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(54) Title: ICE AND CHILLED WATER PRODUCING AND DISPENSING MACHINE

(57) Abstract: An ice producing and dispensing machine for delivering ice on demand to a consumer with a housing containing an ice maker having a discharge outlet for discharging ice. An ice bin is disposed below the ice maker having an open top for receiving ice from the ice maker and a bottom opening for discharging ice therefrom; a substantially vertical tube in communication with the bottom opening for receiving discharged ice with an auger or the like in the tube for driving the ice directly vertically in the tube; and a discharge opening in communication with the tube for conveying the ice to the discharge outlet either in a bag or as free ice cubes. An alternate embodiment provides water delivered in any amount, such as ounces or gallons, either ice-cold, flavored or unflavored, or at ambient temperature.

ICE AND CHILLED WATER PRODUCING AND DISPENSING MACHINE

CROSS REFERENCE TO RELATED APPLICATION

[0001] This utility application claims the benefit of and priority to U.S. provisional application entitled, "Ice and Chilled Water Producing and Dispensing Machine," having serial number 61/928,554, filed January 17, 2014, which is entirely incorporated herein by reference and is a continuation-in-part of U.S. application serial number 13/326,022, filed December 14, 2011.

BACKGROUND

[0002] The production, bagging and sale of ice is an extremely large enterprise throughout the world. At present, the vast majority of pre-bagged ice is produced in a factory, bagged, and shipped frozen to commercial or retail establishments. Whether the ice is produced off-site and shipped to a retail site or bagged on-site and stored in bagged form, the ice is frozen and it could be days or even weeks old before a customer purchases the bag of ice. This can lead to ice that is stale and which may be exposed to environmental elements that can impart an odor to the ice during transport or subsequent storage. Another problem with pre-bagged ice that is stored in a frozen state is that any melting of the ice along the way results in the ice refreezing into large chunks of ice that have to be reduced in size prior to use. Typically, ice that has refrozen into large chunks in the bag is dropped onto a floor or countertop to shatter the ice chunks or chopped up using an ice pick, hammer, and like tools.

[0003] On-site ice producing machines are in wide use in facilities such as hotels and food service establishments. Such devices are typically large, floor standing units that may be capable of producing hundreds of pounds of ice per day. Ice produced in this manner is either dispensed by using a scoop to retrieve the ice from a storage bin or dispensed into an ice

bucket or chest via a chute operated with push buttons on the front of the machine. This system requires that a container be provided, whether it be an ice bucket, ice chest, or plastic bag. Systems such as these can lead to potential contamination of the ice and/or water as human contact with the ice is increased with additional handling. Furthermore, there exist ice forms, such as pelletized ice, that are difficult or even impossible for known ice producing and bagging machines to be able to handle, due to factors such as the size of the pellets and their relatively fragile nature.

[0004] It is known to provide free standing ice bagging machines such as that shown in U.S. Patent Application Publication No. US 2004/0216481 A1 to James et al. This application discloses an ice bagging apparatus for automatically and continuously producing, bagging, and storing bags of ice. The device includes an ice maker, a hopper for receiving ice from the ice maker, a slider box for receiving ice from the hopper and for channeling the ice into a bag, a bagging mechanism, a freezer for storing the bagged ice, and a control panel for managing and monitoring the system. As the ice is produced and bagged, it is transferred to a freezer in the bottom portion of the machine where it is stored until withdrawn for use or sale. A similar device is shown by U.S. Patent Application Publication No. US 2007/0175235 A1 to Metzger, a co-inventor of the '481 application referenced above, the '235 application having many of the same features.

[0005] Other known devices include U.S. Patent No. 5,088,300 to Wessa which discloses a machine that produces ice, bags the ice, and stores the ice in a freezer where it is stored prior to use and/or sale. Additional examples of stand alone ice makers are shown by U.S. Patent No. 7,207,156 to Metzger; U.S. Patent No. 7,624,773 to Maxwell; and U.S. Patent No. 6,093,312 to Boulter.

[0006] Thus, while many solutions have been tried, there exists a need in the art for an ice production machine that is sanitary, energy efficient, and which solves some of the attendant problems found in prior art devices.

SUMMARY

[0007] Broadly stated, the present disclosure is concerned with a stand alone ice production apparatus which utilizes a commercially available ice maker which, in the disclosed embodiment, is capable of producing up to 2,000 pounds of ice per day. The ice is deposited by gravity into an insulated storage hopper having agitation means that periodically churn the stored ice to prevent bridging of the individual pieces. As the present device is meant to be used by consumers to purchase ice in small quantities, in bulk, or individual bags of ice, a vending function is supplied allowing the consumer to deposit bills, coins, credit cards, or other forms of payment into a payment accepting station. Upon payment, the apparatus delivers freshly produced ice to the consumer in any chosen amount, typically being dispensed in bags, into a small container such as a drinking cup, or into an ice chest or similar container holding between a few ounces or even less up to twenty-five pounds of ice or more.

[0008] When the customer inserts payment into the machine, the ice is conveyed from the storage bin through an auger/conveyor to the bag and measured by a level sensor to the quantity of ice that is desired to be purchased. The ice is typically deposited into a bag, which bag may be delivered either sealed or unsealed to the consumer, or the ice may be delivered into another container.

[0009] Water for the production of ice is introduced into a hermetically sealed capsule located within the apparatus. The capsule is located below the ice receiving hopper within an insulated but unrefrigerated holding bin. Inevitably with ice production, some melting of the ice occurs. In addition, ice will escape through a transition/hole in the bottom of the storage bin during operation of the machine. The cold water from the ice melting and any pieces of ice are directed to the storage bin which holds the fresh water capsule. This arrangement chills the water in the capsule prior to its delivery to the ice maker. Thus, instead of the ice maker

receiving water at whatever ambient temperature happens to exist, the ice maker is supplied with chilled water from the capsule by virtue of the capsule being chilled by the byproducts of ice production. This greatly reduces the energy required to produce the ice as the ice maker only has to lower the temperature of the ice a few degrees in order for it to freeze.

[0010] In some embodiments, the present apparatus may also include a cold water dispensing station. In a similar manner in which chilled water is distributed to the ice maker, chilled water is dispensed to a consumer in quantities ranging from a few ounces to a gallon or more.

[0011] Additional objects and advantages of the present apparatus will become apparent to those skilled in the art from the following detailed description, accompanying drawings, photographs and claims.

BRIEF DESCRIPTION OF THE FIGURES

[0012] Fig. 1 is a front elevational view, showing a stand alone ice production and bagging apparatus showing the payment station and the ice dispensing door;

[0013] Fig. 2 is a perspective view of the present apparatus with a water dispensing station added;

[0014] Fig. 3 is an isometric view shown partially in cross-section, showing the ice maker and storage bin and the associated motors;

[0015] Fig. 4 is a partial perspective view showing the electronic control box;

[0016] Fig. 5 is a partial front elevational view showing the modem used to communicate to and from the present apparatus;

[0017] Fig. 6 is a side elevational view shown partially in cross-section, illustrating the means for delivering the ice from the hopper to a vertical auger for moving the ice to the bagging station;

[0018] Fig. 7 is a partial perspective view showing the ice receiving hopper and bag storage station;

[0019] Fig. 8 is a partial top plan view looking down into the ice receiving hopper;

[0020] Fig. 9 is an enlarged partial cross-sectional view showing the vertical auger;

[0021] Fig. 10 is an enlarged partial cross-sectional view illustrating means for delivering the ice from the storage hopper to the auger;

[0022] Fig. 11 is an isometric view shown with portions of the machine cut away, showing an alternate embodiment with a chilled water storage system.

[0023] Fig. 12 is an isometric view, shown with portions of the machine cut away, showing an alternate version of an agitator for the ice storage bin;

[0024] Fig. 13 is a partial side elevational and cross-sectional view showing an embodiment of a sealing apparatus for bagged ice;

[0025] Fig. 14 is a front elevational view of a water dispensing machine;

[0026] Fig. 15 is a cross-sectional view, taken along line 15-15 of Figure 14;

[0027] Fig. 16 is a side elevational view of the water dispensing machine of Figure 14;

[0028] Fig. 17 is a cross-sectional view, taken along line 17-17 of Figure 16;

[0029] Fig. 18 is a front elevational view of the water dispensing machine, shown with a front cabinet door open;

[0030] Fig. 19 is a cross-sectional view, taken along line 19-19 of Figure 18;

[0031] Fig. 20 is flow chart showing the elements and operation of an embodiment of a water dispensing machine; and

[0032] Fig. 21 is flow chart showing the elements and operation of another embodiment of a water dispensing machine.

DETAILED DESCRIPTION

[0033] Referring more specifically to the drawings and to Fig. 1 in particular, numeral 20 designates generally a free standing ice production and bagging apparatus. The apparatus is meant to be placed virtually anywhere that has access to a water line and a power source whether electrical, solar, or other means for powering the apparatus. The apparatus is meant to be used by a consumer to purchase freshly bagged ice and, in some cases, chilled water that is ready for consumption. The apparatus includes a payment station 22 with means for accepting bills, coins, credit cards, and other forms of payment, as is known in the art. Once the ice is produced and bagged, it is delivered to the consumer through an ice delivery outlet 24, located near the bottom of the apparatus. The ice can also be dispensed through a chute or the like (not shown) into a cup, ice chest, etc. The description to follow is concentrated on ice being produced and bagged prior to delivery to the consumer; however, the device is capable of producing and dispensing ice into another type of container and the description should be considered to include this type of delivery.

