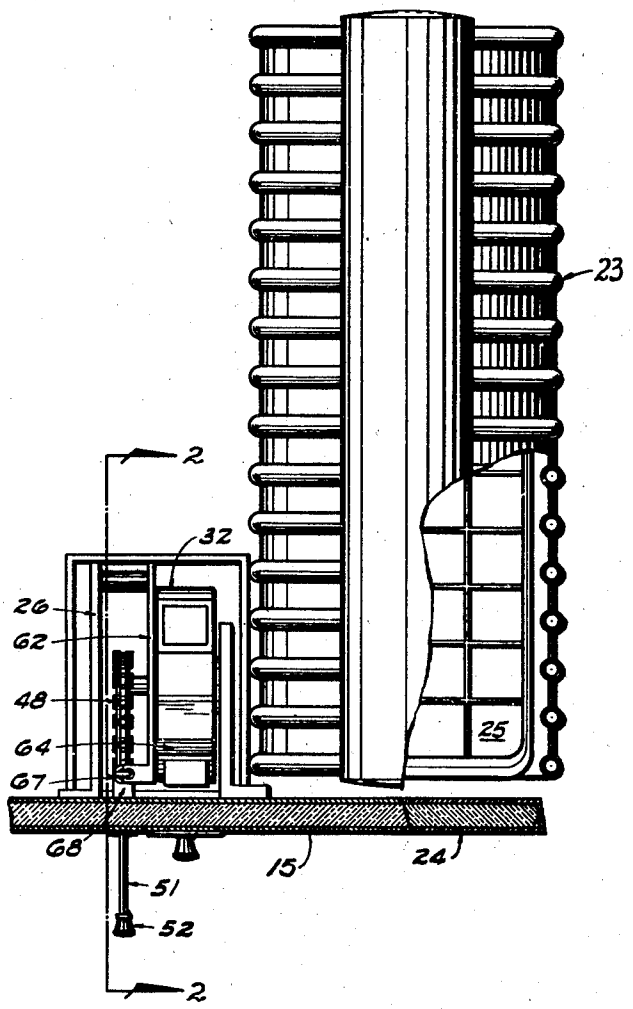
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ICE CUBE FREEZER AND DISPENSER

