(No Model.)

W. F. SINGER.

REFRIGERATING APPARATUS.

No. 597,532. Patented Jan. 18, 1898.

Fig. 1

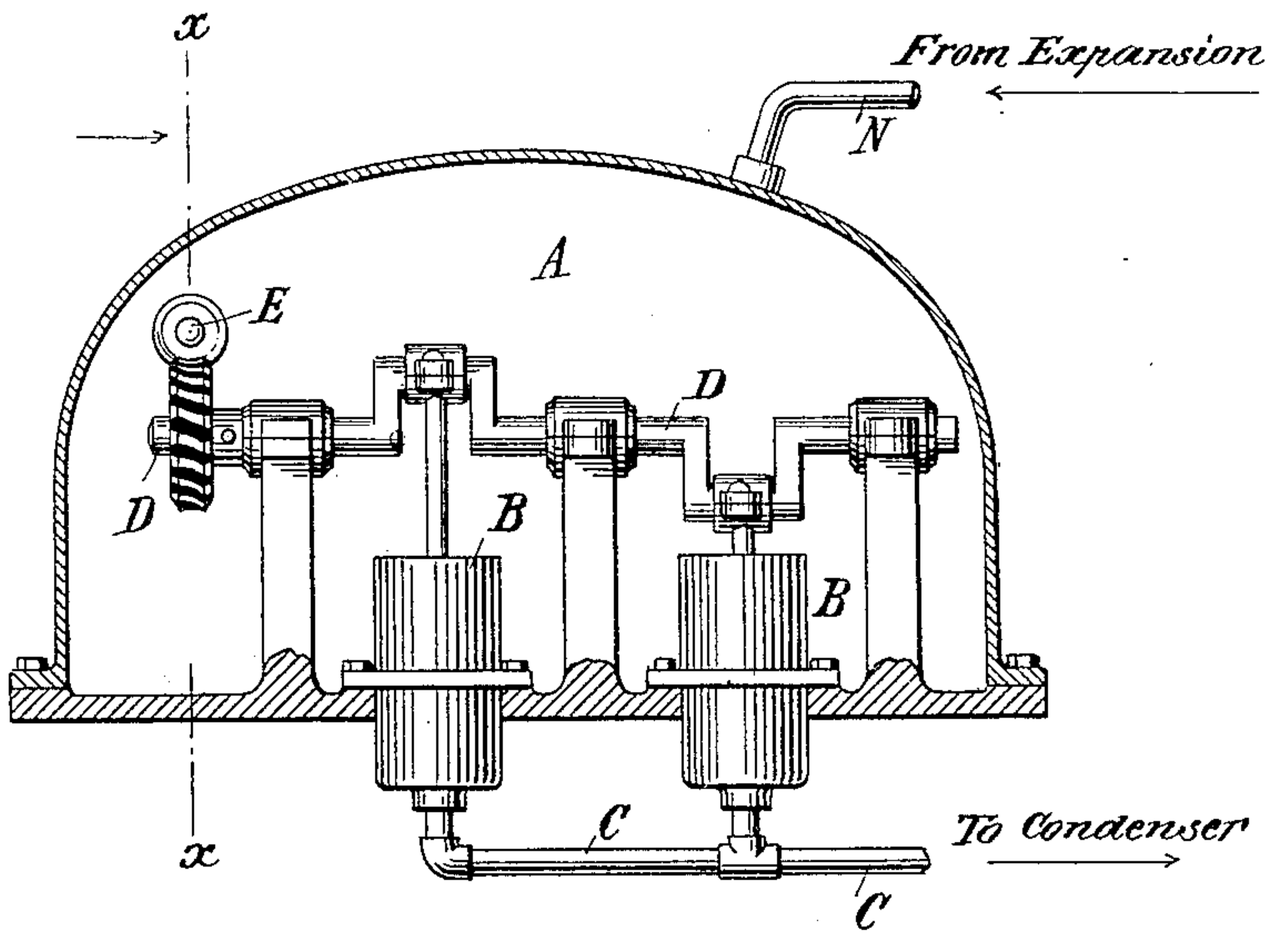
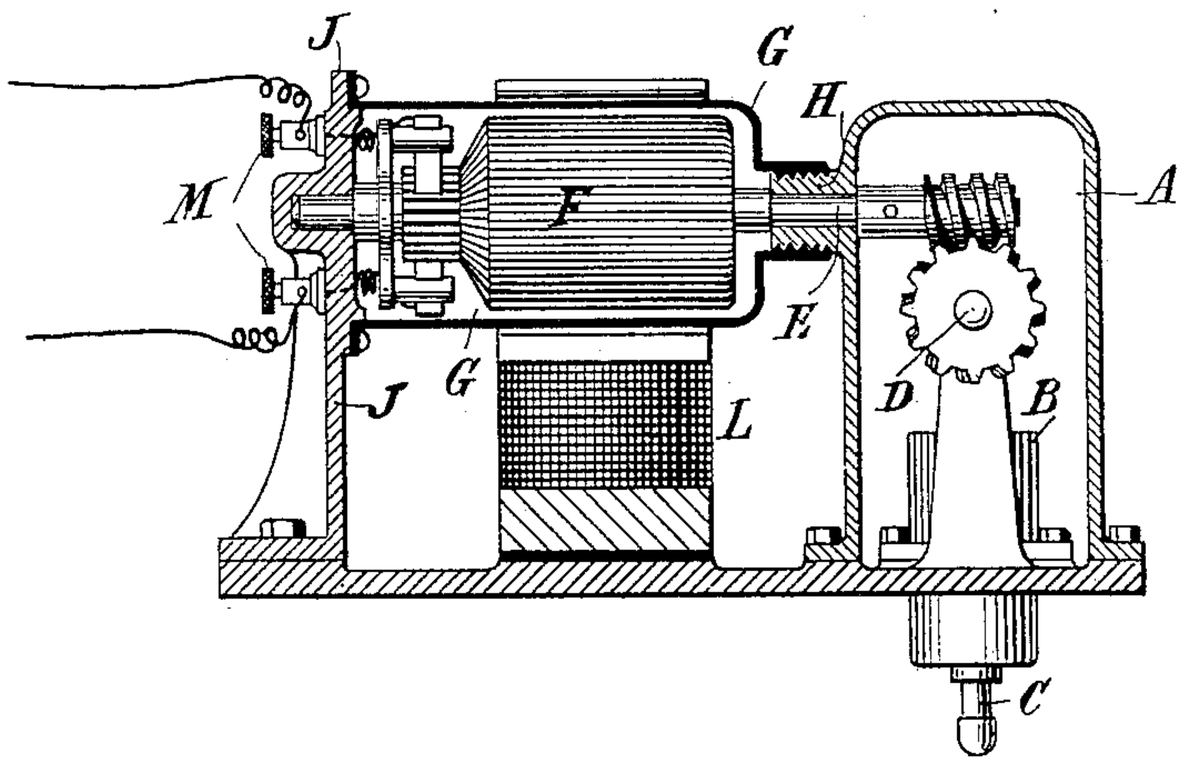


