Sept. 3, 1935. C. G. BUDER 2,013,264

COOLING PACKAGED MATERIALS

Filed April 8, 1933

Fig. 1.

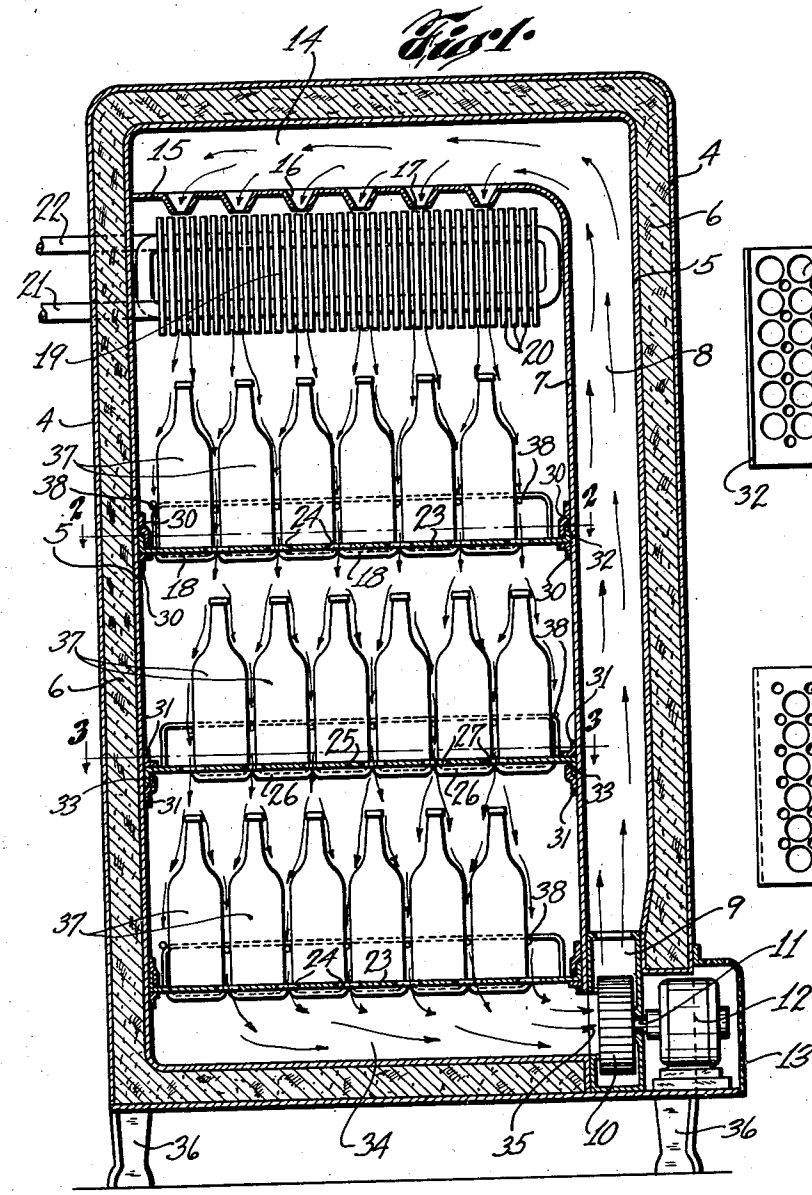


Fig. 2.

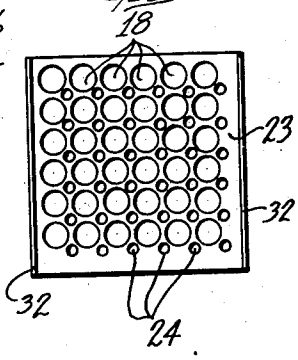
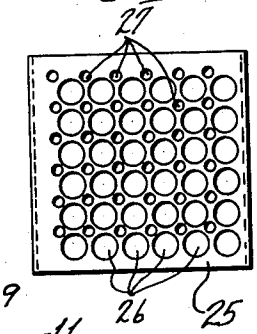


Fig. 3.



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Patented Sept. 3, 1935

2,013,264

UNITED STATES PATENT OFFICE

2,013,264

COOLING PACKAGED MATERIALS

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Application April 8, 1933, Serial No. 665,073

5 Claims. (Cl. 62—102)

This invention relates to improvements in cooling packaged materials, and more particularly to improved apparatus for, and method of the cooling of packaged materials, such as liquids in bottles.

