Feb. 7, 1950 G. MUFFLY 2,496,304

BOTTLE COOLING AND DISPENSING REFRIGERATOR

Filed May 2, 1944 2 Sheets-Sheet 1

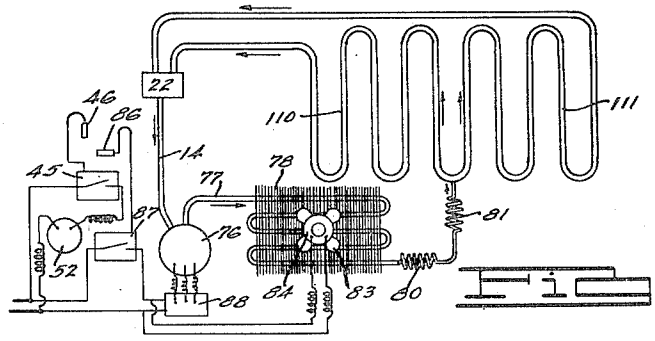


Fig. 1.

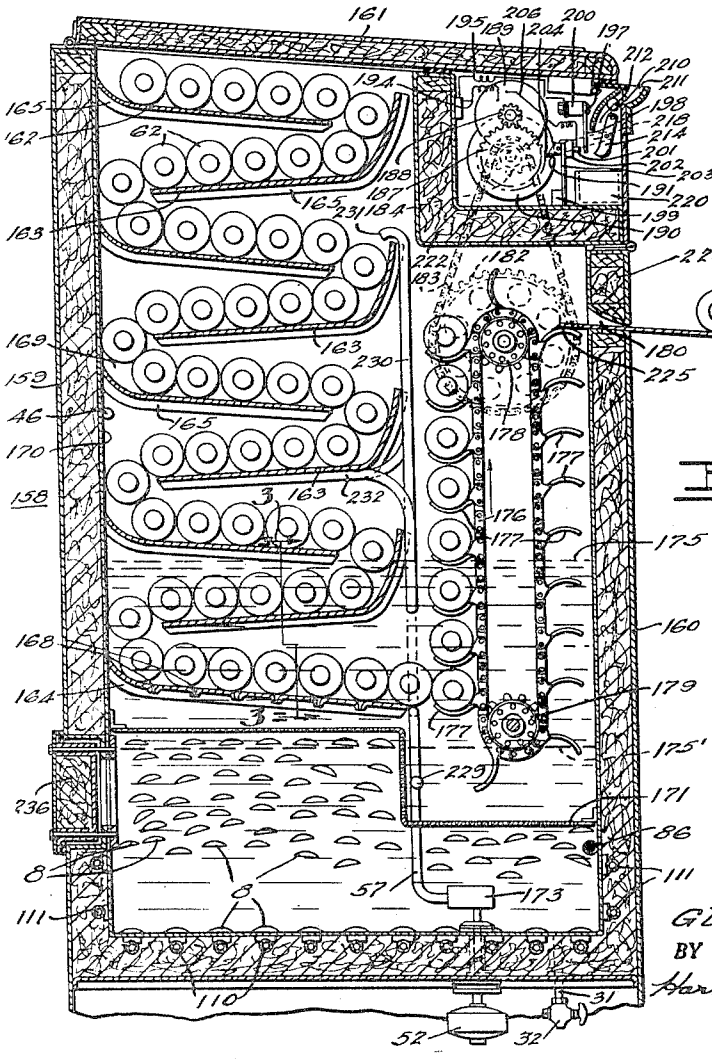


Fig. 2.

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Fig. 3.

