

[54] **TWIST TRAY ICE MAKER WITH
REMOVABLE TRAY**

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[22] Filed: Aug. 12, 1971
[21] Appl. No.: 171,188

[52] U.S. Cl. 62/300, 62/353, 285/53 R
[51] Int. Cl. F25c 1/10
[58] Field of Search 425/440; 62/353,
62/72, 300; 192/67 R; 287/53 R; 242/55.2

[56] **References Cited**

UNITED STATES PATENTS

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U.S. Patent Application No. 46,924, D. C. Nichols

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[57] **ABSTRACT**

An ice maker in which ice bodies are formed in a tray from which the formed ice bodies are harvested by a twisting action. Means are provided for releasably mounting the tray in the apparatus for facilitated disconnection without the use of tools such as for maintenance of the tray.

10 Claims, 2 Drawing Figures

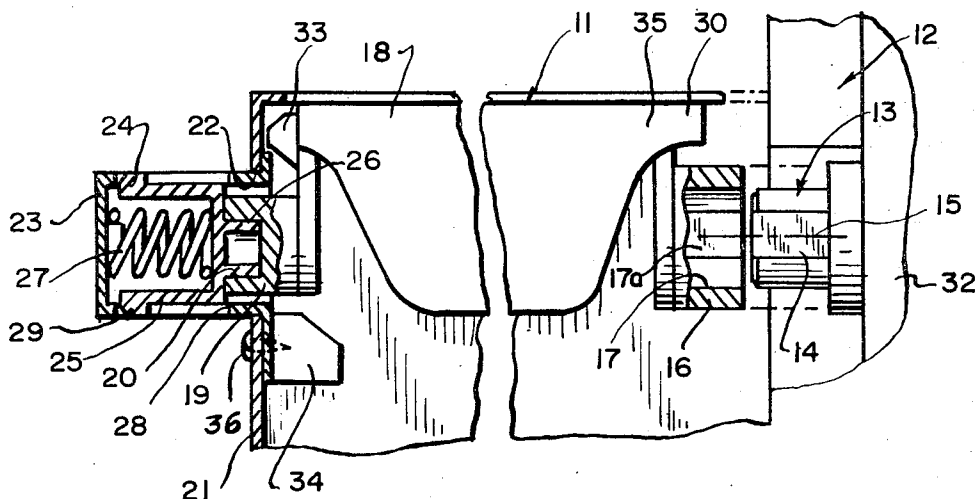


FIG. 1

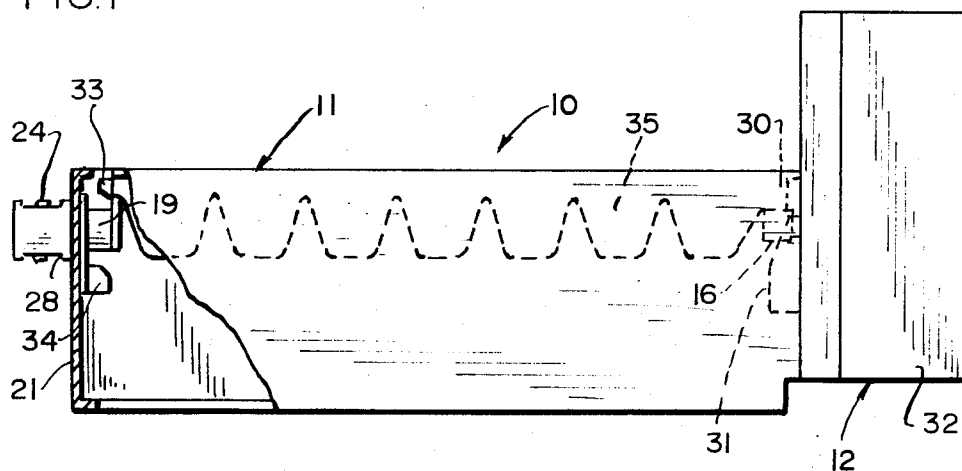
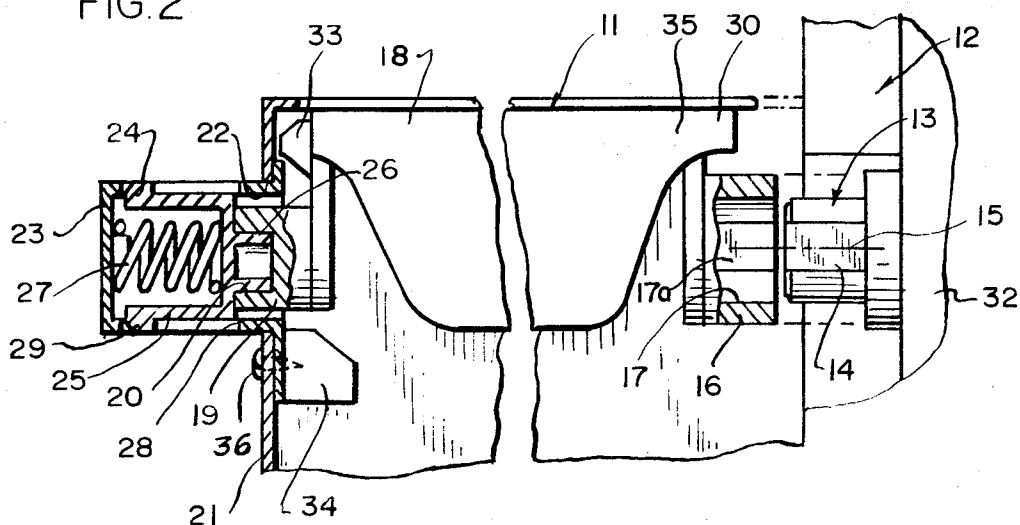


FIG. 2



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TWIST TRAY ICE MAKER WITH REMOVABLE TRAY

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to ice making apparatus and in particular to tray structures for use in automatically forming and harvesting ice bodies.

2. Description of the Prior Art

In copending application Ser. No. 46,924 of Duane C. Nichols, filed June 17, 1970, now U.S. Pat. No. 3,677,060, for an "Axially Movable Twist Tray Domestic Ice Maker", owned by the assignee hereof, an improved ice maker structure is disclosed as including means for twisting a resilient tray while the tray is disposed in an inverted position to free the ice bodies therefrom for delivery to a subjacent collecting bin. The mechanism includes means for automatically effecting the twisting-harvesting action and includes cam means for automatically disposing a shoulder on the tray in abutment with a stop for a preselecting portion of the rotation of the tray by the drive means. Thus, during this portion of the rotation, the tray is automatically twisted to free the ice bodies therefrom. After a preselected amount of twisting, the mechanism automatically releases the tray from engagement with the shoulder means permitting continued rotation of the tray back to the ice forming position.

A number of different types of twist tray ice makers has been developed. The twist tray ice maker structures heretofore developed present the problem of difficulty of removal of the tray as for maintenance purposes. From time to time it is desirable to clean the tray to remove mineral deposits, etc., and with the presentable available devices, it has been found difficult to manipulate the various tools necessary to effect removal of the tray from the mounting means because of the relatively cramped space in which the ice maker is conventionally mounted in the refrigerator chamber.

SUMMARY OF THE INVENTION

The present invention comprehends an improved twist tray ice maker structure having means for facilitated removal of the ice maker tray when desired, eliminating the need for the use of tools and, thus, facilitating the maintenance of the ice maker apparatus.

