May 24, 1932. H. R. LORANGER 1,860,193

ACID ELIMINATOR FOR REFRIGERATING APPARATUS

Original Filed Aug. 8, 1927

Fig. 2.

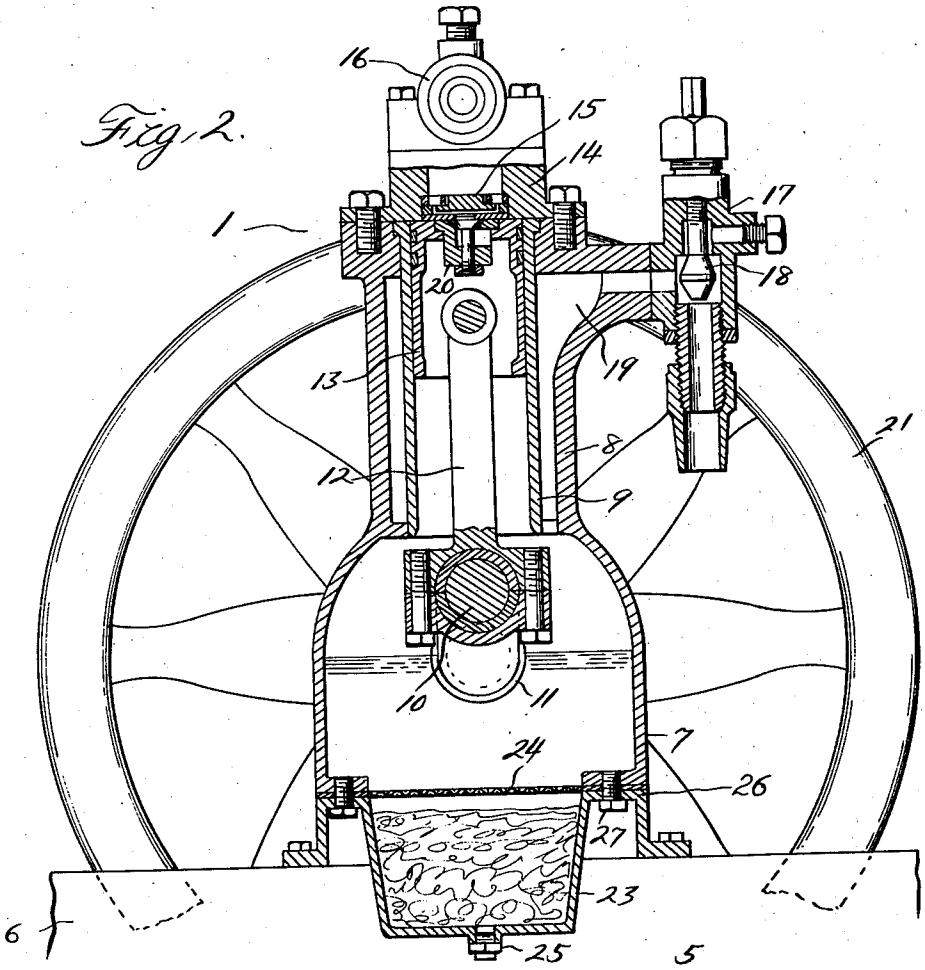
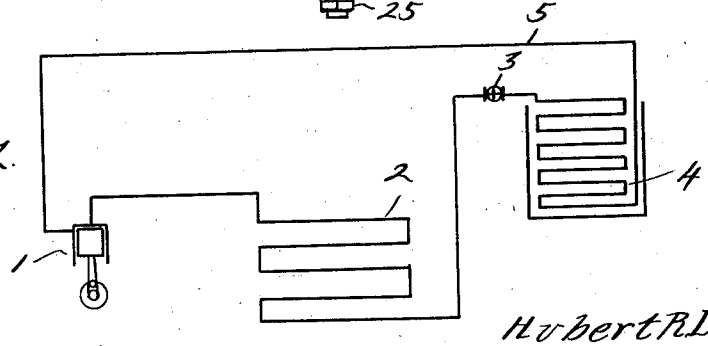


Fig. 1.