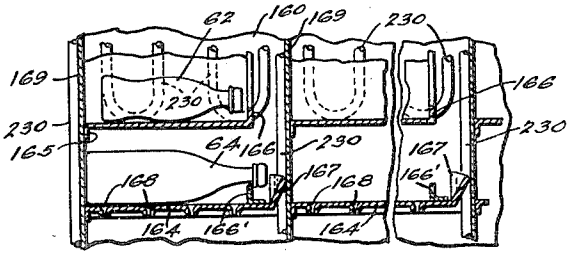
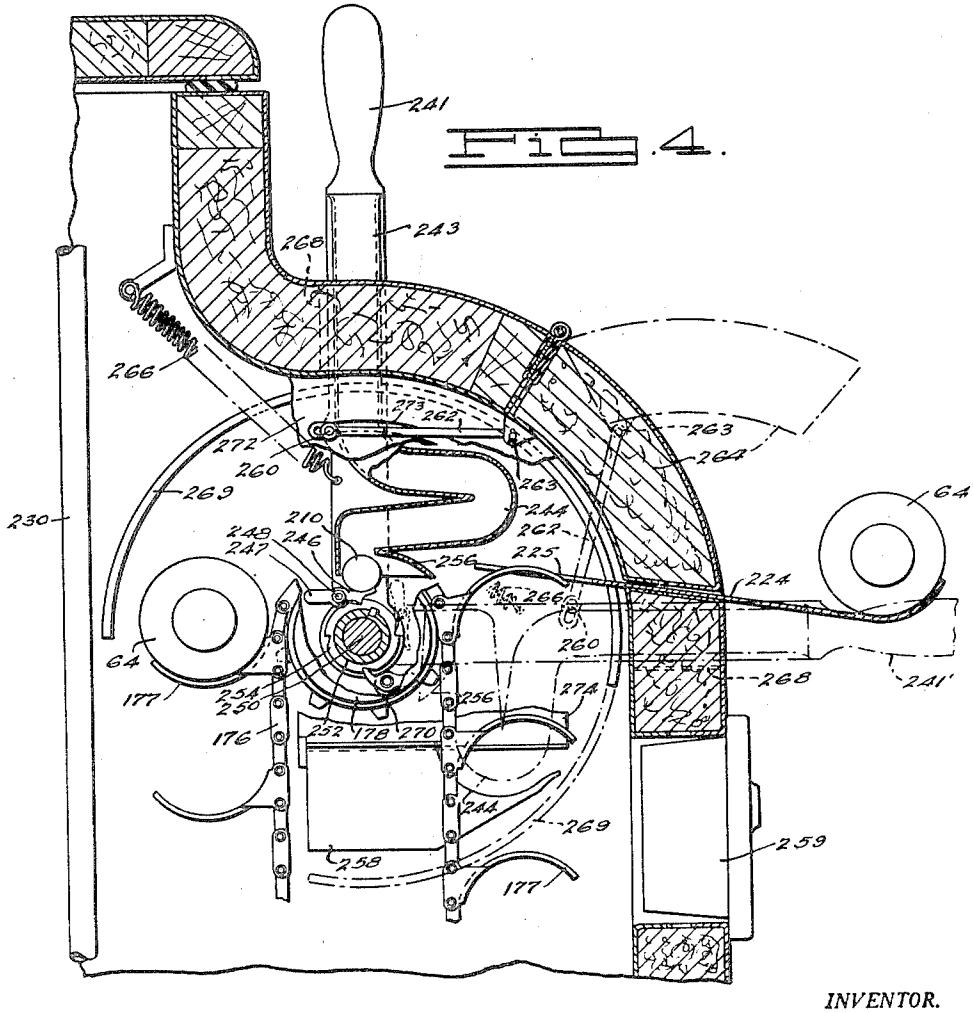


Fig. 4.



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2,496,304

UNITED STATES PATENT OFFICE

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BOTTLE COOLING AND DISPENSING REFRIGERATOR

Glenn Muffly, Springfield, Ohio

Application May 2, 1944, Serial No. 533,778

10 Claims. (Cl. 62—2)

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This application is a continuation in part of my co-pending application, Serial Number 324,466, filed March 18, 1940, now abandoned. The invention relates to refrigerating mechanism and particularly to the application of a refrigerating system to bottle coolers, and in general to the type of apparatus used for cooling foods and drinks in containers.

The ice making principle and control methods covered in my issued Patents Nos. 2,145,773, 2,145,774, 2,145,775, and 2,145,777, are employed herein and reference is made to these issued patents, to divisions thereof and to my pending application, Serial Number 237,629, filed October 29, 1938, now Patent No. 2,359,780, dated Oct. 10. 1944, for more complete discriptions of certain ice making and control features mentioned in the present application.

An object of this invention is to provide a bottled beverage cooler with an emergency capacity beyond that of the refrigerating machine which cools it, such excess capacity being available for quickly cooling a large number of bottles which may be put into the cooler at one time.

Another object of this invention is to provide means for making the cooling effect of an accumulated supply of ice quickly available for handling the peak loads above mentioned.

