Sept. 13, 1960 M. W. GARLAND 2,952,391

ICE HOLDER AND DISPENSER

Filed Sept. 3, 1958 3 Sheets-Sheet 1

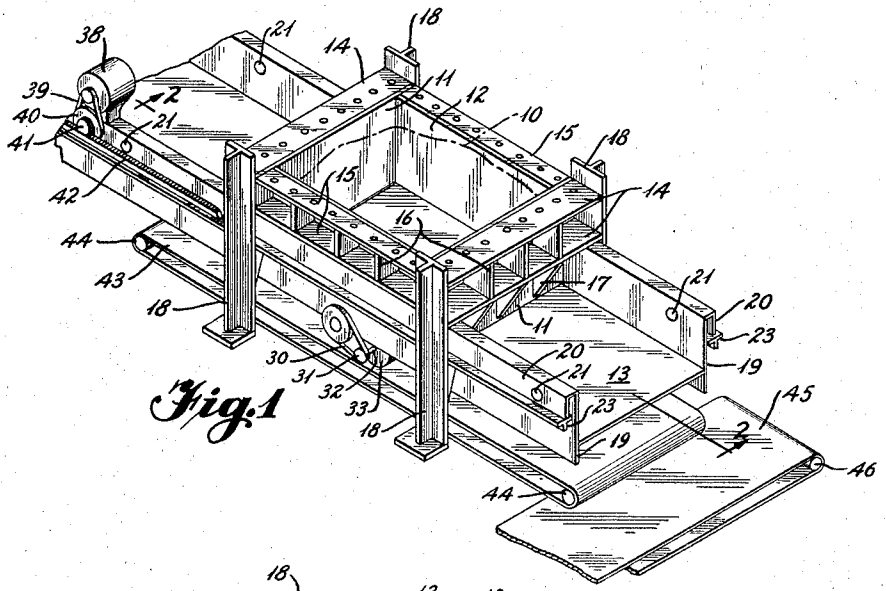


Fig. 1

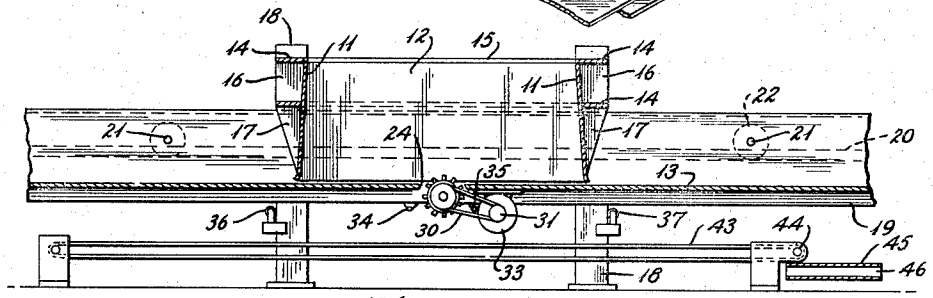


Fig. 2

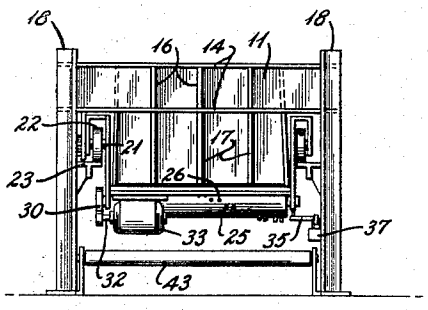


Fig. 3

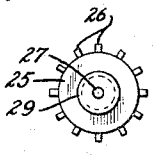


Fig. 5

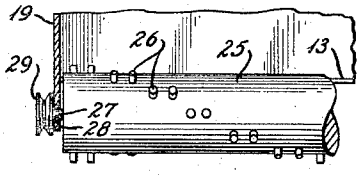


Fig. 4

INVENTOR
M.W.GARLAND

BY Ayalas Dowell
ATTORNEY

Sept. 13, 1960 M. W. GARLAND 2,952,391

ICE HOLDER AND DISPENSER

Filed Sept. 3, 1958 3 Sheets-Sheet 2

Fig. 6

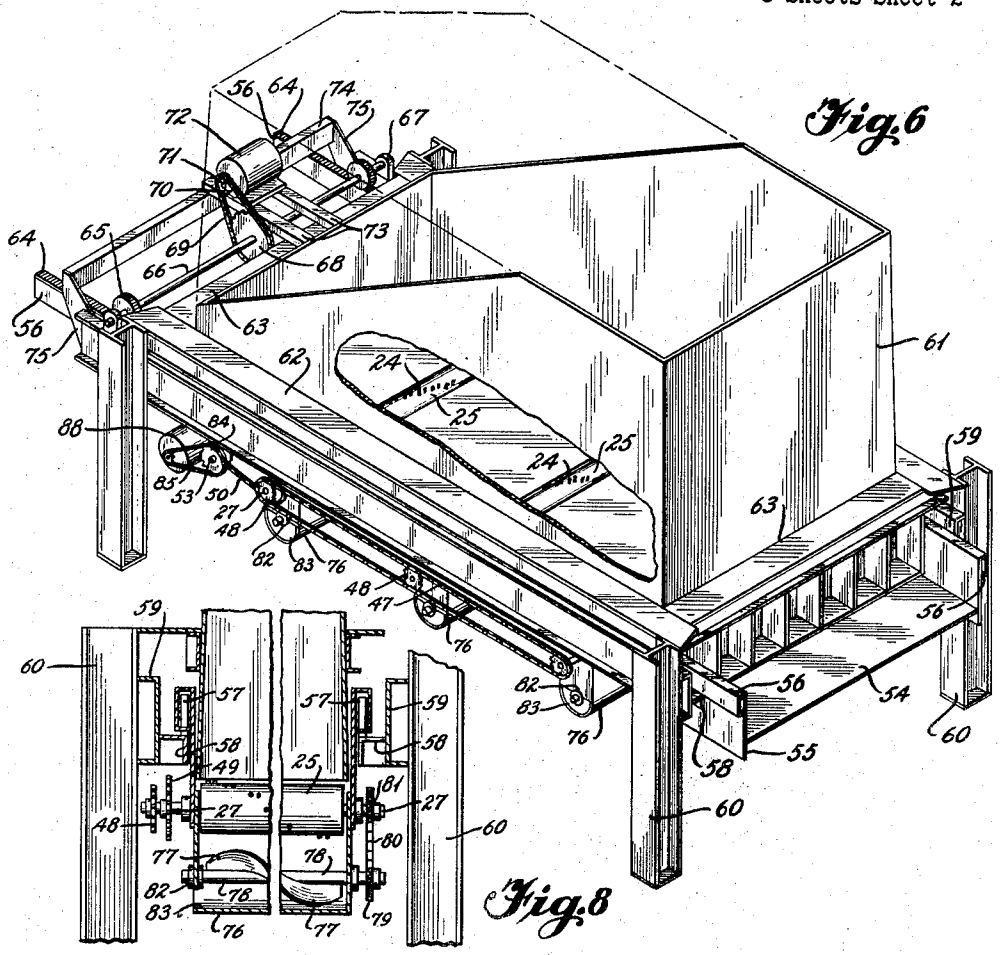


Fig. 8

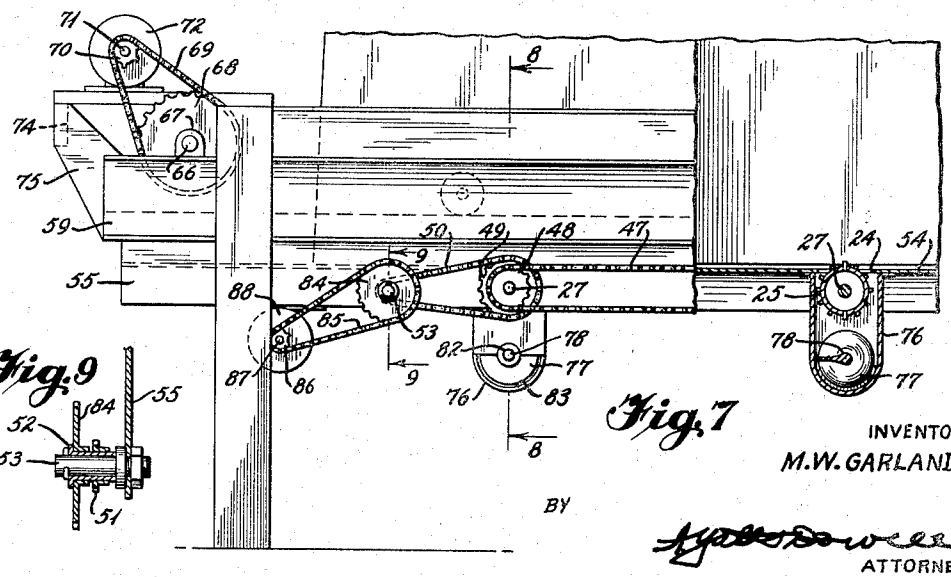


Fig. 7

Fig. 9

INVENTOR
M. W. GARLAND

BY

ATTORNEY

Sept. 13, 1960 M. W. GARLAND 2,952,391

ICE HOLDER AND DISPENSER

Filed Sept. 3, 1958 3 Sheets-Sheet 3

Fig. 10

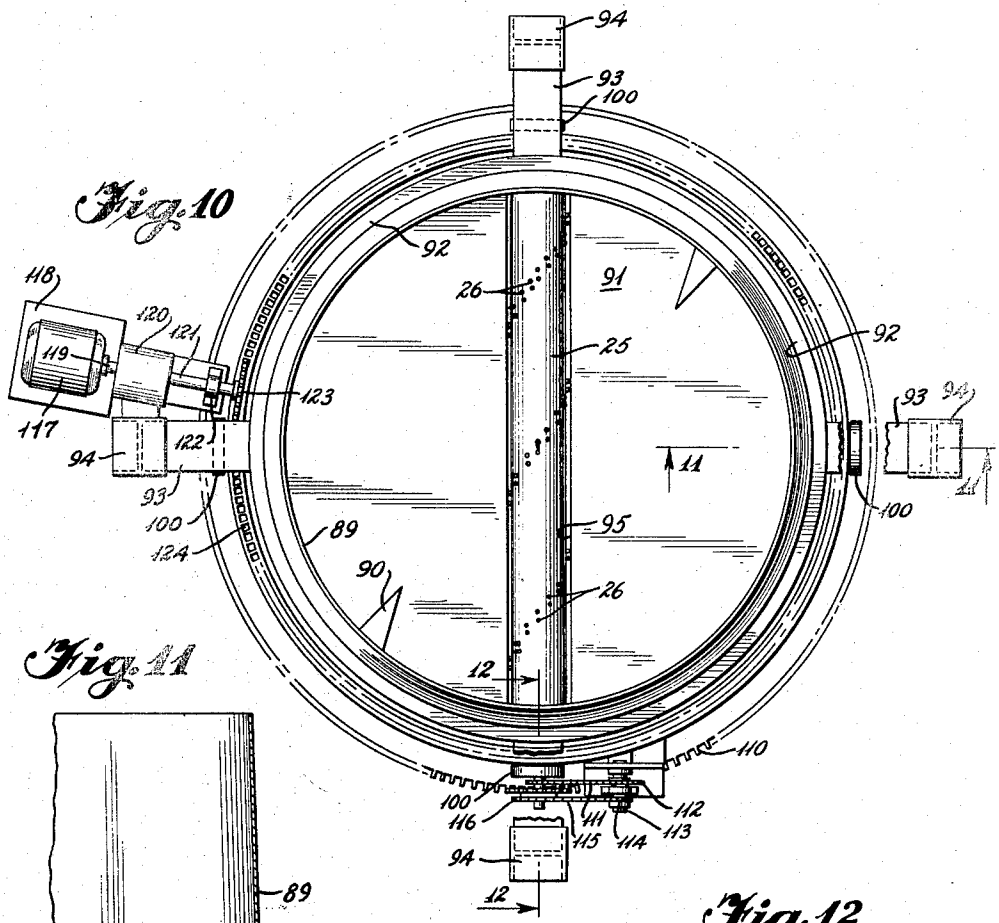


