

June 19, 1934.

E. E. GLENN

1,963,786

COOLING SYSTEM

Filed Aug. 20, 1932

2 Sheets-Sheet 1

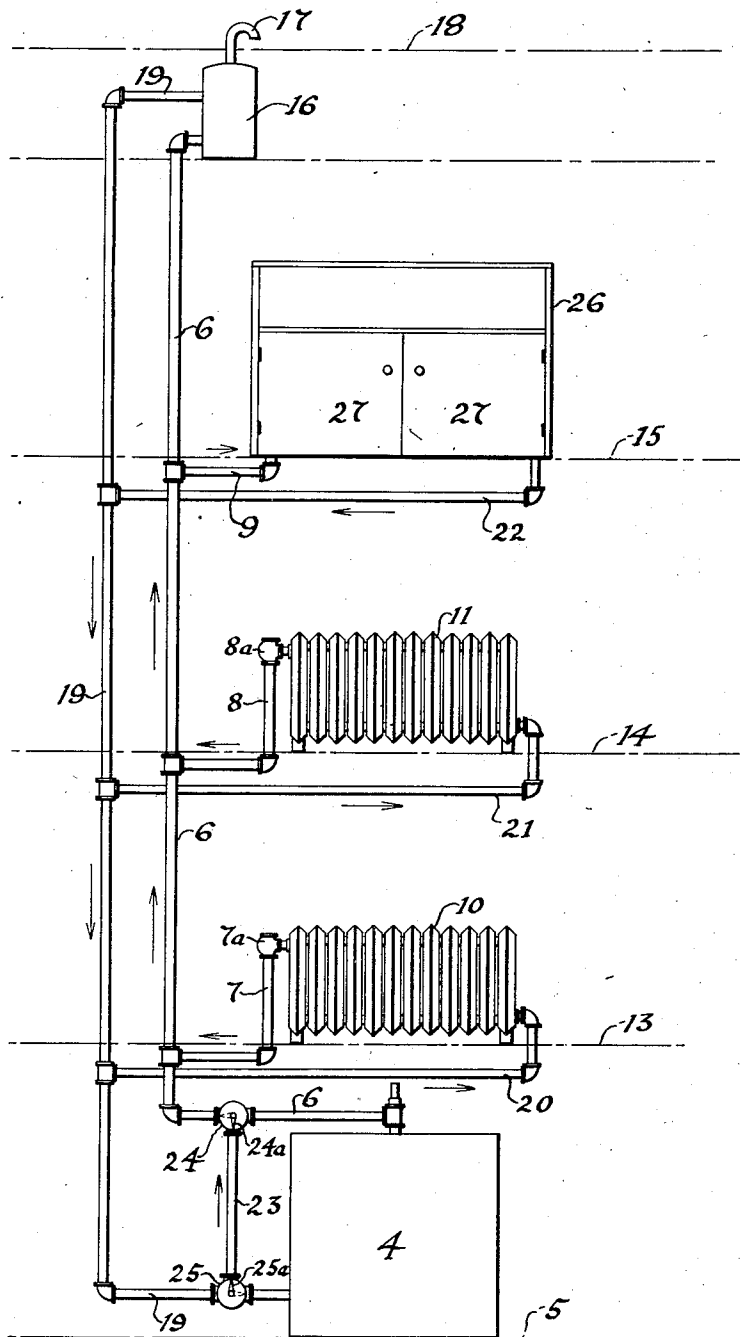


Fig. 1

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Fig. 2

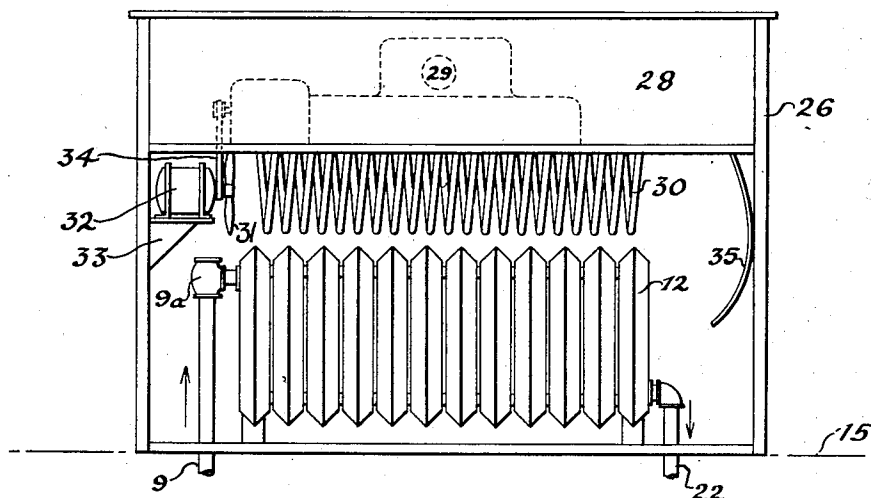
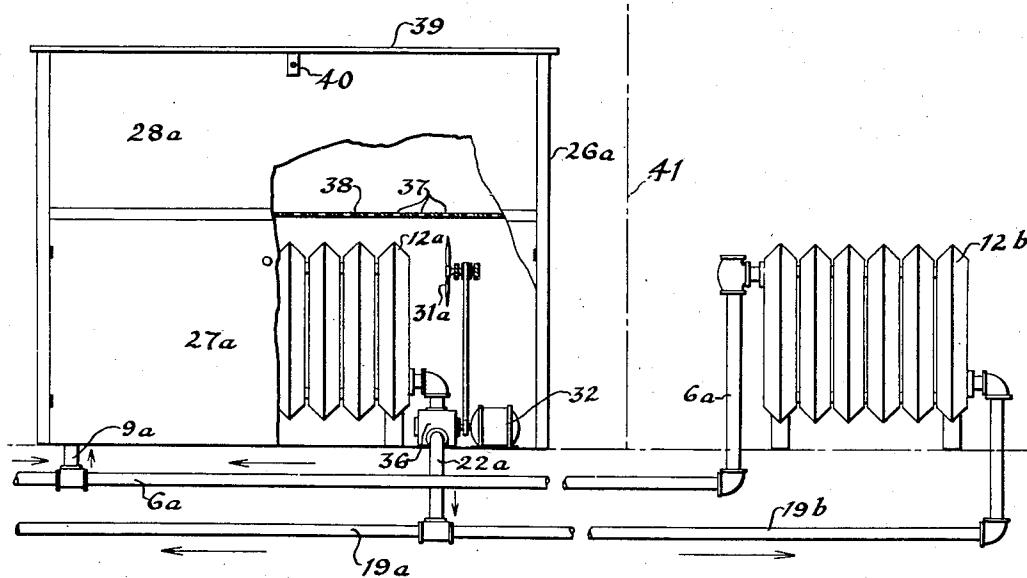


Fig. 3

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COOLING SYSTEM

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5 Claims. (Cl. 257—8)

This invention relates to cooling systems, more especially adaptable for the cooling of rooms, and the embodiments of the invention herein disclosed involve further a particular type of combined heating and cooling system, which is well fitted to residential use.

More specifically, the invention contemplates a novel apparatus advantageously employing an ordinary house heating system, particularly of the hot water type, or parts thereof, for house cooling purposes in hot seasons.

Still more specifically, I propose the cooperative association of a novel cooling unit with an element or unit of a hot water heating system, such as the association of said cooling unit with a tank, an overflow unit, or a radiator, of the heating system; and when associated with a radiator, it is a further object of the invention to utilize the cooling unit as a cooling cabinet in summer and as a radiator enclosure in winter.

Still further, the cooling unit preferably is positioned in a cabinet which may be mounted in juxtaposition to, or placed over, a unit, such as a radiator, of the heating system; said cabinet being so arranged, for example by adjustable doors, as to serve to regulate the temperature of the particular room in which it and the associated radiator are located.

Considered more in detail, I contemplate using the heating medium, usually water, of the system as the cooling medium in summer, the circulation of said medium in the same piping system for cooling as for heating, although at least in certain instances the circulation may be reversed when the system is operating for cooling purposes. In this connection, I may rely upon flow induced by the cooling of the water of the system effected by my improved cooling unit, supplemented, if desired, by a fluid circulating pump.

