly from the flange and connecting the flange and ring; a valve having a stem slidable within said chamber; and a second ring forming a valve seat and positioned below said first ring.

4. The combination of a compressor cylinder; a head thereon having a discharge chamber and a passage communicating with the cylinder; a valve casing having its upper portion engaging the upper part of the head and provided with an annular flange extending downwardly within the discharge chamber; a ring fitting the passage in the head; ribs connecting said flange and ring; with a valve movable through the ring and having a stem operable within the flange.

5. The combination of a compressor cylinder; a head thereon having a discharge chamber and a passage communicating with the cylinder; a valve casing having its upper portion engaging the upper part of the head and provided with an annular flange extending downwardly within said chamber; a ring positioned below the bottom of said flange and fitting the passage in the head; ribs connecting said flange and ring; and a valve having a stem operable within the flange.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

WILLIAM F. RUWELL.

Witnesses:

AUGUSTUS B. COPPES,
Jos. H. KLEIN.