United States Patent

[11] 3,580,416

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Continuation-in-part of application Ser. No. 606,852, Jan. 3, 1967, now abandoned.

[54] METHOD AND APPARATUS FOR DISPENSING ICE CUBES AND THE LIKE

89 Claims, 14 Drawing Figs.

[52] U.S. Cl. 221/203, 221/278
[51] Int. Cl. B65h 3/60
[50] Field of Search ..... 221/203, 278; 302/2, 51 (Inquired); 222/193, 194, 333; 62/378; 198/6

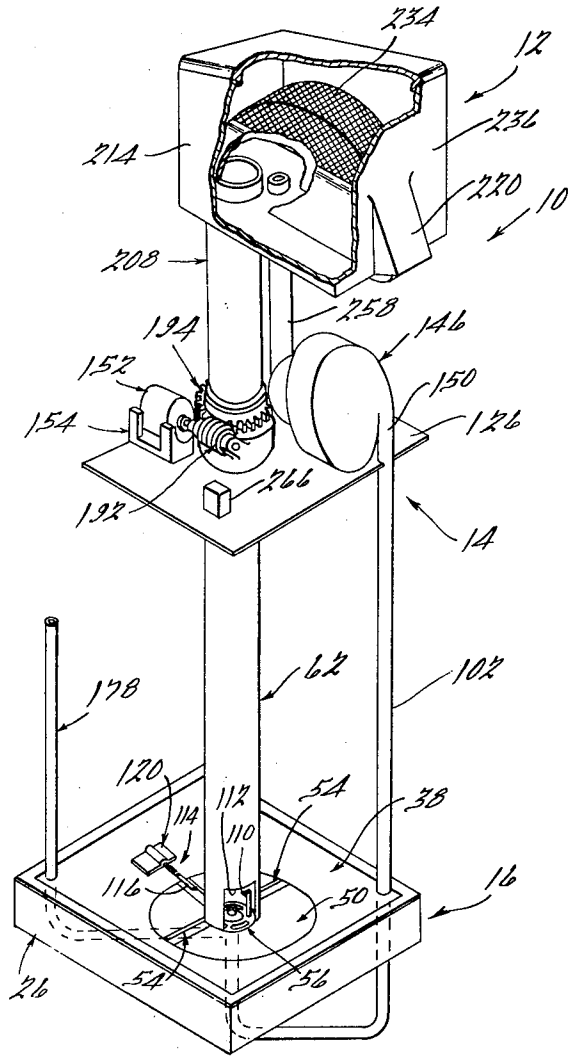
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ABSTRACT: A method and apparatus for transferring ice cubes and the like from a storage compartment to a remotely located dispensing compartment, the apparatus comprising passage means extending between the storage compartment and dispensing compartment and means providing a flow of conveying fluid through the passage means of sufficient magnitude to cause ice cubes to be conveyed through the passage means; an ice cube agitating mechanism for selectively agitating ice cubes within the dispensing compartment and for effecting movement thereof toward the passage means, and a discharge chute disposed adjacent one end of the passage means.



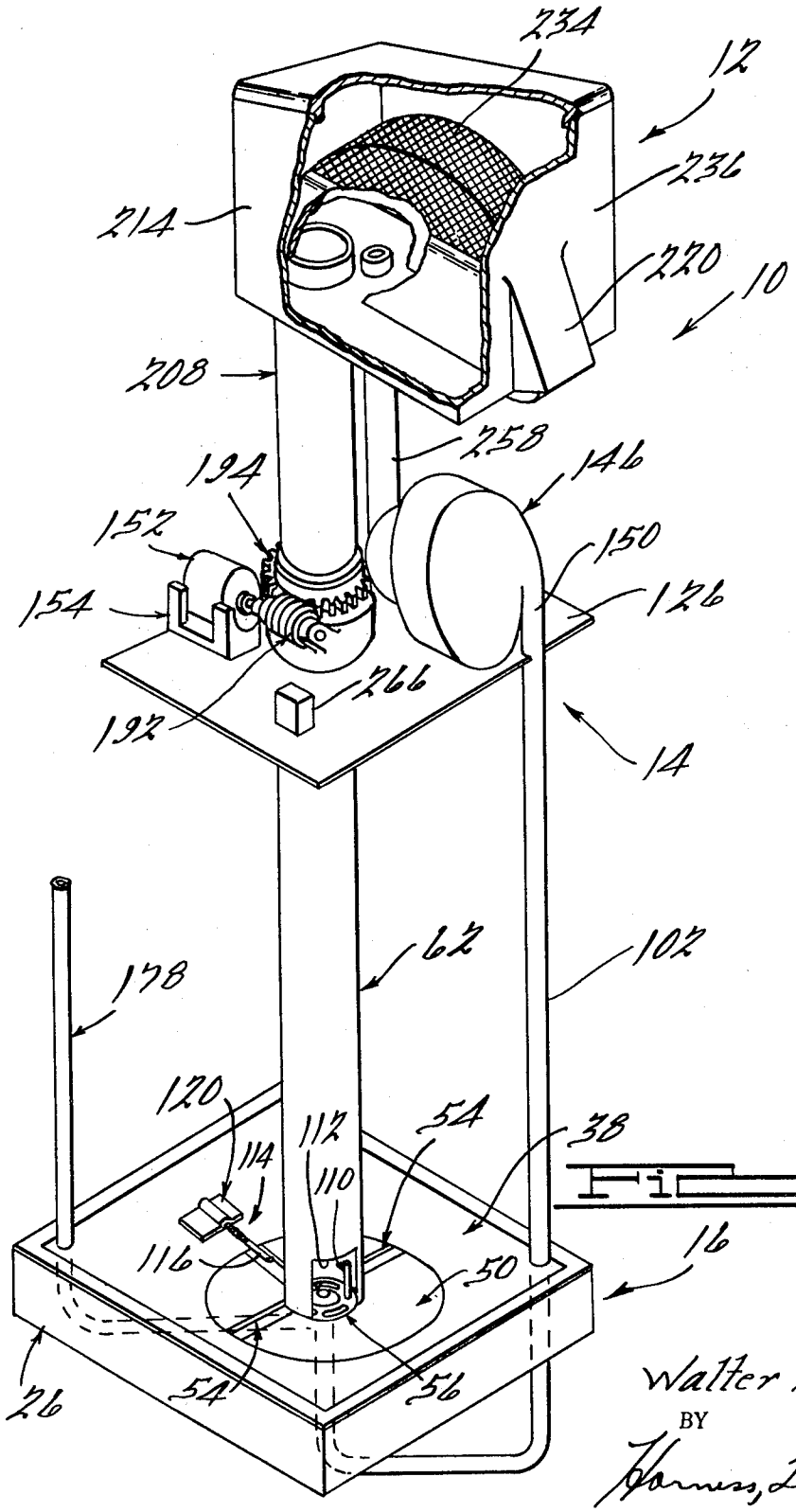


Fig. 1.

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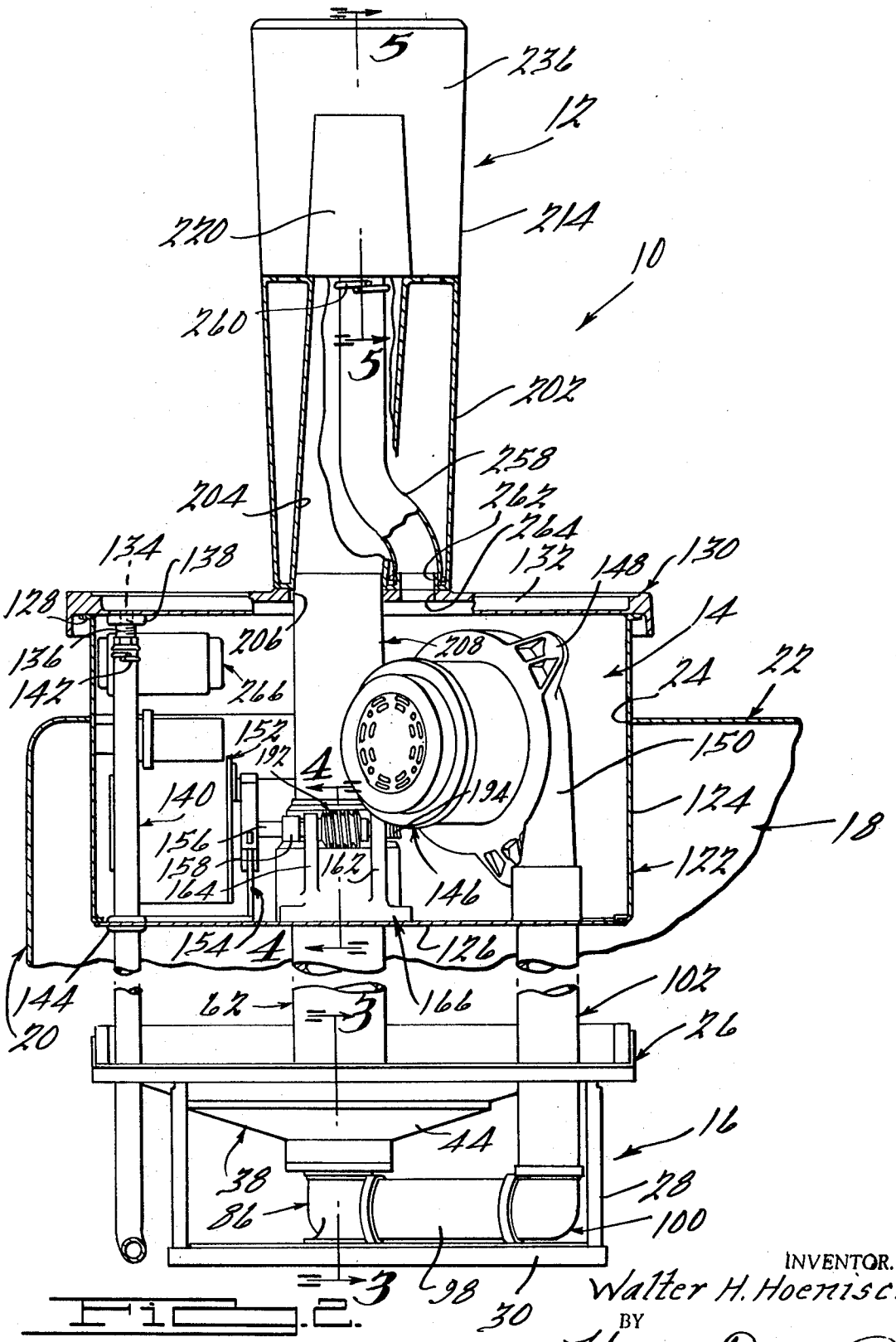


FIG. 2.

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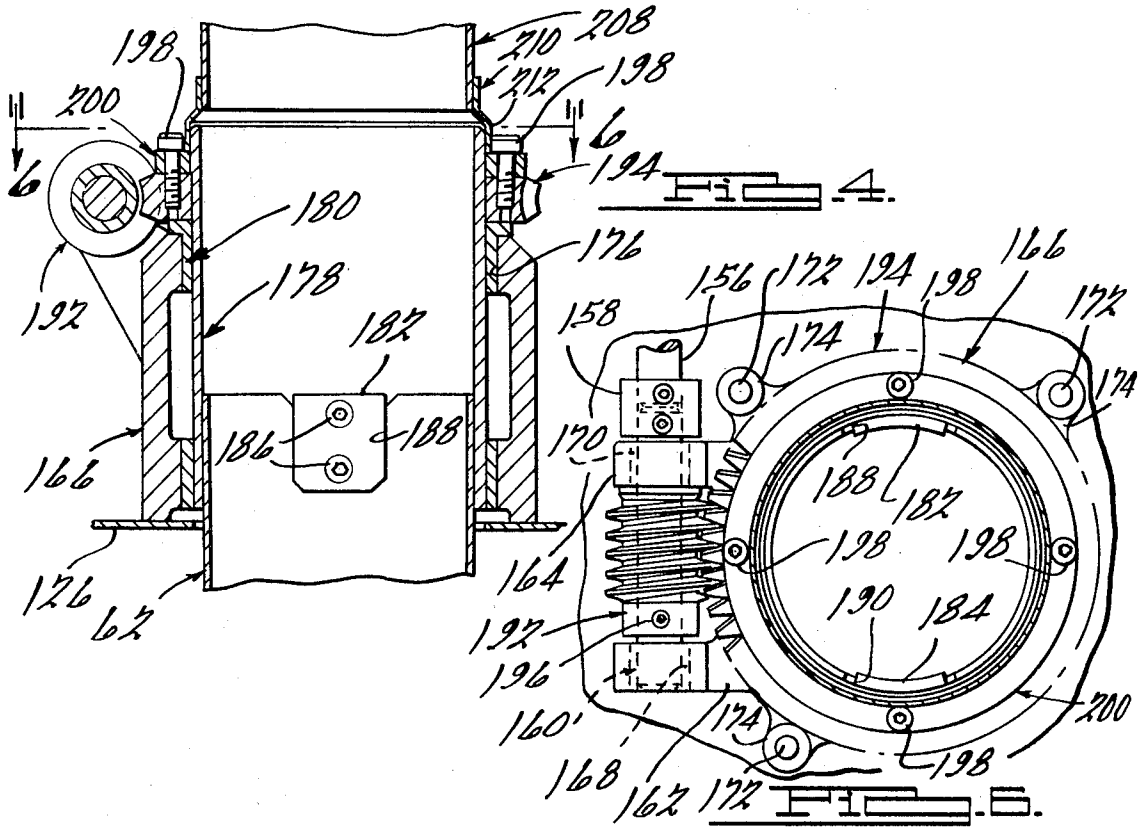


FIG. 4.

