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ARTICLE REFRIGERATION

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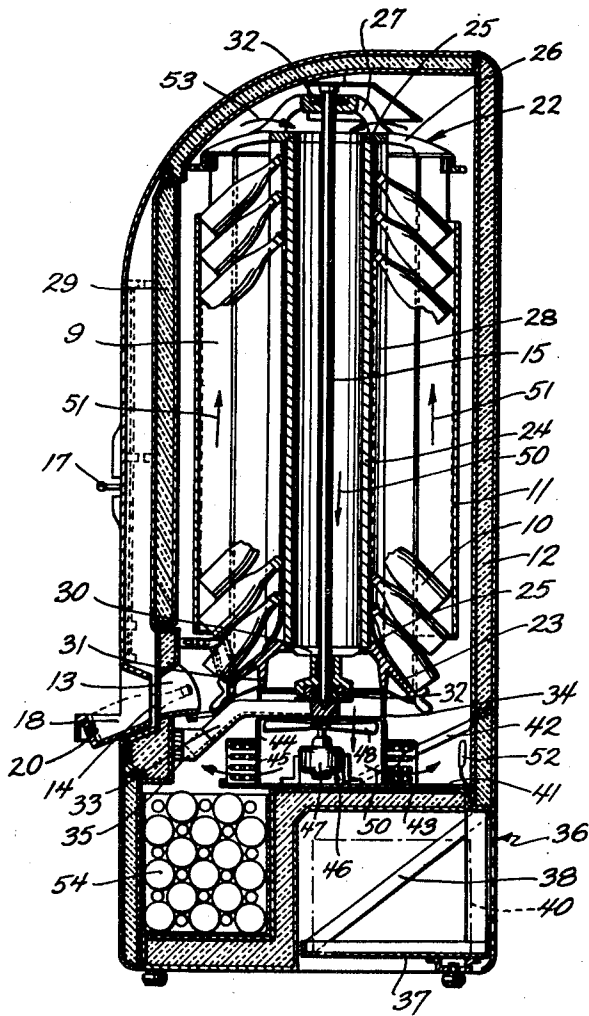


Fig. 2.

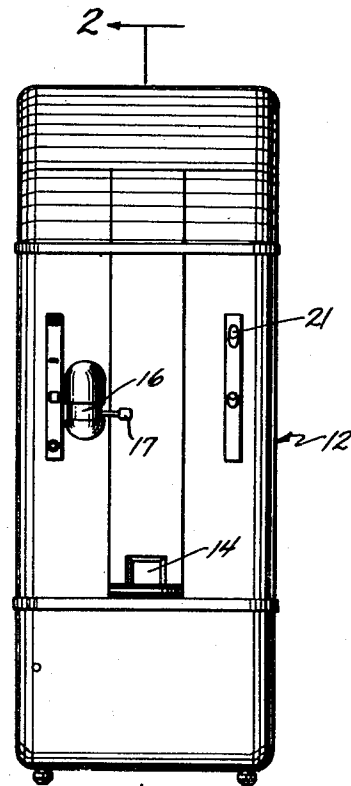


Fig. 1.

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ARTICLE REFRIGERATION

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6 Claims. (Cl. 62-102)

1

The present invention relates to a refrigerator and more particularly to the means and the process of maintaining bottles and other articles at a predetermined low temperature in a dispensing device.

One of the objects of the present invention is to store and dispense vendible articles in a dispenser in a sequence by which the articles leaving the dispenser are subjected to the coldest regulated temperature present in the dispenser.

A further object of the invention is to provide a refrigerated dispenser for vendible articles in which the air leaving the expansion coil of a refrigerating system is directed against the next bottles or other articles to be dispensed.

A further object of the invention is to provide a refrigeration system for vendible articles in a dispenser by which replacement bottles or other articles are the last to be dispensed and are progressively subjected to cooler air as they approach the point of dispensing or move upstream with respect to refrigerated air circulated in the dispenser as they approach the point of dispensing.

Another object of the invention resides in the result that the warmth of replacement articles do not warm up cold articles already in the dispenser ready for dispensing.

A further object of the invention resides in the arrangement in a refrigerated dispensing cabinet whereby warm air is taken from the extreme top of the cabinet without engaging the articles to be dispensed and refrigerated before it again contacts the articles to be dispensed in a process augmenting convective circulation of the articles to be dispensed.

Another characteristic of the invention resides in the arrangement in which articles such as bottled carbonated drink when ready for dispensing are in direct contact with refrigerated air at initial circulating fan pressure.

A further object of the invention resides in a refrigerating arrangement for a dispenser cabinet in which no ice can form on the evaporator coil in that the coil is subjected continuously to an entering flow of warm air above the freezing point of water without the air being discharged therefrom being lowered below the freezing point of water.

A further object of the invention resides in the process of continually cooling vendible articles in the dispensing cabinet by continuously directing a stream of refrigerated air into direct contact with the articles to be dispensed in a direction opposite to their direction of advancement to the discharge point.

