June 16, 1925.

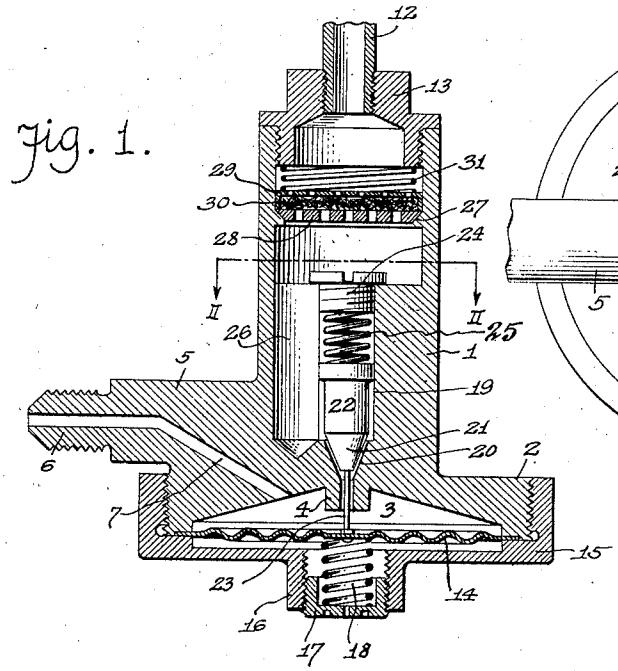
1,541,958

F. HORAWA

DIAPHRAGM VALVE

Filed May 18, 1923

Fig. 1.



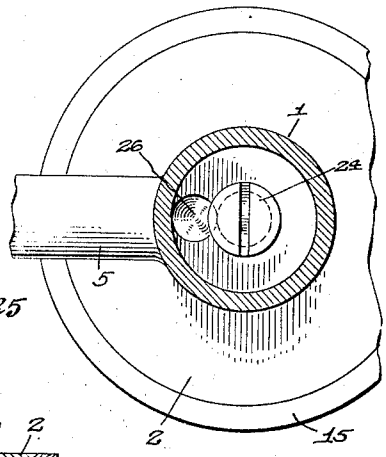


Fig. 2.

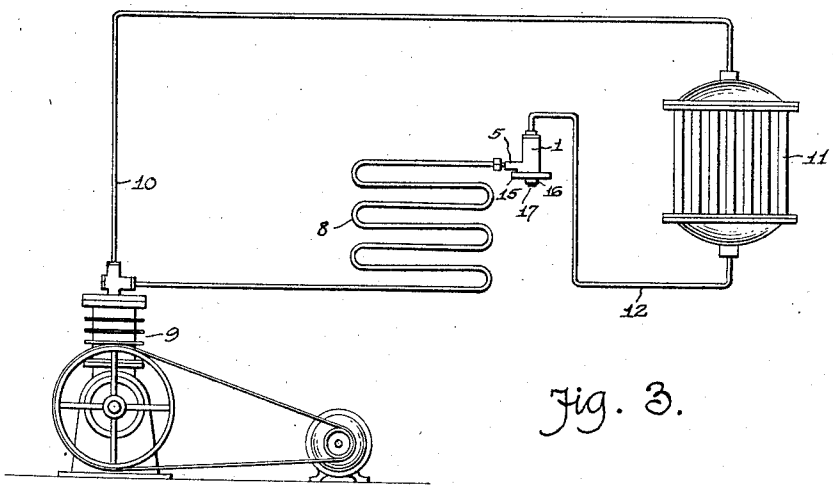


Fig. 3.

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UNITED STATES PATENT OFFICE.

FRANK HORAWA, OF DETROIT, MICHIGAN.

DIAPHRAGM VALVE.

Application filed May 18, 1923. Serial No. 639,759.

To all whom it may concern:

Be it known that I, FRANK HORAWA, a citizen of the United States of America, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Diaphragm Valves, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to a refrigeratory apparatus including a compressor, a condenser coil, and an expansion coil, and has special reference to a diaphragm valve interposed between the expansion coil and the condenser coil to prevent gaseous sulphur dioxide, anhydrous ammonia, or other expansible gases from re-entering the condenser coil should there be a cessation in the operation of the compressor or a back pressure in the expansion coil.

One of the objects of my invention is to provide a diaphragm valve for accomplishing the above result wherein the combined action of a spring and gas pressure against a diaphragm will close the valve against the action of the spring which maintains the valve open under normal conditions, and the expansive force of the last mentioned spring is adapted to open the valve when the pressure is reduced within the expansion coil, and normal operating conditions established in connection with the compressor.