Inventor
Hubert R. Loranger

By

Whittemore, Hulbert & Whittemore & Belknap

Attorneys

Patented May 24, 1932 1,860,193

UNITED STATES PATENT OFFICE

HUBERT R. LORANGER, OF HILLSDALE, MICHIGAN, ASSIGNOR TO AUTOMATIC FREEZER CORPORATION, OF DETROIT, MICHIGAN, A CORPORATION OF MICHIGAN

ACID ELIMINATOR FOR REFRIGERATING APPARATUS

Application filed August 8, 1927, Serial No. 211,573. Renewed May 3, 1930.

The invention relates to means for protecting the working parts of refrigerating apparatus from the effects of corrosive agents in the refrigerating medium. The invention is primarily applicable to apparatus using sulphur dioxide as the refrigerant, since this material in the presence of water results in the formation of acids which readily attack the metallic parts of the compressor with very detrimental effects upon the functioning of the apparatus.

My invention contemplates the use of an acid arrester in the compressor, this arrester consisting of a chemical substance capable of readily reacting with the acid substances and converting them into non-corrosive substances that are retained in the arrester and not permitted to circulate into contact with the working parts of the apparatus. The acid arrester is located in the lower part of the compressor, preferably in the oil sump so that any acids within the compressor will drain or settle into the arrester by gravity action.

In the drawings;

Figure 1 is a diagram of a refrigerating system.

Figure 2 is a sectional elevation of the refrigerant compressor.

In Figure 1 I have illustrated diagrammatically a refrigerating system employing a mechanical compressor 1, a condenser 2 an expansion valve 3, the expansion coil 4 and the return conduit 5. The compressor 1 is mounted upon a base 6 and comprises a crank case 7, having an upwardly extending portion 8 in which is mounted the cylinder sleeve 9. 10 is a crank shaft journaled in bearings 11 and connected by a connecting rod 12 to a piston 13. 14 is a cylinder head in which is arranged the outlet valve 15, and mounted on the cylinder head is a fitting 16 from which the refrigerant is led into the condenser 2. The return conduit 5 of the refrigerating system leads to a fitting 17 having a regulating valve 18 therein. This fitting communicates with a passageway 19 formed within the upper extension 8 of the crank case, and extending downwardly adjacent the cylinder sleeve 9 and discharging into the interior of the crank case. The refrigerant is drawn into the cylinder above the piston through an inlet check valve 20. 21 is a combined fly-wheel fan and driving pulley mounted on the crank shaft outside of the crank case, and is driven by any suitable motor.

With compressors of the type above described, it is usual to fill the crank case with lubricating oil which serves to lubricate the working parts of the compressor by the splashing due to the revolving crank shaft. In applying my invention to a compressor of the above type, I have preferably provided below the crank case 7 a pan 23 communicating with the crank case and forming an oil sump. Between the pan and the crank case there is interposed a screen 24 forming a strainer or filter for the purpose hereinafter set forth. Within the oil sump is placed a material having the property of chemically reacting with the acid impurities in the refrigerating system. Where the compressor is used in a refrigerating system employing sulphur dioxide the substance in the oil sump is preferably zinc, although other materials may be used as substitutes therefor providing they are capable of readily reacting with the acid impurities. The oil sump is provided with a drain plug 25 in the bottom thereof through which the oil may be removed from the compressor when desired. The sump is preferably formed with laterally extending flanges 26 adapted to engage the bottom of the crank case and to be secured thereto by means of bolts 27.