Fig. 11

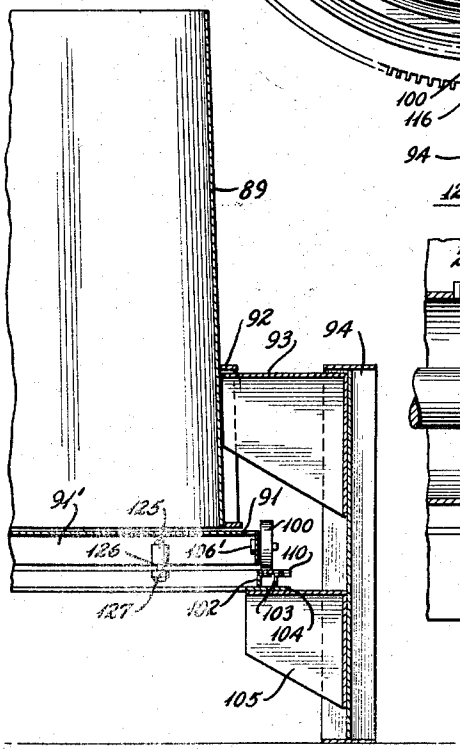
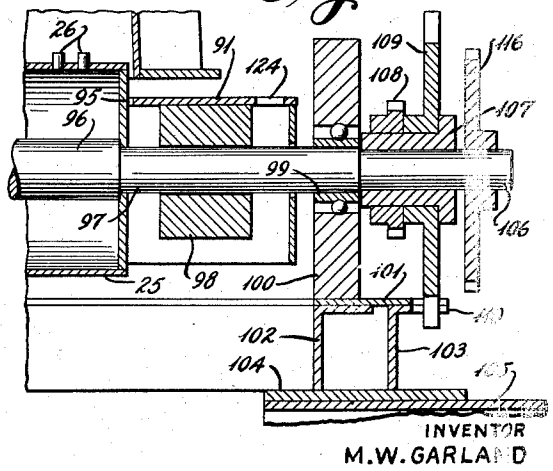


Fig. 12



INVENTOR
M. W. GARLAND

BY

ATTORNEY

United States Patent Office 2,952,391 Patented Sept. 13, 1960

2,952,391

ICE HOLDER AND DISPENSER

Milton W. Garland, Waynesboro, Pa., assignor, by mesne assignments, to Frick Company, Waynesboro, Pa., a corporation of Pennsylvania

Filed Sept. 3, 1958, Ser. No. 758,799

10 Claims. (Cl. 222—80)

This invention relates to the production, storage, distribution, and dispensing of ice in relatively small bodies or particles for use in temperature modification including in connection with the packaging and shipping of perishable foods and other commodities.

