Aug. 21, 1962 J. R. PICHLER ETAL 3,049,894

REFRIGERATING APPARATUS

Filed March 23, 1960

2 Sheets-Sheet 1

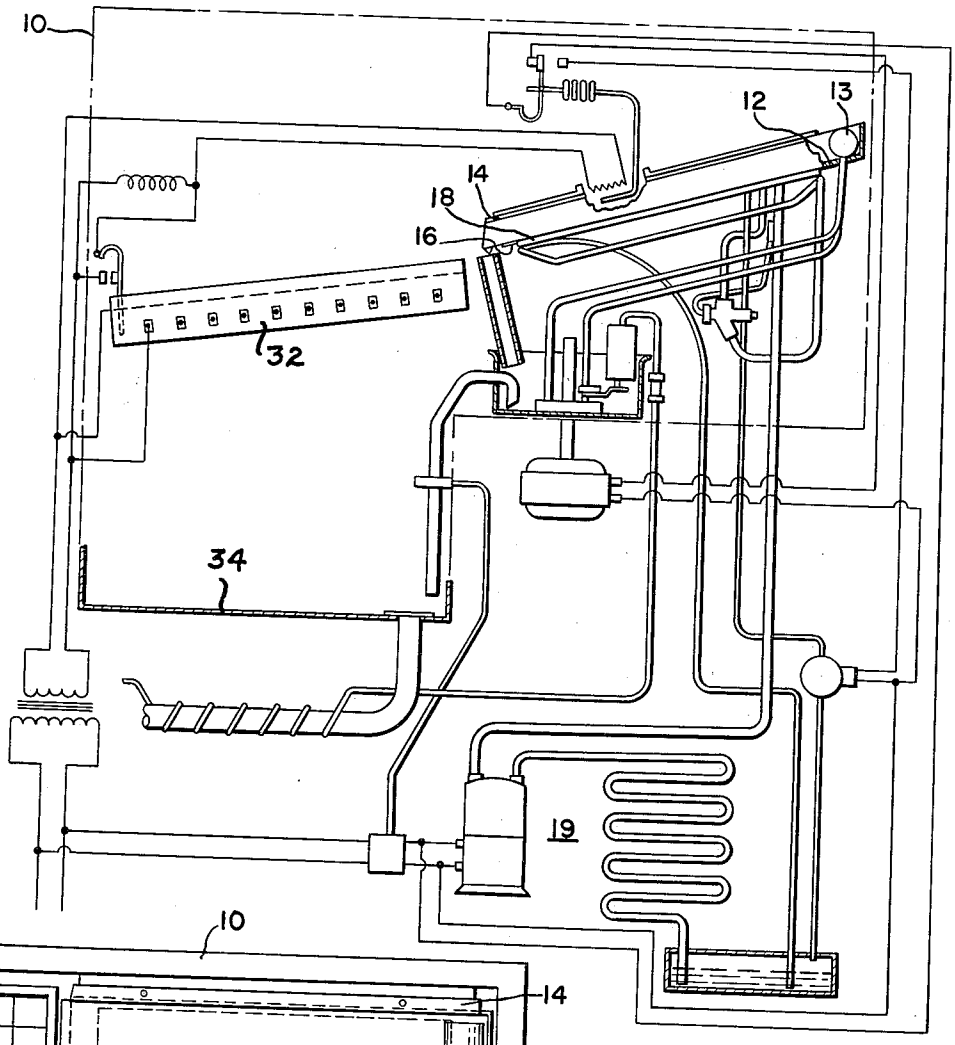


