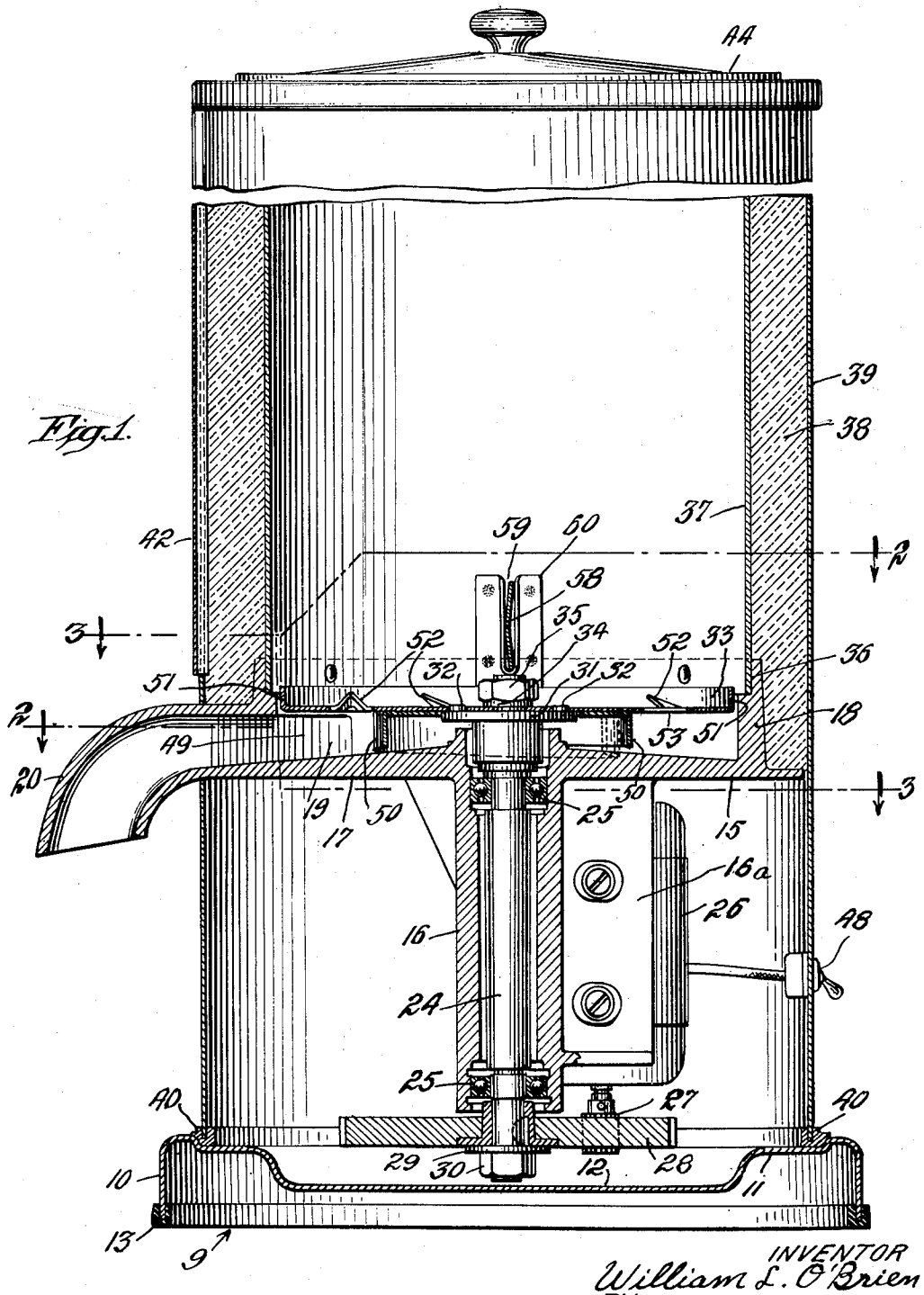
July 20, 1954 W. L. O'BRIEN 2,684,207

ICE-CHIPPING MACHINE

Filed June 8, 1950 2 Sheets-Sheet 1

Fig. 1.



