

Oct. 20, 1936.

H. A. GREENWALD

2,058,077

REFRIGERATOR

Original Filed Oct. 16, 1931

2 Sheets-Sheet 1

Fig. 2.

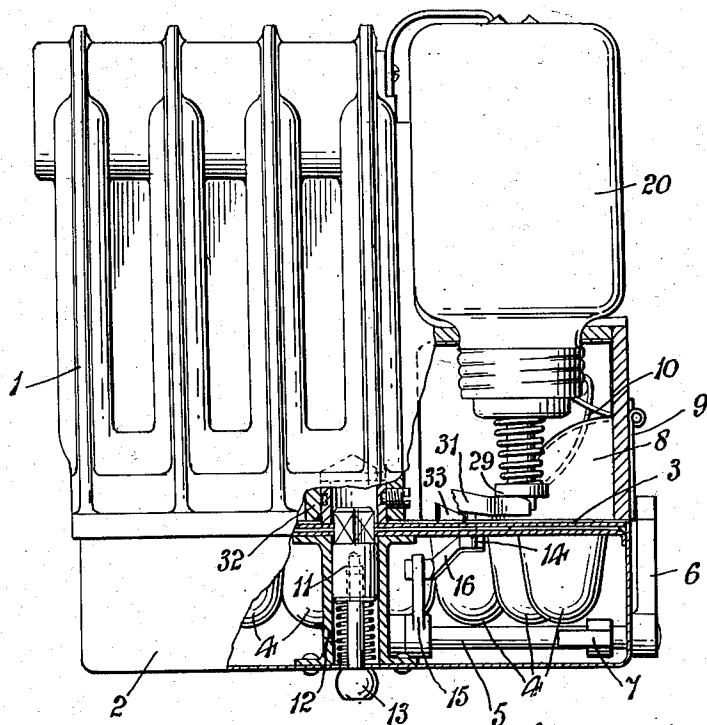
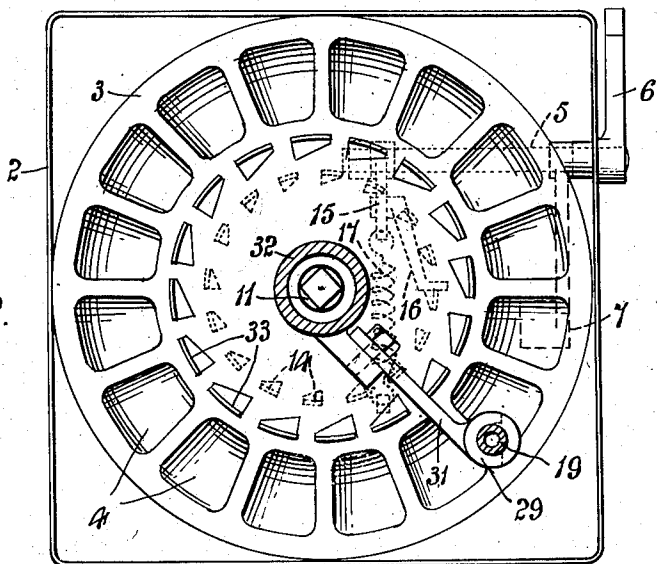


Fig. 1.

Harold A. Greenwald.
INVENTOR

BY *Stanley Lightfoot.*
ATTORNEY

Oct. 20, 1936.

H. A. GREENWALD

2,058,077

REFRIGERATOR

Original Filed Oct. 16, 1931

2 Sheets-Sheet 2

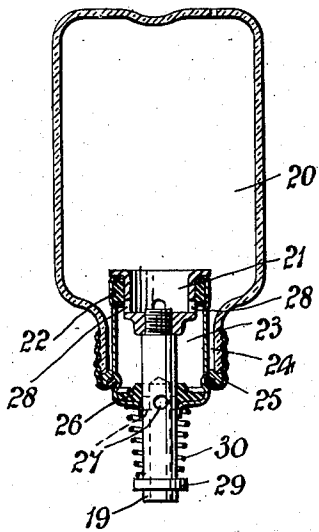


Fig. 5.

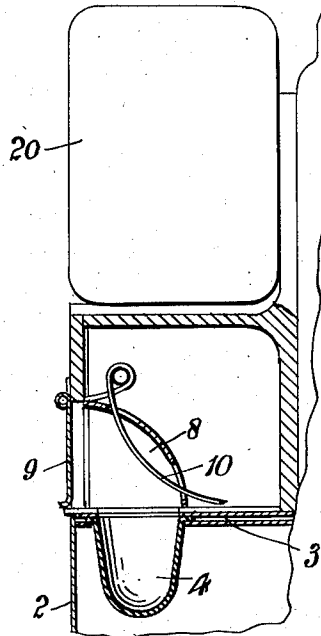


Fig. 4.