[0034] Fig. 2 is a drawing of an embodiment of the present apparatus showing the payment station 22 and the ice delivery door 24. This embodiment also includes a water dispensing station 25, where a consumer can purchase chilled water in any of a number of different volumes, ranging from a few ounces to a gallon or more.

[0035] Referring to Figs. 3-10, numeral 26 designates a commercially available ice maker of known design. The ice maker is capable of producing up to 2,000 pounds of ice a day, given optimum conditions. The amount of ice produced is controlled by limit switches that sense the amount of ice that is stored in the apparatus ready for delivery, the limit switches being operable to either activate or turn off the ice maker, as production warrants. Ice produced in the ice maker 26 is deposited via gravity into an insulated ice storage bin 28. The storage bin is capable, in this embodiment, of holding approximately 1,000 pounds of ice.

[0036] Fig. 4 is a depiction of control means 27 that determine various factors and aspects of operation including, but not limited to, agitation of the ice cubes, timing of the various

functions, limits on production, analysis of the operation, etc. Fig. 5 shows a modem 29 by which the machine owner or operator can control the operation of the machine from virtually any location using a computer, smart phone, or like device, utilizing an internet connection. The control means 27 monitors all aspects of operation and through the modem, is able to alert the operator to power failures, water shut-downs, the number of bags of ice produced and dispensed, the number of bags remaining, revenue received, the state of the water dispenser, etc. Thus, the operator can easily schedule regular maintenance visits, revenue collection, and other tasks, by virtue of the control and communications systems.

[0037] The control system has an auto-agitation feature. This is tied into the actual icemaker green board. It causes the machine/ agitator to gain a personality based on past sales history. If it needs to agitate to fill the bin 28 faster, it will, if not, it shuts down and goes to the predetermined default setting. The benefit of this is that the machine will fill the bin 28 at the fastest possible rate without damaging the ice. In the past this has been a real issue that the owner/operator had to continuously monitor, so one didn't over agitate the ice, therefore causing mechanical damage or actually damaging the product to the point that it will not dispense. With this feature the owner/operator can literally walk away from the machine and it will manage its inventory by itself. The icemaker and the machine literally become one.

[0038] Located in the ice storage bin 28 is an agitator shaft 30, from which project multiple tines 32. The agitator shaft 30 is rotated using a motor 34, which may be coupled to the shaft using a direct drive, chain and sprocket drive, or the like. Periodic agitation of the ice contained in the storage bin 28 is effected to keep the ice in a fluid state and to maintain the ice in a level orientation with respect to the storage bin. Maintaining the ice at a level orientation ensures that the storage bin 28 is maintained in a substantially full capacity, which in turn, provides several advantages that will be discussed hereinbelow. When a consumer inserts payment into the payment acceptor on the front of the present apparatus, a paddle wheel 36, located in a bottom opening 35 below the storage bin 28, is activated. The paddle wheel 36 has

a plurality of blades 37 and may be operated with a motor that is connected to auger/reducer 44, although other drive means may be utilized. The blades of the paddle wheel propel the ice down chute 38 to an upstanding, vertically oriented, and insulated tube 40. Inside tube 40 is a propelling means such as a vertically oriented auger 42 which is activated via motor 44, located therebelow. The auger drives the ice upwardly to a downwardly inclined receiving chute 47. The auger drives the ice into a funnel 48 from where it is directed into a waiting bag 50. In prior art designs, it has not been possible or even suggested that stored ice could be driven upwardly to a discharge chute. The present design solves this problem in an unexpected manner. By driving the ice vertically, the device can be configured in a more compact, space saving design, solving a long-felt need.

[0039] Funnel 48 is shown in drawing figures 7 and 8. The funnel is mounted on the inside of the outer door and can be sized to any dimension within the confines of the available space. The funnel is used to transfer the ice from the auger tube to the bag. The amount of ice dispensed depends on the settings input by the operator and can be set to a desired level depending on the size of available bags, the amount of money inserted into the machine, and any other chosen parameters. For example, the operator could provide bags capable of holding twenty pounds, and the consumer could choose to purchase five, ten, fifteen, or twenty pounds. As can be seen in Figs. 7 and 8, the bags 50 are stored below the funnel 48. When a consumer inserts payment and the ice is driven into the funnel 48, a fan 51, (shown in Fig. 3), is activated and blows air into the bag, causing the mouth of the bag to open for receiving the ice cubes.

[0040] The amount of ice deposited into the funnel 48 is controlled by limit switches which adjust the amount of ice dispensed depending on factors such as bag size, the amount of money deposited, and other factors controlled by the operator of the apparatus when it is initially set up for use. The filled bag of ice is then released onto a discharge chute 52 that leads to a hinged pad 57. The hinged pad pivots the bag forward to be sealed. When the filled bag of ice is deposited onto the inclined discharge chute, it may either activate a magnetic device to

unlock the door and dispense the ice bag, or the bag may be directed via the hinged pad 57, by virtue of its weight, to a sealing pad where the bag is heat sealed or sealed in some other manner. The operation is controlled by motor 53 through a control arm 55 as shown in Fig. 3 or alternatively, by gravity. The sequencing is controlled using the electronic control means 27.

[0041] Referring to Fig. 11, a water storage capsule 70 is shown located beneath the storage bin 28. Fresh water is introduced into the water storage capsule from an outside water line. The water entering the water storage capsule may be purified using filters, ultraviolet light, and/or other means, such that a supply of purified water is held in the capsule. Water from this capsule is then directed to the ice maker for use in ice production. The water storage capsule is located inside of an insulated catch tank 72. As ice is produced, there is inevitably some melting and pieces or chips of ice that escape the storage bin 28. The ice pieces, any melted ice, and any condensation which may be present is at a relatively low temperature. This chilled medium is directed via drains or passages 71 etc. into the insulated catch tank 72 where it contacts the outside of the water storage capsule 70. This arrangement serves to lower the temperature of the water in the water storage capsule, prior to its transfer to the ice maker 26. The delivery of chilled water to the ice maker greatly lowers the energy required to turn the chilled water into ice, thus resulting in substantial energy savings. As the present apparatus has no facility to refrigerate/freeze the ice that is produced by the ice maker, after its initial production, there is inevitably a byproduct in the form of chilled water. Thus an otherwise wasted resource is in effect recycled and used to cool the purified water in the water storage capsule. A suitable drain, not shown, is provided along with control means, to ensure the catch tank is not overfilled.

[0042] To amplify, the water capsule 70 and catch tank 72 are located under the primary ice storage bin to capture melting ice water and the crushed ice that is on the bottom. Since this is the waste being made from the primary product it is basically a "free" way to cool down the water that is being used to make the ice. When the water and crushed ice fall through the

bottom of the bin into the catch tank 72, it partially surrounds the water capsule that is full of fresh incoming water and brings down the temperature of the incoming water that is going to the ice maker to approximately 35° to 40°. This makes the icemaker about 20% more efficient than it is by using normal incoming water that is 60° to 80°, and it is at no cost since it is using the byproduct of the melted ice. Secondly, the machine is dispensing the water that is cold out to the actual customer in any increment from as small as an ounce to multiple gallons, more or less. This is not being done anywhere because it is too expensive to chill the water before dispensing it. In the present case it costs nothing, because there is a constant supply of melting ice to always chill the water capsule. The present device can also be programmed to dispense a relatively small amount of ice into a cup and then dispense chilled water to fill the cup. The ability to fill small containers with chilled water further has the potential to limit the huge amounts of plastic water bottles that are annually discarded into landfills.

[0043] As discussed hereinabove, in an alternate embodiment, the present apparatus can be provided with one or more water dispensing stations 25, typically located on the front of the machine. When a consumer introduces payment into the payment acceptor to purchase water, chilled water is dispensed from the water storage capsule to a receptacle of virtually any size. No known system presently exists for such an efficient provision of purified chilled water in quantities that may range from a few ounces to a gallon or more.

[0044] An alternate embodiment in the form of a spiral staggered agitator is shown in Fig. 12. This agitator is particularly suited for pelletized or nugget ice, as opposed to cubes. Here the agitator has a central shaft 80 with a plurality of staggered and spirally arranged tines 82, projecting radially from the shaft 80. The lowermost tine has a wing-shaped extension or blade 84 that is disposed slightly above the bottom wall of the ice storage bin 28. The blade is angled slightly downwardly from a position parallel to the tine on which it is mounted. A similar extension or blade 86 is mounted on the uppermost tine, and disposed substantially

perpendicular thereto. The top blade 86 serves to level the ice falling into the bin from the icemaker 26 that is located above the bin.

[0045] The lower blade and the spiral, staggered tines glide, or cut, through the stored ice in a very efficient manner. The design is able to handle pelletized ice, which has not been possible with any known prior art designs. A disk 88 is mounted on top of the agitator shaft 80 that has means, such as predrilled holes, to accommodate additional agitator tines if necessary or desired.

[0046] The present device also admits of an inventive method wherein water is introduced into the capsule 70 for use by the ice maker. Once ice production has begun, the by-products, i.e. ice chips, condensation, etc., are funneled to the insulated catch tank around the capsule. The water for the ice maker and for being dispensed as drinking water is pre-chilled prior to its introduction into the ice maker, thus conserving energy as detailed above.

[0047] Figure 13 shows an embodiment of a sealing apparatus 90 for filled ice bags. After the ice cubes have traveled through funnel 48 and into bag 50, the bag drops or is deposited on to a bag catcher 92. With the bag in this position, a sensor recognizes the bag and brings an electric heat sealer element 94 into engagement with a sealer striker bar 96, which results in the bag of ice being sealed.

