

July 1, 1952

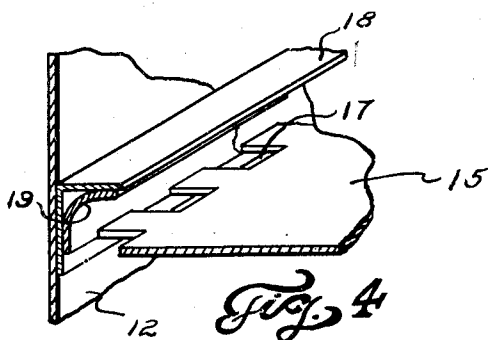
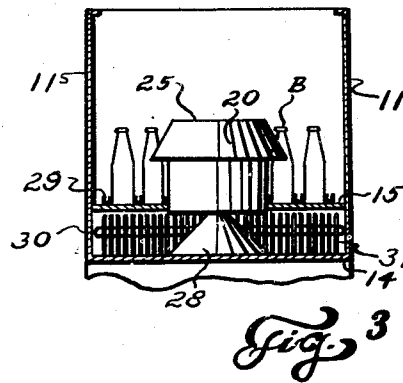
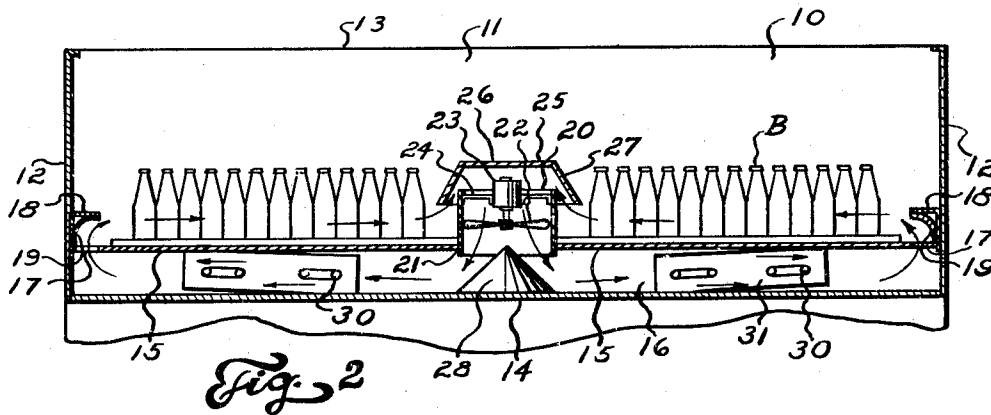
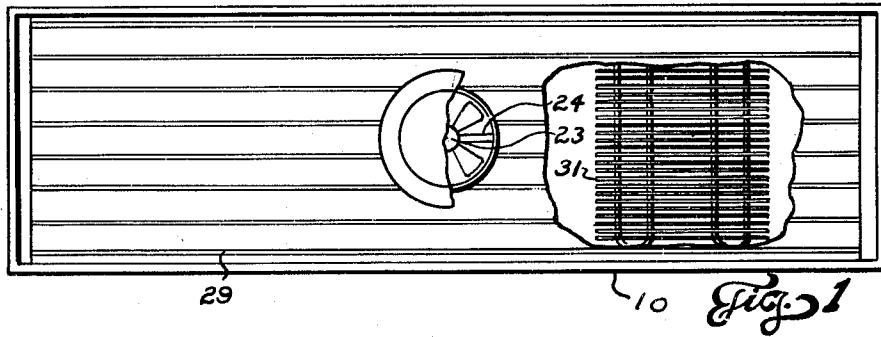
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2,601,765