Fig. 1

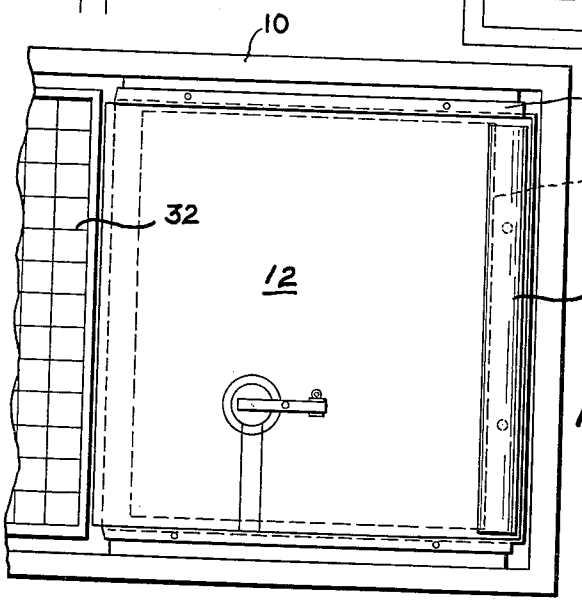


Fig. 3

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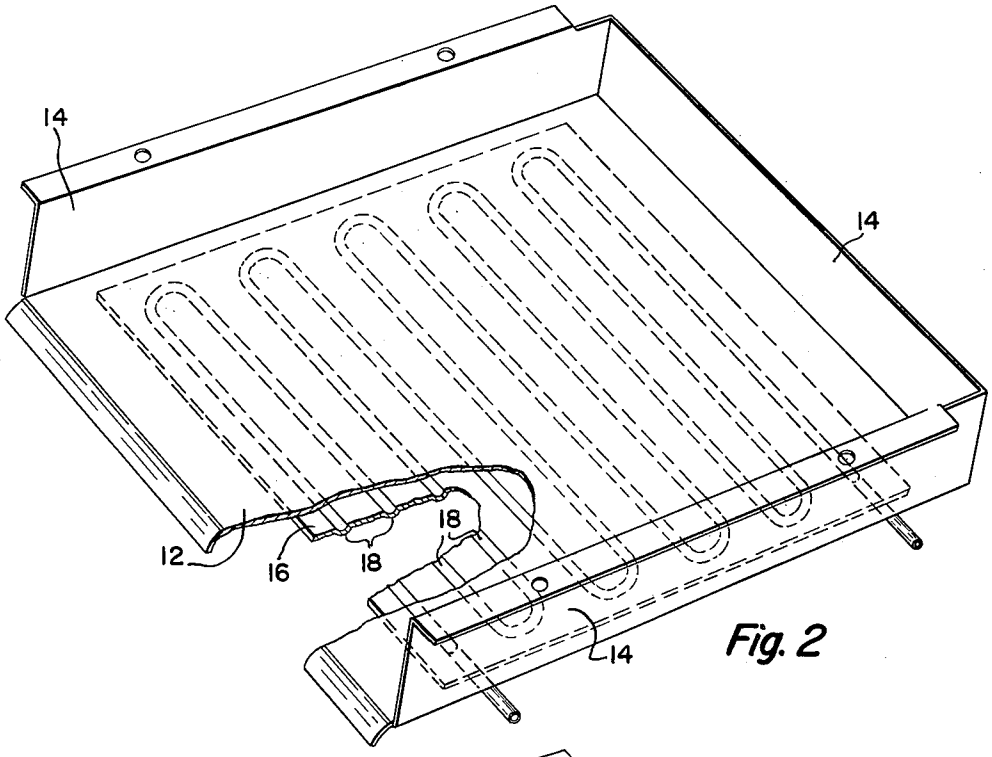


