May 22, 1923. 1,455,940

M. W. STOMS

COMBINED STOP AND SAFETY VALVE

Filed Aug. 29, 1921

Fig. 2.

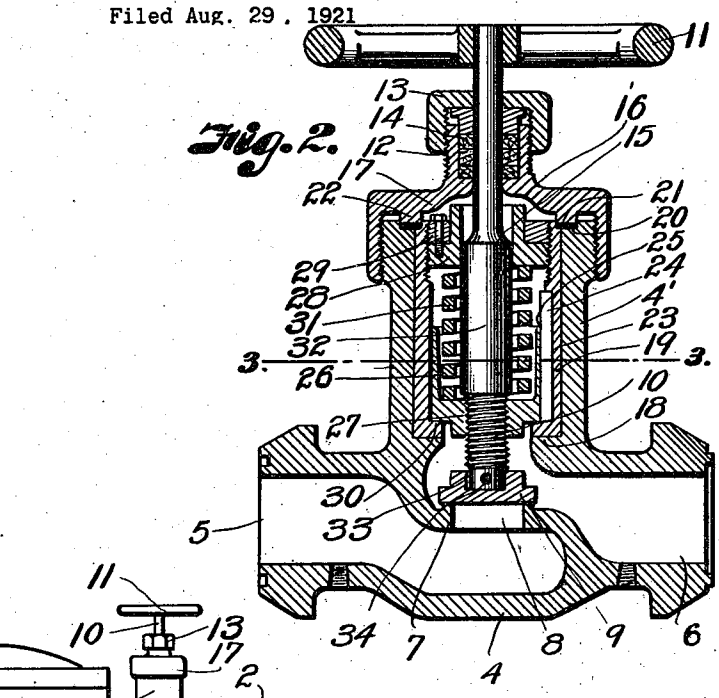


Fig. 1.

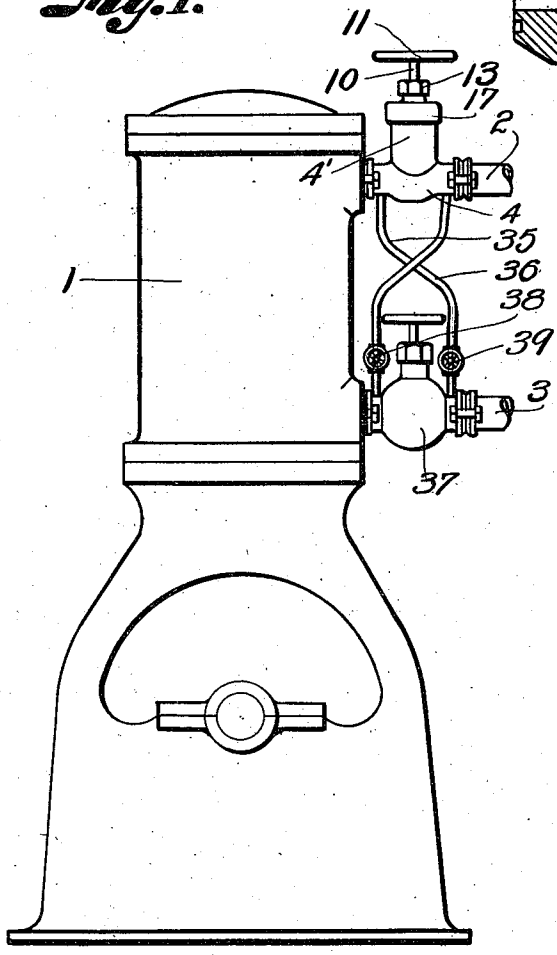
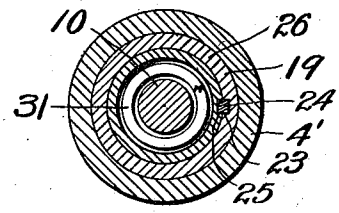


Fig. 3.



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UNITED STATES PATENT OFFICE.

MARION W. STOMS, OF KANSAS CITY, MISSOURI.

COMBINED STOP AND SAFETY VALVE.

Application filed August 29, 1921. Serial No. 496,299.

To all whom it may concern:

Be it known that I, MARION W. STOMS, a citizen of the United States, residing at Kansas City, in the county of Jackson and State of Missouri, have invented certain new and useful Improvements in Combined Stops and Safety Valves; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

This invention relates to a combined stop and safety valve particularly designed to be used on the discharge line of a compressor pump, such as is used to maintain the refrigerant of a refrigerating system in circulation.

