

April 19, 1938.

T. J. DAVIS

2,114,557

ICE SLINGER

Filed Dec. 17, 1935

3 Sheets-Sheet 1

Fig. 2.

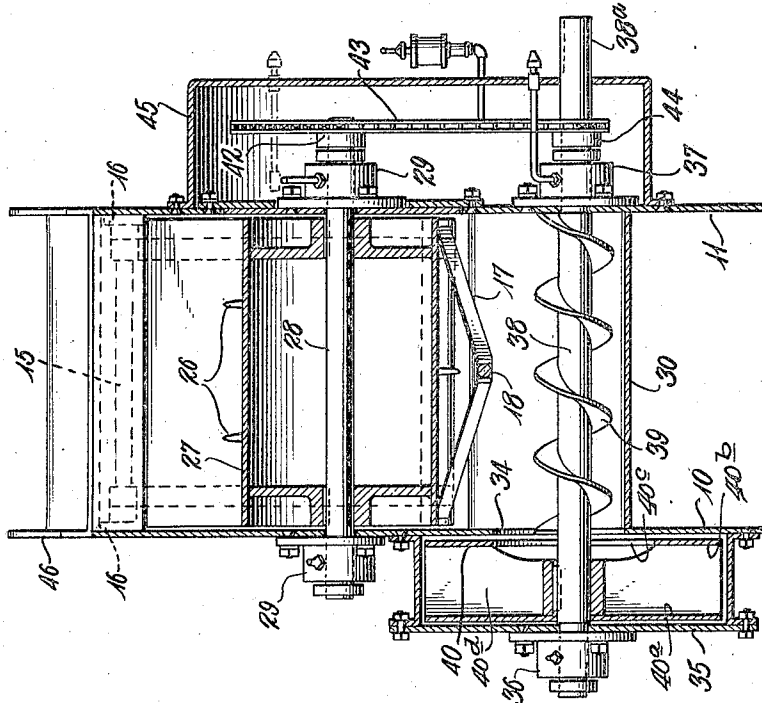
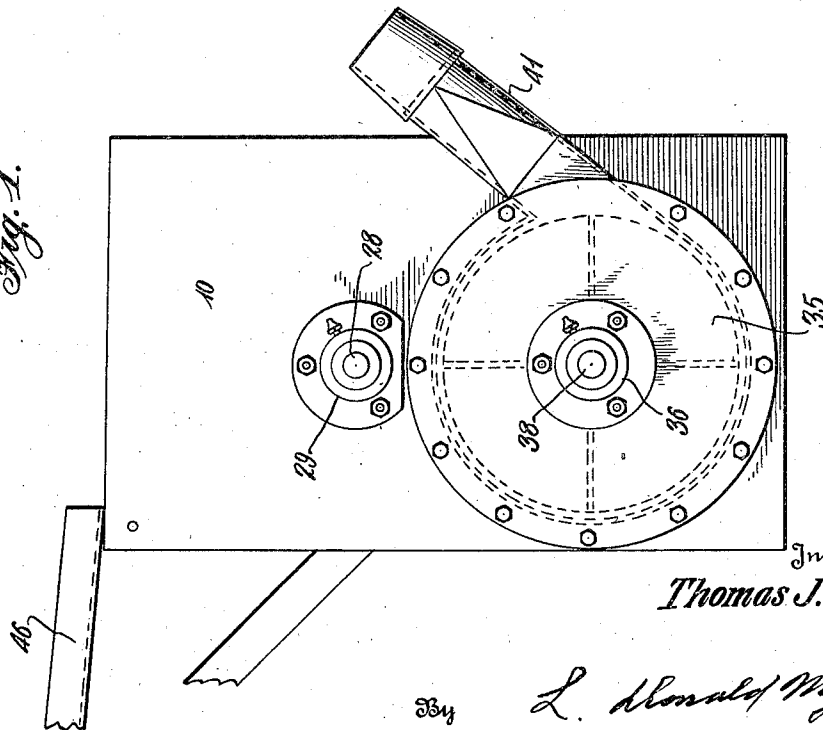


Fig. 1.



