March 26, 1929. A. J. KUSEL ET AL 1,706,891

EVAPORATOR ELEMENT

Filed April 26, 1927 2 Sheets-Sheet 1

Fig. 1.

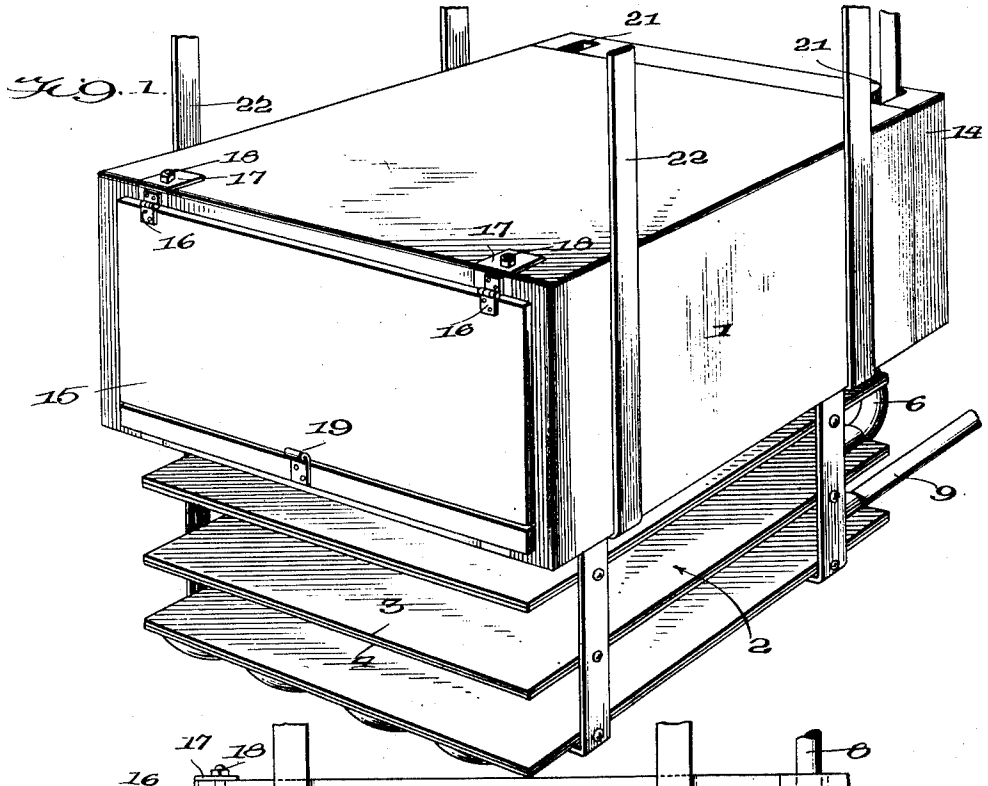
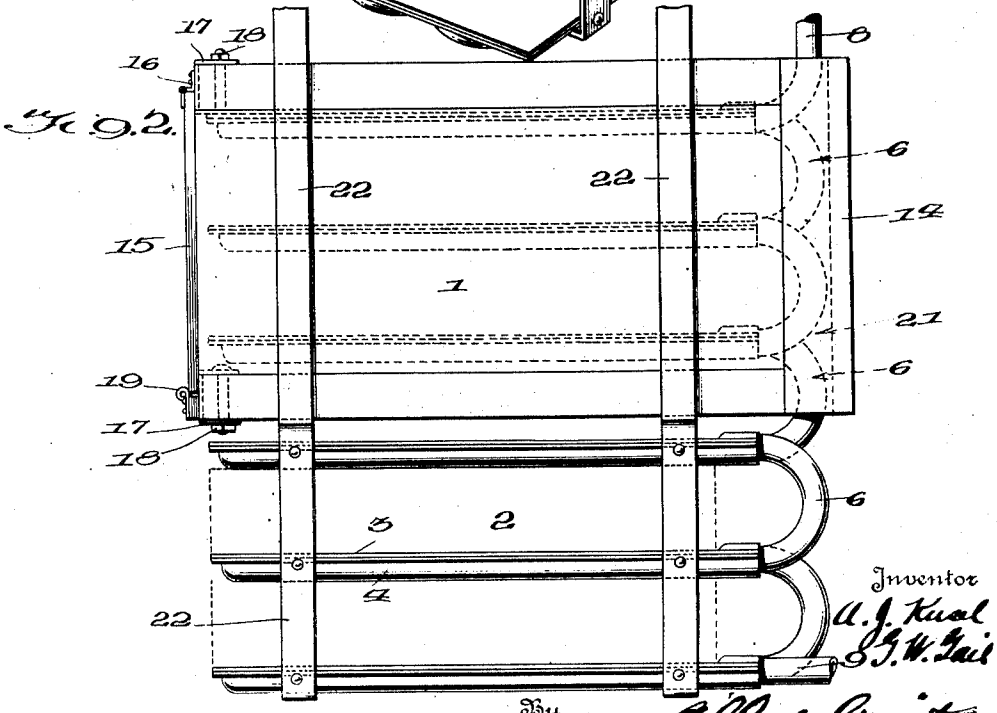