Filed Aug. 28, 1944 2 Sheets-Sheet 1

Fig. 1



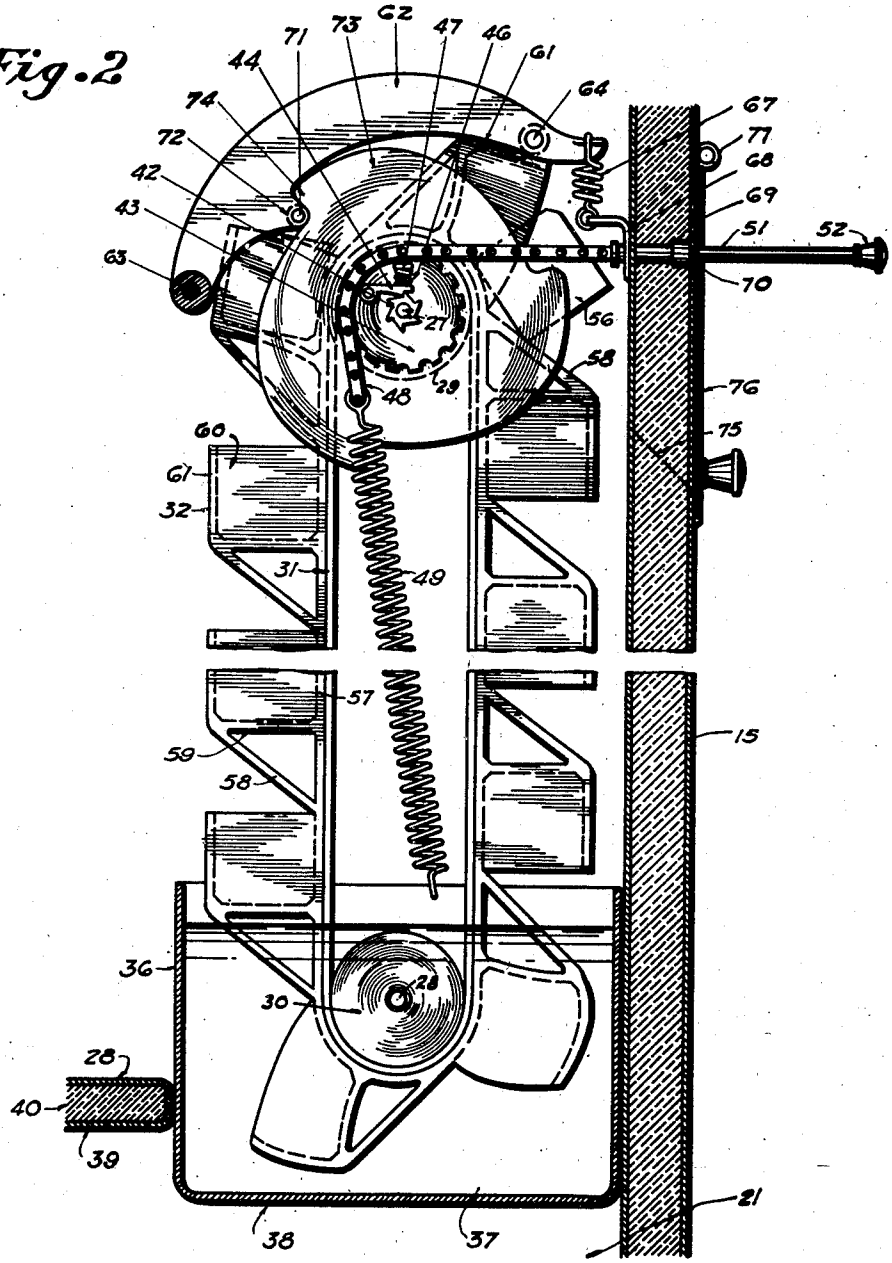
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ICE CUBE FREEZER AND DISPENSER

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Fig. 2



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ICE CUBE FREEZER AND DISPENSER

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Application August 28, 1944, Serial No. 551,461

3 Claims. (Cl. 62—106)

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This invention relates to refrigeration and more particularly to automatic household refrigerators of the type which are entirely self-contained in that both the refrigeration mechanism and the cooled storage compartments are housed within a single cabinet.

An object of my present invention is to provide in an automatic household refrigerator, mechanism for dispensing small cooled bodies adapted to absorb heat from objects and materials with which they make contact, or near which they are placed.

A further object of my invention is so to design and arrange the mechanism for dispensing the cooling bodies that the bodies are dispensed one at a time and without any of the delay or inconvenience ordinarily required to release ice cubes from their freezing tray.

A more detailed object in this connection is to provide mechanism for automatically filling molds with liquid, carrying them after filling into a compartment where the temperature is lower than the freezing point of that liquid and thence to a suitable point of discharge where the frozen cubes are released from the conveyor, the mechanism being operable to so dispense a single one of the frozen cubes each time it is actuated, but also being operable repeatedly so that as many cubes as may be desired may be received from the machine within the normal operating capacity thereof.

The invention possesses other objects and valuable features, some of which, with those enumerated, will be set forth in the following description of the preferred embodiment of my invention illustrated in the drawing accompanying and forming a part of the specification. It is to be understood that I do not limit myself to the showing made by said drawing and description but that I may adopt variations of the preferred form within the scope of my invention as defined by the claims.

Referring to the drawings:

Fig. 1 is an enlarged detail view showing the evaporating or cooling coils of a refrigerator and the cooled body dispensing mechanism there adjacent in top plan; and

Fig. 2 is a more highly enlarged view of the ice cube dispensing mechanism in side elevation, being taken substantially along the line 2—2 of Fig. 1.

