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REFRIGERATING SYSTEM AND METHOD OF OPERATING THE SAME.

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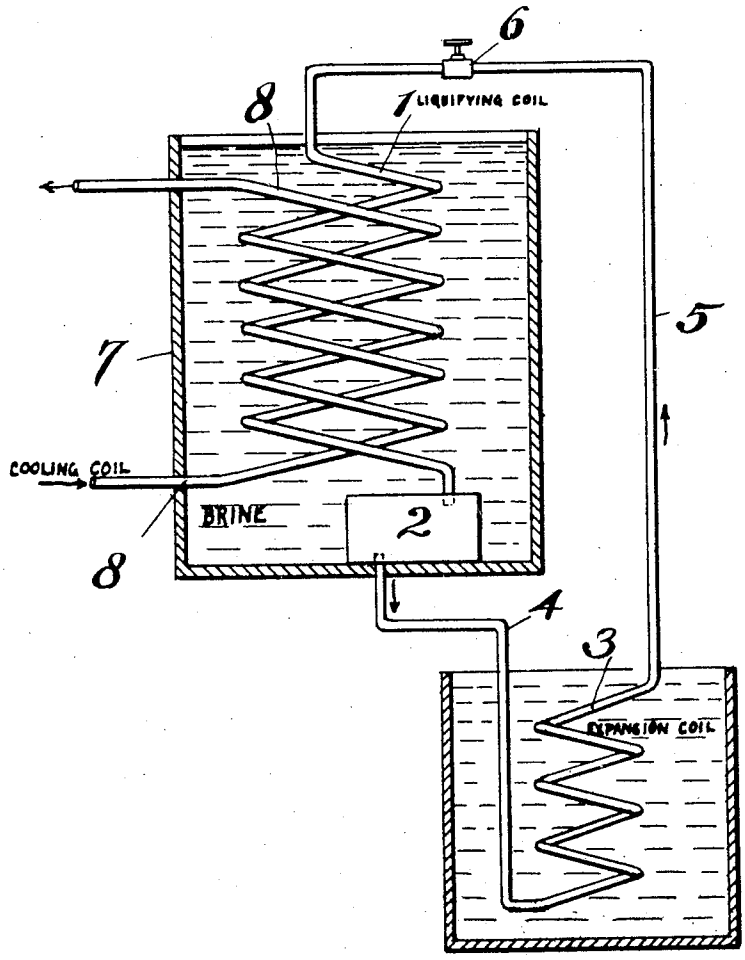
1,371,235. Patented Mar. 15, 1921.



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UNITED STATES PATENT OFFICE.

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REFRIGERATING SYSTEM AND METHOD OF OPERATING THE SAME.

1,371,235. Specification of Letters Patent. Patented Mar. 15, 1921.

Application filed January 8, 1917. Serial No. 141,086.

To all whom it may concern:

Be it known that we, GEORGE A. GASE and ERVIN A. SEYMER, citizens of the United States, and residents, respectively, of East Cleveland, in the county of Cuyahoga and State of Ohio, and Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Refrigerating Systems and Methods of Operating the Same, of which the following is a full, clear, and exact description.

This invention relates to a refrigerating system and a method of operating same, whereby a substantially uniform temperature may be maintained at the expansion coil.

The object of the invention is first to provide a closed system in which the refrigerating medium is continuously permitted to expand and gasify at one portion of the system, and is continuously cooled to its liquefying point at another portion of the system.

A further object is to provide a definite and constant pressure within the system, whereby to control the expansion of the refrigerating medium, and so control the temperature produced by the expansion of the refrigerant in the expansion coil.

Generally speaking, the invention may be said to comprise the method herein disclosed as well as the elements forming the refrigerating system herein disclosed.

Reference should be had to the accompanying drawings, forming a part of this specification, in which the figure shows an arrangement of instrumentalities comprising a closed refrigerating system as contemplated for carrying out our invention.

Referring to the drawings, (1) represents a coil of any desired number of individual turns, which coil we may refer to as the liquefying coil. The lower end of the coil (1) connects with a closed receptacle (2).

At (3) there is a coil similar to the coil (1), which we may term the expansion coil. This coil is connected with the receptacle (2) by a pipe (4).

The upper end of the coil (3) is connected with the upper end of the coil (1) by pipes, which are represented at (5) and in the pipe (5) there is a valve (6), which may be utilized to introduce the refrigerating medium into the system, as well as for introducing an inert gas under pressure, as will be later explained.

The coil (3) is preferably arranged below the coil (1) so that the refrigerating medium may pass from the receptacle (2) to the coil (3) by gravity. This arrangement is not necessary as the refrigerating medium may be pumped from receptacle (2) to coil (3) if preferred.

