Nov. 13, 1934. T. J. FEGLEY ET AL 1,980,952

MACHINE FOR BREAKING CUBES OF ICE

Filed July 29, 1931 2 Sheets-Sheet 1

Fig. 1.

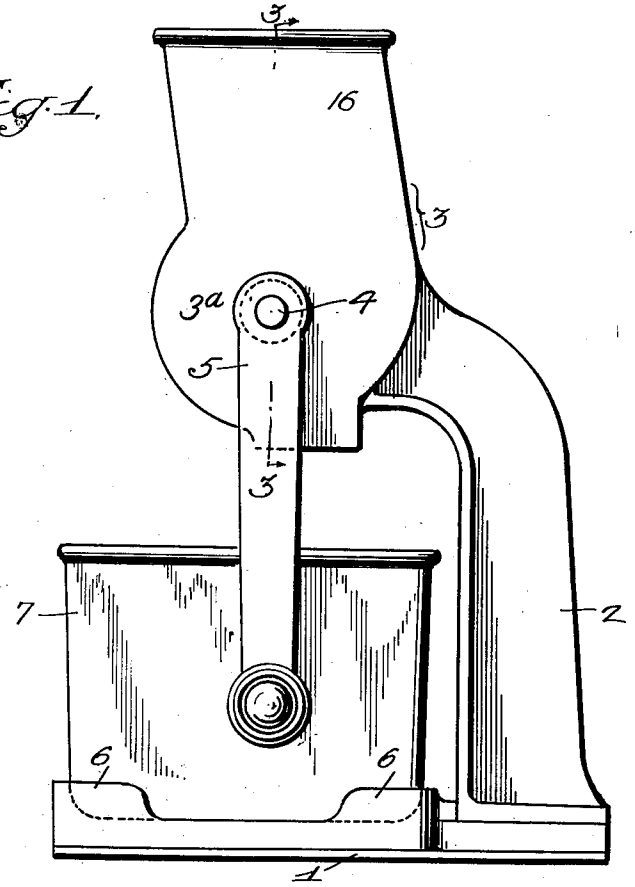



Fig. 6.

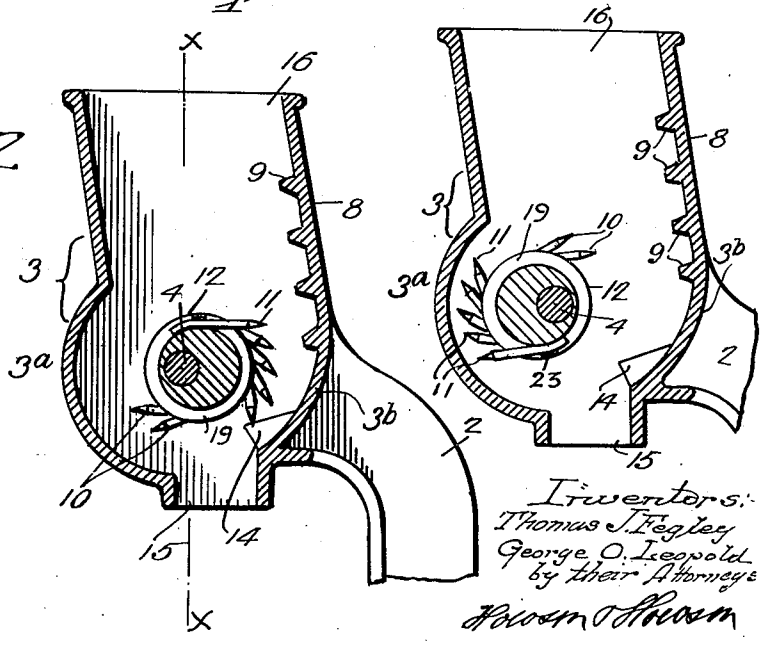



Fig. 2.




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Fig. 3.