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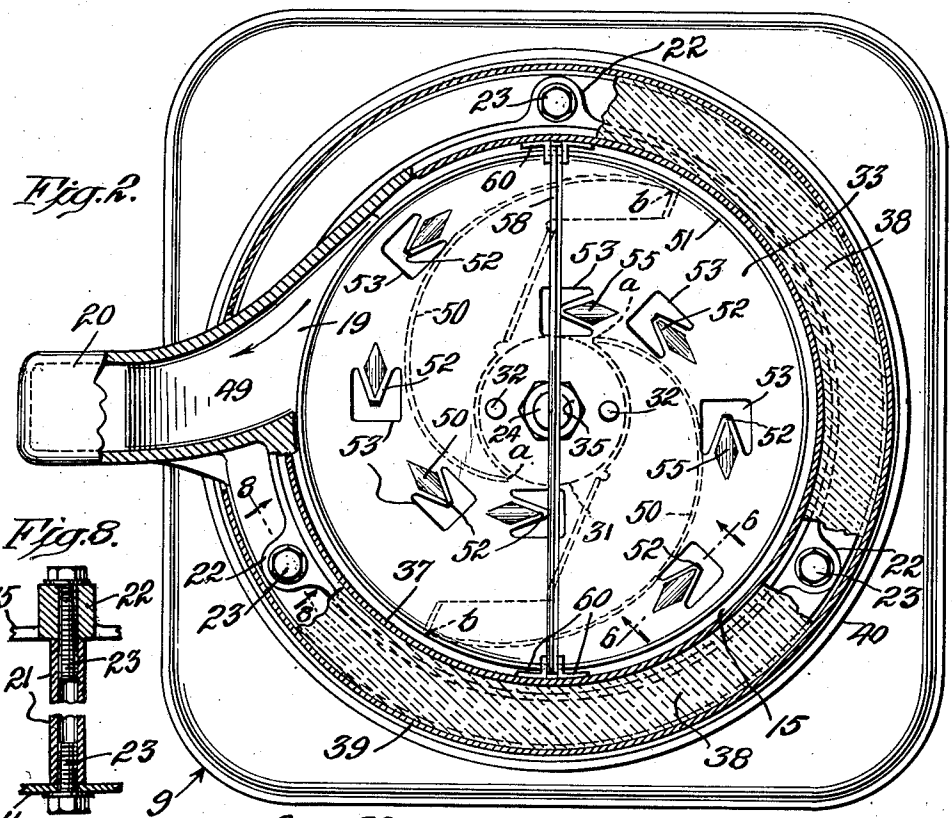


Fig. 2.

Fig. 8.

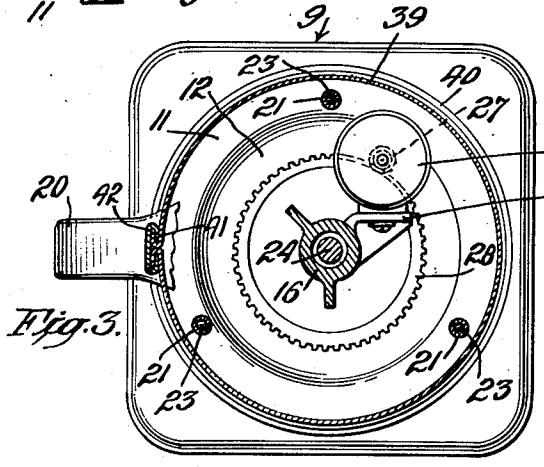


Fig. 3.

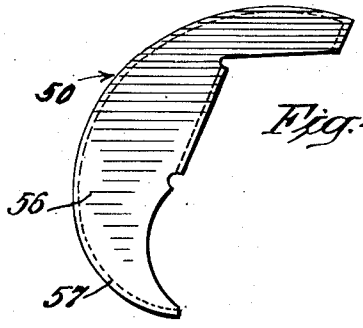


Fig. 4.

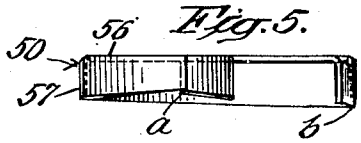


Fig. 5.

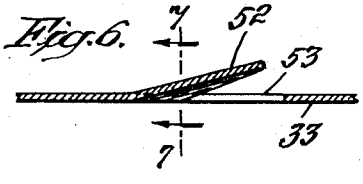


Fig. 6.

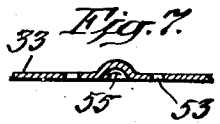


Fig. 7.