FIG. 5.

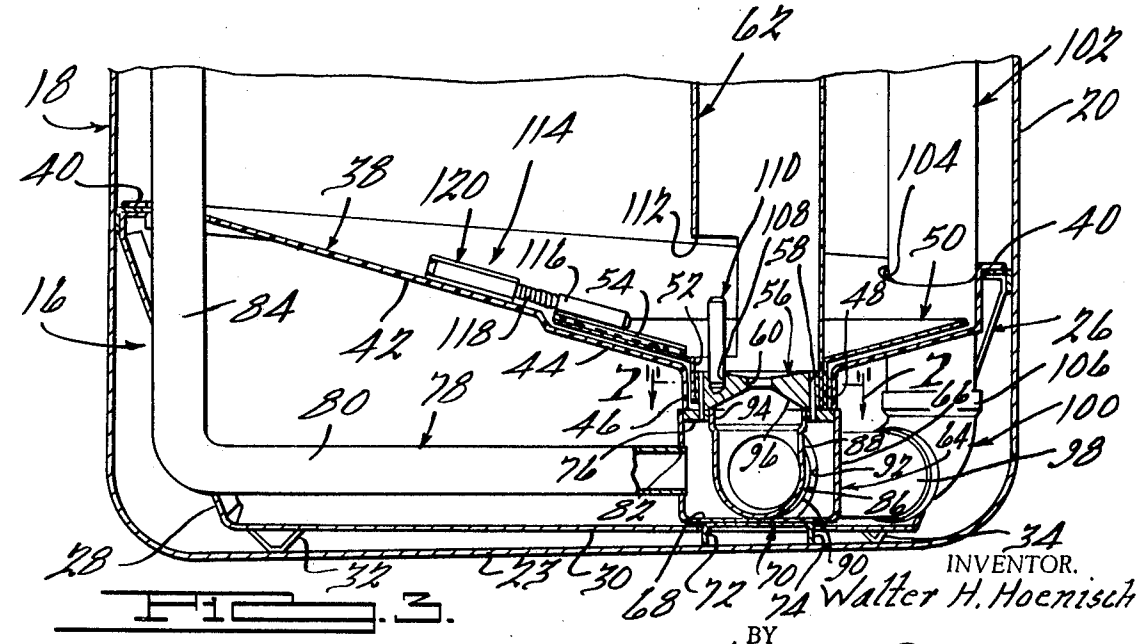


FIG. 3.

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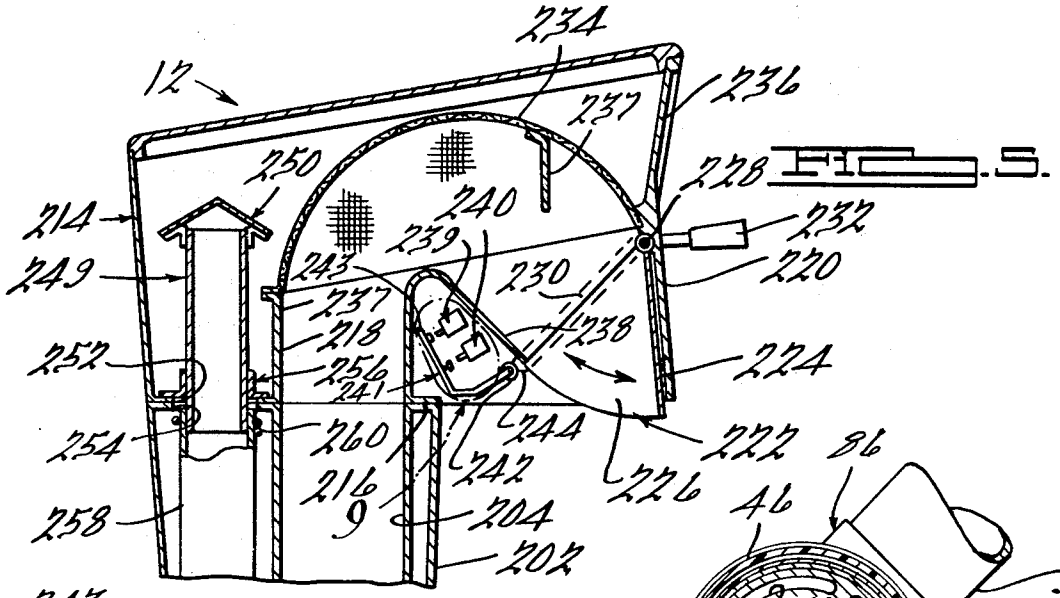


FIG. 5.

FIG. 7.

FIG. 9.

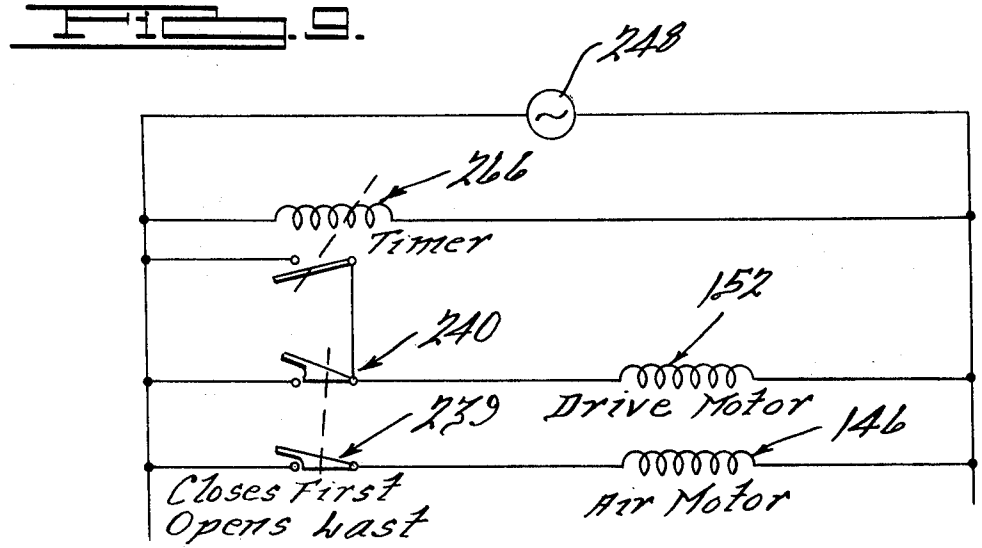


FIG. 8.

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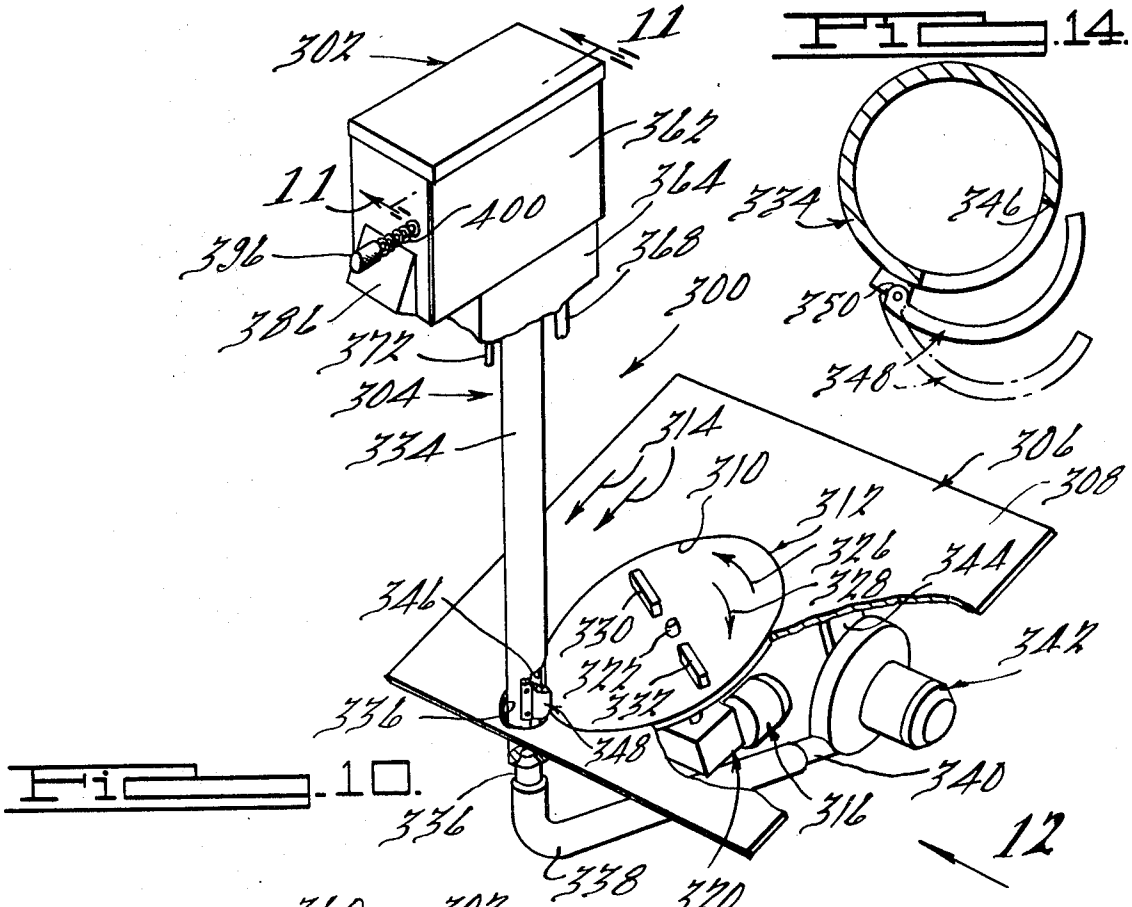


FIG. 10.

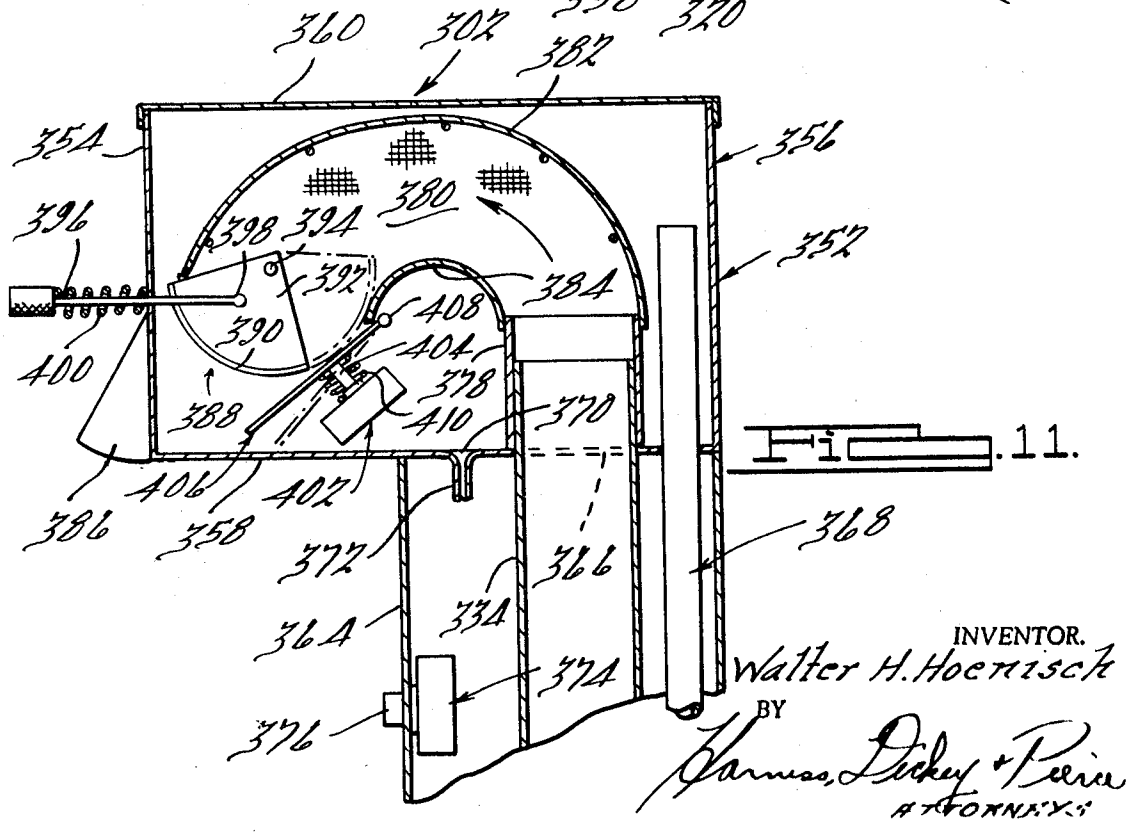


FIG. 11.

FIG. 14.

