

Dec. 9, 1941.

F. J. CUMMING

2,265,634

REFRIGERATING PLANT

Filed April 24, 1939

2 Sheets-Sheet 1

Fig. 1

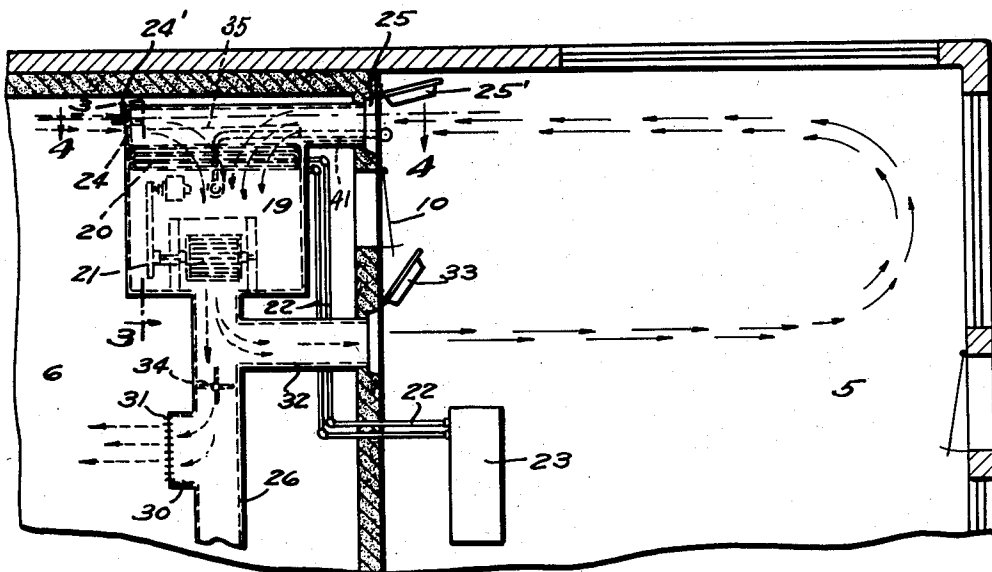
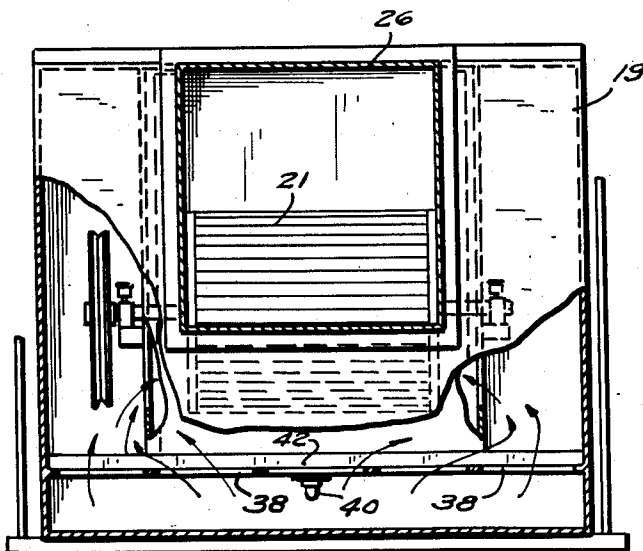