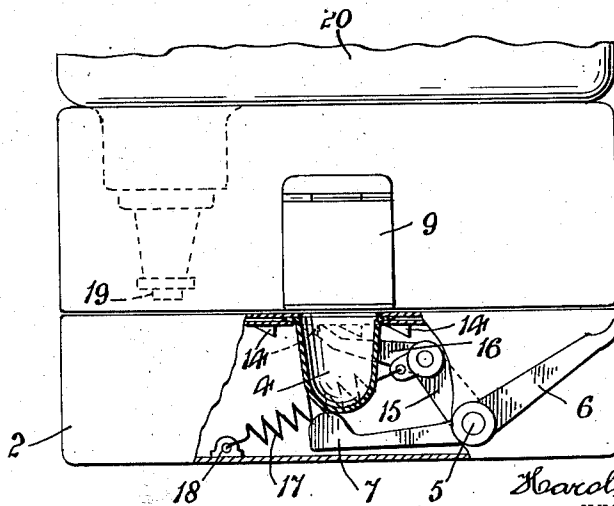


Fig. 3.

Harold A. Greenwald.
INVENTOR

BY *Stanley Lightfoot*
ATTORNEY

UNITED STATES PATENT OFFICE

2,058,077

REFRIGERATOR

Harold A. Greenwald, Los Angeles, Calif.

Refiled for abandoned application Serial No.
569,241, October 16, 1931. This application
January 31, 1936, Serial No. 61,733

36 Claims. (Cl. 62—108.5)

This application is a re-filing of abandoned application Serial No. 569,241, filed October 16th, 1931 and relates to refrigerators, more particularly household refrigerators, wherein provision is made for the freezing of ice cubes. Such cubes, being small, are usually formed in quantity in a tray provided with partitions ensuring isolation of the cubes from one another; and sometimes the tray, or the partitioning, is of rubber or similar flexible material to facilitate removal of the cubes. In any case, the removal of the tray is necessary in order that the cubes may be extracted and generally, in use, wastage of the ice cubes results in cases where it is not desired to use the contents of the entire tray at one time. Also, especially in the case of trays having non-flexible partitions, the removal of the cubes is often quite a difficult matter necessitating the thawing to some extent thereof in order to loosen them from the enclosing structure. Further, the refilling of the tray with water to be re-frozen necessitates the carrying of the tray to a source of water supply, or the carrying of the water to the tray, and this water is often spilled in the process; not only wetting the hands and sometimes the clothing of the user, but accumulating around the tray in the surrounding refrigerating compartment whereby the tray becomes frozen in position and difficult of eventual removal.

The present invention has for its object to eliminate the aforementioned disadvantages, and to provide, in a refrigerator, means for the ready removal of one or more pieces of ice at will without removing the tray or ice carrier from the machine; and more particularly contemplates provision for the mechanical removal of one or more pieces of ice from the machine by the simple operation of a lever or similar device.

A further object of the invention is to provide for the freezing of pieces of ice in individual pockets and ejecting means for effecting removal individually of such pieces of ice; a further object being to provide individual flexible pockets with means for flexing such pockets to effect the ejecting of pieces of ice therefrom.

The invention further contemplates the provision of a movable carrier operable to bring a piece of ice into position for ejection therefrom, and to move a pocket from which a piece of ice has been ejected into position for refilling with water, the invention further having in view the continued moving of said carrier, as further pieces of ice are ejected, thereby effecting the

carrying of the refilled pockets into a cold zone for the freezing of their contained water.

A still further object of the said invention is to provide for the carrying of individual ice pockets in circular series on a rotary carrier so that they may be passed through a cold zone and into a delivery zone; and the provision in combination with such rotary table, of means in the delivery zone for ejecting pieces of ice therefrom and for the refilling with water of the emptied pockets before passing again into the cold zone.

It is also an object of the invention to provide for the metering of water supplied to the emptied pockets.

Still further objects and advantages subsidiary or incidental to the aforesaid objects, or resulting from the construction or operation of the invention as it may be carried into effect, will become apparent as the said invention is herein-after further disclosed.

