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G. A. KRAMER

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ROOM COOLING APPARATUS

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*Fig. 1.*

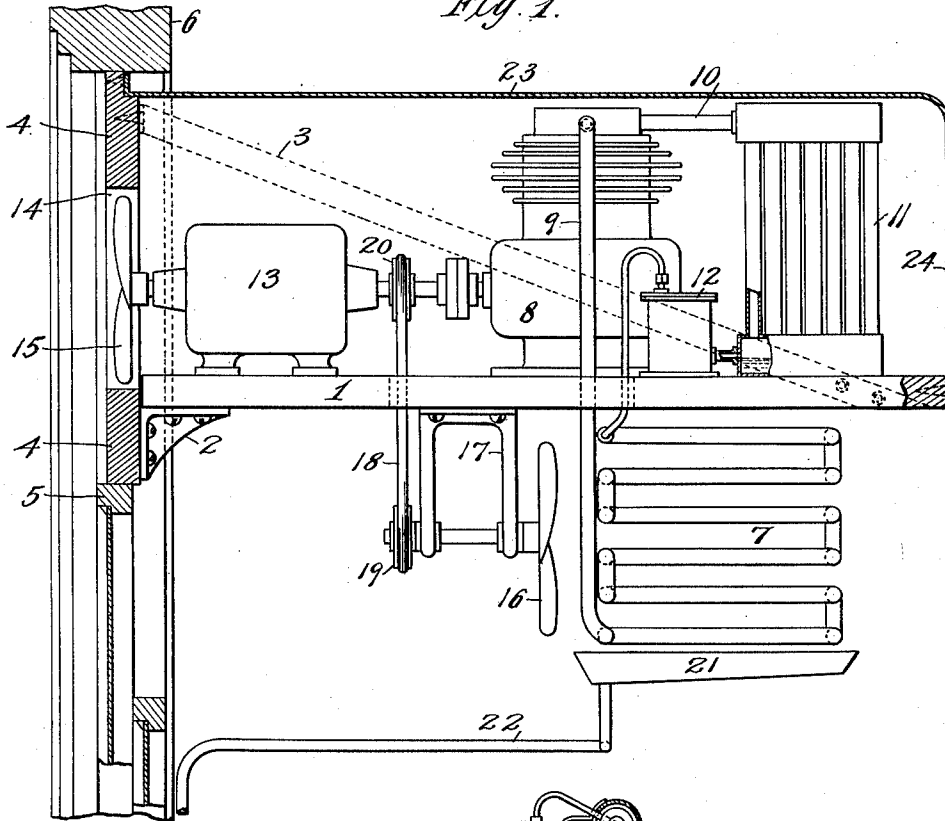
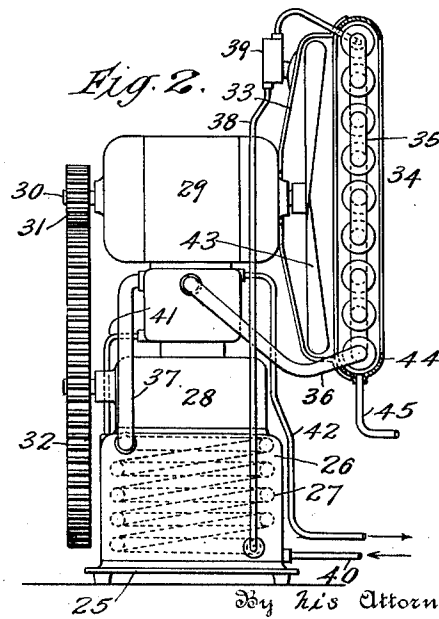


*Fig. 2.*



Inventor

*Gustav A. Kramer*

*Philip S. Sargent & Company*

By *his* Attorneys

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# UNITED STATES PATENT OFFICE.

GUSTAV A. KRAMER, OF CONCORD, CALIFORNIA, ASSIGNOR, BY MESNE ASSIGNMENTS,  
TO FRIGIDAIRE CORPORATION, A CORPORATION OF DELAWARE.

## ROOM-COOLING APPARATUS.

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This invention relates to certain improvements in apparatus for use in cooling rooms or apartments, and for abstracting moisture from the air to reduce the humidity thereof, thereby giving the effect of coolness.

It is the especial object of the invention to produce a simple cooling device which may be used in any room and which shall be portably complete, that is, shall be a unit which will include all the elements necessary to effect the cooling of the room, without requiring the employment of brine pipes or cold air ducts supplied from a central refrigerating station, such as have heretofore been used in effecting the cooling of buildings, and which may be readily moved and positioned as a whole in any part of the room or apartment with which it is to be used.

It is a further object of the invention to produce a unit cooling device, the elements of which are so assembled or arranged that the apparatus as a whole is portable and may be installed in any suitable or desired portion of the room or apartment which it is desired to cool or to dehumidify.