The refrigerating mechanism of the cooling unit may take various forms, two of which I have more or less diagrammatically illustrated herein; and I preferably employ a forced circulation of air, inside the cabinet, to hasten the transfer of heat from the radiator to the cooling mechanism.

The invention further contemplates the use of a common power means or motor to operate both the refrigerating mechanism and the cooling-air circulating mechanism, and/or to operate also a fluid pump to effect or to supplement the circulation of the fluid in the pipes of the system.

In addition to the foregoing, the invention contemplates certain novel arrangements of the cooling mechanism in the cooling cabinet itself, and their relation to the radiator. Furthermore, I contemplate associating my improved cooling unit with an upstairs radiator, and utilizing its action on said radiator to effect a cooling of radiators in

subjacent rooms, and consequently of the temperatures of such rooms. Radiators in rooms on the same floor with the cooling unit may, however, also be cooled thereby, and in such cases it is especially advantageous to include my improved mechanism for circulating the fluid in the piping system as well as circulating the air over the unit immediately associated with the cooling unit.

In addition to the foregoing, I contemplate valve means and a by-pass, for cutting the furnace out of the flow of the system when said system is being used for cooling purposes. The simplicity of my cooling system, and its neat and compact appearance and arrangement are obvious from the disclosure. Further objects and advantages will occur to those skilled in this art.

In the accompanying drawings,

Figure 1 is a more or less diagrammatic elevational view, illustrative of the apparatus which I have devised in utilizing a hot water heating system for cooling purposes;

Figure 2 is an enlarged view of the cabinet and associated radiator of Figure 1, with the doors of the cabinet removed to disclose the association of pertinent parts; and

Figure 3 is a view somewhat similar to Figure 2, illustrating certain modifications of the invention.

By reference first to Figure 1, there will be seen a hot water heater 4 located on the basement floor 5 of a house, for example. A heater pipe 6 extends upwardly, and is connected by branch pipes 7, 8, 9, and valves 7a, 8a, 9a, respectively to radiators 10, 11 and 12, on the first, second and third floors 13, 14 and 15.

Each of said radiators constitutes a unit of the heating system, as does also the overflow tank 16, which latter commonly has an overflow outlet 17 above the roof 18. A return pipe 19 extends from said overflow tank downwardly, and is connected into the heater 4 near the bottom thereof. Return branch pipes 20, 21 and 22 complete the circulation from the radiators to the return pipe.

Before considering the refrigerating or cooling unit specifically, it should be pointed out that a by-pass pipe 23, having two-way valves 24, 25, is preferably provided, below the lowermost radiator, or adjacent the heater, so that the heater may be cut out of the circuit, when the system is being used for cooling purposes. In Figure 1, the handles 24a, 25a of said valves are shown in full lines in the positions which they occupy when the system is serving as a cooling system.

By reference to Figures 1 and 2, it will be seen that I provide a compact cabinet 26 which may be slipped right down over a radiator on an upper floor and may rest upon the floor itself. Hinged doors 27 are provided, which may be closed entirely as in Figure 1, or in winter time may be

opened to any desired extent, to permit the heating of the room, the cabinet 26 being allowed to remain to serve as a radiator enclosure.

As seen in Figure 2, the upper part 28 of the cabinet may serve as a housing and support for any suitable refrigerating equipment, indicated in dotted lines at 29, the form of which need not be here described as it is no part of the present invention, per se; and since there are numerous types of refrigerating equipments commercially available. The cooling coil 30 of the unit 29 is preferably suspended beneath the portion 28 of the mechanism, immediately superjacent the radiator 12. In cases where considerable cooling effect is required, and thus a more rapid heat transfer is necessitated, I provide a fan or blower 31 actuated by any suitable motive power such as an electric motor 32 mounted on an inside face of a wall of the cabinet as by means of a bracket 33, and I utilize the same motor as a power mechanism for the refrigerating equipment 29, which may be actuated by means of a suitable belt or the like, shown at 34. The chilled blast of air, as it passes from the coil 30 is directed or deflected by the baffle 35, at the opposite end of the cabinet, to pass through the radiator sections in the opposite direction. This motor 32 may also be utilized to pump the water in the pipes and radiators of the system as indicated in the modification of Figure 3.

