Oct. 15, 1929. R. M. HYDE 1,731,575

EVAPORATOR UNIT

Filed Sept. 22, 1927

Fig. 1.

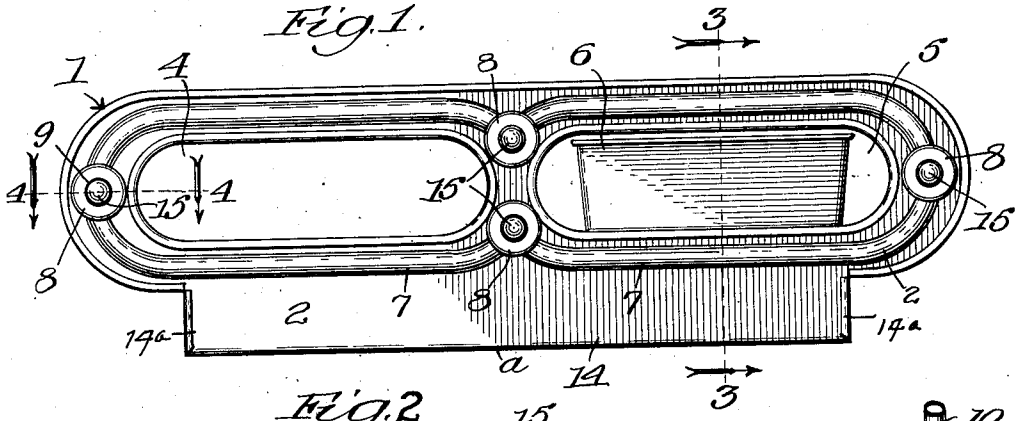


Fig. 2

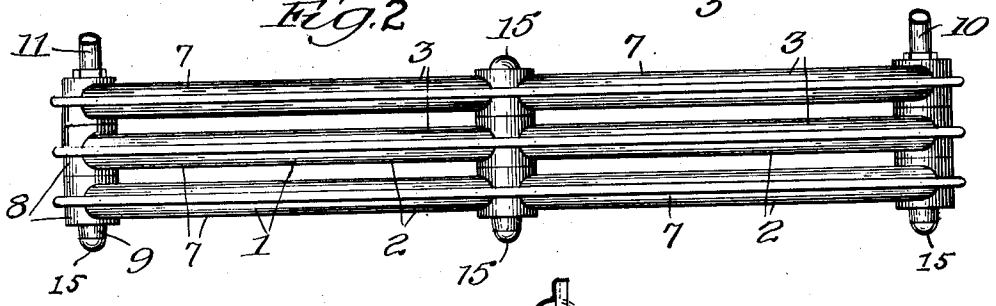


Fig. 4.

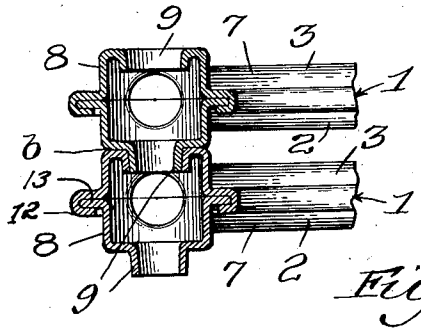


Fig. 5.

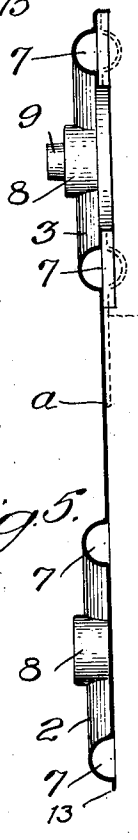
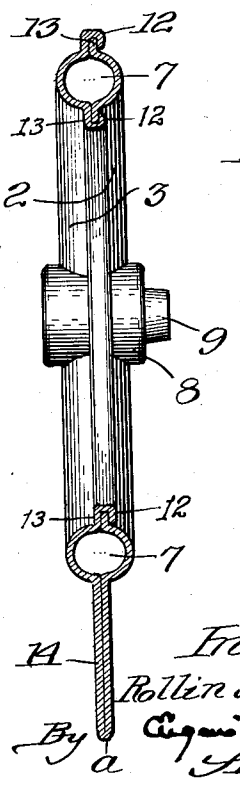


Fig. 3.