The invention relates particularly to a chamber, bin, or storage room for holding small particles of ice and to apparatus or equipment for dispensing such ice from such chamber, bin, or storage room in accordance with requirements and regardless of the volume or quantity of ice within such chamber, bin, or storage room.

Ice for use in various ways has been produced in cakes and crushed, in chips, flakes, small bodies, particles or pieces, and has been stored in bins or contained in room or storage areas from which it has been dispensed both manually and mechanically.

The dispensing of ice in crushed condition or in small particles has been done manually and mechanically neither of which has been satisfactory. Manual removal has been too slow, dependent upon the human element, and expensive, manpower having become shorter, and wages higher. On account of the use of ice, it has become necessary to accelerate or increase the quantity produced as well as the rate of dispensing the same.

Mechanical devices have been inefficient the amount dispensed varying with the change in the size of the mass and the particles having congealed and forced a bridge between the side walls preventing the gravitation of the ice and interfering with the dispensing thereof.

It is an object of the invention to provide apparatus or mechanism for dispensing ice in small particles, which dispensing mechanism is of relatively simple and inexpensive construction, and positive in operation regardless of the amount of ice available and whether the particles of ice have congealed into a frozen mass, or are subject to other conditions which heretofore have interfered with the operation of the dispensing mechanism and the dispensing of the ice.

