June 28, 1932. E. O. STOUT 1,864,957

REFRIGERATING APPARATUS

Filed March 30, 1929 2 Sheets-Sheet 1

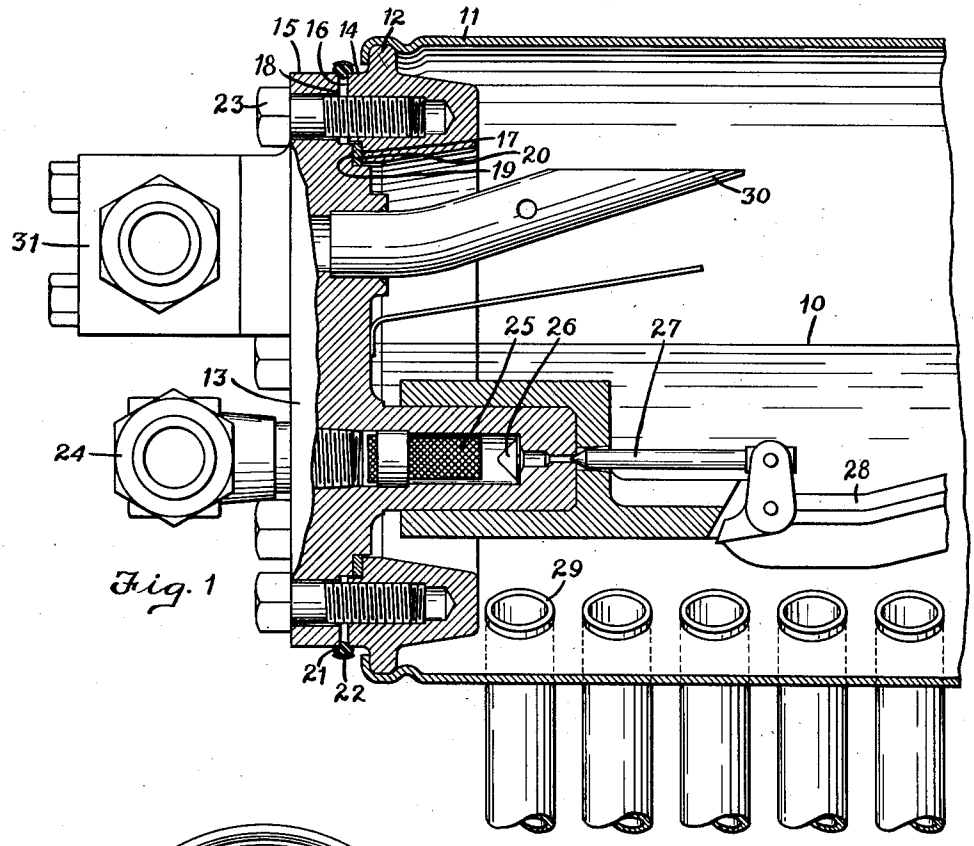


Fig. 1

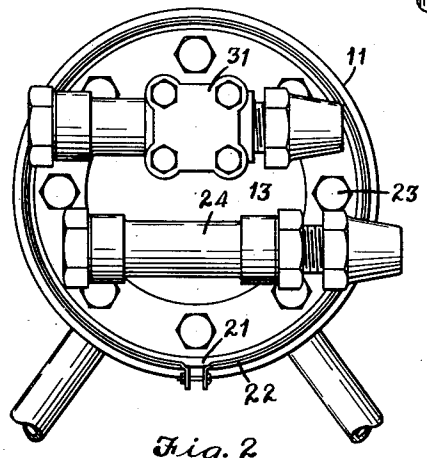


Fig. 2

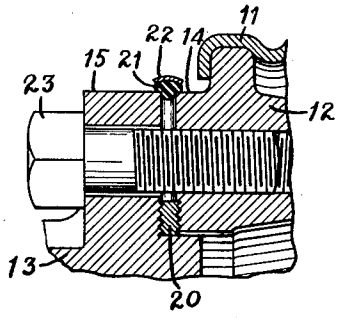


Fig. 3

Inventor

Elmer O. Stout

By Spencer, Hardman & Fehr

Attorneys

June 28, 1932. E. O. STOUT 1,864,957

REFRIGERATING APPARATUS

Filed March 30, 1929 2 Sheets-Sheet 2

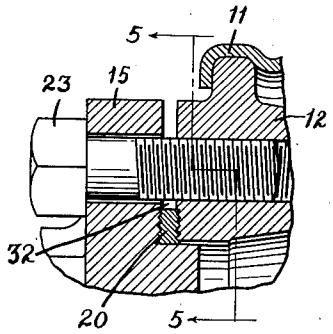


Fig. 4

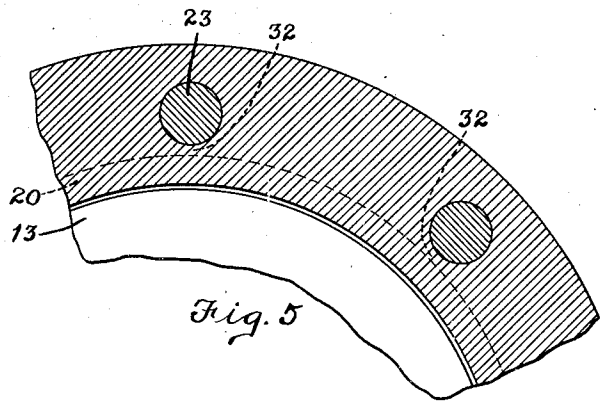


Fig. 5

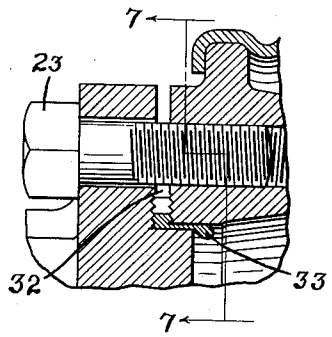


Fig. 6

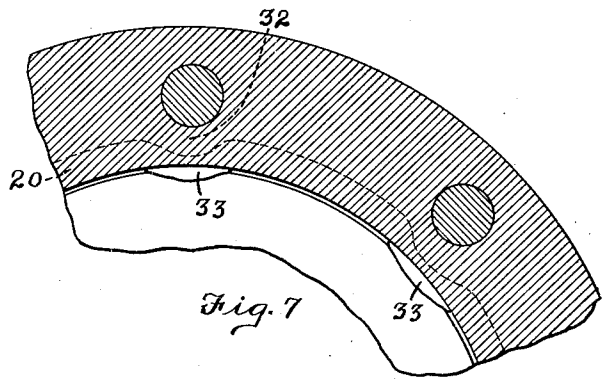


Fig. 7

Elmer O. Stout Inventor

By Spencer, Hardman & Fehr

Attorneys

Patented June 28, 1932 1,864,957

UNITED STATES PATENT OFFICE

ELMER O. STOUT, OF DAYTON, OHIO, ASSIGNOR TO FRIGIDAIRE CORPORATION, OF DAYTON, OHIO, A CORPORATION OF DELAWARE

REFRIGERATING APPARATUS

Application filed March 30, 1929. Serial No. 351,430.

This invention relates to refrigerating apparatus, particularly to the construction of evaporators of the type in which a refrigerant container is provided with a removable closure.

One of the objects of the invention is to provide an improved form of seal between the container and closure of such evaporators.

Another object is to provide a seal which will not deteriorate or develop leaks in operation due to the presence of moisture on the evaporator.

More specifically it is an object to provide sealing means for preventing moisture from entering crevices usually present in evaporators of this type.

Still another object is to provide such a seal which can be readily removed and replaced in service.

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 invention is clearly shown.

In the drawings:

Fig. 1 is a cross section through an evaporator of a preferred type disclosing the application of the invention;

Fig. 2 is a front view of the evaporator in Fig. 1;

Fig. 3 is an enlarged view of a portion of a slightly modified form of evaporator;

Fig. 4 is a section corresponding to Fig. 3 showing conditions which bring about deterioration of a joint;

Fig. 5 is a cross section on line 5—5 of Fig. 4;

Fig. 6 is a view similar to Fig. 4 with the gasket distorted; and

Fig. 7 is a cross section on line 7—7 of Fig. 6.

