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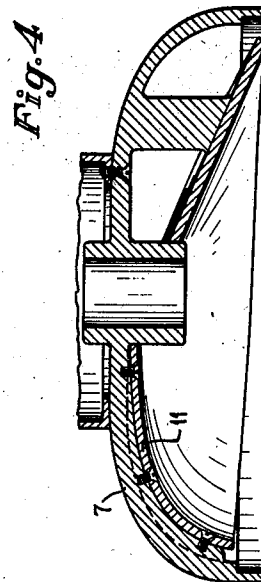
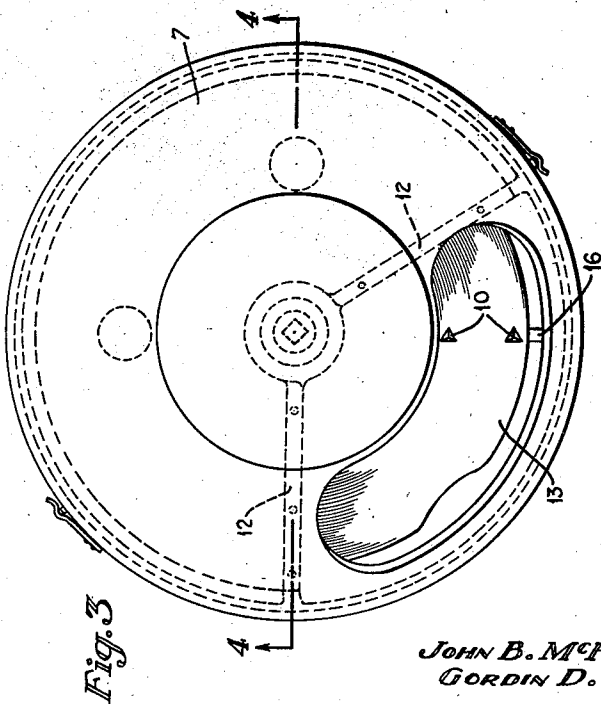
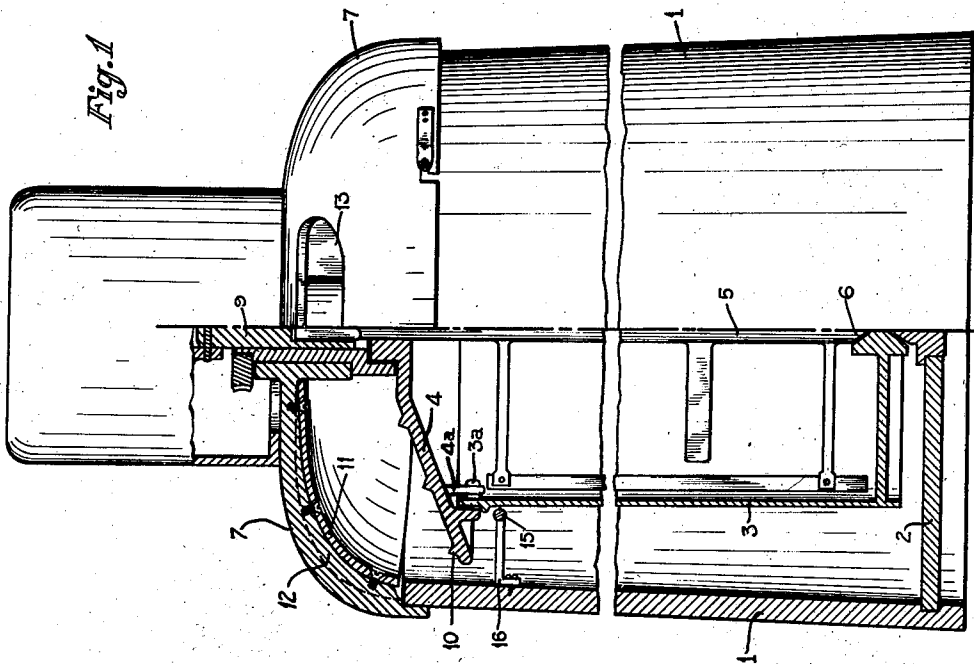
J. B. McFERRAN, JR., ET AL