Another object of the invention is to provide dispensing mechanism which, instead of removing ice from the top of a pile or mass, will remove the ice from the entire bottom area thereof, such mechanism including movable cutting or detaching means, operable over the entire bottom area of the mass of ice.

A further object of the invention is to provide a chamber, bin or storage area for ice of small particle size, such chamber being defined by side walls, a movable floor or bottom with a discharge opening and a cutter in fixed relation thereto movable with the floor over the entire under surface of the ice mass, and powered to drive the cutting mechanism in a manner to dispense the ice during such movement.

Other objects and advantages of the invention will be apparent from the following description taken in conjunction with the accompanying drawings wherein:

Fig. 1 is a perspective illustrating one application of the invention;

Fig. 2, a section on the line 2—2 of Fig. 1;

Fig. 3, an end elevation viewed from right to left in Figs. 1 and 2;

Fig. 4, an enlarged fragmentary side elevation of the rotary cutter;

Fig. 5, an end elevation of the cutter of Fig. 4;

Fig. 6, a perspective of a modified form of the invention;

Fig. 7, an enlarged fragmentary side elevation of the driving end of the embodiment of Fig. 6, with parts broken away;

Fig. 8, a section on the line 8—8 of Fig. 7;

Fig. 9, a section on the line 9—9 of Fig. 7;

Fig. 10, a top plan view of a further modified form of the invention;

Fig. 11, a vertical section on the line 11—11 of Fig. 10; and

Fig. 12, an enlarged fragmentary vertical section on the line 12—12 of Fig. 10.

Briefly stated the invention is a holder of any desired shape such as rectangular, circular or the like for fragmentary ice. The holder includes side wall structure enlarged or diverging slightly from top to bottom to prevent the ice from congealing and forming a bridge so that it can not move downwardly by gravity. Beneath the side wall structure is a movable bottom with a discharge opening for the ice thereon and a device for engaging, freeing and causing ice to fall downwardly and be discharged through such discharge opening. The discharge opening and the cutter may be of elongated generally rectangular shape, and the cutter may be a roller with spaced projections spirally arranged around the same. The cutter may be of a length corresponding substantially to the width of the bottom and with the bottom reciprocable to cause the cutter to travel over the entire area of the bottom and beneath the entire mass of ice in the chamber. If preferred the chamber or bin may be in the form of the inverted frustum of a cone and with a circular rotary bottom and a radially disposed cutter. Power means is employed for driving the cutting mechanism and for producing the necessary movement of the bottom of the device. The discharged ice may be collected in any desired manner.

With continued reference to the drawings, ice particles 10 to be dispensed may be produced in any desired manner and adapted to be placed within a bin or chamber having end walls 11, side walls 12, and a slidable bottom wall or bottom 13.

The end and side walls 11 and 12 diverge slightly from top to bottom so that their lower edges are spaced slightly further apart than their upper edges to prevent ice from forming a bridge between them thus preventing it from moving by gravity downwardly against the bottom 13 at all times.

The sides 11 and 12 are supported by pairs of frame members 14 and 15 respectively, joined by reinforcing members 16. The ends and sides also are supported near their bottoms by reinforcing brackets or gussets 17 so that in effect the bin or chamber is open at both bottom and top and the bottom 13 forms a closure for the bottom and on this closure the ice within the bin is supported.

The bin or chamber is mounted on four corner posts 18 welded or otherwise fastened to the members 14 and 15 to which the ends and sides 11 and 12 are secured by welding or in other desired manner, the parts being preferably metal.

The bottom 13 is mounted between and welded or otherwise secured to parallel side members 19 having their upper portions provided with an outwardly and downwardly extending portion 20 to provide spaced up-

right supporting walls for a pivotal bearing 21 on which is mounted a roller 22 which rests upon a T-shaped side bar or track 23. Four of such shafts 21 and rollers 22 are provided, one adjacent each corner of the bottom although additional rollers and supporting shafts may be used if desired.