DRY COOLING CABINET

Filed Oct. 9, 1948

3 Sheets-Sheet 1



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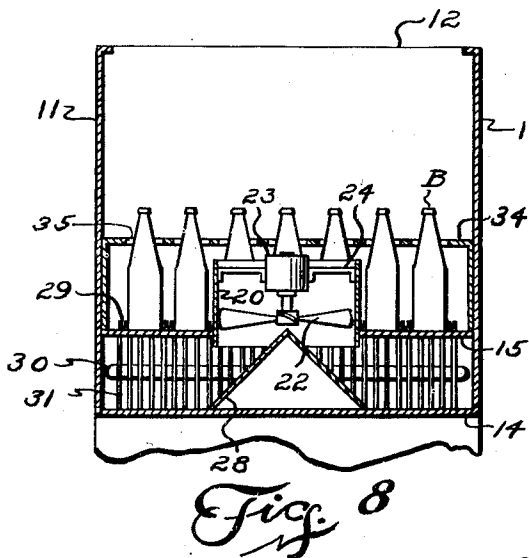
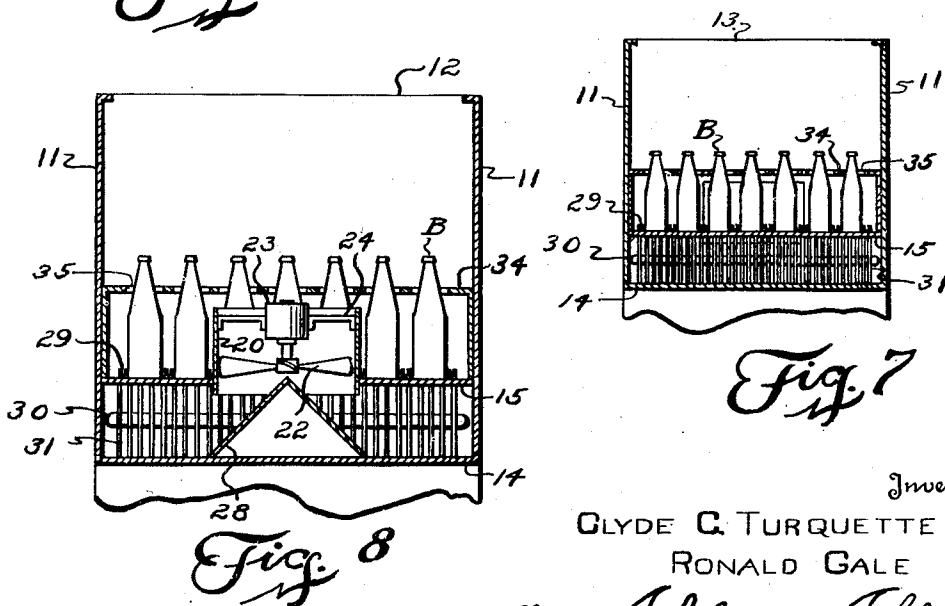
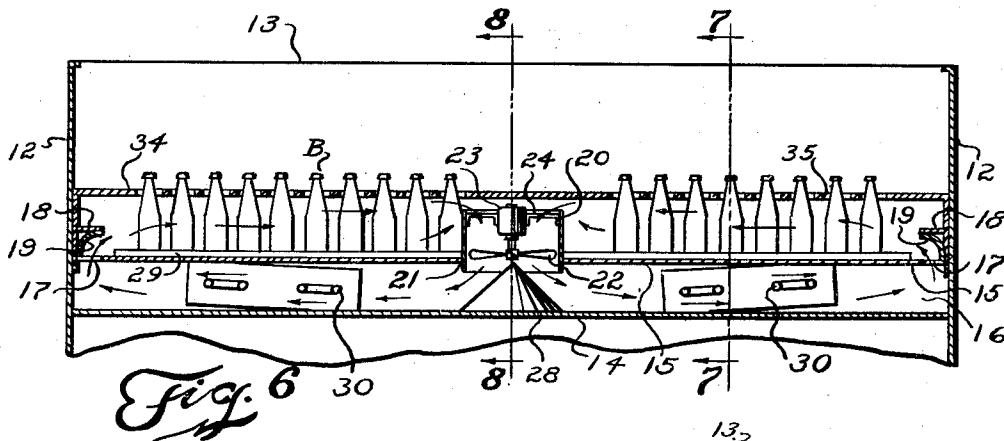
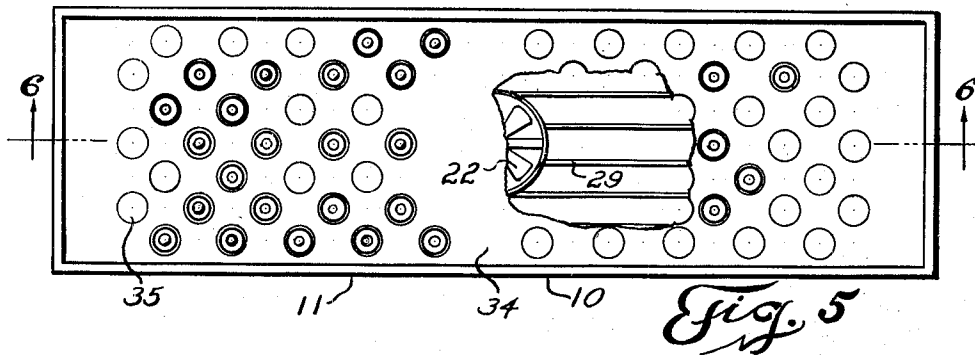
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3 Sheets-Sheet 2