The coil (1) has associated therewith some means by which it may be cooled, and for the purpose we have shown a tank (7) which may contain a brine solution, which brine solution is cooled by a coil (8), forming the expansion coil of another system of refrigeration. The receptacle (2) connected with the coil (1), is also within the tank (7).

The arrangement shown and described for cooling the coil (1), is merely suggestive and forms no limitation upon our invention, as any desired means for cooling the coil (1) may be employed.

With the various instrumentalities just described, assembled in the manner just described, we introduce into the system through the valve (6), a refrigerating medium such as ammonia gas. This ammonia gas will in the coil (1) be liquefied, because the coil (1) will be cooled below the liquefying temperature of the ammonia gas. The liquefied ammonia will collect in the receptacle (2), and pass through the pipe (4) to the expansion coil (3), where the liquefied ammonia will expand and return to its gas condition, and absorb heat from the surrounding air and objects. The gas will pass through the pipe (5) to the coil (1) where it will again be liquefied.

It will thus be seen that in the system proposed the gaseous ammonia will be continually liquefied in the coil (1) and the liquefied ammonia will continually be expanding in the coil (3).

It frequently is desirable to have the temperature produced at the expansion coil definite and fixed, and above the freezing point. This we are able to accomplish in our system by introducing in the system an inert gas under pressure, which inert gas does not liquefy at the temperatures at which the system is operated. Preferably, the gas used is air, and the pressure at which it is introduced in the system is directly related to the temperature it is desired to produce

at the expansion coil (3), the greater the pressure in the system, the higher the temperature produced at the coil (3). For instance, if air under pressure be introduced into the system until the pressure within the system is 50 lbs. per square inch, the temperature produced at the coil (3) will be approximately 39 degrees Fah. and so if air be introduced into the system at other pressures, the temperatures will be produced at the coil (3) in accordance therewith, because increasing the pressure in the system causes the liquefied ammonia to boil or gasify at a higher temperature.

The system and the instrumentalities composing the system which has just been described, of course, form an independently operating system, but the whole system is very useful to be used in connection with another refrigerating system, as for instance, in connection with a soda fountain wherein the main system may be used for cooling the ice cream compartments, which compartments, of course, it is desirable to maintain at a low temperature, so as to hold the ice cream in solid condition. However, if such a system be used in connection with the soda water containers, it frequently happens that the soda water freezes, especially if it is not drawn frequently. The independent system which is herein described, may be used in connection with a general system, by having the coil (1) of the herein described system cooled in a brine tank, in which the brine is cooled by a coil communicating with the main refrigerating system and the expansion coil (3) of the herein described system utilized for cooling the soda water tanks, and by introducing air under pressure into the system, the temperature produced by the coil (3) may be controlled so that it will never be so low as to cause the soda water to freeze.

The above described use of the system of this invention is merely given for illustration and forms no limitation upon the use of the invention.

Having described our invention, we claim:—

1. A refrigerating system comprising a pipe joined at its ends to form a closed system, a portion of said pipe being formed as a liquefying coil, and another portion as an expansion coil, a refrigerating medium in said pipe, an inert gas under pressure within the coil, said inert gas being gaseous at the temperature at which the system operates, and means for maintaining the liquefying coil sufficiently cool to liquefy the refrigerating medium.

2. The method of refrigeration which consists in providing a closed system containing a refrigerating medium which is liquefied and gaseous at different temperatures, the said refrigerating medium giving up heat at one portion of the system and vaporizing, thereby to absorb heat at another portion and maintaining a pressure in the system by means of an inert gas under pressure thereby to control the absorbing of heat in the system.

3. The method of refrigeration which consists in providing a closed system containing a refrigerating medium, cooling the system at one portion thereof to liquefy the refrigerating medium and vaporizing the liquefied refrigerant in another portion of the system by heat absorbed from the substance to be cooled, and maintaining a pressure in the system by means of inert gas under pressure thereby to control the temperature at which the refrigerating medium gasifies at the vaporizing portion of the system.

4. The method of refrigeration which consists in providing a closed system containing a refrigerating medium, cooling the system at one portion thereof to liquefy the refrigerating medium and vaporizing the liquefied refrigerant in another portion of the system by heat absorbed from the substance to be cooled, and maintaining the said system under air pressure thereby to control the temperature at which the refrigerating medium gasifies at the vaporizing portion of the system.

In testimony whereof, we hereunto affix our signatures.

GEORGE A. GASE.
ERVIN A. SEYMER.