One of the objects is to eliminate the danger caused by operators starting up the compressors with the discharge stop valve closed. With the ordinary construction of stop valve it not infrequently happens that the compressor started up with the valve closed will result in the compressor or connections bursting, due to the excess pressure produced.

Hitherto it has sometimes been the practice to attach an auxiliary relief valve in addition to the hand operated stop valve on the compressor discharge line but this is not always possible due to lack of room and even where the auxiliary relief valves are used, they discharge into atmosphere or into the compressor suction line and in actual practice these valves invariably leak after having once relieved. Therefore, if the relief valve discharges into atmosphere, there will be a continuous loss of ammonia, whereas if it discharges into the suction line, the compressor will be compelled to perform uselesss work, depending on how badly the relief valve leaks.

The combined stop and safety valve forming the subject matter of my invention is especially designed to be located between the compressor and the condenser and the parts are so arranged that the relief valve will automatically open to relieve any undue pressure in the compressor, should the compressor be started with the stop valve in a closed position. Therefore, excess pressure will be relieved through the valve without discharging into atmosphere and without discharging into the compressor suction line.

I have, therefore, combined in a single valve mechanism the dual function of a stop valve and a safety valve amply able to take care of the varying conditions encountered in the operation of the compressor in a refrigerating system.

In the drawings,

Fig. 1 is an elevational view of a conventional form of air compressor to which my invention is applied.

Fig. 2 is a vertical sectional view of the valve mechanism constituting my invention, and

Fig. 3 is a sectional view through the spring casing on the line 3—3 of Fig. 2.

Referring now to the drawings by numerals of reference:

1 designates an air compressor, 2 the discharge line and 3 the suction line for the compressor. Located in the discharge line is a combined stop and safety valve mechanism constituting the subject matter of my invention. The valve casing 4 is shown as of the ordinary ammonia globe valve type with an inlet on the pressure side 5 and an outlet on the discharge side 6.

The valve seat 7 is provided with an opening 8 adapted to be closed by a disc valve 9, provided with a threaded valve stem 10, on the outer end of which is a hand wheel 11 for manually controlling the valve so as to seat and unseat the valve to open and close the opening 8.

The stem 10 is provided with a packing gland 12, held in place and adjusted by the nut 13 so as to maintain the proper tension on the packing 14 therein so as to prevent leakage around the stem 10. The stem is also provided with a back seat 15 for engaging the rounded edge 16 of the gland 17 to enable the operator to re-pack the valve stem while the discharge line is open and full of ammonia.

The tubular portion 4′ of the valve casing 4 is provided with a shoulder 18 to hold the spring casing 19 in place and limit its downward movement, the projection 18 and the spring casing 19 being so machined that

their top ends form the female recess 20 for retaining a gasket 21 and receiving the male projection 22 of the gland 17, which screws into the part 4', thus forming a gas-tight joint. The gland 17 may be bolted to the projection or casing 4' if desired, although I prefer to have a threaded connection as shown.

The spring casing 19 is provided with a key-way 23, in which is a spline or key 24, engaging a recess or groove 25 in the follower 26, slidable within the casing and having screw threaded connection with the stem 10, through the threaded portion 27. The casing 19 carries an adjusting nut 28, surrounding the valve stem 10 and having threaded connection with said casing, the adjusting nut being held in fixed position by the jam nut 29. The follower 26 rests against the shoulder 30 of the casing 19 and is held in position by the spring 31, one end of which bears against the shoulder 30 and the other against the spring tensioning and adjusting nut 28 so that the tension of the spring can be controlled.

It will be apparent by reference to Fig. 2 that the smooth portion 32 of the stem 10 has free sliding movement through the adjusting nut 28 and the locking nut 29.

The threaded connection between the stem 10 and the follower 26 permits a hand adjustment of the valve disc 9 through the medium of the hand wheel 11 to provide a safety or relief but due to the fact that the stem 10 is unable to slip through the follower 26, which is held in position by the spring 31, any undue pressure under the valve disc 9 when it is seated will compress the spring 31, allowing the follower 26 and the valve disc 9 to lift and when the pressure has been sufficiently relieved, the spring 31 will push the follower 26 back into place, causing the valve disc 9 to return to its seat 7.

The follower 26 is prevented from turning in the casing by the key 24; thus securing a positive movement of the valve when the handle 11 is operated.

The threads on the stem 10 which engage the follower 26 are limited so that it will be impossible for the operator to unduly compress the spring 31 by thoughtlessly turning the handle 11 beyond the closed position of the valve.