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UNITED STATES PATENT OFFICE

2,684,207

ICE-CHIPPING MACHINE

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Application June 8, 1950, Serial No. 166,948

3 Claims. (Cl. 241—92)

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The present invention relates to an ice chipping machine adapted to produce ice in finely divided form for use at soda fountains, bars, restaurants and the like for cooling beverages or for similar purposes.

Machines of this kind have heretofore been provided in which ice to be chipped is placed in a hopper and chipped ice delivered through a radial spout into a glass or other receptacle. When the desired amount of ice has been obtained the machine is stopped and the receptacle removed. In such prior art machines the chipped ice is delivered through the spout by centrifugal force imparted thereto by a rotating element and the passages including the spout are apt to become clogged.

One of the objects of the present invention is to provide an improved ice chipping machine of the type indicated having a construction and arrangement of elements which eliminates plugging of the passages through which ice is delivered from the machine.

Another object is to provide a machine of the type indicated with mechanism for positively propelling chipped ice from the chipping element as fast as it is formed.

Another object is to provide a machine of the type indicated with a progressively divergent passageway for chipped ice from the place of chipping to the place of discharge.

Still another object of the invention is to provide an ice chipping machine of the type indicated which is of simple and sturdy construction, reliable in operation and economical to manufacture.

These and other objects will become more apparent from the following description and drawings in which like reference characters denote like parts throughout the several views. It is to be expressly understood, however, that the drawings are for the purpose of illustration only and not a definition of the limits of the invention, reference being had for this purpose to the appended claims. In the drawings:

Fig. 1 is a longitudinal sectional view of an ice chipping machine incorporating the novel features of the present invention and showing the divergent passageway for chipped ice;

Fig. 2 is a transverse sectional view taken on line 2—2 of Fig. 1 and showing the picks projecting upwardly from the rotating disk and the spiral vanes depending from the disk;

Fig. 3 is a transversce sectional view taken on line 3—3 of Fig. 1 and showing the driving means for rotating the chipping plate or disk;

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Fig. 4 is a detail plan view of one of the spiral vanes depending from the disk;

Fig. 5 is a side view of the spiral vane illustrated in Fig. 4 and showing its progressive increase in height from one end to the other;

Fig. 6 is a detail sectional view taken on line 6—6 of Fig. 2 showing a pick tooth struck up from the disk;

Fig. 7 is a transverse sectional view taken on line 7—7 of Fig. 6 showing the ribbed form of the pick to increase its resistance to bending; and

Fig. 8 is a detail sectional view taken on line 8—8 of Fig. 2 showing one of the hollow spacer sleeves for mounting the housing on the base.

Referring to the drawings, the machine comprises a sheet metal base 9 of generally rectangular form, see Fig. 2, and formed to provide a depending peripheral flange or skirt 10, an intermediate shelf 11, and a recessed portion 12 at the center. A pad or gasket 13 of rubber or other suitable soft material is provided at the bottom edge of the flange 10 of the base.

A housing 15 in the form of a finished casting is mounted on the base 9. The housing 15 comprises a centrally located hollow bearing sleeve 16, a face plate 17 at the upper end of the bearing sleeve, a vertical wall 18 at the periphery of the face plate and having an outlet opening 19 therein and a spout 20 extending outwardly from the opening first tangentially and then radially, see Fig. 2. The housing 15 is mounted on the base 9 by hollow spacer tubes 21 which extend between the shelf 11 of the base and the bottom of three lugs 22 projecting radially from the wall 18 of the housing member in equally spaced relationship, see Figs. 2, 3 and 8. Screws 23 extend through the shelf 11 and lugs 22, respectively, and are screwed into the threaded ends of the tubes to rigidly support the housing 15 on the base 9.

A drive shaft 24 is rotatably mounted in antifriction bearings 25 in the hollow bearing sleeve 16, the anti-friction bearings being seated between shoulders on the shaft and in the sleeve to properly locate the shaft in the sleeve. The shaft 24 is driven by an electric motor 26 mounted on a pad 16a extending laterally from the bearing sleeve. A pinion 27 on the shaft of the motor 26 meshes with a reduction gear 28 keyed to the lower end of shaft 24 and held in place thereon by a washer 29 and nut 30 screwed onto the lower threaded end of the shaft. A driving head 31 is mounted fast on the upper end of shaft 24 and has pins 32 which project upwardly through holes in a chipping disk or plate 33, later to be described in detail. The assembly of driving head 31 and

chipping disk 33 are locked in position on the upper end of the shaft 24 by means of a washer 34 and nut 35 screwed onto the upper threaded end of the shaft.