In carrying the said invention into effect, I may provide a rotary table having a portion of its surface extending into a refrigerating chamber, the said table being provided with a circular series of flexible pockets below which is arranged a lever operated ejector adapted, when operated, to collapse one of said pockets and thereby eject a piece of ice therefrom; a pawl operable conjointly with said ejector to partially rotate said table to bring an adjacent pocket into position for the subsequent ejection of a piece of ice therefrom when the piece of ice has been ejected from the first mentioned pocket, and the water supply vessel having a metered valve operable upon the rotation of said table to refill the emptied pocket with water.

All of which is more particularly described and ascertained hereinafter, by way of example, having reference to the accompanying drawings, wherein:

Figure 1 is an elevation, shown partly broken away and in section, of a cooling unit involving the said invention;

Figure 2 is a plan of the same with the upper part, including the refrigerating unit and water container, removed;

Figure 3 is a fragmentary front elevation of the lower part of the device, partly broken away to disclose the ejecting and table rotating mechanisms;

Figure 4 is a detail fragmentary vertical section illustrating one of the ice pockets with the means for guiding an ejected piece of ice from the device; and

Figure 5 is a detail vertical section of the water

container, illustrating the metering arrangement.

Similar characters of reference indicate similar parts in the several figures of the drawings.

1 indicates a refrigerator unit beneath which is arranged a casing 2 housing a rotary table 3, which table carries a circular series of flexible pockets 4 which may be of any desirable shape and of any suitable material, such, for example, as rubber. The space within the rear part of the chamber 2 and beneath the refrigerator unit 1 constitutes a cold zone and may be considered as the "refrigeration chamber", and that part of the casing extending forwardly of the refrigerating unit 1 may be considered as the "delivery chamber", it being apparent that the rotation of the carrier will carry the said pockets 4 successively through the refrigeration chamber and from thence through the delivery chamber, and back into the refrigeration chamber as the rotation is continued.

In the delivery chamber is located a shaft 5 rockable by an external lever 6 and carrying a finger 7 which, upon the depression of the said lever, will be raised against the underside of one of the pockets 4 thereby collapsing the said pocket upwardly and forcing therefrom a piece of ice which may be located therein, this ejected piece of ice entering a quadrant-shaped chamber 8 which is normally closed, if desired, at its outer end by an easily movable flap or door 9. To assist the completing of the ejection of the piece of ice from the chamber 8, a spring 10 may be employed which yields to the passage of the piece of ice as it is lifted upwardly by the finger 7, so that the energy thus stored up in the spring 10 under those conditions may eventually react to give the final outward movement to the piece of ice. Thus the said piece of ice is thrown against the said flap 9 which it thus pushes open, permitting the piece of ice to fall from the machine into any suitable receptacle which may be provided to receive it.

The particular construction of the rotary table is a matter of convenience or desirability and is not described in detail herein except to say that it rotates about a spindle 11 and is centrally supported on a post 12. The spindle may be withdrawable from the table, such as by pulling on the provided knob 13, to facilitate removal of the table, if desired.

The table is further shown as being provided on its underside with a series of ratchet teeth 14, and extending from the shaft 5 previously referred to is an arm 15 carrying at its extremity a pawl 16 adapted to engage one or other of the said ratchet teeth 14, this arm being connected to one end of a tension spring 17, the other end of which is secured at 18 to a suitable ear on the base of the casing 2.

It will be obvious that this spring normally retains the lever 6 in raised position and the finger 7 in a depressed position; and it will also be obvious that, as the lever 6 is depressed to effect the ejection of a piece of ice in the manner hereinafter described, the pawl 16 is moved rearwardly from its normal position into engagement with a rearwardly disposed ratchet tooth 14 so that, when the said lever 6 is subsequently released, the reaction of the said spring 17 will cause the pawl to effect the partial rotation of the table 3 thereby moving the now emptied pocket 4 to a position advanced beyond the delivery point.

As these motions of the operating mechanism

described are repeated in ejecting pieces of ice from the table, the emptied pockets 4 are brought beneath the discharge pipe 19 of a water container 20 which is situated above the delivery chamber, this water container being preferably of glass so that its contents may be seen at all times and necessity for refilling at any time thereby noted.

The discharge pipe 19 is shown as being in the form of a tube closed at its upper end which carries a hollow head 21 vertically movable in packing 22 located in the upper end of a metering chamber 23, which chamber in turn is located in the downwardly extending mouth 24 of the water container and held in position therein by the screw cap 25. The lower end of the metering chamber 23 encloses a packing 26 which normally closes transverse openings 27 through the wall of the discharge pipe 19 to the bore thereof. The side wall of the head 21 is also provided with radial openings 28 which, in the normal position of the discharge pipe, effect communication between the water container 20 and the metering chamber 23, thus permitting the said chamber 23 to be filled with water.

