United States Patent

[11] 3,537,618

[72] Inventor **Robert J. Alvarez**
Louisville, Kentucky

[21] Appl. No. **783,801**
[22] Filed **Dec. 16, 1968**
[45] Patented **Nov. 3, 1970**
[73] Assignee **General Electric Company**
a corporation of New York

[54] **ICE PIECE DISPENSER INCLUDING STALL ELIMINATING MEANS**
9 Claims, 3 Drawing Figs.

[52] U.S. Cl. 222/333, 222/240
[51] Int. Cl. G01f 11/20
[50] Field of Search ..... 221/17, 75, 203; 198/213; 222/240—242, 370, 413, 333

[56] **References Cited**
UNITED STATES PATENTS

3,268,118	8/1966	Hoenisch	222/240X
3,322,429	5/1967	Cervelli	222/413X
3,327,903	6/1967	Waller	222/241X

Primary Examiner—David M. Backenek
Attorneys—Walter E. Rule, Harry F. Manbeck, Jr. and Frank L. Neuhauser

ABSTRACT: An ice dispenser comprising a receptacle containing a motor-driven, rotatable dispensing means includes means for storing energy when the motor is energized and the dispensing means is stalled by an ice piece lodged between the dispensing means and the receptacle so that upon deenergizing the motor, the stored energy will reverse the rotation of the dispensing means to clear the stalling ice piece.