The bottom 13 is provided with an ice discharge opening 24 in which is mounted an ice cutter in the form of a roller 25 having relatively short, blunt cutter teeth 26. The teeth are mounted in pairs spirally around and along the length of the roller in spaced relation.

The roller 25 is mounted on shaft members 27 carried in bearings 28 in the side members 19 and the roller being driven by means of a pulley 29 fixed to the shaft 27, such pulley being engaged by a belt 30 driven from a pulley 31 on the shaft 32 of a motor 33.

The bottom 13 with the roller 25 attached may reciprocate beneath the bin and in order to cause reversal of its motion a pair of pins 34 and 35 are provided which are adapted to engage reversing switches 36 and 37. These switches control the operation of a reversible, variable speed motor drive 38 which drives a chain belt 39 and a sprocket 40 having attached thereto a pinion 41 engaging a rack 42 fixed to the track 23. When the armature of the motor 38 operates in one direction the pinion 41 will travel along the rack 42 to cause the bottom to move accordingly carrying with it the rotating cutter 25 which will remove ice at the lowest level within the bin as it travels from one end to the other and across the entire bottom area of the bin.

The ice thus dislodged may fall by gravity downwardly through the opening 24 onto a conveyor 43 mounted on rollers 44 one at each end of the machine and from this conveyor the ice may be discharged onto another conveyor 45 mounted on rollers 46. Thus, ice contained within the bin may be positively dispensed without interruption which might be caused by freezing and bridging. Also the invention permits continuous filling of the bin and removal of the ice instead of the necessity for interrupting the removal or losing time while the removal and filling is being accomplished and necessitating separate operations.

Instead of a single cutter roller adapted to travel a substantial distance across the entire bottom of the mass of ice, a bottom such as that disclosed in Figs. 6, 7 and 8, may be provided. This bottom may have a plurality of openings 24 and a corresponding number of rotating cutters 25 operated in any desired manner as, for example, by a single drive chain 47 engaging about spaced sprockets 48 on the roller shafts 27, one of said shafts having a sprocket 49 (Fig. 8) fixed thereto and driven by a chain 50 extending about a sprocket 51 (Fig. 9) fixed to a sleeve 52, such sleeve being rotatably mounted on a shaft 53 carried in a reciprocable bottom 54 similar to the bottom 13 of the preceding figures and in which bottom the openings 24 are transversely disposed. The bottom 54 is carried by a pair of sides 55 having their upper portions bent outwardly, downwardly and inwardly to provide a hollow box beam 56 in which are mounted rollers 57 (Fig. 8) which roll along tracks 58 attached to a supporting channel 59 carried by posts 60 at each end of the machine. This construction permits the bottom 54 to reciprocate in its mounting, the rollers 57 rolling along the track 58 approximately one-third of the distance of that of Fig. 1.

The posts 60 support a bin 61 by means of a supporting frame having side members 62 and end members 63. Such bin being slightly longer and wider at its bottom than at its top to prevent bridging of ice across the same.

In order to reciprocate the bottom 54 a pair of racks 64 are secured on top of the box beam 56 and these racks are engaged by pinions 65 fixed on a shaft 66 mounted in bearings 67, one at each side of the machine. Between the pinions 65 the shaft has fixed thereon a sprocket 68 driven by a chain 69 engaging a smaller sprocket 70 on the shaft 71 of a motor 72 mounted on a pair of supporting rails 73 attached at one end to the end members 63 and having their other ends attached to a supporting beam 74 carried by brackets 75 attached to the channel members 59.

In order that ice discharged through the openings 24 may be directed to one side of the machine, a transverse U-shaped housing 76 (Fig. 7) may be provided about each roller and in the bottom of which is mounted a screw conveyor 77 on a shaft 78. A sprocket 79 is mounted on the end of each of the shafts 78 and is driven by a chain 80 from a sprocket 81 mounted on and driven by the shaft 27. The opposite end of the screw conveyor 77 is journaled in bearing 82 and the end of the U-shaped housing 76 is provided with an opening 83 for the discharge of ice therethrough.