With the construction as above described, the acid impurities formed within the compressor by the inter-action of sulphur dioxide and water have a tendency to drain downwardly through the lubricating oil into the sump where they chemically combine with the zinc, forming a solid reaction product. The acids formed by the sulphur dioxide are sulphurous and sulphuric acids, both of which have a specific gravity greater than that of the lubricating oil so that when the compressor is at rest the acids readily drain into the sump and are eliminated from the system. The screen 24 permits the lubricat-

ing oil and the liquid acids to pass therethrough into the sump, but does not allow the solid reaction products formed in the sump to be returned to the crank case or circulated into contact with the working parts of the compressor.

One of the advantages of my invention is that it can be readily applied to commercial types of refrigerating compressors and will render the same substantially free from the many troubles resulting from internal corrosion. As stated above, the corrosion results from the reaction of the sulphur dioxide with water forming acids which attack ferrous and certain other metals ordinarily used in the working parts of the compressor. The water in the system may in some cases be present in the machine before it is charged with the refrigerant, or it may be introduced into the machine with the refrigerant or the oil, or again it may find its way into the system through leaks in the compressor or in the joints. In the latter case particularly the amount of water in the system will continually increase, thereby forming additional acids which unless removed will soon cause many operating troubles.

My invention provides a means for removing or eliminating the acids before they have any appreciable detrimental affects on the apparatus. Assuming that there is a slight leak in the compressor through which air in introduced, the moisture in the air reacts immediately with the dry sulphur dioxide forming acid substances. These substances are liquid and have a greater specific gravity than the lubricating oil, and therefore tend to drain through the lower most part of the compressor. While the compressor is in operation there will be a film of oil over the working parts which offers a temporary protection when the acid content is relatively low. When the compressor ceases operation (and it is usual in refrigerating systems to have an intermittent operation) the liquid acids drain into the sump and are removed from the system by their chemical reaction with the zinc, or other material placed in the sump. When the compressor is again put in operation the acid content in the lubricating oil will be very slight and the working parts of the apparatus will not be subjected to corrosive action. While more acid may be formed in the system while operating, it is also removed when it drains into the sump.

From the above description, it will be apparent that my invention provides a very simple means for protecting refrigerant compressors from corrosion, and as the corrosion problem is a very serious one, particularly in apparatus employing sulphur dioxide, it will be readily apparent that my invention has great utility in the field of domestic refrigeration.

What I claim as my invention is:

1. In a refrigerating system the combination with a compressor having inlet and outlet connections for the refrigerating medium, of a container arranged below said connections and adapted to collect acid impurities by gravity action, and means in said container for chemically reacting with said acid impurities to eliminate the corrosive properties.

2. In a refrigerating system the combination with a compressor having inlet and outlet connections for the refrigerating medium, of a container arranged below said connections and adapted to collect acid impurities by gravity action, means in said container for chemically reacting with said acid impurities to eliminate the corrosive properties, and means arranged above said chemical means for preventing the passage of the reaction products of the acids with said chemical means.

3. In a refrigerating system the combination with a compressor having inlet and outlet connections for the refrigerating medium, and having a lubricant reservoir in open communciation with said inlet connection of a sump below said lubricant reservoir, and a substance in said sump capable of chemically reacting with the corrosive impurities associated with the refrigerant.

4. In a refrigerating apparatus employing sulphur dioxide as the refrigerant, the combination of a reciprocating compressor having a lubricant reservoir, said compressor having a refrigerant passageway communicating with said reservoir, of a container arranged below said reservoir and adapted to receive by gravity action the acid substances formed from the sulphur dioxide and means in said container for chemically reacting with said acids.

5. A compressor for sulphur dioxide comprising a crank case, a cylinder communicating therewith, a piston within said cylinder, a crank shaft in said crank case, a connecting rod between said crank shaft and piston, a refrigerant passageway communicating with said crank case, an oil sump below said crank case, a filter between said sump and crank case, and a substance capable of reacting with impurities formed by the sulphur dioxide, said substance being arranged in said oil sump below said filter.

In testimony whereof I affix my signature.

HUBERT R. LORANGER.