The cooling of bottled beverages at a rate to meet the peak requirements of retail sales, has heretofore been attended with numerous objections and difficulties, now overcome to a high degree by the present invention. Various attempts have been made to accelerate the cooling of bottled goods by immersion thereof in a brine or sweet-water bath. While cooling may be hastened somewhat by this method, the difficulty of the loss of adhesively-secured bottle labels, and the necessity for the attendant manually to remove the cooled bottles from within a very cold liquid, have, among other difficulties, seriously detracted from the desirability of the immersion method of cooling.

In distinction, the dry refrigeration of bottled goods has heretofore required a substantial interval of time to lower the bottles and contents from ambient temperature or higher, to a desirable beverage temperature, often a difference, in summer months, of 50° F. The present invention has as its general object, the elimination of all of the difficulties of the immersion method of cooling, and a material reduction in the time required for cooling by dry refrigeration.

Yet another object of the invention is attained in an improved cooling cabinet and appurtenances for the refrigeration of bottled goods, embodying a forced circulation of a cooling fluid, such as refrigerated air.

A further important object of the invention is attained in a bottle-supporting arrangement such that the bottles themselves coact with other air-directing agencies to direct a cold air stream into intimate contact with the major surface of a number of the bottles being cooled, and such that an automatically predetermined arrangement of the bottles results in a somewhat tortuous path of travel of the cooling air, causing the air streams to proceed preferably lengthwise of each of the bottles under treatment, and into close wiping engagement therewith.

Yet another object of the invention is attained in an improved method of and arrangement for directing defined streams of cooled air in such a manner that the bottles intersect the course of preformed air streams, so serving as baffles for the air currents, and augumenting the rate of radiation from the bottles and contents.

The foregoing and still further objects will appear from the following detailed description of a presently preferred embodiment of the invention, considered in connection with the accompanying drawing in which:

Fig. 1 is a vertical sectional elevation through a cooling cabinet constructed and equipped according to the present invention, and Figs. 2 and 3 are plan views, on a somewhat reduced scale, of adjacent shelf structures employed in connection with the cabinet of Fig. 1, for supporting packaged or bottled goods.

The structure of Fig. 1 includes a cabinet which is conveniently of rectangular section, the outer cabinet walls being indicated at 4, and an inner wall or shelf structure shown at 5. The walls 4 and 5 are preferably uniformly spaced, so as to receive therebetween a suitable insulating material, as indicated at 6. Vertically disposed, somewhat inwardly of one of the walls 5, is a partition 7 serving to define, with the adjacent wall 5, a vertical air duct or passage 8. The passage 8 is connected at its lower end with the discharge side of a housing 9 of a fan, or other suitable fluid or air displacement device. As illustrated, the fan is of peripheral-blade type, the rotor or displacement element of which is indicated at 10, carried by a shaft 11, and conveniently driven by an electric motor 12. Access to the motor is provided through a removable cover portion 13.

The upper or discharge end of the vertical air passage 8, is directed into a horizontally disposed chamber 14 located, in the present example, just below the top or upper wall of the cabinet. The chamber 14 is defined in part by the walls 5, and a bottom wall 15 characterized by a series of evenly spaced nozzle or throat portions 16, each terminating in a restricted outlet port 17, it being understood that while only a single row of the nozzles and ports 16—17 appear in Fig. 1, several parallel rows thereof are provided, the arrangement and spacing of which correspond, by preference, to the arrangement and spacing of the plurality of bottle seats such as 18 (Fig. 2). The tray or shelf structures embodying the seats 18 are hereinafter described in more detail.

Disposed by preference immediately below the ports 17, is a cooling agency generally indicated at 19, and exemplified as an expansion coil including a plurality of parallel, spaced, vertically disposed fins 20 carried by the tubular elements of the coil, the inlet and outlet limbs of which are indicated at 21 and 22. Since the expansion unit 19 may consist of any suitable or conventional structure of this kind, and be utilized with standard types of commercial refrigerating ap-

paratus, detailed descriptions of the compressor, receiver, condenser and other items of refrigerating equipment need not be here included. It is to be understood, however, that the cooling agency shown by way of example as consisting of the coil 19, may consist of an ice tray, or a suitable support for other refrigerating materials and/or agencies, such as dry ice, etc., or may consist of a brine coil; it being further noted that the successful operation of the arrangement does not necessarily require the unit 19 to be located as shown.