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DRY COOLING CABINET

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3 Sheets-Sheet 3

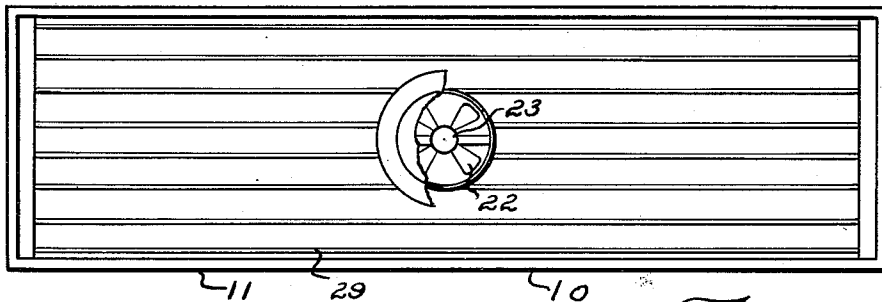


Fig. 9

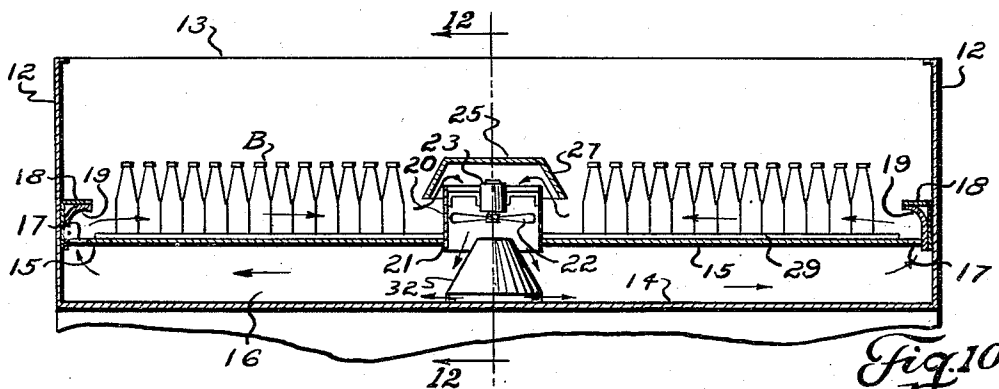


Fig. 10

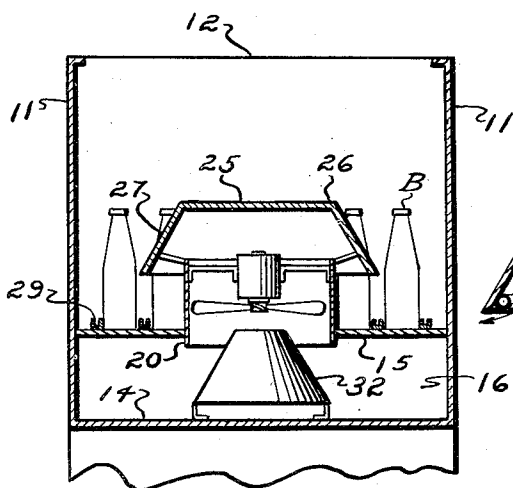


Fig. 12

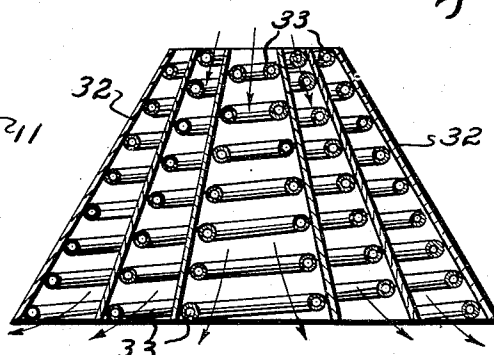


Fig. 11

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DRY COOLING CABINET

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Application October 9, 1948, Serial No. 53,652

12 Claims. (Cl. 62—102)

1

This invention relates to new and useful improvements in dry cooling cabinets.

