

Patented Dec. 25, 1928.

1,696,642

UNITED STATES PATENT OFFICE.

ROBERT F. MASSA, OF NEW YORK, N. Y., ASSIGNOR TO CARBIDE & CARBON CHEMICALS CORPORATION, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

REFRIGERANT LUBRICANT AND METHOD OF LUBRICATING REFRIGERATING MACHINERY.

No Drawing.

Application filed October 9, 1924. Serial No. 742,956.

This invention relates to the lubrication of refrigerating machinery and more particularly of that type of refrigerating machinery wherein methyl or ethyl chloride is employed as the refrigerant medium.

The usual lubricant which has been used in this art in conjunction with refrigerants such as ethyl or methyl chloride has been glycerine for which, prior to my discovery, no satisfactory substitute has been known. While in many respects glycerine is quite satisfactory, it possesses certain properties which render it far from being an ideal lubricant in refrigeration systems. For example, it is highly viscous and yet there has heretofore been no difficultly freezing diluent which could be used to reduce its viscosity and that would at the same time not mix with the refrigerant. Moreover, if a refrigerating machine employing glycerine as the lubricant is allowed to run at a relatively high temperature, so as to render the glycerine less viscous, there is a serious increase of the existing tendency to decomposition of the glycerine, by overheating, into compounds such as fatty acids, carbonic acid, carbon and water which act on the materials used in the construction of the refrigerating machinery and especially on the copper and the high carbon steel surfaces thereof. Furthermore, the water liberated by such decomposition tends to break down refrigerant liquids such as ethyl chloride to form alcohol and hydrochloric acid.

My investigations have led to the discovery that by the employment of a glycol, such as the propylene glycol commonly known as tri-methylene glycol, as such lubricant, many of the objectionable features accompanying the use of glycerine can be largely eliminated. Trimethylene glycol is inert toward metals and not miscible with refrigerants such as ethyl or methyl chloride in liquid form, and because of its low viscosity it reduces the power consumption of the machine and the heating of the bearings.

A glycol can be substituted for glycerine as the refrigerant without interfering with the operation of the machine. Trimethylene glycol can be used at temperatures as low as 5° F. to 10° F. without excessive power

consumption. This is in marked contrast to glycerine which, at about 20° F., becomes too viscous to flow properly to the bearings.

While I prefer to use trimethylene glycol, $\text{HOCH}_2\text{—CH}_2\text{—CH}_2\text{OH}$, other propylene glycols such as that represented by the structural formula $\text{CH}_3\text{CHOH—CH}_2\text{OH}$, the hydroxyl groups being attached to adjacent carbon atoms, may also be used, as may ethylene and butylene glycols and polymers of the glycols, without departing from the spirit of the invention.

It is important that the glycol employed, as well as the refrigerant employed, especially when the refrigerant is ethylene chloride should be approximately anhydrous, i. e. should not contain more than about 2% of water and preferably should contain as low as ½% of water, as otherwise the ethylene chloride will be decomposed or hydrolyzed by the water into hydrochloric acid and ethyl alcohol, the former being obviously extremely corrosive to metals and the latter not possessing the properties desired in refrigerant for the purposes herein described.

While I preferably employ ethylene or methylene chloride or a mixture thereof as refrigerating media, chlor-hydrocarbons of the fatty series capable of substitution therefor are equally within the scope of the appended claims.

Having thus described my invention, what I claim and desire to obtain by Letters Patent is:

1. A lubricant for refrigerating machines containing a glycol.

2. An approximately anhydrous lubricant for refrigerating machines containing a propylene glycol.

3. A lubricant for refrigerating machines containing a glycol having less than 2% of water.

4. A lubricant for refrigerating machines containing trimethylene glycol.

5. A lubricant for refrigerating machines containing trimethylene glycol having less than 2% of water.

Signed at New York city in the county and State of New York, this 18th day of July, 1924.

ROBERT F. MASSA.