The bottles of liquid, or other packages of material to be cooled, are supported on superposed shelves, one or the uppermost of which is indicated at 23, by location, and represented in plan, by Fig. 2. My preference is to construct the shelves or trays such as 23, of stamped or pressed sheet metal, so that at the time of formation, there may be die formed in the shelf, the plurality of sockets or recesses serving as bottle seats, as indicated at 18 and hereinbefore referred to. Intervening, and arranged in staggered relation to the seats 18, are a plurality of apertures 24, the arrangement of the openings 24 and the distance between centers thereof being proportioned and conformable to those of the seats 18. While I have described the trays or bottle holders 23 as being formed of sheet metal, it will be understood that a woven wire construction (not shown), or other perforate or foraminous support may be employed, in the latter case the bottle seats being formed either by the arrangement of wires or for example, by separate cup-shaped elements (not shown) secured, as by welding, to a wire base.

Disposed below the shelf 23, is a shelf 25, which may be of similar bottle-supporting capacity and of the same general structure as shelf 23, with the important exception that shelf 25, as shown by Fig. 3, is provided with bottle seats 26 spaced like the seats 18 of the shelf 23 but laterally offset or staggered with respect to the seats 18. The relative position of the bottle seats 18 and 26 best appears from a comparison of Figs. 2 and 3. Intervening the bottle seats 26 of tray 25, are a plurality of air apertures or passages 27 preferably of a size and general location corresponding to the openings 24 in the tray 23.

Irrespective of the number of shelves employed, three being shown, only two types thereof need be employed, the shelves such as 23 and 25 being alternated, vertically, within the cabinet.

In order that the initial and intended arrangement of the two types of shelves be retained in use and service, it is my preference to provide shelf supports such as 30, for the upper shelf 23, and guides or slides of a different type as shown at 31 for the alternate type of shelf. Both types of supports may be formed conveniently of pressed metal. It will appear that the rim or lateral margins of shelf 23, is upturned as indicated at 32, while the corresponding margin 33 of shelf 25 is turned downwardly. The guides 30 and 31 are arranged, respectively, so as to receive only the shelf appropriate for the particular position and thus it is impossible to introduce shelf 23, in the guides or supports 31, and vice versa. The same arrangement of guides, supports, etc., may be employed for the bottom shelf of a three-shelf cabinet, as is employed in the top. In the example illustrated, end-for-end reversal of the shelves is prevented by an upturned or downturned forward edge (not shown) so that the proper relation of bottle seats on the different shelves cannot be destroyed by endwise shifting of a given shelf.

As will appear from the air currents defined by the arrows of Fig. 1, the cooling streams after passing the bottles on the several shelves, emerge into a lower compartment 34 whence the air is drawn into the intake opening 35 of the fan housing, and recirculated or recycled, as above described, upon being discharged by the fan into the passage 8 and chamber 14.

Many details of the proposed exemplary arrangement have not been exhaustively described as not being material to the present invention; for example, the materials constituting the parts of the cabinet, the details of mounting of the fan and fan housing, and other items being intentionally omitted as being within the realm of choice. It is my preference, however, that the cabinet be of portable or semi-portable nature, and to this end, and for the sake of cleanliness, it is preferred to support the structure on leg elements such as 36.

The course of the individual, defined air streams, and the action thereof with respect to the bottles such as 37, supported by the shelves, is thought to be evident from the foregoing description of structure, but may be reviewed for sake of completeness, as follows: The stream of air discharged from the housing about the fan 10, is impelled upwardly through the vertical passage 8, thence into the chamber 14, and discharged, at a substantially augmented velocity, through the nozzles 16 and ports 17, preferably between the fins 20 of the expansion unit 19. The fins do not, however, serve materially either to alter or to shape the course of the air streams emanating from the nozzle ports 17. It will have been observed that the ports 17 are vertically aligned with the tops of those bottles 37 occupying the first or uppermost shelf 23. These streams are, by preference, the same in number as the bottle seats of each shelf. There is thus directed a defined stream, downwardly along each individual bottle, this stream proceeding in close adjacence to and in wiping engagement with first the neck, and then practically over the entire surface of the bottle. Each bottle thus serves as a spreader, deflector, or baffle for one of the individual streams from the nozzles 17. As the air stream, cooled upon passing the expansion unit or other refrigerating agency 19, passes the first shelf of bottles, it issues through the openings 24 which immediately overlie the caps or crowns of the bottles occupying the next lower shelf, such as 25. The action of the air streams in passing the bottles 37 on the shelf 25 is closely similar to that attained on the first shelf, so upon issuing from the openings 27 of shelf 25, the air streams are again concentrated axially of the bottles on the lowermost shelf, and thus brought into close wiping engagement with each individual bottle on any one of the shelves. It will have been observed that the course of the individual air stream is altered to a certain degree by the bottles themselves, and, due to the laterally staggered arrangement of bottles, is caused to follow a somewhat circuitous or tortuous path in proceeding from one end to the other, of the cabinet, as in moving between the chambers 14 and 34.

