April 19, 1932. O. M. SUMMERS 1,854,280

VALVE FOR REFRIGERATING APPARATUS

Filed Aug. 30, 1929 2 Sheets-Sheet 1

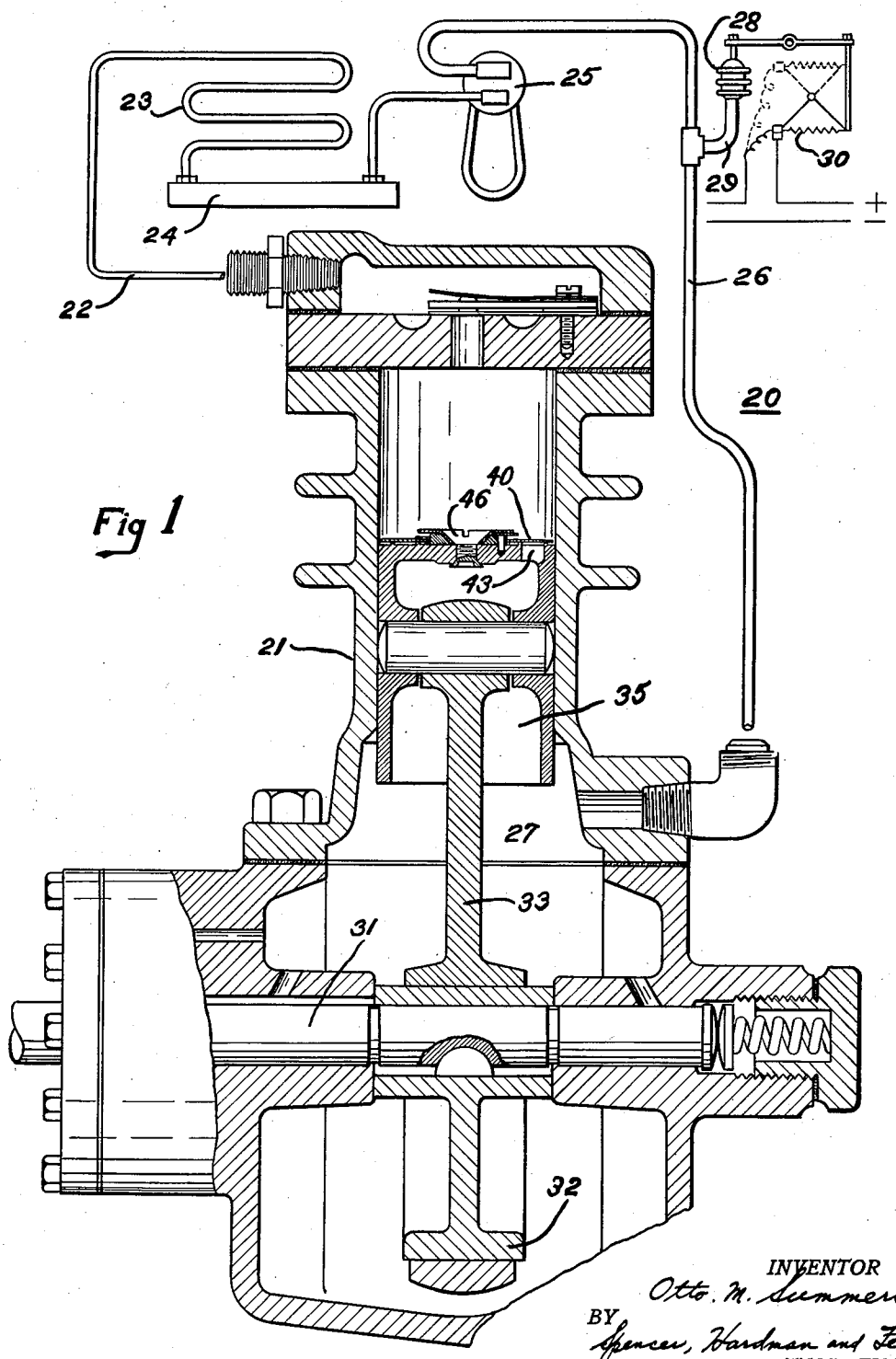

Fig 1

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VALVE FOR REFRIGERATING APPARATUS

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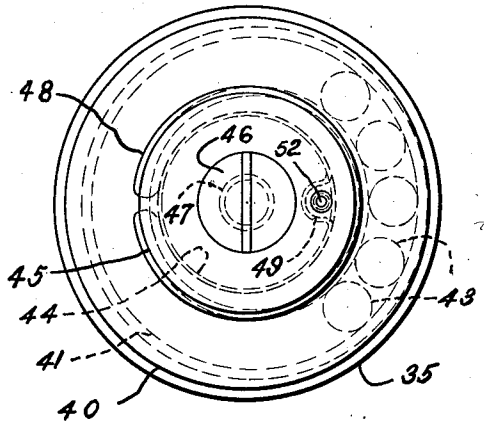