The purpose of this invention is to prevent leaks of the refrigerant whether in gaseous or liquid state from the header of an evaporator such as used in the usual household refrigerator cabinet. The invention contemplates an effective sealing of the closure plate to the container of the refrigerant.

In Fig. 1 is disclosed the preferred means of effectively sealing the refrigerant 10 in its container. The tank 11 has an opening in one end thereof in which an annular supporting member or ring 12 is welded, said annular member or ring bordering the opening and constituting a flange in the open end of the tank. A circular valve or closure plate 13 acts as a closing means for this end of the container. The supporting ring and closing plate have preferably adjacent cylindrical surfaces 14 and 15 of substantially the same diameter. The supporting ring has the annular progressive steps 16 and 17 on its front surface and the closure plate 13 has the annular progressive steps 18 and 19 substantially complementary to the steps 16 and 17 and also an additional inner annular progressive step similar to but smaller in diameter than the step 19. Additional complementary steps could be formed if desired. A gasket 20 preferably of lead or lead composition is placed between two complementary inner steps such as 17 and 19 thereof and consequently the gasket slightly spaces the plate and ring member. The gasket is held or locked within the annular space of rectangular cross section bounded by the opposite steps 17 and 19 and the annular adjacent walls perpendicular thereto. A plurality of screw members 23 secure the plate to the ring and tank. This gasket seals the refrigerant within the container. A slight space or crack is left, however, in this construction between the two cylindrical surfaces 14 and 15. About this crack is placed a flexible rubber ring or annulus 21 which is tensioned in its position by having a normal diameter slightly less than the diameter of the adjacent cylindrical surface. Accordingly the tension of the stretched rubber ring or annulus will force the rubber against the ring member and the closure plate and seal the opening between them against the entrance of moisture. For more positive sealing, however, it is preferred to surround the rubber ring with an additional clamping member 22 made out of any suitable metal.

Also disclosed in this Fig. 1 are the other elements of a preferred type of evaporator to which the invention has been applied. A liquid refrigerant valve 24 admits the refriger-

ant through a filter screen 25 and cone 26 to pass a needle valve 27 controlled by a float ball (not shown) on the float ball arm 28. Also disclosed are the depending loops 29. The liquid is maintained at a constant level in the tank and boiler 11 by the float ball controlling the needle valve 27. As the refrigerant evaporates the gas is drawn off through a suction tube 30 to the suction valve 31 and from there it is returned to a compressing and liquefying apparatus such as disclosed in the patent to H. B. Hull 1,648,178 issued November 8, 1927. Upon being liquefied the refrigerant is again automatically forwarded to the liquid controlling valve 24 as the conditions in the evaporator require. It will be noted that in Fig. 3 the ring and valve plate do not have the complementary annular steps that are disclosed in Fig. 1. The gasket 20, however, is sealed by the same rubber member 21 with its clamping means 22.

In Figs. 4 through 7 are disclosed the conditions that require the sealing means which has been disclosed in its preferred form in the other figures. After a period of operation of the evaporator moisture condenses and freezes on the surface of the evaporator so that it eventually begins to act as an insulating blanket between the interior of the evaporator and the air and other contents in the compartment in which the evaporator is installed. After this period of time, which is determined more or less by the humidity of the air in the cabinet in which the evaporator is installed, it is necessary to stop the condensing apparatus and allow the evaporator to defrost. It has been found that when this occurs the space shown in Figs. 4 and 5 between the closure member and supporting ring permits moisture to collect in the spaces 32 between the shanks of the screws 23 and the lead gasket 20. When the evaporator was again placed in operation this moisture would turn to ice and in its expanded state push the portion of the gasket inward. Accordingly a slight pocket was formed in the surface of the gasket for the collection of more moisture during the next period of defrosting. This moisture again further expanded to push the gasket still further inward and make it flow into the container such as disclosed in the portion 33 in Figs. 6 and 7. Thus it was merely a question of time before the gasket became distorted and allowed the gas to escape from the interior of the container. Accordingly the invention contemplates effectively sealing the space between the closure member and the supporting ring by the protective rubber ring 21 as disclosed in Fig. 3. As a further protection the complementary annular steps on the ring 12 and on the plate 13 have been devised to more thoroughly protect the gasket 20 from any moisture that would collect between the plate and ring member. By means of these protective measures both the gasket and the fastening means 23 are protected from damage that would otherwise result if moisture were allowed betwen the two surfaces. It is obvious that various changes may be made in the protective or sealing means and that the invention is applicable to any number of different types of evaporators and is not limited to the tank and supporting ring construction disclosed.