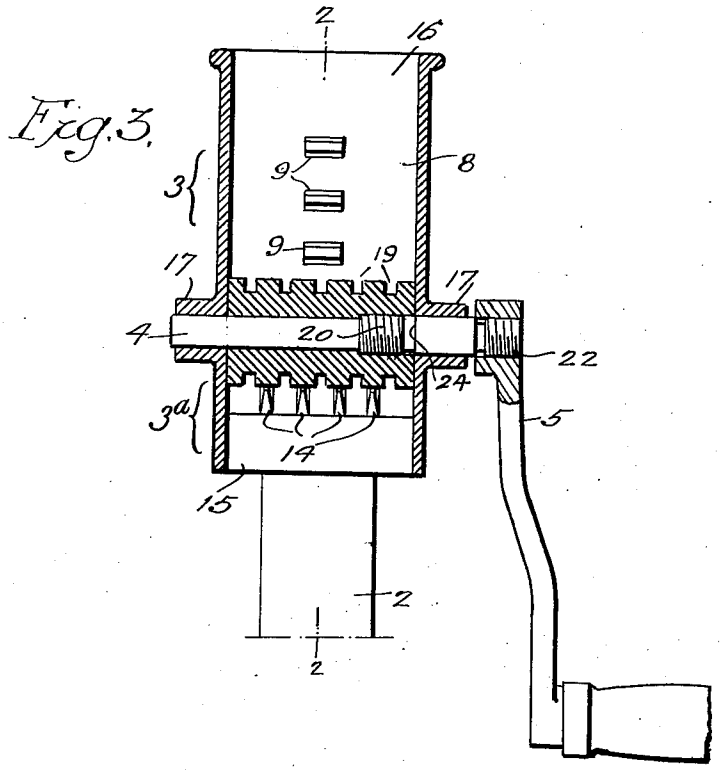



Fig. 4.

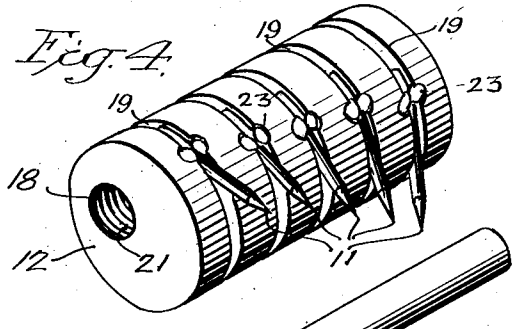
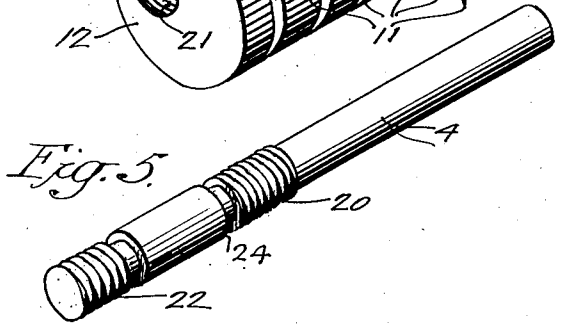



Fig. 5.




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# UNITED STATES PATENT OFFICE

1,980,952

## MACHINE FOR BREAKING CUBES OF ICE

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Application July 29, 1931, Serial No. 553,858

12 Claims. (Cl. 83—63)

One object of our invention is to make a machine particularly adapted for breaking the cubes of ice formed in mechanical refrigerators. These cubes are very hard to break in the ordinary machine designed for reducing rough uneven pieces of ice into chips or other forms or particles.

A further object of the invention is to make a machine which will engage and hold ice cubes while being cut and broken into the required sizes.

A still further object is to provide means for cutting and crushing the cubes as they pass through the machine.

In the accompanying drawings:

Fig. 1 is a side view of our improved machine;

Fig. 2 is a sectional view on the line 2—2, Fig. 3, showing the eccentrically-mounted cylinder in the crushing position;

Fig. 3 is a sectional view on the line 3—3, Fig. 1;

Fig. 4 is a detached perspective view of the breaking cylinder;

Fig. 5 is a detached perspective view of the spindle on which the cylinder is mounted; and

Fig. 6 is a sectional view showing the eccentrically-mounted cylinder in the retracted position.

Referring to the drawings: 1 is the base of the machine. 2 is a standard which supports the casing 3 made in the form illustrated in Fig. 3. 4 is the spindle on which is mounted the cylinder 12. 5 is a handle which is screwed onto the spindle and by which the cylinder is turned. 6 are flanges projecting from the base for holding the receptacle 7, which may be of glass or other suitable material, and in which the chips or small particles of ice are collected as they are discharged from the machine.

The casing 3 has a cylindrical portion 3*a* in which is located the toothed eccentrically mounted cylinder 12. The crushing surface 3*b* of the cylindrical portion 3*a* is segmental. The hopper 16 projects above the cylindrical portion 3*a* and is of such size, in the present instance, to receive cubes of ice formed in a mechanical refrigerator.