Fig 3

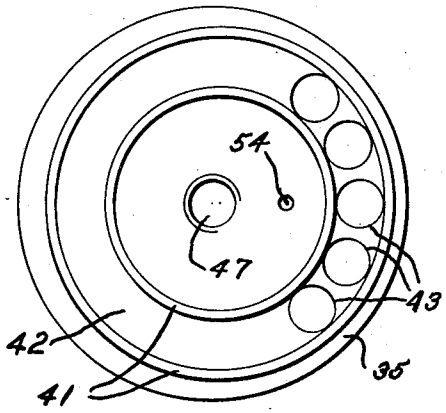

Fig 4

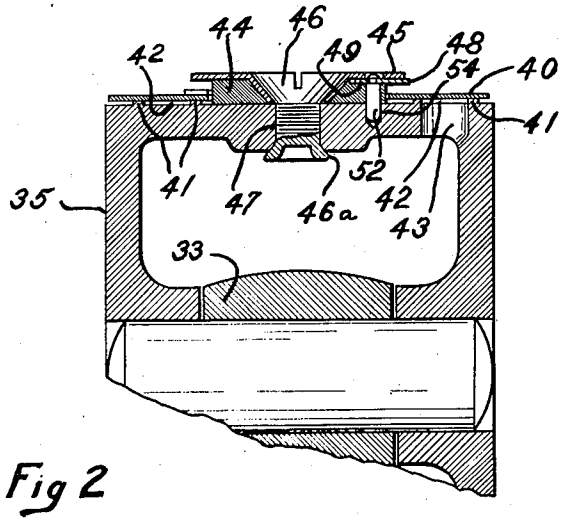

Fig 2

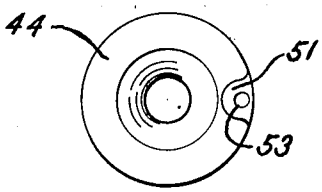

Fig 5

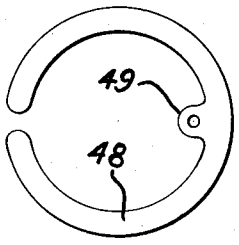

Fig 6

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UNITED STATES PATENT OFFICE

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VALVE FOR REFRIGERATING APPARATUS

Application filed August 30, 1929. Serial No. 389,523.

This invention relates to compressors of refrigerating apparatus and particularly to check valves used therein.

One of the objects of the present invention is to provide a valve structure which will operate sufficiently and quietly in order that the valve may be used in refrigerating apparatus of the household type.

Another object of the invention is to provide a valve structure in which the life of the valve is prolonged.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings, wherein a preferred form of the present invention is hereby clearly shown.

In the drawings:

Fig. 1 is a sectional view of a compressor embodying the invention, the refrigerating system with which the compressor is used being diagrammatically shown.

Fig. 2 is an enlarged sectional view of the compressor piston shown in Fig. 1 having my improved valve secured thereto.

Fig. 3 is a top plan view of the piston shown in Fig. 2.

Fig. 4 is a top plan view of the piston having the valve parts removed therefrom.

Fig. 5 is a view of a spacing member employed in the valve construction, and

Fig. 6 is a view of a spring employed in the valve construction.

A refrigerating system of the domestic type suitable for installation in small household refrigerators is generally designated as 20. This type of apparatus is usually installed in cabinets which are placed in localities where noises caused thereby will be objectionable. This type of apparatus must be automatic in its operation and must operate quietly. The apparatus may comprise a compressor 21 discharging by a pipe 22 to a condenser 23 which delivers liquefied refrigerant to a receiver 24 from which the liquid refrigerant discharges to an evaporator 25, which may be of the type which controls by a float, the admission of refrigerant from receiver 24. The evaporator 25 discharges evaporated refrigerant through the line 26 and back to the compressor 21 preferably through the crankcase 27. Means for controlling a motor which operates the compressor 21 may be provided. This means may comprise an expansible bellows 28 connected by a pipe 29 with the line 26. A collapsible bellows 28 is adapted to operate a snap switch 30 which controls the starting and stopping of the electric motor which drives the shaft 31 of the compressor 21. An eccentric 32, keyed to the compressor shaft 31 carries a pitman 33 which reciprocates the piston 35.

