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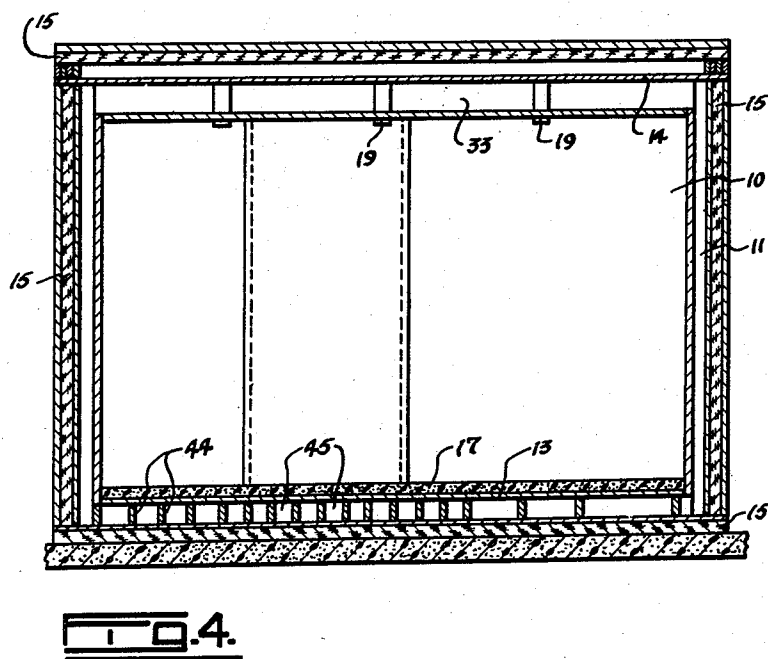
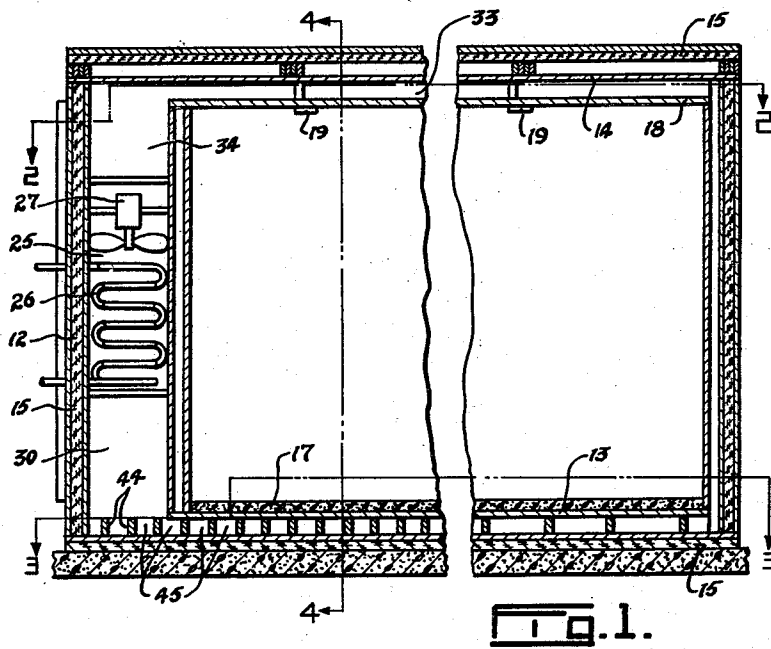
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2,644,317