It will be noticed that the wall 8 of the hopper 16 is inclined in respect to the vertical line *x* through the spindle 4, Fig. 2, so that when the cube of ice is engaged by the teeth 10 and 11 of the cylinder 12 it will be held from lifting by the inclined wall as well as by transverse ribs or lugs 9 on the wall which engage the ice cube and tend to hold the cube while it is being penetrated and broken by the teeth 10 and 11.

The cubes of ice are fed into the hopper portion 16 of the casing 3 and are engaged by the transverse ribs or lugs 9, which are comparatively short in the present instance, the ribs or lugs holding them while they are being cut by the teeth 10 and 11 on the cylinder 12. By reason of the relatively short, vertically-spaced ribs or lugs 9, which are preferably located along the center portion of the inner face of the inclined wall 8, the relatively small ice cubes may be placed in the hopper 16 in any position and the said ribs or lugs 9 will engage the cubes, the unobstructed space on each side of said ribs or lugs allowing the cubes to extend past the ribs or lugs at an angle to the inclined wall so that a corner of the rib or lug will engage above an upper edge of the cube to hold the same in position to be engaged by the teeth 10 and 11 on the cylinder 12. The side walls of the hopper form substantially square corners with the wall 8. When the ice penetrating and breaking mechanism engages an ice cube, the cube is forced into one of the said corners so that it enters one of the said spaces and abuts against the wall 8 and a side wall. One of the ribs 9 of the series of alined, fixed, vertically-extending ribs, engages the cube and this, together with the abutment of the cube with the hopper walls, serves to hold the cube firmly so that it may be broken. At the lower end of the casing are a series of vertical ribs 14 which detain the pieces while they are being further cut by the teeth 11 and crushed by the eccentrically-mounted cylinder against the crushing surface 3*b* of the casing. When the particles of ice have been reduced in size, they are discharged through the outlet opening 15.

At each side of the casing 3 are the bearings 17 for the shaft 4 which form trunnions for the eccentrically-mounted cylinder. The shaft is shown in detail in Fig. 5, and this shaft passes through an opening 18 in the cylinder 12 located eccentrically in respect to the periphery of the cylinder, so that as the cylinder is rotated by the shaft, it has an eccentric movement to and from the crushing surface 3*b* of the casing, the portion of the cylinder furthermost from its axis constituting the crushing portion of the cylinder. In the periphery of the cylinder are a series of grooves 19, in which are located the sharp, spike-shaped teeth 10 and 11. In the present instance there are two teeth 10 which project tangentially from the cylinder nearest the opening 18 in the cylinder, while the series of teeth 11 project tangentially from the cylinder at a greater distance from the center of the opening 18, and the several teeth are offset so that one tooth

will cut in advance of the other in order that the entire teeth of each series will not engage the ice at once, reducing the power necessary to cut the cubes of ice. The teeth 10 project from the cylinder at a point nearer the center of rotation of the cylinder than the crushing portion of the cylinder, and the other set of teeth 11 project at the crushing portion of the cylinder, so that while the teeth 10 will penetrate the ice cube and break particles therefrom, the teeth 11 will cut the ice particles while they are being crushed. The spindle 4 has two screw-threads 20 and 22 spaced apart by a plain section, having a shoulder 24, as shown clearly in Fig. 5. This plain section is mounted in the bearing 17 nearest the handle, and the handle has a screw thread adapted to the screw thread 22 on the spindle, as shown in Fig. 3 while the thread 20 is adapted to a thread 21 in the opening 18 in the cylinder, and the spindle is screwed into the cylinder until the shoulder 24 seats itself against the end of the cylinder, as shown clearly in Fig. 3.

When a cube of ice is placed in the hopper 16 and the cylinder 12 turned so that the crushing portion of the eccentrically mounted cylinder will be retracted from the crushing surface 3*b* of the casing, the two teeth 10 will be in position to penetrate the ice cube, forcing the cube against the wall 8 and into contact with one of the ribs or lugs 9 which prevent the cube raising while it is being penetrated by the teeth. This action of the teeth causes comparatively large pieces to be broken from the cube, and these pieces will drop into the space between the cylinder and the crushing surface 3*b*. On continuing the rotation of the eccentrically-mounted cylinder, the teeth 11 will penetrate the cube and break other pieces therefrom, and as the cylinder continues its rotation the teeth 11 will cut the broken pieces while the crushing portion of the eccentrically-mounted cylinder will crush the pieces against the surface 3*b* of the casing and the teeth 11 will feed the particles past the ribs 14, and they will be discharged through the opening 15 into the receptacle 7.