The valve disc 9 is fastened to the stem by being inserted into the socket 33 and secured by the transverse pin 34 so that the valve 9 will have a slightly wobbling movement to permit it to readily seat upon the seat 7. Any loose connection, however, may be provided so as to provide a self-seating valve. It will be noticed that the spring casing 19 is made self-contained so far as the spring adjustment is concerned, thus permitting the operator to dismantle this valve and reassemble it with positive assurance that he has the proper tension on the safety spring.

When the parts are in the position shown in Fig. 2 and the compressor is to be operated ordinarily the operator will turn the handle 11 so as to turn the stem 10. The threaded connection 27 will cause the stem to rise if the handle 11 is turned in one direction, unseating the valve 9 so that the discharged ammonia or other fluid may pass through 5, through the port 8 and out through 6. When it is desired to close off the valve, this can be accomplished by turning the handle 11 in an opposite direction, as will be clearly apparent by reference to Fig. 2.

If the valve is seated, as shown in Fig. 2 and the compressor is inadvertently started up, as soon as pressure is generated on the inlet side of the casing 4, it will act against the bottom of the disc valve 9, raising the disc valve 9, the stem 10 and the follower 26 against the action of the spring 31 provided, of course, that the pressure preponderates over the spring 31. The spring will then be compressed and the pressure in the valve and compressor will be relieved, the fluid, such as ammonia, passing into the container, through which it may circulate and after passing through the system, re-enter the suction side of the compressor without doing any damage.

The valve is so constructed that it will not take up any more room than an ordinary stop valve while it produces the dual function of a safety valve and a stop valve.

If desired, by-pass pipes 35 and 36 may be connected respectively to the intake side of the valve 4 and the intake side of the valve 37 in the line 3 and the outlet side of the valve 4 and the outlet side of the valve 37 in the line 3. Ordinarily according to my invention, however, these by-pass pipes will be eliminated but where they are used I prefer to include the valves 38 and 39.

From the foregoing it will be apparent that the valve mechanism efficiently provides for an ordinary stop valve as well as a safety or relief valve which becomes effective only upon abnormal pressure or abnormal operating conditions of the compressor.

It frequently happens with the ordinary stop valve that the compressor is started up with the valve closed and unless a relief valve is provided at some convenient point as, for example, in the head of the compressor, the head of the compressor is liable to be blown off with obvious disadvantages and danger to the operator and, as before stated, there is a material disadvantage in putting atmospheric relief valves in the line on account of the objection to discharging ammonia into atmosphere. In actual practice it has been found that when an ammonia relief valve blows off, the com-

pressor must shut down until the valve is repacked because such valves almost invariably leak after they have once functioned.

Such disadvantages are not present with my invention.

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

1. A combined stop and safety valve for compressors comprising a valve casing, a reciprocatory follower carried by the casing, a threaded valve stem in the follower having a valve for normally closing an opening in the seat of the valve casing, a spring for normally exerting pressure against the follower to maintain the valve seated, said spring permitting movement of the follower to allow the valve to unseat upon the accumulation of abnormal pressure in the valve casing sufficient to preponderate over the spring, and a casing within the valve casing splined to the follower whereby the follower may have reciprocatory movement but be held against rotative movement.

2. A combined stop and safety valve for compressors comprising a valve casing having a valve seat provided with an opening, a tubular portion carried by the valve casing, a tubular spring cage in the tubular portion, a tubular follower splined thereto, a valve stem threaded in the follower, a valve thereon for normally closing the opening in the valve seat, the follower having movement away from the valve seat, a spring tensioning means in the spring cage, and a spring surrounding the valve stem, one end of which bears against the tensioning means and the other against the end of the follower.

3. A combined stop and safety valve comprising a valve casing having a tubular member and provided with a valve seat having an opening therein, a tubular spring cage in the tubular member having a threaded upper end, means for holding the spring cage rigid within the tubular member, a follower slidable in the spring cage, a spline connection between the follower and the spring cage, a valve stem in threaded connection with the follower, a handle for turning the stem in the follower, a valve on the stem for closing the opening in the valve seat, an adjustable tensioning nut in threaded engagement with the threaded portion of the spring cage, and a spring surrounding the valve stem, one end of which bears against the tensioning nut and the other against the follower.

4. A combined stop and safety valve comprising a valve casing having an intermediate tubular member at right angles thereto, a valve seat in the valve casing provided with an opening therein, a valve for valving said opening, a stem connected to the valve, a spring cage in the tubular member, a follower movable in the spring cage and splined thereto, means on the follower for threaded engagement with the valve stem, a tensioning nut in the spring cage, a spring interposed between the tensioning nut and the follower, a gland in threaded engagement with the tubular member and provided with an annular flange bearing against the spring cage, and an operating handle for the stem.

In testimony whereof I affix my signature.

MARION W. STOMS.