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UNITED STATES PATENT OFFICE

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EVAPORATOR UNIT

Application filed September 22, 1927. Serial No. 221,160.

This invention relates to refrigerating units, and more particularly to evaporators for use in direct expansion refrigerating systems.

The evaporator unit contemplated by my invention is made in sections, and one object of my invention is to make each section of sheet metal so as to reduce the weight of the entire unit, as well as lessen the cost of making the same.

Another object of my invention is to make each section of the unit from a single blank of sheet metal which after being cut and formed as required is folded on itself to provide the front and rear walls of the section, which walls are connected together about their edges to seal the sections against leakage of the refrigerant which is circulated through them.

A further object of my invention is to provide each section with extended heat radiating flanges about the edges where the walls of the sections are secured together, and to have the flanges where the fold is made of greater extent than the others so as to have a larger radiating surface at the place where the unit encounters the colder strata of air and thus produce a more efficient evaporator.

A further object of my invention is to provide the sections on their opposite sides with tubular bosses which are pressed out of the metal walls of the respective sections, and which bosses are disposed to contact with each other for spacing the sections apart so that air may freely circulate between them.

A further object of my invention is to provide the bosses with interfitting nipples by which the sections are connected together and by which communication is provided between them for the refrigerant flow.

A further object of my invention is to provide the refrigerant circulating passages or channels in each section immediately about and surrounding the chilling opening or openings therein and to make said passages or channels by pressing or stamping half portions of them out of the opposed walls of the sections.

The invention consists further in the matters hereinafter described and claimed.

In the accompanying drawings—

Fig. 1 is a front view of an evaporator unit constructed in accordance with my invention;

Fig. 2 is a top plan view of the unit;

Fig. 3 is an enlarged vertical sectional view taken on line 3—3 of Fig. 1;

Fig. 4 is an enlarged horizontal sectional view taken on line 4—4 of Fig. 1; and

Fig. 5 is a view showing a section in blank form prior to being folded.

As shown in the drawings, the evaporator unit of my invention comprises two or more sections 1, 1 preferably vertically disposed and joined together to complete the unit. Each section has front and rear walls 2, 3 stamped or pressed from sheet metal to the shape desired, and having within the margins thereof one or more openings 4, 5. The sections are arranged with their respective openings 4, 5 in alignment to form the chilling compartments of the unit. The openings are made of such size and shape as to readily receive and accommodate the chilling trays 6 as employed in units of this general character.

Each section 1 is provided between its front and rear walls 2, 3 with refrigerant circulating passages or channels 7, 7 which extend about the openings 4, 5 in close proximity thereto. Each section 1 is further provided with outwardly projecting bosses 8, 8 on its front and rear walls 2, 3, and these bosses are pressed out of these walls and are disposed on opposite sides of the section. The bosses 8, 8 of the several sections contact at their opposed ends and serve to space the sections apart so that air may freely flow over and between the sections. The bosses have nipples 9, 9 by means of which the sections are secured together at the bosses and provide communication between the channels 7, 7 of the sections. The bosses 8, 8 open into the channels 7, 7 of the respective sections and thus permit the refrigerant to flow through all the sections of the unit as well as through all of the channels thereof. The inlet and outlet pipes 10, 11 for the unit are preferably connected with two of the bosses 8, 8 of the unit so that the refrigerant may be circulated through the unit, as shown in Fig. 2. As shown in Fig. 4, the

nipples 9 of the bosses on one side of the section extend into the bosses, while on the other side the nipples project outside of the bosses. This allows the outwardly projecting nipples of one section to extend into the inwardly extending nipples of the adjoining section in connecting the sections together. These nipples are made to fit one within the other and by their contact seal the connections between the sections. The opposed end surfaces *b* of the bosses about the nipples also connect and these surfaces together with the contacting surfaces of the nipples provide a relatively large contact for the sections at each of the bosses and thus make a perfect seal to provide against leakage of the refrigerant passing through the bosses.