2,290,836

COMBINED CRUSHER AND FREEZER

Filed March 2, 1940

2 Sheets-Sheet 1



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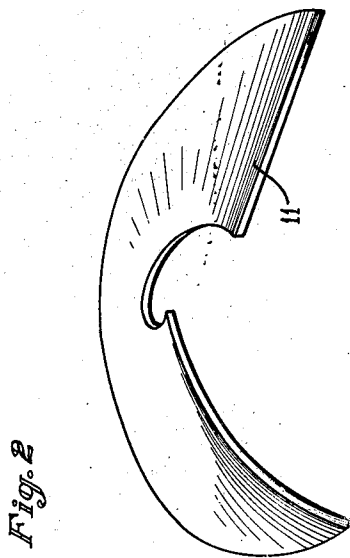
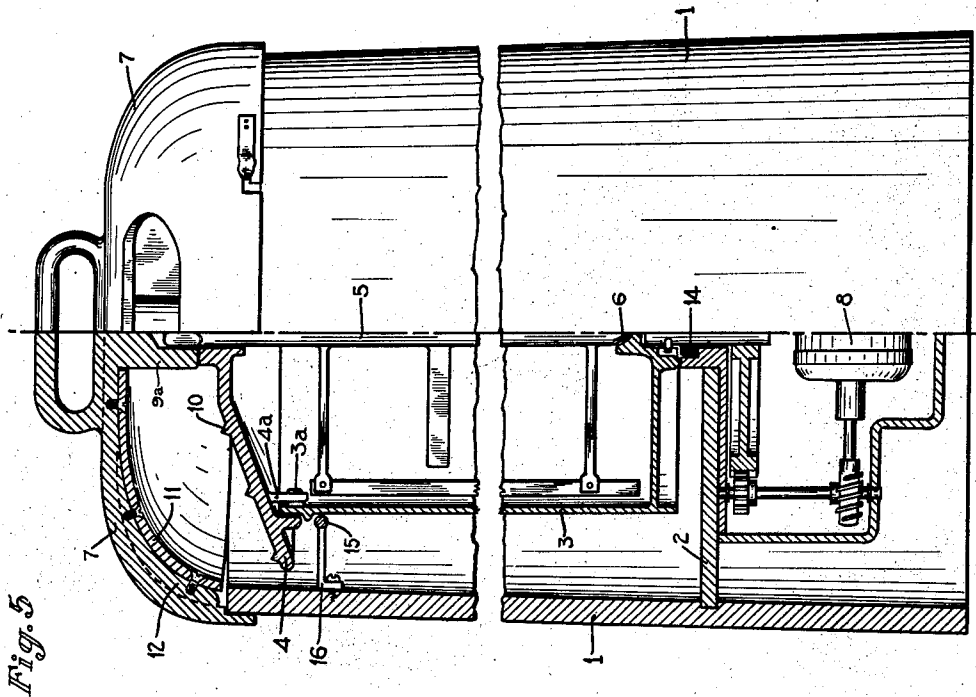
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## UNITED STATES PATENT OFFICE

2,290,836

## COMBINED CRUSHER AND FREEZER

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## 11 Claims. (Cl. 83—63)

This invention relates to ice-cream freezers of the tub type, that is to say freezers having a tub providing an ice chamber, a churning unit within the ice chamber and manually driven or motor-driven means for operating the churning unit.

Heretofore, it has been proposed to incorporate, in the structure of ice-cream freezers of this general character, some means for crushing the ice which is placed in the ice chamber around the churning unit during the churning operation. So far as is known, a satisfactory combination of ice crusher and ice-cream freezer has not yet been devised.

The principal object of this invention is to combine a rugged and relatively compact ice crusher with an ice-cream freezer into a relatively inexpensive, highly effective unit.

Another important object is to provide a combination of this general character of simple design and pleasing appearance.