2

These being among the objects of the invention other and further objects will become apparent from the drawing, the description relating thereto and the appended claims:

In the drawing:

Fig. 1 is a front elevational view of a dispensing apparatus embodying the invention as incorporated for purposes of dispensing bottles containing a carbonated beverage, and

Fig. 2 is a vertical section taken upon the line 2-2 in Fig. 1.

Reference is hereby made to Patent No. 2,435,177 granted January 27, 1948 to William S. Connell et al., which shows and describes in detail the structure and operation of the mechanism by which bottles indicated at 10 are supported on a drum 11 and dispensed from an insulated cabinet 12 through an opening 13 normally closed by a swinging door 14.

Generally speaking, the construction is one in which the drum 11 is mounted for rotation upon a shaft 15, the periphery of the drum being divided into a plurality of vertically disposed slide-ways 9 in which the bottles 10 are stocked in an inclined position with their bottoms disposed outwardly and their tops inwardly at a slant of approximately 35° angle from the horizontal.

The bottles 10 are dispensed one at a time from the bottom of the stacks through the discharge opening as the drum 11 is rotated and indexed by an intermittent manual drive controlled by a coin release mechanism 16 through a handle 17 accessible for movement from outside the cabinet through an arc of approximately 120°.

As each bottle is discharged, it moves bottom first outwardly through the discharge opening 13 and lifting the door 14 merely by sliding lengthwise a short distance without changing its relative inclined position. From the discharge opening the bottle passes outwardly into a trough 18 against a resilient bumper 20 where it can be picked up by hand. A cap lifter 21 is provided on the outside of the cabinet for the convenience of the purchaser in opening the bottle.

The drum 11 comprises a top spider 22 and a lower plate 23 interconnected by a cylindrical spacer 24 resting in suitable recesses 25 in the spider and the plate. The spider has openings 26 therethrough to permit the flow of air through it which moves vertically in the cabinet between the cabinet and the cylindrical member 24. The spider 22 is provided with openings 27 which permit the air to pass freely from the cabinet into the tubular member 24.

3

Furthermore, depending upon the convenience of design the tubular member 24 supports the tops or capped ends of the bottles in vertical grooves 28 so that the bottles are permitted to slide downwardly in guided relationship.

The plate 23 has an opening 30 in the top thereof to permit air present in the cylindrical member 24 to move downwardly therethrough inside an axially directed flange 31.

The drum 24 is supported upon the shaft 15 by suitable frictionless bearings 32 with the lower of the two bearings resting upon a rack 33 having a cylindrical shroud 34 thereon co-extensive with the flange 31 upon the plate 23. The rack 33 is supported with respect to the cabinet by a bracket 35 with the shroud 38 confining the air leaving the control of the flange 31 to flow downwardly.

Below the rack 33 and removable as a unit from the bottom of the cabinet 12 is a refrigerating unit 36 including a lower table 37 braced at 38 to carry a compressor 40 and an upper table 41 braced at 42 to carry an evaporator coil 43 disposed around a cylindrical member 44 coaxial and in communication with the shroud 34. Openings 45 in the wall of the cylindrical member 44 adjacent to the expansion coil 43 places the anterior of the cylindrical member 44 in communication with the cabinet interior through the coil 43. A blower 46 including a motor 47 and fan 48 is mounted upon the table 41 as shrouded by the cylindrical member 44 to move air downwardly through the cylindrical member 24, the flange 31, the shroud 34 and outwardly over the coil 43 to return it to the interior of the cabinet as shown by arrows 50. As the air passes over the expansion coil 43 it is cooled thereby and at its lowest temperature engages the lowermost bottles 10 upon the drum 11 as it moves upwardly through the drum 11.

With this arrangement the bottles dispensed are subjected to the coolest temperature in the cabinet prior to the time of dispensing. Furthermore, the air moving upwardly through the drum as indicated by the arrows 51 moves in a direction opposite to the advance of the bottles to the discharge point without any danger of the effective warmth of warmer bottles affecting the refrigeration of the lowermost bottles, a thermostatic control 52 for the refrigerating action of the coil 43 being disposed in the path of air leaving the coil 43 whereby air warmed by the upper bottles passing through the openings 27 as indicated by the arrows 53 and downwardly under the effort of the fan blower 47 is chilled to the proper temperature before again contacting the lowermost bottles. By locating the fan blower 48 and its driving motor 47 upstream of the expansion coil 43, the possibility of heat produced by the motor warming the chilled air which emerges from the coil 43 is eliminated. Further, the lowermost bottles 10 may be located in closer proximity to the coil 43 than if the fan 48 were downstream of the coil 43. These factors would not be of much importance in normal refrigeration systems but when the heat transfer range between the coil temperature and the temperature at which the articles must be dispensed is so small, the disposition of the various elements is quite important.