Fig. 2



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Fig. 3

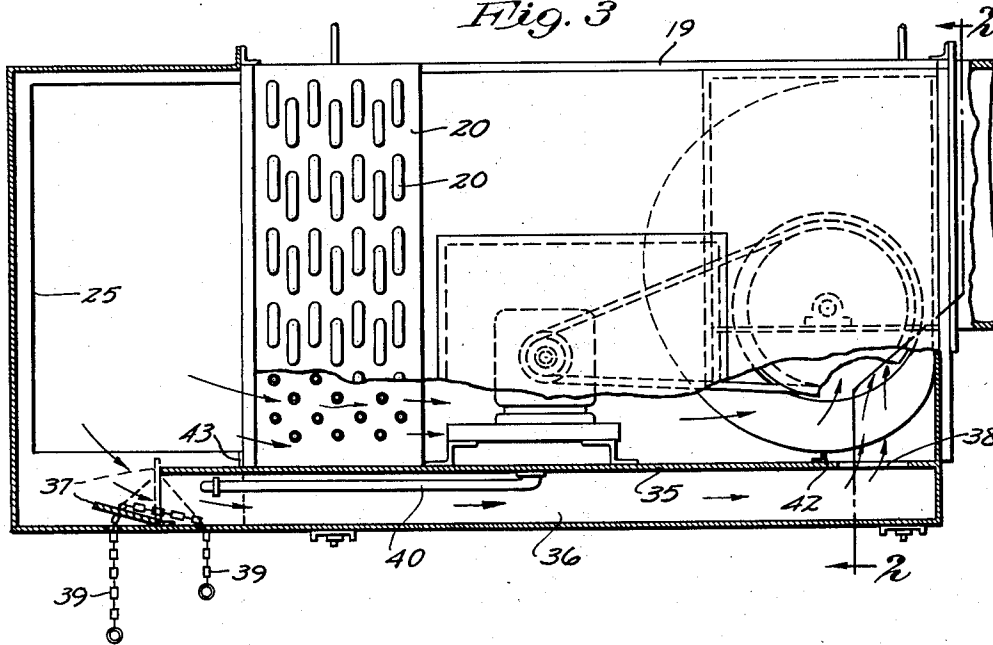
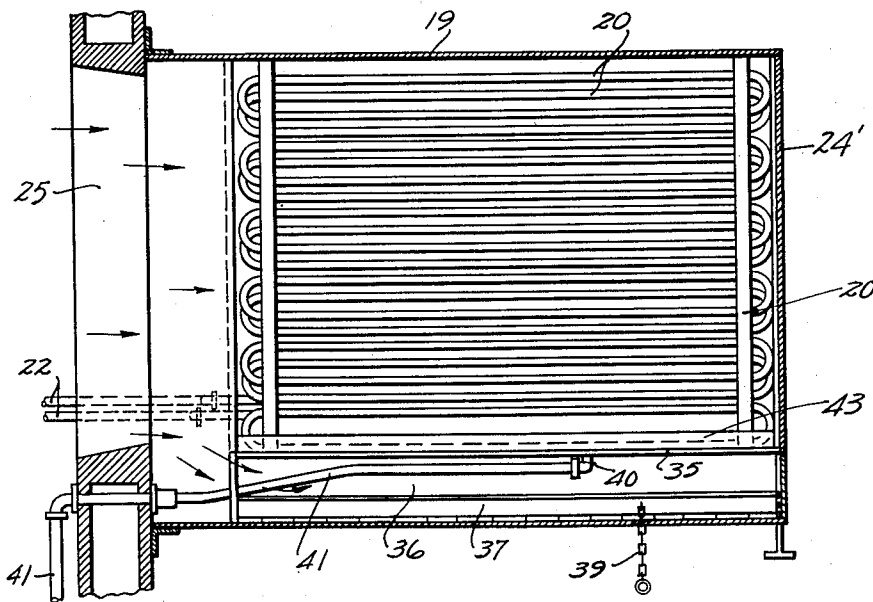


Fig. 4



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UNITED STATES PATENT OFFICE

2,265,634

REFRIGERATING PLANT

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16 Claims. (Cl. 62—102)

My present invention relates to refrigerating plants and has been especially designed as an improvement on or modification of the structure disclosed and claimed in my pending application S. N. 260,993, filed March 10, 1939, and entitled "Refrigerating plant."

In the said pending application there is disclosed a novel arrangement of a low temperature refrigerating unit in connection with a cold storage room and a relatively warm room or compartment. The said low temperature unit, as preferably designed, involves a metallic casing exposed in the storage or low temperature room and containing a low temperature heat exchanger.

The said application also involves novel means of defrosting the refrigerating coils or elements within the casing. In practice it has been found that with the metallic casing of the refrigerating unit exposed in the cold room there was sometimes difficulty in preventing freezing of the water resulting from defrosting on the bottom of the casing or in the drain passage leading therefrom. My present invention provides a simple and efficient means for remedying that defect without providing heavily insulated conduits for the drain and without making it necessary to insulate the casing of the refrigerating unit.

Certain of the features illustrated in the drawings of this application are common to those in my pending application and these common features will be noted after first describing the figures of the drawings illustrating the present invention.

Referring to the drawings:

Fig. 1 is a view partly in plan and partly in horizontal section illustrating the invention, some portions being broken away;

Fig. 2 is a transverse vertical section taken on the irregular line 2—2 of Fig. 3;

Fig. 3 is a vertical section taken on the line 3—3 of Fig. 1; and

Fig. 4 is a vertical section taken on the line 4—4 of Fig. 1.

The elements of the present drawings which correspond to the drawings of the earlier application are indicated by the same numerals, to wit; the numeral 5 indicates a processing room or compartment and the numeral 6 indicates a cold storage or locker room.

For illustration it may be stated that in practice the temperature maintained in the cold storage room or compartment 6 will usually be from zero to plus 10° F.; while the temperature

maintained in the processing room or compartment 5 will usually be from 70° to 30°.