A further object is to incorporate the ice crusher so that it functions not only to crush the ice fed into the freezer but also to effect a partial distribution of the ice around the churning unit within the chamber.

A further object is to provide a novel form of ice crusher which may be manufactured as a relatively inexpensive, highly effective independent unit.

The invention is illustrated in the accompanying drawings, wherein:

Figure 1 is a view, partly in vertical section and side elevation, illustrating a conventional type of freezer to which the invention is applied;

Figure 2 is a perspective of the retaining wall;

Figure 3 is a top plan view of the Figure 1 structure;

Figure 4 is a section through the cover along line 4—4 of Figure 3;

Figure 5 is a view, partly in vertical section and side elevation, illustrating an alternative freezer structure embodying my invention.

The tub type of freezer shown in Figures 1 through 4 conventionally includes: a tub 1 having circular side walls and a bottom partition 2 cooperating to define an ice chamber; a rotatable churning vessel 3 removably positioned centrally within the ice chamber, the vessel having a removable closely-fitting lid 4 and a stationary churning element 5, the upper end of which projects through the lid. Freezers of this type universally are provided at the bottom with some suitable means such as pin 6 for rotationally centering the vessel within the ice chamber, and, at the top, with a framework 7 removably mount-

ed on the top of the tub and carrying a driving member, such as motor 8, and a restraining member, such as lug 9. These parts are arranged respectively to engage the rotatable churning vessel 3 and the stationary churning element 5 when the framework is properly mounted on the top of the tub.

In accordance with my invention, an ice crusher is provided in the space between the upper end of the vessel 3 and the framework 7. The crusher is composed of a rotatable crushing element and a stationary retaining wall both of which cooperate to define a crushing chamber which taperingly extends in the direction of rotation.

The rotatable crushing element can be conveniently incorporated in the churning-vessel lid 4. Accordingly, the radial end face, which the lid provides in relation to the axis of rotation, is provided with a series of spaced cutting or crushing elements 10. While the lid may be of the conventional flat type, it preferably is fashioned to incline or slope downwardly from the axis of rotation to its periphery, which is spaced from the side walls of the tub to provide an opening through which crushed particles of ice may fall into the ice chamber. Positive rotation of the lid may be insured by cooperating lugs 3a and 4a mounted on the inner walls of the vessel 3 and lid 4 respectively.

The retaining wall presents, in relation to the axis of rotation, a radially-extending, downwardly-facing flat surface which spirals downwardly around the axis of rotation. This member preferably is in the form of a sheet-metal strip 11 which, as shown, is rigidly secured to the framework 7 and spirally extended approximately  $\frac{3}{4}$ ths of a revolution around the axis of rotation. Additionally, it is sloped downwardly, from the axis of rotation outwardly toward the tub, simply to conform to the slope of the radial end face of lid 4.

Due to the spiral form of the retaining wall 11, the vertical spacing, between it and lid 4, decreases in the direction of rotation; hence the crushing chamber formed by these parts tapers in the same direction. As a consequence, during operation, when lumps of ice are dropped upon lid 4 in advance of the entrance or mouth of the crushing chamber, they will be carried into the crushing chamber and there compressed between the retaining wall 11 and the lid 4, whereupon the crushing elements 10 will be brought successively into engagement with the ice, causing it to break into smaller and smaller

pieces which slide, or are forced, radially outward until they drop over the edge of the lid 4 into the ice chamber.

Since the retaining strip, when made of light sheet material, will require re-enforcement along its length, in order to withstand the heavy crushing pressures created during the operation of the device, the framework 7 is made in the form of a cap or cover fitting over the mouth of the tub and provided with re-enforcing lugs or flanges 12 extending downwardly into engagement with the strip 11 and with an ice-receiving opening 13 positioned adjacent the ends of the strip 11. The framework cap 7 may be removably secured to the tub by any suitable means such as the well-known bayonet type of fastener comprising spaced pins on the outer side walls of the tub adjacent its mouth and correspondingly spaced slots in the cap along its periphery, the slots extending upwardly from the periphery and thence horizontally in a direction opposite to the direction of rotation.

