

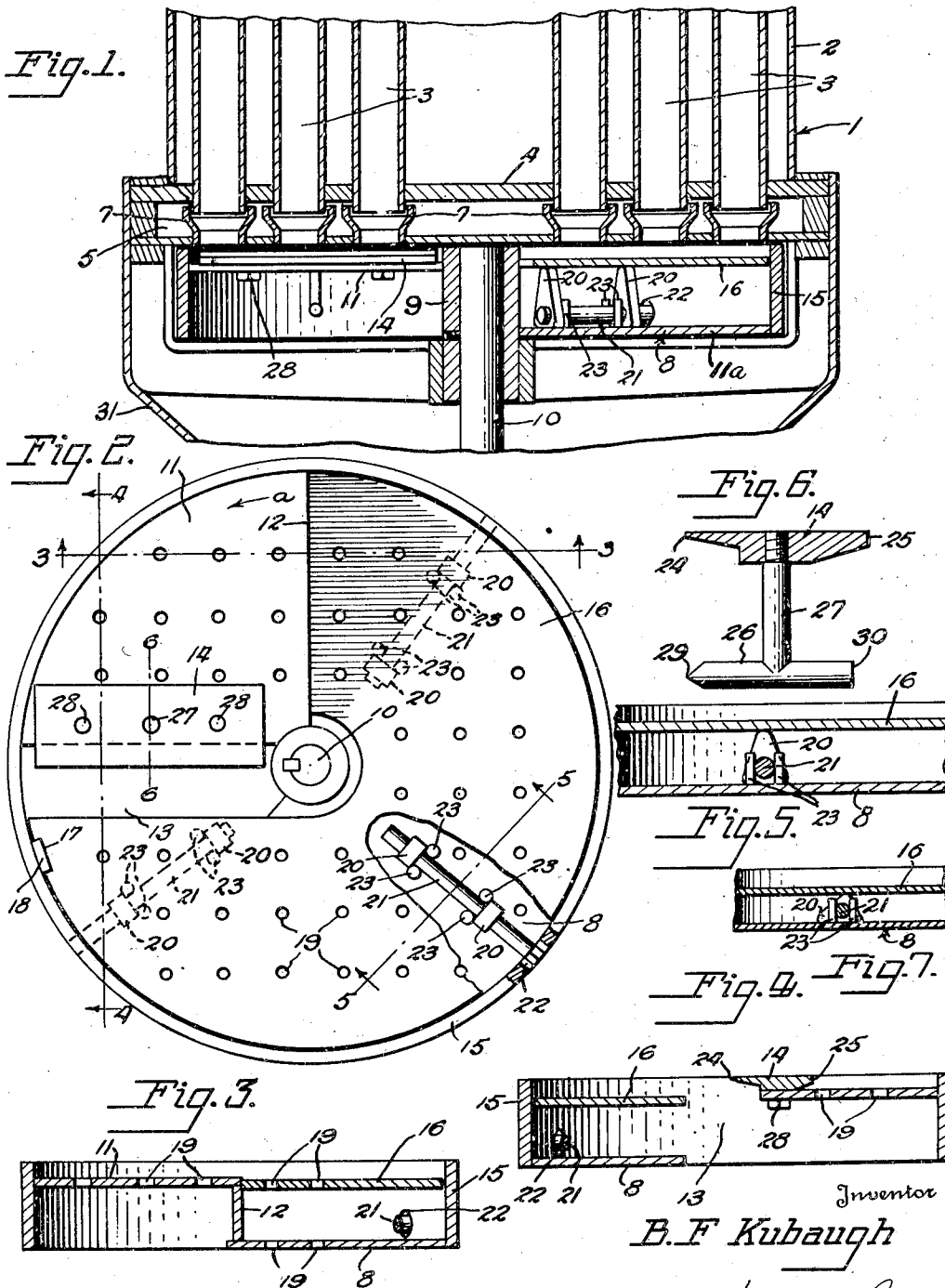
Nov. 9, 1948.

