July 18, 1939. H. W. KLEIST 2,166,161

COOLING APPARATUS

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Fig. 1.

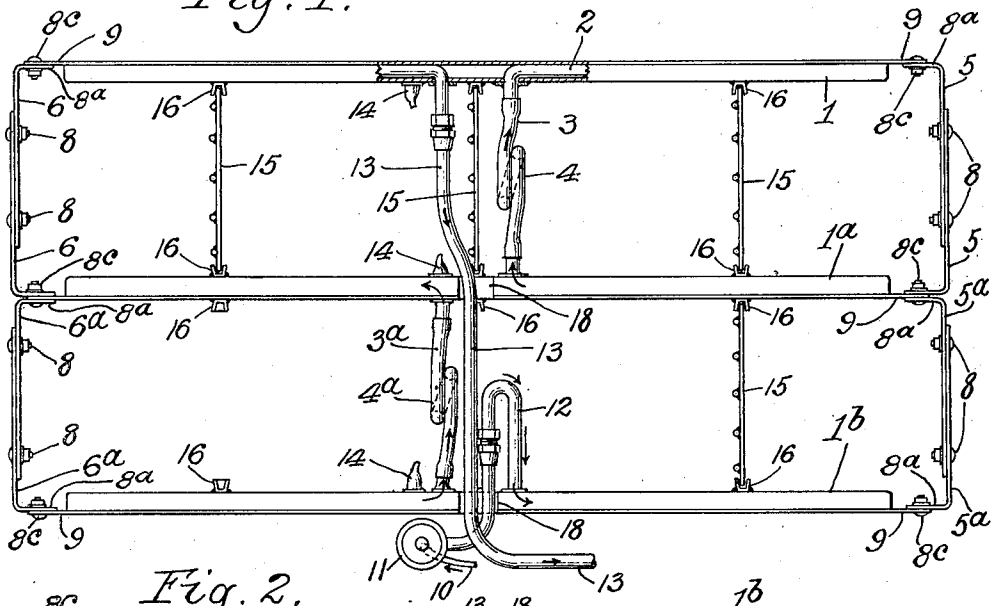
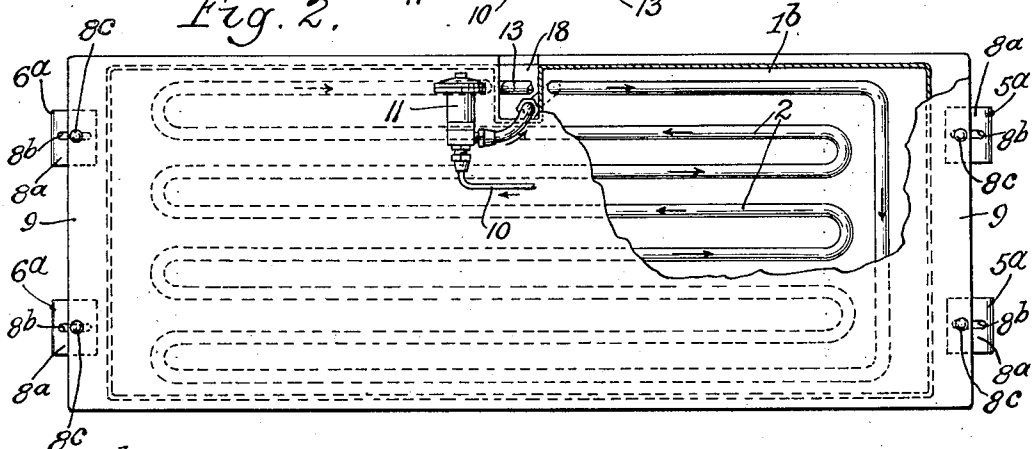


Fig. 2.



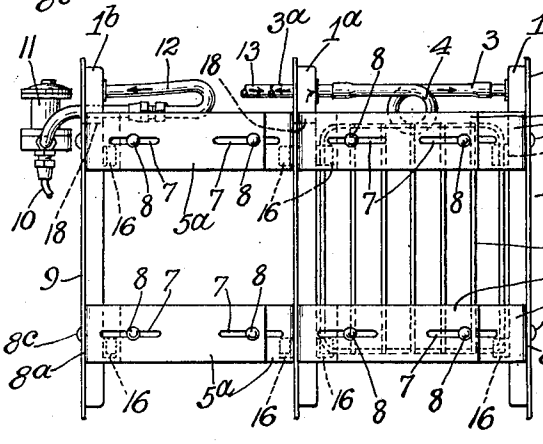
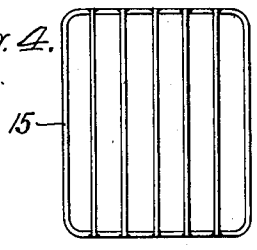


Fig. 3.