Fig. 2



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UNITED STATES PATENT OFFICE.

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REFRIGERATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 597,532, dated January 18, 1898.

Application filed April 5, 1897. Serial No. 630,715. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM F. SINGER, a citizen of the United States, residing at New York, in the county and State of New York, have invented certain new and useful Improvements in Refrigerating Apparatus, of which the following is a specification, reference being had to the drawings accompanying and forming a part of the same.

In Letters Patent of the United States No. 577,328, granted February 16, 1897, I have shown and described a refrigerating apparatus designed more particularly for use in a general system in which complete refrigerating or ice-making plants located in each of a number of stores or houses are operated by a more or less remote source of power, either independently or in common. The chief practical requirement in such a system, especially when the refrigerating devices are of small capacity and used for domestic purposes, is that while each apparatus when supplied with the energy necessary for its operation shall constitute in itself a complete refrigerating plant it shall be of such character or construction as to require but little attention, such as that involved in the packing of exposed joints, which is necessary in the ordinary apparatus. To meet such requirement, I have shown in the patent referred to, in connection with an expansion-coil for producing the refrigerating effect and a condensing-coil and receptacle for the refrigerant, a hermetically-sealed chamber, into which leads the return-pipe from the expansion-coil and in which are contained the gas-pumps connected with the condenser and the motor for operating the pumps. By my present invention I secure the same result, but by a different means, which in certain respects and for certain purposes is an improvement on that described.