More specifically, the invention comprehends the provision, in a twist-release ice maker tray structure having a resilient tray adapted to be actuated by a rotated drive shaft at one end, of mounting means comprising a coupling element at the one end of the tray arranged for axially releasable coupling to the drive shaft for rotating one end of the tray about the axis of the drive shaft, and releasable mounting structure at the other end of the tray including interfitted male and female elements, one of the elements being carried by the tray, means for mounting the other of the elements adjacent the other end of the tray coaxially of the drive shaft axis, and means for yieldingly biasing the elements into coaxial interengaged association for pivotally carrying the other end of the tray about the axis and permitting removal of the tray by yielding movement of the elements sufficient to permit disconnection of the coupling element from the drive shaft.

Further more specifically, the invention comprehends providing in an ice body maker having a rotated drive shaft, apparatus comprising a resilient tray, means for rotatively driving a first portion of the tray to urge the tray rotatively about the axis of the drive shaft including a coupling element at the one portion of the tray axially releasably coupled to the drive shaft, a stop adjacent a second portion of the tray spaced from the first portion, releasable mounting structure at the second portion of the tray including interfitted male and female elements, one of the elements being carried by the tray, means for mounting the other of the elements adjacent the second portion of the tray coaxially of the drive shaft axis, means for yieldingly biasing the elements into coaxial interengaged association for pivotally carrying the other end of the tray about the axis and permitting removal of the tray by yielding movement of the elements sufficient to permit disconnection of the coupling element from the drive shaft, and means for causing relative axial translation between the tray and the stop against the biasing of the yielding means concurrently with the rotation of the tray to cause abutment of the second tray portion with the stop to substantially positively prevent rotative movement of the second portion while the driving means rotatively drives the first portion thereby causing a twisting of the tray between the portions, the yielding means further defining means for causing reverse axial relative translation between the tray and stop for suddenly disengaging the second tray portion from the stop subsequent to the twisting to snap the tray and permit continued rotation of the tray about the axis.

The coupling element and the one of the male and female elements carried by the tray may be formed integrally therewith.

Thus, the ice maker structure of the present invention is extremely simple and economical of construction while yet providing the highly desirable features discussed above.

BRIEF DESCRIPTION OF THE DRAWING

Other features and advantages of the invention will be apparent from the following description taken in connection with the accompanying drawing wherein:

FIG. 1 is a side elevation of an ice maker embodying the invention with a portion broken away to facilitate illustration of the invention; and

FIG. 2 is a fragmentary enlarged longitudinal section thereof.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In the exemplary embodiment of the invention as disclosed in the drawing, an ice maker generally designated 10 is shown to comprise an automatic ice maker adapted to form a plurality of ice bodies (not shown) in a mold generally designated 11 for automatic delivery to a subjacent collecting space. In effecting the harvesting delivery of the ice bodies from the mold, the ice maker causes a twisting of the mold which is formed of resilient material with the mold in an inverted position. The drive mechanism generally designated 12 then causes a return of the mold to the upright ice body forming position shown in dotted lines in FIG. 1. An

improved form of such a twist tray ice body maker is disclosed in copending application Ser. No. 46,924 of Duane C. Nichols, filed June 17, 1970, and owned by the assignee hereof. Said application is incorporated by reference herein and reference may be had thereto for a complete disclosure of a mechanism for effecting such a twist tray harvesting operation.

As indicated briefly above, it is desirable in such twist tray ice maker apparatuses to provide for removal of the tray from time to time, such as for maintenance purposes. The present invention comprehends an improved means for mounting the tray in the ice maker 10 permitting facilitated removal of the tray when desired, without the use of tools, or the like. The means for permitting such facilitated removal cooperatively defines a portion of the means for effecting the desired twisting action in the twist tray harvesting function.

More specifically, as shown in FIG. 2, mechanism 12 includes an output drive shaft 13 having flatted sides 14 which is rotated about the axis 15 thereof by mechanism 12 for suitably controlling the disposition of mold 11 in the automatic ice forming and harvesting operations. Tray 11 is formed of a resilient material, such as plastic, and includes at a first end portion a connecting element 16 adapted to mate with drive shaft 13 to be driven by the drive shaft in the normal operation of the ice making apparatus. Thus, connecting element 16 may comprise a tubular element formed integrally with the tray 11 having a bore 17 with flatted sides 18 so as to have a cross-section complementary to the external cross-section of the drive shaft 13 while permitting facilitated axial movement therebetween. In the normal ice body forming disposition of the mold 11, as shown in dotted lines in FIG. 1, the coupling element 16 is received on the drive shaft 13 with the tray 11 at the righthand disposition.

