April 14, 1942. C. F. MUNSHOWER 2,279,483

DRY STORAGE BOTTLE COOLER

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Fig. 1.

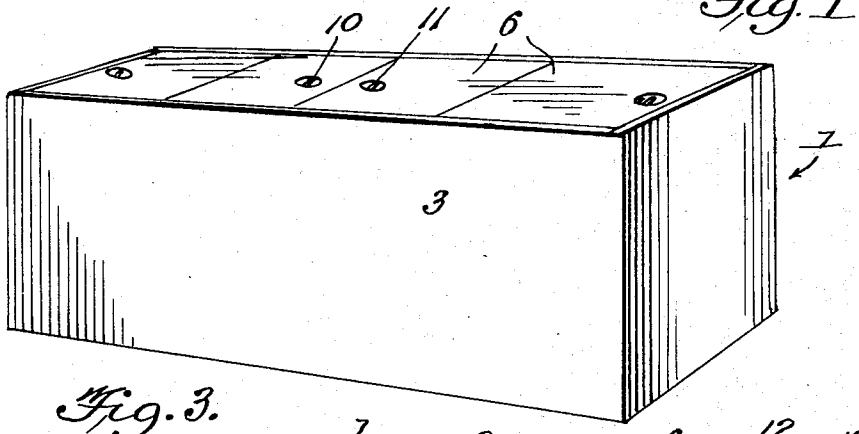
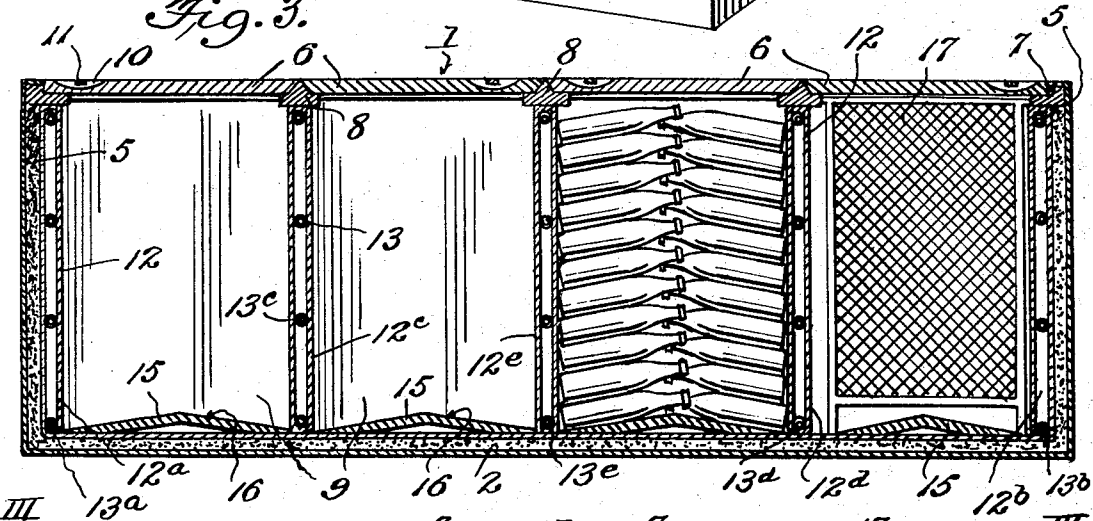


Fig. 3.



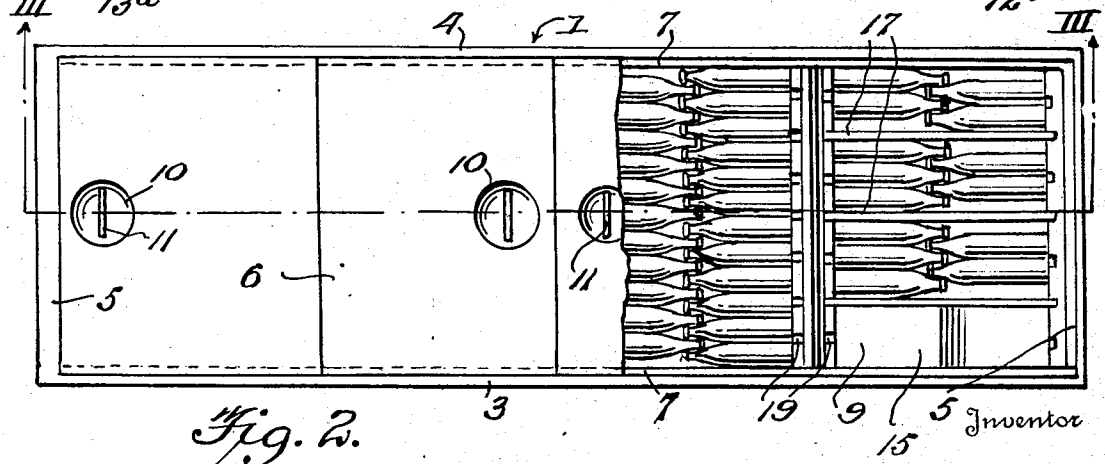


Fig. 2.

