

UNITED STATES PATENT OFFICE.

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COMPRESSOR VALVE.

Application filed April 30, 1924. Serial No. 710,135.

This invention relates to compressors and has particular reference to a compressor for use with a domestic refrigerating apparatus, although not restricted to that use as some features of the same may be of more general application. The objects of the invention are the provision of a new and improved outlet valve and cage therefor whereby cheapness of construction is secured combined with quietness, tightness and reliability of operation; the provision of new improved and simplified means for permitting an extra unseating of the valve under certain abnormal conditions such as the accidental passage of liquid through the compressor; while further objects and advantages of the invention will become apparent as the description proceeds.

In the drawings accompanying and forming a part of this application I have shown one of the many physical forms in which my inventive idea can be embodied, although it will be understood that I do not limit myself to the details of constructions shown in these drawings except as the same are specifically recited in my various claims.

Fig. 1 is a vertical sectional view through the upper end of a compressor cylinder showing my improved valve in section; Fig. 2 is a side elevation and Fig. 3 a top plan view of the valve cage shown in Fig. 1; and Fig. 4 is a sectional view of the cage corresponding to the line 4-4 of Fig. 3.

I have shown for illustration the simplest possible kind of compressor having a cylinder 1, piston 2, valve plate 3 and head 4. The plate 3 is a plain metal closure tightly bolted to the end of the cylinder and having an outlet port 5 for the escape of the compressed gases. In the present embodiment I have shown this aperture as located at the center, the gases being introduced into the cylinder in some other manner as for example by a valve 6 of some suitable type carried by the piston. I have shown the surface of the plate adjacent the cylinder as formed with a slanting portion 7 leading to the aperture, in order to provide a clearance for liquid if by accident any should find its way into the cylinder. At the opposite side the aperture is surrounded by a valve seat 8, here shown as integral and flush with the surface and surrounded by a

groove 9, though none of these minor features is important.

The cylinder head consists of a casting having an outlet hole 10 communicating with a chamber 11 surrounding the valve seat and in this chamber I locate a valve cage which in its preferred form comprises a hollow sheet metal member 12 having a seating face adapted to rest on the plate 3. Immediately inside this seating face is a recess adapted to receive the valve disk 13, the walls 14 of the recess loosely embracing the disk in guiding relation and the bottom 15 of the recess overlying the disk at such short distance as to limit the lift thereof. Outside of the seating face the cage is shown as formed with a plurality of radiating arms 16 formed with apertures 17 which fit loosely over pins 18 carried by the plate 3. Between adjacent arms the sides of the cage are cut away as shown at 20 to form outlet slots.

The exterior and interior of the cage are formed with oppositely facing spring seats 21 and 22, the former receiving the spring 23 whose upper end presses against the roof of the cavity, the latter receiving the spring 24 which presses against the valve disk. In the present embodiment the spring seat 21 is located on the roof of the valve recess which is convenient but not necessary, and the spring 24 is shown as volute to conform to the shape of the recess, but this tapered shape is chosen only because it facilitates stamping the cages and not because of any necessity.

The valve disk also is preferably made of sheet metal and ground to a flat surface although I do not so limit myself. Ordinarily the amount of movement permitted to the valve 13 is only a few thousandths of an inch, and the spring 24 is made comparatively weak so as to hold this valve seated without hammering; if by accident any liquid should find its way into the cylinder, the comparatively large amount of space required for its free egress is provided by the movement of the cage which yields as a whole against the tension of the spring 23.

In addition to the modifications heretofore suggested many other changes may be made in the design and arrangement of parts herein shown and I do not limit my-

self except as specifically recited in the annexed claims.

Having thus described my invention what I claim is:

5 1. In a gas compressor, the combination, with a fixed member having an outlet port, of a valve disk for closing said port, a one piece pressed-metal cage movably seated upon said member and having portions surrounding said disk in locating relation and other portions overhanging said disk in closely spaced relation, said cage having portions cut away to form lateral outlet ports, a spring interposed between said cage and disk and a second spring pressing said cage against said member.

2. In a gas compressor, the combination, with a fixed member having an outlet port, of a valve disk for closing said port, a one piece pressed-metal cage movably seated upon said member and having portions surrounding said disk in locating relation and other portions overhanging said disk in closely spaced relation, said cage having portions cut away to form lateral outlet ports, interengaging means carried by said cage and member for holding said cage with said disk in register with said port while permitting relative separation between said cage and member, a spring inside said cage pressing on said disk, and a second spring outside said cage pressing it against said member.

3. In a gas compressor, the combination with a cylinder, of a flat faced closure therefor having an outlet port therein and a chambered head outside of said closure, a flat valve disk seated on said closure to cover said port, a hollow one-piece sheet-metal cage in the chamber having guiding portions loosely surrounding said valve disk to hold the same in register with said port and stopping portions overhanging said valve disk in movement limiting relation, said cage being movable relatively to said closure, means loosely

holding said cage in register with said port, a spring inside said cage pressing on said valve, and a spring in said chamber pressing said cage toward said closure.

4. In a device of the character described, in combination, a fixed member having a port therein, a cage movably mounted on said member, said cage comprising a frusto-conical hollow sheet-metal member having a flat extension at the mouth of the flaring portion and an abrupt wall at the edge of said extension, said wall engaging said fixed member and forming with said fixed member and said extension a shallow recess, a valve disk located in said recess and having its diameter and depth less than the corresponding dimensions of said first recess, a volute spring in the tapered cavity of said cage above said recess pressing on said disk, and a spring seated on the upper wall of said extension outside said tapered portion, the wall of said recess being notched at intervals to produce outlet ports.

5. In a compressor, in combination, a cylinder, a fixed closure plate therefor having an outlet port, pins spaced from said port, a hollow sheet metal valve cage movable relative to said plate and having a seating face engaging said plate and apertured arms engaging said pins, said cage having an internal spring seat facing said plate and an external spring seat turned away from said plate, a valve in said cage, a spring interposed between said valve and first seat, said cage having a portion of its side wall cut away opposite said valve to form ports and also having means limiting the movement of said valve, a spring engaging said external seat, and a member secured to said plate and holding said second spring.

In testimony whereof, I hereunto affix my signature.

EDWARD R. DE LUIZ.