Fig. 2.



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Fig. 3.

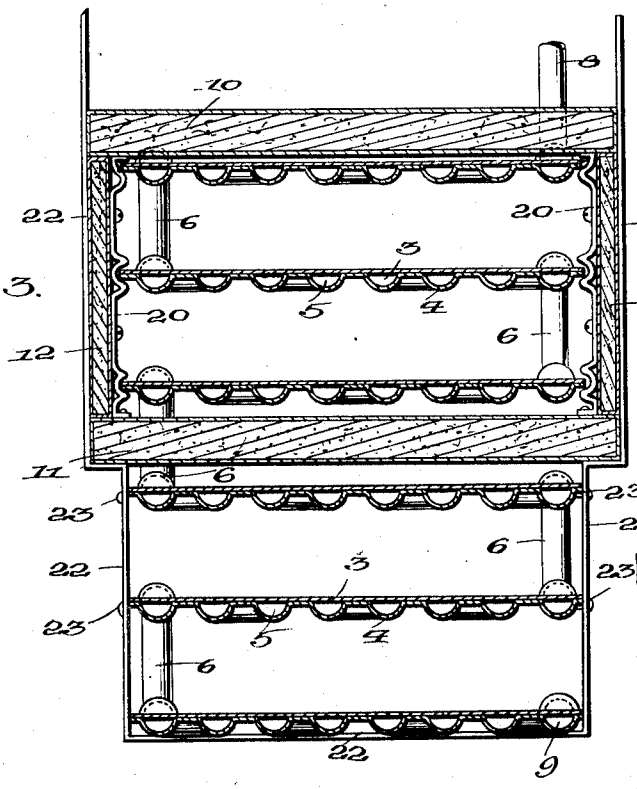


Fig. 6.

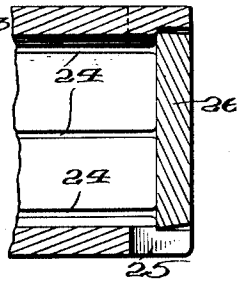


Fig. 4.

