

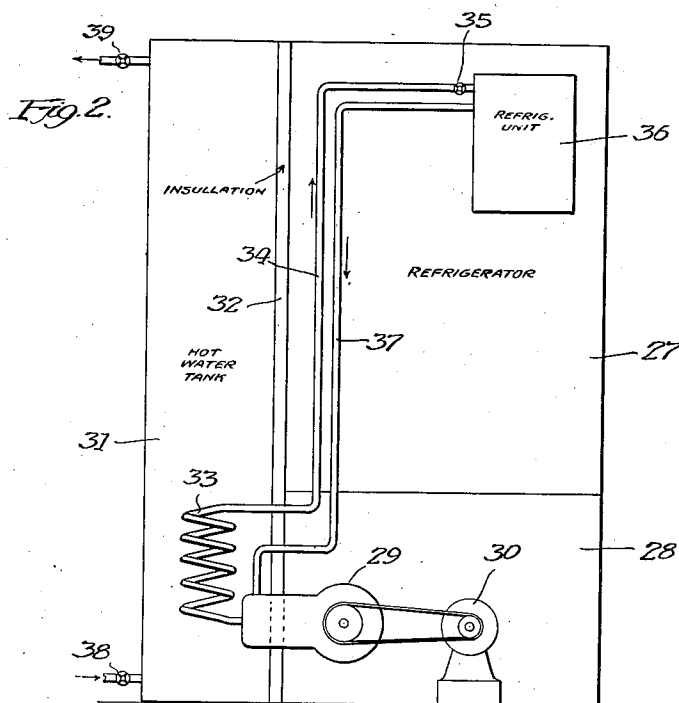
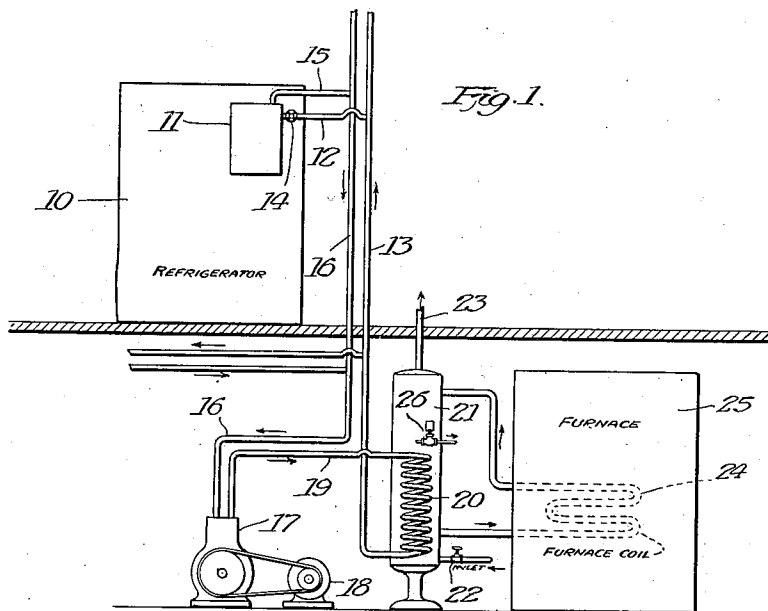
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M. McGRAW

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HEATING AND REFRIGERATION APPARATUS

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Inventor
Max McGraw
By *Samuel C. Branning*
Attys.

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HEATING AND REFRIGERATION
APPARATUSMax McGraw, Chicago, Ill., assignor to McGraw
Electric Company, Chicago, Ill., a corporation
of Delaware

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4 Claims. (Cl. 62-115)

In all forms of refrigeration apparatus as now used the refrigerant is a fluid which is heated, usually by compression, and then cooled, while still in the compressed state. The present invention has for a primary object the economic utilization of the heat thus given up by the refrigerant and of the provision for apparatus for accomplishing this result.

Another object is to provide a simple, compact and efficient form of combined refrigerator and hot water tank, and one which forms a unitary structure.

These and other objects, as will hereinafter appear, are accomplished by this invention which is fully described in the following specification and shown in the accompanying drawing, in which—

Figure 1 is a partial vertical section showing diagrammatically the first floor and basement of a building, such as an apartment, equipped with a combined refrigerator and hot water heater embodying the invention; and

Fig. 2 is a diagrammatic view on a somewhat larger scale of a combined refrigerator and heating tank for a single house or apartment.

In the form illustrated in Fig. 1 a refrigerator 10 is shown on the first floor of a hotel or apartment building, this refrigerator having a refrigerator unit 11 therein, which is supplied under pressure with a suitable fluid refrigerant through pipes 12, 13, the pressure being controlled in a well known manner by means of an expansion valve 14, the return of the refrigerant being through pipes 15, 16. The refrigerant thus returned usually as a vapor or gas is compressed by means of a compressor 17 which is driven by a motor 18, or the like. The refrigerant then quite hot leaves the compressor, usually as a liquid, through a pipe 19 and enters the upper end of a cooling coil 20 which is surrounded by water in a tank 21, the lower end of the coil 20 then connecting with the pipe 13 by means of which the compressed and cooled refrigerant is conveyed to the refrigerator units located at various points in the building.