B. F. KUBAUGH

2,453,140

ADJUSTABLE CUTTER FOR TUBE-ICE MACHINES

Filed Dec. 28, 1943



Inventor
B. F. Kubaugh
Mason Lemick Lawrence
 Attorneys

UNITED STATES PATENT OFFICE

2,453,140

ADJUSTABLE CUTTER FOR TUBE-ICE MACHINES

Benjamin F. Kubaugh, Louisville, Ky., assignor
to Henry Vogt Machine Co. Inc., Louisville, Ky.,
a corporation of Kentucky

Application December 28, 1943, Serial No. 515,955

5 Claims. (Cl. 241—92)

1

This invention relates to a rotary ice cutter designed to be used with a tube-ice machine such as is disclosed in Kubaugh Patent No. 2,239,234, granted April 22, 1941, in which ice in cylindrical form is manufactured in a bundle of upright externally refrigerated tubes by the flow of water through said tubes, the ice forming by accretion on the inner walls of the tubes, the thickness of the ice being dependent upon the length of the freezing period. At the end of the freezing period the ice cylinders are thawed so as to break their adherence to the walls of the tubes and slide gravitationally from the lower ends of said tubes into engagement with a support above which a revolving knife progressively severs the ice cylinders into small units or pieces.

Two commercial forms of ice may be produced by the machine, cylindrical "ice cubes" or "crushed ice." To produce cylindrical pieces, the ice cylinders are frozen with thick walls and the knife is set at a relatively great distance from the support. For crushed ice, the walls are frozen thin and the knife should operate relatively close to the support. In the said Kubaugh patent the knife of the cutter is at a fixed distance from the supporting plate, for example, two inches, so that the machine as illustrated will make sized cylindrical "ice cubes," but not crushed ice. To produce crushed ice the ice cylinders must be frozen in a separate unit having the knife set close to the supporting plate.

The general object of the present invention is to provide an ice cutter which may be adjusted to selectively produce either relatively long or relatively short pieces whereby either cylindrical "ice cubes" or "crushed ice" may be manufactured by the same machine.

Another object of the invention is to provide a knife having a sharp and a blunt edge which may be alternatively employed respectively to cut ice cylinders with minimum shattering, or "crushed ice" with maximum shattering effect.

Other objects of the invention will appear as the following description of a preferred and practical embodiment thereof proceeds.

In the drawing which accompanies and forms a part of the following specification, and throughout the several figures of which the same reference characters have been employed to designate identical parts:

Figure 1 is a vertical diametrical section through an ice cutter, embodying the principles of the invention;

Figure 2 is a plan view, partly in section, and

2

showing part of the floating disc cut away to disclose the parts beneath;

Figure 3 is a vertical section taken along the line 3—3 of Figure 2;

Figure 4 is a vertical section taken along the line 4—4 of Figure 2;

Figure 5 is a vertical section taken along the line 5—5 of Figure 2; and

Figure 6 is a cross-section taken along the line 6—6 of Figure 2.

Figure 7 is a view similar to Figure 5, showing the plate adjusted at low level.

Referring now in detail to the several figures, the numeral 1 represents in general the lower part of a tube ice machine such as that disclosed in the aforementioned Kubaugh patent, comprising a casing 2 forming a refrigerant chamber through which pass a plurality of vertically arranged tubes 3. Water flows downwardly through the tubes, ice freezing by accretion against the inner walls of the tubes, and forming ice cylinders, the thickness of the walls of which depends upon the length of the freezing period. At the end of the freezing period the surface of the ice cylinders is thawed so as to break their adherence with the walls of the tubes 3 by means of hot gaseous refrigerant admitted to the chamber 2. The portions of the ice cylinders protruding below the plate 4 which defines the bottom of the refrigerant chamber are freed from adhesion with the ends of the tubes by thawing water admitted to a chamber 5, surrounding the nozzles 7 at the lower end of the tubes 3. The orifices of said nozzles are of the same diameter as the interior of the pipes 3, to permit the passage of the freed ice cylinders which slide downward by gravity.

The cutter of the subject invention comprises a driven member consisting of a hub 9 fixed to a drive shaft 10, a rim 15 coaxial with the hub, and a disk-like partition 8 connecting the rim and hub. The partition 16 extends less than 360° about the axis of the hub, having parallel end edges that terminate in spaced vertical planes defining a slot 13.

The partition 8 has a vertical shoulder 12, defining it into a small sector 11 at relatively high level terminating at one side of the slot 13, and a large sector 11a at a relatively low level. Thus the slot 13 has a high edge and a low edge. The top of the rim is in a plane higher than the level of both sectors. A knife 14 is secured to the high sector 11, its cutting edge projecting slightly beyond the high edge of the slot.

The vertical shoulder 12, the lower sector 11a, and the part of the rim 15 that bounds that sec-

3

tor, define a floored recess which freely receives a floating plate 16 substantially congruent with the lower sector, maintained horizontal, and capable of being adjustably moved to different levels below the horizontal plane of the cutting edge of the knife 14.

The floating plate 16 is kept from angular displacement in the direction of the slot, by means such as an indent 17 in the floating plate which slidably embraces a vertical feather 18 in the rim.

