Sept. 17, 1935. F. W. DAEMICKE 2,014,837

REFRIGERATING UNIT

Filed July 3, 1933

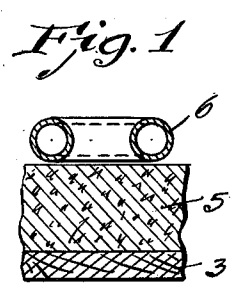


Fig. 1

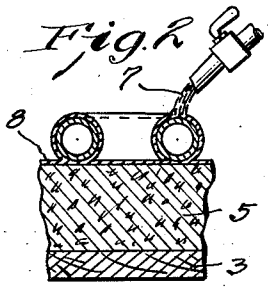


Fig. 2

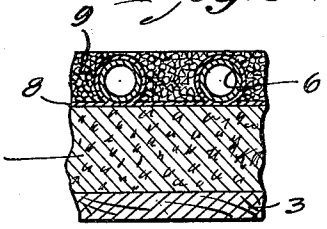


Fig. 3

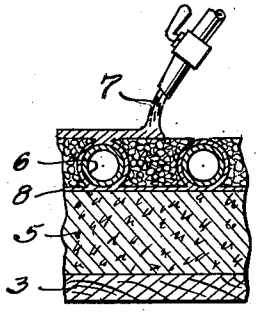


Fig. 4

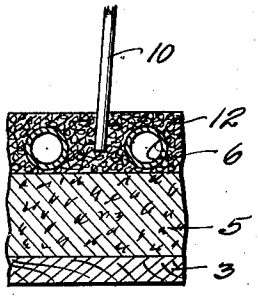


Fig. 5

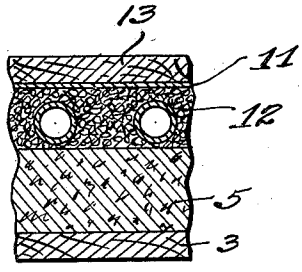


Fig. 6

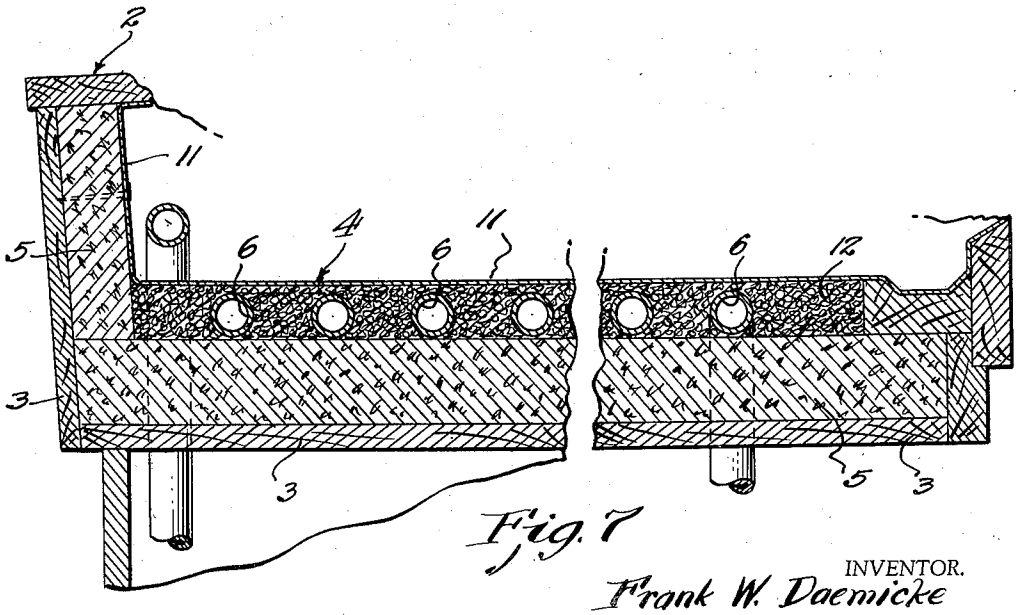


Fig. 7

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REFRIGERATING UNIT

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11 Claims. (Cl. 62—95)

This invention relates to a refrigerating unit, and has to do particularly with display counters of the cold slab type, although it is equally applicable to refrigerating units of any type which embody a sharp freezing unit as a part of the refrigerating system.