The invention is particularly concerned with those types of cooling cabinets for bottled beverages, bottled milk, and similar articles, in which a current or blast of cold air is caused to flow over the bottles or containers, thereby cooling the same, as contrasted to those types of coolers in which the goods are immersed in a liquid cooling medium.

It is, therefore, a particular object of this invention to provide an improved dry cooling cabinet which operates efficiently and effectively to maintain articles such as bottled beverages at the desired temperature without at the same time requiring the immersion or partial immersion of said articles in a liquid cooling medium.

An important object of the invention is to provide an improved dry cooling cabinet in which the path of the cooling air currents is restricted and confined to the desired areas whereby loss of the cooling air is substantially minimized while efficient and desirable cooling is maintained.

A still further object of the invention is to provide an improved dry cooling cabinet in which the cooling air currents are directed in a substantially horizontal fashion through rows of the articles being cooled, and are forced to remain within the article containing portion of the cabinet whereby the upper side of the same may be left open without a serious loss of the cooling or refrigerating air currents.

Yet another object of the invention is to provide an improved dry cooling cabinet having a shielding baffle through which articles may be inserted for cooling, but which functions to confine the cooling air currents and prevent their dissipation and loss.

A still further object of the invention is to provide an improved dry cooling cabinet having a novel arrangement for the cooling coils.

A construction designed to carry out the invention will be hereinafter described together with other features of the invention.

The invention will be more readily understood from a reading of the following specification and by reference to the accompanying drawings, wherein examples of the invention are shown:

Fig. 1 is a plan view, partially broken away, of a dry cooling cabinet constructed in accordance with this invention,

Fig. 2 is a vertical, longitudinal, sectional view of the cabinet shown in Fig. 1,

Fig. 3 is a vertical, transverse, sectional view of the cabinet,

2

Fig. 4 is an enlarged, fragmentary, isometric view of one end of the cabinet showing the air return,

Fig. 5 is a plan view of a modified form of the cabinet, the view being partially broken away to illustrate the structure,

Fig. 6 is a longitudinal, vertical, sectional view of the cabinet shown in Fig. 5,

Fig. 7 is a vertical, cross-sectional view taken upon the line 7—7 of Fig. 6,

Fig. 8 is an enlarged, vertical, cross-sectional view taken upon the line 8—8 of Fig. 6,

Fig. 9 is a plan view, partially broken away, of a further modification of the invention,

Fig. 10 is a longitudinal, vertical, sectional view of the modification shown in Fig. 9,

Fig. 11 is an enlarged, vertical, sectional view of the cooling baffles for the modification shown in Fig. 9, and

Fig. 12 is a vertical, cross-sectional view taken on the line 12—12 of Fig. 10.

In the drawings, the numeral 10 designates an elongate, horizontal, rectangular housing having side walls 11 and end walls 12. The top 13 of the housing is open and is adapted to be closed by a suitable cover or lid (not shown). The housing also has a solid bottom 14, and the entire structure may be suitably insulated, as desired. However, for the sake of simplicity no insulation has been shown since any type may be used and since the invention is not concerned therewith.

A false bottom 15 extends parallel to the bottom 14 and is spaced a short distance thereabove to define an elongate horizontal air passage 16 in the lower portion of the housing. The false bottom 15 extends entirely across the housing between the side walls 11, and also abuts the end walls 12 as shown in Figs. 2 and 4. A plurality of openings or cutouts 17 are provided in the end portions of the false bottom immediately adjacent the end walls 12, said openings being arranged in a row extending transversely of each end of the housing. The end walls 12 have secured thereto angular deflectors 18 at each end of the false bottom 15, said deflectors overlying the openings 17. In addition, an arcuate or concave gusset plate 19 is secured upon the underside of each of the deflectors 18 and in the apex thereof so that the gusset plate and deflectors together form a curved baffle which overlies each of the rows of openings 17. As will appear more fully hereinafter, air currents are directed toward each end of the housing through the air passage 16, and pass upwardly through the openings 17. The baffles 55 formed by the gusset plates 19 and deflectors 18

function to divert the air currents flowing upwardly through said openings, and to direct them laterally in a horizontal fashion across the upper surface of the false bottom 15.