REFRIGERATING STORAGE APPARATUS

Filed June 19, 1950

3 Sheets-Sheet 1



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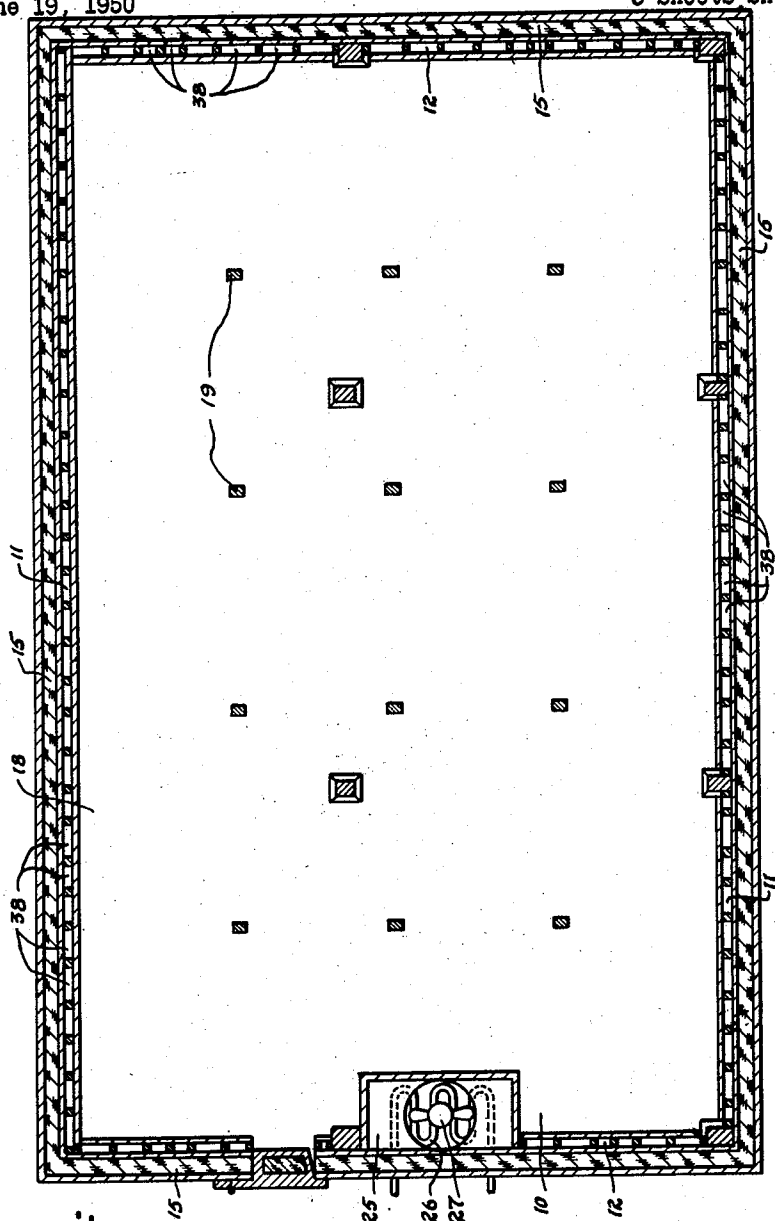


FIG. 2.