Fig. 2

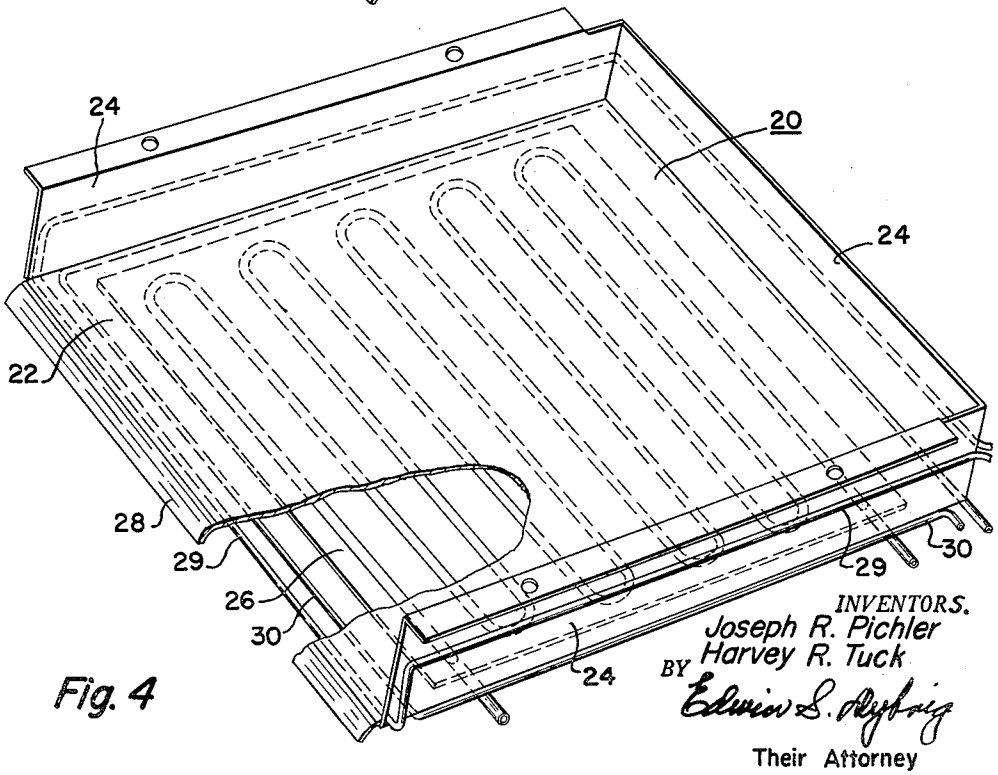


Fig. 4

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United States Patent Office 3,049,894 Patented Aug. 21, 1962

3,049,894

REFRIGERATING APPARATUS

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Filed Mar. 23, 1960, Ser. No. 17,213
4 Claims. (Cl. 62—340)

This invention relates to refrigerating apparatus and more particularly to the construction of the freezing plate for use in a commercial ice maker.

It is an object of this invention to provide an inclined refrigerated plate on which ice may be frozen and wherein the main freezing effect is concentrated throughout a given area.

More particularly, it is an object of this invention to provide an inclined freezer plate having a bottom and integrally formed side flanges made from a single sheet of metal which has secured thereto a second sheet of metal having a higher coefficient of heat transfer than the first sheet and which has embossed portions which form refrigerant passages.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings wherein preferred embodiments of the present invention are clearly shown.

In the drawings:

FIGURE 1 is a diagrammatic view of an ice maker embodying the invention.

FIGURE 2 is a fragmentary perspective view with parts broken away showing the construction of the freezer plate.

FIGURE 3 is a plan view of the freezer plate.

FIGURE 4 is a perspective view showing a modified freezer plate construction.

Referring now to FIGURES 1 through 3 of the drawings wherein a preferred embodiment of the invention has been shown, reference numeral 10 designates an insulated cabinet which serves to house ice making apparatus of the general type disclosed in United States Patent No. 2,784,563 to which reference should be made for a more complete description of the refrigerating mechanism, water supply system, and controls which are used.

Ice makers of this type utilize a refrigerated inclined plate or channel member 12 over which a film of water is directed by means of a conventional water distributing header 13 while a layer of ice is formed on the top surface of the plate 12. One of the problems in the manufacture of ice makers of the type wherein a slab of ice is frozen on an incline plate and thereafter released to slide off onto a cutting grid is that of confining the freezing action so that there will not be an excessive buildup of ice adjacent the edges of the plate. It has been common practice to limit the extent of freezing at the edges of the plate by utilizing side flanges which are insulated from or made of a different kind of material than the ice freezing plate itself but such arrangements involve expensive manufacturing techniques.