The ice cylinders, simultaneously detached by thawing, from the ice machine, rest endwise upon the high sector 11 of the partition 8, and upon the floating plate 16. For the purpose of draining the thawing water both the partition 8 and plate 16 are provided with the perforations 19. The cutter, both as regards the partition 8 and the floating plate 16, rotates in the direction of the arrow *a*, that is to say, counterclockwise as viewed in Figure 2. Since the ice cylinders are stationary, the leading edge of the knife engages them at each revolution, cutting off or crushing off small sized pieces. The size of these pieces depends upon the height of the level of the floating plate 16 with respect to the knife 14. To form sized cylindrical pieces, the floating plate should be in a relatively low position with respect to the plane of the path of the knife, and to form crushed ice it should be relatively close to the path of the knife. The subject invention, therefore, provides an adjustment for the height of the floating plate with respect to the plane of the knife blade.

Any form of adjustment is within the purview of the invention, but the one herein disclosed is simple and effective. It comprises a plurality of pairs of cams 20, the pairs being angularly displaced from one another at optimum intervals to support the floating plate in a horizontal position. The cams are preferably in the form of isosceles triangles having a relatively narrow flat base and relatively long flat sides, and having rounded corners. Each pair of cams is fixed in spaced relation on a shaft 21 radially arranged. The ends of the shafts preferably terminate in apertures 22 in the flange 15 and have polygonal ends which are accessible to a suitable tool by means of which the shafts may be turned either to set the cams upright on their narrow base, or to lay them down on one of their longer sides. In either position, the floating plate rests upon the cams. Since the perpendicular distance from the axis of the shaft to any of the sides is less than the distance from the axis of the shaft to the corners, it is obvious that in turning the cams from erect to supine position the shaft must rise, consequently, the shafts are mounted in bearings which permit such vertical movement. These bearings, as shown, consist simply of short vertical pins 23 in spaced inner and outer pairs, between which the shafts are positioned. The apertures 22, if circular, should be large enough to permit the vertical rise of the shafts 21, or may be ovalized in a vertical direction. The bearings, as shown, are placed close to adjacent faces of the cams to prevent any material longitudinal shifting of the shafts 21.

When the floating plate 16 is supported upon the cams 20 in upright position, as illustrated in Figure 1, it is close to the plane of the path of the knife 14 and in position to cut small lengths from the bottom ends of the ice cylinders in the making of crushed ice. When the cams 20 are turned down, the floating plate 16 will

4

be at a lower level and longer pieces of the ice cylinders will be cut off.

As has been suggested, in the making of sized ice cylinders it is desirable to have as little shattering of the ice as possible, and with this end in view the knife 14 is provided with a sharp edge 24, as shown in Figure 4. When the floating plate 16 is in its low position, the knife blade 14 should be oriented with its sharp edge 24 in leading position. When crushed ice is to be produced, the maximum of shattering effect is desired. The knife blade 14 is therefore provided with a blunt edge 25 which should be arranged in leading position when the floating plate 16 is in elevated position. The knife blade is provided with a handle 26 having a shank 27 secured to the middle of the knife blade, and which may be turned to reverse position of the knife blade to bring either its sharp or blunt edges into leading position with respect to the direction of rotation of the cutter. When in either of these positions, the knife blade is secured by means of cap screws 28, passing through holes in the underlying face of the sector 11 and screwed into the knife blade. The handle 26 is preferably formed with a sharp end 29 and a blunt end 30 arranged to correspond in direction with the respective sharp and blunt edges of the knife blade so that simply by observing the position of the handle one may know which edge of the blade is in active position.

Sections or fragments of ice severed by the knife blade drop through the slot 13 into the underlying portion 31 of the ice machine, where they are collected.

While I have in the above description disclosed what I believe to be a preferred and practical embodiment of the invention, it will be understood to those skilled in the art that the details of construction and the arrangement of parts as shown and described are by way of example, and not to be construed as limiting the scope of the invention as defined in the appended claims.

What I claim as my invention is:

1. Rotary ice cutter for severing the lower end portions of a plurality of freely descendable laterally immovable parallel ice cylinders, comprising a partition having a radial slot and having ice cylinder supporting portions at two levels, terminating in the respective edges of said slot, a knife secured to the higher edge comprising a reversible blade having its opposite edges respectively sharp and blunt, and a handle secured to said blade extending downwardly through an aperture in the portion of said disk at higher level for rotating said blade to bring either of its edges into active position.

2. Rotary ice cutter as claimed in claim 1, said handle having a cross piece with pointed and blunt opposite ends correspondingly oriented with respect to the blade edges, to serve as an indicator of the position of said blade.

