

Jan. 12, 1954

J. J. SHIVELY
ICE CHIPPING MACHINE

2,665,852

Filed June 17, 1950

2 Sheets-Sheet 1

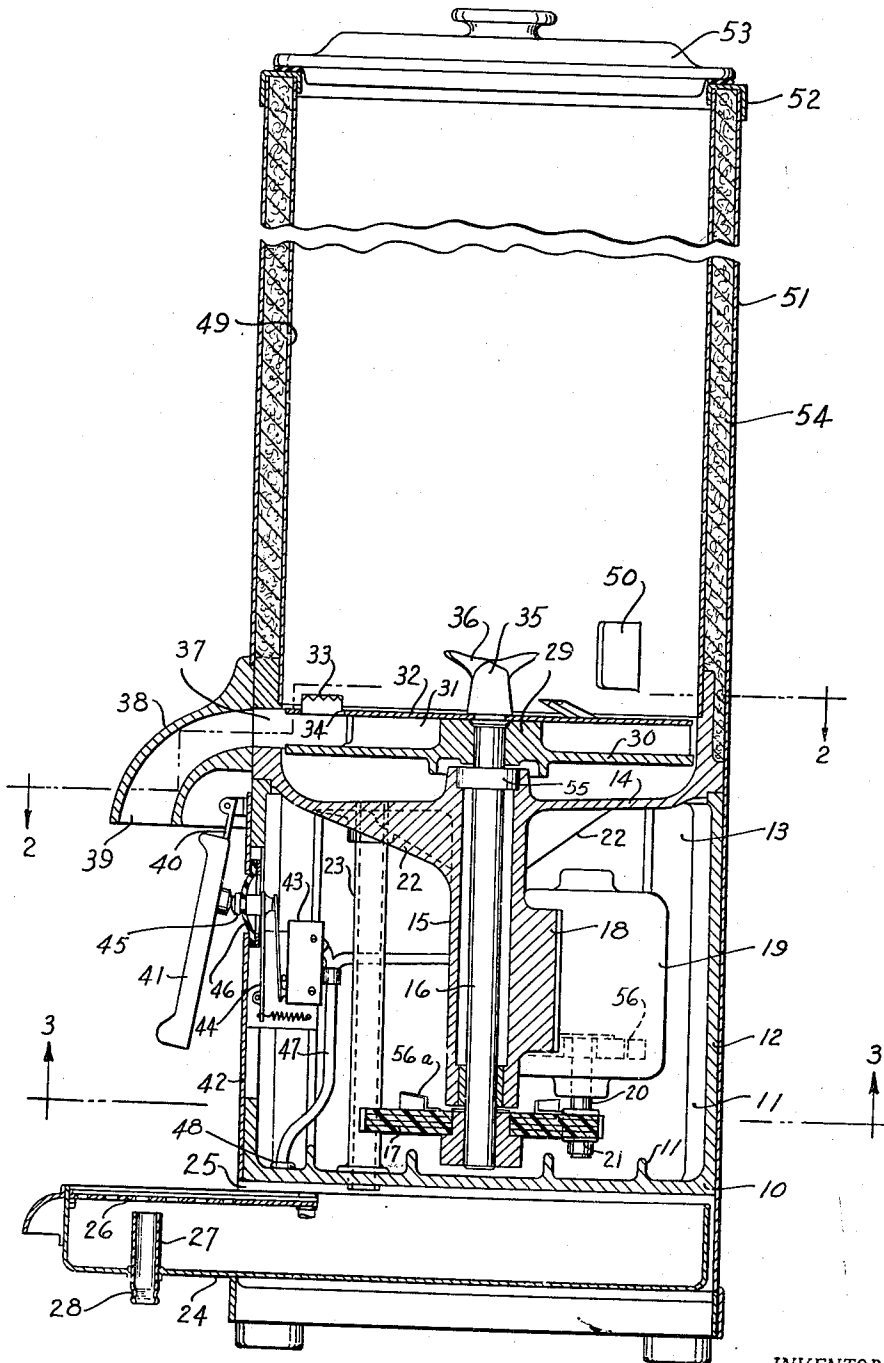


FIG. 1

INVENTOR.
JOHN J. SHIVELY
BY *Van Devanter & Shively*

ATTORNEYS

Jan. 12, 1954

J. J. SHIVELY
ICE CHIPPING MACHINE

2,665,852

Filed June 17, 1950

2 Sheets-Sheet 2

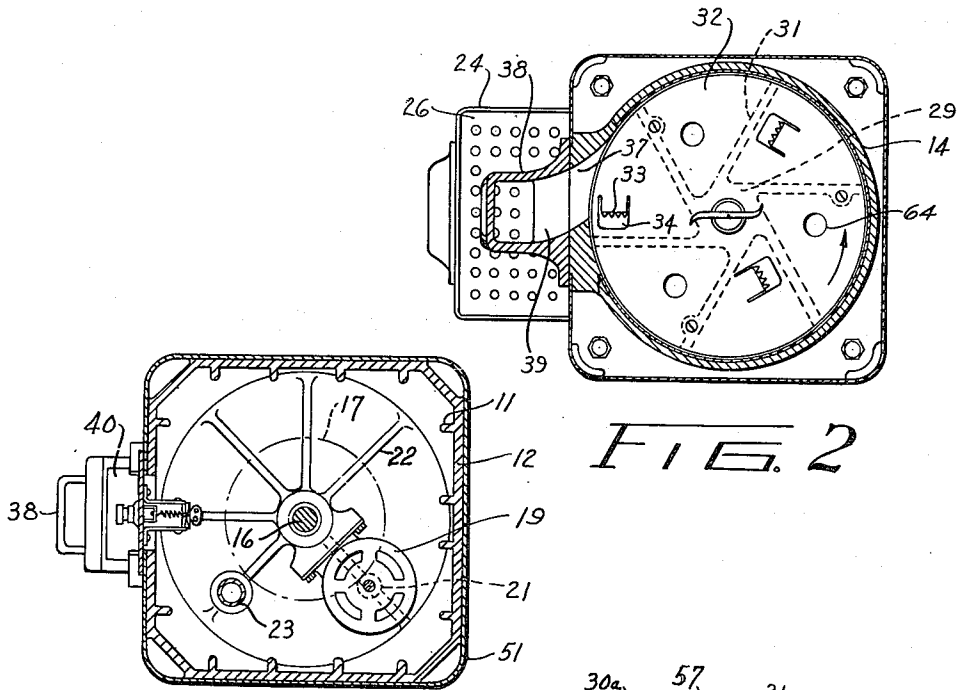


FIG. 3

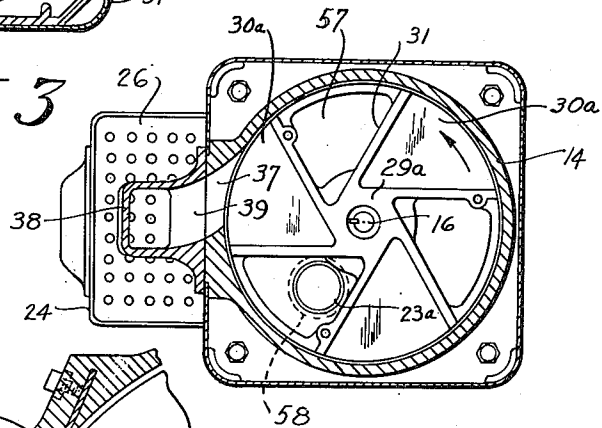


FIG. 4

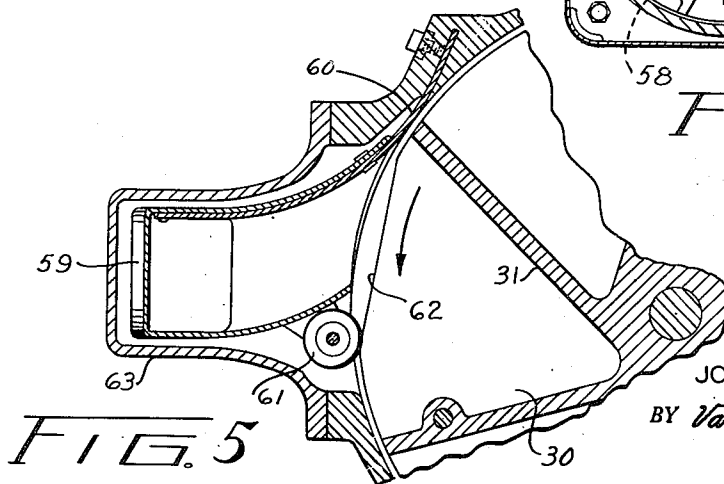


FIG. 5

INVENTOR.
JOHN J. SHIVELY
BY *Van Doren & Shively*

ATTORNEYS

UNITED STATES PATENT OFFICE

2,665,852

ICE CHIPPING MACHINE

John J. Shively, New York, N. Y.

Application June 17, 1950, Serial No. 168,727

5 Claims. (Cl. 241—92)

1

The present invention pertains to improvements in ice chipping machines.

My U. S. Patent Number 2,181,000, issued on November 21, 1939, disclosed and claimed a machine for chipping ice, particularly adapted to counter use in soda fountains, restaurants, bars and the like, the chipped ice being delivered directly into the glass or other container for drinks. The present invention comprises a machine of the above general type but containing new and useful provisions and combinations by which the performance, efficiency, and durability are greatly augmented.

An object of the invention is to provide a device of the above nature including an improved housing, driving gear and motor combination by which the motor is protected both against condensation of moisture and against overheating under the severest operating conditions.