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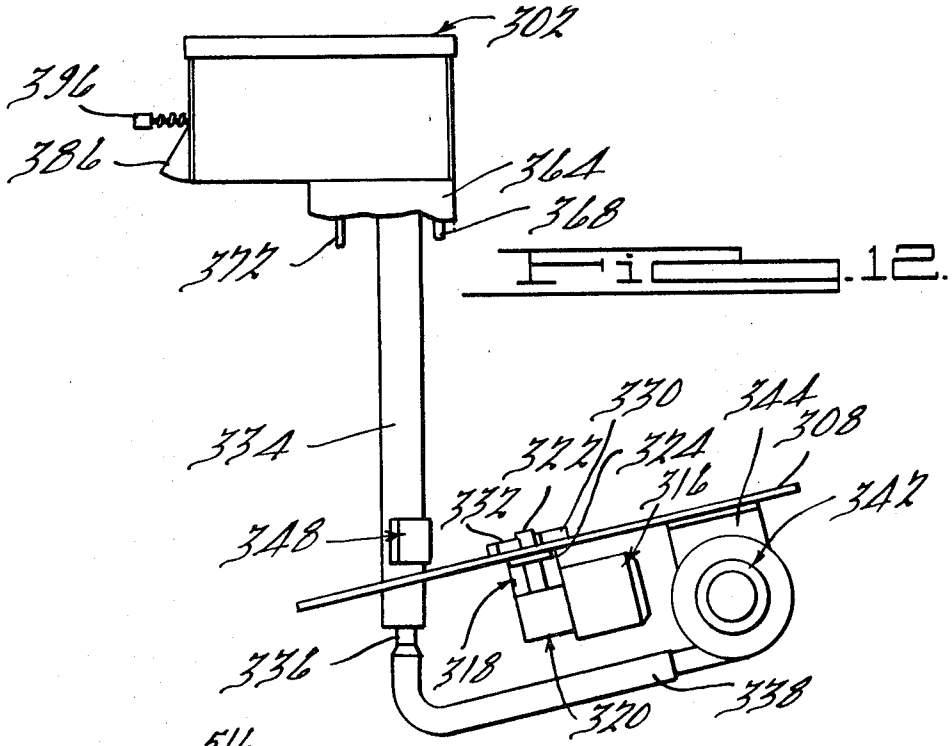


Fig. 12.

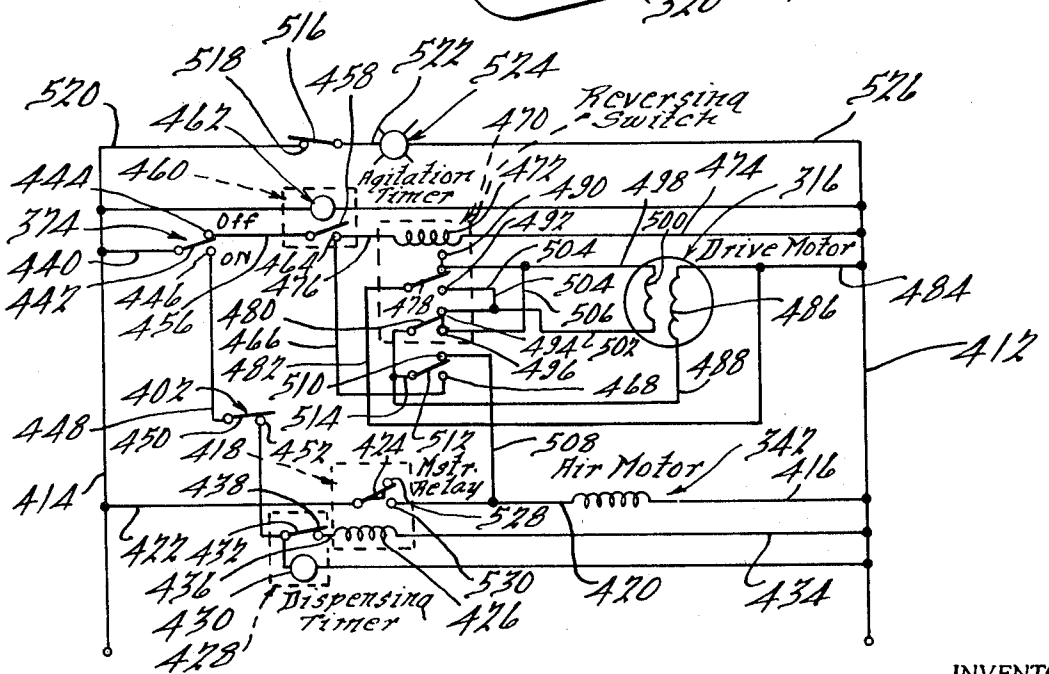


Fig. 13.

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METHOD AND APPARATUS FOR DISPENSING ICE CUBES AND THE LIKE

This application is a continuation-in-part of application Ser. No. 606,852, filed Jan. 3, 1967, for Ice Dispenser, now abandoned.

BACKGROUND OF THE INVENTION

In the broadest sense, the present invention is directed toward a new and improved method and apparatus for conveying discrete articles from a remote storage reservoir to a dispensing or discharge compartment through the use of a relatively high velocity flow of conveying fluid. In a more limited sense, the present invention utilizes a relatively high velocity flow of air, as provided by a suitable air motor or blower, for sequentially conveying discrete articles through a conveying tube or conduit which extends between a reservoir containing a large number of such articles, to a discharge compartment located some preselected distance from the reservoir.

By virtue of the fact that ice in discrete form, for example, ice cubes or particulate ice, has the tendency of compacting or "bridging" as it is conveyed by heretofore known and used mechanical ice conveying devices, such as helical augers and the like, the principles of the present invention find particularly useful application in effecting the transfer of such ice from the ice storage bins or reservoirs to various types of dispensing devices. Accordingly, for purposes of illustrating an exemplary embodiment of the broad concepts of the present invention, the principles thereof are incorporated herein in an ice dispensing apparatus which is adapted to convey ice cubes from a remote cube reservoir or storage bin which may, for example, be located below a service counter or the like, to an ice dispensing head assembly mounted above the counter. Since the present invention utilizes a high velocity flow of air for conveying the ice cubes from the storage bin to the dispensing head assembly, as opposed to using a mechanical ice conveying auger or like device, virtually all of the objectionable characteristics, such as expensive and time consuming installation, maintenance and operation, as well as the aforementioned objectionable ice compaction and bridging, of heretofore known and used ice dispensing mechanisms are overcome.

SUMMARY OF THE INVENTION

This invention relates generally to discrete article handling apparatus and, more particularly, to a new and improved apparatus for handling and dispensing ice cubes and the like.

It is accordingly a primary object of the present invention to provide a new and improved method and apparatus for conveying discrete articles between two remote locations through the use of a high velocity flow of conveying fluid.

It is a more particular object of the present invention to utilize a high velocity flow of conveying fluid for conveying ice in cube form from a cube storage reservoir or bin to a dispensing assembly.

It is still a more particular object of the present invention to provide a new and improved ice dispensing apparatus which overcomes the above objectionable features of heretofore known and used ice dispensing devices.

It is a further object of the present invention to provide an ice dispenser of the above character which facilitates the handling of ice cubes in an extremely sanitary manner.

It is a more specific object of the present invention to provide an ice dispenser of the above type wherein the ice cubes are dispensed without any contact with human hands or other possible sources of contamination.

It is another object of the present invention to provide an ice cube dispenser of the above character which may be easily installed and readily disassembled for purposes of cleaning and the like.

It is yet another object of the present invention to provide a new and improved ice dispenser of the above type which includes means for preventing jamming of ice cubes during dispensing thereof.

It is another object of the present invention to provide a new and improved ice dispenser which may be easily adapted for various operational environments and hence is characterized by universality of installation.

It is another object of the present invention to provide an ice dispenser of a relatively simple design, which is easy to assemble, and economical to commercially manufacture.

Other objects and advantages of the present invention will become apparent from the following detailed description, taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an elevated perspective view, partially broken away, of a schematic representation of an exemplary embodiment of the ice dispenser of the present invention;

FIG. 2 is a side elevational view, partially broken away, of the front side of an embodiment of the ice dispenser of the present invention having the free-air conduit and manifold removed; and shown in operative association with a conventional ice storage bin or reservoir;

FIG. 3 is an enlarged fragmentary cross-sectional view of a portion of the ice dispenser illustrated in FIG. 2, as viewed substantially along the line 3–3 thereof;

FIG. 4 is an enlarged fragmentary cross-sectional view of a portion of the ice dispenser illustrated in FIG. 2, as viewed substantially along the line 4–4 thereof;

FIG. 5 is an enlarged fragmentary cross-sectional view of a portion of the ice dispenser illustrated in FIG. 2, as viewed substantially along the line 5–5 thereof;

FIG. 6 is a transverse cross-sectional view taken substantially along the line 6–6 of FIG. 4;

FIG. 7 is a transverse cross-sectional view taken substantially along the line 7–7 of FIG. 3;

FIG. 8 is a schematic diagram of an exemplary electrical circuit which is incorporated in the ice dispenser of the present invention;

FIG. 9 is an enlarged view of the portion of the structure illustrated within the oval 9 of FIG. 5;

FIG. 10 is an elevated perspective view, partially broken away, of an alternate embodiment of the present invention;

FIG. 11 is an enlarged transverse cross-sectional view taken substantially along the line 11–11 of FIG. 10;

FIG. 12 is a side elevational view of the structure illustrated in FIG. 10, as seen from the direction of the arrow 12 therein;

FIG. 13 is a schematic diagram of an exemplary electrical circuit incorporated in the ice dispenser illustrated in FIG. 10, and

FIG. 14 is an enlarged cross-sectional view of a portion of the ice cube conveying conduit incorporated in the structure illustrated in FIG. 10.

DETAILED DESCRIPTION OF THE INVENTION

Broadly speaking, the ice dispenser of the present invention is adapted to be utilized in conveying ice cubes from an ice storage bin to a remotely located dispensing head assembly. In general, the subject ice dispenser comprises three cooperative assemblies, namely, a dispensing head assembly which is adapted to dispense ice cubes into a glass or similar receptacle, an ice cube conveyor assembly which communicates ice cubes from the associated ice reservoir to the dispensing head assembly, and a cube feeder assembly which feeds ice cubes from the interior of the associated cube reservoir to the conveyor assembly. By way of example, the subject ice dispenser is shown in operative association with a conventional ice storage bin of the type well known in the art, with the dispensing head assembly being located above the bin, the feeder assembly being located within the interior of the bin, and the conveyor assembly extending upwardly through the door or similar opening in storage bin between the feeder and dispensing assemblies. It may be noted that the ice dispenser of the instant invention is not intended to be solely limited to the illustrated application, since the dispensing assembly may be located a substantial distance from the associated ice

storage bin and feeder assembly, It is contemplated, in fact, that the ice cube feeder assembly and reservoir may be located in the basement of a building, while the dispensing assembly may be located on the second or third floor thereof, with result that the conveyor assembly will function to communicate ice cubes a distance in the order of 20—20 feet or more. It is further contemplated that the ice cube conveyor assembly comprise a relatively flexible cube conveying conduit so that the dispensing assembly may be moved relative to the feeder assembly as ice cubes are being discharged therefrom.

For convenience of description, the terms "inwardly," "outwardly" and words of similar import will have reference to the geometric center of the ice dispenser of the present invention and the various component parts and assemblies thereof. Likewise, the terms "forwardly," "rearwardly" and derivatives thereof will have reference to the ice dispenser of the present invention as shown in FIG. 1, with the forward side of said dispenser substantially facing the right side of this FIG.

Referring now in detail to FIGS. 1 and 2 of the drawings, an ice dispenser 10, in accordance with an exemplary embodiment of the present invention, is shown as comprising three cooperative assemblies, namely, an ice cube dispensing assembly 12, a cube conveyor assembly 14, and a cube feeder assembly 16. By way of illustration, the ice dispenser 10 is shown in FIG. 2 in operative association with a conventional ice cube storage bin 18 having four sidewall portions 20, a top or cover portion 22 and a bottom portion 23. The cube feeder assembly 16 is located adjacent the bin portion 23 while the conveyor assembly 14 extends upwardly through an access opening 24 which is normally provided in the cover portion 22 of the bin 18, and the cube dispensing assembly 12 is disposed directly above the top of the bin 18 on the upper end of the conveyor assembly 14. The feeder assembly 16 is adapted to receive ice cubes disposed with the interior of the bin 18 and transmit the same to the conveyor assembly 14, which in turn communicates the cubes upwardly into the dispensing assembly 12, with the result that the ice cubes may be selectively dispensed from the bin 18, in the manner hereinafter to be described.

Referring now in detail to the construction of the ice cube feeder assembly 16, as best seen in FIGS. 2 and 3, the assembly 16 comprises a generally rectangular-shaped support structure or frame 26 which includes four downwardly and inwardly inclined wall sections 28 that terminate at their lower ends at a substantially horizontally extending bottom section 30. As illustrated in FIG. 2, the frame 26 is provided with downwardly depending leg portions 32 and 34 on the bottom section 30 thereof that are adapted to bear upon the bottom portion 23 of the storage bin 18. Mounted within and supported by the frame 26 is an ice cube tray, generally designated 38. The tray 38 is formed with an outer peripheral lip portion 40 which is adapted to bear upon the upper edge of the frame 26, the lip portion 40 being integrally formed around the outer edge of a downwardly and inwardly tapered central section 42. The lowermost part of the section 42 is formed with a frustoconical portion 44 which is in turn formed with an annular downwardly projecting flange portion 46. As seen in FIG. 3, the flange portion 46 defines a central opening 48. In a preferred construction of the present invention, the ice tray 38 is of a one piece construction fabricated of a suitable plastic or similar light weight corrosion resistant material that may be easily formed or molded; however, for certain installations, the tray 38 may comprise two or more sections to facilitate insertion through the opening 24 of certain types of ice bins.