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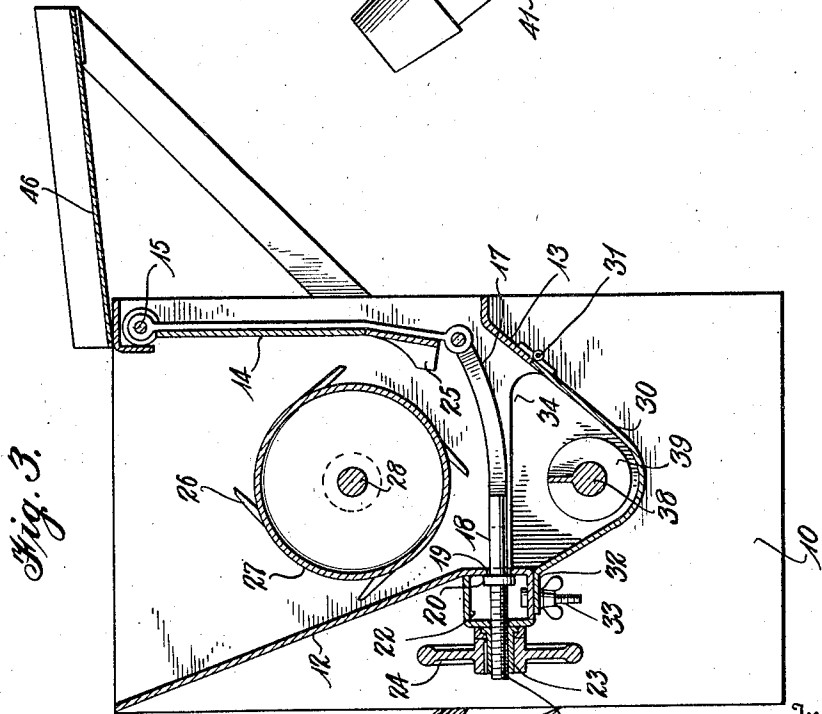
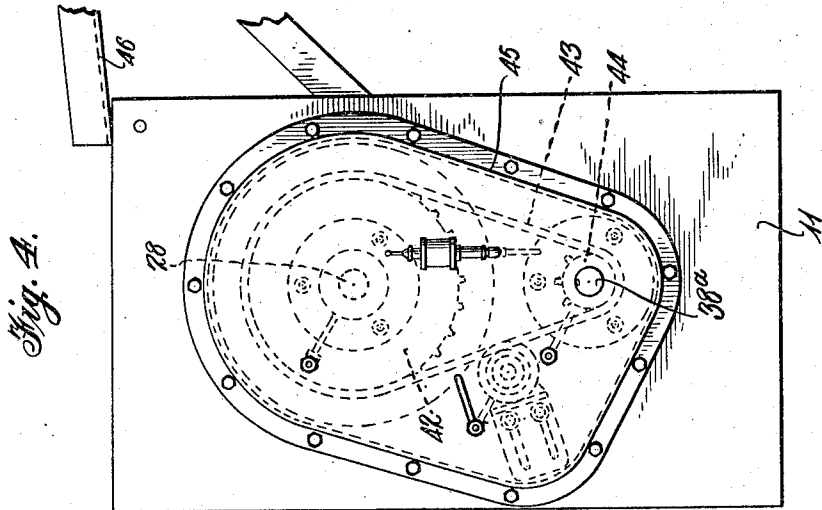
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3 Sheets-Sheet 2



