Jan. 11, 1927.

1,614,124

C. C. HANSEN

GAS COMPRESSOR VALVE

Filed August 7, 1926

2 Sheets-Sheet 1

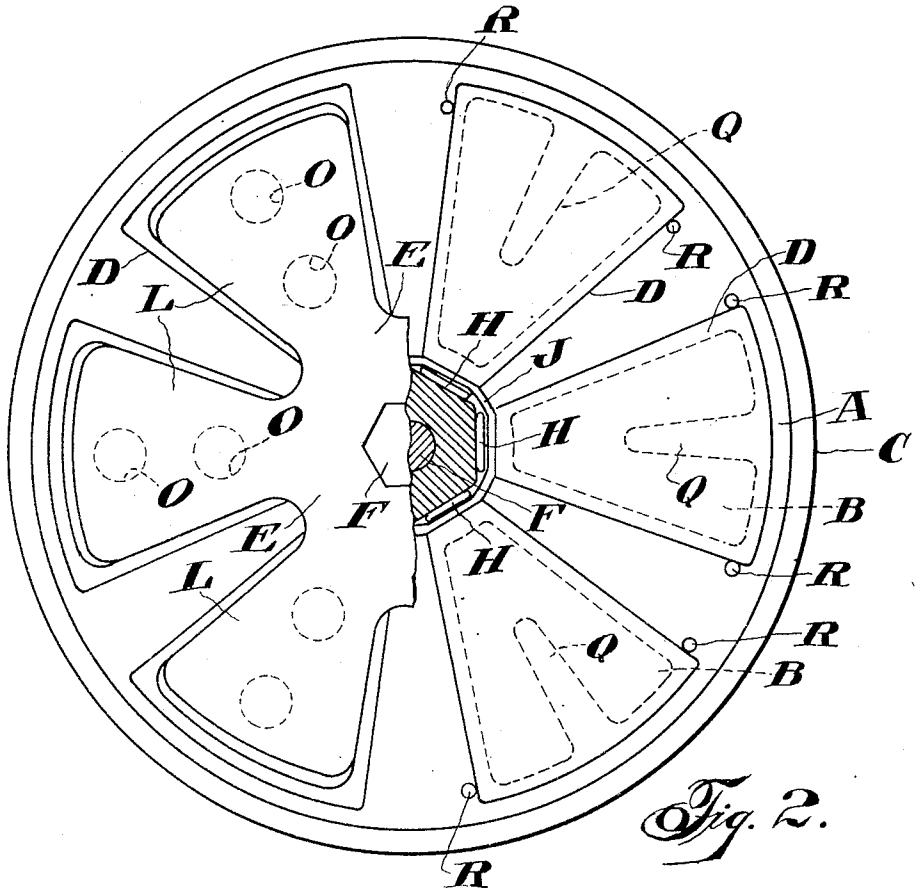


Fig. 2.

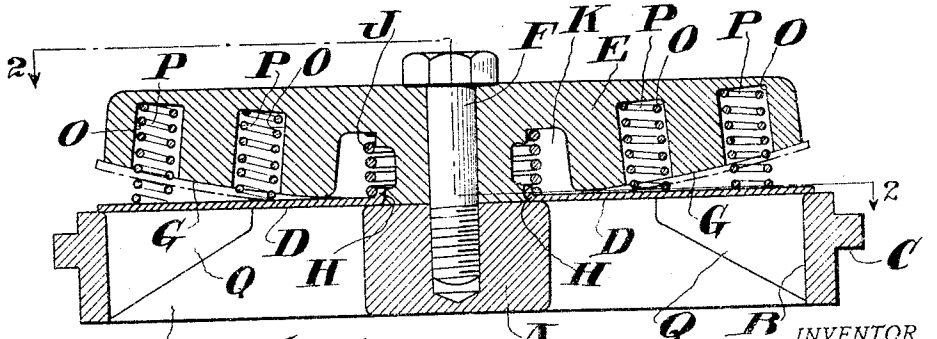


Fig. 1.

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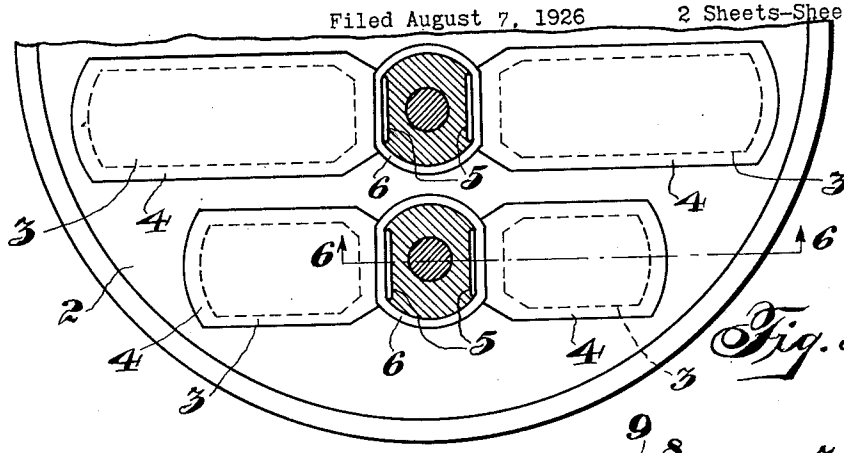


Fig. 5.