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Fig. 7.

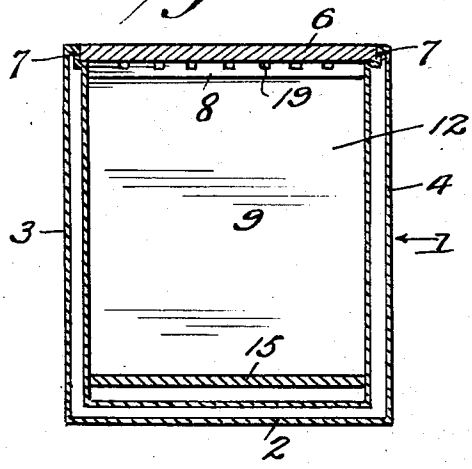


Fig. 4.

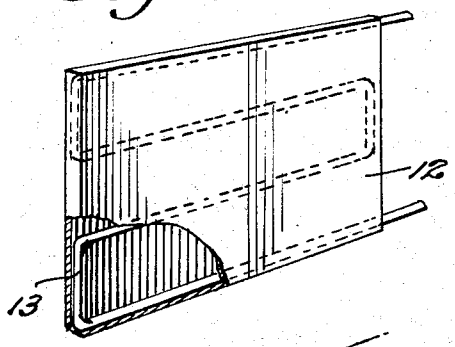


Fig. 5.

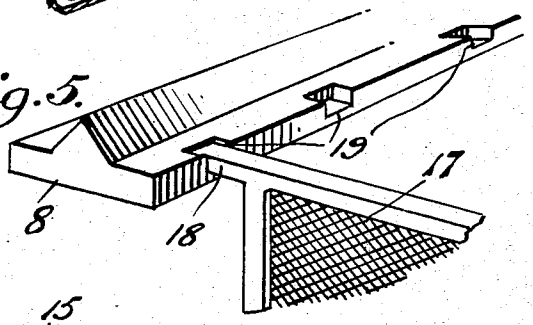
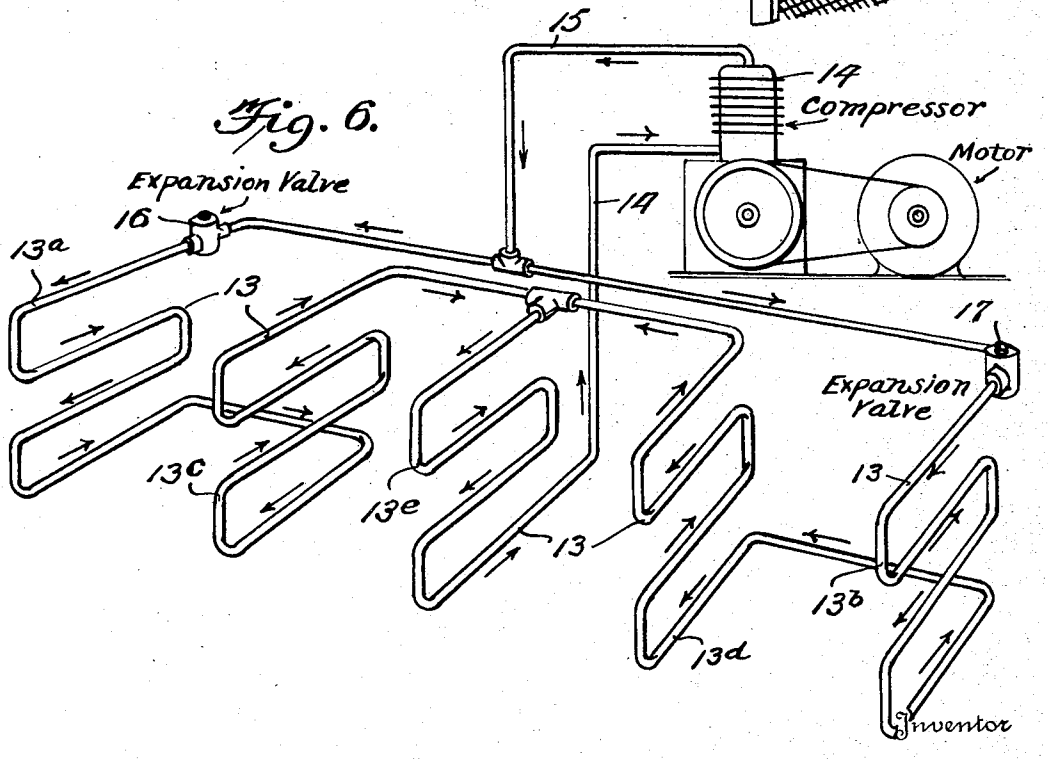