At the center of the false bottom 15, an open-ended, cylindrical, vertical stack 20 is positioned, the lower end of the stack being received within an opening 21 cut in the center of said false bottom and projecting a slight distance therebelow, while the upper end of said stack is positioned a short distance above the upper surface of the false bottom. This cooler is intended primarily for use in refrigerating bottled beverages, such as soft drinks, bottled milk, and the like, and all of the containers for such beverages are of approximately the same height, that is seven to ten inches. It is to be noted that the open upper end of the stack 20 is disposed at a height above the false bottom 15 of the same magnitude as the height of the bottles B being cooled. However, the stack may be slightly higher or taller than said bottles, if desired. It is pointed out and stressed that it is essential to this invention for the upper end of the stack 20 to be positioned in a plane adjacent to the plane of the upper end of the containers being cooled. This means that some degree of latitude exists in the positioning of the stacks and that it need not be precisely and exactly mounted. However, since one primary purpose of the invention is to achieve a horizontal flow of air over the bottles B, it is obvious that the stack 20, through which the air must flow, must be positioned substantially in horizontal alignment with said bottles.

For establishing air flow through the cabinet, a suitable fan 22 is positioned within the stack 20, and is adapted to be driven by an electric motor 23 mounted within the stack upon a suitable spider 24. It is obvious that any suitable driving means may be employed and that various types and designs of fans may be driven thereby. The necessary result sought is that an air flow of considerable velocity be caused to pass through the stack 20.

For limiting the direction of air flow into the upper end of the stack 20, a hood or shield 25 is mounted thereover, said hood including a central circular portion 26 of approximately the same diameter as stack 20, and a depending and outwardly flared skirt 27 secured to the periphery of the portion 26. The hood is positioned above the open upper end of the stack with the depending skirt 27 encircling the upper edge of the stack and extending a short distance therebelow. Thus, air entering the stack must flow under the lower edge of the skirt 27, upwardly into the hood, and then around the upper edge of the stack 20 to flow downwardly through the latter. The hood prevents the fan from drawing warm or hot air from the upper portion of the cabinet, and limits the air intake to the stratum of cooled air flowing from the deflectors 18. It is to be noted that the effective plane of the air intake is thus positioned below the upper ends of the bottles B and that the air is drawn from the stratum overlying the false bottom 15 and extending upwardly to a point adjacent to the medial portions of the bottles B.

The air which is drawn into the stack 20 is driven downwardly by the fan through the open bottom of said stack and enters into the space between the bottom 14 and the false bottom 15. A conical deflector 28 is positioned upon the bottom 15 in vertical alignment with the stack 20, said deflector thus functioning to divert the air

stream in a radial fashion and cause it to spread out into the air passage 16 and flow toward either end of the housing. As this air reaches the ends of the housing, it passes upwardly through the openings 17 and is deflected by the gusset plates 19 whereby it undergoes a change in direction of 180° and passes horizontally over the bottles B, which are supported upon the upper surface of the false bottom 15, and is again drawn under the skirt 27 into the open upper end of the stack 20. Thus, the cooling air flows in a rapid fashion through two adjacent and parallel horizontal paths, one of which extends between the bottom 14 and the false bottom 15, while the other is in a layer immediately overlying the false bottom 15 and having its upper boundary below the upper extremities of the bottles being cooled. To facilitate the passage of the air currents through the bottles, a plurality of elongate, parallel guide members 29 are secured to the upper surface of the false bottom 15. As shown in Fig. 3 the guides 29 may be in the form of small, inverted channels, the adjacent guides being positioned apart a distance sufficient to receive the bases of the bottles B. In this manner, the longitudinally extending rows of bottles are spaced apart so as to provide passages through which the cooling air currents flow.