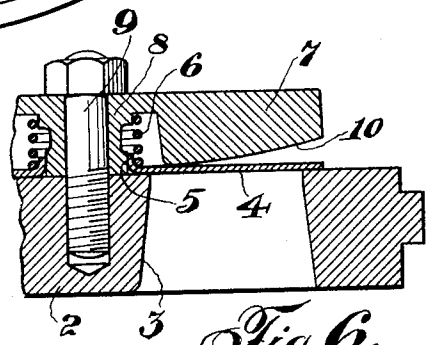


Fig. 6.

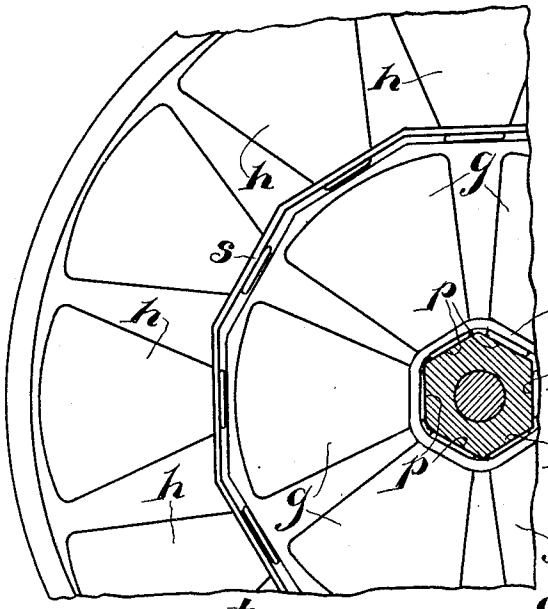


Fig. 4.

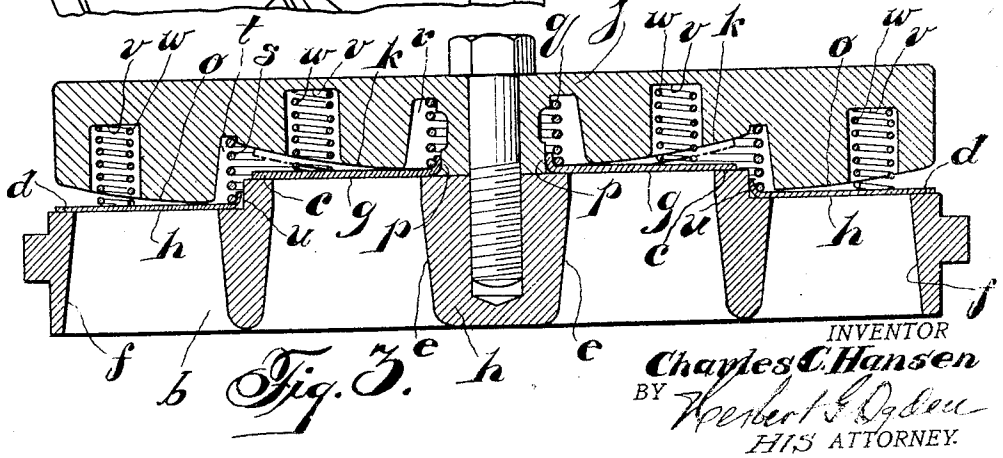


Fig. 3.

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Patented Jan. 11, 1927. 1,614,124

UNITED STATES PATENT OFFICE.

CHARLES C. HANSEN, OF EASTON, PENNSYLVANIA, ASSIGNOR TO INGERSOLL-RAND COMPANY, OF JERSEY CITY, NEW JERSEY, A CORPORATION OF NEW JERSEY.

GAS-COMPRESSOR VALVE.

Application filed August 7, 1926. Serial No. 127,954.

This invention relates to valves and more particularly to valves adapted to be used in gas compressors and operated by pressure of the fluid being compressed.

It is an object of the invention to mount the movable parts of the valve in such a manner that relatively little wear takes place and to eliminate bending in weak portions of the valve. Another object of the invention is to permit freedom of movement of the moving valve portions and to cushion the valve movements.

Other objects and advantages of the invention will be in part obvious and in part pointed out hereinafter.

In the drawing in which similar reference characters refer to similar parts,

Figure 1 is a vertical section through a valve constructed in accordance with the practice of the invention,

Figure 2 is a top plan view partly in section along the line 2—2 of Fig. 1 looking in the direction of the arrows,

Figure 3 is a vertical sectional view of a second embodiment of the invention, the ports being arranged in a plurality of rings,

Figure 4 is a top plan view of the embodiment shown in Fig. 3, the stop plate being removed,

Figure 5 is a top plan view of a third embodiment of the invention in which the ports and valve fingers are arranged parallel to each other, the back stop being removed, and,

Figure 6 is a vertical sectional view taken along the line 6—6 of Fig. 5, looking in the direction of the arrows.