In pursuance of the above object, a further object is to provide means by which the available cooling effect of water from meltage is utilized to the fullest extent for cooling the atmosphere in the motor compartment.

Another object is to provide improved means of disposing of the water of meltage.

A further object is to provide means of facilitating the complete discharge of very fine ice particles.

Other objects and advantages will become evident during the course of the following description in connection with the accompanying drawings, in which:

Figure 1 is a vertical sectional view of a preferred form of the device;

Figure 2 is a horizontal sectional view in the plane 2—2, Fig. 1;

Figure 3 is a horizontal sectional view in the plane 3—3, Fig. 1;

Figure 4 is a similar view of an alternative form of impeller;

Figure 5 shows an alternate rotor and spout combination.

Referring to Figure 1, the numeral 10 designates a motor housing of good heat-conducting material such as cast aluminum, having a plurality of internal ribs 11 on the walls 12 of the interior chamber 13. A bowl 14, also of suitable heat-conducting material is secured in sealing relation to the top of the housing. A central extension 15 of the bowl 14 projects downward within the chamber 13, a vertical shaft 16 being journaled therein. A gear 17 of comparatively large diameter is secured to the lower end of the shaft 16.

2

A bracket 18, formed or secured on the side of the extension 15, carries a motor 19 having a downwardly directed shaft 20. A small pinion 21 on the shaft 20 meshes with the gear 17. The bottom surface of the bowl 14 is also provided with ribs 22 joined to the central extension 15. A drain pipe 23, secured in the bottom of the bowl 14, passes in sealing relation through the bottom of the chamber 13. A drawer or tray 24 is slidably disposed in a lower compartment 25 underlying the end of the drain pipe 23. The front end of the tray 24 extends outwardly from the front of the machine and is provided with a removable perforated shelf 26 for supporting a glass or the like. A small overflow pipe 27 in the front of the tray 24 has a lower exterior portion 28 adapted to receive a flexible hose if desired.

A rotor 29, secured to the upper end of the shaft 16 within the bowl 14, comprises a lower disc 30 carrying a plurality of impeller vanes 31, these vanes being canted rearwardly from the direction of rotation as shown in Fig. 2. A cutter plate 32 removably secured on the top of the rotor 29 and overlying the impeller vanes 31, has a series of upwardly inclined picks 33 disposed above suitable openings 34 for the passage of ice chips. A central breaker comprising a hub 35 equipped with outwardly extending hooked picks 36, is secured on the top of the cutter plate 32.

Referring to Fig. 2, the numeral 37 designates a passage extending through the front of the bowl member 14 in substantially tangential relation to the rotor 29. A spout 38, secured to the front of the bowl 14, has an outwardly and downwardly curving interior 39 registering with and forming a continuation of the tangential passage 37. The entire outlet passage is slightly divergent outwardly to facilitate the flow of ice.