As shown, a normally closed door 10 leads from the room 5 into the room 6. The low temperature unit shown involves a box-like metallic casing 19 in which a low temperature heat exchanger 20 and a motor driven fan or blower 21 are located. The casing 19 is preferably hung high or near the ceiling in the room 6 and is provided with two air intake ports 24 and 25, the former being exposed to cold storage room 6 and the latter being exposed to the warm processing room 5. These intake ports 24 and 25 are adapted to be opened and closed by valves or gates 24' and 25'. Also the casing is provided with a main cold air discharge pipe or conduit 26 that opens into the room 6 through one or more discharge conduits 30 adapted to be opened and closed by valve acting louvers or dampers 31. Pipe or conduit 26 is provided with a branch 32 that opens into the processing room 5 and is adapted to be opened and closed by a valve acting damper or gate 33.

Located in the main pipe or conduit 26 between the branch 32 and outlet 30 is a damper or valve-acting closure 34. The low temperature heat exchanger 20 is shown as supplied with refrigerating fluid through pipes 22 leading from a suitable compressor 23.

In the use of the apparatus so far described, as will more fully appear from the description of the said prior application, closures 25' and 33 will be closed, and dampers or closures 24', 31 and 34 will be open when the refrigerating unit is used to produce the low temperature in the room 6. When, however, the apparatus is to be defrosted, closures 25' and 33 will be opened and the closures 24' and 34 will be closed so that the warm air from the room 5 will be circulated through the casing 19 to defrost the refrigerating coils 20.

In accordance with my present invention, the bottom of the casing compartment containing the low temperature heat exchanger is located above the casing bottom and the drain pipe leading from the heat exchanger of the casing is located in a by-pass formed in the bottom of the casing 19 and through which a part of the warm air from the room 5 will be circulated to keep the bottom proper of the refrigerating compartment and the drain pipe leading therefrom at a temperature above the freezing point. In the preferred form of this arrangement, the casing 19 is provided with a raised deck or false bottom 35 on which the refrigerating coils and the motor

propelled fan or blower are mounted. This deck 35 is air spaced from the bottom of the casing to afford an auxiliary air passage 36 between the deck 35 and the bottom of the casing. The receiving end of this auxiliary air passage 36 is adapted to be opened and closed by a valve acting damper or gate 37 and the delivery end of said auxiliary passage opens into the upper part of the casing through a large air passage 38 located quite close to the eye of the fan or blower.

As a means for adjusting and variably setting the gate or damper 37 there is shown as provided a depending chain or operating cables 39 that depend through the bottom of the casing. Opening upwardly through the false bottom or deck 35 and located within the auxiliary air passage 36 is a water conveying drain pipe 40. This drain pipe 40 is extended through the auxiliary air passage 36 to a point outside of the cold storage room or compartment 36 and from thence, by an extension 41, is extended outward and downward to a suitable point of discharge. As shown, the extension pipe 41 extends into the relatively warm room 5 and from thence outward to a suitable point of discharge or to a suitable receptacle that may be located within the said room or compartment 5. Of course, it is desirable to keep the drain pipe out of contact with the surfaces of the casing, so that it will be surrounded by and subject to the influence of a current of warm air during defrosting periods.

In the defrosting operation above indicated, the damper or gate 37 will be opened to such an extent that there will be enough warm air drawn through the auxiliary air passage 36 to keep the drain pipe and the deck 35, from dropping to the freezing point. This obviously prevents freezing of water on the deck or bottom 35 and in the drain pipe. Of course, the main volume of air passes between and around the refrigerating coils of the heat exchanger 20 to melt the ice therefrom, and from thence to the intake of the fan or blower, and the air drawn in through the auxiliary air passage 36 will also be taken in through the eye of the fan and discharged from the fan.

It follows from the foregoing that, for the defrosting operation, the circulation of the relatively warm air from the warm room 5 will be into the casing and from thence back into the said warm room or compartment 5.

On the deck 35 just forward of the air intake passage 38 is a raised transverse flange 42; and just forward of the radiator 20 on said deck is a similar transverse raised flange 43. These flanges and the sides of the casing form on the deck 35 a shallow water collecting drain pan that prevents the water resulting from defrosting from running directly into the air duct 36 and from coming into contact with the extreme bottom of the casing, which latter, as noted, is subject to the low freezing temperature in the room 6. By the means described, the water is prevented from coming into contact with the cold bottom of the casing where it would be likely to freeze, and is caused to run out freely through the drain pipe 40.

Broadly considered, the casing 19 forms an enlarged part of the conduits leading to and from the cold storage room 6, and to and from the warm room 5. Hence, the casing 19 and its extended conduits may hereinafter be jointly referred to as a conduit having inlet and outlet openings.

What I claim is:

1. In an air conditioning installation, separated

relatively cold and relatively warm rooms, a refrigerator casing exposed within said relatively cold room, said casing having damper-equipped air intake and discharge conduits leading from and to said relatively warm room, a heat exchange radiator located in said casing, a motor driven fan in said casing, and a drain pipe extended from said casing longitudinally of and within the air intake conduit and leading into said relatively warm room.