It will appear that, by the provision of a suitable speed control (not shown) on the fan motor 12, the rate of circulation of the air, and hence the rate of cooling of the bottle liquid, may be varied, and thus is provided an effective control of refrigeration rate, according to the number of

bottles being dispensed, or the number occupying the cabinet. This control may be effected or augmented by any suitable or usual control of the machine supplying refrigerant to the unit 19.

The cabinet and accessories embodying the present invention has been described by making particular reference to a construction to be utilized for the cooling of beer bottles of standard size, in which case no support or positioning structure other than that afforded by the sockets or seats 18 and 26 need be employed. However, in case bottles of very tall type are to be cooled, it is sometimes desirable further to stabilize them with respect to the shelves, through the provision of crossed wire guards such as 38 disposed crosswise of, and spaced above the surface of the shelf, the ends of the wires being bent downwardly and anchored to the shelf in any suitable manner.

While I have described the invention by making particular reference to the details of a construction selected as an example to illustrate the invention, it is to be understood that numerous changes may be made in the parts, their combinations, as well as in their arrangement, without departing from the spirit and full intended scope of the invention as defined by the claims hereunto appended.

I claim as my invention:

1. A refrigerator for cooling bottled goods, including a vertical insulated cabinet, a chamber at the top of said cabinet, a chamber at the bottom of said cabinet, a circulating fan having its intake connected to the said bottom chamber, an air duct connected to the discharge of said fan and communicating with the upper chamber, a refrigerating compartment between the upper and lower chambers, a partition member forming the lower wall of said upper compartment, a plurality of spaced nozzles or ports provided by the said partition member, an expansion coil disposed in the refrigerating compartment and below said ports, a plurality of superposed bottle-holding shelves in the refrigerating compartment below said expansion coil, means carried by each of said shelves providing evenly spaced bottle holding seats, the bottle seats being laterally offset in the vertically adjacent shelves, those of the uppermost shelf being vertically aligned with the said nozzles or ports, the shelves being provided with apertures between the bottle seats thereon, whereby to permit the circulation of cooled air through the shelves, the shelves further being arranged so that the bottle seats of a lower shelf are in line with the apertures of a shelf next thereabove, supports for the shelves and means associated with the shelf supports, necessitating insertion of the shelves in predetermined relative positions.

2. A refrigerator for bottled goods, including an insulated cabinet, a shelf in the cabinet having spaced pockets formed thereon, each pocket being adapted to receive a bottle in upright position, a plate disposed above said shelf, in overlying relation to bottles positioned thereon, said plate being apertured to form air passages, each aperture being disposed in vertical alignment with one of said shelf pockets, and means for forcing a stream of cooled air downwardly through said plate, whereby such stream is divided into individual streams of augmented velocity.

3. A refrigerator for bottled goods, including an insulated cabinet, a shelf in the cabinet having spaced pockets formed thereon, each pocket being adapted to receive a bottle in upright position, a plate parallel to, and spaced above said shelf, said plate having nozzle-forming apertures therein, each of said apertures being disposed in vertical alignment with one of said shelf pockets, and means for cooling, and forcing air through said plate in a direction toward said shelf.

4. A refrigerator for bottled goods including an insulated cabinet, a plurality of vertically spaced shelves in said cabinet, means carried by each shelf forming evenly spaced seats adapted to receive bottles in upright position, the bottle seats being laterally offset in vertically adjacent shelves, each of said shelves having openings between adjacent bottle seats; and means for cooling and circulating cooled air through said shelves.

5. A refrigerator for bottled goods, including an insulated cabinet, a plurality of vertically spaced shelves in said cabinet, and a horizontal partition member spaced above the uppermost shelf, said partition member having a plurality of evenly spaced apertures formed therein, means carried by each shelf forming laterally spaced seats adapted to receive bottles in upright position, the seats in the uppermost shelf being disposed in vertical alignment with the apertures in said partition member, the bottle seats being laterally offset in vertically adjacent shelves, each of said shelves having openings between adjacent bottle seats to provide air passages; and means for cooling and circulating air downwardly through said partition member and shelves.

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