A trigger 40, equipped with a contact pad 41 of rubber or the like, is hinged below the spout 38. A plate 42 fastened to the front of the casing 10 in air-tight relation, carries on its inner side a normally open snap switch 43 and an actuating lever 44 therefor having a button 45 adapted to be moved by the trigger 40. A resilient diaphragm 46 forms an airtight seal between the button 44 and the plate 42.

The switch 43 is connected in circuit with the motor 19 and a current supply cord 47, the latter being provided with an air-tight grommet 48 at its point of entry to the chamber 13.

A cylindrical hopper 49 is mounted in the top of the bowl 14. A small fin 50 is secured in the interior of the hopper 49 above the level of the picks 33 to restrain rotation of ice.

3

An exterior casing 51, preferably of sheet metal, is surmounted by a cap 52 which extends over and forms an inner rim for the top of the hopper 49. A lid 53 forms a top closure for the hopper. Suitable heat-insulating material 54 is disposed between the hopper 49 and the outer casing 51.

The operation of the device is as follows:

Broken ice is placed in the hopper 49. When it is desired to dispense ice into a receptacle, for example a glass, the latter is held under the spout 38 and pressed against the trigger pad 41. The movement of the trigger 40 actuates the switch 43, starting the motor 19. The motor, acting via the pinion 21, gear 17, and shaft 16, rotates the rotor 29 and cutter plate 32. The picks 33 attack the bottom of the ice chunks, picking chips therefrom which pass downward through the openings 34 to the interior of the rotor 29, whence the vanes 31 hurl them outward through the passage 37-39 into the glass. When chips delivered approach the desired amount the operator withdraws the glass, allowing the switch 43 to open and the device to stop.

The height to which the picks 33 are inclined above the plate 32 determines the size of the ice chips produced. Thus plates 32 may be provided with picks 33 adapted to produce any desired size of chips from very coarse to very fine grades, dependent on the type of service required.

The breaker picks 36, rotating above the middle of the plate 32, break up any masses of ice which may have become caked during idle periods, casting the fragments outward into line with the chipper picks 33.

In certain types of service, particularly in warm and humid climates, it is important that the motor 19 and attached gearing be protected against heavy condensation of moisture from the atmosphere during idle periods when residual ice in the hopper 49 causes the lower portion of the device to cool down. In the present invention this is accomplished by making the chamber 13 airtight, joints of the bowl 14, plate 42, drain pipe 23 and cord 47 with the housing 10 being of sealing type as already described, and the shaft 16 being provided with a sealed upper bearing 55. Thus no entry of or circulation of outer air is possible, so that the motor and gears operate in a confined atmosphere in which the only moisture present is the negligible amount which may have been present in initial assembly. Consequently, harmful condensation cannot occur to injure the motor, gears, switch, internal wiring and related parts.

Since, as noted above, the motor 19 operates in an air-tight chamber, special provision is made for cooling the motor, especially as warm climatic conditions, giving rise to heavy demand for iced drinks and the like, frequently keep the device in almost continuous operation for considerable periods of time. Such provision is made as follows:

It has been noted that the motor 19 is preferably of the open type employing an internal fan 56, Fig. 1, for forcing air therethrough. In the present invention the effect of the fan is to cause a continuous recirculation of air throughout the closed chamber 13 and through the motor.

The bowl 14, forming the bottom of the working chamber, receives a certain amount of cold water of meltage both when the machine is at rest and when it is in operation, the latter

4

since a large part of the meltage developed during chipping is centrifuged to the inner circumference of the bowl and runs down therein. By this means the upper surface of the bowl is subjected to continuous cooling. A certain amount of refrigerating effect is also transmitted directly from the ice by the walls of the bowl. The lower surface of the bowl is exposed directly to the atmosphere within the closed chamber 13, without the interposition of gear boxes or other obstructions, and as previously noted, is provided with ribs 22 which give it a large heat-absorbing area in contact with the re-circulating air, so that heat from the motor and carried by the air is efficiently absorbed and transmitted out of the chamber. Thus the continuously cooled bowl structure described comprises a direct and positive refrigerating means for the moving interior air, thereby insuring proper cooling of the motor. The actual over-all effect is to provide means for applying a small fraction of the cooling effect of the ice charge positively to the motor while at the same time protecting the latter against moisture either of meltage or of condensation.