In the ice maker disclosed in FIGURES 1 through 3 herein the ice freezing plate 12, as well as the integrally formed side flanges 14, are made of a single sheet of metal, such as stainless steel or a deep drawing type alloy containing essentially 65% copper, 17% zinc and 18% nickel and known as nickel silver alloy A. Attached to the bottom side of the plate 12 is a plate 16 of metal, such as copper which has a much higher coefficient of heat transfer than the plate 12. The plate 16 is provided with embossed portions 18 which cooperate with the bottom side of the plate 12 to form refrigerant passages into which refrigerant is fed from the condensing unit 19 in accordance with well known practice. The plate 16 may be secured to the underside of the sheet 12 by any one of many well known processes, such as by brazing, electric welding, or pressure welding. In the arrangement shown in FIGURE 2, a copper plate 16 is brazed to the under side of the nickel silver plate 12. By virtue of this construction, it is obvious that the need for making the side flanges 14 of a different material than the plate 12 has been eliminated as the copper plate 16 serves to evenly and rapidly distribute the refrigerating effect throughout the area where it is desired to freeze ice. It is recognized that the side flanges 14 may become cold enough so that some ice may form thereon but the amount of ice formed thereon is not enough to interfere with the removal of the ice slab. A small amount of heat could be added to the side flanges if desired. Since the construction of the cabinet, the refrigerating system, the water circulating apparatus and the electrical controls are the same as those shown in the above mentioned patents and form no part of the invention, they will not be described in greater detail herein.

FIGURE 4 shows a modified channel 20 wherein the entire channel assembly including the bottom wall 22 and the side walls 24, as well as the bottom fluid passage forming plate 26, are all made of copper, brass or other material having a high coefficient of heat transfer.

For controlling the growth of the ice slab in its outer boundaries during the ice freezing portion of the cycle, the side walls 24 and the lower edge 28 of the bottom 22 are heated by means of an electric heater 29 which is energized at all times during operation of the ice maker. A hot refrigerant gas line 30 is secured to the under side of the bottom periphery of the channel 22 as shown. Hot refrigerant gas from the condensing unit is fed into this gas line 30 to aid in the release of the ice slab. If desired, the hot gas line 30 could be replaced by an electric heater energized only during the ice harvesting portion of the cycle. Slabs of ice released from the freezing surface slide off onto the cutting grid assembly 32 which cuts the slabs into small pieces which fall into the storage bin 34 in accordance with well known practice.

While the embodiments of the present invention as herein disclosed, constitute preferred forms, it is to be understood that other forms might be adopted.

What is claimed is as follows:

1. An ice forming apparatus including an inclined plate having integrally formed side flanges and a bottom surface on which a slab of ice is adapted to be frozen, means for directing water over said inclined plate so as to freeze a slab of ice on said inclined plate, and means secured to the bottom side of said inclined plate for refrigerating said plate, said means including a metallic plate smaller than said inclined plate but substantially coextensive with the area of said bottom surface to be refrigerated and having a coefficient of heat transfer greater than that of said inclined plate.

2. In an ice forming machine, an inclined channel having a bottom surface and integrally formed side flanges of a material having a relatively low coefficient of heat transfer, means for directing water onto said bottom surface of said inclined channel for freezing the water, means for refrigerating said bottom surface including a plate having a relatively high coefficient of heat transfer arranged in thermal exchange relationship with the bottom side of said inclined channel, said plate being substantially coextensive with the area of said bottom surface which is to be refrigerated.

3. In an ice forming machine, an inclined channel having a bottom surface and integrally formed side flanges of a material having a relatively low coefficient of heat transfer, means for directing water onto said bottom surface of said inclined channel for freezing the water, means

for refrigerating said bottom surface including a plate having a relatively high coefficient of heat transfer arranged in thermal exchange relationship with the bottom side of said inclined channel, said plate being substantially coextensive with the area of said bottom surface which is to be refrigerated, said plate being spaced from the bottom of said inclined channel throughout portions thereof so as to form with the bottom of said inclined channel refrigerant passages.

4. In an ice forming machine, a plate over which water to be frozen into an ice slab flows, means for refrigerating said plate, said plate being formed of a material having a relatively low coefficient of heat transfer, said means for refrigerating said plate including a member secured to one side thereof and having a relatively high coefficient of heat transfer, said member being smaller in area than said plate and corresponding in size substantially to the area of said plate which is to be refrigerated.

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