In terms of broad inclusion, the present invention provides dispensing mechanism adapted for incorporation with various types of refrigeration machinery and operable to cause delivery of small

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blocks of ice of such size that they can be used for any of the purposes for which it is customary to employ the well-known "ice cubes" now commonly produced in household refrigerators. After an ice cube has been dispensed, the mold in which it was frozen again is filled automatically and thereafter caused to pass through a compartment where a temperature sufficiently low to freeze the liquid is maintained. A handle accessible outside the cabinet of the device is operable to cause the several filled molds to advance through the freezing compartment and as each mold arrives in position adjacent a delivery opening, means actuated by the same operating handle positively releases the ice cube from that mold. In this manner a single ice cube is caused to be delivered without any of the inconvenience which usually accompanies melting or breaking ice cubes from their freezing tray, and without having to remove from the freezing compartment more of the cubes than desired for immediate use.

Since the invention relates primarily to an ice cube dispensing mechanism, a fragment only of the refrigerator cabinet is shown, indicated in Figs. 1 and 2 at 15. Supported by the cabinet 15 are cooling coils 23 surrounding a compartment 25 which affords convenience as a "quick freeze" chamber or for the manufacture of ice cubes in freezing trays in accordance with conventional practice. In the interior of cabinet 15, a framework 26 is provided for the support of a pair of vertically spaced horizontal shafts 27 and 28, carrying pulleys 29 and 30, respectively. These pulleys 29 and 30 support a flexible belt 31 upon the outer surface of which a series of buckets 32 are provided. These buckets 32 take the form of molds composed of suitable flexible, resilient material which may or may not be formed integrally with the belt 31. Whereas the shape and size of each of the molds 32 are a matter of individual selection and will be determined by the requirements of installation and use, it is preferred that for use in connection with a refrigerator for ordinary household service each mold 32 be of such size that it is of substantially one or one and a half cubic inches capacity, so that a block of ice frozen therein will correspond rather closely in shape and size to the ice cubes produced in present-day automatic household refrigerators.

A reservoir 36 is mounted within cabinet 15 in such position that as the molds 32 pass around the lower pulley 30 they dip into liquid 37 contained therein which preferably is kept at such

a depth within the reservoir 36 by suitable automatic filling mechanism (not shown) that as the molds 32 move upwards from the lower pulley 30 they will be filled with liquid. Observation of Fig. 2 discloses that the bottom wall 38 of the reservoir 36 is of single thickness, and the reservoir extends through the insulated bottom wall 39 of the compartment within which the drawer 16 is mounted, so that this bottom wall 38 of the reservoir 36 is exposed to the compartment 21 within which the refrigerating machinery is arranged. As already stated, the compartment 21 is in communication with the outside atmosphere, and this fact coupled with the fact that a considerable quantity of heat is given off from the refrigerating mechanism, not only from the cooling coils, but also from the motor which operates the refrigerating machinery, will maintain the temperature of the liquid 37 within the reservoir 36 considerably above that which prevails within the refrigerated interior of the cabinet. The mechanism is so adjusted that the temperature within the refrigerated interior of the cabinet immediately adjacent the cooling coils 23 is considerably below 32° F. whereas the temperature of the contents of the reservoir 36 is sufficiently above 32° F. to prevent the water therein from freezing, thus avoiding interference with operation of the belt 31 by solidification of water within the reservoir with buckets 32 immersed therein. However, after the buckets have been elevated from the reservoir by operation of the belt 31, the contents of the buckets will freeze.

Since the upper shaft 27 is directly above the lower shaft 28, and since the two pulleys 29 and 30 are of substantially the same size, both runs of the conveyer belt 31 extend substantially vertically. Such vertical position for the run emerging from the water reservoir 36 is of importance because it causes the buckets or molds 32 to emerge from the reservoir 36 in substantially upright position, making it possible for them to retain their full capacity of water as the molds are elevated and carried through the cooling chamber.