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. An evaporator comprising a container, a valve plate secured to said container, a gasket between said valve plate and said container and means for preventing the access of moisture from the exterior to the gasket.

2. In combination a tank, said tank having an opening in one end thereof, a member bordering the opening of said tank and secured thereto, a plurality of annular progressive steps on the face of said member, a member adapted to close said opening, said last mentioned member having a plurality of annular progressive steps on its inner face substantially complementary to said annular progressive steps on said first mentioned member and a gasket enclosed and locked between an intermediate annular step on one of said members and one of the annular steps on another of said members.

3. An evaporator comprising a tank, said tank having an opening in one end thereof, a member bordering the opening of said tank and secured thereto, a plurality of annular steps on the face of said member, a member adapted to close said opening, said last mentioned member having a plurality of annular steps on its inner face substantially complementary to said annular steps on said first mentioned member and sealing means about the joint between said members.

4. An evaporator comprising a tank, said tank having an opening in one end thereof, a member bordering the opening of said tank and secured thereto, a plurality of annular steps on the face of said member, a member adapted to close said opening, said last mentioned member having a plurality of annular steps on its inner face substantially complementary to said annular steps on said first mentioned member and sealing means about the joint between said members and clamping means about said sealing means.

5. An evaporator comprising a tank having an opening, a member bordering said opening, a closure plate for said opening, a gasket spacing said plate and member and sealing means for the space between said plate, said gasket, and said member.

6. An evaporator comprising a tank hav-

ing an opening, a member bordering said opening, a closure plate for said opening, a gasket spacing said plate and member and sealing means for the space between said plate and said member, said sealing means comprising an annulus of rubber and clamping means about said annulus.

7. An evaporator comprising a tank having an opening, a member bordering said opening, a closure plate for said opening, a gasket spacing said plate and member and sealing means for the space between said plate and said member, said sealing means comprising an annulus of rubber.

8. An evaporator comprising a tank having an opening, a member bordering said opening, a closure plate for said opening, a gasket spacing said plate and member and sealing means for the space between said plate and said member, said sealing means comprising an annulus normally of less circumference than said outer circumference of the space between said plate and said member.

9. An evaporator comprising a tank having an opening, a member bordering said opening, a closure plate for said opening, said member and said plate having substantially cylindrical surfaces of substantially the same diameter adjacent each other, a gasket spacing said member and plate, and a sealing member sealing the space between said cylindrical surfaces.

10. An evaporator comprising a tank having an opening, a member bordering said opening, a closure plate for said opening, said member and said plate having substantially cylindrical surfaces of substantially the same diameter adjacent each other, a gasket spacing said member and plate, a flexible annulus normally of less diameter than said cylindrical surfaces placed about the opening between said cylindrical surfaces and sealing the same.

11. An evaporator comprising a tank having an opening, a member bordering said opening, a closure plate for said opening, said member and said plate having substantially cylindrical surfaces of substantially the same diameter adjacent each other, a gasket spacing said member and plate, a flexible annulus normally of less diameter than said cylindrical surfaces placed about the opening between said cylindrical surfaces and sealing the same, and a clamping member about said annulus and compressing said torus into the space between said cylindrical surfaces.

12. In a cooling unit for refrigerating apparatus, the combination of a member adapted to receive refrigerant having an open end with a flange thereon, a member adapted to close said opening and adapted to be secured to said flange, a gasket between said flange and said last mentioned member and forming a space therebetween, and means outside said space for sealing the entrance to said space.

13. In a cooling unit for refrigerating apparatus, the combination of a member adapted to receive refrigerant having an open end with a flange thereon, a member adapted to close said opening and adapted to be secured to said flange, said flange and the closing member having complementary annular steps adapted to fit together, a gasket between certain of said complementary steps of said flange and the closing member forming a space between other of said complementary steps, and means for sealing the entrance to said space.

In testimony whereof I hereto affix my signature.

ELMER O. STOUT.