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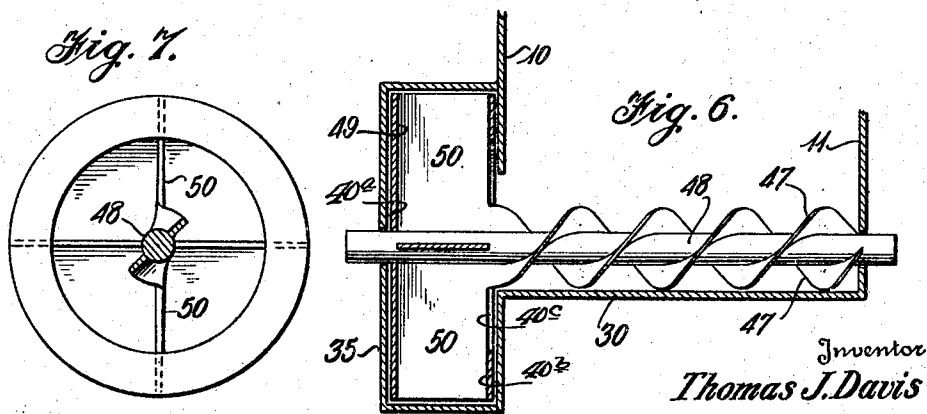
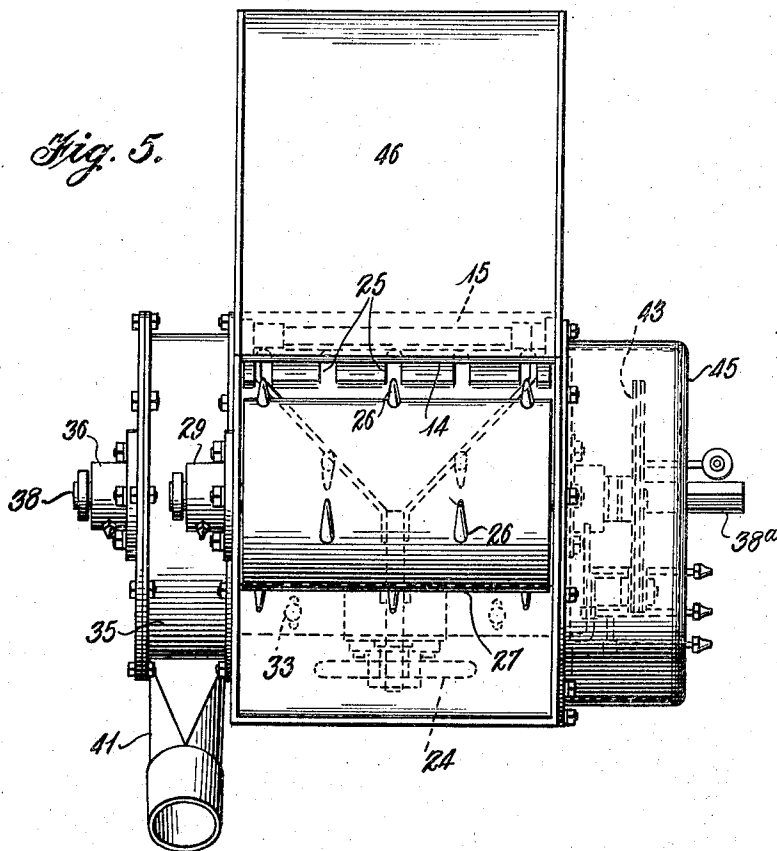
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ICE SLINGER

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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

2,114,557

ICE SLINGER

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Application December 17, 1935, Serial No. 54,884

6 Claims. (Cl. 83—63)

This invention relates to new and useful improvements in ice slingers.

The primary object of this invention is to provide a single unit ice slinger adapted for crushing large lumps or cakes of ice to form small ice cubes, fine ice particles or snow ice which is directly dropped into a mechanical conveyor that positively feeds the crushed ice to an impeller which in turn forces or throws it through a flexible tube, or the like, for spraying the ice over the material to be iced. Obviously, the assembling of mechanism for crushing ice, positively conveying it and delivering the ice to the point of use in a single unit has the decided advantage of causing the mechanism to occupy a minimum amount of space and permitting the weight to be reduced to a minimum with the result that the unit may be made portable as well as stationary.

A further important object of the invention is to provide a single unit of the above mentioned type which has the driven members of its mechanism so arranged relative to each other that a single prime mover may be employed for driving the same with a minimum of transmission equipment and loss of power.

A still further important object is to provide a screw form of conveyor for feeding the ice from the crusher to the impeller.

Other objects and advantages of the invention will be apparent as the description proceeds.

In the accompanying drawings forming a part of this specification and in which like numerals are employed to designate like parts throughout the same,

Figure 1 is a side elevational view of the single unit ice slinger embodying this invention,

Figure 2 is a vertical sectional view of the mechanism disclosed in Fig. 1,

Figure 3 is a vertical sectional view of the mechanism embodying this invention and taken at right angles to the sectional view disclosed in Fig. 2,

Figure 4 is a side elevational view viewed from the opposite side to that disclosed in Fig. 1,

Figure 5 is a top plan view of the mechanism disclosed in the preceding figures,

Figure 6 is a modified form of screw conveyor and impeller mechanism embodying this invention, and

Figure 7 is a transverse sectional view of the mechanism disclosed in Fig. 6.