[0048] After the consumer removes the sealed bag, the bag sealer arm remains in the now forward and closed position. The bag door is returned to the closed position by a retractable door cylinder 104 and an energized magnetic door lock 100, in combination with magnet 98. This seals the machine to maintain the lowered temperature inside the machine until the succeeding use. The bag catcher returns to the bag receiving position shown, in Figure 13 through a drive motor 102 which operates a linkage arm 106 when a consumer enters payment or a code to begin the sequence of purchasing a bag of ice.

[0049] Additional embodiments are shown in Figures 14-21. The machine is configured and designed to dispense water, either chilled, flavored, or unflavored, or at ambient

temperature. Once the influent water has been filtered and purified, it can be dispensed in virtually any amount from a single cc to multiple gallons.

[0050] A suitable computer program is utilized to receive orders or commands from an operator or customer as to the type and quantity of the desired water. For example, chilled water is produced by directing purified water through an ice storage bin, where the water is chilled to just above freezing temperature (32°F or 0°C). The precise amount of water desired is metered out to a waiting vessel, which may be supplied by the customer or by the machine operator. Just prior to the chilled water exiting the machine, a flavor injection is operable on demand to provide chilled and flavored water. A temperature sensor or probe is installed in the chilled water conduct system to monitor and control ice production, which ice is employed to chill the water, obviating the need for refrigerating means. If the water can not be delivered at the proper temperature, the sensor will direct more ice production but halt delivery to the customer until the water reaches the correct temperature. A purge water solenoid is employed to periodically purge the cold water side of the system to maintain fresh water therein and to ensure chilled water delivery.

[0051] On the ambient water side, a large quantity water meter and solenoid are employed to meter ambient temperature, purified water in virtually any amount desired by the customer.

[0052] Figures 14-21 show a water vending machine for dispensing water into a vessel that can be provided by or at the machine, or that can be provided by the consumers themselves. Water is introduced via an incoming water line upon which it undergoes filtration in several stages, reverse osmosis, and irradiation by ultraviolet (UV) light. In one embodiment, an ice maker produces ice from a portion of the filtered water, the ice being deposited into an ice storage bin. The filtered and irradiated water is pumped through the stored ice, thereby chilling the water to a temperature slightly above the freezing temperature (32°F or 0°C). A solenoid is programmed to send a signal to dispense the chilled water, which may be in pre-programmed

amounts, or the consumer may be able to select the amount they desire to purchase. The amounts may be set by the operator in common sizes, pints, quarts, liters, etc. The machine may be equipped with suitable control systems to allow the operator to monitor and control operation on-site or from a remote location using a computer, smart phone, and the like. The water dispensing machine 120 comprises a housing 122 having a payment station 124, a container filling station 126, and a panel 128, which can be a window for a consumer to view the inner workings of the machine, a video screen, an advertising sign, a light fixture, or other aesthetic or functional feature.

[0053] Disposed within housing 122 is an ice maker 130 that produces ice cubes, pelletized ice, or the like. The ice is deposited, as by gravity, for example into ice bin 132. The water machine includes at least one, and may include a plurality of reverse osmosis membranes 134, a water tank 136, and a sump pump 138.

[0054] A post demand pump 140 is mounted above the water tank 136 and a separate demand pump 137 is deployed in the water conduct system. An ultraviolet light filter 142 is disposed in the incoming water line, as discussed hereinbelow. At least one, and in some embodiments, a plurality of flavor containers 144 are mounted within the housing for selective deployment by a consumer. Each flavor container may have a separate pump 146 and solenoids 147, typically one for each flavor container.

[0055] Incoming water is provided from a suitable water source through conventional means and is directed through one or a series of water filters 148 and a total dissolved solids (TDS) meter 150. A reverse osmosis pump 160 is provided for pumping water through the reverse osmosis membrane or membranes 134. Disposed at the filling station 126 are one or a plurality of output nozzles 162.

[0056] A first embodiment of the water dispensing machine just described is shown in Figure 20. Water is introduced from a conventional water source through an inflow line through a backflow preventer 164. The water is directed through a primary filter 166 and a secondary

filter 168. The water pressure is monitored by a low pressure switch 170 and a low pressure solenoid 172. From here, the water is introduced into a reverse osmosis pump 174 which pumps the water through a reverse osmosis membrane 176. Depending on the needs of the machine, a flow meter 178 is employed to either fill the good water tank 180 or to pump unneeded water out of the system through waste water outlet 182.

[0057] In this embodiment, water can be provided at ambient temperature or chilled to a temperature just above freezing. Water from the good water tank 180 is directed into the ice machine 130 or ice maker as directed by demand pump 182. Water to be dispensed is directed from the good water tank 180 using demand pump 184 through a UV carbon filter 186 and a UV like filter 188.

[0058] Depending on the demands of the consumer, the machine's control system (not shown), may then direct water through a large quantity water meter 190 that is controlled by a large quantity water solenoid 192. From here the water is output into a waiting large vessel 194 at ambient temperature.

[0059] Water to be dispensed cold is directed by the ice bin water solenoid 196 into the ice bin 132. The water is checked for temperature by the temperature sensor 198 and, if sufficiently cold, is directed by a small quantity water solenoid 200 using demand pump 202 to a small quantity water meter 204. A flavor injector 206 can be employed to flavor the water, depending on the desires of the consumer. The chilled water is then output to a small vessel 208 that is either provided by the consumer or provided as a function of the water dispensing machine itself.

[0060] An alternate embodiment of the water dispensing machine is shown in figure 21. In this embodiment, the water machine is designed to only dispense chilled water; however, suitable modifications can be made to dispense water at ambient temperature and in any desired quantity. Here, water is input through a conventional water line and directed through back flow preventer 164. The amount of water allowed to enter the machine is controlled by an

overfill control 210. The water is directed through a sediment filter 212, and a carbon filter 214. The water pressure is detected and controlled via low pressure switch 170 and low pressure solenoid 172. The reverse osmosis pump 174 pumps the water through a first reverse osmosis membrane 177 and, depending on demand, is either directed to a second reverse osmosis membrane 179 or out of the system through a waste outlet 182.

[0061] Water from the second reverse osmosis membrane goes into a reverse osmosis water tank 181 where it is held until needed. The water is then directed through a pre-demand pump 185 through a UV like filter 188 and either into the ice maker 130 to be made into ice cubes or, utilizing bin valve 216 into the ice bin 132.

[0062] The ice maker is equipped with a current sensor to ensure its proper and continuous operation.

[0063] Ice from the ice maker is deposited into the ice bin 132 which, in this embodiment, is sized to hold approximately 60 pounds of ice. Larger and/or smaller designs are of course possible. Should the ice bin become overfilled, an overflow drain 218 is provided and the overflow is moved by sump pump 138 to the waste water outlet 182.

[0064] The ice bin itself is equipped with a UV light, a vibrator to ensure that there is no bridging of the ice in the bin and a temperature probe to detect the temperature of the water and ice mixed together in the ice bin.

[0065] From this point, the chilled water can be dispensed either as pure filtered and unflavored water or as flavored water. Depending on the selection made by the consumer, a flow meter 220 measures the desired quantity of water and through post demand pump 203 either pumps the water through an appropriate conduct to output 1, 222 controlled by solenoid 224 or to output 2, 226 that is controlled and monitored by one or a plurality of flavor solenoids 228, 230, and/or 232. The consumer has the ability to select a single flavor or a mixture of flavors, depending on how the machine is set up and the desires of the consumer. A separate solenoid 234 is provided to purge the entire system should it be necessary or required for

maintenance or other purpose. If overflow is detected below the outputs of the water machine, the control system operates to shut down the post demand pump, thereby providing an additional level of safety and security. In addition, each of the flavor lines have dedicated water lines so that no cross contamination occurs between the various flavors. In addition, each of the flavor lines are purged after each use so that the next consumer receives what they have selected from the machine.

[0066] In the use and operation of the present water dispensing machine, and in the embodiment shown in figure 21, the ice bin contains approximately 60 pounds of ice and approximately one quart of water. When a consumer desires to purchase water from the machine, payment is introduced using any of a number of payment options and the consumer selects either pure water or flavored water to be dispensed. The machine can be programmed to dispense water in virtually any amount; however typical sizes might be 12 ounces, 20 ounces, or one quart. In tests of the present machine, the machine was able to continuously dispense over 180 quarts of water chilled to just above freezing temperature before the temperature probe operated to shut down the operation and wait for more ice production.to protect the consumer, the dispensing nozzles are recessed so that no contact with nozzles is possible either before, during, or after use. Thus, the machine is able to re-use empty water bottles or other empty containers, thereby keeping these containers out of landfills, or the machine can be set up to provide containers for the consumer to use.

[0068] Thus, while an embodiment of an ice production, bagging, and dispensing machine and a water dispensing machine, and modifications thereof have been shown and described in detail herein, various additional modifications may be made without departing from the scope of the present Invention or the appended claims.

Claims

1. An ice producing and dispensing machine for delivering ice on demand to a consumer comprising:

a housing having an ice maker operationally disposed therein, said housing having an ice delivery outlet for delivering ice to consumers;

an ice storage bin disposed below said ice maker having an open top for receiving ice from said ice maker and a bottom opening for discharging ice therefrom;

said ice storage bin having an agitator therein with a lower portion operationally connected to a motor for stirring the stored ice, said agitator having a tine with a downwardly angled blade disposed parallel to said tine and disposed at said lower portion for urging the stored ice to said bottom opening;

a vertical tube in communication with said bottom opening for receiving discharged ice and a propelling means in said tube for driving the ice into and upwardly in said tube;

a receiving chute in communication with said tube for conveying the ice to said ice delivery outlet; and

a bag sealing apparatus for receiving an empty bag, said bag receiving ice from said receiving chute, and sealing said bag for delivery to a consumer.