Disposed directly above the frustoconical portion 44 of the ice tray 38 is an ice cube agitator disc 50 which is of a frustoconical configuration complementary to the configuration of the tray portion 44. The lower central portion of the agitator disc 50 defines a central opening which is arranged coaxially of the opening 48 and has the upper end of annular collar member 52 rigidly secured, as by welding, brazing or the like therewithin. As illustrated, the collar member 52 is slightly smaller in diameter than the opening 48 and is arranged concentrically therewithin. The disc 50 is provided with a plurality of radially outwardly and upwardly extending rib member 54 which function in a manner later to be described to agitate the ice cubes located directly above the ice tray 38.

Disposed within the interior of the opening 48 is an annular air nozzle member 56 which, as best seen in FIG. 7, is formed with a plurality of circumferentially extending openings 58 and a central opening 60. As illustrated in FIG. 3, the nozzle member 56 is located directly below the lower end of an upwardly extending ice conveying tube 62, with the uppermost portion of the member 56 being disposed within the lower end of the tube 62. The inner periphery of the collar member 52 is rigidly secured, as by welding or the like, to the outer periphery of the lower end of the tube 62, whereby the agitator disc 50, collar member 52, and conveyor tube 62 comprise a single utilized assemblage which is rotatable relative to the nozzle 56 and ice tray 38, as will be described.

As best seen in FIG. 3, a generally cup-shaped, free-air manifold 64 is disposed directly below and arranged coaxially of the nozzle member 56. The manifold 64 comprises an upwardly extending annular sidewall portion 66 and a bottom portion 68, the latter of which is supported upon the bottom portion 23 of the ice storage bin 18 by means of a support bracket 70 having downwardly depending leg sections 72 and 74 that extend through the bottom section 30 of the frame member 26 and bear upon the ice bin portion 23. It will be seen that the upper edge of the sidewall portion 66 of the manifold 64 peripherally engages and is fixedly secured to a radially outwardly extending shoulder section 76 on the nozzle member 56, thus supporting the nozzle within the frame 26. As will later be described, the manifold member 64 is adapted to receive "free-air" from an air conduit 78 that comprises a lower horizontally extending section 80 which terminates within a suitable opening 82 in the sidewall portion 66 of the manifold 64. The conduit 78 also comprises an upwardly extending section 84, the upper end of which is adapted to be normally located above the upper surface of the mass of ice cubes stored within the bin 18. It will be seen that free-air communicated into the manifold 64 by means of the conduit 78 is communicable with the plurality of openings 58 formed in the nozzle member 56, and hence with the interior of the conveyor tube 62.

Disposed within the interior of the manifold member 64 is a generally right angle or elbow-shaped air conduit member 86 that comprises an upwardly extending section 88 and a generally horizontally extending section 90, the latter of which extends through an opening 92 in the sidewall portion 66 of the manifold 64. The upper end of the elbow section 88 is formed with a swaged or enlarged diameter portion 94 that is disposed within a recessed portion 96 formed in the lower side of the nozzle member 56 and is communicable with the opening 60 thereof. It may be noted that the manifold 64 and free-air conduit 78 may be omitted for certain types of installations, as shown in FIG. 2 whereby the member 86 is supported directly on the bottom section 30 of the frame member 26. The elbow section 90 is adapted to be connected to a horizontally extending conduit section 98 which is in turn connected to an communicable with another right angle or elbow member 100. A generally vertically extending conduit section 102 extends through a suitable opening 104 in the ice tray 38 and is connected to an upper portion 106 of the elbow member 100, with the result that air flowing through the conduit section 102 will be communicated to the elbow members 100, 96 and conduit section 98, and finally through the opening 60 of the nozzle member 56 into the lower end of the conveying tube 62.

The upper side of the nozzle member 56 is formed with a bore 108 which is adapted to receive and support a stud or antijamming pin 110 that extends upwardly within the lower end of the conveying tube 62. The pin 110 is adapted to successively register with a cube access opening 112 formed in the

lower end of the tube **62** directly above the nozzle member **56** upon rotation of the tube **62** relative to the nozzle member **56**, whereby to prevent any jamming of ice cubes as they pass from the bin **18** into the interior of the tube **62** through the opening **112**.

An ice cube guide assembly, generally designated **114**, is mounted on the upper surface of the ice cube tray section **42** adjacent the agitator disc **50**. The assembly **114** comprises a guide pin **116** that is secured on one end of a helical coil spring **118** directly above the radially outermost portion of the agitator disc **50**. The opposite end of the spring **118** is rigidly secured to the upper surface of the tray section **42** by means of a retaining plate **120**, as best seen in FIGS. **1** and **3**, with the result that the guide pin **116** is free to move slightly relative to the tray **38** in order to align ice cubes on the agitator disc **50** and also prevent rotation of the entire mass of ice cubes within the bin **18** during operation of the ice dispenser **10**, as will later be described.

Referring now to the construction of the ice cube conveyor assembly **14**, as best seen in FIG. **2**, in the exemplary embodiment of the present invention illustrated herein, the assembly **14** extends upwardly through the access opening **24** of the ice storage bin **18**. By way of example, the assembly **14** is disposed within a generally rectangular housing **122** having upwardly extending sidewall sections **124** and a bottom or base section **126**. Preferably the size of the housing **122** corresponds closely to the size of the opening **24** of the bin **18** to prevent any warm air from the atmosphere from entering the bin **18**. Also, the housing **122** is preferably provided with suitable insulation to prevent heating leakage and to provide for sound deadening. The upper edges of the wall sections **124** are formed with outwardly extending flange portions **128** upon which a generally horizontally extending sink casting **130** is mounted. Central portions of the sink **130** are recessed, as seen at **132**, so that any water or other liquid which may be spilled onto the top of the sink **130** will not overflow onto the storage bin **18** or floor. The sink **130** is formed with a drain opening **134** at one edge thereof which is communicable with a suitable conduit **136** having the upper end thereof threadably or similarly secured within a suitable mounting section **138** integrally formed on the lower side of the sink **130** circumjacent the opening **134**. The conduit **136** is adapted to be connected to any suitable drain conduit **140** by means of a suitable fastening device **142**, the conduit **140** extending through a suitable grommet **144** in the bottom section **126** of the housing **122**. The lower end of the conduit **140** is adapted to be connected with the commonly provided drain outlet in the lower end of the ice storage bin **18**.

The conveyor assembly **14** comprises an air motor or blower **146** which, in the exemplary embodiment illustrated herein, has an output of approximately 80—100 ft.^{3}/min., which produces an air flow rate of approximately 2,000 ft./min. within the conveying tube **62**. The motor **146** may be mounted by any suitable means within the housing **122**, for example, by a suitable mounting structure shown at **148** in FIG. **2**. The air outlet section **150** of the motor **146** is adapted to be connected to the upper end of the air conduit **102** which extends upwardly through the bottom section **126** of the housing **122**, with the result that upon energization of the motor **146**, the high velocity flow of air produced by the motor **146** travels downwardly through the conduit **102** and thereafter to the nozzle member **56**, as previously described.

During operation of the ice dispenser **10**, the ice cube conveying tube **62** and agitator disc **50** are adapted to selectively rotate to facilitate the influx of ice cubes through the access opening **112** in the lower end of the tube **62**. Means for effecting such rotational movement of the tube **62** is achieved by an electrically energized drive **152** which is mounted by means of a suitable mounting bracket or the like **154** on the bottom section **126** of the housing **122**. The motor **152** is provided with an output shaft **156** that is connected by means of a suitable coupling **158** to another shaft **160** which is rotatably mounted within a pair of supporting arms **162** and **164** integrally formed on an annular gear housing **166**. Preferably, suitable antifriction bearing means **168** and **170** are provided within the arms **162**, **164** to assure free rotation of the shaft **160** relative thereto. As best seen in FIG. **6**, the gear housing **166** is adapted to be rigidly secured to the bottom section **126** of the housing **122** by means of suitable screws, bolts or the like **172** which extend through integral portions **174** on the lower end of the housing **166**.

The gear housing **166** defines a central annular bore **176** within which an annular coupling member **178** is rotatably mounted by means of a suitable sleeve bearing or bushing **180** that is interposed between the outer periphery of the coupling **178** and the bore **176**. The inside diameter of the coupling **178** is preferably slightly larger than the outside diameter of the conveying tube **62** so that the upper end of the tube **62** may be telescopically received within the lower end of the coupling **178**, as shown in FIG. **6**. The coupling **178** is adapted to be drivingly connected to the tube **62** by means of a pair of diametrically opposed drive dogs **182** and **184** that are rigidly secured to the inner periphery of the coupling **178** by means of suitable screws, bolts or the like **186**. The upper end of the conveying tube **62** is formed with a pair of rectangularly shaped recesses or notched portions **188** and **190** which are adapted to receive the drive dogs **182**, **184**, respectively, as the upper end of the tube is inserted into the lower end of the coupling **178**. With this construction, it will be seen that rotation of the coupling **178** will result in simultaneous rotation of the conveying tube **62**, and that the coupling **178** may be easily disengaged from the tube **62** by merely moving one of these members axially away from the other of said members.

Means for driving connecting the shaft **160** with the coupling **178**, and hence the output shaft **156** of the drive motor **152** with the conveying tube **62**, is provided by a worm and worm gear assembly comprising a worm **192** which is fixedly secured to the shaft **160** interjacent the arms **162** and **164**, and a worm gear **194** that is mounted around the outer periphery of the upper end of the coupling **178**, as best seen in FIGS. **4** and **6**. The worm **192** is fixedly secured to the shaft **160** by means of a suitable lock screw **196**, while the worm gear **194** is fixedly secured to the coupling **178** by means of suitable screws, bolts or the like **198** which extend downwardly through a radially outwardly extending mounting ring **200** fixedly secured to the upper end of the coupling **178**. With the above described construction, upon energization of the drive motor **152**, the worm **192** and worm gear **194** will cause the coupling **178** and hence the tube **62** to rotate. Upon such rotation of the conveying tube **62**, the agitator disc **50**, which is fixedly secured to the lower end thereof, will rotate relative to the ice tray **38** and thus facilitate the influx of ice cubes through the opening **112** of the tube **62**, as will be explained in detail in connection with the description of the overall operation of the ice dispenser **10** of the present invention. Preferably, the motor **152**, worm **192** and worm gear **194** are designed such that upon energization of the motor **152**, the tube **62** and agitator disc **50** will rotate at approximately 30 r.p.m. It will be apparent, of course, that various alternative types of drive means may be used for rotating the conveying tube **62**, for example, a geared drive motor and spur gear arrangement.

Referring now to the cube dispensing assembly **12** of the ice dispenser **10**, as best seen in FIGS. **2** and **5**, mounted on a central portion of the sink **130** is an upwardly extending enclosure **202**. The enclosure **202** defines an internal passage **204** that is generally circular in cross section and the lower end of which is aligned with an annular opening **206** formed in the sink **130**. An ice cube conveying tube **208** extends upwardly through the opening **206** into the lower end of the passage **204**, the lower end of the tube **208** being aligned with and terminating directly above the upper end of the coupling **178**, as shown in FIG. **4**. A flanged sealing member **210** is rigidly secured to the outer periphery of the lower end of the tube **208**, which member **210** is formed with a lower swaged or enlarged diameter flange portion **212** that extends downwardly around

the outer periphery of the upper end of the coupling 178. It will be noted that the flange 212 is not secured to the outer periphery of the coupling 178 due to the fact that the coupling 178 is rotatable upon energization of the drive motor 152, as above described.

Mounted on the top of the enclosure 202 is a dispensing housing 214, the lower end of which is adapted to be fixedly secured to the top of the enclosure 202 by any suitable means, as best seen at 216 in FIG. 5. The housing 214 defines an internal passage 218 which, upon assembly of the housing 214 on the enclosure 202, is aligned and communicable with the passage 204. It will be noted that the housing 214, enclosure 202 and sink 130 may be easily removed from the housing 214 to be used in different locations and to facilitate cleaning. The housing 214 is formed with a forwardly extending chute section 220, the lower end of which is adapted to be closed by a pivotably mounted wherein or closure member 222. More particularly, the closure member 222 is formed with a forward wall section 224 that extends between a pair of generally "-pie" shaped side sections 226. The member 222 is pivotably mounted on the housing 214 by means of a suitable pivot pin or hinge arrangement indicated by the numeral 228 in FIG. 5, whereby the spout member 222 may be pivotally moved from the solid line position indicated in FIG. 5 wherein a rectangular discharge opening 230 formed in the housing section 220 is open, to the dotted line position in this figure wherein the forward wall section 224 of the member 222 closes the opening 230. Means for thus biasing the spout member 222 between the aforesaid open and closed positions is provided by an actuating handle 232, which may be rigidly secured to the spout member 222 by any suitable means and extends forwardly from the housing 214 to provide for convenient manual access thereof.