Turning now to the construction of Figure 3, the cabinet 26a is placed over a radiator 12a, as before, and the motor 32 actuates an air fan 31a and a fluid motor 36 which, for example, may be placed in the return branch pipe 22a leading to the main return pipe 19a. The circulation into the radiator 12a is by means of the branch pipe 9a from the main pipe 6a. The upper part 28a of the cabinet is here made as a container for a cooling medium such as the product commonly known as "dry ice", and the circulation of the cooled air may pass downwardly and upwardly through apertures 37 in the shelf or bottom 38 of the compartment 28a. This cabinet may have doors 27a, and is also provided with a hinged lid 39 having a latch 40, for ready renewal of the refrigerant.

The modification of Figure 3 also shows an adaptation of the system to the cooling of more than one radiator on the same floor, the circulation from pump 36 extending to the left in pipe 19a to radiators on subjacent floors, if desired, while the circulation passing through the pipe 19b, from said pump 36, goes through the radiator 12b and the return pipe 6a. A division line 41 represents a wall between the room used for the cooling system, and the other room on the same floor, which is being cooled.

From the foregoing it will be evident that the cycle of operation is about as follows: the refrigerant cools the atmosphere in the cabinet (the heat from the mechanical system of Figures 1 and 2 being taken off into the room in which the machine is located or else into a radiating unit, not shown, which may be located outside the wall of the house); this cooled air in the cabinet may be permitted to circulate naturally, or preferably may be circulated by a blower to hasten the transfer of heat from the radiator to the air cabinet; the water in the radiator flows downwardly through the radiator sections, to the outlet connection or pipe 22 and thence to the heater return line 19 (which is now cut off from the heater 4 by means of the valves 24 and 25); as shown by the

arrows, the natural circulation through the sub-jacent radiators tends to be in a direction opposite to that in the first-cooled radiator, the water taking on heat from the rooms and rising in the elements of radiators 10 and 11, and thence returning through pipe 6 to the cooling unit.

Where fluid pumping means are used, as in Figure 3, they may supplement the said natural flow or may be used to provide a positive flow in any direction desired, according to the piping arrangement of the system.

The simplicity of the apparatus, its adaptability to existing heating systems, its compactness, ease of installation, and ornamental appearance, will now be evident. If any particular room is not in use, it is contemplated that the particular valve (for example, valve 8a) for the radiator of that room may be closed.

I claim:—

1. A radiator cooling unit of the character described comprising a cabinet having a lower compartment adapted to receive a radiator and an upper compartment adapted to house refrigerating means, and means for forcing a relative air circulation between the refrigerating means and the radiator, said refrigerating means including a chilled coil located above the radiator space and said circulating means including a fan adjacent one end of the cabinet and a deflector adjacent the other end.

2. A cooling unit adapted to be mounted over a radiator of the heating system and including refrigerating mechanism, mechanism for circulating refrigerated air within said unit about said radiator, and a common power device for said two mechanisms.

3. A cooling unit adapted to be mounted over a radiator of the heating system and including means for refrigerating air, mechanism for circulating the refrigerated air about said radiator, mechanism for enforcing circulation of the fluid in the radiator through said system, and a common drive means for said mechanisms.

4. In apparatus of the character described, in combination with a radiator having heat transfer elements adapted to contain a heat transfer medium and to heat the air in a room or compartment, a cooling unit including a casing for insulating and substantially completely shielding at least a portion of said elements from the air in the room or compartment, refrigeration means incorporated in said unit, and means for effecting heat transfer between said refrigeration means and the heat transfer elements which are shielded from the air in the room or compartment.

5. In apparatus of the character described, in combination with a radiator having heat transfer elements adapted to contain a heat transfer medium and to heat the air in a room or compartment, a cooling unit including a casing for insulating and substantially completely shielding at least a portion of said elements from the air in the room or compartment, refrigeration means incorporated in said unit, and means for effecting heat transfer between said refrigeration means and the heat transfer elements which are shielded from the air in the room or compartment, the casing being at least in part displaceable to expose said elements adapted to be shielded thereby, whereby said elements may alternatively be employed for heating the air in said room and for cooling the heat transfer medium therein.