The teeth in the present instance project tangentially from the cylinder and are cylindrical in cross-section and are sharpened at the projecting ends forming spikes which readily penetrate the ice cube and break pieces therefrom. The body portions of the teeth are located in the grooves and are held therein by peening down the walls of the grooves on each side of the tooth as at 23, so as to firmly hold the teeth in position in the grooves. When it is necessary to remove the teeth the teeth are forcibly withdrawn from the grooves and other teeth can be readily placed in position and the side walls of the grooves again peened over the teeth, holding them rigidly in position.

By providing two sets of teeth spaced apart, a clear space is provided between the casing and the cylinder for the passage of comparatively large particles of ice which are to be crushed by the crushing portion of the cylinder.

While the invention is particularly adapted for cutting cubes of ice frozen in an electric or other refrigerator, it can also be used for cutting small blocks of ice of any form without departing from the essential features of the invention.

We claim:

1. The combination in an ice cube breaker, of a casing having a hopper at its upper end and a discharge opening at its lower end; a spindle mounted in bearings in the casing; a cylinder eccentrically mounted on the spindle and having two sets of teeth, the outer ends of one set of teeth being located nearer the center of rotation than the outer ends of the teeth of the other set; means for turning the spindle, the one wall of the hopper having a projection extending into the hopper and located above the cylinder so that an ice cube within the hopper will be held by the projection while it is being cut by the teeth of the cylinder.

2. The combination in an ice cube breaker, of a casing having a hopper at the upper end and a discharge opening at the lower end; bearings on the casing at one side of the center thereof; a spindle mounted in the bearings; an eccentrically-mounted cylinder secured to the spindle within the casing and having teeth, the wall of the hopper on the opposite side of the center line from the spindle having a series of transverse ribs above the cylinder; a series of vertical ribs extending into the casing below the cylinder and positioned to support the cube of ice while it is being cut by the teeth and crushed by the cylinder, the transverse ribs of the hopper holding the cube of ice as it is cut by the teeth of the cylinder, the ice as it is reduced in size being engaged by one transverse rib after another until it is sufficiently broken to pass through the throat between the casing and the cylinder.

3. The combination in an ice cube breaker, of a casing having a hopper at its upper end and a discharge opening at its lower end, one wall of the hopper being inclined outwards toward the lower end and having ribs thereon, said casing having bearings located at one side of the vertical center line of the casing; a spindle mounted in the bearings; a toothed cylinder eccentrically mounted on the spindle, said spindle having a screw-threaded portion, the cylinder having a like thread engaging the thread of the spindle, the spindle having a shoulder bearing against one end of the cylinder; and a handle mounted on the end of the spindle for turning the spindle and the cylinder, the cylinder being provided with teeth for severing the ice as it is fed into the hopper and held by the ribs of the casing.

4. The combination in an ice cube breaker, of a casing having a cylindrical portion provided with a crushing surface, and having a hopper above the cylindrical portion, and having a discharge opening below the cylindrical portion; means in the cylindrical portion for crushing the ice; and axially-spaced, pointed teeth on the said means positioned with respect to said crushing means so as to act independently thereof for penetrating and breaking the ice, the wall of the hopper which forms a continuation of the crushing surface of the cylindrical portion having a series of transverse ribs for progressively retaining the cubes of ice while being penetrated and broken by the teeth.

5. The combination in an ice cube breaker, of a casing having a segmental crushing surface at one side; ribs projecting in the casing at the base of the said surface; a hopper forming part of the casing, one wall of the hopper being inclined outwards toward the crushing surface of the casing and having ribs thereon; a cylinder eccentrically mounted in the casing opposite the crushing surface, said cylinder having a crushing portion; and spiked teeth projecting tangentially from the cylinder at a point nearer the center of rotation of the cylinder than the crushing portion of said cylinder so that the ice cube will be penetrated and broken by the spiked teeth

and carried into the crushing space, and as the cylinder is turned the ice will be crushed by the crushing portion of the cylinder against the segmental crushing surface of the casing.

6. The combination in an ice cube breaker, of a casing having a segmental crushing surface at one side; ribs projecting in the casing at the base of the said surface; a hopper forming part of the casing, one wall of the hopper being inclined outwards towards the crushing surface of the casing and having ribs thereon; a cylinder eccentrically mounted in the casing opposite the crushing surface, said cylinder having a crushing portion; spiked teeth projecting tangentially from the cylinder at a point nearer the center of rotation of the cylinder than the crushing portion of said cylinder; and a second series of spiked teeth projecting from the crushing portion of the cylinder so that the ice cube will be penetrated and broken by the spiked teeth and drawn into the crushing space, and as the cylinder is turned the ice will be crushed by the crushing portion of the cylinder against the segmental crushing surface of the casing.