Another object of this invention is to provide means for storing a large supply of ice in small pieces for the cooling of bottled beverages or other products without allowing such ice to interfere with the placing of bottles or other containers in the cabinet.

Still another object is to provide means for circulating water through the stored ice, then into heat exchange with the containers to be cooled and then back through the ice to provide rapid heat transfer from such containers to the ice.

A further object is to provide thermostatic control means for the water circulating means that provides this rapid heat transfer.

Another object is to provide a sectional type of bottle cooler adapted for use in multiple to vend various flavors or varieties of drinks and accommodate a maximum stock of goods in a minimum of floor area.

An additional object is to provide a dry compartment for storage of products to be cooled and at the same time to retain the holdover effect of the floating ice.

Still another object is to provide means for drying containers after they have been wetted in cooling.

An additional object is to provide coin actuated vending means for the sale of the products cooled, this means being operable either manually or by power means.

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Another object is to provide means for cooling the chutes on which containers are stored.

With these and other objects in view, I describe my invention by referring to the drawings, in which similar reference characters refer to similar parts.

Figure 1 is a diagram of the refrigerating system and thermostatic controls adapted for use in connection with the other figures.

Figure 2 is a vertical sectional view of a bottle cooler, showing gravity and power means for moving bottles into and out of the cooling zone, which may be either wet or dry, and further showing a coin actuated, power driven vending mechanism.

Figure 3 is a vertical section of Fig. 2, taken on the line 3—3 thereof.

Figure 4 is a vertical sectional view of a modified form of the cooler shown in Fig. 2, illustrating a manually operated vending mechanism.

Referring to Fig. 1, the motor-compressor unit 76 draws vaporized refrigerant from the tube 14 and delivers compressed vapor through the tube 77 to the condenser 78, from which the liquefied refrigerant passes through the capillary tube 80 and the second capillary tube 81, the latter being preferably embedded in the insulation and leading to the coils 110 and 111 seen in Fig. 2.

The fan 83 and its driving motor 84 are provided for cooling the condenser 78. A bulb 46 is located as in Fig. 2 for the purpose of controlling the circulation of water and it is connected to a thermostatic switch 45 to control the operation of the motor 52 in Fig. 2. The result is that water is forced to flow through the ice and then into heat exchange with or over the bottles to cool them. The wiring diagram of Fig. 2 will be understood by referring to Fig. 1.

The bulb 86, which is seen in Figs. 1 and 2, is connected with a thermostatic switch 87, (Fig. 1) to control the operation of the motor compressor unit 76 and may have a starting circuit breaker 88 connected with it. Both the bulb 46 and the bulb 86 are located in the cabinet, but at different points to control different motors for different purposes. The bulb 46 and its switch 45 initiate water circulation whenever it is required to lower the temperature of the bottles in the upper part of the cabinet. The bulb 86 and its switch 87 control the starting and stopping of the refrigerating system, starting the system when the supply of floating ice diminishes so that it does not contact the bulb 86. The compressor then runs continuously while the evaporators 110 and 111 are alternately refrigerated, making and releasing ice until there has been accumulated an amount of floating ice such that the lower pieces of floating ice contact and partially surround the bulb 86 to cool it down to the cut-out point of the switch 87.

In Fig. 2 the evaporator coil 110 is shown associated with the bottom of the tank 170, while the evaporator coil 111 is associated with side walls of this same tank. Optionally, the coil 110 might be associated with one-half of the tank bottom and with the sides adjacent thereto, while the coil 111 is associated with the other half of the tank bottom and with the side walls adjacent to this other half. In either case the operation is to refrigerate first the coil 110 and then the coil 111, such alternate refrigeration being caused by alternately connecting the coils with the suction tube 14 of Fig. 1. The valve mechanism 22, indicated in Fig. 1, is preferably of a type disclosed in one of my issued patents above mentioned, or it may, for example, be a mechanism such as is shown in Figs. 9, 10 and 11 of my co-pending application, Serial No. 237,629, filed October 29, 1938, now Patent No. 2,359,780, issued October 10, 1944.

This method of controlling the quantity of ice formed in a tank is explained in my co-pending applications above mentioned. The bulb 86 may be cooled down to the temperature of 32° F. by the floating ice when there is ice at and below its level, but when the ice supply is not sufficient to reach downwardly to this bulb level, the temperature of the bulb will be higher than 32° F.