Each section 1 is formed from a single blank of sheet metal, as shown in Fig. 5. The blank is of a size to include both the front and rear walls 2, 3 of the section. The blank is pierced to provide all the holes required to form the openings 4, 5 of the section, and is also formed to provide the bosses 8, 8 and their nipples 9, 9. The blank is also formed to provide the passages or channels 7, 7, these being pressed out of the metal of the blank about each of the openings 4, 5 therein in half section, which register to complete the channels on the folding of the blank. The line of fold *a* is lengthwise of the blank substantially midway between the portions of the blank forming the front and rear walls of the section, as shown in Fig. 5.

The folded blank is secured about its outer edges and also about the edges of its openings 4, 5 either by welding or lock-seaming. The latter type of connection is shown in the drawings. It comprises forming outwardly extending flanges 12, 13 on the two halves of the blank about these edges and bending and pressing the outer margins of the flanges 12 over the flanges 13, as shown in Fig. 3. The flanges 12, 13 provide extended heat radiating surfaces about these outer edges of the section, as well as about the edges of the openings 4, 5 and thus increase the heat transfer from the section to the surrounding atmosphere to produce a more efficient device. The portion 14 of the blank where it is folded on itself to form the front and rear walls 2, 3 is considerably wider than the flanges 12, 13, and, in addition to integrally connecting said front and rear walls, provides a greater heat radiating surface than afforded by the balance of the flanges on the section. The ends of the folded section 14 are closed by flanges 14ª integral with one half of the section and folded over the other around the adjacent ends thereof, as shown in Fig. 1.

In use, the unit is located in the desired compartment of the refrigerator with the folded portions 14 of the several sections 1, 1 extending downward so as to be in the colder strata of air and thus be most effective.

In operation, refrigerant enters the unit at 10 under considerable pressure and in the unit is allowed to expand, there being an expansion valve (not shown) in the supply line 10 just ahead of the unit. The pressure being released, the refrigerant expands in the unit, recovering its specific heat. The temperature of this expanded refrigerant is lower than the air surrounding the unit and extracts heat therefrom and lowers the temperature of the refrigerator compartment in which the unit is located. The refrigerant collects in the lower portions of the channels 7, making the lower portion of the unit its coldest part. The natural circulation of air about and between the sections of the unit is from top to bottom, the warmer air ascending and the colder air descending. This makes the coldest strata of air along the bottom of the unit, and by having the larger heat radiating surfaces 14 of considerable area and extending downward they will be located in this cold strata of air so as to most effectively absorb heat therefrom and lower the temperature of the refrigerator. In practice, the unit will be suspended in the refrigerator by a number of brackets (not shown).

In the particular form of evaporating unit shown in the drawings, the bosses 8, 8 at the opposite ends of the unit are employed as a means of inlet and outlet for the refrigerant, the balance of the openings in the remainder of the bosses on the front and rear sections of the entire assembly being closed and sealed by plugs or caps 15, 15. The inlet and outlet conduits 10, 11 for the unit are connected with the bosses at the opposite ends of the rearmost section, as shown in Fig. 2. These conduits could, if desired, be connected with the intermediate bosses on the front and rear sections depending on the requirements of the installation. The intermediate bosses of each section are arranged one above the other, and also intersect or communicate with channels 7, 7, with which the section is provided. After the unit has been completely assembled with the flanges 9, 9 of the respective bosses pressed one into the other and the flanges 12, 13 of the sections secured together, the entire assembly is dipped in solder so as to seal all the joints against leakage and bind all the sections of the unit together as one complete device.