7. The combination in an ice cube breaker, of a casing having a segmental crushing surface at one side; ribs projecting in the casing at the base of the said surface; a hopper forming part of the casing, one wall of the hopper being inclined outwards towards the crushing surface of the casing and having a rib thereon; a cylinder eccentrically mounted in the casing opposite the crushing surface, said cylinder having a crushing portion; spiked teeth projecting tangentially from the cylinder at a point nearer the center of rotation of the cylinder than the crushing portion of said cylinder; and a second series of spiked teeth projecting from the crushing portion of the cylinder so that the ice cube will be penetrated and broken by the spiked teeth and carried into the crushing space, and as the cylinder is turned the ice will be crushed by the crushing portion of the cylinder against the segmental crushing surface of the casing and will be cut by the second set of teeth while it is being crushed.

8. The combination in an ice cube breaker, of a casing having a cylindrical portion provided with a crushing surface and having a hopper above the cylindrical portion and a discharge opening below the cylindrical portion, the wall of the hopper which forms a continuation of the said crushing surface of the cylindrical portion having a series of alined, fixed, vertically-spaced ribs of predetermined short dimension relative to the width of the said wall and located so as to provide a predetermined unobstructed space along the said wall extending from the ends of each rib transversely of the wall to the ends of said wall into which space a portion of an ice cube may enter and thus allow one of the ribs to firmly hold the ice cube against upward displacement, and toothed means in the cylindrical portion for penetrating and breaking the ice cube into particles while it is held by the said rib.

9. The combination in an ice cube breaker, of a casing having a cylindrical portion provided with a crushing surface and having a hopper above the cylindrical portion and a discharge opening below the cylindrical portion, said hopper having a wall forming a continuation of the said crushing surface of the cylindrical portion and a side wall forming a substantially square corner with said first wall, said first wall having a series of alined, fixed, vertically-spaced ribs of predetermined short dimension relative to the width of the said wall and located so as to provide a predetermined unobstructed space along the said wall between the ends of the ribs and the said side wall into which space a portion of the ice cube may enter and thus allow one of the ribs to firmly hold the ice cube against upward displacement, and toothed means in the cylindrical portion for penetrating and breaking the ice cube into particles and acting to force the ice cube into said space and into abutment with said walls so that the ice cube may be broken while it is held by the said hopper walls and the said rib.

10. The combination in an ice cube breaker, of a casing having a segmental crushing surface, and having a hopper at its upper end and a discharge opening at its lower end; a cylinder eccentrically mounted on a horizontal axis in the casing opposite the segmental crushing surface, the portion of the cylinder furthermost from its axis constituting a crushing portion on said cylinder; means for turning the cylinder, said cylinder having a set of spike-shaped teeth projecting at its crushing portion; and stop ribs near the lower end of the crushing surface of the casing preventing pieces of ice passing through the casing until they have been cut by the spike-shaped teeth and crushed by the crushing portion of the cylinder.

11. The combination in an ice cube breaker, of a casing having a segmental crushing surface, and having a hopper at its upper end and a discharge opening at its lower end; a cylinder eccentrically mounted on a horizontal axis in the casing opposite the segmental crushing surface, the portion of the cylinder furthermost from its axis constituting a crushing portion on said cylinder; means for turning the cylinder, said cylinder having a set of spike-shaped teeth projecting at its crushing portion; stop ribs near the lower end of the crushing surface of the casing preventing pieces of ice passing through the casing until they have been cut by the spike-shaped teeth and crushed by the crushing portion of the cylinder; and a series of transverse projecting ribs on the wall of the hopper which forms a continuation of the crushing surface of the casing for progressively retaining the ice cubes against upward displacement while being penetrated by the teeth on the cylinder.

12. The combination in an ice cube breaker, of a casing having a cylindrical portion provided with a crushing surface, and having a hopper and a discharge opening; a crushing cylinder in the cylindrical portion of the casing; means for rotating said cylinder; means for mounting said cylinder so that a portion thereof moves toward and away from the crushing surface of the casing during the rotation of the cylinder, said portion constituting a crushing portion; and tangential teeth on said cylinder for penetrating and breaking the ice cubes prior to the subjection of the ice to crushing by the crushing portion of the cylinder.

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