Check valves heretofore used in pistons of compressors of the type disclosed have been objectionably noisy. These check valves have therefore been constructed as light in weight as possible so as to reduce noise and in some instances are made so light that it is necessary to frequently replace them after being in use a short time. The present invention is directed to the provision of a valve which will be light in weight and quiet in operation and which will last indefinitely.

The piston check valve employed to intermittently close the passages which establish communication between the crankcase 27 and the cylinder of the compressor disclosed comprises a flat annular valve 40 adapted to seat upon flanges 41 formed on the top of piston 35. The flanges 41 provide a recess 42 therebetween forming an area to which the valve 40 is subjected to fluid pressures. The ports or passageways 43 extend through the head of the piston 35 and are located on one side of the piston within the recess 42 so as to be asymmetrically arranged with respect to the center of piston 35. A spacer 44 and a keeper 45 are secured to the head of piston 35 by a screw 46 adapted to be threaded into the central opening 47 provided in the piston head. This screw 46 after being tightly secured in place has its end staked or spun over as at 46*a*. It is obvious that the spacer 44 could be formed integral with the piston but I prefer making this spacer a separate part in order to facilitate honing of the valve seats or flanges 41. A split ring spring 48 in the form of a lock washer, having its ends out of alignment, is adapted to be placed between

the keeper 45 and the valve 40. One end of the spring 48 engages with the keeper 45 while the other end engages the valve 40. The spring 48 has an ear 49 formed thereon which is adapted to be located in a counter-bored portion 51 provided in the spacer 44. The ear 49 formed on the spring carries a stud 52 which extends through a hole 53 provided in the spacer 44 and into an aperture 54 located in the head of piston 35. This stud 52 prevents rotation of the spacer 44 and spring 48 to insure pressure of the spring being applied upon the valve 40 on the opposite side of the piston from where the passageways 43 are located. It is apparent by providing the passageways 43 on one side only of the piston that valve 40 will have a tilting action during operation without the use of the spring 48. However it is desirable to use the spring 48 which has been found to substantially eliminate or reduce to a minimum noises created by the valve during operation thus rendering the apparatus suitable for installation in places where objection to noise might arise. Furthermore when the spring is employed in a valve construction of the type disclosed it is desirable to lock the spring against rotation so that it will not move around and apply its pressure on the valve directly over the passageways provided in the piston.

The flanges 41 forming valve seats for the valve 40 are concentrically located with respect to each other but are eccentrically located with respect to the top center of piston which is also the center of valve 40. The valve 40 is loosely mounted between the piston head and the keeper 45, thus during operation of the piston the valve may turn from one position to another about its center. The centrally located free rotating valve and the eccentric valve seats thus afford a relatively wide wearing surface on that portion of the valve which engages the valve seats. By virtue of obtaining the wide wearing or seating surface on the valve its life is greatly prolonged.

From the foregoing it is apparent that I have provided an efficient valve construction the valve of which has a quiet tilting action and capable of successful operation over a long period of time.

While the form of embodiment of the invention as herein disclosed, constitutes a preferred form, it is to be understood that other forms might be adopted, all coming within the scope of the claims which follow.

What is claimed is as follows:

1. A fluid check valve for compressors comprising in combination, an element having a circular flange member formed thereon, a valve member adapted to seat on said flange member and rotatable secured to said element within the area enclosed by said flange member, said valve member having an area exposed to fluid pressure, said members being arranged eccentrically with respect to each other and so that fluid pressure acts on one side of the valve member to cause it to turn during normal operation.

2. A fluid check valve for compressors comprising in combination, an element having a pair of spaced circular flange members formed thereon, a valve member adapted to seat on said flange members and rotatably secured to said element within the area enclosed by one of said flange members, said valve member having an area exposed to fluid pressure, said first named members being arranged eccentrically with respect to said valve member and so that fluid pressure acts on one side of the valve member to cause it to turn during normal operation.

3. A fluid check valve for compressors comprising in combination, an element having a circular flange member formed thereon, a valve member adapted to seat on said flange member and rotatably secured to said element within the area enclosed by said flange member, spring means adapted to urge said valve member to said flange member, said valve member having an area exposed to fluid pressure, said members being arranged eccentrically with respect to each other and so that fluid pressure acts on one side of the valve member to cause it to turn during normal operation.

4. A fluid check valve for compressors comprising in combination, an element having an eccentric flange formed thereon, a valve adapted to seat on said flange and having an area exposed to fluid pressure, means for securing said valve concentrically to said element so that fluid pressure acts on one side of the valve to cause it to turn during normal operation.