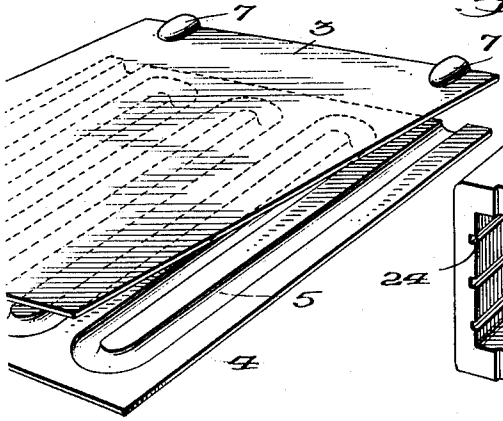
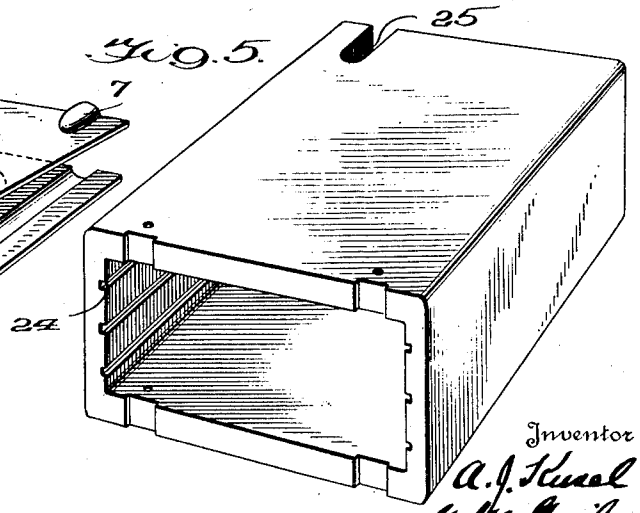


Fig. 5.



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UNITED STATES PATENT OFFICE.

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EVAPORATOR ELEMENT.

Application filed April 26, 1927. Serial No. 186,743.

This invention relates to certain improvements in refrigerating machines of the domestic type and has particular reference to the evaporator or expander element mounted within the refrigerator compartment.

In the later developments of automatic domestic refrigerators, the evaporator or expander element performs two functions, to wit, the cooling of the refrigerator compartment of the box and the freezing of a small quantity of ice, this latter usually being in the form of cubes, small compartment pans or trays being provided for this purpose.

The freezing portion of the evaporator or expander element, known in the art as the "sharp freezer" is generally formed by that portion of the element first receiving the refrigerant from the condenser of the system, the exhaust from the "sharp freezer" flowing through the remainder of the evaporator element to provide the necessary refrigeration for the refrigerator compartment of the box.

It also has been proposed to insulate the "sharp freezer" from the remainder of the evaporator element in various ways, by either placing said "sharp freezer" in a separate insulated compartment in the refrigerator box, or by placing insulation around the said "sharp freezer."

In all of the hereinbefore referred to constructions however, the evaporator element has been in the form of a coil of tubing, that part of the evaporator element forming the "sharp freezer" being merely a continuation of the evaporator element or coil proper.

Coils are expensive and hard to maintain in assembled relation as a unit. Moreover in these previous constructions, these evaporator elements are so designed that it is impossible to increase or decrease the size of said element, or change the relative proportions of the "sharp freezer" and cooling portion of the element after the same has been assembled or made up, and the same parts cannot be interchangeably used with evaporator elements of various sizes and capacities in the initial production of said elements.

The object of the present invention is to provide an evaporator or expander element, comprising a "sharp freezer" and a refrigerator compartment cooling portion, of such design and construction that the said parts can be cheaply produced, readily assembled in any relative proportions and easily maintained in said assembled relation in an inexpensive and simple manner.

As distinguished from a continuous coil type of evaporator element, the instant invention comprises generally the combination of a series of similarly constructed individual heat exchange units interconnected to permit a continuous flow of the refrigerant therethrough, the desired number of said individual units being enclosed in an insulated box or the like forming the "sharp freezer." These individual units are of plate like form and constructed of sheet material comprising a flat upper plate and a grooved lower plate properly connected together to provide fluid type passageways therebetween, and also a flat upper surface for the reception of the ice pans to be inserted in the "sharp freezer" compartment, and when desired, for supporting brine tanks or trays in that exposed portion of the expander element forming the cooling medium for the refrigerator box.

This construction is not only efficient, but well adapted to cheap quantity production, as the size and capacity of the expander element as a whole merely depends upon the number of heat exchange units used, and the relative proportions between the size of the "sharp freezer" and the refrigerator compartment cooling portion of the expander element simply depends upon the relative size of the "sharp freezer" casing or box and the remainder of the expander element, it is of course to be understood that the larger the "sharp freezer" casing the more heat exchange units are enclosed therein.