3. Rotary cutter for severing the lower end portions of a plurality of freely descendable laterally immovable parallel ice cylinders, comprising a rotary driven member including a rim and a substantially horizontal partition circumscribed by said rim and secured thereto, said partition extending less than 360° about the inner circumference of said rim, having its ends terminating in spaced vertical planes defining a slot, said partition having a vertical shoulder intermediate its circumferential extent dividing said partitions into a small sector at relatively high level and a

large sector at relatively low level, whereby the opposite sides of said slot are at said respective levels, a knife secured to the high sector projecting slightly beyond the high edge of said slot, the top of said rim being at a higher level than both of said sectors, said shoulder, the lower sector of said partition, and the portion of the rim that bounds said lower sector defining a recess, a plate substantially congruent with said recess freely floating in a vertical direction therein, and means beneath said plate for supporting it horizontally and adjustably varying its level below the plane of rotation of said knife, said supporting and adjusting means comprising radial shafts rotatably mounted at spaced intervals on said lower sector, and cams on said shafts, said cams having adjacent short and long flat sides adapted to serve alternatively as bases of support for said cams on said lower sector, and having long and short altitudes corresponding to the respective short and long bases, the corresponding dimensions of said cams being the same, said cams being positioned by rotation of said shaft to bring the parts of the corresponding long or short dimensions into supporting relation to said floating plate.

4. Rotary cutter for severing the lower end portions of a plurality of freely descendable laterally immovable parallel ice cylinders, comprising a rotary driven member including a rim and a substantially horizontal partition circumscribed by said rim and secured thereto, said partition extending less than 360° about the inner circumference of said rim, having its ends terminating in spaced vertical planes defining a slot, said partition having a vertical shoulder intermediate its circumferential extent dividing said partitions into a small sector at relatively high level and a large sector at relatively low level, whereby the opposite sides of said slot are at said respective levels, a knife secured to the high sector projecting slightly beyond the high edge of said slot, the top of said rim being at a higher level than both of said sectors, said shoulder, the lower sector of said partition, and the portion of the rim that bounds said lower sector defining a recess, a plate substantially congruent with said recess freely floating in a vertical direction therein, and means beneath said plate for supporting it horizontally and adjustably varying its level below the plane of rotation of said knife, said supporting and adjusting means comprising radial shafts rotatably mounted at spaced intervals on said lower sector, and cams on said shafts, said cams having adjacent short and long flat sides adapted to serve alternatively as bases of support for said cams on said lower sector, and having long and short altitudes corresponding to the respective short and long bases, the corresponding dimensions of said

cams being the same, said cams being positioned by rotation of said shaft to bring the parts of the corresponding long or short dimensions into supporting relation to said floating plate, and vertically open bearings on said lower sector in which said cam shafts are journaled.

5. Rotary cutter for severing the lower end portions of a plurality of freely descendable laterally immovable parallel ice cylinders, comprising a rotary driven member including a rim and a substantially horizontal partition circumscribed by said rim and secured thereto, said partition extending less than 360° about the inner circumference of said rim, having its ends terminating in spaced vertical planes defining a slot, said partition having a vertical shoulder intermediate its circumferential extent dividing said partitions into a small sector at relatively high level and a large sector at relatively low level, whereby the opposite sides of said slot are at said respective levels, a knife secured to the high sector projecting slightly beyond the high edge of said slot, the top of said rim being at a higher level than both of said sectors, said shoulder, the lower sector of said partition, and the portion of the rim that bounds said lower sector defining a recess, a plate substantially congruent with said recess freely floating in a vertical direction therein, and means beneath said plate for supporting it horizontally and adjustably varying its level below the plane of rotation of said knife, said supporting and adjusting means comprising radial shafts rotatably mounted on said lower sector, and cams on said shafts, said cams having adjacent short and long flat sides adapted to serve alternatively as bases of support for said cams on said lower sector, and having long and short altitudes corresponding to the respective short and long bases, the corresponding dimensions of said cams being the same, said cams being positioned by rotation of said shafts to bring the parts of corresponding long or short dimensions into supporting relation to said floating plate, said rim having holes therethrough in alignment with said cam shafts for the insertion of a tool for turning said cam shafts.

BENJAMIN F. KUBAUGH.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,303,617	Tuck	May 13, 1919
1,543,343	Sivertsen	June 23, 1925
1,577,611	Pfeifer	Oct. 20, 1925
1,676,241	Ayars	July 10, 1928
2,239,234	Kubaugh	Apr. 22, 1941