The cooling coils 30 for refrigerating the air currents are positioned in the air passage 16 and embedded in a finned radiator 31 employed in the usual manner to increase the heat absorbing surface. One of the finned radiators is positioned in each end of the housing within the air passage 16 between the bottom 14 and the false bottom 15 medially between the deflector 28 and said end of the housing. Thus, the air currents flowing through the air passage 16 toward each end of the housing are caused to pass over one of the radiators or cooling structures and are thereby thoroughly refrigerated and cooled before passing upwardly into contact with the bottles. As shown in Fig. 2, the radiators are slightly inclined with respect to the longitudinal axis of the housing to allow condensed moisture to drip therefrom, and to eliminate direct contact with the false bottom whereby the latter would be excessively cooled and containers frozen thereto and thereby. It is obvious that any suitable or desirable type of cooling structure or arrangement may be employed, but the structure described has been found particularly advantageous in that all of the air is forced to flow over the cooling surfaces which extend throughout the full vertical distance between the bottom 14 and the false bottom 15, and because the cooling coil structure also extends throughout the full width of the air passage 16. Of course, a suitable refrigerant is passed through the coils 30 from the usual type of refrigerating unit (not shown) which may be positioned in the lower portion of the cabinet below the bottom 14, or at any other suitable point. In addition, a thermostat control (not shown) may be employed to control the degree of refrigeration.

In the operation of this cooling cabinet, the air, which is cooled by the cooling fins 31, is directed in a horizontal path over the intermediate and lower portions of the bottles B which are positioned upon the upper surface of the false bottom 15. While there will be small eddy currents and some turbulence due to the flow between and around the bottles, and such turbulence and eddy flows may reach to or slightly above the upper ends of the bottles so as to cool

5

the same, there will be substantially no air flow or agitation in the portion of the housing above the bottles and above the hood 25. In this manner, a dead air space or blanket of non-agitated air will be maintained in the upper portion of the housing 10 and there is no loss or dissipation of refrigerated air thereinto or therethrough. Thus, the upper portion of the housing may be frequently exposed or opened, or even may be left entirely open at all times with no cover of any type, and adequate cooling and refrigeration yet maintained in the lower portion thereof. This is possible because of the horizontal flow of the refrigerating air and the spreading or extension of that portion of the air flowing into the bottle space over the entire width of the housing at each end thereof. In this manner, zones or areas of extremely high velocity air currents are avoided, and the tendency for such air currents to go astray and escape from the cooling zone is eliminated. A steady uniform flow of cold air over the bottles is maintained, and since vertical vectors in the direction of air flow are eliminated, there is no tendency for the air to pass into the upper portion of the housing and thus be lost for any useful purpose.

A modified form of the cooling arrangement is shown in Figs. 9 through 12 of the drawings, in which the cooling fins 31 are eliminated, and instead a plurality of concentric, hollow, open ended, frustro-conical cooling elements 32 are positioned in vertical alignment with the stack 20 and at the lower end thereof. Suitable cooling coils 33 are secured to the elements 32 and cool said elements to affect the desired refrigeration of the air currents passing thereover. This structure functions to refrigerate the air and at the same time to deflect and direct the air in a radial fashion as was previously accomplished by the deflector 28. Having been cooled and correctly directed by the cooling element 32, the air currents flow through the air passage 16 and upwardly through the openings 17 as previously described. This type of cooling structure requires a slightly deeper housing than the structure first described but permits the obtaining of lower temperatures since additional cooling coil area may be employed.

A modification of the cooling cabinet is shown in Figs. 5 through 8 and is particularly adapted for the cooling and refrigerating of large numbers of identical and uniform containers, such as bottles of soft drinks. The structure involved is identical in many respects to that shown in Figs. 1 through 4, but the hood 25 is dispensed with, and instead, an elongate rectangular shield 34 is positioned horizontally within the housing a distance above the false bottom 15. The distance of spacing of the shield 34 above the false bottom is equivalent to about two-thirds or three-quarters of the height of the usual soft drink bottle, and a large number of staggered openings 35 are cut in the shield 34 for the purpose of receiving said bottles. Thus, the bottles may be lowered through the openings 35 to rest on the false bottom 15 which may or may not carry the guides 29, as desired, and the upper extremity of said bottles will remain projecting upwardly through said openings whereby the bottles may readily be grasped and removed from the cabinet. The positioning of the shield 34 is determined by downwardly turned flanges 36 at each end thereof, the flanges abutting the end walls 11 and having their lower edges resting upon the upper portion of the angular deflectors 18. By employ-

6

ing the shield 34, the cooling air currents passing upwardly through the opening 17 are further confined and restricted, and only the minimum amount of communication between the upper portion of the housing and the cooling zone, is permitted. This minimum amount is that required for insertion and removal of the articles being cooled, and the portions of the shield between the openings 35 serve as a baffle to insure further that no stray currents of the cooling air will escape to the upper portion of the housing. The central portion 36 of the shield 34 which overlies the stack 20 is imperforate to prevent the fan 22 from drawing air from the upper portion of the housing and restricts the air intake of the fan to the space beneath the shield 34. With this structure, a high degree of confinement for the refrigerating air currents is achieved, and at the same time, proper spacing of the containers for cooling is assured, it being pointed out that the containers are spaced longitudinally as well as laterally within the cooling cabinet.