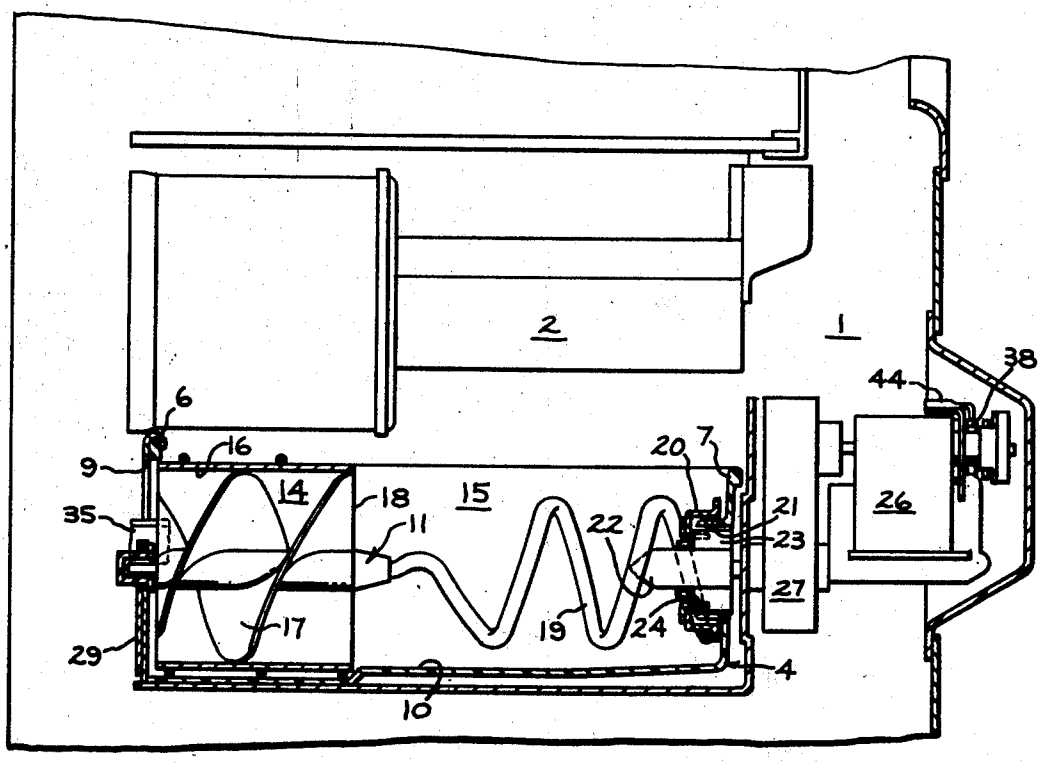


FIG.1

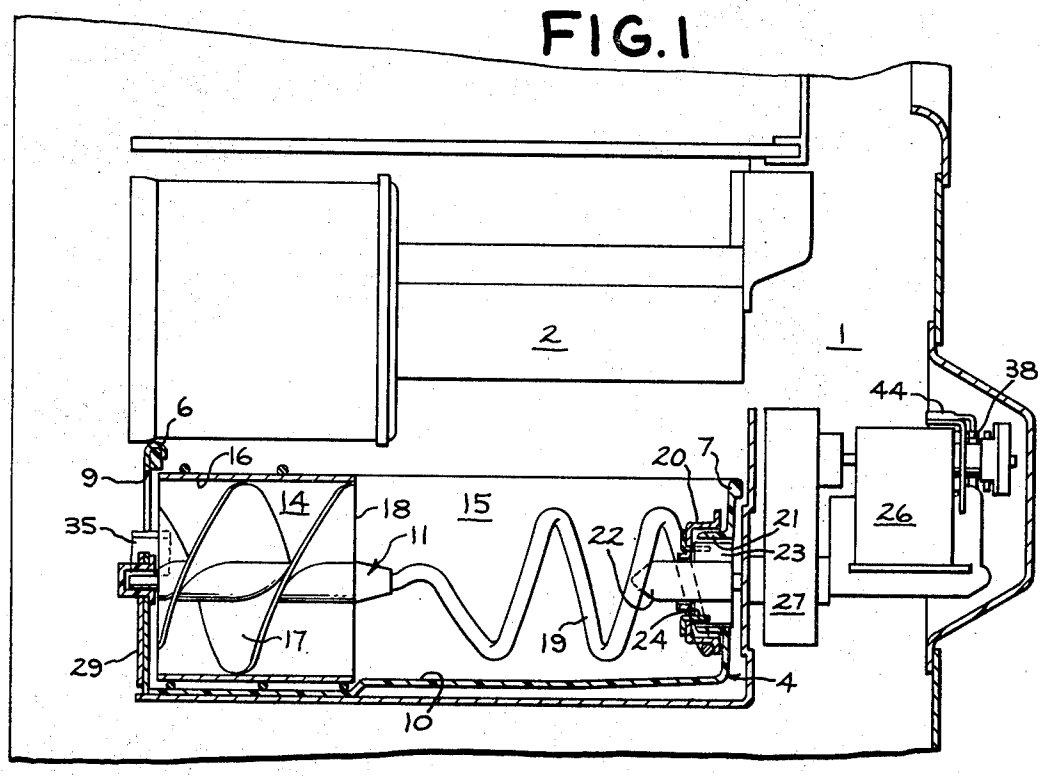


FIG.2

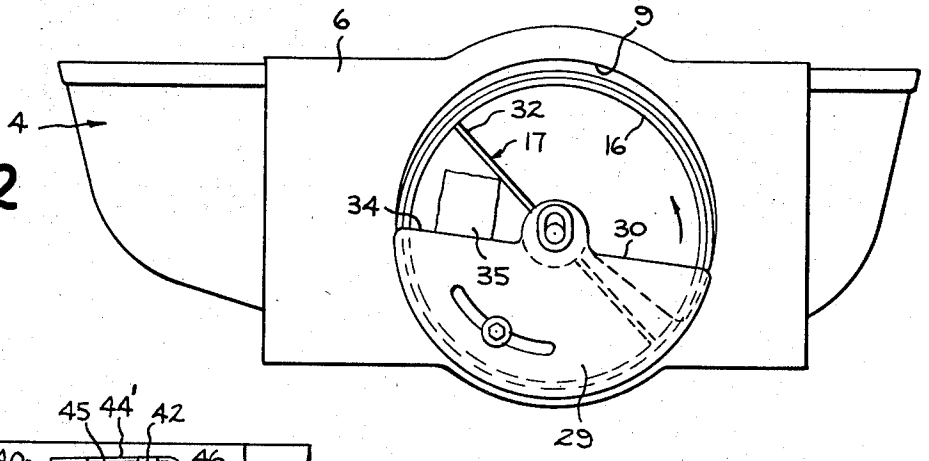
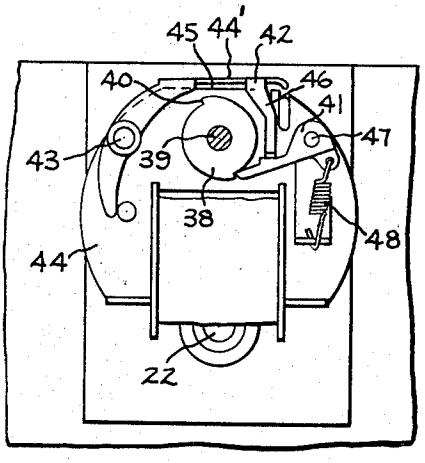


FIG.3



INVENTOR.
ROBERT J. ALVAREZ
BY Walter E. Rule
HIS ATTORNEY

ICE PIECE DISPENSER INCLUDING STALL ELIMINATING MEANS

BACKGROUND OF THE INVENTION

The present invention relates to an ice dispenser of the type described and claimed in copending U.S. Pat. application Ser. No. 668,364 filed Sept. 18, 1967 now U.S. Pat. No. 3,422,944 in the name of R. J. Alvarez and assigned to the same assignee as the present invention.