A generally semicircular configured wire mesh or similar imperforate screen 234 extends between a forward side portion 236 of the housing 214 and a central wall portion 237 thereof. The screen 234 is open on the lower side thereof and is adapted to act as a guide or deflector means for controlling the path of ice cubes which are conveyed from the passage 218 to the discharge opening 230. The purpose of the imperforate construction of the screen 234 is to permit any water adhering to the surface of the cubes being dispensed, to be removed from said cubes during the dispensing operation, as will later be described in detail. As indicated at 237 in FIG. 5, a downwardly extending flap may be provided on the screen 234 for reducing the velocity of the ice cubes as they are directed toward the spout 222. A suitable forwardly and downwardly inclined guide plate 238 is preferably provided in the lower end of the housing 214 for guiding ice cubes toward the discharge opening 230 after said cubes are deflected downwardly off of the screen 234. The lower end of the housing 214 is communicable with the drain conduit 136 by suitable conduit means (not shown) which extends downwardly through the enclosure 202 so that any meltage water which is removed from the cubes as they engage the screen 234 is drained from the housing 214.

Mounted rearwardly of the discharge opening 230 is a pair of actuating switches 239 and 240 which are adapted to selectively effect actuation of the motors 146 and 152, respectively. Disposed directly below the actuating switches 239, 240 is a generally L-shaped switch actuating arm 241 having an upwardly and forwardly extending portion provided with an actuating roller 242. The upper rearwardly extending end of the actuating arm 241 is pivotably connected within the housing 214, as indicated at 243, and the arm 241 is spring biased by any suitable means in a counterclockwise direction in FIG. on about the upper end thereof. The roller 242 is adapted to be engaged by a downwardly extending boss 244 provided on the lower side of one of the side members 226 as the spout member 222 is moved from its closed position to its open position shown in FIG. 5. As illustrated in FIG. 9, the arm 241 is provided with a pair of contact portions 245 and 246, the first of which is disposed directly on the upper side of the arm 241 and adapted to engage and actuate the switch 239 and the second of which is mounted on a suitable helical spring 247 that extends upwardly and forwardly from the upper side of the arm 241 and is adapted to engage and actuate the switch 240. The spring 247 is designed to have a greater tension than the spring means which resists normal actuation of the switch 240. The actuating arm 241 is normally disposed in the dotted line position shown in FIG. 9, whereby the contact portions 245 and 246 are engaged with and maintain the switches 239, 240, respectively, in an open condition; however, at such time as the spout member 222 is moved to its open position, the boss 244 will engage the roller 242 and thereby bias the actuating arm 241 to the solid line position in FIG. 9. As the arm 241 thus moves to its solid line position, the contact portion 245 will be immediately biased out of engagement with the switch 239 thereby closing the same, but the contact portion 246, by virtue of being s paced upwardly from the arm 241, will maintain the switch 240 closed momentarily until the arm 241 is biased sufficiently away from the switch 240. At such time as the spout member 222 is again closed, the actuating arm 241 will be spring biased to its dotted line position in FIG. 9, whereby the contact portion 246 will move into engagement and deactuate the switch 240 momentarily before the contact portion 245 engages and deactuates the switch 239. With this construction, the air motor 146 will remain energized for just a moment longer than the drive motor 152 upon biasing the spout member 222 to its closed position, whereby to permit any ice cubes which are disposed within the conveying tube 62 and/or passages 204, 218 to be conveyed therefrom at the end of each ice cube vending cycle.

Means for returning or recirculating back to the housing 122 the major portion of the high velocity flow of air that is communicated into the dispensing assembly 12 through the passages 204 and 218, is provided by a return air conduit 249 which extends upwardly within the housing 214 and is provided with a suitable conically-shaped baffle or deflector cover 250 on the upper end thereof to prevent any ice cubes from falling into the upper end of the conduit 249. The lower end of the conduit 249 extends through suitable openings 252 and 254 in the lower end of the housing 214 and the top of the enclosure 202, the conduit 249 being supported by a suitable retaining member or the like 256 which is disposed within the lower end of the housing 214. A return air conduit section 258 is connected to the lower end of the conduit 249 by a suitable fastening member 260, and the lower end of the conduit section 258 is communicable with the interior of the housing 122 through suitable aligned openings 262 and 264 formed in the lower end of the enclosure 202 and the sink 130. With this construction, it will be seen that the ice cube conveying air is retained within a substantially closed circuit, thereby considerably reducing the possibility of the ice cubes being contaminated by unsanitary air from the atmosphere. Furthermore the temperature of the air in the closed circuit will be reduced as it circulates around the cubes during each dispensing cycle, and thus the air will be precooled to minimize cube meltage during the dispensing thereof. Also, by returning the air from the housing 214, any outward blast of air through the open spout 222 is prevented.

Referring now to FIGS. 2 and 8, the ice dispenser 10 is provided with a timer device 266 which is adapted to cause the drive motor 152 to be energized periodically so that the agitator disc 50 will be rotated to prevent freezing and thus adherence of the ice cues disposed above the ice tray 38. Preferably the timer device 266, which may be of any suitable type, energizes the drive motor for approximately 1 minute every one-half hour.

The actuating switches 239, 240, drive motor 152, air motor 146 and timer 266 are adapted to be connected to a suitable source of electrical energy 248 by any suitable electric circuitry, an exemplary illustration of which is shown in FIG. 8.

In order to facilitate correlating the various component assemblies of the ice dispenser 10 of the present invention, a brief description of an exemplary operational cycle thereof will now be given.

Assuming that a mass of ice cubes is disposed within the ice storage bin **18** and that at least a portion of such cubes is disposed directly above the ice tray **38**, operation of the ice dispenser **10** is initiated upon pivoting or biasing the ice spout **222** from its dotted line position in FIG. **5** wherein the spout **222** closes the discharge opening **230**, to the solid line open position in this figure. As the spout **222** is thus opened, the boss **244** engages the roller **242**, whereby the arm **241** is biased in a clockwise direction in FIGS. **5** and **9**, thereby closing the switches **239** and **240**, with the result that the drive motor **152** and air motor **146** are energized. Upon energization of the drive motor **152**, the worm **192** and worm gear **194** rotate the conveying tube **62** and agitator disc **50**, as above described. As the agitator disc **50** rotates, the ice cubes directly above the disc **50** will rotate therewith due to the upwardly extending rib members **54** on the disc **50**. By virtue of the fact that the disc **50** is inclined downwardly at its center, the cubes will move radially inwardly toward the center of the disc **50** and a certain number thereof will move through the access opening **112** in the lower end of the conveying tube **62**. Upon rotation of the disc **50**, the assembly **114** is adapted to align the ice cubes radially of the agitator disc **50** and also prevent the entire mass of ice cubes within the bin **18** from turning with the agitator disc **50**. It will be seen that the antijamming pin **110**, which is nonrotatably mounted on the nozzle member **56**, functions to limit radially inward movement of the ice cubes through the access opening **112** on the tube **62** as the opening **112** registers with the pin **110**. This prevents the cubes from bridging across the opening **112** or similarly becoming jammed in the front of the opening **112**, whereby to assure the continuous ingress of the ice cubes through the opening **112**.

Energization of the air motor **146** results in a high velocity flow of air being forced downwardly through the conduit section **102** and thereafter through the members **100**, **98** and **86**, and finally upwardly through the central opening **60** of the nozzle member **56**. The ice cubes which have moved radially inwardly through the opening **112** into the interior of the tube **62** are forced upwardly by this flow of air through the tube **62**, coupling **178**, passages **204**, **218** and into the interior of the dispensing housing **214**. As the cubes enter the housing **214**, they initially impinge against the screen **244**, whereby the cubes are deflected downwardly and forwardly against the plate **239**, with the result that the cubes drop downwardly into any suitable receptacle, for example, a glass, which may be placed below the discharge opening **230**. Any water which may have accumulated on the surface of the cubes due to the flow of air circulating therearound continues upwardly through the screen **234** as the ice cubes are impinged thereagainst, this water thereafter falling back onto the lower surface of the housing **214** where it may drain freely through the aforementioned drain conduit provided therein.

It will be seen that the air which is utilized for conveying the ice cubes upwardly through the conveying tube **62** passes through the screen **234** and thereafter through the conduits **102**, **258** and into the housing **122**, where this air is subsequently recirculated through the conduit section **102** and thereafter back through the nozzle member **56**. Accordingly, the air which is used for cube conveying purposes is substantially retained within a closed circuit with the exception of a certain amount of air which may escape through a discharge opening **230** during the dispensing of ice cubes. In order to replace any air which may be thus lost, "free-air" is drawn into the air flow circuit through the conduit **78** and openings **58** in the nozzle member **56** by virtue of a vacuum created directly above the nozzle member **56** as the high velocity flow of air passes through the opening **60** thereof.

At such time as a preselected number of ice cubes have been dispensed, the spout member **222** may be biased toward its closed position, whereby the actuating arm **241** will move to its dotted line position in FIG. **9**. As above described, the contact portion **246** will move into engagement and deactuate the switch **240** to shut off the drive motor **152** and momentarily thereafter, the contact portion **245** engages and deactuates the air motor **146**, thus permitting any ice cubes disposed within the dispensing and conveying assemblies **12**, **14** to be removed therefrom.

It will be seen from the above description that the present invention finds particularly useful application when embodied in an ice dispensing apparatus of the type shown herein. It will be apparent, of course, that the principles of the present invention are not limited solely to dispensing ice per se, but instead may be incorporated in various other types of devices for conveying discrete articles from one location to another. It will also be noted that the ice dispenser **10** hereinabove described is not intended to be limited to conveying only ice cubes, but may with only slight modification being made to the feeder assembly **16** thereof, be adapted to dispense ice in particulate form, such as shaved or chipped ice. Also, it may be noted that the ice dispenser **10** may be easily disassembled for purposes of cleaning and maintenance by virtue of the fact that the ice dispensing assembly **12** is easily removable from the enclosure **202**, which enclosure **202** may be also easily removed to provide access to the sink **130** and housing **122**.

It is contemplated that the tube **208** may be extended a considerable distance to enable the dispensing assembly **12** to be located at a location remote from the ice bin **18**. If the length of the tube exceeds a predetermined amount, for example, approximately 15 feet, the return air conduit **258** may be directed into the interior of the storage bin **18** instead of being connnected to the air motor **146** since the blast of air in the housing **214** decreases in proportion to the distance which the assembly **12** is located away from the bin **18**. As above stated, it is also contemplated that such an extended tube **208** may be of a relatively flexible construction to permit the dispensing assembly **12** to be moved when desired.

FIGS. **10** through **14** illustrate an alternate embodiment of the ice dispensing apparatus of the present invention. Generally speaking, the apparatus shown in these figures serves the same basic function as the dispenser **10** hereinabove described; however, this embodiment of the present invention differs from the ice dispenser **10** in that the conveyor assembly or ice cube conveying tube thereof is stationary, i.e., nonrotatable; the ice cube agitating disc is offset laterally from the conveying tube and is adapted to be rotated by an electric motor disposed therebelow, as opposed to being rotated by the conveying tube itself. Additional differences reside in the elimination of the ice cube guide assembly **114**, the location of the blower motor below the agitating disc and the provision of a somewhat different electrical control system, as will hereinafter be described.

Referring now in detail to FIG. **10**, an ice dispenser **300**, in accordance with an alternate embodiment of the present invention, is shown as comprising a dispensing head assembly **302**, an ice cube conveyor assembly **304**, and an ice cube feeder assembly **306**. By way of illustration, the dispenser **300** is adapted to be operatively associated with a conventional ice storage reservoir or bin such as the above-described bin **18**. In such an application, the feeder assembly **306** is located adjacent the lower side of the bin, while the conveyor assembly **304** extends upwardly through a suitable opening in the bin, and the cube dispensing assembly **302** is disposed above the upper end of the bin. The feeder assembly **306** is adapted to receive ice cubes or the like disposed within the interior of the bin and transmit the same to the conveyor assembly **304** which, in turn, communicates the ice cubes upwardly to the dispensing assembly **302** that functions to selectively dispense the same.

The feeder assembly **306** comprises a generally flat or planar ice cube tray **308** which is formed with a central annular opening **310** therein. Disposed within the opening **310** is a generally flat, annular ice cube agitating disc **312** which is arranged generally coplanar with the tray **308**. In a preferred construction, the tray **308** and disc **312** are inclined from the horizontal so hat ice cubes disposed thereon will have a tendency to flow downwardly in the direction of the arrow **314** in FIG. **10** so that said cubes will feed toward the conveyor assembly **304**, as will hereinafter be described.

The ice cube agitating disc 312 is adapted to be selectively rotated by means of a reversible electrically energized drive motor 316 which is secured to the lower side of the tray 308 by means of a suitable mounting bracket or the like 318. The motor 316 is provided with a right angle drive mechanism 320, which transmits motive power from the motor 316 to a generally upwardly extending drive shaft 322, the upper end of which is secured through suitable coupling means 324 to the ice cube agitating disc 312, with the result that energization of the motor 316 will effect rotation thereof in the direction of the arrows 326 and 328 in FIG. 10. The upper side of the agitating disc 312 is provided with a pair of generally radially extending diametrically aligned agitating lugs or ribs 330 and 332 that project upwardly therefrom and are adapted to function in agitating the ice cubes juxtaposition the disc 312. The lugs 330, 332 are also adapted to function in biasing ice cubes toward and into alignment with the conveyor assembly 304 in a manner similar to the guide assembly 114 hereinabove described.