Heretofore, in the fabrication of sharp freezing units for display counters, ice cream cabinets, domestic refrigerators and the like, it has been proposed to back or surround the surface of the sharp freezing unit, usually a metal surface, with a layer of asphalt, which layer of asphalt also usually embeds the refrigerant circulating coils; such structure is very efficient as far as sealing and preserving the coils and surface of the sharp freezing unit is concerned, but it is markedly lacking in conductivity and over all efficiency. Other sharp freezing units have embodied artificial stone in place of the asphalt, such artificial stone usually having a cementitious binder. Artificial stone substantially eliminates all the inefficiency of the asphalt in that the artificial stone is a good conductor as well as a good hold over. However, most artificial stone cooling units are open to the objection that the binder has a deleterious action on the coils and the surface of the sharp freezing unit where metal is used.

It is the object of the present invention to provide a sharp freezing unit making use of stone as an efficient hold over and conductive medium and at the same time utilizing a relatively small amount of asphalt or similar material as a binder; in this case the binder has very little retarding effect upon the conductive and hold over properties of the stone, and in addition such binder seals the refrigerant conducting coils, seals the lining, if any is used, and enters the small interstices of the cork or other insulation, to assist in locating the stone cooling unit as a permanent part of the refrigerator.

Such novel stone cooling unit with a minimum amount of binder is obtained by a novel method which includes as an important step thereof, the preheating of the stone to materially assist in the fluidity and distribution of the binder prior to the setting up step. Other steps in the method and the structural details of the stone cooling unit will be more clearly set forth in the specification and claims.

In the drawing:

Fig. 1 is a fragmentary enlarged view of the first step of my fabrication process wherein a coil of the cooling unit is shown positioned slightly above the insulation.

Fig. 2 illustrates the second step in the method and showing the manner of initially sealing the refrigerant coils with a thin layer of hot asphalt.

Fig. 3 illustrates the step of building up and covering the coils with a layer of stone.

Fig. 4 illustrates the next step wherein hot asphalt is being distributed over the surface of the layer of hot stone.

Fig. 5 illustrates one manner of evenly distributing the binder throughout the stone.

Fig. 6 illustrates the step of pressing the metal covering for the cooling unit in place.

Fig. 7 is a cross sectional view of the sharp freezing cold slab of a display counter constructed in accordance with the present invention.

The present invention may best be understood by describing the method of building up the sharp freezing unit. I have illustrated the invention as being embodied in a refrigerating unit of the display counter type wherein standard display counters are usually provided with a base portion 2 carrying glass side walls and a glass top (not shown) for display purposes. The base portion 2 usually consists of a wooden or metal framework 3 and a cold slab or sharp freezing unit 4, backed by suitable insulation 5. In Fig. 7 the cold slab is shown as being positioned horizontally, but in actual practice the left hand wall, which is the back wall, is usually positioned vertically so that the cold slab is given a slight incline.

After the insulation 5, preferably cork, has been fitted into place, as best shown in Fig. 7, the refrigerant circulating coils 6 are next arranged as shown, and preferably spaced a slight distance above the insulation. Molten asphalt 7, paraffin, or similar binder and sealing material is then poured over the individual coils 6 and allowed to run down over the same to not only coat the coils but form a thin layer 8 across the top of the insulation 5. This molten asphalt may be fed from a continuously heated hopper, and the temperature or degree of fluidity may vary considerably. This molten asphalt forms a thin coating around the pipes and seals the same, and also enters the small interstices of the cork 5 or other insulation.

A mass of hot stone aggregate 9 is next poured into the well formed by the bottom and side insulating members and up to a level above the top of the coils 6. The amount of stone used will depend upon the amount of hold over desired, but

preferably the height of the stone above the coils should not be too great. Molten asphalt or paraffin and the like is next poured over the surface of the heated stone aggregate, as best shown in Fig. 4, and because the stone aggregate is heated, the fluidity of the asphalt will be increased, or at least maintained, so that the same will flow and fill every small space or void in the stone aggregate. If the stone were not heated, the tendency would be to chill the molten asphalt and materially restrict the flow of the same. I do not limit myself to any particular type of stone or stone aggregate used, but I prefer a stone having relatively great density and relatively high thermal conductivity.