2. The structure defined in claim 1 in which said casing has a raised deck forming a false bottom and drip pan to which said drain pipe is connected and from which said drain pipe leads to said relatively warm room.

3. In a cold storage refrigerating plant, a cold storage room wherein air is refrigerated to below freezing temperatures, an associated warm room wherein the temperature is maintained above freezing, an air conduit exposed to the freezing temperature in the cold storage room and having inlet and outlet openings exposed to the warm air above freezing temperature in said associated warm room, a low temperature heat exchanger located in said conduit intermediate said openings, said conduit being equipped with valve means for opening and closing the same to passage of warm air therethrough to and from said warm room, and water collecting and conveying means positioned and arranged within said conduit to collect water precipitated from the heat exchanger during defrosting period and convey the same outwardly of the cold storage room through an extended end portion of said conduit that opens into said warm room, whereby the collecting and conveying means will be maintained under the influence of warm air circulated through the conduit from the warm room during derrosting periods.

4. The structure defined in claim 3, in further combination with blower means for force circulating air through said conduit.

5. The structure defined in claim 3, in which the said water conducting means extends through the warm air intake end portion of said conduit.

6. The structure defined in claim 3, in which the said water collecting and conducting means is air spaced from the bottom and top of the conduit and in which the air spaces above and below the same are open to passage of air longitudinally of the conduit.

7. The structure defined in claim 3, in which the water collecting and conveying means includes a drip pan positioned within the conduit to intercept and collect water dripping from the heat exchanger defrosting periods, said drip pan being air spaced from the top and bottom of the conduit so as to permit free passage of air above and below the same.

8. The structure defined in claim 3, in which the water collecting and conveying means includes a drip pan positioned within the conduit to intercept and collect water dripping from the heat exchanger defrosting periods, said drip pan being air spaced from the top and bottom of the conduit so as to permit free passage of air above and below the same, and further includes a water conductor leading from the drip pan and outwardly of the cold storage room through an extended end portion of the conductor that opens in to the warm room, said water conductor being air spaced from the cold surfaces of the conduit substantially throughout that por-

tion thereof within the cold storage room exposed portion of the conduit.

9. In a cold storage refrigerating plant, a cold storage room wherein air is refrigerated to below freezing temperatures, an associated warm room wherein the temperature is maintained above freezing, an air conduit exposed to the freezing temperature in the cold storage room and having valve controlled inlet and outlet openings exposed to the warm above-freezing temperature air in said associated warm room and also having inlet and outlet openings exposed to freezing air in the cold storage room, a low temperature heat exchanger located in said conduit intermediate the inlet and outlet openings, said conduit being equipped with valve means operative to open the conduit to passage of air therethrough from and to the cold storage compartment and to close the same to passage of warm air therethrough from and to the warm room or to close the conduit to passage of air therethrough from and to the cold storage compartment and open the same to passage of warm air therethrough from and to said associated warm room and water collecting and conveying means positioned and arranged within said conduit to intercept and collect water precipitated from the heat exchanger during defrosting periods and convey the same outwardly of the cold storage compartment through an extended end portion of said conduit that opens into the warm room, whereby the conducting and conveying means will be maintained under the influence of warm air circulated through the conduit from the warm room during defrosting periods.

10. The structure defined in claim 9 in which the water conducting and conveying means extends through the warm air intake end portion of the conduit.

11. The structure defined in claim 9 in which the said water collecting and conducting means is air spaced from the bottom and top of the conduit and in which the air spaces above and below the same are open to passage of air longitudinally of the conduit.

12. The structure defined in claim 9, in combination with blower means for force circulating air through said conduit.

13. The structure defined in claim 9, in which the water collecting and conveying means includes a drip pan positioned within the conduit to intercept and collect water dripping from the heat exchanger defrosting periods, said drip pan being air spaced from the top and bottom of the conduit so as to permit free passage of air above and below the same.

14. The structure defined in claim 9, which further includes a water conductor leading from the drip pan and outwardly of the cold storage room through an extended end portion of the conductor that opens in to the warm room, said water conductor being air spaced from the cold surfaces of the conduit substantially throughout that portion thereof within the cold storage room exposed portion of the conduit.

15. The structure defined in claim 9, in which the said water conducting means extends through the warm air intake end portion of said conduit.

16. Structure defined in claim 1, in which said warm air intake passage within said casing is divided, one branch thereof leading to the intake of the fan through said heat exchanger and the other branch thereof leading to the intake of the fan past the heat exchanger, and in which said drain pipe is located in and is extended longitudinally through the last noted branch of said warm air intake conduit.

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