With these and other objects not referred to in view, the invention consists in a certain novel arrangement and combination of parts which will be hereinafter fully described with reference to the accompanying drawings, in which—

Figure 1 is a side elevation, certain parts being in section, of one form of portably complete cooling unit, the heat of the room or other apartment cooled being removed in this arrangement by circulation of air;

Figure 2 is a side elevation of another form of portably complete cooling unit, in which the heat of the room or other apartment is removed by water circulation.

Referring now to the drawings, and first to Fig. 1, the portably complete cooling unit may be of various designs and arrangement. Such unit will, however, preferably be such that all the elements necessary for the cooling cycle may be positioned or supported from a common support so that the unit as a whole may be installed in any part of the room to be cooled where it may be desirable to so install it. Such unit, furthermore, will include a refrigerating system which may be of any well known type now in use for other purposes, the capacity of the system being made sufficient to effect the cooling desired in any particular instance. In the particular con-

struction illustrated, however, a refrigerating system of the evaporating type is employed, the refrigerant being of any suitable character, as ethyl chlorid, for instance.

In accordance with the invention, the various elements of this system are arranged so that they form in effect a unit and are so positioned that they can be used as a unit. While this may be effected in various ways, in the particular construction illustrated the various elements are supported from a base 1 dimensioned to accommodate the various parts to be supported thereby. This base may be positioned in any part of the room or apartment where it is desired to cool the air. In the particular construction illustrated, it is shown as supported by suitable brackets 2 and brace rods 3 secured to what may be called a unit support 4 which is, as shown, arranged to be placed between the top 5 of the upper sash of a window and the upper sill 6, the unit being positioned, for purposes hereinafter referred to, as near the ceiling of the room as practicable.

In the particular construction illustrated, which shows an ethyl chlorid refrigerating system, there is included a refrigerating coil 7 which is, as illustrated, suspended below the base 1, before referred to. As is usual in this system, the coil 7 is connected to a compressor 8 which is mounted on the base, through a suitable pipe or other connections 9. The compressor is also connected by a pipe 10 with the usual condensing coil, which may be, as shown, a series of vertical pipes marked generally 11. Return from the condensing coil to the refrigerating coil is effected through a valve construction 12 of any suitable character. The condensing coil 11 is, like the compressor, mounted on the base 1, and the compressor is or may be driven by an electric motor 13, likewise mounted on the base 1.

In the particular construction illustrated, the heat of the room to be cooled is removed by means of a circulation of air, this air circulation also acting to cool the condensing coil. Such a construction is shown in Fig. 1, and this construction also acts as a ventilator, the current of air forcing the hot air of the room out and drawing in fresh air. Where this construction is employed, the unit support 4, before referred to, is provided with an opening 14 to receive a fan 15 on the shaft of the motor 13, before referred to. This fan is, as

shown, positioned close to the top of the room to be ventilated and acts to force the warm air out through the opening 14.

In the best constructions, a second fan will be employed to provide a thorough and efficient circulation of air. While this fan may be arranged in any convenient place in the unit, in the best constructions it will be arranged so as to drive a current of fresh air through the cooling coil before referred to. Such a fan is provided, marked 16, which is supported in a bracket 17 depending from the base 1. This fan may be driven in any suitable manner, and in the particular construction illustrated, this drive is effected from the motor 13, before referred to, through a belt 18 passing over pulleys 19, 20 on the fan shaft and the shaft of the motor, respectively.

Means are provided by the present invention for removing the moisture which condenses on the cooling coil. These means may be of any suitable character, as a drip pan 21, in which the moisture collects and from which it may be removed through pipe 22 to any suitable receptacle.

To effect a strong circulation of air, there is preferably provided a hood 23 having an inlet opening 24 at one end, this hood covering the parts heretofore referred to as supported on the base 1, the covering with the base forming in effect an air channel or chamber through which the air is sucked from the rear and expelled through the opening 14 in the support 4.

The construction heretofore described has been found to be very effective for cooling and ventilating a room or apartment which has access to the outer air. In some circumstances it may be desirable to effect, through a self-contained unit system, the cooling of a room or apartment which is not open to the outside air. Where such room or apartment is to be cooled, the invention contemplates the cooling of such closed room or apartment, and a construction for effecting this purpose is shown in Fig. 2 of the drawings. In this construction, as in the construction heretofore described, the various elements of the cooling system are mounted and arranged so as to form a unit which can be installed in any part of the room or apartment where it is desired, and, as in the case of the air-cooled system described, any suitable refrigerating system may be used. For convenience, an evaporation system, using ethyl chlorid as the refrigerant, is used in this case, as in the case of the air cooling system before referred to. In this modified construction, however, the heat of the room or apartment is absorbed or carried away chiefly by water.