In order to cause rotation of the ice cutter rollers 25 and the conveyor screw 77, a sprocket 84 is mounted on the rotatable sleeve 52 and such sprocket is driven by a chain 85 from a sprocket 86 mounted on a shaft 87 of a motor 88.

Instead of a square or rectangular bin with a reciprocating bottom as disclosed in the preceding figures a circular slightly frusto-conical bin 89 may be employed having its small end uppermost to prevent ice bridging as previously described and with upright inwardly projecting ribs 90 to prevent the mass of ice within the bin from rotating with the bottom or floor 91 as ice is dispensed.

The bin 89 is supported by an annular frame 92 mounted on a series preferably of equally spaced supporting plates 93 of any desired number, four being disclosed. The supporting plates 93 are mounted on posts 94 which rest upon a floor or other supporting surface. The plates 93 are welded or otherwise secured to the members 92 and 94 so that the bin is maintained in fixed position.

The floor or bottom 91 is provided with an opening 95 for a cutter roller 25 having teeth 26, such cutter roller being mounted on a shaft 96 (Fig. 12) having a reduced portion 97 supported in a bearing 98 attached to the floor 91. The shaft 96 is supported by means of a bearing 99 in a roller 100 which rests upon a circular track 101 mounted on annular flanges 102 and 103, and supported by a series of plates 104 mounted on brackets 105 carried by the posts 94.

The shaft 96, having the reduced portion 97, has a further reduced portion 106 on which is mounted a rotatable sleeve bearing 107 to which are fixed a small sprocket 108 and a driving gear 109 driven by a ring gear 110 formed of the outer perimeter of the track 101. Thus, when the bottom is rotated on the rollers 100 the driving gear 109 will be rotated by its contact with the fixed ring gear 110. Thus, driving the sleeve portion 107, the small sprocket 108, and a chain 111 which in turn drives a sprocket 112 fixed to the shaft 113 carrying a sprocket 114 which drives a chain 115 which drives a sprocket 116 fixed to the reduced portion of the shaft 96.

Thus, this end direct drive provides a reduction in gearing as well as a positive drive. The bottom 91 is driven by a variable speed motor 117 mounted on a platform or support 118, such motor having a shaft 119 which in turn drives through a gear reduction box 120, a shaft 121 at a slow speed, such shaft being mounted in one or more bearings 122 and having a driven gear 123 which projects through openings 124 in the floor 91 for rotating the bottom of the bin.

It will be apparent from the foregoing that when the motor 117 is energized the bottom or floor of the bin will be rotated by the driving gear 123 and due to the rotation of the floor, the ring gear of the floor 110 will engage the sprocket 109 and the chain of gear reduction

elements will drive the gear **116** and the shaft of the cutting roller.

The bottom **91** may have a reinforcing flange or ring **91'** depending therefrom and such ring may be employed to support a stub shaft **106'** which supports the rollers **100** which are disposed at right angles to the cutter **25** and likewise may form a support for a boss **125** in which is disposed a depending stub shaft **126** on the lower portion of which is mounted a roller **127** which engages the inside of the track **102**.

It will be obvious to those skilled in the art that various changes may be made in the invention without departing from the spirit and scope thereof and therefore the invention is not limited by that which is illustrated in the drawings and described in the specification, but only as indicated in the accompanying claims.

What is claimed is:

1. Ice holding and dispensing mechanism comprising side wall structure diverging slightly from top to bottom for preventing the ice from forming a bridge between the side wall structure to stop its downward movement by gravity, a bottom beneath said side wall structure and having an opening for the discharge of ice downwardly therethrough, said bottom being movable and the relation of the opening therein and said bottom being such that the opening may be moved beneath the entire area between the side wall structure making it possible to remove ice from every portion thereof, ice dislodging means of a configuration and disposed within the opening in said bottom and having ice engaging projections extending upwardly in said opening for engaging the ice resting on said bottom to dislodge the same so that it may drop by gravity through said discharge opening, power means for driving said ice dislodging means and for moving said bottom to change the location of said ice dislodging means.