During idle periods of the motor 52 there will be a slow thermostatic circulation of water in the tank due to the fact of water having a reverse coefficient of expansion between its freezing point and its maximum density temperature of 39.2° F. Water at any temperature between 32° F. and 46.4° F. is heavier than 32° water of the same purity. The water surrounding the bottles in Fig. 2 may be at 40° F. while the water immediately below the perforated wall 171 (Fig. 2) and between the disks of ice must necessarily be at 32° F. Since 32° water is lighter than 40° water there will be an upward circulation of the cold water from the body of ice.

The bottle cooler shown in Fig. 2 is arranged for power driven delivery of bottles, with a coin mechanism for starting the delivery mechanism. The cabinet 158 is seen in vertical section, showing the rear wall 159 and the front wall 160. The rear wall 159 may be placed against the wall of a room in which the cabinet is located and access is had to the cabinet at its front and top.

The lid 161 is designed to be locked so as to protect the stock, the coin mechanism and the money that has been collected thereby. This lid is unlocked and lifted so that bottles 62 may be placed upon the chutes 162 and 163. These bottles will roll over the series of such chutes and the first one will come to rest at the extreme right of chute 164 on the lift hook 177, which is attached to two chains 176. The shaft supporting the sprockets 179 is preferably so located that as the idle position is approached the hook 177 which is to receive the next bottle will still be inclined downwardly a bit to provide a wider gap for the bottle to roll into place. This gap is reduced as the hook leaves the sprockets 179 to travel straight up. Upon operation of the chains in the direction indicated by the arrows there will be a bottle on each of the hooks that are traveling in the upward direction and further movement of the chain will cause a bottle to roll out of the cabinet through the opening 180 onto the rack 224.

The chutes 163 and 164 are seen in more detail in Fig. 3 which is taken on the line 3—3 of Fig. 2.

The chutes 162 and 163 are quite similar but of right and left hand as seen in Fig. 2. All of these

chutes and the chute 164 are welded or otherwise attached to a vertical wall 169, Fig. 3 forming an assembly which is suitably supported in the cabinet. There may be any number of these assemblies, each with its own mechanical delivery mechanism, in the same cabinet. Ordinarily each such chute assembly and delivery mechanism is used for a different flavor or variety of bottled beverage and the cabinet may extend to whatever length is required, offering a wide variety of drinks to the public so that a customer may drop a coin in whichever slot 211 is marked with the brand or flavor he desires.

Each of the chutes 162 and 163 is provided with a flange 165 for welding to the wall 169 as a support and with an upturned outer flange 166, which is high enough to make contact with the top of the cap of small bottle such as 62, yet low enough to pass under the neck of a larger bottle such as 64. The lowermost chute 164 has a flange 166' in line with the flanges 166 of the other chutes and is also provided with a higher flange 167 for limiting the horizontal movement of the longest bottles handled by the device. This flange 167 is positioned angularly as seen in section in Fig. 3 for its entire length except that at its lower end it is bent to a vertical plane to allow the passage of the tube 230 between it and the adjacent vertical wall 169 of the next chute assembly. The inclined portion is to prevent bottle caps from resting on the top of the flange when they drop from the next chute above and to align the taller bottles as they approach the end of their travel on the chute 164, so as to prevent them from hitting the pipe 230. The chute 164 also differs from chutes 162 and 163 in being provided with drip openings 168. These holes are punched in the metal in a manner to draw it downwardly, forming a slight collar around each hole so that water will be distributed over the ice instead of all being delivered at the end of the chute 164. These holes 168 are not necessary in the event that the water level is maintained at 175, but are useful when the water level is maintained below the perforated wall 171, as indicated by the dotted line 175'.

The lining of the cabinet 158 is in the form of a water-tight tank 170, the lower portion of which is equipped with evaporator coils 110 and 111 for the making of ice as previously described. The tank is provided with a drain pipe 31 and valve 32. Below the bottle handling mechanism is a perforated wall 171 which serves to stop the upward flotation of ice as previously described in the event that water is placed in the tank up to a level higher than this wall. Some users may, however, prefer to keep the level as shown at 175' by the dotted line or lower, in which case the shelf 171 could be omitted.