The lower part of the discharge pipe 19 is enlarged or provided with a shoulder 29 which supports the lower end of the compression spring, the upper end of which impinges on the lower end of the metering chamber, and beneath the said shoulder 29 extends the forked end of a lever 31 the inner end of which lever is hingedly attached to a fixed central member 32 which in this case is shown as a downwardly projecting boss on the underside of the refrigerator unit 1. This lever 31 as the table is rotated is adapted to be periodically raised by one or other of a circular series of inclined projections or cams 33 passing thereunder, these projections being formed on the upper surface of the table and so situated that they will effect the said raising of the lever 31 as one of the emptied pockets 4 passes beneath the discharge pipe 19 of the water container.

It will be apparent that the resulting raising of the said discharge pipe 19 discloses the openings 27 thereof to the interior of the metering chamber 23 so that its contents will be discharged into the pocket therebeneath, thus refilling the pocket with water ready for re-freezing. The raising of the said discharge outlet also causes the radial openings 28 of the head 21 to be closed by the packing 22, so that the passage of further water into the metering chamber 23 is prevented until such time as the discharge pipe 19 has again assumed its normal lower position under the influence of the spring 30 after the projection 33 has passed beyond the lever 31. The metering chamber 23 will then be refilled from the container 20 through the medium of the said openings 28, ready for the next delivery operation of the discharge pipe 19.

After the pocket has been refilled with water, the continued rotation of the table, as ejection of pieces of ice is successively effected, will result in the movement of the refilled pocket into the refrigeration chamber, or cold zone, through which it passes; so that within a reasonable lapse of time when such pocket re-enters the delivery chamber in its continued travel, the water therein will have been frozen and the resulting piece of ice be ready for ejection, in the manner described, when it reaches the vicinity of the quadrant shaped chamber 8.

It will be understood that the use of the term

"ice cubes" herein, and in the claims, is not intended as a designation of the actual shape of the pieces of ice, the said term being used in the broader sense which has become customary to indicate small individual pieces of ice suitable for the cooling of beverages, et cetera, as distinguished from large commercial blocks of ice which must be broken up for general table and similar use. Furthermore, the term "household refrigerator" is used herein as indicating that type of refrigerator now well known and only installed in houses, apartments, and locations where it is desirable that ice be formed in small quantities suitable for table and similar use, as distinguished from commercial refrigerators which provide ice in bulk form.

With an arrangement such as that described, excellent provision is made for the delivering of individual pieces of ice one at a time and the recharging of the carrier in a continuous manner, so that its application to household refrigerators and the advantages which it presents to a small user of ice cubes will be readily seen. The arrangement may be developed, however, on almost any scale or capacity and the mode of carrying the pieces of ice and effecting their movement and release may be arrived at by many equivalent mechanical mechanisms without departing from the essential features of the said invention, and it is desired, therefore, that the specification and drawings be read as being merely illustrative, and not in a limiting sense, except as necessitated by the prior art.

What I claim is:

1. In a household refrigerator, an ice carrier carrying a plurality of pieces of ice, a finger movable to eject an individual piece of ice from said carrier, and means for operating said finger.
2. In a refrigerator, a rotatable ice carrier carrying a circular series of pieces of ice, and ejector adapted to remove said pieces of ice individually from said carrier as said carrier is rotated, and means operable with said ejector for rotating said carrier.
3. In a refrigerator, a rotatable ice carrier carrying a circular series of pieces of ice, an ejector adapted to remove said pieces of ice individually from said carrier as said carrier is rotated, and means operable with said ejector for rotating said carrier to bring said pieces of ice successively into position for removal by said ejector.
4. In a refrigerator, a rotatable ice carrier carrying a circular series of pieces of ice, an ejector adapted to remove said pieces of ice individually from said carrier as said carrier is rotated, and ratchet means operable with said ejector for rotating said carrier to bring said pieces of ice successively into position for removal by said ejector.
5. In a household refrigerator, a cooling unit having a freezing chamber, a series of individual cube pockets, means progressively moving said pockets into and out of said chamber, a finger movable to individually remove ice from said pockets after they leave said chamber, and means for operating said finger.
6. In a household refrigerator, a cooling unit having a freezing chamber, a circular series of ice pockets, means for rotating said pockets successively through said chamber, and an ejector adapted to individually remove ice from said pockets after they leave said chamber.
7. In a household refrigerator, a cooling unit having a freezing chamber, a circular series of

ice pockets, means for intermittently rotating said series of pockets whereby they will successively pass through said chamber, and an ejector adapted to individually remove ice from said pockets after they leave said chamber.