The second, or outer, portion 18 of the tray is provided with a first connector element 19 which in the illustrated embodiment comprises a female element formed integrally with the tray and defining an outwardly opening bore 20 coaxial with bore 17 of element 16. The ice maker apparatus 10 further includes a fixed frame structure 21 having an opening 22 in which is received a cup-shaped support 23 defining a cylindrical well 24 in which is received a hollow carrier 25 provided with a projecting male, second connector element 26 movably received in bore 20 of female connector element 19. Carrier 25 is slidably received in support bore 24 for facilitated axial movement. The carrier is biased toward drive shaft 15 by a coil spring 27 received in well 24 compressedly received for yieldingly biasing the carrier and male element 26 toward tray 11 and urging the tray to the right, as seen in FIG. 2, to retain connector 16 on drive shaft 13.

In the preferred embodiment a stop shoulder portion 34 is integrally formed as a part of support 23 which may be molded of a plastic material. The support 23 may be held against rotation by a fastener 36 fastening the stop shoulder portion 34 to frame 21. Alternately, the support 23 could be provided with snap retainer means to cooperate with opening 22 to retain support 23 in place. Support 23 could then be held against rotation by means of a locating pin replacing fastener 36. Also, support 23 and stop shoulder portion 34 may be separate elements each mounted on frame 21.

One or more slots 28 may be provided in support 23 adapted to receive one or more outturned fingers 29 on carrier 25 for limiting the axial movement of the carrier in the support and preventing rotation thereof about its axis.

As discussed in detail in the above-indicated Duane C. Nichols' application, the twisting of tray 11 is effected by the drive shaft firstly rotating the tray to bring a cam follower 30 into abutment with a cam carried on the drive mechanism housing thereby translating the tray axially away from the housing 32 and bringing a shoulder portion 33 on the tray into abutment with stop shoulder 34 to prevent further rotation of the distal portion 18 of the tray while the proximal portion 35 is continued to be turned by the rotation of drive shaft 13 thereby twisting the tray and freeing the ice bodies therefrom for delivery to the subjacent collecting space. Such axial translation of the tray 11 positions the shoulder 33 in the vertical plane of the stop shoulder 34 against the biasing action of spring 27. Thus, when the cam follower 30 rides past the cam 31, spring 27 snaps the tray to the right permitting tray portion 18 to become aligned again with tray portion 35 and drive shaft 13 to rotate the entire tray in an untwisted configuration back to the upright ice forming disposition of FIG. 1.

The present invention comprehends the arrangement of the mounting pivotal means at distal end 18 of the tray such that the tray may be further moved to the left, as seen in FIG. 2, to a limit position wherein shoulder 33 abuts the frame 21, with the coupling element 16 clearing the end of drive shaft 13 in this extreme lefthand position and, thus, permitting the first portion 35 of the tray to be swung upwardly or downwardly and the second portion 18 of the tray then to be moved to the right away from the pivotal mounting means to free the tray from the apparatus 10 for maintenance purposes and the like. Thus, the removal of the tray is extremely simple, eliminating the use of tools and permitting the user to effect the removal of the tray notwithstanding the mounting of the tray in extremely close quarters such as in a corner of the refrigerated chamber. The removal of the tray is effected by simple manipulation thereof by the user's fingers while yet when the tray is installed in the apparatus 10, positive secure mounting thereof is effected.

Facilitated maintenance of the tray is effected by virtue of the fact that no separate parts are removed in effecting the release of the tray from the apparatus 10 as each of the connecting elements associated with the tray may be formed integrally therewith. The adjustable bearing means defined by the male element 26 is effectively maintained in the apparatus 10 by virtue of the retention of the carrier 25 therein by fingers 29.