As more particularly described in the copending application referred to, the replacement bottles are stacked on top of the bottles remaining in the dispenser through an inner door 29 with an initial reserve supply indicated at 54

4

where they are refrigerated in the lowermost part of the cabinet by air discharged through the expansion coil 43. The bottle reserve 54 is generally the first to be placed in the drum when the drum is reloaded and any further bottles required to fill the drum are supplied from an outside source. Once the drum is recharged the bottle reserve at 54 is again filled and the dispenser placed back in operation. The fact that the bottle reserve 54 is located where air is not directed over and through it under forced draft prevents these bottles from appreciably warming the air discharged from the expansion coil 43. However, since they are located in the lowest portion of the cabinet their temperature will be gradually brought down without appreciably affecting the refrigeration of the lowermost bottles since the output of the blower 46 is more than enough to maintain a constant cold draft upon the lowermost bottles.

The thermostatic control 52 is located in the direct path of flow of air from the evaporator and is set to deliver air at approximately 32° within a degree or two either way with the result that the temperature of the lowermost bottle is approximately 36° and the uppermost bottle after this operation has been carried on for a while at approximately 40°. The thermostatic control 52 controls the compressor of the refrigeration unit to cause it to run while the temperatures are high and to shut off when a predetermined temperature is reached thereby doing away with any need for a pressure control valve and enabling the warmer air drawn from the top of the cabinet on the off cycle to maintain the coil free of ice. Carbonated beverages hold their charge much better at 36° than 40° or above when agitated as by handling.

Although it has been proposed to make perforations through the cylindrical member 24 at spaced points throughout its length so that some of the air movement is short-cycled after contacting the lowermost bottles, this is an added and needless expense where the temperature control 52 operates the compressor and the blower 46 is run continuously, the blower 46 being a low speed blower which maintains a mild movement of air in the cabinet. Furthermore it has been proposed to vary the speed of the blower 46 in relation to recharging bottles but due to the large capacity of the dispenser and the other controls already mentioned the expense of controlling the blower for this purpose is not necessary. The fact that the lowermost bottles are contacted by the coolest air immediately prior to their discharge is sufficient to give adequate refrigerating capacity for a large number of bottles with a small capacity compressor and refrigeration unit.

Having thus described the invention, its operations and various features, it will be apparent to those skilled in the art that various and further modifications can be made without departing from the spirit of the invention, the scope of which is commensurate with the appended claims.

What is claimed is:

1. An article dispensing cabinet comprising an insulated housing, a drum mounted for rotation therein having a conduit down through the center thereof, means for supporting rows of articles on the drum for discharge at one end of the drum, means for drawing air from the opposite end of the drum through said conduit, and means for refrigerating said air and moving the air

over the outside of the drum from said other end to the first end, said moving means being located upstream of said refrigerating means.

2. An article dispensing cabinet comprising an insulated housing, a drum mounted for rotation therein having a conduit down through the center thereof, means for supporting the drum including an air shroud coaxial and mating with the lower end of the conduit, means for supporting rows of articles on their side in the drum for discharge at one end of the drum, means for drawing air from the opposite end of the drum through said conduit including a sleeve mating with said shroud and a fan in said sleeve, and means for refrigerating said air as it leaves the sleeve including a refrigeration coil and for moving the air over the outside of the drum from the first end to the opposite end.

3. The process of refrigerating bottled beverages including propelling a moving stream of air through a refrigerated zone, abstracting heat from said moving stream of air in said zone and directing said stream to impinge on said bottled beverages immediately thereafter, said bottles advancing in the opposite direction to said air stream and being disposed in overlapping relationship so that their axes form an angle of approximately 65° to the direction of flow of said stream for achieving maximum turbulence, and the diversion of secondary streams laterally and upwardly along the sides of the bottles.

4. The process of refrigerating bottled beverages including imparting motion to a stream of air in a closed circuit, abstracting heat from said air stream, and advancing a row of bottles in a direction opposite to that of said air stream, said bottles being disposed in overlapping rela-

tionship, the axis of each bottle being disposed at an angle of approximately 65° to the direction of said air stream.

5. The method of cooling articles dispensed one by one including storing the articles in radially disposed stacks in a refrigerated space, directing a continuously flowing stream of air radially outwardly through a refrigerating zone and upwardly in a column in contact with the stacks of articles in a direction opposite to their direction of advancement in a closed cycle, and refrigerating said stream of air in relationship to the temperature of the air as it leaves said zone.

6. The method of cooling articles dispensed one by one from the end of a progressively lowering row of articles including storing the articles in a refrigerated space, directing a continuously flowing stream of air upwardly over the articles, downwardly to one side of the articles and laterally outwardly to again pass upwardly over the articles in a closed cycle, passing the air stream through a refrigerating zone during lateral movement thereof immediately before it contacts the lowermost article, and refrigerating said stream of air in relationship to the temperature of the air as it leaves said zone.

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The following references are of record in the file of this patent:

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