Fig. 6.



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DRY STORAGE BOTTLE COOLER

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Application September 13, 1939, Serial No. 294,724

5 Claims. (Cl. 62—141)

This invention relates to improvements in the construction of mechanically refrigerated coolers, and has particular reference to that type of cooler employed in maintaining relatively large numbers of beverage-containing bottles under conditions of cold, dry storage.

Restaurants, hotels and beverage dispensing establishments require in the conduct of their business large coolers capable of simultaneously receiving and cooling in an externally dry condition several hundreds of beverage-containing bottles. It is, therefore, important that such coolers should be so designed as to compactly receive relatively large numbers of bottles, admit of ready selection and removal of such bottles, and to provide for rapid and uniform cooling of bottled beverages, so that the latter will possess desired temperatures upon removal from the cooler.

Bottle coolers now commercially available of the mechanically refrigerated type are subject to the following criticisms: first, the limited storage capacity which such coolers possess per cubic feet of storage space, second, the inability of such coolers to rapidly reduce the temperature of the bottle beverages placed therein, and, third, the inability of such coolers to uniformly cool to a requisite temperature all bottles placed therein.

It is the aim, therefore, of the present invention to provide a bottle cooler having an unusually high storage capacity for standard twelve ounce bottles, receiving a greater number of such bottles per cubic feet of storage space than other standard types of coolers now available for this purpose. Such increased storage capacity is attained in the present invention primarily by the provision of a novel means for stacking and arranging the bottles in the several compartments of the cooler cabinet.

Another salient feature of the present invention is the provision of refrigerating elements in the cooler so formed and disposed that each bottle under storage will directly and physically contact with a cooling element, so that the bottles will be cooled in the main by conduction and only in a secondary way by convection, whereby not only are the bottles and their contents more rapidly cooled than heretofore, but exacting uniformity is attained in temperature regulation, so that each bottle and its contents will attain closely regulated temperatures of a desired low order.

Further objects and advantages of the invention will be gained by reference to the following description and the accompanying drawings, wherein:

Fig. 1 is a perspective view of a bottle cooler formed in accordance with the present invention;

Fig. 2 is a top plan view thereof;

Fig. 3 is a vertical longitudinal sectional view on the line III—III of Fig. 2;

Fig. 4 is a perspective view of one of the cooling plates, parts thereof being broken away and shown in section;

Fig. 5 is a detail perspective view disclosing the means for supporting the removable compartment dividers;

Fig. 6 is a diagrammatic view of the refrigeration circuits.

Fig. 7 is a vertical transverse sectional view taken through the cooler.

Referring more particularly to the drawings, the numeral 1 designates the chest-like cabinet of the bottle cooler comprising the present invention. This cabinet may be of any desired external configuration and the walls thereof formed from standard materials employed in refrigerator or cooler construction. Usually, these walls are heavily insulated to resist heat transmission. Internally, the cabinet is of box-like form, having a bottom 2, vertical front and rear walls 3 and 4, respectively, and vertical end walls 5. The open top of the cabinet, through which access is provided to its interior, is preferably closed by means of a plurality of sliding, horizontally disposed doors or covers of the type indicated at 6. These doors are also of heavy insulated construction and travel in guiding grooves 7. In the cooler disclosed, there are four of the doors or covers 6, although any suitable number may be employed.