The ice dispenser specifically described in the aforementioned Alvarez application comprises an ice piece receptacle including a discharge opening in the front wall thereof through which ice pieces are discharged, as required by the user, by rotation of a dispensing means supported substantially horizontally within the receptacle. The dispensing means includes a feed section adapted to discharge the ice pieces through the opening and a conveying section for conveying ice pieces from the more remote portions of the receptacle to the feed section. The feed section comprises a cylindrical collar having an outlet at the front end thereof communicating with the discharge opening and an inlet at the rear end thereof. Means such as a screw auger is contained within the collar for advancing ice pieces in single file from the inlet to the outlet end of the collar upon rotation of the dispensing means. The conveying section includes helical means in the form of a heavy wire or rod bent to form a helix of one or more turns coaxially aligned with and connected to the feed section. Power for rotating the dispensing means comprises an electric motor connected through a speed reduction gear train to the rear end of the dispensing means.

In the operation of this type of ice dispenser, the dispensing means occasionally stalls when an ice piece trying to exit through the discharge opening becomes lodged between the forward edge of the feed section and an edge of the discharge opening.

SUMMARY OF THE INVENTION

The present invention is directed to an improvement in this type of ice dispenser designed to eliminate the stalling problem or more specifically to provide means whereby a stalling ice piece is automatically dislodged and the stall cleared upon deenergization of the drive motor.

In accordance with the illustrated embodiment of the invention, the helix forming the conveyor portion or section of the dispensing means is employed as an energy storing means for storing sufficient energy when the drive motor is energized and rotation of the dispensing means is prevented by an ice piece lodged between the dispensing means and the receptacle to effect a reverse rotation of the dispensing means upon deenergization of the motor thereby releasing the jamming ice piece. In accordance with a further aspect of the present invention, and for the purpose of stopping the dispensing operation of the dispensing means immediately upon deenergization of the motor, the motor is provided with a one way brake which prevents rotation of the deenergized motor only in the discharge direction. By employing such a one way brake, energy stored in the dispensing conveyor coil or helix during the stall can spin the gear train and the motor rotor in the reverse direction and the inertia in the gear train and motor will rotate the dispensing means back away from the stall producing ice piece. The ice piece is then free to fall back into the feed section or forwardly through the discharge opening.

BRIEF DESCRIPTION OF DRAWING

In the accompanying drawing:

FIG. 1 is a side elevational view, partly in section, of the ice dispensing means of the present invention as incorporated in the freezer compartment in the household refrigerator;

FIG. 2 is a front elevational view of the ice dispenser illustrating a stalled condition thereof; and

FIG. 3 is a rear view of the dispenser showing a suitable motor and brake means for providing the stall eliminating feature of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

With reference to FIGS. 1 and 2 of the drawings, there is illustrated a household refrigerator comprising a freezer compartment 1 having an access opening at the front thereof. In the upper portion of the freezer compartment, there is mounted an automatic ice maker 2 which may be any of the well known types presently provided in household refrigerators for the automatic production of ice pieces, generally referred to as ice cubes regardless of their particular shapes. The ice pieces produced by the ice maker are discharged into a storage bin or receptacle 4 which serves not only to store the manufactured ice pieces at subfreezing temperatures but also forms part of an ice dispenser for automatically dispensing stored ice pieces as required by the user. The receptacle 4 includes vertical front and rear walls 6 and 7 and the front wall 6 is provided with a dispensing opening 9 above and spaced from the lowest portion of the bottom wall 10 of the receptacle.

For the purpose of conveying ice pieces stored in the receptacle 4 to the discharge opening 9, there is provided within the receptacle a dispensing means generally indicated by numeral 11. This dispensing means extends lengthwise of the receptacle adjacent the bottom wall 10 and in alignment with the discharge opening 9 and is pivotally supported in a horizontal position on the front and rear walls 6 and 7 for rotational movement about its horizontal axis. It comprises essentially a feed section 14 at the front end thereof and a conveyor section 15 connected to the feed section and forming the rear section of the dispensing means.