Fig. 4.



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COOLING APPARATUS

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Fig. 5.

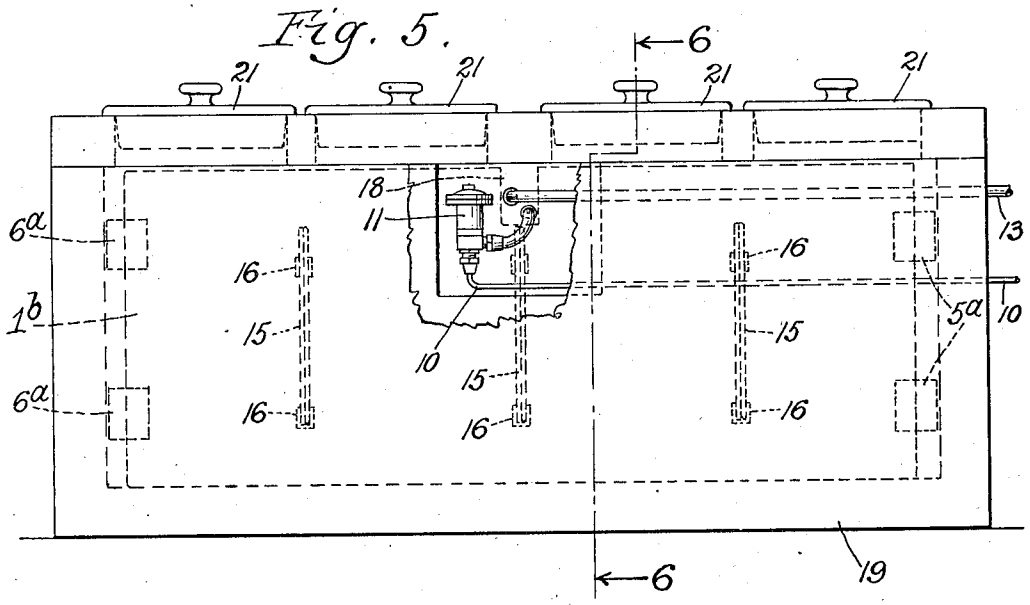
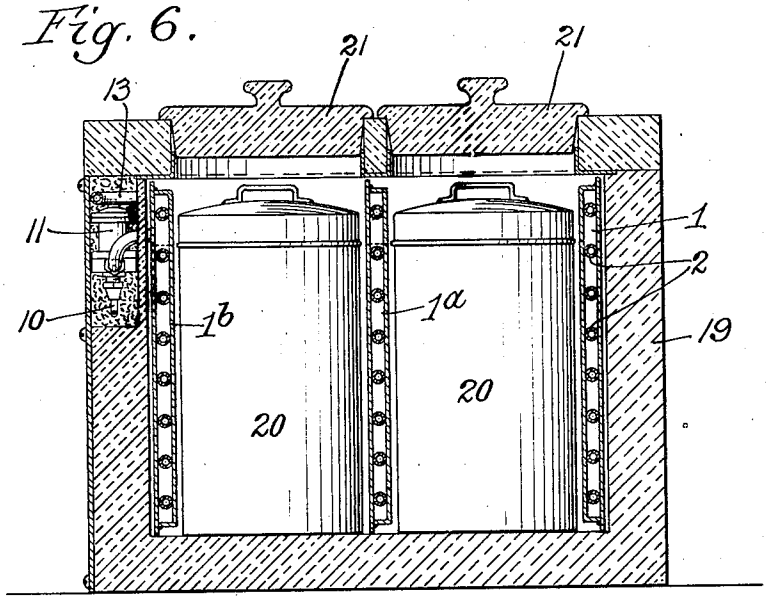


Fig. 6.



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UNITED STATES PATENT OFFICE

2,166,161

COOLING APPARATUS

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Application February 27, 1937, Serial No. 128,052

7 Claims. (Cl. 62—126)

This invention relates to cooling or refrigerating apparatus and has for its object to provide a new and improved apparatus of this description particularly adapted for a cooling cabinet conversion unit.

The invention has as a further object to provide a refrigerating apparatus consisting of a series of plates with refrigerating coils in them and means for adjustably connecting these plates together so that they may be made up in the factory and shipped to the point of use and placed in cabinets varying in size. At the present time, there are a large number of ice cream cabinets in use which have brine tanks in the cabinets. These brine tanks often leak and are objectionable in other ways.

