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A. Y. DOWELL

2,076,770

EVAPORATOR

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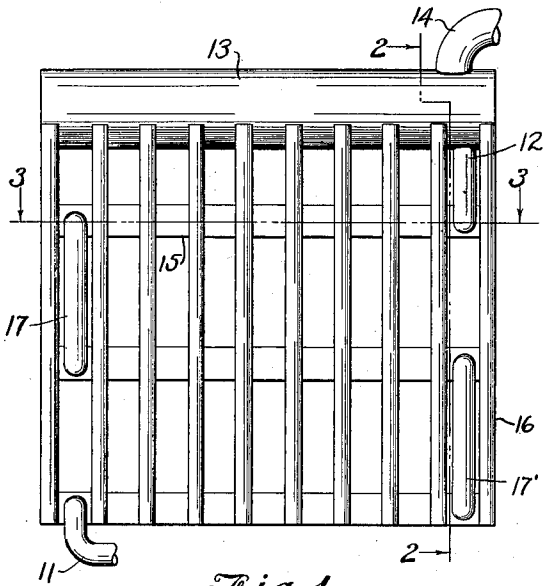


Fig. 1

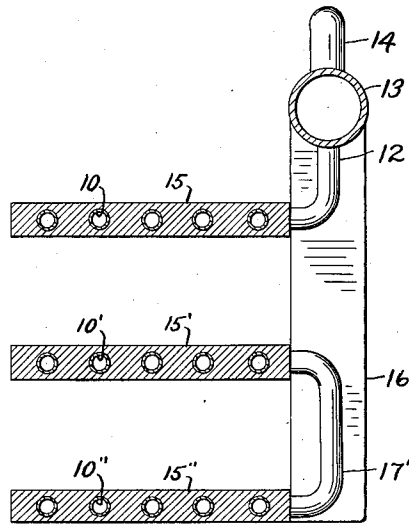


Fig. 2

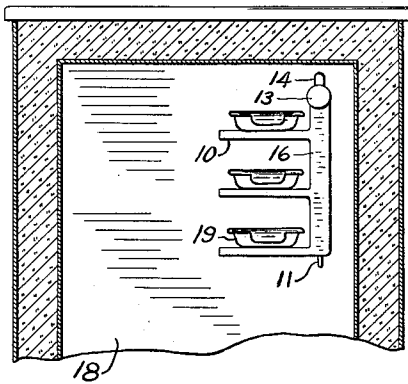


Fig. 4

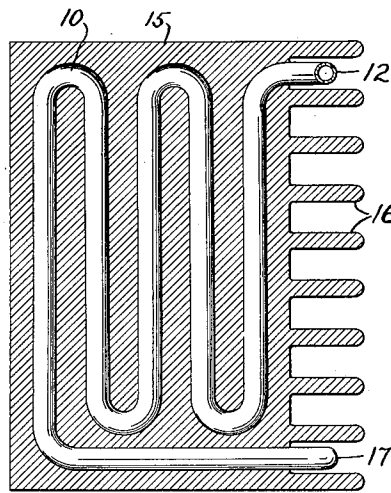


Fig. 3

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EVAPORATOR

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11 Claims. (Cl. 62—126)

This invention relates to cooling elements or evaporators for refrigeration apparatus.

In many refrigerators, especially those of the household type, a single cooling element is provided for the dual purpose of cooling the air in the refrigerator storage compartment and freezing water into ice cubes. The water or other substance to be frozen is usually contained in a receptacle adapted to be supported in thermal transfer relation with the cooling element or evaporator which latter is operated at a below-freezing temperature. For the best efficiency of heat transfer from the water or other substance to be frozen to the evaporator, there is required a very short path of high thermal conductivity. A plate or shelf type of evaporator best meets this requirement. On the other hand, there is required a much greater thermal transfer surface for efficient cooling of the air in the storage compartment. Also, since the air should not be reduced to freezing temperature, the thermal path from the air to the evaporator may be longer and of less thermal conductivity.

It is an object of this invention to provide an evaporator meeting the above requirements which is efficient in operation, simple, inexpensive, and durable in construction.

It is a further object of the invention to provide an evaporator that is very accessible for insertion and removal of freezing receptacles and for cleansing.

Other objects and advantages of the invention will be apparent from the following description taken in connection with the accompanying drawing in which:

Fig. 1 is a side elevation of an evaporator illustrating one embodiment of the invention;

Fig. 2, a section taken on line 2—2 of Fig. 1;

Fig. 3, a section taken on line 3—3 of Fig. 1; and

Fig. 4, an end view of the evaporator of Fig. 1 shown mounted in the storage compartment of a refrigerator.

Referring to the drawing, the evaporator comprises essentially a pipe coil, a header, and a cast metal body. The pipe coil is formed with a plurality of vertically spaced groups of horizontal loops 10. The lower end 11 of the pipe coil is adapted to be connected to receive liquid refrigerant from a suitable refrigeration apparatus or supply, not shown. The upper end 12 of the coil is connected to a header or disengaging vessel 13. The latter is preferably cylindrical and is formed by a tubular casing closed at both ends. As well known in the art, liquid refrigerant, admitted at the lower end 11 of the coil, evaporates and pro-

duces a refrigerating effect. The vapor is exhausted from the header 13 through a conduit or suction line 14 adapted to be connected to the low side of the refrigeration apparatus, not shown.