The peripheral wall 18 of the housing 15 has an annular recess 36 for seating the lower end of a cylindrical shell 37 constituting a hopper for holding ice to be chipped. Surrounding the hopper shell 37 is insulation 38 which, in turn, is enclosed by an outer shell 39 having its lower end seated in a suitable gasket or ferrule 40 on the shelf 11 of the base 9. The outer shell 39 is split vertically at one side and the edges folded outwardly to provide opposed channels 41 above the spout 20 and is cut away to provide a clearance for the spout below the folded portions. After the outer shell 39 has been placed in position around the insulation 38 a C-shaped fitting 42 is slid downwardly over the outwardly folded channels 41 to close the seam, see Fig. 3, and a cover plate detachably connected to the shell below the spout. The top of the hopper 37 is closed by a cover 44.

The arrangement of the spout 20 is such as to permit a glass or other receptacle to be positioned thereunder and the operation of the motor 26 may be controlled by a switch operated by the receptacle if desired. As illustrated, however, a separate manually operated switch 48 is provided for controlling operation of the motor 26 to deliver chipped ice from the spout 20. Any suitable arrangement may be provided for draining the water from ice melting in the machine such as the one described and claimed in an application for United States Letters Patent of Arthur C. Shuart, Serial No. 166,897, filed concurrently herewith on June 8, 1950, and now abandoned.

In accordance with the present invention a progressively divergent passageway 49 is provided from the place where the ice is chipped to the discharge end of the spout 20 together with spiral vanes 50 depending from the rotating chipping disk 33 which cooperate with the stationary face plate 17 for positively propelling the chipped ice through the passageway as fast as it is formed. To this end, the face plate 17 is of conical form with its upper surface sloping downwardly from an annular shoulder adjacent the driving head 31 toward the peripheral wall 18. Also, the top and bottom walls of spout 20 progressively diverge from the tangential outlet opening 19 in the peripheral wall 18 to the end of the spout, see Fig. 1. Thus, the passageway 49 for chipped ice progressively increases in depth from the point where chipped ice is formed to the point where it is discharged from the end of the spout 20.

The chipping disk or plate 33 is in the form of a flat plate having an upwardly projecting flange 51 at its outer periphery to increase its resistance to bending or deformation. Picks 52 are formed on the chipping disk 33 by punching openings 53 therein, see Fig. 2, to form pointed teeth and bending the teeth upwardly as illustrated in Fig. 6. Preferably, the teeth or picks 52 are stamped with diamond shaped recesses 55 to provide strengthening ribs therein, see Fig. 7. As illustrated in Fig. 2, a series of teeth or picks 52 are arranged in pairs at opposite sides of the rotational axis and with each pair spaced angularly and outwardly from an adjacent pair to provide a series of teeth at each side of the rotational axis located generally in a spiral from the center to the periphery of the disk.

Mounted on and depending from the bottom of the chipping disk or plate 33 are the spiral vanes 50 arranged at the rear of the teeth 52 for positively displacing chipped ice as fast as it is formed. The vanes 50 are in the form of plates 56 welded or otherwise attached to the bottom of the disk 33 and having right angular depending flanges 57 in the form of an Archimedes spiral starting at a point *a* adjacent the driving head 31 and ending at a point *b* at the periphery of the disk 180° at the rear of the point *a* in the direction of rotation. By reference to Fig. 5, it will be noted that the flanges 57 of vanes 50 vary in height from the point *a* to the point *b* corresponding to the slope of the conical face plate 17 from the driving head 31 to the peripheral wall 18. The vanes 50 cooperate with the upper conical surface of face plate 17 and act in the manner of plows to positively propel the chipped ice outwardly and through the outlet opening 19 and spout 20. Overlying the top of disk 33 is a cross strut 58 having its ends seated in slots 59 in brackets 60 on opposite side walls of the hopper 37 for holding the ice in the hopper from rotating with the disk. One form of the invention having now been described in detail, the mode of operation is explained as follows.

To prepare the machine for an ice chipping operation, the cover 44 is removed and chunks of ice, such as cakes, manufactured cubes or the like, are placed in hopper 37. The ice feeds by gravity against the top face of the disk 33. When chipped ice is desired a glass or other receptacle is placed under the spout 20 and switch 48 actuated manually to initiate operation of the motor 26. Rotation of the motor 26 is transmitted through the pinion 27 and reduction gear 28 to rotate shaft 24 and disk 33 connected thereto by the driving head 31 and pins 32.