In the drawings, wherein for the purpose of illustration are shown the preferred embodiments of this invention, and particularly referring to

Figs. 2 and 3, the main housing of the ice slinger unit includes a pair of parallel, substantially rectangularly shaped side plates 10 and 11. These plates are held in fixed relation to each other by an end plate 12 which is connected in any suitable manner at its vertical edges to the side plates. A relatively small section 13 of a bottom wall also is fixed and is connected at its ends to the vertical side walls 10 and 11 for assisting in bracing and spacing these latter walls.

The main housing further includes a breaker plate 14 which is pivoted at its upper edge to a transversely extending shaft 15 which in turn is carried by brackets 16 on the side plates 10 and 11. Figs. 2 and 3 best illustrate this manner of mounting the breaker plate 14. It will be appreciated by inspecting Fig. 3 that the plate 14 is arranged in opposition to the fixed wall 12 for completing the upper portion of the housing.

Figs. 2 and 3 disclose the lower edge portion of the breaker plate 14 as having pivotally connected thereto a forked member 17 which terminates in a stem 18 intended to pass through an aperture 19 formed in the lower portion of the end wall 12. A stop collar 20 is fitted on the stem 19 to limit pivotal movement of the breaker plate 14 in one direction. Outwardly of the collar 20, the stem 18 is threaded at 21 and adjustably passes through an aperture in the outer wall of a box-like formation 22 carried by the wall 12. A nut 23 is threaded on the portion 21 of the stem 18. This nut has keyed thereto an adjusting wheel 24. By inspecting this mechanism in connection with Fig. 3, it will be appreciated that the breaker plate 14 may be adjusted inwardly of the position disclosed in this figure, which position is determined by the stop collar 20.

Figs. 3 and 5 disclose the lower edge portion of the breaker plate 14 as being provided with breaker teeth 25 which cooperate with the picks 26 carried by the periphery of the roll 27. This roll is keyed to a transversely extending shaft 28 which is journaled in bearings 29 mounted in any desired manner on the plates 10 and 11 of the housing. The roll 27 with the picks 26 cooperate with the adjustable breaker plate 14 and its breaker teeth 25 for forming ice crushing mechanism. By employing rolls 27 of different diameters and picks 26 of different sizes, and also by adjusting the breaker plate 14 which carries the breaker teeth 25, the ice lumps or cakes to be crushed by this mechanism may be

crushed into small ice cubes, fine ice particles or snow ice.

As the crushed ice is formed by the mechanism just described, it falls directly into the trough-shaped bottom wall section 30. This bottom wall section is hinged at 31 to the fixed bottom wall section 13. The remaining side edge of the bottom wall is flanged at 32 for being detachably clamped to the bottom of the box-shaped portion 22 by means of the screw and wing nut fastening mechanism 33. The side wall plate 10 is provided with a crushed ice discharge opening 34 arranged in alignment with and corresponding in shape to the trough portion 30 of the bottom wall of the housing.

Suitably bolted, or otherwise fastened, to the outside of the wall 10 is an impeller housing 35. A bearing 36 is suitably mounted on the outer wall of the impeller housing 35. In alignment with the bearing 36 is a second bearing 37 which is suitably secured to the outer side of the wall 11. These bearings support a transversely extending shaft 38 which is of sufficient length to project appreciably outwardly of the bearing 37 to provide an end portion 38a to which a prime mover may be drivingly connected in any desired manner.