Means operable from outside the cabinet 15 are provided for rotating the pulleys 29 and 30 in step-by-step movement so as to carry the empty molds 32 downwards into the reservoir 36 to be filled, and to carry the filled molds upwards from the reservoir 36, through the freezing compartment, and into a discharge opening. Rigidly secured to the upper shaft 27 is a ratchet wheel 42. Also mounted upon the shaft 27 closely adjacent to the ratchet wheel 42 is a sprocket wheel 43 carrying a pawl 44 which is at all times pressed against the toothed edge of the ratchet wheel 42 by a spring 46 under compression between the pawl 44 and a block 47 on the sprocket wheel 43. A chain 48 is connected at its lower end to a coil spring 49 which is suitably anchored to a rigid portion of the cabinet 15 so as to maintain the spring 49 and chain 48 in tension. From the spring 49 the chain 48 extends upwards to and around a portion of the periphery of the sprocket wheel 43 so that the upper end of the chain 48 extends horizontally from the top of the sprocket wheel to be connected to a reciprocably mounted rod 51 which extends slidably through the front wall of the cabinet 15, thus making a knob 52 on the forward outer end of the rod 51 accessible outside the cabinet. The parts are so arranged that when the rod 51 is pulled forward, the resulting motion of the chain 48 will impart rotation to the sprocket wheel 43 whereupon the pawl 44 will similarly rotate the ratchet wheel 42 and shaft 27 which, being secured to the upper pulley 29, will cause the belt 31 to move through a distance substantially corresponding to the distance between adjacent molds 32 thereon.

Means are provided for positively releasing each ice cube 56 from its associated mold 32 after that mold has been carried around the upper pulley 29 far enough to pass the uppermost point thereon. Inasmuch as the back wall 57 of each mold is of flexible material and since that back wall will conform to the curvature of the pulley 29 as the associated portion of the belt travels thereabout, the back wall 57 of each mold will automatically be broken loose from the frozen ice cube 56 therein as the mold moves around the pulley. A web 58 interconnects the outermost edge of the bottom wall 59 of each mold 32 with the belt 31 at a point spaced materially below the bottom wall 59; and preferably each web 58 is reinforced by a strip of longitudinally inextensible material such as a metal wire, with the result that as the mold 32 passes around the upper pulley 29, the bottom wall 59 will be flexed as clearly shown in Fig. 2, thus causing the ice cube within that mold to be broken away from the bottom wall 59 also. Inasmuch as the two opposed side walls 60 of the mold are connected at their upper edges to the belt 31 which is forced to flex around the pulley 29 whereas the outermost wall 61 remains rigid and straight because of the presence of the solid ice cube 56 frozen thereto, the side walls 60 of each mold also will be broken loose from the ice cube as the mold passes around the pulley 29. Consequently, when each mold reaches its uppermost position in passing around the pulley 29, the ice cube therein will have been broken loose from all walls of the associated mold 32 except the outermost wall 61. An arm 62 is pivotally mounted upon a rigid pintle 63 behind the upper pulley 29 and extends from the pintle 63 forward so as to position a finger 64 on its forward end over the position which is assumed by each mold 32 shortly after the mold 32 has passed its uppermost position upon the pulley 29. A spring 67 is under tension between the extreme forward end of the arm 62 and an eye 68 rigid with the front wall of the cabinet. The eye 68 can conveniently be carried by the bushing 69, which serves as a guide for the rod 51, and which is secured rigidly to the front wall of the cabinet as by a threaded ferrule 70.