The above cooling effect is augmented by the ribs 11 in the interior of the housing 10, which also absorb heat from the moving interior air and transmit it outward through the exterior casing 51 and to the lower chamber 25, and by the passage of water down through the drain pipe 23. The chamber 13 is of large extent in proportion to the size of the motor 19, thus providing an ample volume of cooling air as well as large heat-conducting surface as noted. A certain amount of motor heat is also transmitted directly to the cooling bowl structure via the bracket 18 on the extension 15.

By disposing the gear 17 and pinion 21 in the bottom of the chamber 13 instead of the top thereof, interference with free access of the circulating air to the bottom of the bowl 14 is prevented. The gear 17 is preferably made of laminated plastic with helical teeth, the corresponding pinion 21 being of metal. By this combination smooth and durable operation is secured without the necessity for lubrication, thereby also eliminating grease housings which would act as obstructions to air movement. In case it may be desired to use a motor not equipped with an internal fan, or if further reinforcement of the air circulation is deemed advantageous, suitable fan blades 56a may be mounted on the gear 17 or their equivalent attached to the motor shaft 20.

For the severest operating conditions a further addition to the refrigerating system for the interior air may be made by use of the rotor and drain modification illustrated in Figure 4. In this embodiment the rotor 29a, instead of being formed with the lower disc 30 a solid throughout its circumference, is cut away to form openings 57 in those sectors not underlying the picks 38. By this means the vanes 31 trailing the openings 57 are in direct communication with the inner bottom of the bowl 14, so that in rotation these vanes operate as a centrifugal fan to force the air from the bowl out through the spout 38. The drain pipe 23a may be made of comparatively large diameter, forming an inlet for air which insures a positive circulation through the bowl. The air forced out through the spout by the blower action not only carries away most of the heat transmitted up through the bowl, but also assists in the ejection of the

5

ice particles. Additional motor cooling effect may also be provided by means of fins 58 on the enlarged drainpipe 23a, by which means heat from the chamber is transmitted to the air flowing up through the drain. The latter flow, however, has not sufficient velocity to interfere with downward flow of water along the walls of the drain when the machine is in operation.

The openings 57 in the rotor structure shown in Figure 4 provide easy access to the bottom of the bowl 14 for cleaning, by removal either of the cutter plate 32 or the spout 38, but without removal of the rotor itself.

Figure 5 illustrates a form of the discharge mechanism particularly adapted to facilitating the fast ejection of fine ice particles which due to their very small mass acquire less centrifugal momentum than larger chips and consequently pass less readily through the outlet. In this form the spout 59 proper is made of light material such as sheet metal, and is resiliently secured to the bowl 14a, for example by means of a leaf spring 60. A small roller 61, preferably tired with rubber or the like is horizontally mounted on the spout structure so as to press against the periphery of the lower rotor disc 30. The latter is cut away to form a plurality of flats 62.

When the device is in operation the roller 61 follows the peripheral contour of the disc 30 which acts as a cam, causing the spout 59 to be vibrated rapidly inward and outward. By this action any tendency for ice particles to stick in the spout is prevented, the spout acting as a vibratory feeder to supplement the centrifugal ejecting action of the rotor vanes 31. It will be understood that in practice the amplitude of vibration is very small, the extent of the flats 62 being necessarily exaggerated in Fig. 5 for clarity in illustration. As a structural variation the vibratory effect may be attained by leaving the disc 30 circular and making the roller 61 slightly eccentric.

An outer spout cover 63 may be provided for purposes of appearance and to prevent glasses from encountering the vibrating spout 59.

It will be obvious that vibratory spout structure may be employed either with the solid lower rotor disc 30 as shown in Fig. 5 or with the cut-away disc 30a of the type shown in Fig. 4.