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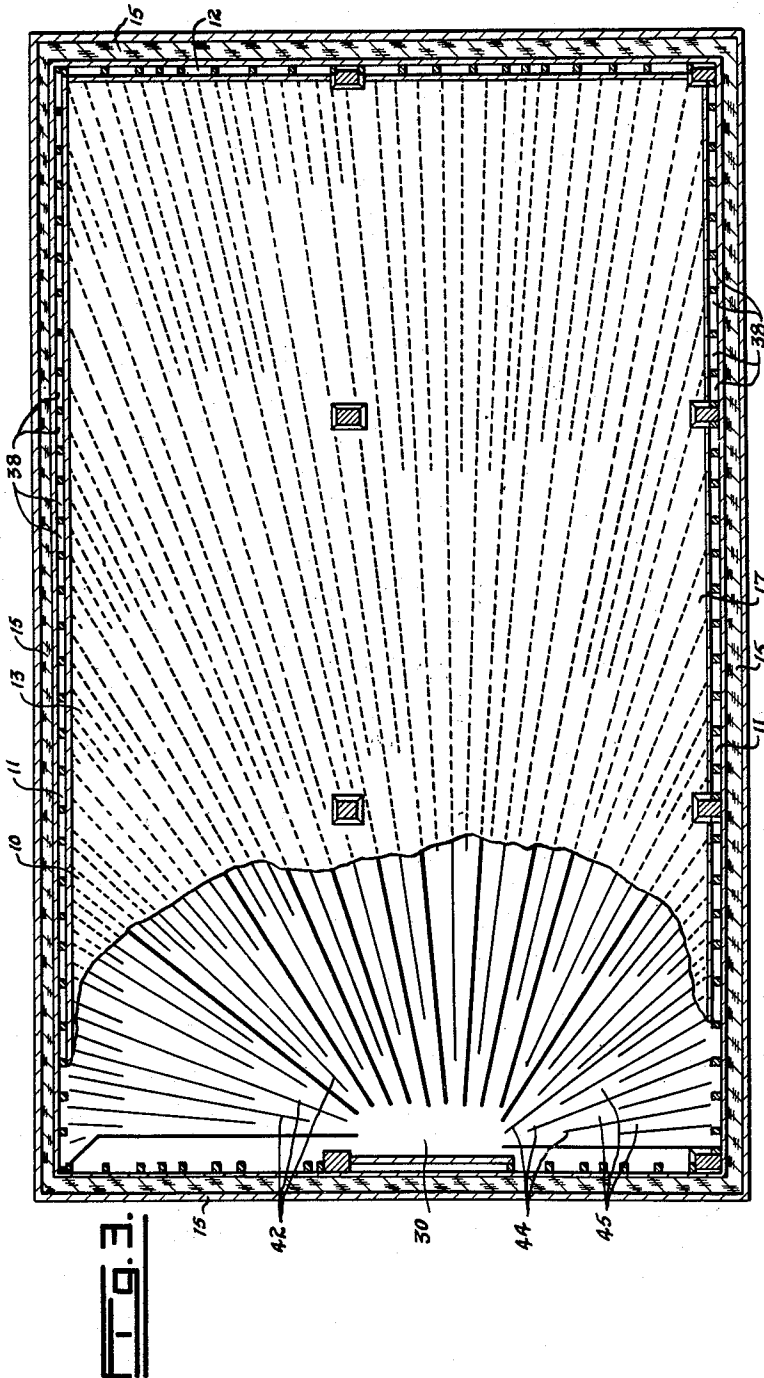
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REFRIGERATING STORAGE APPARATUS

Harold D. Haywood, Vancouver, British
Columbia, CanadaApplication June 19, 1950, Serial No. 168,920
In Canada June 27, 1949

4 Claims. (Cl. 62—95)

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This invention relates to improvements in refrigerating apparatus, and particularly to cold storage rooms.

An object of the present invention is the provision of a refrigerating room, the walls, floor and ceiling of which are maintained in a cool or cold condition.

Another object is the provision of a refrigerating room which does not have an excessively cold spot therein.

Another object is the provision of a refrigerating room having cold air circulated through the walls, floor and ceiling thereof, in which there is very little difference between the temperature in the room and the temperature of the air in the walls, floor and ceiling.

A further object is the provision of a refrigerating room in which the freezing unit is more efficiently used than in similar storage rooms now in use.

Yet another object is the provision of a cold storage or refrigerating room in which there is very little dehydration of the products stored therein.

The refrigerating storage apparatus according to this invention includes a room which is completely insulated, that is, the walls, floor and ceiling include proper insulation. A blower and freezing unit is provided, the inlet of which is connected to a low pressure chamber and the outlet to a plenum chamber. One of these chambers preferably, although not necessarily, covers the entire ceiling of the room. A plurality of channels extend from the plenum chamber through all the confining walls of the room to the low pressure chamber. The chambers, apparatus and channels may be contained within the room insulation.

An example of this invention is illustrated in the accompanying drawings in which,

Figure 1 is a vertical longitudinal section through a refrigerating room,

Figure 2 is a horizontal section taken on the line 2—2 of Figure 1,

Figure 3 is a horizontal section taken on the line 3—3 of Figure 1, in which channels and partitions beneath the floor surface of the room are diagrammatically illustrated, and,

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

Referring to the drawings, 10 is a refrigerating or storage room having side walls 11, end walls 12, floor 13 and ceiling 14. Suitable insulation 15 is provided at the outer surface of the side and end walls, below the floor, and above the ceiling.

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The floor is provided with a floor surface 17, while the ceiling 14 is provided with a false ceiling 18 suspended from the main ceiling by straps or hangers 19.