As the disk 33 rotates, the ice at the bottom of the hopper 37 is held by cross strut 58 and the upwardly projecting teeth or picks 52 chip ice over substantially the entire area at the bottom of the ice pack in the hopper. Ice chipped by the picks 52 is delivered through the openings 53 surrounding the picks and into the chamber or passageway 49 between the bottom of the disk and the conical face plate 17. The chipped ice entering the passageway 49 is immediately and positively propelled outwardly on the upper surface of the face plate 17 by the relatively moving spiral vanes 50 as fast as it is delivered thereto. At the outer periphery of the face plate 17 the chipped ice is forced outwardly through the tangential opening 19 and radial spout 20 by the vanes 50. Due to the progressively divergent passageway 49 the chipped ice flows freely through the spout 20 into the receptacle.

After the desired amount of ice has been obtained the switch 48 is actuated to deenergize the motor 26 and stop the machine and the receptacle with the chipped ice therein is removed. Even though the spout 20 may be filled with chipped ice after an ice chipping operation, the passageway 49 will not become clogged between periods of operation because of the progressively divergent form of the passageway. In other words, when the machine is again operated the spiral vanes 50 will positively displace chipped ice delivered by the rotating disk 33 and push the ice ahead of it outwardly through the passageway 49 which offers little or no resistance because of its expanding area toward the outlet.

It will now be observed that the present invention provides an improved ice chipping machine

which eliminates plugging of the passages through which ice is delivered. It will also be observed that the present invention provides for positively displacing chipped ice as fast as it is formed and provides a progressively divergent passageway from the place of chipping to the place of discharge. It will still further be observed that the present invention provides a machine of simple and sturdy construction which is reliable in operation and economical to manufacture.

While a single embodiment of the invention is herein illustrated and described, it will be understood that modifications may be made in the construction and arrangement of parts without departing from the spirit or scope of the invention. Therefore, without limitation in this respect the invention is defined by the following claims.

I claim:

1. An ice chipping machine comprising a base, a stationary housing mounted on said base, said housing having an axial bearing sleeve, a conical face, and a peripheral wall having an opening therein, a vertically arranged cylindrical hopper for ice above said housing, a shaft rotatable in the bearing sleeve, a disk at the upper end of said shaft in spaced relation to the conical face of the housing, picks projecting upwardly from the disk for chipping ice fed axially thereto from the hopper, said conical face flaring away from the disk in a direction outwardly from its rotatable axis, spiral vanes depending from the disk for forcing chipped ice outwardly between the spaced disk and conical face of the housing, and a spout having one wall forming a continuation of the conical face of the stationary housing and progressively diverging with respect to the opposite wall from the opening in the peripheral wall to its outer end.

2. An ice chipping machine comprising a base, a stationary housing mounted on said base, said housing having a vertically arranged bearing sleeve, a conical face at the upper end of the bearing sleeve, a peripheral wall surrounding the conical face, and a spout extending from an opening in the peripheral wall, a vertically arranged cylindrical hopper above the housing, a drive

shaft in the bearing sleeve, an electric motor mounted on the housing and connected to rotate the drive shaft, a disk mounted on the upper end of the drive shaft and having teeth projecting upwardly and spiral vanes depending therefrom, and the conical face of said stationary housing and the bottom of said disk providing an annular chamber of progressively increasing height from the picks outwardly to the peripheral wall and the walls of the spout forming a continuation of the chamber with opposite walls progressively diverging from the opening in the peripheral wall to its outlet end.

3. An ice chipping machine comprising a hopper for holding ice to be chipped, a stationary housing having a face opposite the end of the hopper, a rotatable chipping disk between the hopper and face of the stationary housing, said chipping disk having at least one pick projecting from one side for chipping ice fed thereto from the hopper and an opening adjacent the pick through which chipped ice passes, a vane projecting from the other side of the disk and extending spirally from its rotatable axis to its periphery for sweeping engagement with the face of the stationary housing, the rotatable disk and face of the stationary housing forming the opposite sides of an annular passageway through which chipped ice is propelled outwardly by the spiral vane, a spout extending from the passageway, and said face, rotatable disk and spout being formed to provide a passageway for chipped ice with progressively diverging sides from the picks to the outer end of the spout.

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