The main purpose of heating the stone is to make it possible to use as little as possible of waterproof material such as asphalt, paraffin, and the like, and still obtain a thin coating of such waterproof material around each stone particle. By heating the stone it is possible to use a mixture of approximately 90% stone and 10% binder or waterproof material, and thus produce a very efficient cold slab having high conductivity, relatively great hold over, and still having no deleterious effects on the metal coils or metal covering.

After the predetermined amount of asphalt has been poured on top of the heated stone aggregate, the ingredients are worked and mixed together by means of slender sticks or tools 10 whereby the asphalt is thoroughly mixed around the heated stones and forms a very thin layer around each stone particle and around the coils 6. Furthermore, all voids or water pockets are eliminated. The mixture of stone and asphalt is then packed and smoothed down by a hot iron, so as to produce a solid slab.

A sheet metal form 11 is then lowered into place, against the surface of the stone and asphalt mixture 12, as best shown in Figs. 6 and 7, and wooden forms 13 fitted on the top of said sheet metal form 11 so as to press and clamp the same down tight against the stone surface. The sheet metal form 11 is lowered into place while the asphalt is still plastic and before the mixture has finally set up. The clamps 13 hold the sheet metal form 11 tightly against the stone so that when such stone mixture 12 sets up, there will be direct contact and direct heat conductivity between the sheet metal 11, the stone slab, and the refrigerant circulating coils 6. After the stone slab has set up, the blocks 13 are removed and the metal surface 11 of the sharp freezing unit tapped. A hollow sound will indicate any voids and a hot iron may be pressed firmly against the metal surface 11 over any hollow sounding portion to insure contact between the stone and the metal form 11.

It will be understood that the asphalt, paraffin, or other binder and waterproof material is such that the stone slab, while solid, can still give slightly, because of any contraction or expansion of any part of the structure, without cracking. The metal form 11 presents a smooth sanitary surface for receiving foodstuffs and also plays a part in the even distribution of heat units for the most efficient preservation of such foodstuffs.

It will be seen that I have provided a sharp freezing unit having a relatively great hold over because of the large mass of stone, approximately 90%. The sharp freezing unit also has relatively great heat conductivity because of the direct contact between the refrigerant coils, the stone and the metal surface 11. Water voids are completely eliminated, each particle of stone is coated with a thin layer of waterproof binder, and the refrigerant coils and the inner surface of the metal slab 11 are coated with the same waterproof protective binder. The asphalt or other binder material permanently clings to the cork insulation because it fills the pores and small interstices thereof, and as this same asphalt is directly connected to the stone particles, it will be seen that the entire sharp freezing unit or cold slab is cast united to the cork or other insulation, making for a light permanent unit that may be shipped and roughly handled without damage.

Actual tests have shown a considerable saving in operating expense with a counter constructed as shown in Fig. 7 as compared with the same counter having an air space between the coils 6 and the metal slab 11, or asphalt or similar material between the coils 6 and the slab 11. Actual tests show that the hold over properties of the stone materially reduce the running time of the refrigerating apparatus. Furthermore, the even distribution of the stone, the relatively high percentage of stone, the direct conductivity between the coils and the plate 11, and the fact that the plate 11 itself is of metal, all make for uniform heat transfer and uniform chilling of meats and other foodstuffs. Display counters constructed exactly as shown in the drawing produce uniform frosting of the entire metal slab 11, whereas in exact duplicate display counters where the slab is formed entirely of asphalt instead of 90% stone and 10% asphalt, frost is only formed in rather thin lines just above the coils themselves.

If, in fabricating the cold slab or sharp freezing unit, a relatively cold instead of heated stone aggregate were used, it would be necessary to use approximately 50% asphalt or similar binder. The use of over 40% asphalt in the stone mixture produces a very inefficient cooling unit. It is one of the definite objects of the present invention to reduce the percentage of asphalt or similar binder to something below 40% by the heating of the stone.