A blower and freezing unit 25 of any well-known construction is provided in the room 10. This unit is preferably located at one end of the chamber, and it includes a freezing coil 26 and a blower 27. A plenum chamber 30 is provided beneath the unit 25 and is connected to the outlet of the blower. A low pressure chamber 33 covers the entire ceiling of the room, this chamber being located between the ceiling 14 and false ceiling 18. The inlet of the blower of the unit 25 is connected to the chamber 33 in any convenient manner, such as by means of a relatively large duct 34 extending upwardly from the unit to and communicating with the chamber. A plurality of vertical channels 38 are formed in each of the walls 11 and 12. These channels extend upwardly through the wall and open at one end into the chamber 33, while the opposite ends thereof communicate with the space beneath the floor covering 17.

A plurality of channels 42 are formed in the floor 13 and radiate from the plenum chamber 30. Each of these channels communicates with the plenum chamber at one end and with a plurality of wall channels 38 at the opposite end thereof. These channels are arranged to distribute cold air from the plenum chamber equally to all the channels in the four walls. A plurality of vertical partitions 44 divide each floor channel 42 into a plurality of sub-channels 45 adjacent its outer end. Some of these partitions extend from the outer end of each floor channel back therein towards the plenum chamber farther than others, as clearly shown in Figure 3. These partitions act as baffles to assist in distributing the cold air to the wall channels. If any wall of the chamber is what is known as a warm wall, that is, the temperature at the outer surface of said wall being relatively high, the floor channels may be arranged to deliver more cold air to the warm wall than to the others.

It will be noted that each floor channel 42 communicates at its outer end with a plurality of wall channels. Each floor channel and its wall channels form part of an individual circuit which extends from the plenum chamber 30 through the floor and a wall of the room to the ceiling chamber 33 and back to the floor and freezing unit inlet. In other words, cold air passing along each floor channel from the plenum chamber moves upwardly through one or more

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wall channels into the ceiling or low pressure chamber. This air naturally moves directly from its point of entry into the ceiling chamber to the floor and freezing unit inlet. Thus, each circuit is completely separate from the others in the floor and walls.

This invention represents a new concept in refrigeration and cold storage. In the past, cold air has been directed first to the top of the storage area and removed from the bottom thereof. The theory was that the top is the warmest area of the storage space, and that the cold air naturally moves downwardly. This means that the cold air is warmed to some extent before it moves through the remainder of the storage space. Yet the present invention reverses this. The cold air is moved through the floor and walls before it gets to the warmest point of the room. As a result of this, the room obtains the full benefit of the cold air. This air picks up the heat from the warmest area of the room just before it moves directly to the freezing coil. It has been found that lower temperatures may be maintained throughout the entire area of the storage room with cold air of a given temperature than has heretofore been possible. It has also been found that the average temperature throughout the ceiling area of the room was very little higher than the average temperature throughout the floor area thereof.

The chamber may be provided with one or more doors through which the products to be stored may be moved into or out of the room. In use, the blower of the unit 25 draws air from the low pressure or ceiling chamber 33 through the duct 34 and directs it through the freezing coil 26. The cold air is discharged into the plenum chamber 30, whence it moves along the floor channels 42 and through the sub-channels therein to the wall channels 38. This cold air is pushed by the pressure in the floor channels and drawn by the comparatively low pressure in the ceiling chamber into the latter. This means that the cold air completely covers the floor area, the wall areas and the ceiling area. With this arrangement it is not necessary to have an extremely low temperature at any point in the storage room in order to maintain at least a predetermined temperature throughout the rest of the room. It will be noted that the ceiling chamber, and the floor and wall channels are all located within the insulation 15 which completely surrounds the room. Any warmth which may get through the insulation tends to rise in the wall channels rather than pass on into the storage room. Dehydration of the products stored in the room is greatly reduced by the fact that there is no cold spot therein at which the moisture in the air condenses and freezes. This means that the products remain in better condition during the storage period and require little or no reconditioning after removal.

If it is desired to remove most of the moisture from the air being circulated in this system, it is only necessary to operate this apparatus until the moisture accumulates and freezes on the freezing coil. After the coil is defrosted in the usual manner, and the water removed, the air remaining in the system is relatively dry.