The conveyor assembly 304 is shown as comprising a generally upwardly or vertically extending ice cube conveying tube or conduit 334, the lower end of which extends downwardly through a suitable opening 336 formed in the tray 308 directly adjacent the opening 310. The upper end of the conduit 334 is communicable with the dispensing assembly 302, while the lower end of the conduit 334 is communicable through a suitable tubular coupling or the like 336 with an air supply conduit 338 which is disposed subjacent the tray 308. The end of the conduit 338 opposite that which is connected to the coupling 336 is communicable with an outlet section 340 of an air motor or blower, generally designated 342. By way of example, the blower 342 may be of the same type as the blower 146 hereinabove described which produces an air flow rate of approximately 2,000 feet per minute. The blower 342 is adapted to be secured by any suitable means, such as, for example, a support bracket 344, to the lower side of the tray 308, as best seen in FIGS. 10 and 12. As will be apparent, upon energization of the blower 342, a high velocity flow of air will be produced and transmitted through the conduit 338, coupling 336 to the lower end of the conduit 334, which flow of air is thereby adapted to function in transmitting or elevating ice cubes upwardly from the feeder assembly 306 to the dispensing assembly 302, as was previously described.

The ice cube conveyor conduit 334 is formed with a generally rectangular-shaped opening 346 which is located directly above the upper surface of the tray 338 and disc 312, which opening 346 is adapted to receive ice cubes which are agitated by the disc 312 in the same manner as the aforedescribed opening 112 in the ice dispenser 10. Adjacent to the opening 346 is a generally arcuate-shaped closure door, generally designated 348. The door is hingedly mounted by suitable hinge device 350 along one edge of the opening 346, and the door 348 is adapted to hinge or pivot between the solid and phantom line positions shown in FIG. 14, thereby selectively opening and closing the opening 346 to provide for or block ice cube communication therethrough. More particularly, when the disc 312 rotates in the direction of arrow 326, i.e., in a counterclockwise direction in FIG. 10, the ice cubes disposed of on the disc 312 will act to pivotally bias the door 348 from the closed solid line position in FIG. 14 to the open phantom line position in this Figure. Conversely, when the disc 312 rotates is the direction of the arrow 328, i.e., in a clockwise direction in FIG. 10, the ice cubes supported on the disc 312 will function to bias the door 348 from the phantom line open position to the solid line closed position, thereby blocking communication of ice cubes through the opening 346. As will hereinafter be described in detail, in a normal dispensing cycle of the dispenser 300, the disc 312 will rotate in the direction of the arrow 326, whereby ice cubes will maintain the door 348 open to provide for free communication thereof into the conduit 334; however, the dispenser 300 is designed to intermittently agitate ice cubes disposed above the tray 308 and disc 312, at which time the disc 312 will rotate in the direction of the arrow 328. Since ice cubes are not intended to be dispensed during such intermittent agitation thereof, the door 348 will be biased to a closed position to prevent the cubes from passing into the interior of the conduit 334.

Referring now in detail to the dispensing head assembly 302, as best seen in FIG. 11, said assembly is shown as comprising a generally parallelepiped-shaped housing 352 which includes a forward or front side 354, a rearward or backside 356, a bottom side 358, top 360 and lateral sides 362. Extending downwardly from the lower side of the housing 352 is a generally vertically disposed enclosure 360 adapted to enclose the upper end of the conduit 334, the upper end of which extends through a suitable opening 366 formed in the bottom side 358. Disposed within the enclosure 364 is a generally vertically disposed air return line or conduit 368, the upper end of which is communicable with the interior of the housing 352 and the lower end of which is adapted to terminate somewhere above the level of the ice cubes disposed above the tray 308 and agitator disc 312. The bottom side 358 is formed with a suitable opening 370 which is communicable with a drain line 372 that extends downwardly within the enclosure 364, with the lower end of the line 372 being communicable with a suitable drain, as is commonly provided on ice dispensing machines. The forward side of the enclosure 364 has an actuating switch 374 mounted on the interior side thereof, which switch 374 is provided with a manually engageable actuator button or the like 376 that projects outwardly from the enclosure and is adapted to be selectively actuated to effect energization of the dispenser 300, in a manner hereinafter to be described.

The upper end of the conduit 334 is communicable through a suitable coupling member 378 with a generally inverted U-shaped passage 380, the upper side of which is defined by a generally semicircular screen or similar imperforate member 382. The lower side of the passage 380 is defined by a generally semicircular baffle or the like 384. The discharge end of the passage 380 is communicable with an ice tray discharge spout 386 provided on the forward or front side 354 of the housing 352. Means for selectively controlling the flow of ice cubes from within the passage 380 to the spout 386 is provided by a pivotally mounted closure member 388 which is similar in construction to the aforedescribed member 222. In particular, the closure member 388 comprises a generally arcuate-shaped closure section 390 and a pair of generally wedged or pie-shaped end sections 392, the latter of which are pivotally mounted within the housing 352 by means of a suitable pivot pin or hinge arrangement, as indicated at 394 in FIG. 11. A generally horizontally extending, elongated actuating member or rod 396 projects outwardly from the forward side 354 and is pivotally connected at its inner end to the closure chamber 388 as illustrated at 398. It will be seen that when the member 396 is biased inwardly or toward the right in FIG. 11, the closure member 388 will be pivoted from the solid line position to the phantom line position in this figure, whereby to provide for communication between the passage 380 and spout 386. Similarly, when the member 396 is disposed in the position shown in FIG. 11, the closure member 388 effects closing of the discharge end of the passage 380. A helical coil spring 400 is mounted circumjacent the member 396 and is adapted to resiliently maintain the closure member 388 in the solid line position shown in FIG. 11. As will be apparent, when the member 396 and closure member 388 are biased inwardly to open the passage 388, the spring 400 will function to resiliently urge said members back toward the solid line position of FIG. 11.

Disposed below and between the baffle 384 and the closure member 388 is a safety switch, generally designated 402. The switch 402 comprises an actuating plunger 404 which is adapted to be actuated upon pivotably downwardly movement of an actuating plate 406 that is hingedly mounted at the upper end thereof, as seen at 408 in FIG. 11. The switch 402 is adapted to be connected in the electrical circuit of the dispenser 300 in a manner such that when the plate 406 is

biased from the solid line position in FIG. 11 to the phantom line position, the switch 402 will effect deenergization of the dispenser 300, as will later be described. A suitable return spring 410 is provided on the plunger 404 to resiliently maintain the actuating plate 406 in the solid line position shown in FIG. 11.

Referring now to the circuit incorporated in the ice dispenser 300 of the present invention, as best seen in FIG. 13, said system comprises a pair of primary conductors 412 and 414 which are adapted to be connected to a suitable source of electrical energy such as, for example, a source of 115 volt current. The air motor or blower 342 is communicable with the conductor 412 through a conductor 416 and to a master relay assembly 418 through a conductor 420. The master relay 418 is in turn connected through conductor 422 with conductor 414 and comprises a movable armature 424 and relay coil 426. The electrical system further comprises a dispensing timer 428 which includes a timer motor 430 and armature 432. The relay coil 426 is communicable through conductor 434 with the conductor 412 and through a conductor 436 with the terminal 438 of the armature 432.

The actuating switch 374 is communicable through conductor 550 with the conductor 414 and comprises armature 442 which is movable between a normally closed terminal 444 and a normally open terminal 446. The terminal 446 is connected through conductor 448 with the armature 450 of the safety switch 402, the armature 450 normally being in a closed condition with a terminal 452 which is connected through conductor 454 with the armature 432.

The terminal 444 of the actuating switch 374 is connected through conductor 456 with the armature 458 of an agitation timer mechanism, generally designated 460. The mechanism 460 comprises a timer motor 462 which controls actuation of the armature 458 between an open and closed condition with respect to a terminal 464 which is connected through a conductor 466 with a terminal 468. The electrical system further comprises a reversing switch assembly 470 which includes a relay coil 472 that is connected through conductor 474 with conductor 412, and through conductor 476 with the terminal 464. The assembly 470 comprises a pair of reversing armatures 478 and 480, the former of which is connected through conductor 482 to a conductor 484 that communicates conductor 412 with one end of the drive motor field winding 486. The armature 480 is connected through conductor 488 with the opposite end of the field winding 486. The armature 478 is movable between terminals 490 and 492, while the armature 480 is movable between terminals 494 and 496. The terminal 490 is connected through conductor 498 with one end of the armature winding 500 of the drive motor 316. The opposite end of the winding 500 is connected through conductor 502 with terminal 494, the conductor 502 also being connected to terminal 492 through conductor 504. The terminal 496 is connected through conductor 506 with the aforementioned conductor 498. The conductor 420 is connected through a conductor 508 with a switch terminal 510 that is normally in contact with a switch armature 512 that controls the flow of current to the reversing switch assembly 470. The armature 512 is selectively movable to engage the terminal 468, as will later be described, and is connected through conductor 514 with conductor 488.

In the preferred construction of the ice dispenser 300 the control circuit thereof is provided with a sensing switch comprising an armature 516 and terminal 518. The terminal 518 is connected through conductor 520 with the primary conductor 414, while the armature 516 is connected through conductor 522 with an indicating light or the like 524. The light 524 is in turn connected through conductor 526 with the primary conductor 412.

In order to correlate the various operational components of the ice dispenser 300 of the present invention, as well as to facilitate understanding the operation of the above described electric control system thereof, a description of an exemplary operational cycle thereof will now be given.

In general, energization of the ice dispenser 300 is achieved by actuation of the switch 374 which causes the air motor 342 to be energized, as well as the drive motor 316. During a normal dispensing cycle, the drive motor 316 is adapted to cause counterclockwise movement of the agitator disc 312 in FIG. 10. The timer 428 is designed to control the current flow to the air motor 342 and drive motor 316 so as to control the time for each vend cycle. Preferably, the timer 428 is adjustable and may, for example, control the length of a vend cycle anywhere from one to five seconds, at which time the circuit to the drive motor 316 and air motor 342 is opened, regardless of whether the switch 374 remains actuated. The agitation timer 460 is adapted to effect periodic energization of the drive motor 316 in a clockwise direction in FIG. 10, with the timer 460 being adapted, for example, to energize the drive motor 31 for approximately 5 seconds every 15 minutes, whereby to assure against bridging or similar adherence between the ice cubes disposed upon the tray 308 and agitator disc 312.

Referring now in detail to the operation of the electrical circuit shown in FIG. 13, assuming the condition that the circuit is in the condition shown in FIG. 13, during normal vend cycle, the armature 442 is biased into contact with the terminal 446 upon suitable actuation of the plunger 376, whereby a circuit is completed from the conductor 414 to the conductor 448. The armature 450 of the safety switch 402 is normally engaged with the terminal 452, whereby the circuit is closed from the conductor 448 to the armature 432 and timer motor 430, thereby permitting energization of the motor 430. Upon energization of the motor 430, the armature 432 will contact terminal 438, thereby completing a circuit to the master relay coil 426, with the result that the master switch armature 424 will be moved from terminal 528 to terminal 530. When this occurs, the circuit will be completed to the air motor 342 through conductor 420 and to the drive motor 316 through conductor 508, armature 512, conductor 488, armature 480 and conductor 502, resulting in energization of the air and drive motors. Upon energization of the motors 316, 342, the agitator disc 312 will rotate in the direction of the arrow 326 in FIG. 10, and a high velocity flow of air will be forced from the motor 342 upwardly through the conduit 334. Accordingly, ice cubes will be moved toward and through the opening 346 into the interior of the conduit 334, at which time the cubes will be forced upwardly by the aforesaid flow of air into the interior of the housing 352. As the cubes enter the housing 352, they are impinged against the lower side of the screen 382, whereby the cubes are deflected downwardly into the closure member 388, which may be opened in the manner above-described by suitable actuation of member 396. Any water that may accumulate on the surface of the cubes will continue upwardly through the interstices in the screen 382 and will thereafter accumulate on the top of the side 358 and eventually be communicated to a suitable drain through the conduit 372. The air which is forced upwardly through the conduit 334 will be communicated to the return line 368 and downwardly therethrough into the ice bin and will eventually seek its way through the cubes stored therein to the ice cube opening 346 in the conduit 334 for purposes of recirculation.

At such time as the timer motor 430 times out, for example, after 1 to 5 seconds after the vend cycle is initiated, the armature 432 will be moved out of engagement with the terminal 438, thereby effecting deenergization of the relay coil 426 and movement of the armature 424 from the terminal 530 to the terminal 528. This in turn opens the circuit to the air motor 432 and drive motor 316 to effect deenergization thereof and termination of the vend cycle.