Within the trough-shaped bottom wall 30, the shaft 38 is provided with a flight 39 that forms a screw conveyor for feeding the crushed ice deposited in the trough-shaped bottom 30 of the housing to and through the opening 34 in the housing wall 10. This conveyor fed crushed ice is delivered to the center of the centrifugal impeller 40 which is suitably keyed to the shaft 38. The impeller 40 is formed of end walls 40a and 40b with an axial inlet opening 40c formed in the wall 40b. Blades 40d extend radially and are joined to the end walls at their longitudinal edges. The end walls and blades therefor form a plurality of ice impelling chambers which are closed with the exception of the axial inlet and radial outlet openings. This design of impeller has been found to be very desirable for handling ice particles as it maintains the ice out of contact with the walls of the stationary housing 35 to the greatest extent possible, thereby preventing formation of ice on the inner surfaces of the housing walls and the drag of the blades 40d and the ice particles being impelled over the housing walls which would retard rotation of the impeller and cause breakage of the ice particles. It will be appreciated that the impeller must rotate at a high rate of speed to effect delivery of the ice particles and if the particles are broken, undue slushing of the ice will result.

The housing 35 is provided with an outlet 41, (see Figs. 1 and 5). A flexible tube, or the like, is intended to be connected to the outlet 41 so that the crushed ice thrown through the outlet of the impeller housing 35 may be controllably delivered to and sprayed upon the material to be iced.

The shaft 28 is disclosed in Figs. 2 and 4 as having mounted thereon a sprocket 42 over which is trained a sprocket chain 43. This chain also is trained over a sprocket 44 suitably keyed to the shaft 38. It will be appreciated that by applying power from a single prime mover to the end 38a of the shaft 38, the ice crusher roll 27, the screw conveyor flight 39, and the centrifugal impeller 40 will be directly driven thereby.

A suitable housing 45 is connected to the side wall plate 11 of the main housing for enclosing

the transmission mechanism employed for driving the shaft 28 from the main shaft 38.

When desired, a shelf 46, as shown best in Figs. 3 and 5, may be employed for supporting large lumps or cakes of ice prior to feeding the same into the open upper end of the main housing where they are operated upon by the picks 26 of the crusher roll 27.

Figs. 6 and 7 disclose a modified form of screw conveyor and centrifugal impeller. This modification consists of two screw conveyor flights 47 which are suitably fastened to a main drive shaft 48 which corresponds to the shaft 38 of the preceding figures. The impeller unit 49 has surfaces or blades 50 which are suitably connected to or formed integral with the flights 47 of the screw conveyor so that continuous surfaces will connect the conveyor flights and the impeller blades. This modified form of combined screw conveyor and impeller are housed in the same members as that disclosed in and described in connection with the preceding figures. The same reference characters, therefore, will be applied. It will be understood that the number of flights 47 carried by the shaft 48 may be varied as desired and that the use of two in these figures is merely illustrative.

It will be appreciated that the single unit ice slinger embodying this invention is capable of handling large lumps or cakes of ice for crushing the same and that the crushed ice will be uniformly and quickly delivered from the unit to the point of use where it may be sprayed upon the material to be iced. The compact arrangement of the various elements of the unit enables the same to be made portable by mounting upon any form of conveyance and also permits large lumps or cakes of ice to be delivered to the same without being elevated to a considerable height. The compactness of the device, of course, will cause it to occupy a minimum amount of space and have a minimum weight.

The use of a mechanical conveyor for feeding the crushed ice formed by the cooperating picks 26 and breaker teeth 25 quickly and uniformly to the impeller mechanism has numerous advantages which will be set forth as follows:

(a) It permits the use of wide crushing rolls and avoids the necessity of placing the crusher a considerable distance above the center of the impeller which would be necessary if a chute, or other form of gravity feed were used for delivering the crushed ice.

(b) It feeds the ice to the center of the impeller and thus the breakage of the ice cubes is less with this arrangement than would occur if a gravity form of feed were employed.

(c) It eliminates the tendency of the crushed ice to choke at any point between the crusher and the impeller and provides a more uniform feed of the crushed ice with the result that maximum efficiency is obtained.

(d) It also enables a single shaft to be used for the screw conveyor and the impeller and as a main drive shaft for all of the rotating parts of the entire unit.

It is believed that the mode of operation of the ice slinger unit embodying this invention will be readily understood from the preceding description and that no further explanation will be necessary.

It is to be understood that the forms of this invention herewith shown and described are to be taken as preferred examples of the same, and that various changes in the shape, size, and ar-

rangement of parts may be resorted to without departing from the spirit of the invention or the scope of the subjoined claims.