2. The ice machine as defined in claim 1 in which said machine includes an ice bagging station in which a bag is disposed between said receiving chute and said ice delivery outlet for receiving the ice so that the consumer receives the ice in the bag.

3. The ice machine as defined in claim 1 in which said housing includes an insulated catch tank with a water storage capsule disposed in said catch tank below said ice bin, said capsule holding water for use by the ice maker, said insulated catch tank positioned below said

ice storage bin and having at least one drain to receive any ice particles and melted water from the ice production and chilling the water in said capsule to hasten ice formation in the ice maker.

4. The ice machine as defined in claim 1 and including a water dispensing station.

5. The ice machine as defined in claim 4 in which said housing includes an insulated catch tank with a water storage capsule disposed therein below said ice bin, said capsule holding water for use by the ice maker, said insulated catch tank positioned to receive any ice particles and melted water from the ice production and chilling the water in said capsule.

6. The ice machine as defined in claim 5 in which said water dispensing station is connected to said capsule for receiving chilled water to dispense.

7. The ice and chilled water producing and dispensing machine for delivering ice and chilled water on demand to a consumer comprising:

a housing having an ice maker operationally disposed therein for producing ice to be dispensed to a consumer, and an ice delivery outlet from which the consumer obtains the dispensed ice;

an ice storage bin disposed below said ice maker having an open top for receiving ice from said ice maker and a bottom opening for discharging ice therefrom;

a paddle wheel disposed in said bottom opening and

a vertical tube in communication with said bottom opening for receiving discharged ice and a propelling means in said tube for driving the ice upwardly in said tube; said paddle wheel and propelling means having a common motor for simultaneous operation;

a receiving chute connected to said tube for conveying the ice to said ice delivery outlet;

an ice bagging station in which a bag is disposed between said discharge opening and said ice delivery outlet for receiving the ice so that the consumer receives the ice in the bag; and

a bag sealing apparatus for sealing the filled bag of ice.

8. The ice and chilled water producing and dispensing machine as defined in claim 7 in which said housing includes an insulated catch tank with a water storage capsule disposed in said catch tank and below said ice bin, said capsule holding water for use by the ice maker, said insulated catch tank having at least one drain and positioned to receive any ice particles and melted water from the ice production, for chilling the water in said capsule.

9. The ice and chilled water producing and dispensing machine as defined in claim 7 in which a water dispensing station is connected to said capsule for receiving chilled water to dispense.

10. A water dispensing machine for dispensing water to a consumer comprising:

a housing having an ice maker operationally disposed therein;

an ice storage bin for receiving the ice produced by said ice maker, said ice storage bin having an outlet;

an incoming water source for introducing water into said ice storage bin; and

a conduit for transferring water from said storage bin outlet to a consumer, whereby said consumer receives chilled water.

11. A water dispensing machine as defined in claim 10 and including at least one water filter deployed to filter the incoming water.

12. A water dispensing machine as defined in claim 10 and including at least one flavor container for introducing a flavor into the chilled water.

13. A method for delivering chilled water to a consumer in which water is introduced into a water dispensing machine having an ice maker operationally disposed therein, an ice storage bin in communication with said ice maker for receiving the ice produced by the ice maker, and an outlet in communication with the ice bin, the method comprising the steps of:

introducing water into said ice bin; and

transferring chilled water from said outlet to a consumer.

14. The method of claim 13 and including the step of filtering the water introduced into the machine.

15. The method of claim 13 in which said machine includes a flavor dispenser and said method further includes the step of adding flavor to the chilled water.