The described structure of the drain tray 24 provides for ready disposal of water of meltage in different operating situations. When the device is used on a counter or back-bar location in which no sink or other drain facility is conveniently available, the tray 24 is simply drawn out and emptied periodically. In counter locations wherein a sink or the like is directly behind the machine's position, the latter may be disposed with the projecting tray overhanging the sink. In this case the water flows through the overflow tube 27 and falls directly into the sink, eliminating the removal of the tray 24 except for occasional cleaning. If the sink or other drain facility is nearby but not directly in line as noted, a suitable tube leading thereto may be attached to the extension 28. The extended front portion of the tray 24, in addition to providing the necessary overhang for the convenient drainage noted, also serves to catch any drip from the spout 38 and trigger pad 41. The trigger and its pad have been removed in Figures 2 and 4 in order to show the plate 26 most clearly.

While the invention has been described in pre-

6

ferred form, it is not limited to the exact structures illustrated, as various modifications may be made without departing from the scope of the appended claims.

Referring again to Figure 2, the cutter or pick plate 32 may be provided with a plurality of perforations 64 opposite the picks 33. These perforations facilitate drainage of water, and when the plate is used with the type of rotor 30a illustrated in Fig. 4, the perforations also comprise a direct inlet to the bowl 14 through which cold air and moisture from the ice mass above are drawn directly into the lower bowl by the described centrifugal fan action of the trailing vanes 31.

While the portion of the refrigerating effect of the ice charge applied positively to the motor by the means herein described is great enough to insure against overheating at all times, its magnitude in proportion to the total refrigerating effect contained in the charge is so small as to be commercially insignificant. Obviously the more the device is operated the greater the motor's cooling requirement becomes, but at the same time the greater also becomes the quantity of ice dispensed, so that the proportion remains substantially constant under any given condition of climate and weather.

What is claimed is:

1. In an ice-chipping machine, in combination, means forming a working chamber including a hopper adapted to contain ice and a member supporting said hopper and comprising a bottom for said chamber, a rotary plate in said chamber and having a plurality of openings, a plurality of picks on said plate adjacent said openings, said picks being adapted to form chips from said ice and to deflect said chips through said openings, means forming an outlet passage from said chamber, a centrifugal ejector for said chips below said plate and picks and in cooperative alignment with said passage, said centrifugal ejector having a plurality of bottom air inlet openings circumferentially spaced from said first openings and in direct communication with the air above said bottom whereby said air may be ejected through said passage, means forming a second chamber below said supporting member, and a motor in said second chamber operatively connected to said rotary plate and said ejector.

2. The combination claimed in claim 1 including a conduit of substantial cross-sectional area extending through said second chamber into said supporting member and adapted to admit air to said bottom of said working chamber.

3. The combination claimed in claim 1 including a conduit extending through said second chamber into said supporting member and adapted to admit air to said bottom of said working chamber, and a plurality of heat-absorbing fins on the outer surface of said conduit within said second chamber.

4. In an ice chipping device, in combination, a casing having a working chamber adapted to contain ice, means in said chamber to chip said ice, an outlet spout resiliently attached to said casing and forming an outlet for said chipped ice from said chamber, a centrifugal rotor cooperative with said chipping means and adapted to move said chipped ice from said chamber into said spout, and mechanical means operatively connecting said rotor and said spout to vibrate said spout.

5. The combination claimed in claim 4 wherein

said rotor includes a disc having a periphery comprising a plurality of camming surfaces, and wherein said mechanical means includes a roller rotatably secured to said spout and resiliently pressed against said periphery.

JOHN J. SHIVELY.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
237,404	McKeever	Feb. 8, 1881
525,195	Egner	Aug. 28, 1894

Number	Name	Date
1,428,829	Anderson	Sept. 12, 1922
1,935,104	Weigel	Nov. 14, 1933
1,944,245	Krause	Jan. 23, 1934
2,033,903	Smith	Mar. 10, 1936
2,181,000	Shively	Nov. 21, 1939
2,186,672	Fromm	Jan. 9, 1940
2,352,206	Kendall	June 27, 1944
2,481,010	Gundelfinger	Sept. 6, 1949
2,539,734	Echols Sr., et al.	Jan. 30, 1951
2,542,778	McIntyre	Feb. 20, 1951