The water tank 21 is kept filled with water through an inlet 22, the hot water passing out through an outlet pipe 23 to faucets, and the like (not shown). Any additional means for heating the water in the tank 21 may be used, such as a coil 24 located within the fire box of a furnace 15 located preferably in the basement adjacent the tank 21, the coil 24 having a suitable connection near the bottom of the tank 21 and another near its top so as to provide a thermosyphon flow of water through the heating coil. Thus it will be

seen that a large part of the heat generated in compressing the refrigerant will be carried by the refrigerant to the cooling coil 20 where it will be transferred to the water in the tank 21, thereby effecting a real saving of fuel which would otherwise be required to heat this water.

It is necessary, however, to guard against heating the water in the lower portion of this tank too hot as when relatively little hot water is withdrawn, and the compressor is operated a great deal of the time as might be the case during very hot weather. To guard against this contingency and to insure that the temperature of the water in the lower portion of the water tank never exceeds a predetermined amount, I have located a thermostatically-operated valve 26 of any well known type in the tank 21 at a point just above the level of the top of the cooling coil 20. This valve connects with a suitable pipe which leads to a drain, and is automatically opened when the temperature of the water at this point reaches a predetermined figure. Since water enters through the inlet 22 and passes out through the valve 26 to a drain, it will continue to flow until the temperature has been lowered to a point at which the thermostatic valve will close. In this way the water in the upper portion of the tank may remain quite hot, while that in the bottom of the tank is relatively cool and thus provides a means for much more efficiently cooling the coil 20.

In Fig. 2 is shown a modified form of the invention in which the parts are enclosed within a single cabinet. These consist of a refrigerator 27, a space 28 therebeneath for housing a compressor 29, and a driving motor 30 therefor, and a water tank 31 alongside the refrigerator and separated therefrom by means of suitable insulation 32. The compressor 29 preferably has its head extending into the bottom of the hot water tank, the outlet from the compressor being connected to a cooling coil 33 which connects through a pipe 34, an expansion valve 35 with a refrigeration unit 36, the return of the compressor being through the pipe 37.

Suitable inlet and outlet pipes 38 and 39, respectively, are connected to the tank 31. Thus the heat given up by the head of the compressor and by the cooling coil 33 serves to heat the water in the tank, and this heated water rises to the top of the tank so that the water withdrawn from the tank through the outlet pipe is always the warmest water in the tank. At the same time, the coolest water in the tank is that which serves as a

cooling medium for the compressor and the cooling coil, so that this cooling is efficiently done.

Any supplemental means for heating the tank 31 may be used, if desired, in order to supply hot water in greater amounts than can be heated by the coil 33 alone. The thermostatically-operated valve of Fig. 1 may also be used in the same way as was described above. It will thus be seen that in both the forms of the invention here disclosed an efficient means is provided for effecting the necessary cooling of the compressed refrigerant, and the heat thus recovered is stored in the hot water tank where it is readily available.

While I have shown and described but a few embodiments of my invention, it is to be understood that it is capable of many modifications. Changes, therefore, in the construction and arrangement may be made which do not depart from the spirit and scope of the invention as disclosed in the appended claims.

I claim:

1. In combination, a refrigerating system including a compressor, a cooling coil, an expansion chamber, a tank surrounding said cooling coil and adapted to hold water which is heated by said cooling coil, said tank forming part of a hot water system, said coil being located in the lower portion of said tank, and means for maintaining below a predetermined degree the temperature of the water in that portion of the tank in which the cooling coil is located.

2. In combination, a refrigerating system including a compressor, a cooling coil, an expansion

chamber, a tank surrounding said cooling coil and adapted to hold water which is heated by said cooling coil, said tank forming part of a hot water system, said coil being located in the lower portion of said tank, and thermostatically-operated means for maintaining below a predetermined degree the temperature of the water in that portion of the tank in which the cooling coil is located.

3. In combination, a refrigerating system including a compressor, a cooling coil, an expansion chamber, a tank surrounding said cooling coil and adapted to hold water which is heated by said cooling coil, said tank forming part of a hot water system, said coil being located in the lower portion of said tank, and a thermostatically-operated valve for maintaining below a predetermined degree the temperature of the water in that portion of the tank in which the cooling coil is located.

4. In combination, a refrigerating system including a compressor having a part which becomes heated by compression of the refrigerating medium as the compressor is operated, a tank surrounding said part and adapted to hold water which is heated by said part in contact therewith thereby cooling said part and the refrigerating medium therein, said tank forming part of a hot water system, and means for maintaining below a predetermined degree the temperature of the water in that portion of the tank in which said part is located.

MAX MCGRAW.