With the sections of the unit being made of sheet metal, the entire unit is light in weight and may be made at a minimum cost because the several sections may be stamped or formed in a single operation. Also the sections may be made uniform, thereby giving the entire unit a neat and symmetrical appearance, as well as being compact in form. This is of considerable importance in itself because the unit is not required to occupy a great amount of space in the chamber in which it is in-

stalled, as is necessary with those evaporators which are made of castings, boxes, pipe coils, and the like.

Another advantage of my invention resides in the fact that the flanges 12, 13, and 14, which are provided about the inner and outer edges of the sections, provide extended heat radiating surfaces for the sections at the places where needed and thus render the unit highly efficient. With each section being formed from a single blank of sheet metal, the front and rear walls of the section may be stamped in one operation, and thus be kept uniform and be made to properly fit one against the other with their respective parts in proper registration on final assembly. With the device sectional, it is much more flexible, in that the number of sections for different units may be varied in accordance with the installation requirements.

The details of structure and arrangement of parts shown and described may be variously changed and modified without departing from the spirit and scope of my invention.

I claim as my invention:

1. A refrigerating unit, comprising two or more sections, each section being formed from a single blank of sheet metal folded on itself to provide the sections with foldably connected front and rear walls, the walls of each section having registering grooves and openings therein, the grooves being pressed out of the opposed walls of the sections about the openings therein and forming the refrigerant circulating channels of the sections, and means connecting the sections together and providing communication between the channels thereof.

2. A refrigerating unit, comprising two or more sections, each section being formed from a single blank of sheet metal folded on itself to provide the sections with foldably connected front and rear sheet metal walls, the walls of each section having registering grooves and openings therein, the grooves being pressed out of the opposed walls of the sections about the openings therein and forming the refrigerant circulating channels of the sections, and hollow bosses pressed out of the walls of the respective sections on opposite sides thereof and opening into the channels; said bosses being disposed to contact for spacing the sections apart and having interfitting nipples to connect the sections together and communicate the channels.

3. A refrigerating unit, comprising two or more sections, each section having front and rear walls stamped from sheet metal with registering grooves and openings therein, the grooves being pressed out of the opposed walls of the sections about the openings therein and forming the refrigerant circulating channels of the sections, the walls of the several sections being flanged and secured together about their outer edges and about the edges of their registering openings, the flanges along one of the outer edges of each section having a greater width than the remaining flanges of the section.

4. A refrigerating unit, comprising two or more sections, each section being formed from a single blank of sheet metal folded on itself to provide the sections with foldably connected front and rear walls having registering grooves and openings therein, the grooves being pressed out of the opposed walls of the sections about the openings therein and forming the refrigerant circulating channels of the sections, the folded portion of the blank of each section constituting an enlarged heat radiating surface for the section.

5. A refrigerating unit, comprising two or more sections, each section being formed from a single blank of sheet metal folded on itself to provide the sections with foldably connected front and rear sheet metal walls, the walls of each section having registering grooves and openings therein, the grooves being pressed out of the opposed walls of the section about the openings therein and forming the refrigerant circulating channels of the section, the walls of each section being secured together about their outer edges and about the edges of the openings therein, hollow bosses pressed out of the walls of the sections on opposite sides thereof and having abutting contact at their outer ends for spacing the sections apart, and interfitting nipples on the respective bosses for connecting the sections together and continuing the contact surfaces of the bosses along the nipples.

6. A refrigerating unit, comprising two or more sections, each section having front and rear sheet metal walls with registering grooves and openings therein, the openings being in offset relation and the grooves surrounding the same and forming the refrigerant circulating channels of the sections, hollow bosses pressed out of the walls of the respective sections on opposite sides thereof for spacing the sections apart, the bosses of each section opening into the channels thereof with certain of the bosses arranged at opposite ends of the section and the others intermediate said ends, and interfitting nipples on the respective bosses for connecting the sections together and communicating the channels thereof.

In testimony whereof I affix my signature.

ROLLIN M. HYDE.