8. In a household refrigerator, a cooling unit having a freezing chamber, a circular series of ice pockets, ratchet means for intermittently rotating said series of pockets whereby they will successively pass through said chamber, and an ejector adapted to individually remove ice from said pockets after they leave said chamber.

9. In a refrigerator, a cooling unit having a freezing chamber, a circular series of ice pockets, means for rotating said pockets successively through said chamber, a water reservoir, and means metering water from said reservoir to said pockets prior to their entering said chamber.

10. In a refrigerator, a cooling unit having a freezing chamber, a circular series of ice pockets, means for intermittently rotating said series of pockets whereby they will successively pass through said chamber, a water reservoir, and means metering water from said reservoir to said pockets prior to their entering said chamber.

11. In a refrigerator, a cooling unit having a freezing chamber, a circular series of ice pockets, ratchet means for intermittently rotating said series of pockets whereby they will successively pass through said chamber, a water reservoir, and means metering water from said reservoir to said pockets prior to their entering said chamber.

12. In a refrigerator, a cooling unit having a freezing chamber, a circular series of ice pockets, means for rotating said pockets successively through said chamber, a water reservoir, and means timed with the movement of said pockets metering water from said reservoir to said pockets prior to their entering said chamber.

13. In a refrigerator, a cooling unit having a freezing chamber, a circular series of ice pockets, means for intermittently rotating said series of pockets whereby they will successively pass through said chamber, a water reservoir, and means timed with the movement of said pockets metering water from said reservoir to said pockets prior to their entering said chamber.

14. In a refrigerator, a cooling unit having a freezing chamber, a circular series of ice pockets, ratchet means for intermittently rotating said series of pockets whereby they will successively pass through said chamber, a water reservoir, and means timed with the movement of said pockets metering water from said reservoir to said pockets prior to their entering said chamber.

15. In a refrigerator, a cooling unit having a freezing chamber, a circular series of ice pockets, means for rotating said pockets successively through said chamber, an ejector adapted to individually remove ice from said pockets after they leave said chamber, a water reservoir, and means, timed to operate following the ejection of a piece of ice, metering water from said reservoir to the emptied pocket.

16. In a refrigerator, a cooling unit having a freezing chamber, a circular series of ice pockets, means for intermittently rotating said series of pockets whereby they will successively pass through said chamber, an ejector adapted to individually remove ice from said pockets after they leave said chamber, a water reservoir, and means, timed to operate following the ejection of a piece of ice, metering water from said reservoir to the emptied pocket.