According to my present invention I place the gas-pumps in a sealed chamber into which the gas from the expansion-coil exhausts and operate them through the intermediary of a shaft or shafts passing to another part of the same chamber or into a second chamber hermetically sealed and united to the first containing the armature or motor of an electromagnetic motor, of which the field or stator is exterior to the chamber. This arrangement is effected in such manner that there will be no exposed joints between moving and stationary parts, which are extremely difficult to preserve in a condition that prevents the escape through them of the pungent and offensive gases or vapors used for refrigerating. The apparatus which I have devised for this purpose is illustrated in the accompanying drawings, in which, for sake of clearness, the refrigerator with its expansion-coil and also the condenser are omitted.

Figure 1 is a sectional view of the pump-chamber; and Fig. 2, a sectional view on line *x x*, showing the armature-chamber.

A is a hermetically-sealed chamber containing two or more pumps B B of the character usually employed in such devices and having their barrels extending through the bottom of said chamber and connected with the pipe C, through which the gas from the chamber A is forced by the pumps to the condenser. The gas-return pipe N from the expansion-coil leads into the chamber. The pump-pistons are reciprocated by suitable crank connection with a shaft D, with which meshes by worm or bevel gear a shaft F.

F is the rotor of an electromagnetic motor. I have shown in the present instance a continuous-current motor with a commutator and brushes; but it will be understood that any other form of electromagnetic motor may be employed, such as a Tesla induction-motor, to which current is supplied to the coils of the stator only. The rotor or rotating parts of the motor is inclosed in a chamber or casing G, hermetically sealed and united to the chamber A around the point through which its shaft enters the latter. The specific construction in this particular may be greatly varied, but a convenient plan is as follows: A projection H is formed on the side of the chamber A, which is bored out to form a bearing for one end of the armature-shaft, and the casing G is contracted and screwed or otherwise fitted over said projection. The opposite end of the chamber G is formed by a metal standard or plate J, to which the flanged end of the casing is bolted or clamped and in which is formed a bearing for the end of the armature-shaft.

The field-magnets L are supported on the base-plate of the apparatus and inclose that portion of the casing in which the drum of the armature is contained. The current is led to the armature-coils by wires or conductors, which pass through the walls of the casing from binding-posts M.

The material of which the casing G is composed should be non-conducting, such as vulcanized fiber or hard rubber, unless special provision be made to prevent the loss of energy which would result from the circulation in it of eddy-currents. The joint between the armature-shaft and its bearing, when the two chambers are separated thereby, should be packed so as to prevent, as far as practicable, the escape of gas from the chamber A into the armature-chamber; but as its total exclusion is practically impossible it is necessary to employ, in addition, the permanent hermetically-sealed joints described.

I am aware that it has been proposed to inclose the armature of an electromagnetic motor in a casing in which a vacuum could be maintained, and I am also aware that the gas-pumps in a hermetically-sealed chamber have been operated by means of a motor located outside of such chamber. My improvement, however, differs from these in that I maintain a direct mechanical connection between the motor-armature and the pumps, both being contained in a hermetically-sealed chamber, and place the field-magnets of the motor outside of said chamber.

What I claim is—

1. In a refrigerating apparatus, the combination with the gas-pumps, the rotor of an electromagnetic motor geared thereto, a hermetically-sealed casing inclosing the same and the gas-return pipe from the expansion-coil leading into the casing, of a field-magnet or stator exterior to the portion of the casing which incloses the rotor, as set forth.

2. In a refrigerating apparatus, the combination with a hermetically-sealed chamber into which leads the return-pipe from the expansion-coil and gas-pumps in said chamber connected with the condenser, of a second chamber hermetically sealed and united to the first and an electromagnetic motor, the rotor of which is contained within the second chamber and having its shaft connected with the gas-pumps while the stator is exterior to the chamber, as set forth.

3. In a refrigerating apparatus, the combination of a gas-pump, the rotor of an electric motor connected thereto, a hermetically-sealed casing inclosing said pump and rotor, and the stator of said motor located exterior to said casing, as set forth.

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