In any case the pump 173, driven by the motor 52, takes water from below the floating ice 8 and delivers it through pipe 57, the manifold 229, and the cooling coils 230 to discharge ports 231. The cold water thus circulated serves to cool the air within the cabinet and the contents thereof, particularly those bottles which are located on the hooks 177 of the chains 176, and the water further serves to cool the bottles supported by the chutes 162, 163 and 164 by being discharged at ports 231 to flow downwardly over the bottles from this point. Since the pump 173 has its intake below the level of floating ice and water returns by gravity to the top of the ice there will be a downward flow of water through the floating

ice, thus insuring that the water passing upwardly through the pipe 57 is not far above 32° F.

In the event that it is desired to cool the bottles entirely by air contact without wetting them the coil 230 may be extended to provide sufficient cooling surface for this purpose and instead of discharging water to flow over the chutes the tube may be returned downwardly to bring the opening 231 below the level of the lowermost chute 164. One method of extending the coil 230 to provide more cooling surface is by forming loops as indicated at 232, extending horizontally between the chutes or metallically attached to the bottoms of the chutes themselves for more direct cooling of the bottles or other containers which roll over the chutes. Another alternative arrangement would be to use the coils 230 and 232 as the evaporator of a refrigerating system for direct cooling of the bottles or other containers, but this would sacrifice the advantage of the hold-over effect obtained through the use of floating ice and would necessitate a control setting to insure against freezing the contents of bottles.

Delivery of bottles is accomplished by means of the chains 176 on which are mounted a number of lift hooks 177. The chains 176 are preferably used in pairs, a pair for each of the cabinet sections designed to hold a given flavor or variety of drink, each of the hooks 177 being rigidly attached to one link of each of a pair of chains. Thus there are two sprockets 178 at the top of the chains and the two sprockets 179 at the bottom of the chains for each section of the cabinet.

The normal idle position of the chains 176 is as seen in Fig. 2 or a little lower, in position for a bottle to roll onto a hook 177 from the lower chute 164. On the same shaft or sleeve with each pair of sprockets 178 is a larger sprocket wheel 182 for the chain 183 which is driven by the small sprocket 184. This small sprocket is mounted on the same shaft with the driven gear 187, this gear being driven by the pinion 188 on the shaft of the motor 189. Arranged to rotate with the gear 187 is the cam 190 having a notch 191. The electrical circuit for driving the motor 189 includes the wire 194, going directly to the motor, and the line wire 195 leading to the screw 197, which secures the spring 198 to its insulating support 200. The spring 198 is arranged so that it may be caused to make contact with the contact 201, which is carried by the insulating block 202 on the spring 203, which is supported at 199. Attached to or made a part of the spring 203 is the pawl 204, which is located for engagement with the cam 190.

When the cam 190 rotates in a clock-wise direction it engages the pawl 204 and flexes the spring 203 until the contact 201 closes the electrical circuit through the spring 198. Since the contact 201 is connected by means of wire 206 to the opposite pole of motor 189 the motor is thus energized to rotate the pinion 188, the gear 187, sprocket 184, chain 183, sprocket 182 and sprockets 178 which carry the chains 176.

Springs 203 and 198 are so formed and located that the contact 201 is normally spaced a bit from the spring 198, thus preventing the motor 189 from being energized except when spring 198 or spring 203 is flexed by some means. The starting of motor 189 is accomplished by flexing spring 198 through the insertion of a coin 210 in the slot 211. A coin so inserted passes down through the chute 212 which is shaped to provide a tortuous path to form a means of theft prevention. After the coin has passed through such a theft prevention means such as the chute 224 of Fig. 4, it comes to rest between the spring 198 and the insulated movable wall member 214, which is retained in position by the connecting rod 218 joining it with the pawl 204.

As the coin comes to rest between the member 214 and the spring 198 it is wedged between them due to their small relative angle, flexing the spring 198 until it makes contact with 201, thus starting the motor 189 and moving the chains 176 in the direction indicated, at the same time rotating cam 190 until it lifts the pawl 204, flexing the spring 203. The flexing of the spring 203 by the cam is sufficient to insure contact by 201 on spring 198 in the unstressed position of the latter before the coin is allowed to drop to the receptacle 220. After the spring 203 has been flexed enough to insure continuing of the contact between 201 and 198 the movable wall 214 will be moved to the right by connecting rod 218 far enough to allow the coin 210 to drop into the coin receptacle 220. The motor 189 continues to operate until the cam 190 has completed one full revolution, at which time the pawl 204 drops into the notch 191, breaking the contact between 198 and 201 and stopping the motor 189.