Referring to the drawings and more particularly to the embodiment shown in Figs. 1 and 2, the valve comprises a valve seat A provided with a plurality of ports B, in this instance extending radially with respect to the center of the valve seat A. In this instance the valve seat A is circular in outline and flat on its upper face. On the periphery of the seat A there is provided a flange C adapted to seat in the valve opening (not shown) of a suitable cylinder. The flow of fluid through the ports B is adapted to be controlled by a plurality of valve fingers D having a flat lower face. The valve fingers D are independent of each other being formed of separate thin pieces of flexible material adapted to bend slightly from the pressure of the fluid on their lower faces to uncover the ports B. A valve stop plate E mounted on the valve seat A and rigidly attached thereto by means of a bolt F which is provided with curved lower faces G adjacent the valve fingers D, the curvature being approximately the natural curvature of the fingers D when raised from the valve seat A by pressure of the fluid beneath.

The valve fingers D are each provided with a bent-up inner end H which is adapted to be engaged by a coil spring J inserted in an aperture K in the stop plate E at the face adjacent the valve seat A. The coil spring J may have a polygonal outline as shown in Fig. 2 to fit more closely the inner ends of the valve fingers D.

Preferably the valve fingers D are tapered, being wider at their outer ends than at their inner ends to provide space for the fluid passing the valve fingers D from the ports B. Preferably the stop plate E is formed with fingers L of the same general outline as the valve fingers D and extending radially from the center of the stop plate E over the valve fingers D. The space between the valve stop fingers L allows ample space for the fluid to pass the stop plate E.

Each of the valve stop fingers L is provided with an aperture O preferably circular to receive coil springs P normally tending to press the valve fingers D against the valve seat A. The springs P are adapted to cushion the valve fingers D as they rise and strike against the stop plate fingers L. Furthermore, the curvature of the lower face G of the stop plate fingers L causes the flexure of the valve fingers D tending to start the fingers D back toward the valve seat A upon the release of pressure beneath.

It the ports B are relatively wide the valve fingers D may be prevented from collapsing by means of an inwardly projecting tongue Q with which the fingers D are adapted to contact while lying flat on the seat A. In order to prevent sidewise motion of the valve fingers D there are provided pins R inserted in the valve seat A adjacent the outer ends of the fingers D.

In the embodiment shown in Figs. 3 and 4, a valve seat *b* is provided with a stepped upper face including an inner plane surface *c* and an outer lower surface or step *d*. Each of the steps *c* and *d* is provided with a plurality of ports *e* and *f* respectively controlled by a plurality of valve fingers *g* and

h respectively held in place in substantially the same manner as the valve fingers D. To this end a stop plate j is provided with curved faces k and o overlying the valve fingers g and h respectively and adapted to limit the raising of said valve fingers. The inner set of valve fingers g is provided with bent-up inner ends p engaged by a polygonal spring q inserted into an aperture r in this stop plate j; and the outer set of valve fingers h is held in position by means of a coil spring s inserted in a cut away portion t in the stop plate j and engaging the valve fingers h at the bent-up inner ends u of said valve fingers. The stop plate j is provided with bores or apertures v directed toward the ports e and f and arranged to receive coil springs w adapted to bear against the valve fingers g and h.

If desired, the ports in the valve seat may be arranged parallel to each other as in the embodiment shown in Figs. 5 and 6. In this embodiment the valve seat 2 is provided with a plurality of parallel ports 3 adapted to be controlled by substantially rectangular valve fingers 4 having their inner ends 5 bent-up to be engaged by coil springs 6. The raising of the valve fingers 4 is limited by the fingers 7 of a back stop 8 mounted on the valve seat 2 and rigidly attached thereto by means of a bolt 9. The under faces 10 of the stop plate fingers 7 are preferably curved to flex the valve fingers 4 upon rising.

Thus by the above construction are accomplished among others, the objects hereinbefore referred to.

I claim:

1. A compressor valve comprising a seat having a plurality of ports, a stop plate mounted on said valve seat having a plurality of apertures directed toward said ports and curved on its lower face, a plurality of valve fingers interposed between said valve seat and portions of said stop plate to control the flow of fluid through said ports, a spring around a portion of said stop plate to engage said fingers at one end of said fingers, and springs in said apertures normally tending to press said fingers against said stop plate.

2. A compressor valve comprising a valve seat having a stepped surface having a plurality of ports in said steps, a stop plate mounted on said valve seat having curved faces adjacent the ports in said steps, a valve finger for each of said ports adapted to control the flow of fluid therethrough and having an up-turned end, springs between said stop plate and said valve fingers adapted to engage said fingers at their up-turned ends, said stop plate being provided with apertures directed toward said ports and said valve fingers, and springs in said apertures normally tending to press said fingers against said stop plate.

In testimony whereof I have signed this specification.

CHARLES C. HANSEN.