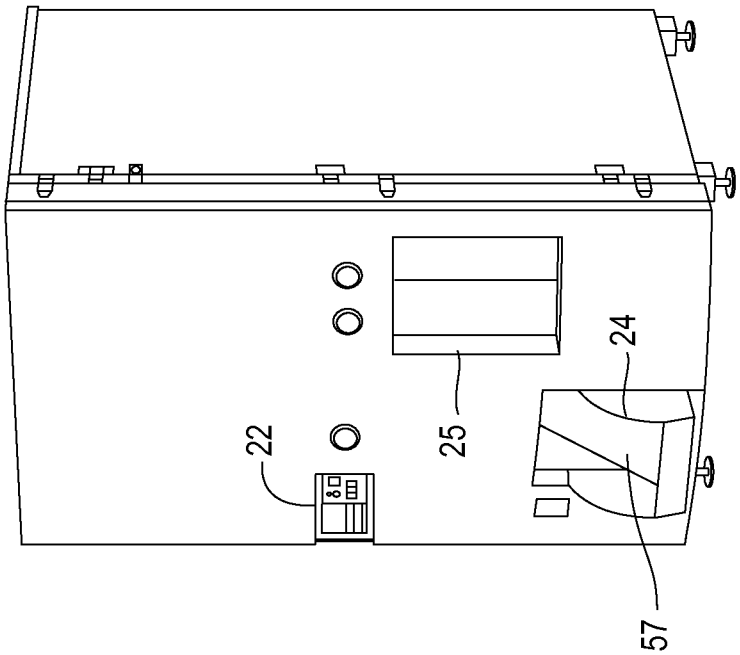


FIG. 2

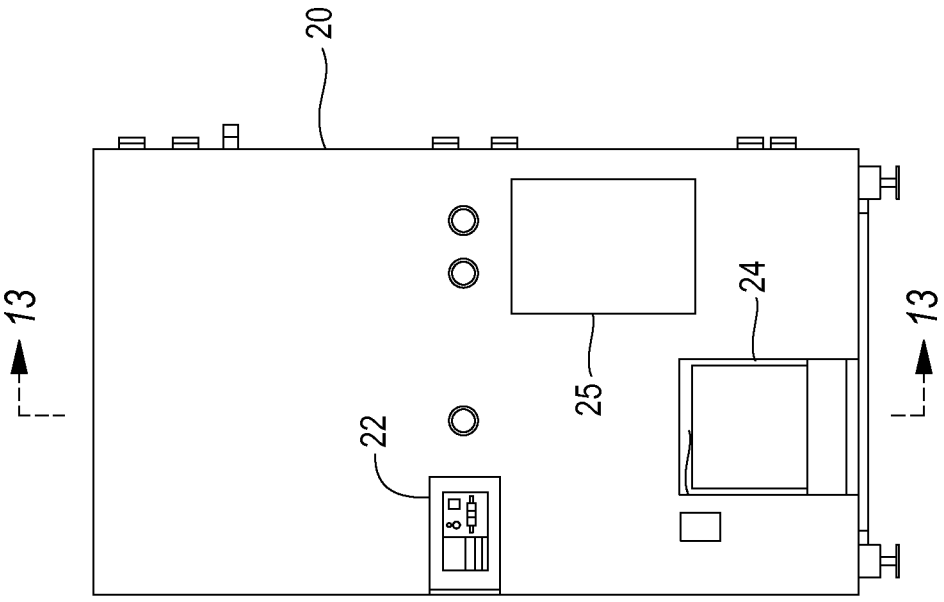


FIG. 1

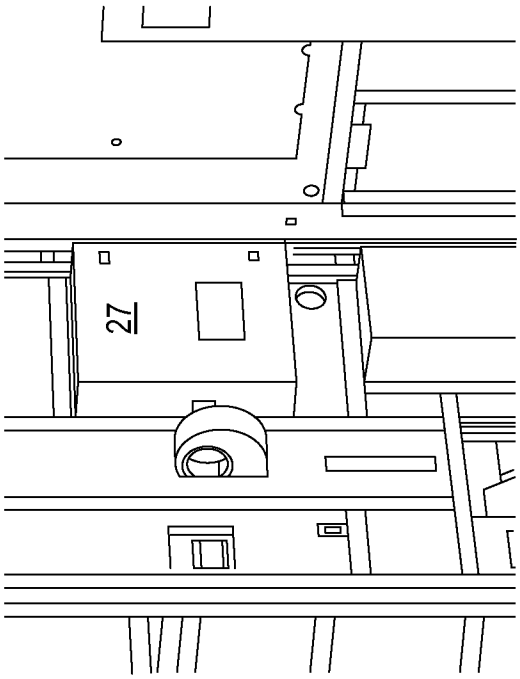


FIG. 4

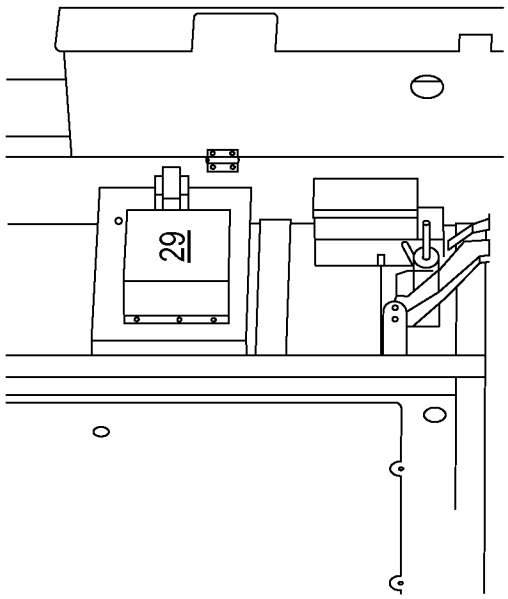


FIG. 5

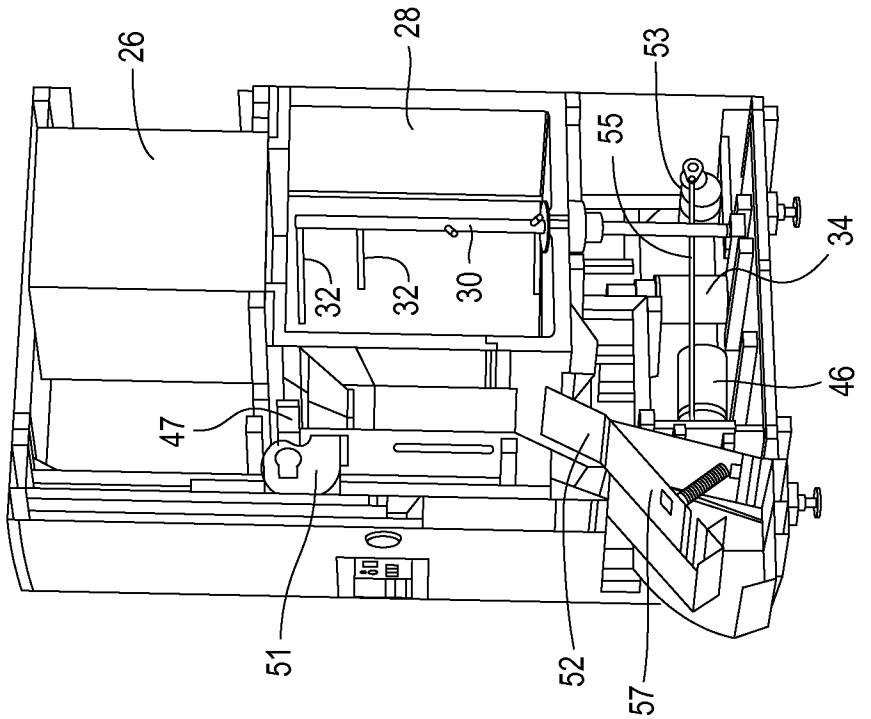


FIG. 3

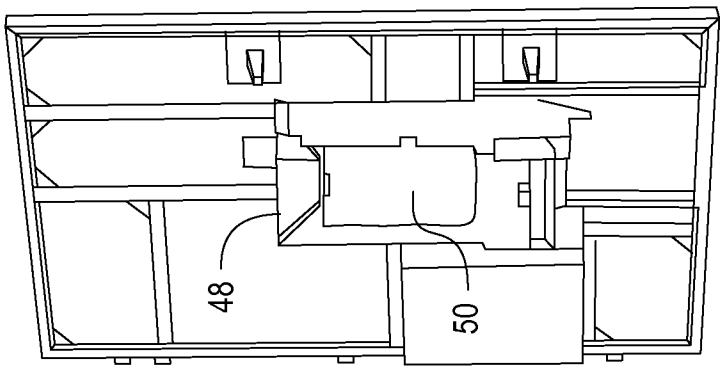


FIG. 7

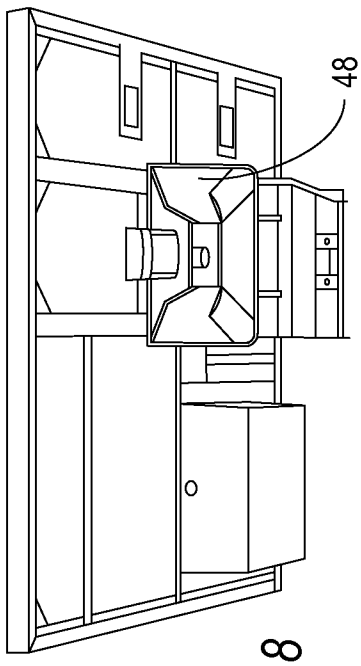


FIG. 8

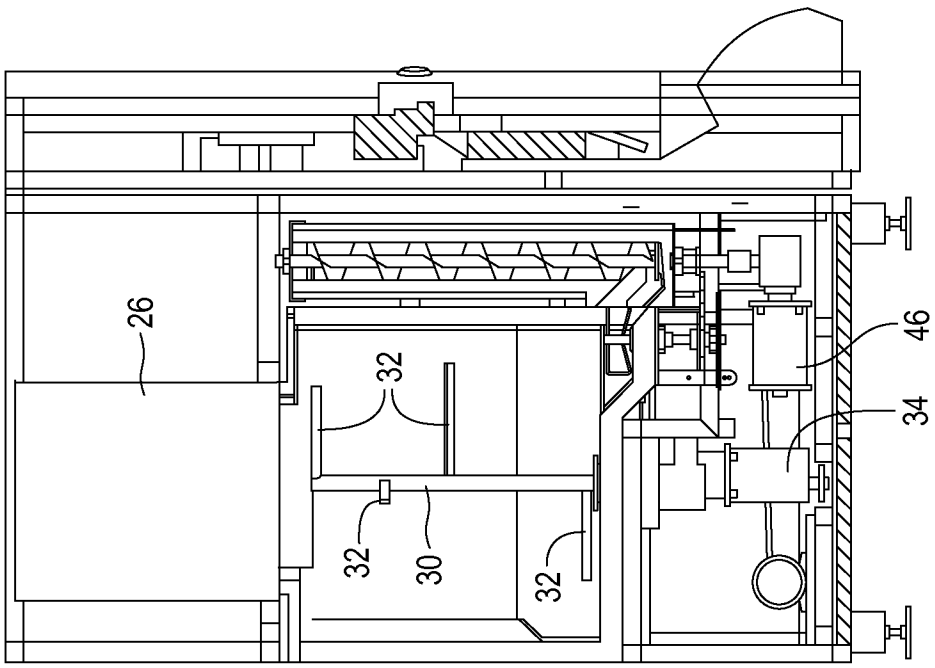


FIG. 6

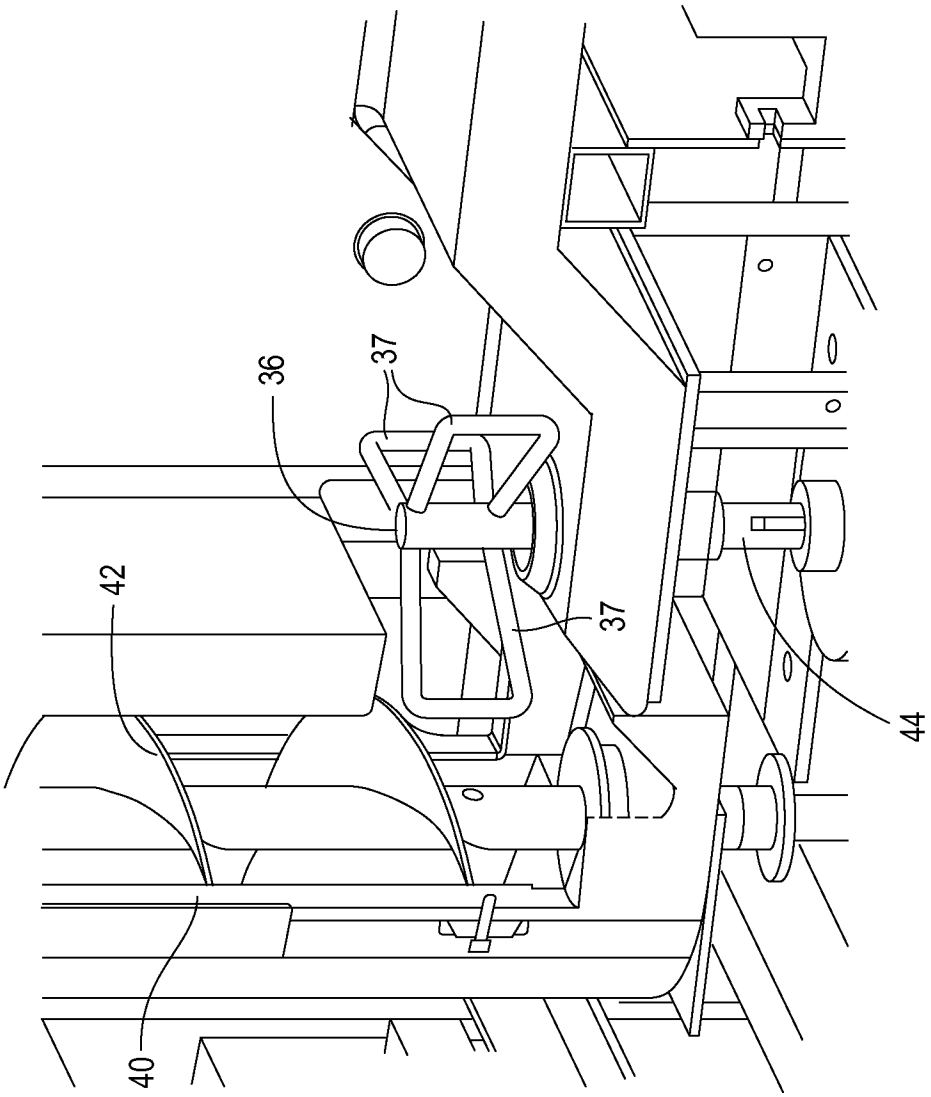


FIG. 10

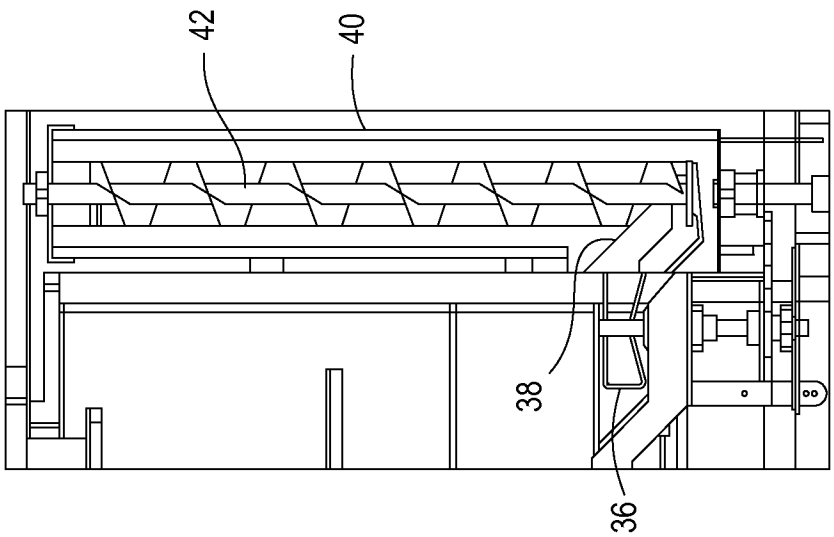


FIG. 9