These doors engage with transversely extending supporting strips 8 extending across the open top of the cabinet. The opposite faces of each of the strips 8 are reversely inclined to correspond with the inclination or bevel along the edges of the doors. This permits the doors to slide upwardly and move over the upper edges of the strips 8 in order that one door may be positioned over the other when access to the individual compartments 9 within the cabinet is desired. Preferably, each door is provided with a recessed area 10 in its upper surface, and across each recess there extends a rigid bar 11. By this means, the lids or covers 6 may be conveniently grasped and by sliding movements advanced between positions of opening and closure.

Arranged vertically in longitudinally spaced order within the cabinet are vertical refrigerat-

ing or cooling plates 12. One of these plates is applied to the inner surface of each of the end walls 5, and, in addition, in the cabinet shown, three partition plates, appropriately spaced to form the compartments 9, are situated. These cooling plates are of a standardized design and are commercially known as vacuum cold plates. Each plate comprises a thin hollow sheet metal body with the surfaces thereof protected by a corrosion-proof zinc coating. Within the interior of the bodies forming the cooling plates 12, there are disposed copper tubes or coils 13 through which a normally gaseous refrigerant is circulated. Any standard mechanically operated refrigerating system may be used in conjunction with the tubes or coils 13. Such a system may be placed either within the confines of the cabinet 1, or more remotely positioned with respect thereto, depending upon the necessities of installation.

The compressor of such a refrigerating system has been indicated at 14 and, in order to assist in maintaining uniform temperatures throughout the interior of the cabinet, the pressure outlet pipe line 15 of the compressor extends to a pair of expansion valves 16 and 17, as shown in Fig. 6. The expansion valve 16 is disposed contiguous to the inlet of the coil 13*a* arranged in one of the end wall cooling plates 12*a*, while the expansion valve 17 is arranged in or contiguous to the inlet of the coil 13*b* arranged in the end wall cooling plate 12*b*.

Following passage of the refrigerant through the coil 13*a*, said refrigerant passes to a coil 13*c* arranged in the partition plate 12*c*. Likewise, following the passage of the refrigerant through the coil 13*b* of the plate 12*b*, the said refrigerant is delivered to the coil 13*d* of the partition plate 12*d*. In order that the central partition plate 12*e* will have a temperature approximately that of the remaining cooling or partition plates, the outlets of the coils 13*c* and 13*d* merge in a common pipe or fitting and center the coil 13*e* within the plate 12*e*, passing through the coil 13*e* and returning to the compressor system by way of the return line 14. By the employment of these split refrigeration circuits, I am able to balance the temperature throughout the interior of the cabinet within limits of approximately 2° F. and the arrangement is therefore important in uniformity in temperature control.

The bottom of each of the compartments 9 is provided with a removable bottle support 15. Each of these supports has oppositely inclined upper surfaces 16, the said supports being higher adjacent their centers and sloping downwardly toward the partition walls of the cabinet. Standard bottles are placed on the surfaces 16, as disclosed in Fig. 3 and also placed one on another in superposed tiers or stacks with the reduced necks of the bottles disposed in interfitting order, as shown in Fig. 2. This provides for a very compact stacking of the bottles so that a maximum number thereof may be received within each cubic foot of storage space within the cabinet.

Also, the inclination of the surfaces 16 causes the bottles to positively gravitate toward the cooling plates 12 so that the enlarged base portions of the bottles will directly and physically contact with the refrigerated surfaces of said cooling plates. By thus conditioning each bottle stored within the compartments 9 into direct contact with the refrigerating elements, the cooling of the liquids contained within the bottles takes place largely by conduction and enables each bottle to be not only rapidly cooled but to possess the same low temperature as the other bottles under storage. When a bottle contacts with the applied surface of the refrigerating plates, the cold being conducted to the walls of the bottle establishes, in all probability, a thermal circulation or movement of the liquids within the bottles, thus causing an accelerated reduction in temperature of the liquids.

In most coolers now available for bottled beverages, the bottles are placed in mechanically cooled compartments so that only certain of the bottles come into direct contact with the cooling elements, the remaining bottles being cooled by convected air currents established by the refrigeration of the compartment space, the result being that the bottles more distantly removed from the refrigerating elements are not chilled to the required low temperatures. Even when forced circulation of the air currents within the compartments by means of blowers or the like is attempted, lack of uniformity in bottle temperatures still prevails. In the present construction, each bottle has direct physical contact with a refrigerated element.