The foregoing description of the invention is explanatory thereof and various changes in the size, shape and materials, as well as in the details of the illustrated construction may be made, within the scope of the appended claims, without departing from the spirit of the invention.

What we claim and desire to secure by Letters Patent is:

1. A dry cooling cabinet including, a housing having side walls and end walls and a closed bottom, a false bottom in the housing above the closed bottom forming an air passageway along said closed bottom, a relatively short open-ended stack extending through the false bottom and communicating between the spaces thereabove and therebelow, a fan in the stack, a hood overlying the upper end of the stack, the false bottom having an opening at each end adjacent the housing end walls, deflectors overlying the openings for directing air toward the stack, and cooling means for the air passing through the fan, the stack having its upper end disposed a substantial distance below the upper ends of the side and end walls of the housing and adjacent the horizontal plane of the deflectors.

2. A dry cooling cabinet including, a housing having side walls and end walls and a closed bottom, a false bottom in the housing above the closed bottom forming an air passageway along said closed bottom, a relatively short open-ended stack extending through the false bottom and communicating between the spaces thereabove and therebelow, a fan in the stack, a hood overlying the upper end of the stack, the false bottom having an opening at each end adjacent the housing end walls, deflectors overlying the openings for directing air toward the stack, the deflectors being positioned in a horizontal plane closely adjacent the horizontal plane of the under surface of the hood, whereby air is caused to flow in a substantially horizontal path over the upper surface of the false bottom, and cooling means for the air passing through the fan.

3. A dry cooling cabinet including, a housing having side walls and end walls and a closed bottom, a false bottom in the housing above the closed bottom forming an air passageway along said closed bottom, the false bottom having an opening at each end adjacent the housing end walls through which air may flow, deflectors overlying the openings for directing air passing upwardly through the latter toward the center

7

of the housing in a horizontal plane, a relatively short open-ended stack extending through the center of the false bottom and receiving air flowing from said openings, the stack having its upper end disposed in a horizontal plane closely adjacent the horizontal plane of the deflectors whereby the flow of air from the deflectors through the stack is maintained in a substantially horizontal plane, a fan in the stack, and means for cooling the flowing air.

4. A dry cooling cabinet as set forth in claim 3, and a shield overlying the open upper end of the stack and positioned adjacent thereto to limit the intake of the stack to a horizontal plane adjacent the horizontal plane of the air currents passing to the stack from the openings at each end of the false bottom.

5. A dry cooling cabinet as set forth in claim 3 wherein the cooling means is disposed in the air passageway between the closed bottom and the false bottom.

6. A dry cooling cabinet as set forth in claim 3, and a radial deflector carried by the closed bottom below the open lower end of the stack.

7. A dry cooling cabinet as set forth in claim 3 wherein the cooling means is a plurality of truncated concentric cones carrying cooling coils.

8. A dry cooling cabinet as set forth in claim 3 wherein the cooling means is a plurality of truncated concentric hollow cones having cooling coils secured thereto.

9. A dry cooling cabinet as set forth in claim 3 and adapted for the cooling of beverage containers received upon the false bottom, wherein,

8

the deflectors and the open upper end of the stack are positioned in horizontal planes a distance above the false bottom lesser than the height of the containers.

10. A dry cooling cabinet as set forth in claim 3, and a horizontal plate in the housing above the false bottom having an imperforate center spaced above the stack, the plate having a plurality of openings therein for receiving the bodies of beverage containers resting upon the false bottom.

11. A dry cooling cabinet as set forth in claim 10 wherein the plate is positioned in a horizontal plane a distance above the false bottom lesser than the height of the containers.

12. A dry cooling cabinet as set forth in claim 10 wherein the plate is positioned in a horizontal plane a distance above the false bottom lesser than the height of the containers but greater than planes of the deflectors and open upper end of the stack.

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