One of the objects of the invention is to provide a plurality of refrigerating plates with refrigerating coils between them arranged so that they may be placed in these old cabinets after the brine tank is removed.

The invention has further objects which will be more particularly pointed out in the accompanying specification.

Referring now to the drawings:

Figure 1 is a plan view of one form of device embodying the invention with parts broken away;

Figure 2 is a side elevation of the device shown in Figure 1 with parts broken away;

Figure 3 is an end view of the device shown in Figure 1;

Figure 4 is a view of one of the removable partitions which divides the spaces between the plates into sections for the receptacles containing material to be cooled;

Figure 5 is a side elevation showing the refrigerating apparatus installed in a cabinet, which is here shown as one of the old ice cream brine tank cabinets; and

Figure 6 is a sectional view taken on line 6—6 of Figure 5.

Like numerals refer to like parts throughout the several figures.

Referring now to the drawings, Figure 1 shows one of the refrigerating units as made up ready to be installed in a suitable cabinet. As herein shown, this unit comprises a plurality of refrigerating plates 1, 1*a*, 1*b*. These plates are made up of metal sheets between which is received a pipe 2, through which the refrigerant passes. This pipe preferably extends back and forth to form a coil. Some means are provided for properly causing the metal sheets to press tightly against the pipe. I prefer to use vacuum plates, that is plates in which sufficient air is exhausted from the space between the sheets to cause the outside air to press the sheets tightly against the pipe. The sheets are connected together so as to form a sealed plate which will hold a vacuum. I may also, when desired, partially fill the space in the plates with a liquid which has a low freezing point, which liquid will congeal when the device is in use. So as to maintain the desired low temperature for a longer period of time when the liquid is used in the plate, I also prefer to use the vacuum in connection with the plates having the liquid therein. The plates 1, 1*a*, 1*b* are made up of the desired size and are then adjustably connected together. Since these plates must be connected together by the pipes through which the refrigerating medium passes, it will be seen that these pipes must be arranged so as to be adjustable. It is impractical to adjust these pipes by means of joints as they usually must be adjusted at the point of use.

In the construction shown, the coil 2 of the plate 1 is connected to the coil 2 of plate 1*a* by pipe 3. This pipe is preferably made of some metal which can be bent or changed in shape, such as copper. This pipe is made longer than the distance which is spans between the plates, that is, longer than the straight line distance between its ends, thus providing a reserved portion or extra length, and this reserved portion or extra length forms an adjustable member which permits adjacent plates to be moved toward or from each other without disconnecting the connection between the coils. This adjustable member may be shaped or formed in any desired manner. For example, it may be provided with a bent or looped portion 4 so that the plates 1 and 1*a* can be easily moved toward or from each other to adjust them by simply applying pressure so as to cause the bent portion 4 to more or less change its position or shape. It is of course evident that these bent portions may be of any desired shape. One of the simplest constructions is to provide a U-shaped bent portion. The plate 1*a* is connected to the plate 1*b* with a similar pipe 3*a* and bent portion 4*a*. The plates themselves are adjustably connected together in any desired manner. As herein shown, these plates have connecting members 5, 5*a*, 6 and 6*a*, preferably, at their ends. These connecting members overlap and are provided with slots 7 which register. There are fastening devices 8 passing through these slots so that when the plates are adjusted to

proper position, the fastening devices will hold them in such position. These fastening devices may be bolts or any other suitable fastening devices. These connecting members are preferably adjustably connected with the plates by means of slots 8b for fastening devices 8c.

The connecting members 5 and 6 may be connected to the plates in any desired manner. I prefer to provide the plates with projecting parts 9 which project beyond the body of the plate and to which the ends of the projecting members may be attached. These projecting members may be formed in any desired manner, but I prefer to form them by making one of the sheets larger than the other so that it will project at the ends beyond the body of the plate.

The refrigerating medium, when the device is in use, passes through pipe 10 and through expansion valve 11 into pipe 12 which connects with one end of the pipe in one of the plates such as the plate 1b. This refrigerating medium then passes through the pipe in the plate 1b, for example, and then through pipe 3a into the pipe in plate 1a, and then through the pipe 3 into the pipe in plate 1, and then out of the pipe in plate 1 through the pipe 13 to the suction side of the compressor. The plate 1 is provided at one side with a notch for the pipe 13 and the plates 1a and 1b are provided with spaces or notches 18 for the pipes 13 and 12.