The preferred embodiment of the invention is illustrated in the accompanying drawings in which

Fig. 1 is a perspective view of the assembled evaporator or expander element including the "sharp freezer";

Fig. 2 is a side elevation thereof;

Fig. 3 is a transverse vertical sectional view;

Fig. 4 is a detailed view illustrating generally the manner of constructing the heat exchange unit; and

Figs. 5 and 6 show a modified construction of insulated casing or enclosure for the "sharp freezer."

Referring to the drawings in detail the

invention comprises generally an evaporator element consisting of an enclosed "sharp freezer" 1 and an exposed portion 2 forming the cooling means for the refrigerator box, the unit as a whole adapted to be mounted within the refrigerator in the usual manner.

This expander element is constructed of a series of superimposed heat exchange units of the same size and shape. Each of these heat exchange units consists of the flat top plate 3 and a grooved lower plate 4 producing therebetween a serpentine passageway 5, the passageways 5 of the heat exchange units being interconnected by curved pipe sections 6 more clearly shown in Fig. 2. These pipe sections 6 are of tubular form and in order to make the proper connections with the passageways 5 of the respective heat exchange units, the top flat plate 3 of each unit is pressed upwardly as at 7 at certain points as shown in detail in Fig. 4. It is of course to be understood that the uppermost heat exchange unit is connected by a pipe or tube 8 to the expansion valve and the condenser of the system, not shown, and the lowermost heat exchange unit is similarly connected by a pipe 9 to the return pipe of the compressor.

The heat exchange units constituting the "sharp freezer" are enclosed in an insulated box or casing comprising a top 10, a bottom 11, sides 12 and 13, a removable back portion 14 and the front of the casing is provided with a door or closure 15.

In the form of insulated casing or enclosure as shown in Figs. 1, 2 and 3 the various parts thereof are constructed of sheet cork covered with thin copper and in order to properly support the closure 15, the hinges 16 thereof are secured to metallic U-shaped clips 17 which are in turn fastened through the sheet cork top 10 by bolts or the like 18. The door is maintained in closed position by a conventional spring catch or the like 19 as shown.

Secured to the inner faces of the sides 12 and 13 of the insulated casing are guideways 20 preferably made of sheet metal for supporting the heat exchange units in properly spaced relation within the enclosure.

It is to be noted that the curved pipe sections 6 connecting the heat exchange units are all arranged at the rear end of the evaporator or expander element and in order to permit the proper application of the back portion 14 said back portion is provided with vertically disposed grooves 21 to accommodate the curved pipe sections 6.

The lower, or exposed portion of the expander element, which as hereinbefore stated, is constructed of heat exchange units similar to those used in the "sharp freezer" compartment, is suspended by straps or the like 22 which straps also embrace the "sharp freezer" compartment and at their upper ends said straps 22 are appropriately secured to the refrigerator box (not shown). These respective straps 22 are preferably continuous, passing beneath and supporting the lowermost heat exchange unit of the exposed portion of the evaporator and are secured in any preferred manner to the edges of the adjacent heat exchange units, as at 23.

With the above arrangement the flat upper plates 3 of the heat exchange units provide a very convenient and efficient support for the ice pans to be inserted in the "sharp freezer" compartment and also the brine tanks or trays to be inserted when desired between the exposed heat exchange units of that portion of the evaporator employed for cooling the refrigerator box.

The whole construction is very simple and cheap to manufacture and assemble into expander elements of various relative proportions and capacities with respect to the "sharp freezer" and the remainder of the element comprising the refrigerator cooling portion. As a matter of fact the whole evaporator consists in reality of only two main parts to wit the heat exchange unit per se and the insulated casing or enclosure for the "sharp freezer" and with these two elements many variations as to proportions and capacities can be produced.