2. Ice holding and dispensing mechanism comprising side wall structure diverging slightly from top to bottom for preventing the ice from forming a bridge across such side wall structure to stop its downward movement by gravity, a bottom beneath said side wall structure and having an opening for the discharge of ice downwardly therethrough, ice dislodging means projecting upwardly in said opening for loosening the ice so that it may drop by gravity through said discharge opening, said bottom being movable with said dispensing opening and ice dislodging means along the bottom of the pile of ice, said ice dislodging means being provided with spaced ice engaging elements, and driving means for said ice dislodging means and for the movement of said bottom.

3. Ice holding and dispensing mechanism comprising relatively stationary upright side wall structure diverging slightly from top to bottom to prevent ice contained between such side wall structure from bridging and preventing it from moving downwardly by gravity, a bottom in cooperative relation beneath and movable relative to said side wall structure, said movable bottom having an opening for the discharge of ice therethrough, and cutter means extending upwardly in said opening to dislodge and cause the discharge of ice through said opening, and means for producing simultaneous motion of said cutter and bottom with respect to said upright side wall structure.

4. Ice holding and dispensing mechanism comprising side wall structure, a bottom beneath said side wall structure and having an opening for the discharge of ice downwardly therethrough, ice dislodging means projecting upwardly in said opening for loosening the ice so that it may drop by gravity through said discharge

opening, said bottom being movable with said dispensing opening and ice dislodging means along the bottom of the pile of ice, said ice dislodging means being provided with spaced ice engaging elements, and driving means for said ice dislodging means and for the movement of said bottom.

5. The structure of claim 3 in which said bottom is generally rectangular, and carriage means and a track supporting the latter.

6. The structure of claim 3 in which said bin is provided with a movable bottom supporting said ice dislodging means.

7. Ice holding and dispensing mechanism comprising circular side wall structure diverging slightly from top to bottom to prevent bridging and failure of the ice to gravitate, said side wall structure having upright internal ribs to prevent rotation of the mass of ice in said bin, a rotatable bottom closing the lower end of said circular bin and having a transversely located dispensing opening, an ice dislodging member having means extending through said opening for engaging and dislodging ice within the bin so that it may be discharged through said opening, means for producing relative rotation between said bottom and the side wall structure of said bin to cause rotary movement of said ice dislodging means.

8. A circular load sustaining member, a sleeve supporting said load sustaining member, anti-friction means supporting said sleeve, ring gears means mounted on the periphery of said sleeve, a motor and gear adapted to drive said ring gears means, a rotary cutter carried by said sleeve, a shaft supporting said rotary cutter, a second ring gears means, an independently rotatable gear on said shaft and in engagement with said second ring gears means, a first pulley adapted to rotate with said independently rotatable gear, a belt connecting said first pulley to a second pulley, a third pulley adapted to rotate with said second pulley, an independent shaft extending from said sleeve and supporting said second and third pulleys, a second belt connecting said third pulley to a fourth pulley fixed to said rotary cutter shaft, said pulleys being adapted to drive said cutter at a different speed than said sleeve when said cutter comes into contact with a load on said load sustaining member.

9. Ice holding and dispensing mechanism as set forth in claim 3 in which the bottom is generally circular and rotatable and with a radially disposed discharge opening.

10. Ice holding and dispensing mechanism as set forth in claim 3 in which the bottom is generally circular and rotatable and with a radially disposed discharge opening, and with a sleeve supporting said circular bottom, a motor driven gear and a ring gear for driving said bottom from said sleeve.

References Cited in the file of this patent

UNITED STATES PATENTS

473,952	Ozley	May 3, 1892
1,113,229	Lyle	Oct. 13, 1914
1,143,634	Lane et al.	June 22, 1915
1,398,047	Stevens	Nov. 22, 1921
2,070,349	Woodruff	Feb. 9, 1937
2,286,554	Lieberman	June 16, 1942
2,689,092	Clark et al.	Sept. 14, 1954
2,726,792	Seymour	Dec. 13, 1955
2,727,542	Fischer	Dec. 20, 1955
2,796,198	Weigel et al.	June 18, 1957
2,796,202	Lawrence et al.	June 18, 1957

FOREIGN PATENTS

804,828	Great Britain	Nov. 26, 1958