The duration of the motor operation after insertion of each coin is thus one revolution of the gear 187, cam 190 and sprocket 184. The number of teeth on sprocket 184 represents an angular movement of the sprockets 182 and 178, equivalent to the space on chains 176 from one of the hooks 177 to the next one, thus the stopping position of one hook will be identical with the starting position of the hook next above and one additional bottle will have rolled from chute 164 onto a hook 177 and one bottle will have rolled from a hook 177 onto the delivery rack 224, where it is accessible to the customer upon opening the door 223.

When there is a motor 189 and coin mechanism for each section of the cabinet the various coin receptacles 220 will provide a tally of the number of bottles sold of each kind or flavor.

If desired, one or more of the cups 220 may be separately locked so that the coins received from sales of a certain flavor or variety of the drinks may be retained for use in paying rental charges, to apply on electric bills or for meeting time payments.

It will be noted that the bottle carriers 177 are designed so one blocks the opening above the sprockets 178 at the idle position while another one blocks the opening between these sprockets and the front insulated wall 160 of the cabinet. It is possible to eliminate the insulated door 223, which is shown closing the opening 180 by making the hooks 177 of insulating material with their bottoms or rear sides formed to replace the forked end 225 of rack 224. The insulated hooks replacing 177 will, as in Fig. 2, be attached to both chains but will pass closer to the walls so that two of them act as doors at each idle position.

For the purpose of servicing the pump 173 or of cleaning the tank 170 it may be desired to provide a hand hole closed by a gasketed cover 236, which is bolted in place and gasketed both to the tank 170 and to the outer wall of the cabinet. This opening may be located in one of the end walls of the cabinet, or it may be dispensed with in case the handling mechanism is assembled in a unit structure which may be lifted out of the cabinet in its entirety, preferably carrying with it the insulated wall 222. The perforated wall

171 and the pump 173 would in this case be parts of the removable assembly, the pump 173 and motor 52 being connected by means of a jaw clutch arrangement which is disconnected or engaged by merely lifting the pump 173 or by replacing it.

Control of the refrigerating system to regulate the amount of ice produced is obtained by means of the bulb 86 which is connected to the switch 87 as seen in Fig. 1. Control of the pump 173 is by means of the bulb 46 and switch 45, also as shown in Fig. 1.

The chain lift device may be manually operated after release of the mechanism by means of a coin operated device if it is desired to economize on costs. In cases where a clerk is always in attendance to serve customers the coin mechanism may also be eliminated.

The enlarged sectional view seen in Fig. 4 shows a modification of the bottle delivery and coin operating mechanism seen in Fig. 2. In this modified arrangement the power for turning the sprockets 178 is supplied manually by means of the lever 241. This lever carries the coin chute 243, including the return bend portion 244. A coin 210 is dropped into the upper open end of the chute 243 and comes to rest in the position shown, where it depresses the right hand end of the pawl 246 by overbalancing the weighted end 247 of this pawl. The pivot 248 on which the pawl is supported is mounted near the lower end of the lever 241, which lever has a bearing on the shaft 250.

Also bearing on the shaft 250 there are a plurality of sleeves 252, each carrying two sprockets 178 and a four-tooth ratchet wheel 254. The weight of the coin 210 causes the pawl 246 to engage a notch in the ratchet wheel 254, thus connecting the lever 241 with the sprocket wheels 178 so that when the lever 241 is moved forward and downward to the position of 241' after coin has been inserted in the slot at the upper end of 243 the sprocket wheel will rotate to the right one quarter of a turn. This elevates one of the bottles 64 to a position directly above the shaft 250, where the bottle is free to roll to the right onto the delivery rack 224. As the lever approaches the position 241' the coin falls off of the pawl 246 and is guided by the delivery guard 256 so that it falls into the coin receptacle 258.