The expansion valve may be of any suitable type. Each of the plates is provided with a suitable valve connection 14 for connecting it to a suitable vacuum producing device by means of which air can be withdrawn between the plates. The pipe 13, as it leaves the unit, in most instances, would have a bend as indicated in Figure 1, and this bend is at a sufficient distance from the outside plate to permit adjustment of the plate if desired after it is in position. I prefer to provide in between the plates removable partitions 15 so as to divide the space into sections for receiving the receptacles into which the material to be cooled is placed, such as ice cream cans. These partitions may be of any suitable form and are preferably made with openings through them so that the sections are all connected together from the cooling standpoint. I have illustrated these partitions as being formed of grates. The plates are shown as having guides 16 into which these partitions are received. When it is desired to use the unit in a brine ice cream cabinet, the brine tank is removed and the unit is placed in the cabinet, the plates being adjusted so as to properly fit into the cabinet. In Figs. 5 and 6, I have shown a cabinet 19, having plates 1, 1a and 1b placed therein, and I have also shown the cans 20 in between the plates and the covers 21, for each section containing a can. The unit, when so used, may be simply sent to the place of use, the old brine tank removed, and the unit placed in the receptacle and connected up to the compressor.

The connecting members 5 and 6 are not only adjustable laterally, but they are adjustable longitudinally. This adjustment is secured by adjustably connecting the ends 8a with the projections 9. This adjustment is secured by providing the bent ends 8a with the slots 8b. It will be seen that by means of these slots the fastening devices may be loosened and the connecting members adjusted longitudinally. This insures providing the proper space between the plates and the partitions for the end cans.

I have shown a particular construction embodying the invention, but it is of course evident that the parts may be varied in many particulars without departing from the spirit of the invention as embodied in the claims hereto appended, and I therefore do not limit myself to the particular construction shown.

I claim:

1. A cooling cabinet conversion unit comprising a plurality of vertically extending plates, each made up of a pair of sheets of metal with a space between them, a pipe in the space between each pair of sheets of metal, formed into a coil located in said space, refrigerant conducting pipes connecting the coils of said plurality of plates together so that the refrigerant is passed successively through the coils in said plurality of plates, and adjusting means for adjustably connecting said plates together.

2. A cooling cabinet conversion unit comprising a plurality of plates made of sheets of metal with spaces between said sheets of metal, pipes formed into coils for circulating refrigerant material and located in said spaces, each pair of sheets being hermetically sealed together to form a hermetically sealed receptacle, a portion of the air being withdrawn from this receptacle, and adjustable connections connecting the coils of the plates together so that the plates may be moved relatively, laterally, to fit the unit into cabinets of various sizes.

3. A cooling cabinet conversion unit comprising a plurality of vertically extending plates each made of a pair of sheets of metal with a space between them, pipes formed into coils for circulating refrigerant material and located in said spaces, adjustable connections connecting the coils of the plates together, and adjustable connections adjustably connecting the plates so that they may be moved relatively, laterally, to fit the unit into cabinets of various sizes, and means for holding said plates in any of their adjusted positions.

4. A cooling cabinet conversion unit comprising a plurality of vertically extending plates each made of a pair of sheets of metal with a space between them, pipes formed into coils for circulating refrigerant material and located in said spaces, pipes extending across between adjacent plates for connecting the coils of the plates together, portions of said pipes between their ends formed into loops to permit the lengthening and shortening of the pipes to adjust the plates so that they may be moved relatively to fit the unit into cabinets of various sizes.

5. A cooling cabinet conversion unit comprising a plurality of plates each made of a pair of sheets of metal hermetically sealed together and providing a hermetically sealed space between said sheets of metal, pipes formed into coils for circulating a refrigerant material and located in said spaces between said pairs of sheets of metal, a portion of the air being exhausted from between the sheets of metal, adjustable connections connecting the coils of the plates together, said plates provided at their upper edges with hermetically sealed notches for the pipes leading from the coils therein to and from the source of refrigerant supply, whereby the plates may be moved relatively to fit the unit into cabinets of various sizes.

6. A cooling cabinet conversion unit comprising a plurality of vertically extending plates each made of a pair of sheets of metal with spaces between them, pipes formed into coils and located

in said spaces between said pairs of sheets of metal, adjustable pipe connections connecting the coils of the plates together, connecting members connected with said plates, the connecting members of adjacent plates overlapping, said connecting members provided with slots, and fastening devices located in said slots.

7. A cooling cabinet conversion unit comprising a plurality of vertically extending plates each made of a pair of sheets of metal with spaces between said pairs of sheets of metal, pipes formed into coils and located in said spaces between said pairs of sheets of metal, adjustable pipe connections connecting the coils of the plates together, one of the sheets of metal of each plate projecting at each end from the body of the plate, and adjustable connecting members connected with the projecting ends of said sheets of metal for adjustably connecting said plates together.

HERMAN W. KLEIST.