Thus, the apparatus is extremely simple and economical of construction, permitting facilitated installation and maintenance. The pivotal mounting means of tray portion 18 not only provides for an improved control of the tray end in the twisting functioning, as discussed above, but further synergistically provides for the desired facilitated removal or mounting of the tray in the apparatus.

The foregoing disclosure of specific embodiments is illustrative of the broad inventive concepts comprehended by the invention.

Having described the invention, the embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. In a twist-release ice maker structure having a resilient tray adapted to be actuated by a rotated drive shaft at one end, mounting means comprising: releasable coupling means at said one end of the tray arranged for axially displaceable separable coupling to said drive shaft for rotating said one end of the tray about the axis of said drive shaft; releasable mounting structure at the other end of the tray including interfitted male and female elements, one of said elements being carried by the tray, means for mounting the other of said elements adjacent said other end of the tray coaxially of said drive shaft axis, and means for yieldingly biasing said elements into coaxial interengaged association for pivotally carrying said other end of the tray about said axis while substantial twisting forces are generated therein, and permitting removal of the tray by yielding relative axial movement of said elements sufficient to cause axial separation of said coupling element from said drive shaft; and means for twisting the tray including means for causing a preselected axial displacement of the tray as an incident of rotation of said drive shaft about said axis, said preselected axial displacement being a preselected amount less than that necessary to effect said axial separation of said coupling means from said drive shaft.

2. The ice maker structure of claim 1 wherein said releasable mounting structure comprises an element formed integrally with said tray.

3. The ice maker structure of claim 1 wherein said means for mounting the other of said elements further defines means for limiting the axial movement of the tray during a tray removing operation.

4. The ice maker structure of claim 1 including means for limiting the axial movement of said coupling means toward said drive shaft and said yielding means biases said coupling means to the limit of such movement.

5. The ice maker structure of claim 1 including means for limiting the movement of said male and female elements together and said yielding means biases said male and female elements to the limit of such movement.

6. The ice maker structure of claim 1 wherein said

coupling means is formed integrally with said tray.

7. The ice maker structure of claim 1 wherein one of said male and female elements is formed integrally with said tray.

8. The ice maker structure of claim 1 wherein said coupling means and one of said male and female elements are formed integrally with said tray.

9. In an ice body maker having a rotated drive shaft, apparatus comprising: a resilient tray; means for rotatively driving a first portion of the tray to urge the tray rotatively about the axis of the drive shaft including a coupling element at said one portion of the tray axially separably coupled to the drive shaft; a stop adjacent a second portion of the tray spaced from said first portion; releasable mounting structure at said second portion of the tray including interfitted male and female elements, one of said elements being carried by the tray; means for mounting the other of said elements adjacent said second portion of the tray coaxially of said drive shaft axis; means for yieldingly biasing said elements into coaxial interengaged association for pivotally carrying said second portion of the tray about said axis while substantial twisting forces are generated therein, and permitting removal of the tray by yielding relative axial movement of said elements sufficient to cause disconnection of said coupling element from said drive shaft; and means for causing a preselected relative axial translation of the tray relative to the stop against the biasing of said yielding means concurrently with the rotation of the tray to cause abutment of said tray second portion with said stop to substantially positively prevent rotative movement of said second portion while said driving means rotatively drives said first portion thereby causing a twisting of the tray between said portions, said yielding means further defining means for causing reverse axial relative translation of the tray for suddenly disengaging said second tray portion from said stop subsequent to said twisting to snap said tray and permit continued rotation of the tray about said axis, said preselected axial translation being a preselected amount less than that necessary to effect said axial separation of said coupling means from said drive shaft.

10. The ice body maker of claim 9 wherein one of said male and female elements comprises an element formed integrally with said second portion of the tray.

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