It is planned that there will be a plurality of bottle delivery mechanisms. Each includes a lever 241 with the associated coin mechanism and each lever will be marked to indicate the flavor or variety of drink that will be obtained by the operation of this lever. In this manner a half dozen or more varieties of drinks may be vended from one cabinet in which there are an equal number of bottle handling conveyors, or a plurality of narrow cabinets, each having a single pair of gravity and chain conveyors, may be placed together against a wall with a different flavor of drink in each of the cabinets. Either with multiple mechanisms in one cabinet or with a lot of cabinets, each containing a single mechanism, it is possible to vend a variety of different drinks from a cabinet or cabinets occupying a relatively small floor space and accommodating a large number of bottles.

As the lever 241 is pulled forward (to the right in Fig. 4) it carries the pin 260 and moves the connecting rod 262 to the right. This rod is pivoted at 263 so that the movement of the lever causes the door 264 to open, allowing free passage for the bottle 64 which is to be delivered. After delivery of the bottle the lever 241 is returned by means of the spring 266, which is anchored at one end of the cabinet and attached at its opposite end to lever 241. The lever 241 comes to rest a bit to the left of its vertical position against the end of the slot 268, which is provided in the cabinet wall beyond the opening for door 264. At the vertical position of lever 241 the pawl 246 is ready for engagement with the next notch of ratchet wheel 254 as soon as another coin is dropped. Should the lever 241 be moved without a coin having been dropped there will be no movement of the ratchet wheel 254 because of the fact that the weighted end 247 holds the pawl out of engagement with the ratchet wheel. To prevent reverse movement of the ratchet wheel 254, sleeve 252 and the sprocket wheels 178, pawl 270 is mounted on a fixed pivot to engage a tooth of the ratchet wheel on its lowermost side. This pawl may for economy of production be a duplicate of the pawl 246, and the weighted end will move the point of the pawl into engagement with a notch in the ratchet wheel.

A sheet metal guard 272 is provided to separate the door opening through which bottles are delivered from the coin mechanism. This guard is shown broken away to disclose the coin mechanism. In practice it surrounds the shaft 250 and is formed with one of the slideways on which the coin drawer 257 slides. The shield 272 is at the right (far side) of each door 264 and a similar shield 274 is located at the left (near side) of the door opening, thus protecting the coin mechanism from the door opening at each side. Each of these shields 274 is formed with an angle at the bottom which provides one half of the slideway for the drawer 258. The guard 272 is provided with an arcuate slot 273 to accommodate the movement of pin 260. The slotted guard 272 as shown would have a bearing on the outside diameter of the sleeve 252, but the guard 274 which is located beyond the coin mechanism may support the shaft 250 directly. Since this shaft is not required to rotate there need be no bearing between the shaft and its supporting guard 274.

As a further means of theft prevention a semicircular strap of metal 269 may be attached to the lever 241 in position to close the slot 268 at all positions of the lever. The coin receptacle 258 is of such form and location as to allow a free passage for the lower end of the guard 269 when the lever is brought down to its lowermost position.

In order to allow passage for the bottle carriers 177, the delivery rack is slotted as indicated at 225 forming fingers or prongs extending near enough to the chains 176 so that the bottles as they roll off of the carriers will continue to roll onto the delivery rack 224 and will come to rest beyond the door opening in a position to clear the extremity of the door 264.

The coin receptacles are made accessible by means of small doors 259 which are arranged to be locked. The receptacle 258 is located between guards 272 and 274 and slidingly supported by them in line with the door 259. The section of cabinet wall seen in Fig. 4 is not all in one plane, as the doors 259 are disposed in line with coin mechanisms while doors 264 are located between and above the doors 259 in line with the bottle delivery mechanisms.

The coin box 258 is so shaped and supported that there is clearance for the coin chute bend 244 and the guard 269 in their lowermost positions.

The cabinet, of which only a part is seen in Fig. 4, is similar to 150 of Fig. 2 and is equipped with the same cooling means and chutes for bottles. A portion of the coil 230 is seen in Fig. 4.

Formal changes may be made in the specific embodiments of the invention described without departing from the spirit or substance of the broad invention, the scope of which is commensurate with the appended claims.

What I claim as new and desire to secure by United States Letters Patent is:

1. In a refrigerator adapted for the cooling of containers, conveyor means for said containers comprising superimposed inclined chutes over which said containers pass in succession by gravity feed, fluid circulating means for delivering cold liquid so that it flows in heat exchange relationship with said containers first on one of said chutes and then on another of said chutes, and means for cooling said liquid by freezing a portion of it and circulating the unfrozen portion of said liquid in contact with said frozen portion thereof.