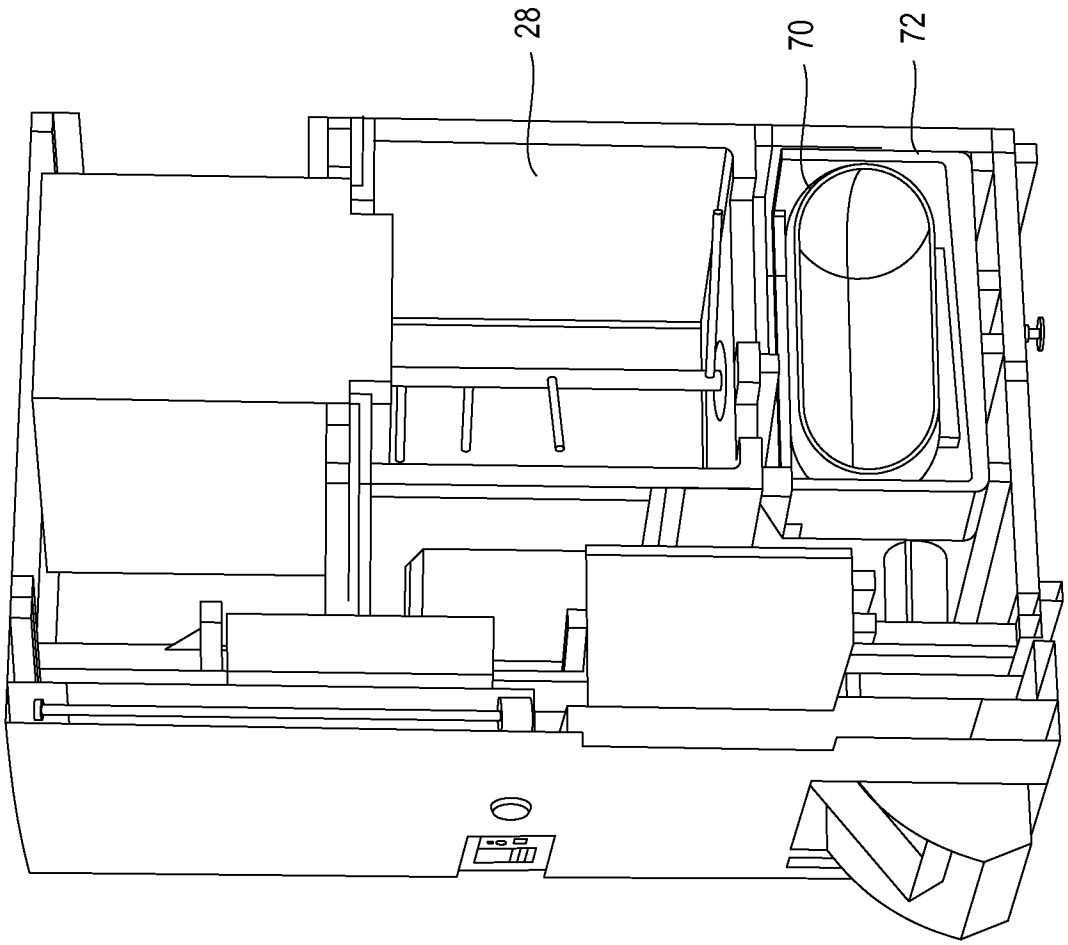


FIG. 11

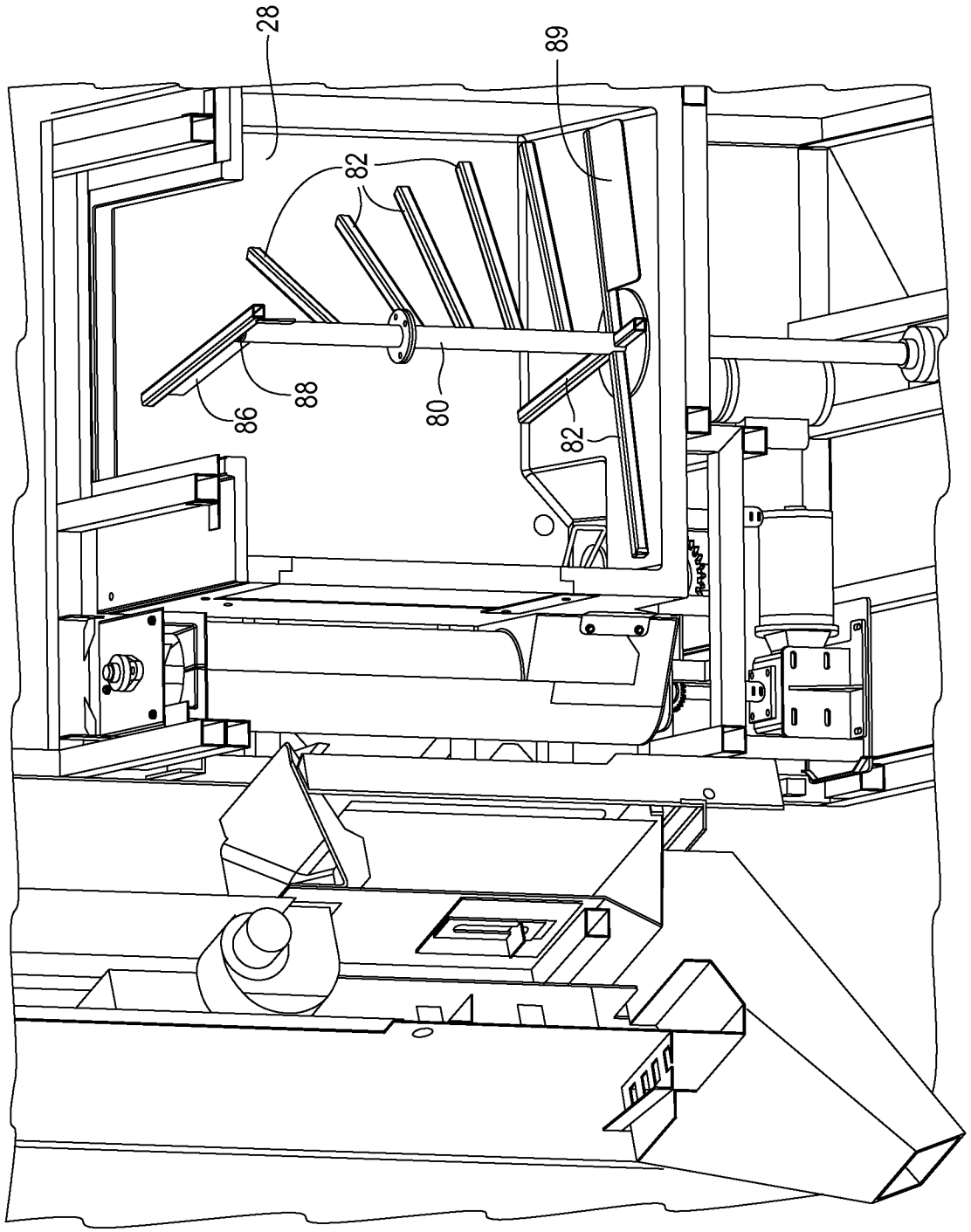


FIG. 12

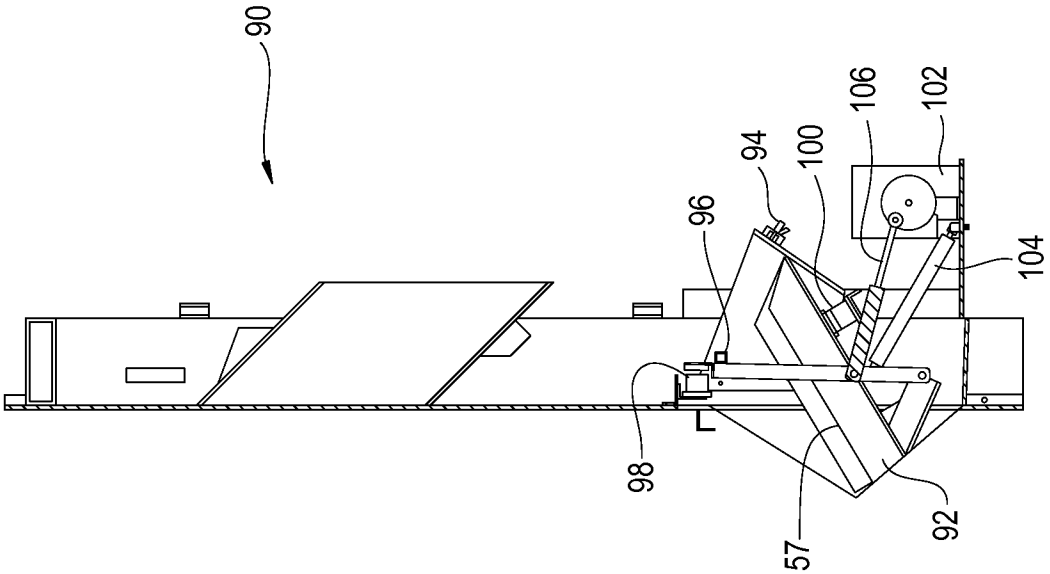


FIG. 13

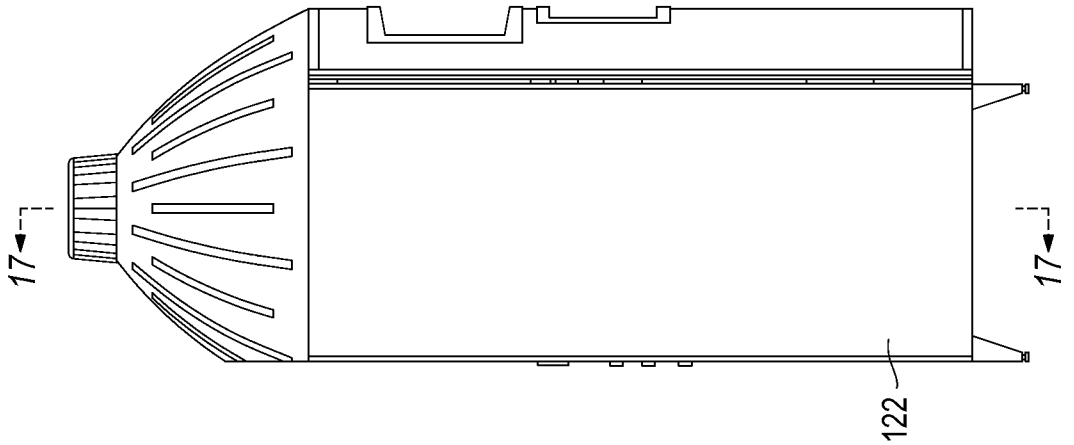


FIG. 16

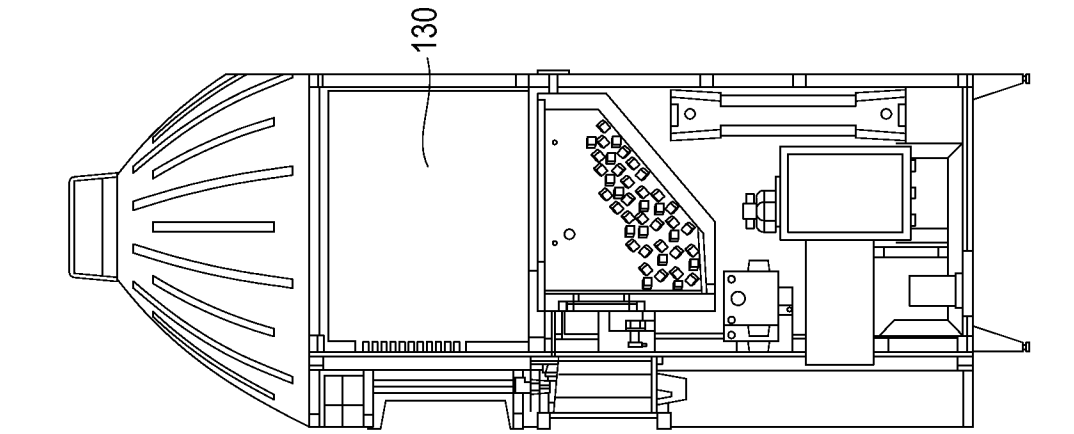


FIG. 15

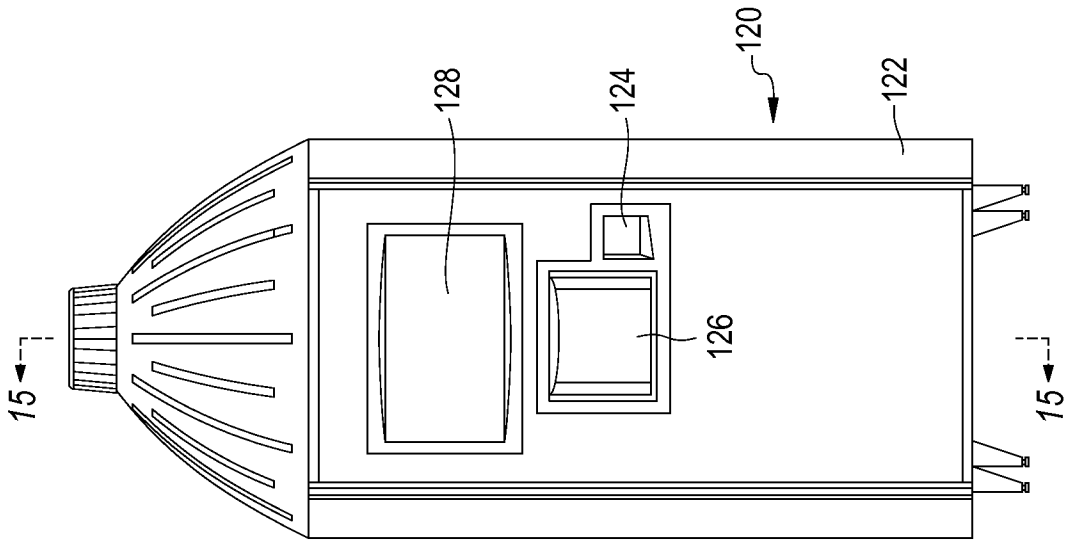


FIG. 14

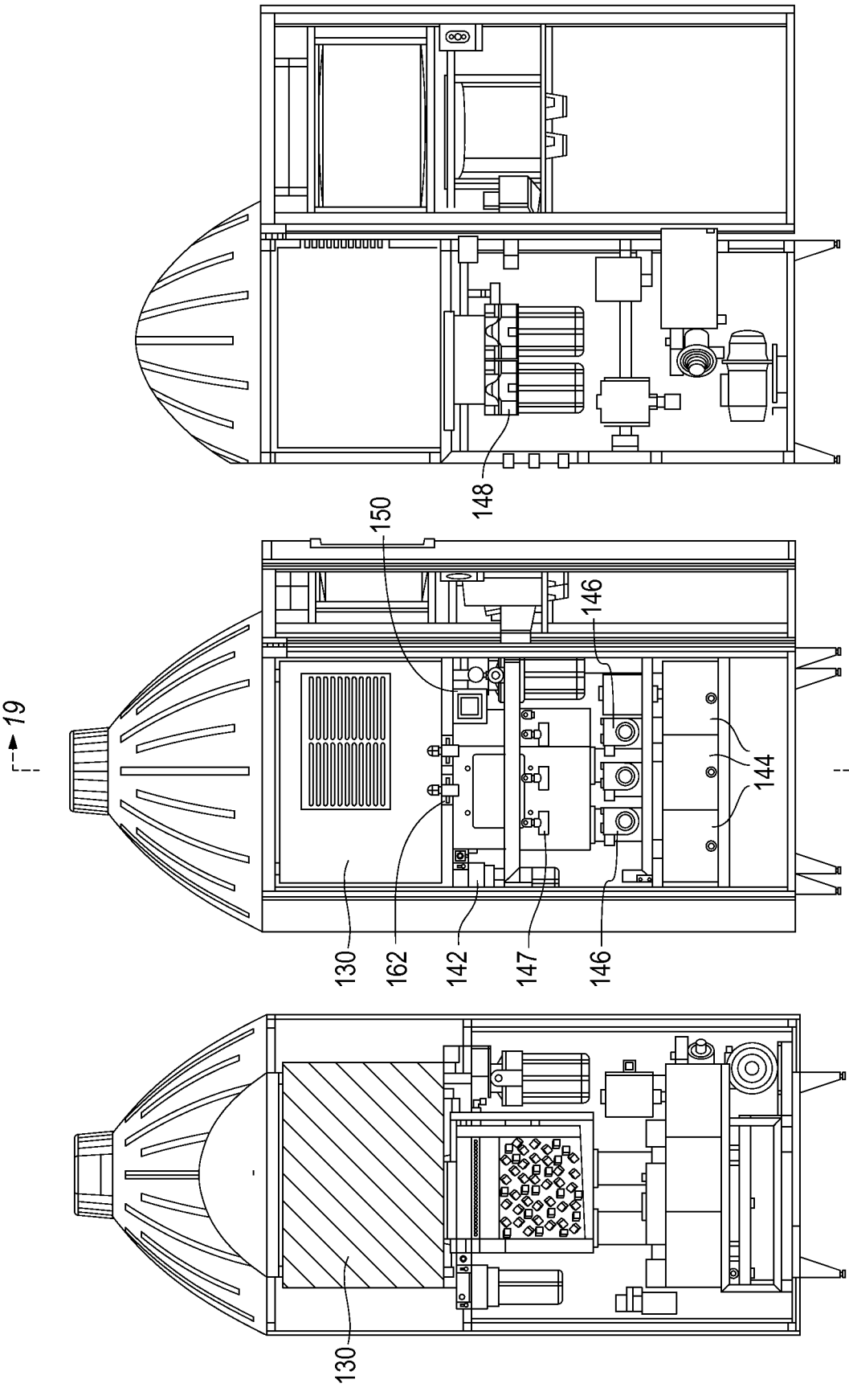


FIG. 19

FIG. 18

FIG. 17

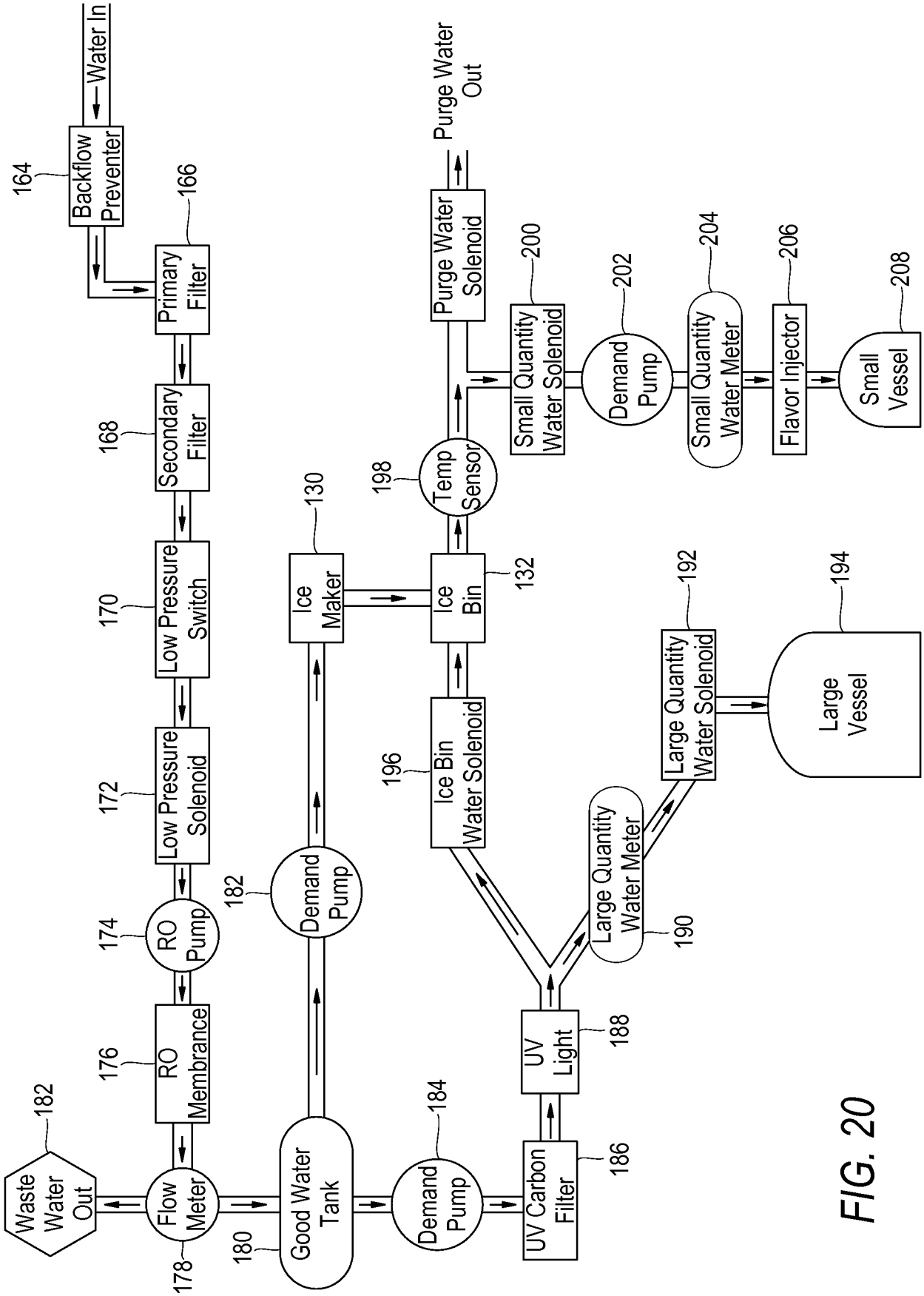

Water In
Backflow Preventer
164
Primary Filter
166
Secondary Filter
168
Low Pressure Switch
170
Low Pressure Solenoid
172