5. A fluid check valve for compressors comprising in combination, an element having a pair of spaced circular eccentric flanges formed thereon, a valve adapted to seat on said flanges and having an area exposed to fluid pressure, means for securing said valve concentrically to said element so that fluid pressure acts on one side of the valve to cause it to turn during normal operation.

6. A fluid check valve for compressors comprising in combination, an element having an eccentric flange formed thereon, a valve adapted to seat on said flange and having an area exposed to fluid pressure, spring means adapted to urge said valve to said flange, means for securing said valve concentrically to said element so that fluid pressure acts on one side of the valve to cause it to turn during normal operation.

7. A fluid check valve for compressors comprising in combination an element having a pair of spaced integral flanges providing a recess between said flanges, a flat annular valve eccentrically located with respect to said flanges and being adapted to

seat on said flanges, a keeper tightly secured to said element and overhanging said valve, said overhanging portion of the keeper being spaced from said valve to permit movement thereof, said element having a gas passageway opening into said recess.

8. A fluid check valve for compressors comprising in combination an element having a pair of spaced integral flanges providing a recess between said flanges, a flat annular valve eccentrically located with respect to said flanges and being adapted to seat on said flanges, a keeper tightly secured to said element and overhanging said valve, a spacing member disposed between said keeper and the element for permitting movement of said valve, the element having a plurality of gas passageways opening into said recess.

9. A fluid check valve for compressors comprising in combination an element having a pair of spaced integral flanges providing a recess between said flanges, a flat annular valve eccentrically located with respect to said flanges and being adapted to seat on said flanges, a keeper tightly secured to said element and overhanging said valve, a split ring spring between said keeper and said valve adapted to urge said valve to said flanges, said overhanging portion of the keeper being spaced from said valve to permit movement thereof, the element having a plurality of gas passageways opening into said recess.

10. A fluid check valve for compressors comprising in combination an element having a pair of spaced integral flanges providing a recess between said flanges, a flat annular valve eccentrically located with respect to said flanges and being adapted to seat on said flanges, means tightly secured to said element and overhanging said valve, a split ring spring between said means and said valve adapted to urge said valve to said flanges, means engaging said spring to prevent rotation thereof, a spacing member disposed between said first named means and the element for permitting movement of said valve, one side of the element having a plurality of gas passageways opening into said recess.

11. A fluid check valve for compressors comprising in combination an element having a pair of spaced integral flanges providing a recess between said flanges, a flat annular valve eccentrically located with respect to said flanges and being adapted to seat on said flanges, means tightly secured to said element and overhanging said valve, a split ring spring between said means and said valve adapted to urge said valve to said flanges, locking means engaging the spring on the side opposite the ends thereof to prevent its rotation, a spacing member disposed between said first named means and the element for permitting movement of said valve, gas passageways opening into said recess on the side of the element carrying the spring locking means.

12. A fluid check valve for compressors comprising in combination an element having a pair of spaced integral flanges providing a recess between said flanges, a flat annular valve eccentrically located with respect to said flanges and being adapted to seat on said flanges, a keeper tightly secured to said element and overhanging said valve, a spacing member disposed between said keeper and the element permitting movement of said valve, a split ring spring between said keeper and said valve adapted to urge said valve to said flanges, a stud engaging said spring and extending through said spacing member and into said element to prevent rotation of the spring, a plurality of gas passageways opening into said recess on the side of the element carrying the said stud.

13. A fluid check valve for compressors comprising in combination an element having a pair of spaced integral flanges providing a recess between said flanges, a flat annular valve eccentrically located with respect to said flanges and being adapted to seat on said flanges, a keeper tightly secured to said element and overhanging said valve, a spacing member disposed between said keeper and the element permitting movement of said valve, a split ring spring between said keeper and said valve adapted to urge said valve to said flanges, a stud engaging said spring on the side opposite the ends thereof to prevent its rotation, said stud extending through said spacing member and into said element, a plurality of gas passageways opening into said recess on the side of the element carrying the said stud.

14. A fluid check valve for compressors comprising in combination an element having a circular flange member formed thereon, a valve member rotatably carried by said element and being adapted to seat on said flanged member, said valve member having an area exposed to fluid pressure and being eccentrically located with respect to said flanged member so that the fluid pressure acts on one side of the valve member to cause it to turn during normal operation.

15. A fluid check valve for compressors comprising in combination an element having a pair of spaced circular flanged members formed thereon, a valve member rotatably carried by said element and being adapted to seat on said flanged members, said valve member having an area exposed to fluid pressure and being eccentrically located with respect to said flanged member so that the fluid pressure acts on one side of the valve member to cause it to turn during normal operation.

In testimony whereof I hereto affix my signature.

OTTO M. SUMMERS.