The feed section 14 comprises an open end cylindrical sleeve 16 containing a screw or auger 17 rotatable with the collar 16 for picking up ice pieces at the inlet or rear end 18 of the feed section and advancing these ice pieces to the discharge opening 9 during rotation of the dispensing means in a counterclockwise direction as viewed in FIG. 2.

The conveying section 15 comprises an open coil of wire or rod the primary purpose of which is to advance ice pieces from the rear of the receptacle to the inlet end of the feed section 14 and to agitate and circulate the ice pieces stored in the receptacle 4. It should, as shown, contain one or more spaced helical coils 19 designed upon rotation of the dispensing means in its discharge direction to advance the ice pieces to the feed section.

The rear end of the conveying section 15 has secured thereto a sleeve 20 adapted to loosely fit over or within an inwardly extending flange 21 on the rear receptacle wall 7. The flange 21 defines an opening in the rear wall 7 for receiving the end of a shaft 22 forming part of drive means including a motor 26 and a speed reduction gear train 27 mounted rearwardly of the receptacle 4. This shaft 22 includes radially opposed drive pins 23 adapted to engage cooperating extensions 24 on the sleeve 20.

The discharge opening 9 communicates with only the upper portion of the feed section, or in other words, the lower part of the feed section outlet is closed by a dam generally indicated by the numeral 29. As a result, the ice pieces must be lifted by an upwardly moving front edge of an auger blade above the edge 30 of the dam 29 before they can pass through the discharge opening 9. The ice pieces generally travel in single file through the channel or channels in the feed section 18 so that no ice piece can be discharged through the discharge opening 9 until the foremost or front ice piece has been raised to a point clearing the edge 30. At this point, this ice piece and any ice piece immediately behind it that is still on a downwardly sloping portion of the auger blade or, in other words, has not been moved over top center position relative to the shaft or hub of the auger 17, will usually also be discharged through the opening 9.

Occasionally and particularly when the dam is set for discharge of two or more ice pieces during each half revolution of the feed section, a trailing ice piece may fail to pass completely through the opening 9 with the result that such an ice piece, indicated in FIG. 2 of the drawing by the numeral

35, can become lodged between the forward edge 32 of an auger blade and the rear edge 34 of the dam 29 where it stops rotation of the dispensing means.

In accordance with the present invention, energy storing means are provided, preferably between the feed section 14 and the gear train 27, adapted upon deenergization of the motor 26 to effect a reverse rotation of the gear train and the motor sufficiently to also rotate the feed section 14 in a reverse direction a distance such that the lodged ice piece 35 may fall freely back into the feed section or forwardly through the opening 9.

In the illustrated embodiment of the invention, this energy storing means comprises the one or more coils or turns 19 in the helical conveyor section 15. Under stalling conditions in the feed section or in the front portion of the conveyor section, the coils 19 of the conveyor section function like a torsion spring so that even though there is no substantial distortion of this component, it is "wound-up" sufficiently to store energy during a stall.

In order that this energy may be used to clear a stalled condition, the brake employed for immediately stopping rotation of the dispensing means upon deenergization of the motor 26 is of the unidirectional type which will prevent normal or discharge rotation of the motor and associated dispensing means but will permit reverse rotation thereof.

A suitable brake mechanism for this purpose is illustrated in FIGS. 1 and 3 of the drawing. This mechanism, associated with the motor 26, includes a stop wheel 38 on the motor rotor shaft 39 having thereon a pair of opposed stops or shoulders 40 and a pawl 41 arranged to engage one of these stops 40 whenever the motor is deenergized to immediately prevent further discharge rotation of the motor. The pawl 41 is released from its stopping position whenever the motor is energized by means of a lift 42 pivotally mounted at 43 to the rear surface of the motor stator 44 and having a magnetic arm or plate portion 44' overlying a flat upper surface 45 of the stator. Upon energization of the motor, magnetization of the stator draws the plate portion 44' into engagement with the upper surface of the stator thereby rotating the pawl lift about its pivot point 43 for engagement of the downwardly extending arm portion 46 with the pawl 41. As a result, the pawl 41 is pivoted downwardly about its pivot point 47 against the biasing action of a spring 48 to a point where it disengages a stop 40. Thus, so long as the motor is energized, the brake mechanism is inoperative and the motor rotor will continue to rotate in the counterclockwise or discharge direction as viewed in FIG. 3. However, the pawl 41 will stop rotation of the motor immediately upon deenergization of the motor by engagement with one of the stops or shoulders 40.