2. In a refrigerator, means for making ice in one portion thereof, means for circulating liquid into and out of contact with said ice and into cooling relationship with respect to a body to be cooled in another portion of said refrigerator, control means for said circulating means responsive to temperature changes of said refrigerator, and control means responsive to variations in the accumulated quantity of said ice to regulate said ice making means.

3. In a refrigerator for cooling a packaged product, an opening for loading said refrigerator with packages, an opening for delivery of said packages after cooling, conveying means for moving said packages step by step from the first to the second of said openings, means for cooling said packages during an intermediate portion of their travel on said conveying means, the last said means including means for making ice and for circulating a fluid into heat exchange with said ice and with said packages, and control means for regulating the production of said ice to maintain the reserve supply of ice within minimum and maximum limits.

4. In a cooling and vending apparatus, a cabinet for storage of merchandise in original containers, gravity chute means with repeated reversals of inclination for receiving and storing said merchandise, means for cooling said merchandise by forcibly circulating a coolant in heat exchange with said containers and said chute means, elevating means arranged to receive said containers from said chute means, means for operating said elevating means to lift containers for the purpose of vending them and a coin operated device for actuating the last said means.

5. In a refrigerator, a cabinet comprising a storage space for a product to be cooled and a reservoir for ice and water, means for making ice and storing it in flotation in the liquid from which ice is formed, means for circulating said liquid to and from said product storage space and through the floating ice for the purpose of cooling said product, and thermostatic control means for said circulating means.

6. In a bottle cooler, a tank having a space adapted to contain water and ice, means for circulating water, a reticulated grid for confining the ice to said space, a conveyor adapted to carry bottles through said liquid in a zone from which said ice is substantially excluded by said grid, and ice-making means in said tank on the side of said grid where ice is stored.

7. In a refrigerator adapted for the cooling of bottles, means for recirculating liquid in said refrigerator, means for freezing a portion of said liquid and storing the ice thus formed in the path of said circulating liquid, and multiple inclined chutes within said refrigerator for conveying said bottles, said chutes being formed to serve as troughs for conveying said liquid in contact with said bottles during a part of its circulation, said recirculating means including means for supplying said liquid to an upper one of said chutes, and said chutes being so arranged that the liquid drains from one to another of them.

8. In a refrigerator, a storage space for a product to be cooled, means for cooling said product by heat transfer to a liquid, a second space within said refrigerator for storing a quantity of said liquid, means for freezing a portion of said liquid to form ice, circulating means for causing said liquid to circulate into and out of heat exchange with the first said space and into and out of contact with said ice, and control means for regulating the operation of said freezing means to maintain the quantity of said ice within maximum and minimum limits and to regulate said circulating means.

9. In a refrigerator, a storage space for a product to be cooled, a second space within said refrigerator for storing a quantity of liquid, means for freezing a portion of said liquid to form ice and releasing it for storage in said second space, circulating means for moving said liquid from the vicinity in which said freezing occurs into heat exchange with the product in the first said space and through said released ice, and control means responsive to variations in the quantity of ice in said second space for regulating the operation of said freezing means.

10. In a refrigerator, a storage space for a product to be cooled, a second space within said refrigerator for storing a quantity of liquid, means for freezing a portion of said liquid to form ice, circulating means for moving said liquid from the vicinity in which said freezing occurs into heat exchange with the product in the first said space and through said released ice, control means responsive to variations in the quantity of ice in said second space for regulating the operation of said freezing means, and conveyor means for carrying said product progressively through the first said storage space so that a part thereof first put into said space will be the first to be removed therefrom.

GLENN MUFFLY.

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Certificate of Correction

Patent No. 2,496,304 February 7, 1950

GLENN MUFFLY

It is hereby certified that errors appear in the printed specification of the above numbered patent requiring correction as follows:

Column 8, line 30, for "coin drawer 257" read *coin drawer 258*; column 11, line 5, list of references cited, for "Butter" read *Butler*; line 8, for "Goosman" read *Goosmann*;

and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 25th day of July, A. D. 1950.

[SEAL]

THOMAS F. MURPHY,
Assistant Commissioner of Patents.