With this apparatus, it is possible to maintain the temperature of the air in the room at almost the same temperature as the air in the surrounding walls, floor and ceiling. This maintains the temperature approximately the same throughout the entire apparatus. By circulating and recir-

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culating the air in the manner described, the freezing unit is used to the best advantage.

While the chambers 30 and 33 have been described as plenum and low pressure chambers, respectively, it is to be understood that this may be reversed, in which case the blower unit would move the air in the opposite direction. Although the chamber 33 preferably covers the entire ceiling of the room, as shown, it is obvious that it may cover only a portion of it or may be located away therefrom. In the latter case, suitable ducts would connect the wall passages to the chamber. Furthermore, the blower and freezing unit may be located outside the refrigerating room, if it is so desired.

What I claim as my invention is:

1. Refrigerating storage apparatus comprising an insulated room, a low pressure chamber covering the ceiling of the room, a blower and freezing unit having an inlet and an outlet, the inlet of the blower being connected to the ceiling chamber, a plenum chamber connected to the blower outlet, a plurality of channels radiating from the plenum chamber in the floor covering the entire area of the latter, each of said channels increasing in width towards its outer end, a plurality of vertical partitions dividing each floor channel into sub-channels adjacent its outer end, some of said partitions extending from the outer end of each floor channel back therein farther than others, and a plurality of vertical channels in each of the walls covering the entire area thereof leading from the floor channels to the ceiling chamber, each floor channel being connected at its outer end to a plurality of wall channels to form therewith part of an individual circuit which extends from the plenum chamber through the floor and a wall to the ceiling chamber and back to the blower and freezing unit inlet, and each circuit being completely separate from the others in the floor and walls.

2. Refrigerating storage apparatus comprising an insulated room, a single low pressure chamber covering the ceiling of the room, a blower and freezing unit adjacent a wall of the room and having an inlet and an outlet, a relatively large duct leading from the ceiling chamber down to the inlet of the blower, a plenum chamber connected to the blower outlet, a plurality of channels radiating from the plenum chamber in the floor covering the entire area of the latter, each channel extending to a wall of the room, and each of said channels increasing in width towards its outer end, a plurality of vertical partitions dividing each floor channel into sub-channels adjacent its outer end, and a plurality of vertical channels in each of the walls covering the entire area thereof leading from the floor channels to the ceiling chamber, each floor channel being connected at its outer end to a plurality of wall channels to form therewith part of an individual circuit which extends from the plenum chamber through the floor and a wall to the ceiling chamber and back to the blower and freezing unit inlet, and each circuit being completely separate from the others in the floor and walls.

3. Refrigerating storage apparatus comprising an insulated room, a low pressure chamber at the ceiling of the room, a blower and freezing unit having an inlet and an outlet, the inlet of the blower being connected to the ceiling chamber, a plenum chamber connected to the blower outlet, a plurality of channels radiating from the plenum chamber in the floor covering the entire area of the latter, each of said channels

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increasing in width towards its outer end, and a plurality of vertical channels in each wall covering the entire area thereof leading from the floor channels to the ceiling chamber, each floor channel being connected at its outer end to at least one wall channel to form therewith part of an individual circuit which extends from the plenum chamber through the floor and a wall to the ceiling chamber and back to the blower and freezing unit inlet, and each circuit being completely separate from the others in the floor and walls.

4. Refrigerating storage apparatus comprising an insulated room, a low pressure chamber at the ceiling of the room, a blower and freezing unit having an inlet and an outlet, the inlet of the blower being connected to the ceiling chamber, a plenum chamber connected to the blower outlet, a plurality of channels radiating from the plenum chamber in the floor covering the entire area of the latter, each of said channels increasing in width towards its outer end, and a plurality of vertical channels in each wall covering

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the entire area thereof leading from the floor channels to the ceiling chamber, each floor channel being connected at its outer end to a plurality of wall channels to form therewith part of an individual circuit which extends from the plenum chamber through the floor and a wall to the ceiling chamber and back to the blower and freezing unit inlet, and each circuit being completely separate from the others in the floor and walls.

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