17. In a refrigerator, a cooling unit having a freezing chamber, a circular series of ice pockets, ratchet means for intermittently rotating said series of pockets whereby they will successively pass through said chamber, an ejector adapted to individually remove ice from said pockets after they leave said chamber, a water reservoir, and means, timed to operate following the ejection of a piece of ice, metering water from said reservoir to the emptied pocket.
18. In a household refrigerator, an ice carrier carrying a plurality of individual ice cubes, a finger movable to eject an ice cube from said carrier, means for operating said finger, and means for bringing any one of said ice cubes and said finger into co-operative juxtaposition.
19. In a household refrigerator, an ice carrier carrying a plurality of individual ice cubes, a finger movable to eject an ice cube from said carrier, means for operating said finger, and means for moving the ice cubes of said carrier successively into position for removal by said finger.
20. In a household refrigerator, a movable ice carrier carrying a plurality of individual ice cubes, a finger movable to eject ice cubes from said carrier, means for operating said finger, and means for moving said carrier to bring one or more of said cubes into position for removal by said finger.
21. In a household refrigerator, a movable ice carrier carrying a plurality of individual ice cubes, a finger movable to eject cubes from said carrier, means for operating said finger, and means for moving said carrier to bring said pieces of ice successively into position for removal by said finger.
22. In a household refrigerator, a rotatable ice carrier carrying a circular series of ice cubes, a finger over which said ice cubes pass as said carrier is rotated, said finger being movable to eject cubes from said carrier, and means for operating said finger.
23. In a refrigerator, a cooling unit having a freezing chamber, a circular series of ice pockets rotatable about a common vertical axis, means for rotating said pockets successively through said chamber, a water reservoir, and means metering water from said reservoir to said pockets prior to their entering said chamber.
24. In a refrigerator, a cooling unit having a freezing chamber, a circular series of ice pockets rotatable about a common vertical axis, means for intermittently rotating said series of pockets whereby they will successively pass through said chamber, a water reservoir, and means metering water from said reservoir to said pockets prior to their entering said chamber.
25. In a refrigerator, a cooling unit having a freezing chamber, a circular series of ice pockets rotatable about a common vertical axis, ratchet means for intermittently rotating said series of pockets whereby they will successively pass through said chamber, an ejector adapted to individually remove ice from said pockets after they leave said chamber, a water reservoir, and means, timed to operate following the ejection of a piece of ice, metering water from said reservoir to the emptied pocket.
26. In a refrigerator, a cooling unit having a freezing chamber, a series of ice pockets rotatable about a common vertical axis, means for moving said pockets successively into and out of said chamber, a water reservoir, and means timed with the movement of said pockets metering water from said reservoir to said pockets prior to their entering said chamber.
27. In a refrigerator, a cooling unit having a freezing chamber, a circular series of ice pockets rotatable about a common vertical axis, means for rotating said pockets successively through said chamber, a water reservoir, and means timed with the movement of said pockets metering water from said reservoir to said pockets prior to their entering said chamber.
28. In a refrigerator, a cooling unit having a freezing chamber, a circular series of ice pockets rotatable about a common vertical axis, means for intermittently rotating said series of pockets whereby they will successively pass through said chamber, a water reservoir, and means timed with the movement of said pockets metering water from said reservoir to said pockets prior to their entering said chamber.
29. In a refrigerator, a cooling unit having a freezing chamber, a circular series of ice pockets rotatable about a common vertical axis, ratchet means for intermittently rotating said series of pockets whereby they will successively pass through said chamber, a water reservoir, and means timed with the movement of said pockets metering water from said reservoir to said pockets prior to their entering said chamber.
30. In a refrigerator, a cooling unit having a freezing chamber, a circular series of ice pockets rotatable about a common vertical axis, means for rotating said pockets successively through said chamber, an ejector adapted to individually remove ice from said pockets after they leave said chamber, a water reservoir, and means, timed to operate following the ejection of a piece of ice, metering water from said reservoir to the emptied pocket.
31. In a refrigerator, a cooling unit having a freezing chamber, a circular series of ice pockets rotatable about a common vertical axis, means for intermittently rotating said series of pockets whereby they will successively pass through said chamber, an ejector adapted to individually remove ice from said pockets after they leave said chamber, a water reservoir, and means, timed to operate following the ejection of a piece of ice, metering water from said reservoir to the emptied pocket.
32. In a refrigerator, a cooling unit having a freezing chamber, a circular series of ice pockets rotatable about a common vertical axis, ratchet means for intermittently rotating said series of pockets whereby they will successively pass through said chamber, an ejector adapted to individually remove ice from said pockets after they leave said chamber, a water reservoir, and means, timed to operate following the ejection of a piece of ice, metering water from said reservoir to the emptied pocket.
33. In a refrigerator, in combination, a cooling unit having a freezing chamber, a circular series of ice pockets rotatable about a common vertical axis whereby said pockets are progressively movable through said freezing chamber, and means for the individual removal of ice from said pockets after passage through said chamber.
34. In a refrigerator, in combination, a cooling unit having a freezing chamber, a circular series of ice pockets rotatable about a common vertical axis whereby said pockets are progressively movable through said freezing chamber, and an ejector disposed towards the entrance of said chamber for the removal of individual pieces of ice from said pockets.
35. In a refrigerator, in combination, a cooling unit having a freezing chamber, a circular series of ice pockets rotatable about a common vertical axis whereby said pockets are progressively

movable through said freezing chamber, a water supply for filling each pocket immediately prior to its entrance into said chamber, and an ejector for removing ice from said pockets immediately in advance of said water supply.

5 36. In a refrigerator, in combination, a cooling unit having a freezing chamber, a circular series of ice pockets rotatable about a common vertical axis whereby said pockets are progressively movable through said freezing chamber, a water sup-

ply for filling each pocket immediately prior to its entrance into said chamber, an ejector for removing ice from said pockets immediately in advance of said water supply, and mechanism operating said ejector and said water supply substantially simultaneously to fill an emptied pocket with water as the ice is discharged from the preceding pocket.

HAROLD A. GREENWALD. 10