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UNITED STATES PATENT OFFICE

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REFRIGERANT

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This invention relates to refrigerants. More specifically it is concerned with a new and improved refrigerant consisting of methyl formate with which is associated a relatively small proportion of a low boiling alcohol, such as methyl or ethyl alcohol.

Methyl formate has been found to be an excellent refrigerant for certain types of refrigerating machines, such as the compressor type. Where methyl formate is employed as the refrigerant, the system generally speaking, may be similar to that shown in the patent to Steenstrup, 1,736,635, dated November 19, 1929, and may be provided with a gas-tight casing enclosing the refrigerating unit and forming part of a closed system. In such a closed system moisture is apt to be entrapped in the walls of the casing and the windings of the driving motor, regardless of the precautions taken to remove all traces of moisture from these parts.

In the presence of moisture methyl formate tends to dissociate into formic acid and methyl alcohol according to the equation

$$H{\cdot}COOCH_3 + H{\cdot}OH \rightleftarrows H{\cdot}COOH + CH_3{\cdot}OH$$

While the degree of dissociation will vary with conditions such as for example the amount of moisture present, and may not be material ordinarily, yet, in some cases, if an appreciable degree of dissociation occurs and hence an appreciable amount of formic acid is formed, the metal parts with which the refrigerant comes in contact will be attacked and corroded.

In order to guard against the danger of forming this acid in the unit if any moisture should be present and at the same time preserve the desirable refrigerating characteristics of the methyl formate, I have found that if I add to the methyl formate a relatively small proportion of a low boiling alcohol, such as methyl alcohol or ethyl alcohol, I can insure the prevention of the formation of the acid which attacks the metal parts of the unit. The presence of the alcohol prevents the dissociation of the methyl formate which would tend to take place in the presence of even the small amount of moisture which is likely to be present no matter how carefully the apparatus has previously been treated to remove the moisture. In addition, the alcohol exerts no harmful effect on the refrigerating characteristics of the methyl formate, but in fact is a desirable addition because the low boiling alcohols have properties which in themselves make the alcohols suitable for refrigerants.

In carrying my invention into practice I prefer to add a relatively small proportion of alcohol to the methyl formate. Preferably, I employ the alcohol in the anhydrous condition. While the amount of alcohol which I add to the methyl formate may vary, I prefer to use at least 5% by weight. This amount materially improves the stability of the methyl formate while not appreciably affecting its refrigerating characteristics. I may employ any percentage between about 5% to 10% by weight of the alcohol, but I prefer not to use over 10% of the alcohol because such an amount will tend to reduce the vapor pressure of the methyl formate below that desired in the operation of the apparatus.

The refrigerant of my invention may be employed in a system of refrigeration, such for example as that shown in the Steenstrup patent above referred to, passing through the cycle of first being compressed by the compressor, then to a condenser, from there to an expansion chamber or evaporator, and finally returning to the compressor to complete the cycle.

What I claim as new and desire to secure by Letters Patent of the United States, is:

1. A refrigerant consisting of methyl formate and about 5% to 10% by weight of anhydrous low boiling alcohol associated therewith.

2. A refrigerant consisting of methyl formate and about 5% to 10% by weight of anhydrous methyl alcohol associated therewith.

3. A refrigerant consisting of methyl formate and about 5% to 10% by weight of anhydrous ethyl alcohol associated therewith.

4. A refrigerant, capable of being alternately compressed and liquefied and then expanded and gasified, consisting of methyl formate and about 5% of anhydrous methyl alcohol associated therewith.

In witness whereof I have hereunto set my hand this 18th day of September, 1930.

CHRISTIAN DANTSIZEN.