RO Pump
174
RO Membrance
176
Flow Meter
178
Waste Water Out
182
Good Water Tank
180
Demand Pump
182
Ice Maker
130
Demand Pump
184
UV Carbon Filter
186
UV Light
188
Ice Bin
132
Ice Bin Water Solenoid
196
Temp Sensor
198
Purge Water Solenoid
Purge Water Out
Small Quantity Water Solenoid
200
Demand Pump
202
Small Quantity Water Meter
204
Flavor Injector
206
Small Vessel
208
Large Quantity Water Meter
190
Large Quantity Water Solenoid
192
Large Vessel
194

FIG. 20

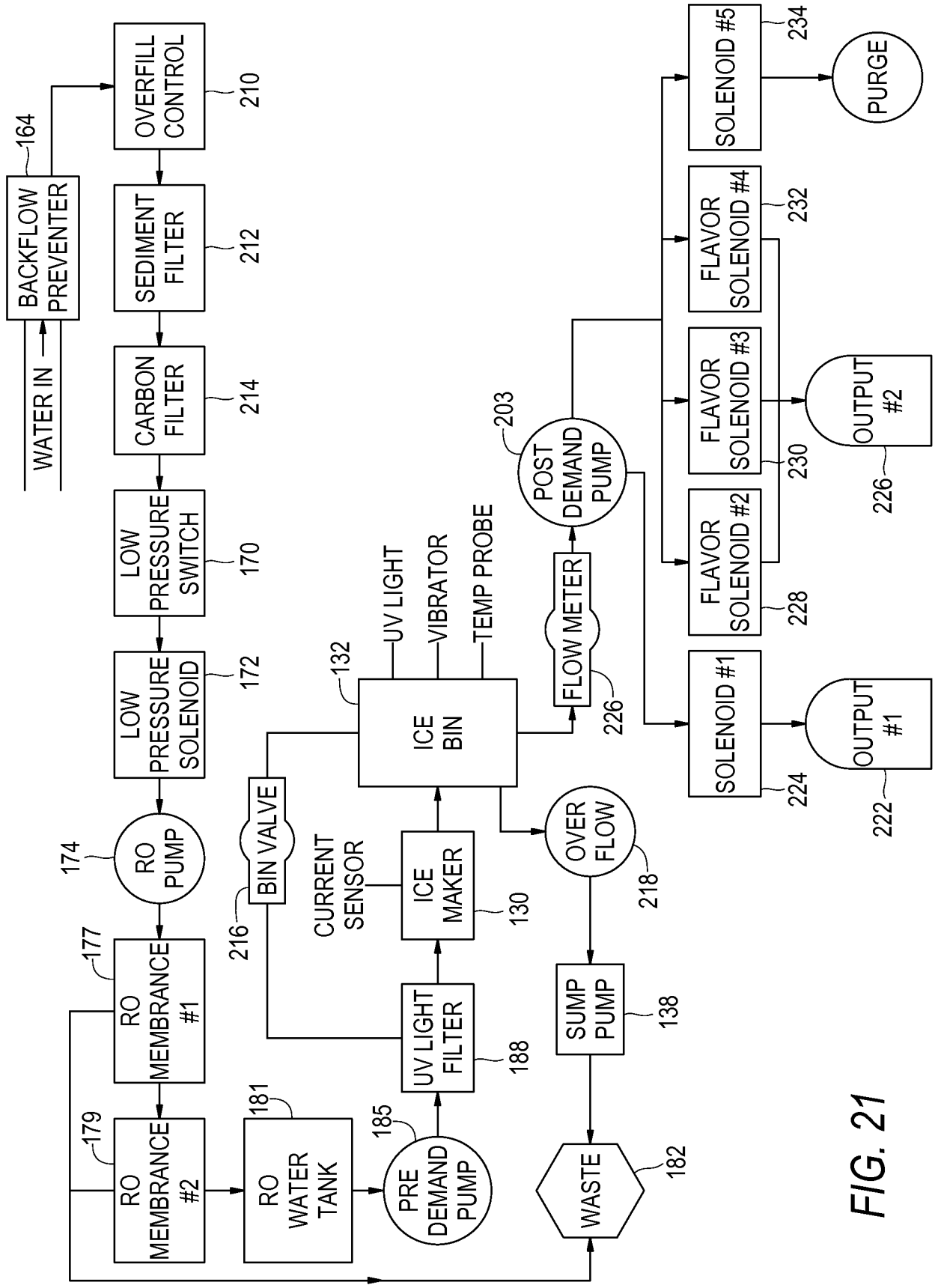

WATER IN
BACKFLOW PREVENTER
164
OVERFILL CONTROL
210
SEDIMENT FILTER
212
CARBON FILTER
214
LOW PRESSURE SWITCH
170
LOW PRESSURE SOLENOID
172
RO PUMP
174
RO MEMBRANCE #1
177
RO MEMBRANCE #2
179
RO WATER TANK
181
PRE DEMAND PUMP
185
UV LIGHT FILTER
188
ICE MAKER
130
CURRENT SENSOR
BIN VALVE
216
ICE BIN
132
UV LIGHT
VIBRATOR
TEMP PROBE
OVER FLOW
218
SUMP PUMP
138
WASTE
182
POST DEMAND PUMP
203
FLOW METER
226
SOLENOID #1
224
SOLENOID #5
234
FLAVOR SOLENOID #4
232
FLAVOR SOLENOID #3
230
FLAVOR SOLENOID #2
228
PURGE
OUTPUT #2
226
OUTPUT #1
222

FIG. 21