In order to permit reverse rotation of the motor rotor and hence the gear train connected thereto whenever the dispensing means 11 is stalled by a jamming ice piece such as the ice piece 35, the pawl 41 or the stop wheel 38 or both are so designed that the stop wheel 38 may freely rotate in its reverse direction that is in the clockwise direction as viewed in FIG. 3.

Thus when a stall occurs as described hereinbefore, the coil or coils 19 of the conveyor section are twisted slightly by the power transmitted through the gear train 27 to the dispensing means. As soon as the motor is deenergized, the energy thus stored in the coils spins the gear train and the motor rotor in the reverse direction. Due to inertia, the gear train and rotor continue to rotate in the reverse direction to an extent sufficient to also rotate the stalled portion of the dispensing means in a rearward direction away from the stall producing ice piece thereby releasing the ice piece. When the motor is again energized, the dispensing means is free to rotate in a normal manner.

Preferably the coils of the conveyor section are rigid enough so that during normal dispensing operation there is no appreciable "wind-up" of these coils and hence no reverse rotation of the motor upon deenergization thereof. However, these coils should have sufficient flexibility so that during a stall, the coils will collectively twist or wind a few degrees, generally less than ten degrees, thereby storing the energy required to eliminate the stall.

I claim:

1. An ice piece dispenser comprising:
a storage receptacle;
a rotatable dispensing means supported in said receptacle and including a feed section adjacent one end thereof for discharging ice pieces from said receptacle upon rotation of said dispensing means in a discharge direction;
drive means for rotating said dispensing means in said discharge direction;
means for controlling the energization of said drive means;
means operable upon deenergization of said drive means for preventing rotation of said drive means only in said discharge direction; and
said dispensing means including energy storing means for storing sufficient energy when said drive means is energized and rotation of said dispensing means is prevented by an ice piece jamming said dispensing means to provide a reverse rotation of said dispensing means upon deenergization of said drive means sufficient to dislodge said ice piece.

2. The dispenser of claim 1 in which said energy storing means comprises an open coil springlike member forming part of said dispensing means.

3. The dispenser of claim 1 in which said drive means is an electric motor.

4. An ice piece dispenser comprising:
a storage receptacle having a dispensing opening therein:
rotatable dispensing means supported in said receptacle and including a feed section adjacent one end thereof for discharging ice pieces through said opening upon rotation of said dispensing means in a discharge direction;
drive means connected to the opposite end portion of said dispensing means for rotating said dispensing means in said discharge direction;
means for controlling the energization of said drive means;
a brake operable upon deenergization of said drive means for stopping rotation of said drive means only in said discharge direction; and
said dispensing means including energy storing means between said feed section and said drive means adapted to store sufficient energy upon energization of said drive means during a period when said rotation of said dispensing means is prevented by an ice piece jamming said dispensing means to provide a reverse rotation of said dispensing means upon deenergization of said drive means sufficient to dislodge said ice piece.

5. The dispenser of claim 4 in which said drive means is an electric motor and said brake is magnetically released upon energization of said motor.

6. The dispenser of claim 4 in which said energy storing means is a coiled wire member between said feed section and the connection of said dispensing means to said motor.

7. An ice piece dispenser comprising:
a storage receptacle including a front wall having a dispensing opening therein;
rotatable dispensing means supported in said receptacle and comprising a front feed section adjacent said opening for discharging ice pieces through said opening upon rotation of said feed section in a discharge direction and a conveying section rearwardly from said feed section;
said conveying section comprising a helically coiled wire member including a main portion containing at least one coil operable to advance ice pieces towards said feed section;
drive means connected to a rear portion of said conveying section for rotating said dispensing means in said discharge direction;
means for controlling the energization of said drive means;
a brake operable upon deenergization of said drive means for stopping rotation of said drive means only in said discharge direction; and

said coiled wire member being adapted to store sufficient energy during energization of said drive means when rotation of said dispensing means is prevented by an ice piece lodged between said dispensing means and an adjacent portion of said receptacle for reversing the rotation of said drive means upon deenergization thereof thereby reversing rotation of said dispensing means to release said lodged ice piece.

8. The dispenser of claim 7 in which said drive means is an electric motor connected through a speed reducing gear train to said dispensing means.

9. The dispenser of claim 8 in which said brake is magnetically released by energization of said motor.