In Figs. 5 and 6 a modified form or type of "sharp freezer" compartment is shown. In this modified form the enclosure is made of porcelain or the like and the manner of securing the door or closure to this form is the same as previously described with respect to the form of enclosure involving the use of copper covered sheet cork. In the porcelain construction however, the guideways or supports for the heat exchange units are formed integral with the side walls of the enclosure as shown at 24. Also in this form the rear end of the enclosure is somewhat different from that previously described and instead of forming the vertical grooves in the back portion to accommodate the connecting pipes or tubes 6, in this latter construction, the top and bottom at the rear of the enclosure is recessed as at 25 and a back portion 26 is cemented into the rear end of this porcelain structure which latter is shown in Fig. 6.

Although the invention has been illustrated and described in connection with a structure wherein the exposed portion of the evaporator element is suspended below the "sharp freezer" compartment, which is the preferred form, it is of course to be understood that this arrangement can be reversed without in any way affecting the efficient operation of the unit as a whole. In other words, the exposed portion of the ex-

pander element can be positioned above the "sharp freezer" compartment in which event the supporting straps 22 will pass beneath the "sharp freezer" compartment or casing for supporting the complete unit in an obvious manner.

We claim:—

1. An evaporator element for refrigerating machines, comprising a series of superimposed connected heat exchange units, an insulated casing for enclosing a certain number of said units, depending straps for suspending the remaining units below the casing, said straps embracing the evaporator element as a whole and providing a means for supporting said element within a refrigerator compartment.

2. An evaporator element for refrigerating machines, comprising a series of superimposed connected heat exchange units, an insulated casing for enclosing a certain number of said units, guideways carried by the inner side walls of the casing for supporting and maintaining said units in spaced relation, a removable back for said casing, a closure for the front of the casing and means for suspending the remaining units below said casing.

3. An evaporator element for refrigerating machines, comprising a series of superimposed connected heat exchange units, an insulated casing for enclosing a certain number of said units, guideways carried by the inner side walls of the casing for supporting and maintaining said units in spaced relation, a removable back for said casing, a closure for the front of the casing and means for suspending the remaining units below said casing in spaced relation.

4. An evaporator element for refrigerating machines, comprising a series of superimposed connected heat exchange units, an insulated casing for enclosing a certain number of said units, guideways carried by the inner side walls of the casing for supporting and maintaining said units in spaced relation, a removable back for said casing, a closure for the front of the casing, depending straps for suspending the remaining units below the casing, means for securing said remaining units to the straps in spaced relation, said straps embracing the evaporator element as a whole and providing a means for supporting said element within a refrigerator compartment.

5. An evaporator element for refrigerating machines, comprising a series of superimposed connected heat exchange units, an insulated casing for enclosing a certain number of said units, guideways carried by the inner side walls of the casing for supporting and maintaining said units in spaced relation, a removable back for said casing, a closure for the front of the casing, depending straps for suspending the remaining units below the casing, means for securing said remaining units to the straps in spaced relation, said straps embracing the evaporator element as a whole and providing a means for supporting said element within a refrigerator compartment and inlet and outlet connections to and from said element.

6. An evaporator element for refrigerating machines, comprising a series of superimposed connected heat exchange units, an insulated casing for enclosing a certain number of said units, guideways carried by the casing for supporting and maintaining said units in spaced relation, a removable back for said casing, a closure for the front of the casing and means for supporting the remaining units outside of said casing.

7. An evaporator element for refrigerating machines, comprising a series of superimposed connected heat exchange units, an insulated casing for enclosing a certain number of said units, guideways carried by the inner side walls of the casing for supporting and maintaining said units in spaced relation and means for supporting the remaining units outside of said casing.

8. An evaporator element for refrigerating machines, comprising a series of superimposed connected heat exchange units, an insulated casing for enclosing a certain number of said units, guideways carried by the inner side walls of the casing for supporting and maintaining said units in spaced relation, a closure for the front of the casing and means for supporting the remaining units outside of said casing.

In testimony whereof we affix our signatures.

ABRAHAM J. KUSEL.
GEORGE W. GAIL.