Having thus described the invention, I claim:

5 1. In an ice handling device, a housing comprising side walls and one end wall fixed relative to each other, a pivoted breaker plate forming the second end wall, and a trough-shaped bottom wall, a breaker plate adjusting rod projecting through the housing, means associated with the fixed end wall for actuating said rod to adjust and hold the breaker plate in different positions, a crusher roll rotatable in the housing and cooperating with the breaker plate for crushing ice and dropping it into the trough, means for pivotally supporting the bottom wall to permit it to be dropped to obtain access to the housing below the crusher roll, a screw conveyor rotating in the trough for feeding the crushed ice longitudinally thereof, and means for receiving the crushed ice from said trough and throwing it toward the point of use.

2. In an ice handling device, a housing comprising side walls and an end wall fixed relative to each other, a breaker plate pivoted at its upper edge forming the second end wall, and a substantially V-shaped trough forming the bottom wall, means for pivotally supporting one edge of said trough beneath the breaker plate, a lateral extension carried by the lower portion of the fixed end wall, a breaker plate adjusting rod projecting through the housing, means associated with the adjusting rod and the lateral extension for actuating said rod to adjust and hold the breaker plate in different positions, means associated with the free edge of the trough and the lateral extension for detachably retaining said trough in elevated position, a crusher roll in the housing and cooperating with the breaker plate for crushing ice and dropping it into the trough, and a conveyor operating in the trough for feeding the crushed ice longitudinally thereof.

3. In an ice handling device, a main housing having a trough shaped bottom portion and a discharge opening at one end of the said trough, means in the housing for crushing ice and dropping the same into said trough, an impeller housing having a tangential outlet and mounted on the housing in communication with the trough through said discharge opening, a shaft extending through the trough and impeller housing, flights forming a screw conveyor mounted on the shaft within the trough, and an impeller mounted on the shaft within the impeller housing, said impeller comprising end walls, one of which has an axial inlet opening registering with the discharge opening of the main housing, and a plurality of radial blades joined to the end walls at their longitudinal edges.

4. In an ice handling device, a main housing having a trough shaped bottom portion and a discharge opening at one end of the said trough,

means in the housing for crushing ice and dropping the same into said trough, an impeller housing having a tangential outlet and mounted on the housing in communication with the trough through said discharge opening, a shaft extending through the trough and impeller housing, flights forming a screw conveyor mounted on the shaft within the trough, and an impeller mounted on the shaft within the impeller housing, said impeller comprising end walls, one of which has an axial inlet opening registering with the discharge opening of the main housing, and a plurality of radial blades joined to the end walls at their longitudinal edges, said conveyor flights and impeller blades being connected to form continuous crushed ice feeding surfaces.

5. In an ice handling device, a main housing having a substantially V-shaped bottom wall forming a trough with a large top opening, the housing at one end of the trough having a large discharge opening of the size and shape of and aligned with said trough, means in the housing for crushing ice and dropping it into said trough, an impeller housing having a tangential outlet and mounted on the housing in communication with the trough through said discharge opening, a shaft extending through the trough and impeller housing, flights mounted on the shaft within the trough and forming a screw conveyor of considerably less area than the trough or the discharge opening, and an impeller mounted on the shaft within the impeller housing, said impeller comprising end walls, one of which has an axial inlet opening registering with the discharge opening of the main housing, and a plurality of radial blades joined to the end walls at their longitudinal edges.

6. In an ice handling device, a main housing having a substantially V-shaped bottom wall forming a trough with a large top opening, the housing at one end of the trough having a large discharge opening of the size and shape of and aligned with said trough, means in the housing for crushing ice and dropping it into said trough, an impeller housing having a tangential outlet and mounted on the housing in communication with the trough through said discharge opening, a shaft extending through the trough and impeller housing, flights mounted on the shaft within the trough and forming a screw conveyor of considerably less area than the trough or the discharge opening, and an impeller mounted on the shaft within the impeller housing, said impeller comprising end walls, one of which has an axial inlet opening registering with the discharge opening of the main housing, and a plurality of radial blades joined to the end walls at their longitudinal edges, said conveyor flights and impeller blades being connected to form continuous crushed ice feeding surfaces.

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