Inasmuch as most dispensers of bottled beverages carry many different brands or makes of such beverages, it is often found convenient to subdivide each of the compartments 9, so that the subdivisions may each receive a beverage of a single type. The subdivision of the compartments may be conveniently effected by the provision of reticulated dividers 17 which, at their lower ends, rest on the support 15 and at their upper ends are formed with lateral extensions 18. These extensions are received within pockets 19 provided at intervals along the longitudinal edges of the strips 8, so that the dividers may be positioned wherever desired and securely supported in their selected operative positions.

In view of the foregoing, it will be seen that the present invention provides a bottle cooler which cools by virtue of the principle of conduction, that is, by direct contact of each bottle under storage with a refrigerated cooling unit, the result of this construction being rapid and uniform cooling of all bottles placed in the cooler. By the formation and arrangement of the compartments 9, the bottles are stacked or nested in extremely close order, so that a maximum number of such bottles may be stored in each cubic foot of storage space. By the provision of the removable dividers 17, each compartment can be subdivided in a minimum of time and without the employment of special tools to effect the operation. The rack or bottle support 15 in the bottom of the cabinet may be lifted out for convenience in cleaning the interior of the cabinet and, in addition, the construction of said rack or support is such as to insure the contact of the bottles with the cooling units which, in this instance are in the form of the plates or panels 12. It is of course within the scope of the invention to employ other types of cooling units. The split refrigeration circuits passing through the cooling plates, provide for the balancing of the temperatures throughout the interior of the cabinet, so that such temperatures may be held within unusually close limits.

The sliding lids of the top of the cabinet provide ready access to each of the compartments so that it is a very simple matter to load or unload the compartments of bottles. There are no

moving parts in the cooler proper, such as fans or blowers which demand attention or require repair. Essentially the cooler is quite simple in construction and maintains the bottles placed therein in a dry state so that labels thereon do not become wet or moist and easily removed from the bottles.

As illustrative of the storage capacity of a cooler formed in accordance with the present invention, a cabinet having outside dimensions of 60 in. by 33 in. by 28 in., with a remotely positioned compressor unit, will hold 30 cases or 720 standard 12 oz. bottles. Moreover, all these bottles may be quickly cooled to usable temperatures within a period of several hours, so that if the cooler is filled to its desired capacity at the end of a day's business, all bottles will be available for use or sale the following day. This is in marked contrast with standard coolers of more conventional design, where the recommended period of storage is 24 hours.

What is claimed is:

1. A cooler for bottled beverages, comprising a cabinet, a plurality of vertically arranged longitudinally spaced refrigerating panels stationarily mounted in said cabinet, the spacing of said panels producing a plurality of bottle storage compartments, and oppositely inclined supports provided in the bottom of said compartments for the reception of bottles resting on their sides, the inclination of such supports being such as to positively maintain the base end of each bottle in direct contact with at least one of said refrigerating panels.

2. A cooler for bottled beverages comprising a box-like cabinet having an open top and insulated walls, a plurality of vertically arranged, longitudinally spaced refrigerating panels stationarily mounted in said cabinet, the spacing of said panels producing a plurality of bottle storage compartments, movable closures for the open top of said cabinet, and bottle supporting means arranged in said compartments and serving to positively maintain the base end of each bottle positioned in said compartments in direct contact with said refrigerated panels.

3. A cooler for maintaining bottled beverages under dry storage refrigeration, comprising a cabinet, spaced refrigerating units arranged within said cabinet and dividing the latter into a plurality of bottle-receiving compartments, and oppositely inclined walls provided in the bottoms of said compartments for the reception of bottles resting on their sides, the inclination of said walls being such as to maintain by gravity the base end of each bottle received within said compartments in direct contact with at least one of said refrigerating units.

4. A cooler for bottled beverages comprising an elongated cabinet having insulated side, end and bottom walls, vertically disposed transversely extending refrigerated panels positioned in said cabinet to divide the interior thereof into a plurality of compartments, each compartment having a pair of opposed refrigerated walls, and being of such size and shape as to receive a pair of oppositely disposed stacks of bottles, and means in said compartments for maintaining each bottle therein in direct contact with a refrigerated wall.

5. A cooler for bottled beverages comprising an elongated cabinet having insulated side, end and bottom walls, vertically disposed transversely extending refrigerated panels positioned in said cabinet to divide the interior thereof into a plurality of compartments, each compartment having a pair of opposed refrigerated walls, and being of such size and shape as to receive a pair of oppositely disposed stacks of bottles, and a pair of bottle supports disposed in each compartment, each bottle support sloping toward a refrigerated wall.

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