The body of the evaporator is formed as an integral metal casting. Aluminum is preferred on account of its high thermal conductivity. The casting is formed with a plurality of vertically spaced horizontal plate or shelf portions 15 embedding the respective groups of pipe loops 10. At one side of the shelves 10 a plurality of vertical ribs or fins 16 are formed integrally therewith. The size and the number of these fins depend of course upon the amount of air to be cooled and the desired temperature. The upper ends of the fins 16 form a cradle in which rests the header 13. The connecting portions 17 of the pipe coil between the horizontal loops 10 are preferably arranged so as to lie in the vertical finned wall 16 of the evaporator.

The evaporator is preferably mounted in the storage compartment of a refrigerator in the position illustrated in Fig. 4. The vertical finned section 16 is located at one side in the top of the compartment 18 and is therefore in the most advantageous position for adequately cooling the air. The warm air rises to the top compartment 18 and circulation is induced by the descent of air cooled by the evaporator. Since most of the air is cooled by the finned section 16, the downward flow of cool air takes place adjacent a side of the compartment where there is the least likelihood of obstruction due to shelf loading. The plates or shelves 10 extend laterally from the fin section and form refrigerated supports for ice trays 19 or other receptacles for substances to be frozen.

It will be apparent to those skilled in the art that various other changes may be made in the construction and arrangement without departing from the spirit of the invention, and therefore the invention is not limited to that which is described in the specification and shown in the drawing, but only as indicated in the following claims:

What is claimed is:

1. An evaporator comprising a pipe coil having a plurality of vertically spaced groups of horizontal loops and a metal casting forming a plurality of vertically spaced horizontal shelves respectively embedding said groups of pipe coil loops and a plurality of upright fins integral with and interconnecting said shelves on only one side thereof.

2. An evaporator comprising an integral metal

casting forming an upright structure of heat transfer fins and a plurality of vertically spaced shelves extending horizontally therefrom, a pipe coil having a plurality of vertically spaced groups of horizontal loops embedded respectively in said shelves, and a header connected to the upper end of said pipe coil and supported on the upper edge of said upright structure.

3. An evaporator comprising an integral metal casting forming an upright structure of parallel heat transfer fins and a plurality of vertically spaced shelves extending horizontally therefrom, a pipe coil having a plurality of vertically spaced groups of horizontal loops embedded respectively in said shelves, and a tubular header connected to the upper end of said coil, the upper edge of said upright structure forming a cradle in which said header is supported.

4. An evaporator comprising a shelf having a passage for refrigerant fluid, heat transfer fins forming an upright structure on one side of said shelf, a header supported on the upper edge of and in the plane of said upright structure, and a conduit connecting said passage to said header.

5. An evaporator comprising a shelf having a passage for circulation of refrigerant fluid and a plurality of fins forming an upright structure of the evaporator on one side of said shelf, and supply and discharge conduits for said passage disposed in the upright structure formed by said fins.

6. An evaporator comprising an integral metal casting forming an upright structure of parallel heat transfer fins and a plurality of vertically spaced shelves extending horizontally therefrom and having passages for the circulation of refrigerant fluid, and supply and discharge conduits for said passage disposed in the upright structure formed by said fins.

7. An evaporator comprising an integral metal casting forming an upright structure of finned construction with one or more shelves extending laterally therefrom and having passages interconnected for circulation of refrigerant fluid therethrough in series, and a header at the top of said upright structure connected to one end of said series passages, the interconnections for said passages being disposed in said upright structure.

8. An evaporator of cast metal construction comprising a single upright structure formed of

plates to provide extended heat transfer surface and a shelf at one side and extending from said structure, said shelf containing a coil embedded therein.

9. An evaporator designed to cool a chamber in which the same is adapted to be placed and also designed to cool matter contained in said chamber, said evaporator being formed of plate means forming extended heat transfer surface, said plate means being arranged in one position to support matter placed in the chamber, and other plate means arranged integrally with and on one side transversely of the first plate means and leaving the remainder of the first plate means unobstructed to provide increased heat transfer surface having sufficient area to adequately cool said chamber, the arrangement of said first plate means providing substantially unobstructed passage for air across and in contact with said second plate means.

10. An evaporator designed to cool a chamber in which the same is adapted to be placed and also designed to cool matter contained in said chamber, said evaporator being formed of plate means forming extended heat transfer surface, said plate means being arranged in one position to support matter placed in the chamber, and other plate means arranged integrally with and on one side transversely of the first plate means and leaving the remainder of the first plate means unobstructed to provide increased heat transfer surface having sufficient area to adequately cool said chamber, the arrangement of said first plate means providing substantially unobstructed passage for air across and in contact with said second plate means, the parts being assembled in a manner to permit access to be had to the supporting means from a position other than the front of the evaporator.

11. An evaporator formed as an integral metal casting having a series of upright fin plates and one or more shelf plates extending transversely of said fin plates and having refrigerant passages therein, there being open communication for air circulation between said fin plates to said shelf plates, and inlet and discharge conduits for said refrigerant passages disposed between said upright fin plates.

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