Inasmuch as freezers of this general type are usually used in the home, good appearance, coupled with simplicity of design achieved at low expense, is highly desirable. An alternative construction embodying other features of this invention which make the achievement of these objectives possible, is illustrated in Figure 5. In this structure, the driving motor 8 is concealed by mounting it underneath the bottom partition 2 within a chamber formed by extending the side walls of the tub 1 downwardly. The motor is operatively connected, to the bottom of the churning vessel, by extending its drive through a leak-proof fitting 14 on the bottom partition 2. The framework cap 7 is provided with an axially arranged depending restraining member or lug 9a which, when the cover is positioned on the tub, fits over the upper end of the stationary churning element 5 to restrain it against rotation. In order to facilitate the attachment of the framework cover to the tub, a centering ring 15 is arranged concentrically within the upper portion of the ice chamber to encircle the churning vessel. The ring 15 is secured in any suitable manner to the tub 1 as by means of spaced brackets 16. The details of this structure otherwise are generally similar to the structure shown in Figures 1 through 4. The use of a bottom drive permits the motor to be concealed, the framework cap to be rounded off, and the churning element retaining means to be simplified. In this way, the appearance of the freezer is enhanced and its structure simplified at relatively low expense.

Having described our invention, we claim:

1. An improvement in freezers of the class described comprising the combination with a freezer of the tub type having a lower churning vessel and an upper framework with a space therebetween, of an ice crusher in said space, said crusher including: a member arranged in said space for rotation about a vertical axis, said member presenting an end face; crushing elements on said face; and a stationary retaining wall in said space, said wall being vertically spaced from and cooperating with said end face to define a crushing chamber which taperingly extends in the direction of rotation of said elements.

2. The improvement defined in claim 1 wherein said rotatable member is in the form of a disc with the crushing elements on one face of said disc.

3. The improvement defined in claim 1 wherein said rotatable member is positioned below said wall and fashioned in the form of a disc which slopes downwardly from its axis of rotation toward its periphery, the retaining wall being sloped along the narrower portion of the chamber to conform generally to the slope of said disc.

4. The improvement defined in claim 1 wherein said retaining wall extends helically along the axis of rotation of said member.

5. An improvement in freezers of the type having a tub, a rotatable churning vessel in the tub, and a framework at the upper end of the tub comprising: a member horizontally arranged over the upper end of the vessel to rotate in one direction therewith, the periphery of said member cooperating with the walls of the tub to form an opening; crushing elements on the upper face of said member; and a stationary retaining wall spaced above said member and cooperating with it to define a crushing chamber which taperingly extends in the direction of rotation of said member.

6. The improvement defined in claim 5 wherein said member forms the lid of said churning vessel.

7. The improvement defined in claim 5 wherein said retaining wall extends helically along the axis of rotation of said member.

8. A combination freezer and crusher comprising: a tub having an ice chamber; a rotatable churning vessel in said chamber, said vessel having a lid at its upper end; crushing elements on the upper face of said lid; and a cover framework for the tub, said cover having an inner wall which extends helically along the axis of rotation to form, in cooperation with said lid, a crushing chamber taperingly extending in one direction of rotation.

9. The combination defined in claim 8 wherein: said churning vessel and lid are arranged for rotation about a vertical axis; the upper face of said lid slopes downwardly from its axis of rotation toward its periphery which cooperates with the inner wall of the tub to form an opening through which the crushing chamber communicates with the ice chamber; and said cover is provided with an ice-receiving inlet opening communicating with said crushing chamber.

10. A combination freezer and crusher comprising: a tub having a bottom partition dividing the interior of the tub into an upper ice chamber and a lower motor chamber; a churning unit in the upper ice chamber; a driving motor in the lower motor chamber; a driving connection extending through said bottom partition and connecting the motor to the unit; a framework securable to the tub at its upper end; and an ice crusher arranged between said framework and the upper end of said unit.

11. The combination defined in claim 10 wherein tub supported means are provided in the upper part of the ice chamber to center the churning unit therein.

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