In the particular construction illustrated, there is provided a base 25 which is portable and may be arranged to be positioned in any suitable part of the room or apartment to be cooled. Mounted on this base is a casing 26,

in which is located a condenser, which may be in the form of a coiled pipe 27. Supported above the condenser is a power driven compressor 28 which is driven preferably by an electric motor 29, mounted on the compressor, as shown, the compressor being driven from the motor shaft 30 through suitable gearing 31, 32. Supported in any suitable manner, as by brackets 33 on the casing of the motor, is a refrigerating coil 34, which may be in the form of interconnecting pipes 35. The coil 35 is connected with the compressor by means of pipe 36, through which the compressor draws the vapors from the coil, and from the compressor the compressed vapors are led to the condenser through pipe 37 from which, through pipe 38 and valve 39, of any suitable construction, the condensed liquid is returned to the refrigerating coil 34.

In the construction illustrated in the modified refrigerating unit shown in Fig. 2, the compressor and condenser are cooled by means of water which is supplied to the condenser through pipe 40 and from the condenser to the water jacket of the compressor through pipe 41, returning through pipe 42 to any suitable place of discharge. In the construction shown in this figure, there will preferably be provided means for producing a current of air on the cooling and refrigerating coil 34, which means may, as illustrated, comprise a fan 43 driven from the motor 29, before referred to. This combined water and air cooling system furnishes a very efficient method of removing the heat and keeping the parts of the unit cool.

In the construction before referred to in the description of the system shown in Fig. 1, means will be provided for removing the water of condensation from the exterior of the cooling coil. While these means may, of course, be varied, in the particular construction illustrated the coil is or may be surrounded by a curved water collecting device 44 to which is connected a drain pipe 45, by means of which the condensed water may be discharged to any suitable place.

From the foregoing it will be apparent that the present invention provides a simple unitary device for cooling rooms and for abstracting moisture from the air while it is cooled by the cooling coil.

While the various elements just described may be arranged in various ways, for compactness the parts are arranged as shown, with the cooling coil mounted on the support and the compressor, condenser and cooling tank and valve arranged below the support, this arrangement making the unit very small and compact and readily portable as desired.

While the invention has been shown and described in what is believed to be its best form, it will be understood that various arrangements of the parts of the units may be made, and the invention is not limited to the

precise arrangement shown and described. It will be further understood that any refrigerating system may be used for effecting the cooling, and that the invention is not restricted to a refrigerating system of the evaporation type.

What is claimed is:

1. An apparatus for cooling rooms the parts of which are supported from a common base said apparatus and base being readily portable as a unit about a room, having in combination a mechanical cooling apparatus, a prime mover actuating the same, a fan, a frictional drive connection between said fan and prime mover, and a cooling coil open to the room, the coil being so arranged relatively to the fan that the air current induced by the fan and passing through the cooling coil is cooled thereby.

2. An apparatus for cooling rooms the parts of which are supported from a common base said apparatus and base being readily portable as a unit and operable in the room to be cooled, having in combination a cooling coil, a condenser and compressor, regulated means for admitting liquefied refrigerant from said condenser to said cooling coil to be vaporized therein, a prime mover for actuating the compressor, a fan driven from the prime mover for circulating air past the condenser for taking the heat therefrom, and a second fan driven from the prime mover and so arranged with relation to the cooling coil that the air from the fan is circulated through the coil for cooling the air.

3. A cooling apparatus including in combination with a room or apartment to be cooled, of an apertured support mounted in the wall of the room near the top thereof, a portably complete cooling unit supported

therefrom, said unit including a portable base, and a refrigerating mechanism the elements of which are supported by the base and extend into the room, and means for drawing air through the unit and expelling it through the apertured support.

4. An apparatus for cooling rooms, the parts of which are supported from a common base said apparatus and base being readily portable as a unit about a room, having in combination a mechanical cooling apparatus, a motor actuating the same, a fan driven from the motor, a cooling coil open to the room, the coil being so arranged relatively to the fan that the air current from the fan passing through the cooling coil is cooled thereby, and means supported by said base for collecting moisture deposited upon said coil.

5. In combination with a room to be cooled, apparatus within said room for cooling and dehumidifying the air thereof, said apparatus comprising a mechanical refrigerating device including air-cooled refrigerant-liquefying means, cooling means for cooling the air of the room, reducing means for admitting liquid refrigerant from said liquefying means to said cooling means to be vaporized therein, a prime mover, a fan driven from the prime mover and so related to the cooling means as to circulate the air of the room into contact with the cooling surface of said cooling means and to return the cooled air to said room, and means connected to the exterior of the room for carrying off the air heated by said refrigerant-liquefying means in the process of liquefaction.

In testimony whereof, I have hereunto set my hand.

GUSTAV A. KRAMER.