What I claim is:

1. In a refrigerating unit, a sharp freezing container comprising a mass of stone held together by a waterproof binder, refrigerant circulating means positioned in direct heat exchange relation to said stone, and a sheet metal form also in direct heat exchange relation to said stone and forming the exposed surface of said sharp freezing container.

2. In a refrigerating unit, a sharp freezing container comprising a mass of stone held together by a waterproof binder, the proportion of stone and binder being substantially 90% and 10%, refrigerant circulating means positioned in direct heat exchange relation to said stone, and a metal form also in direct heat exchange relation to said stone and forming the exposed surface of said sharp freezing container.

3. In a refrigerating unit, a sharp freezing container comprising a mass of stone held together by a waterproof binder, the proportion of stone and binder being substantially 90% and 10%, and refrigerant circulating means positioned in direct heat exchange relation to said stone.

4. In a refrigerating unit, a sharp freezing container comprising a mass of stone held together by a waterproof binder, refrigerant circulating means embedded in said stone, and a metal form in direct heat exchange relation to said stone and forming the exposed surface of said sharp freezing container.

5. In a refrigerating unit a sharp freezing container comprising a mass of stone held together solely by a waterproof binder, refrigerant circulating means embedded in said stone and coated with said waterproof binder, and a form of relatively high heat conductive material in direct heat exchange relation to said stone and forming the exposed surface of said sharp freezing container.

6. In a refrigerating unit, a sharp freezing container comprising a mass of stone held together by asphalt, refrigerant circulating means positioned in direct heat exchange relation to said stone, and a metal form also in direct heat exchange relation to said stone and forming the exposed surface of said sharp freezing container.

7. In a refrigerating unit, a sharp freezing container comprising a relatively large mass of stone held together by a relatively small amount of asphalt, and refrigerant circulating means positioned in direct heat exchange relation to said stone.

8. The method of building up a sharp freezing unit for refrigerating systems, which comprises positioning refrigerant circulating conduits adjacent a wall of insulating material, coating the conduits and the surface of the insulating material with a fluid waterproof binder and sealing medium, covering the refrigerant conduits with a layer of heated stone, adding a molten waterproof binder and sealing medium to said stone and in relatively small proportions compared to the mass of stone, said heated stone causing said binder to flow freely, mixing the stone and binder to form a thin coating of binder around each stone particle, applying a metal surface form to the mass of stone while said binder is still plastic, and allowing said binder to set up to form a solid sharp freezing unit having relatively good hold over and heat conductive properties.

9. The method of building up a sharp freezing unit for refrigerating systems, which comprises positioning refrigerant circulating conduits adjacent a wall of insulating material, covering the refrigerant conduits with a layer of heated stone, adding a molten waterproof binder and sealing medium to said stone and in relatively small proportions compared to the mass of stone, said heated stone causing said binder to flow freely, mixing the stone and binder to form a thin coating of binder around each stone particle, applying a metal surface form to the mass of stone while said binder is still plastic, and allowing said binder to set up to form a solid sharp freezing unit having relatively good hold over and heat conductive properties.

10. The method of building up a sharp freezing unit for refrigerating systems, which comprises positioning refrigerant circulating conduits adjacent a wall of insulating material, covering the refrigerant conduits with a layer of heated stone, adding a molten waterproof binder and sealing medium to said stone and in relatively small proportions compared to the mass of stone, said heated stone causing said binder to flow freely, mixing the stone and binder to form a thin coating of binder around each stone particle, and allowing said binder to set up to form a solid sharp freezing unit having relatively good hold over and heat conductive properties.

11. The method of building up a sharp freezing unit for refrigerating systems, which comprises positioning refrigerant circulating conduits adjacent a wall of insulating material, coating the conduits and the surface of the insulating material with a fluid waterproof binder and sealing medium, covering the refrigerant conduits with a layer of stone, adding a molten waterproof binder and sealing medium to said stone and in relatively small proportions compared to the mass of stone, mixing the stone and binder to form a thin coating of binder around each stone particle, applying a metal surface form to the mass of stone while said binder is still plastic, and allowing said binder to set up to form a solid sharp freezing unit having relatively good hold over and heat conductive properties.

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