A further object of this invention is to provide a simple, durable and inexpensive valve of the above type with a filter, baffle or liquid retardation element which precludes or reduces to a minimum chances of liquid flowing through the valve into the expansion coil from the condenser.

The above and other objects are attained by a construction that will be hereinafter described and then claimed, and reference will now be had to the drawing, wherein

Figure 1 is a vertical sectional view of the valve;

Fig. 2 is a horizontal sectional view taken on the line II—II of Fig. 1, and

Fig. 3 is a diagrammatic view of the refrigeratory apparatus showing the location of the valve.

In the drawing, the reference numeral 1 denotes a cylindrical valve body having one end thereof provided with an exteriorly screwthreaded head 2 and in the end of said head is a conical shaped diaphragm chamber 3 with an apertured boss 4 centrally thereof. At the juncture of the body 1 and the head 2 is a side enlargement 5 provided with an outlet connection 6 communicating with the diaphragm chamber 3 by an angularly disposed passage 7. The outlet connection 6 is adapted to be connected to an expansion coil 8 forming part of the refrigeratory apparatus including a conventional form of driven compressor 9 connected by a pipe 10 to a condenser coil 11 which in turn is connected by a pipe 12 to an inlet connection 13 detachably mounted in the body 1, said inlet connection being in the form of a coupling or plug screwed into the valve body 1.

Mounted against the end of the head 2 is a circumferentially corrugated diaphragm 14 held in place by a cap 15 screwed on the head 2, said cap having a central interiorly screwthreaded boss 16 for a spring retaining nut or member 17 in which is mounted a coiled expansion spring 18. This spring bears against the diaphragm 14 and the expansive force of said spring is overcome when the diaphragm 14 is flexed towards the cap 15 by back pressure within the diaphragm chamber 3.

Axially of the valve body 1 is a bore 19 which has one end thereof tapered to communicate with the apertured boss 4 and provide a seat 20 for the conical end 21 of a member 22 slidable in the bore 19. The conical end 21 of the member 22 has a stem 23 extending through the apertured boss 4 and connected to the central portion of the diaphragm 14 so that the conical member 22 and the diaphragm 14 may move in synchronism.

Detachably mounted in the bore 19 is a screw plug 24 and between said screw plug and the conical member 22 is a coiled expansion spring 25 of less expansive force than the coiled spring 18 and the expansive force of the spring 25 cooperates with back pressure in the diaphragm chamber 3 in overcoming the pressure of the spring 18 so that the diaphragm 14 may be flexed and the conical member 22 closed.

At the side of the bore 19 there is a by-path 26 disposed parallel to the bore and establishing communication between the seat or conical end of the bore and the outer end of the valve body 1.

In the outer end of the valve body 1, between the inlet connection 13 and the screw plug 24 is an annular seat or flange 27

for an atomizing baffle, screen or liquid retardation member, preferably in the form of a perforated washer 28, a cage 29 and a body of felt or other pervious material 30 between the cage and washer, said cage being retained on the washer and said washer on the flange 27 by the expansive force of the spring 31 between the cage 29 and the inlet connection 13.

Any liquid entering the outer end of the valve body 1 from the condenser coil 11 is held in suspense by the baffle and atomized before passing into the by-path 26, through the conical end of the bore 19 and the apertured boss 4 into the diaphragm chamber 3, from where it passes through the passage 7 and outlet connection 6 to the expansion coil 8. Should there be any back pressure in the expansion coil, due to a cessation in operation of the compressor 9 or for other causes, the back pressure flexes the diaphragm 14 and closes the conical member 22 to shut off the supply of gas to the expansion coil until the compressor 9 is placed in operation or normal conditions again established in connection with the apparatus.

It is thought that the operation and utility of my valve will be apparent without further description, and while in the drawing there is illustrated a preferred embodiment of my invention it is to be understood that the structural elements are susceptible to such changes as fall within the scope of the appended claim.

What I claim is:—

A valve of the type described comprising a valve body having a diaphragm chamber and inlet and outlet connections, a diaphragm in said chamber, and a conical member between the inlet connection and chamber of said valve body and slidable axially of said body, said conical member being connected to said diaphragm and held normally open thereby, and said valve body having a by-path leading to the conical portion of said conical member.

In testimony whereof I affix my signature in presence of two witnesses.

FRANK HORAWA.

Witnesses:

KARL H. BUTLER,

ANNA M. DORR.