Between the pintle 63 and the finger 64 the arm 62 is provided with a pin 71 upon which a roller 72 is revolubly mounted. This roller is held by the spring 67 in rolling engagement with the peripheral edge of a cam 73, the lobes 74 of which are so arranged that the finger 64 is held up out of position to engage a mold 32 until that mold has passed the uppermost position upon the pulley 29 and has moved directly under the finger 64. This will assure that when the arm 62 is operated, the ice cube 56 which is consequently released will fall forward and, being guided by the inclined web 58 of the mold 32 which is in advance of the mold from which the ice cube has just been released, slide toward a delivery opening 75 in the front wall of the cabinet 15. Preferably the space between the front wall of the cabinet and the empty mold 32 is less than any one of the dimensions of one of the ice cubes 56, with the result that even though the door 76 for the opening 75 is closed, the ice cube released from an upper mold 32 will remain in

contact with the door 76 until the door is opened. The door 76 is supported by a hinge 77, and in such a manner that in opening, it swings outwards and upwards; and the upper and lower edges of the opening 75 diverge outwardly. Due to the fact that the lower edge of the opening 75 slopes downwards and outwards, when the door 76 is open, passage of an ice cube out of the opening 75 and into a suitable receptacle held in front of and just below the opening is facilitated.

Thus it may be seen that means are provided for filling suitable ice cube molds with water, advancing the filled molds through a freezing compartment and in step-by-step movement so that the molds with their frozen contents arrive successively in position adjacent a suitable discharge opening where the cube is broken loose from each mold and caused to be dispensed, thus making available a single ice cube or a number of ice cubes, depending upon the number of times the rod 51 is actuated, and without any of the inconveniences usually accompanying the removal of ice cubes from their freezing tray.

I claim:

1. Refrigerating apparatus comprising a cabinet having a cooling chamber therein, means for lowering the temperature therein, a pair of spaced pulleys mounted within said cabinet for rotation about parallel axes, a conveyor belt mounted on said pulleys and extending through said cooling chamber, a plurality of molds on said belt, means for supplying water to said molds, means for lowering the temperature within said cooling chamber to below freezing, means for turning said pulleys to advance said molds within said cooling chamber, each of said molds being of flexible, resilient material and comprising a bottom wall, side walls, and front and back walls, all of said walls except said front wall being so connected to said belt that they are distorted as the associated portion of said belt is flexed to conform to the curvature of a pulley whereby ice adhering thereto is broken loose therefrom, and movable means operable in response to rotation of one of the pulleys as each of said molds arrives in predetermined position with relation to a discharge opening in said cabinet for breaking ice loose from said front wall of that mold.

2. Refrigerating apparatus comprising a cabinet having a cooling chamber therein, means for lowering the temperature therein, a pair of spaced pulleys mounted within said cabinet for rotation about parallel axes, a conveyor belt mounted on said pulleys and extending through said cooling chamber, a plurality of molds on said belt, means for supplying water to said molds, means for lowering the temperature within said cooling chamber to below freezing, means for turning said pulleys to advance said molds within said cooling chamber, each of said molds being of flexible, resilient material and comprising a bottom wall, side walls, and front and back walls, and a substantially inextensible web interconnecting the bottom wall of each of said molds with said belt at a point spaced from that bottom wall whereby said bottom and side walls are distorted as the associated portion of said belt is flexed to conform to the curvature of a pulley and ice adhering to said distorted walls is broken loose therefrom.

3. Refrigerating apparatus comprising a cabinet having a cooling chamber therein, means for lowering the temperature therein, a pair of spaced pulleys mounted within said cabinet for rotation about parallel axes, a conveyer belt mounted on said pulleys and extending through said cooling chamber, a plurality of molds on said belt, means for supplying water to said molds, means for lowering the temperature within said cooling chamber to below freezing, means for turning said pulleys to advance said molds within said cooling chamber, each of said molds being of flexible, resilient material and comprising a bottom wall, side walls, and front and back walls, a substantially inextensible web interconnecting the bottom wall of each of said molds with said belt at a point spaced from that bottom wall whereby said bottom and side walls are distorted as the associated portion of said belt is flexed to conform to the curvature of a pulley and ice adhering to said distorted walls is broken loose therefrom, and means operable as each of said molds arrives in predetermined position with relation to a delivery opening in said cabinet for breaking all the then remaining bond between that mold and a block of ice therein.

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