During periods of nondispensing, the armature 442 of the actuating switch 374 is engaged with terminal 444. At such time as an agitation cycle occurs, for example, every 15 minutes, the timer motor 462 will cause actuation of the armature 458, thereby moving the same into engagement with terminal 464. This results in completion of a circuit from conductor 414 to the reversing switch relay coil 472 which in turn

causes the armatures 478, 480 and 512 to move into engagement with terminals 492, 496 and 468. According, an electrical circuit will be completed from the terminal 464 through conductor 466, armature 512, conductor 488, armature 480, conductor 506 and conductor 488 with the armature winding 500 of the drive motor 316 in order to effect energization of said drive motor 316 in a reverse direction, i.e., in the direction of the arrow 328 in FIG. 10. The motor 316 will remain energized during the agitation cycle until the timer motor 462 times out, i.e., after approximately 5 seconds, at which time the armature 458 will move out of engagement with the terminal 464 to open the circuit to the reversing relay coil 472 and drive motor 316, thereby terminating the agitation cycle.

As previously mentioned, the safety switch armature 450 is normally engaged with the terminal 452; however, at such time as too many cubes accumulate with passage 380, or when an ice vend is attempted without removing cubes from within the passage 380, the plate 406 will be biased downwardly to the phantom line position in FIG. 11, thereby actuating the plunger 404 which in turn causes the armature 540 to open. The switch 402 will remain open to prevent subsequent energization of the drive motor 316 and air motor 342 until such time as the ice cubes in the passage 380 are removed, at which time the spring 410 will bias the plate 406 to the solid line position shown in FIG. 11 and permit the armature 450 to move into engagement with the terminal 452 to complete or close the normal vend circuit. Thus, the switch 402 acts as a safety feature to eliminate overfeeding the dispensing assembly 302.

The armature 516 is adapted to be controlled by any suitable means within the ice bin to open and close a circuit between the conductor 414 and the indicator lamp 524 in a manner such that as the level of ice within the bin drops below some predetermined amount, the electric circuit to the lamp 424 will be either opened or closed, thereby providing for a visual warning that the ice level in the bin has diminished sufficiently to warrant cessation of the ice cube vending until the cube supply is replenished. It will be apparent, of course, that various alternate means may be provided for indicating to the dispenser operator that the cube supply is such that a vend cycle should not be initiated until such time as additional cubes have been supplied to the bin.

It will be seen from the foregoing that the ice dispenser 300, like the aforedescribed dispenser 10, will find varied application due to its simplicity of design and operation, as previously described. Also, it will be noted that the principles of the present invention embodiment in the dispenser 300 are not intended to be limited solely to dispensing ice cubes, but instead may be used for dispensing various other types of discrete articles, as well as other types of ice besides ice cubes, such as shaved or chipped ice. Also, it will be apparent that the length of the conduit 334 may be considerably greater than that illustrated herein so that cubes may be conveyed over a relatively long distance from the assembly 306 to the assembly 302. Moreover, it will be noted that the conduit 334 may be of a relatively flexible construction to permit movement of the dispensing assembly 302 relative to the ice feeder assembly 306, as previously mentioned.

While it will be apparent that exemplary embodiment illustrated herein is well calculated to fulfill the objects above stated, it will be appreciated that the present invention is susceptible to modification, variation and change without departing from the proper scope or fair meaning of the subjoined claims.

I claim:

1. In an apparatus for handling discrete articles:
means defining an article storage compartment adapted to contain a mass of discrete articles,
means defining an article discharge compartment,
means defining an article conveying passage extending between said compartments;
means selectively opening and closing said passage adjacent said discharge compartment,
means including a relatively rotatable agitating element disposed adjacent the lower end of said storage compartment and having means projecting upwardly therefrom into said mass of articles for transferring articles toward the lower end of said conveying passage upon rotation of said element; and
means providing a flow of conveying fluid through said passage of sufficient magnitude to transfer articles from said storage compartment to said discharge compartment.

2. The invention as set forth in claim 1 wherein said means for providing a flow of conveying fluid through said passage comprises blower means for introducing a flow of air through said passage.

3. The invention as set forth in claim 2 wherein said means for providing a flow of air through said passage comprises an air motor and conduit means communicating a flow of air from said motor to said passage.

4. The invention as set forth in claim 2 which includes means for recirculating at least a portion of the air conveyed through said passage back to said blower means.

5. The invention as set forth in claim 1 wherein said agitator element comprises a rotatable disc disposed generally coplanar the lower end of said storage compartment.

6. The invention as set forth in claim 1 wherein said agitating element is operatively connected to said passage defining means and is thereby movable in response to preselected movement of said passage defining means.

7. The invention as set forth in claim 1 which includes drive motor means disposed below said element for rotating the same.

8. The invention as set forth in claim 1 wherein said means for transferring articles from the mass to said conveying passage comprises an agitator disc rotatable about an axis extending generally parallel to said passage.

9. The invention as set forth in claim 8 wherein said passage defining means comprises a substantially vertically extending conduit having said agitator disc fixedly secured to the lower end thereof, and which includes means for selectively rotating said conduit, whereby articles disposed adjacent said disc will move toward said conduit.

10. The invention as set forth in claim 1 which includes nozzle means disposed adjacent the lower end of said passage for introducing said flow of conveying fluid into said passage.

11. The invention as set forth in claim 9 wherein said agitator disc is tapered downwardly toward the central portion thereof, and wherein the lower end of said conduit has an access opening formed therein, whereby rotation of said conduit and said disc will result in articles moving inwardly and downwardly toward said access opening.

12. The invention as set forth in claim 11 which includes nozzle means fixedly mounted below a central portion of said agitator disc and adapted to introduce said flow of conveying fluid into the lower end of said conduit, whereby articles disposed adjacent said access opening will be drawn into said conduit through said access opening and thereafter will be forced upwardly through said conduit by said flow of conveying fluid.

13. The invention as set forth in claim 1 which comprises a support structure disposed within said storage compartment, wherein said means for transferring articles from said mass to said conveying passage comprises an agitator disc rotatably mounted on said structure, wherein said passage defining means comprises a substantially vertically extending conduit, said conduit having an access opening formed in the lower end thereof adjacent the upper surface of said disc, which includes means for introducing said flow of conveying fluid into the lower end of said conduit, and which includes motor means for selectively rotating said agitator disc and for communicating the conveying fluid to said conduit.

14. In an apparatus for handling discrete articles:
means defining an article storage compartment adapted to contain a mass of discrete articles;
a support structure disposed within said storage compartment;

a relatively rotatable agitator disc mounted on said structure;

means defining an article discharge compartment remotely located from said storage compartment;

means defining an article conveying passage extending from said storage compartment to said discharge compartment;

means providing an access opening at one end of said passage defining means and adjacent the upper surface of said agitator disc; and

means for introducing a flow of conveying fluid into the lower end of said passage defining means including motor means providing a flow of conveying fluid through said passage defining means of sufficient magnitude to transfer articles introduced through said access opening to said discharge compartment.

15. The invention as set forth in claim 14 wherein said agitator disc is inclined relative to said conduit.

16. The invention as set forth in claim 14 wherein said motor means is disposed at least in part below the bottom of said storage compartment.

17. The invention as set forth in claim 14 which includes first and second motor means and wherein at least one of said motor means is disposed below said disc.

18. An invention as set forth in claim 14 which includes means for selectively opening and closing said access opening for controlling the transfer of articles from said mass to the interior of said conduit.

19. The invention as set forth in claim 18 wherein said means for opening and closing said access opening comprises door means movable in response to the movement of articles within said storage compartment.

20. The invention as set forth in claim 14 wherein the upper surface of said agitator disc includes lug means projecting upwardly into said mass of articles for agitating the articles upon rotation of said disc.

21. The invention as set forth in claim 14 which includes means on said support structure and extending adjacent said agitator disc for preventing the entire mass from rotating upon rotation of said disc.

22. The invention as set forth in claim 14 which includes antijamming means for preventing articles from jamming in said access opening upon rotation of said conduit and said disc.

23. The invention as set forth in claim 22 wherein said antijamming means comprises an antijamming pin extending upwardly within the lower end of said conduit and adapted to selectively register with said access opening upon rotation of said conduit.

24. The invention as set forth in claim 14 which includes timing means for selectively energizing said motor means at periodic intervals to prevent adherence of the articles in the mass.

25. The invention as set forth in claim 14 which includes an article dispensing assembly communicable with said conduit, said assembly comprising closure means selectively closing a discharge opening, and means for selectively actuating said motor means.

26. The invention as set forth in claim 25 which includes movably mounted spout means, and switch means actuable in response to movement of said spout means for energizing said motor means.

27. The invention as set forth in claim 25 which includes means for recirculating the conveying fluid used for conveying the articles to the dispensing assembly back to said second motor means.

28. The invention as set forth in claim 25 which includes means responsive to the volume of articles within said assembly for deenergizing said motor means.

29. The invention as set forth in claim 28 which includes safety means actuatable by a preselected volume of articles within said dispensing assembly for opening an electrical circuit to said motor means and thereby deenergizing said motor means when the quantity of articles within said dispensing assembly exceeds a predetermined amount.

30. In an apparatus for conveying ice cubes:

means defining an ice cube storage compartment adapted to contain a mass of ice cubes;

means defining an ice cube dispensing compartment;

means defining an ice cube conveying passage extending from a position adjacent the lower end of said mass of cubes to a position above said storage compartment and communicating said compartments; and

means providing a flow of air through said passage of sufficient magnitude to transfer ice cubes from said storage compartment to said dispensing compartment.

31. The invention as set forth in claim 30 which includes a rotatable element for transferring ice cubes from said mass toward said conveying passage, and which further includes an air motor for supplying said flow of air to said passage.

32. The invention as set forth in claim 31 wherein said means for transferring ice cubes from the mass comprises an agitator disc disposed adjacent the mass, and which includes means for selectively rotating said disc, whereby ice cubes will move from said mass toward said conveying passage.

33. The invention as set forth in claim 30 which includes a support structure disposed within said storage compartment, wherein said means for transferring ice cubes from said mass comprises an agitator disc rotatably mounted on said structure, wherein said passage defining means comprises a substantially vertically extending conduit disposed adjacent said agitator disc, said conduit having an access opening formed in the lower end thereof adjacent the upper surface of said disc, which includes means for introducing a flow of air into the lower end of said conduit, which includes first motor means for selectively rotating said agitator disc, whereby ice cubes disposed above said disc will move toward said access opening, and which includes second motor means for forcing air through said nozzle means.

34. The invention as set forth in claim 33 wherein said dispensing compartment includes closure means selectively closing a discharge opening and means controlling operation of said motor means in response to preselected movement of said closure means.

35. The invention as set forth in claim 30 which includes means within said dispensing compartment for removing moisture from said ice cubes before they are dispensed through said discharge opening, said means comprising imperforate baffle means against which the ice cubes are impinged prior to being dispensed.

36. The invention as set forth in claim 33 which includes means for selectively deenergizing said first and second motor means.

37. The invention as set forth in claim 33 which includes timer means for selectively energizing said first motor means to periodically rotate said agitator disc and thereby prevent adherence of the ice cubes within said storage compartment.

38. The invention as set forth in claim 37 which includes means for reversing the direction of said first motor means, whereby said agitator disc is rotated in one direction in order to agitate ice cubes within said storage compartment and is rotated in the opposite direction during an ice vend cycle.

39. The invention as set forth in claim 30 which includes a support structure disposed within said storage compartment, wherein said means for transferring ice cubes from said mass comprises an agitator disc rotatably mounted on said structure, said disc being inclined toward the lower end of said passage defining means, wherein said passage defining means comprises a generally vertically extending conduit, the lower end of which is disposed adjacent said agitator disc, said conduit having an access opening formed therein adjacent the upper surface of said disc, which includes door means movable to and from a position opening and closing said access opening in response to the direction of movement of said agitator disc, which includes first motor means for introducing a flow of air through said conduit, which includes a second motor means disposed below said disc for rotating said disc, which includes control means for energizing said first and second motor means, said control means being operable to rotate said disc in different directions, which includes

manually engageable actuator means for actuating said control means, and which includes safety switch means for effecting deenergization of said first and second motor means in response to an excess quantity of ice cubes disposed within said dispensing assembly.

40. The invention as set forth in claim 33 which includes cooperable worm and worm gear means drivingly connecting said first motor means with said conduit, whereby energization of said first motor means will result in rotation of said conduit means and said agitator disc.

41. In the method of transferring discrete articles from an article storage compartment containing a mass of articles through an article transfer passage to an article discharge compartment, the steps which include, selectively conveying articles from the mass toward the passage, conveying the articles through the passage by communicating a conveying fluid through the passage at a flow rate of sufficient magnitude to transfer the articles from the storage compartment to the discharge compartment, and recirculating at least a portion of the conveying fluid back toward the source thereof so that at least part of said fluid may be reused.

42. The method as set forth in claim 41 which includes the step of conveying the articles from the storage compartment to the discharge compartment by introducing a flow of air into said conveying passage.

43. The method as set forth in claim 41 which includes the step of agitating the articles adjacent the conveying passage, whereby said articles will move toward said passage.

44. The method as set forth in claim 43 which includes the step of rotating an agitator disc disposed below a portion of the mass of articles in response to preselected movement of the conveying passage.

45. The invention as set forth in claim 1 wherein said means for providing a flow of conveying fluid through said passage is actuatable in response to preselected movement of said means opening and closing said passage.

46. In an ice cube dispensing machine:
- means defining an ice cube storage compartment adapted to contain a mass of ice cubes;
- means defining an ice cube dispensing compartment;
- means defining an ice cube conveying passage extending through a portion of said mass of cubes and communicating said compartments;
- means including a rotatable transfer element disposed below said mass of cubes for moving ice cubes disposed at the lower end of said mass thereof toward said passage defining means; and
- a source of conveying fluid communicable with the lower end of said passage defining means and being of sufficient magnitude to transfer ice cubes from said storage compartment to said dispensing compartment.

47. In an ice cube dispensing machine:
- means defining an ice cube storage compartment adapted to contain a mass of ice cubes;
- means defining an ice cube dispensing compartment;
- means defining an ice cube conveying passage communicating said compartments; and
- means providing a conveying circuit, including means for recirculating conveying fluid, whereby said fluid may be initially communicated from a source thereof through said passage defining means, in order to transfer ice cubes from said storage compartment to said dispensing compartment, and at least a portion of said conveying fluid may be communicated back to said source thereof for reuse in transferring additional ice cubes through said passage defining means.

48. In an ice cube dispensing machine:
- means defining an ice cube storage compartment adapted to contain a mass of ice cubes;
- means defining an ice cube dispensing compartment;
- means defining an ice cube conveying passage communicating said compartments;
- a source of forced air for transferring ice cubes from said storage compartment to said dispensing compartment; and
- means for communicating at least a portion of the forced air communicated through said passage defining means back to said source thereof, whereby at least a portion of said air may be recirculated for reuse.

49. In an ice cube dispensing machine:
- means defining an ice cube storage compartment adapted to contain a mass of ice cubes;
- means defining an ice cube dispensing compartment disposed above said storage compartment;
- means defining an ice cube conveying passage extending between and communicating said compartments;
- means for selectively closing said passage defining means;
- first power actuated means for proving a flow of conveying fluid through said passage defining means; and
- control means movable within said dispensing compartment for controlling operation of said first power actuated means.

50. The invention as set forth in claim 49 which includes second power actuated means for effecting transfer of ice cubes toward said passage defining means.

51. The invention as set forth in claim 50 which includes first and second switch means for energizing and deenergizing said first and second power actuated means in response to preselected movement of said means closing said passage defining means.

52. The invention as set forth in claim 51 which includes means for sequentially actuating said first second switch means.

53. In an apparatus for conveying discrete articles:
- means defining an article storage compartment adapted to contain a mass of discrete articles;
- means defining an article discharge compartment;
- means defining an article conveying passage between said compartments;
- means including first power operated means for providing a flow of conveying fluid through said passage;
- means including second power operated means for moving articles within said storage compartment; and
- control means responsive to the delivery of articles to said discharge compartment for controlling operation of at least one of said power operated means.

54. In an apparatus for conveying discrete articles:
- means defining an article storage compartment adapted to contain a mass of discrete articles;
- means defining an article discharge compartment;
- means defining an article conveying passage between said compartments;
- means including first power operated means for providing a flow of conveying fluid through said passage;
- means including second power operated means for moving articles within said storage compartment;
- control means responsive to the delivery of articles to said discharge compartment for controlling operation of at least one of said power operated means; and
- said control means being adapted to simultaneously energize said first power operated means and said second power operated means in a first mode of operation and energize only said second power operated means in a second mode of operation.

55. An apparatus as defined in claim 54 wherein the first mode of operation of said second power operated means moves articles within said storage compartment in one direction and wherein the second mode of operation of said second power operated means moves the articles within said storage compartment in another direction.

56. An apparatus as defined in claim 54 which includes timer means for periodically energizing said second power operated means in said second mode of operation.

57. An apparatus as defined in claim 54 which includes manually engageable means for selectively energizing said first

power operated means and said second power operated means in said first mode of operation.

58. An apparatus as defined in claim 57 which includes timer means for controlling the period of energization of said first power operated means and said second power operated means in said first mode of operation irrespective of actuation of said manually engageable means.

59. An apparatus as defined in claim 57 which includes safety switch means for preventing energization of said first and second power operated means regardless of actuation of said manually engageable means.

60. An apparatus as defined in claim 53 which includes signal means responsive to the quantity of articles within said article storage compartment.

61. An apparatus as defined in claim 53 wherein said first and second power operated means comprises first and second motors, and wherein said second motor is reversible.

62. An apparatus as defined in claim 61 which includes a reversing circuit for selectively reversing said second motor.

63. An apparatus as defined in claim 62 which includes timer means for automatically energizing said reversing circuit and thereby effecting energization of said second motor in a reverse direction.

64. An apparatus as defined in claim 62 which includes manually engageable means and circuit means energizable in response to actuation of said manually engageable means to effect energization of said first motor and simultaneous energization of said second motor in a forward direction.

65. An apparatus as defined in claim 64 which includes timer means for deenergizing said first and second motors regardless of actuation of said manually engageable means.

66. The invention as set forth in claim 1 wherein said means for transferring articles from the mass to said conveying passage comprises an agitator element rotatable about an axis inclined slightly from the longitudinal axis of said conveying passage.

67. The invention as set forth in claim 33 wherein said dispensing compartment includes closure means selectively closing said discharge opening and means responsive to the volume of ice cubes within said dispensing compartment for at least in part controlling operation of said motor means.

68. The method as set forth in claim 41 wherein the transfer passage includes closure means, of the steps of conveying articles in a first direction for opening said closure means to permit transfer of articles into the interior of said passage, and conveying said articles in another direction to close said closure means and thereby prevent the further transfer of said articles into the interior of said passage.

69. An ice cube dispensing machine as set forth in claim 49 wherein said control means includes said means for selectively closing said passage defining means.

70. An ice cube dispensing machine as set forth in claim 49 wherein said control means comprises switch means responsive to a preselected volume of ice cubes within said dispensing compartment for controlling operation of said first power actuated means.

71. In an apparatus for conveying discrete articles:
- means defining an article storage compartment adapted to contain a mass of discrete articles;
- means defining an article discharge compartment;
- means defining an article conveying passage between said compartments;
- means including first power operated means for providing a flow of conveying fluid through said passage;
- means including second power operated means for moving articles within said storage compartment;
- control means responsive to the delivery of articles to said discharge compartment for controlling operation of at least one of said power operated means; and
- said control means being adapted to simultaneously energize said first and second power operated means and energize only one of said power operated means.

72. In an apparatus for conveying discrete articles:
- means defining an article storage compartment adapted to contain a mass of discrete articles;
- means defining an article discharge compartment;
- means defining an article conveying passage between said compartments;
- means including first power operated means for providing a flow of conveying fluid through said passage;
- means including second power operated means for moving articles within said storage compartment;
- control means responsive to the delivery of articles to said discharge compartment for controlling operation of at least one of said power operated means; and
- timer means for periodically energizing one of said power operated means.

73. In an ice cube dispensing machine:
- means defining an ice storage compartment adapted to contain a mass of ice cubes;
- means defining an ice cube dispensing compartment located remote from said storage compartment;
- means defining an ice cube conveying passage extending between said compartments;
- means for providing a flow of forced air through said passage defining means, whereby ice cubes will be transferred from said storage compartment to said dispensing compartment; and
- means for removing any water which may accumulate on said ice cubes during transfer thereof to said dispensing compartment preparatory to said ice cubes being discharged from said dispensing compartment.

74. In an apparatus for dispensing discrete articles:
- means defining an article storage compartment adapted to contain a mass of discrete articles;
- means defining an article discharge compartment;
- means defining an article conveying passage extending between said compartments;
- said storage compartment comprising in part a generally flat article supporting surface inclined toward said conveying passage; and
- a transfer element movable relative to said surface and arranged generally coplanar therewith for transferring articles from said mass thereof toward said conveying passage.

75. In an apparatus for dispensing discrete articles:
- means defining an article storage compartment adapted to contain a mass of discrete articles;
- means defining an article discharge compartment;
- means defining an article conveying passage extending between said compartments;
- means providing an access opening for communicating articles from said storage compartment to the interior of said passage;
- closure means movable between positions opening and closing said access opening; and
- a transfer element movably disposed within said storage compartment for moving articles toward said access opening and for controlling opening and closing movement of said closure means.

76. In an ice cube dispensing machine:
- means defining an ice storage compartment adapted to contain a mass of ice cubes;
- means defining an ice cube dispensing compartment located remote from said storage compartment;
- means defining an ice cube conveying passage extending between said compartments;
- means for providing a flow of forced air through said passage defining means, whereby ice cubes will be transferred from said storage compartment to said dispensing compartment; and
- means for recirculating forced air from said dispensing compartment back through said mass of ice cubes toward the inlet end of said passage defining means, whereby said forced air may be at least in part reused for transferring ice cubes from said storage compartment to said dispensing compartment.

77. In an apparatus for dispensing discrete articles through a receptacle:
means defining an article storage compartment adapted to contain a mass of discrete articles;
means defining an article discharge compartment;
means defining an article conveying passage communicating said compartments;
power operated means for providing a flow of conveying fluid through said passage; and
control means for controlling operation of said power operated means including switch means engageable by said receptacle for initiating operation of said power operated means and timer means for terminating operation of said power operated means after a preselected time interval.

78. In an apparatus for dispensing discrete articles:
means defining an article storage compartment adapted to contain a mass of discrete articles;
means defining an article discharge compartment located remote from said storage compartment;
means defining an article conveying passage communicating said compartments;
means providing a flow of conveying fluid through said passage for transferring articles from said storage compartment to said discharge compartment;
a relatively movable transfer element disposed within said transfer compartment; and
said transfer element being movable in one direction for transferring articles toward said conveying passage and being movable in another direction for agitating articles within said compartment to prevent adherence thereof to one another.

79. The invention as set forth in claim 78 which includes timer means for actuating said transfer element to move in said direction agitating said articles at predetermined time intervals.

80. The invention as set forth in claim 78 which includes timer means for controlling the length of time said transfer element moves in said direction transferring said articles toward said conveying passage.

81. The method as set forth in claim 41 which includes the step of initiating the transfer of discrete articles from said article storage compartment to said discharge compartment by engaging a receptacle into which the articles are to be discharged with a control switch.

82. The method as set forth in claim 41 which includes the step of terminating the transfer of discrete articles from said storage compartment to said discharge compartment by sensing the quantity of articles previously transferred to said discharge compartment.

83. The method as set forth in claim 41 wherein the discharge compartment is provided with a dispensing spout and which includes power operated means for supplying the conveying fluid through said passage, of the step of deenergizing said power means in response to preselected movement of said discharge spout.

84. The method as set forth in claim 41 which includes the step of agitating the mass of articles within said storage compartment at predetermined timed intervals in order to prevent adherence of the articles to one another.

85. The method as set forth in claim 41 wherein the storage compartment is provided with a transfer element for transferring articles through said conveying passage, the steps of moving said element in one direction to transfer the articles within the storage compartment toward the passage and moving the transfer element in another direction to agitate the articles within the storage compartment.

86. The method as set forth in claim 41 wherein the passage includes an access opening and door means movable between positions opening and closing the access opening, of the steps of moving the articles within the storage compartment in a preselected manner such that said articles engage said closure means to open the same and permit the transfer of articles from said storage compartment into said passage.

87. The method as set forth in claim 41 wherein the passage includes an access opening and door means movable between positions opening and closing the access opening, of the steps of moving the articles within the storage compartment in a preselected manner such that said articles engage said closure means to close the same and prevent the transfer of articles from said storage compartment into said passage.

88. In an ice cube dispensing machine:
means defining an ice cube storage compartment adapted to contain a mass of ice cubes;
means defining an ice cube dispensing compartment;
means defining an ice cube conveying passage extending between and communicating said compartments;
power operated means providing a source of conveying fluid adapted to flow through said passage defining means at a sufficiently high flow rate to transfer ice cubes from said storage compartment to said dispensing compartment;
first actuatable means for energizing said power operated means; and
second actuatable means for deenergizing said power operated means regardless of whether or not said first actuated means is actuated.

89. The invention as set forth in claim 88 wherein said second actuatable means includes means for maintaining said power operated means in a deenergized condition in response to a predetermined quantity of ice cubes being transferred from said storage compartment to said discharge compartment.

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,580,416 Dated May 25, 1971

Inventor(s) Walter H. Hoenisch

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 2, line 71, Insert --the--before "storage".

Column 3, line 5 Insert --the--after "with".

Column 3, line 6 "20-20" should be --20-30--.

Column 4, line 68 "96" should be --86--.

Column 6, line 17 "1178" should be --178--.

Column 6, line 25 "tube" should be --tube 62--.

Column 7, line 17 "wherein" should be --spout--.

Column 7, line 6 After Fig. insert --5--.

Column 10, line 72 "hat" should be --that--.

Column 12, line 29 After "sure" insert --364--.

Column 12, line 52 "chamber" should be --member--.

Column 13, line 7 Insert --electrical-- before "circuit".

Column 13, line 24 "550" should be --440--.

FORM PO-1050 (10-69)

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CERTIFICATE OF CORRECTION - Page 2

Patent No. 3,580,416 Dated May 25, 1971

Inventor(s) Walter H. Hoenisch

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 14, line 16 "31" should be --316--.

Column 15, line 17 "with" should be --within--.

Column 15, line 21 "540" should be --450--.

Column 18, line 7, Claim 13 After "compartments" insert --transfer means adjacent the lower end of said storage compartment for moving ice cubes in said storage compartment toward said passage, and--

Signed and sealed this 14th day of March 1972.

(SEAL)
Attest:

EDWARD M.FLETCHER, JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents

FORM PO-1050 (10-69)

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