April 7, 1942. F. FINK 2,279,116

ICE BREAKER

Filed May 9, 1940

Fig. 1.

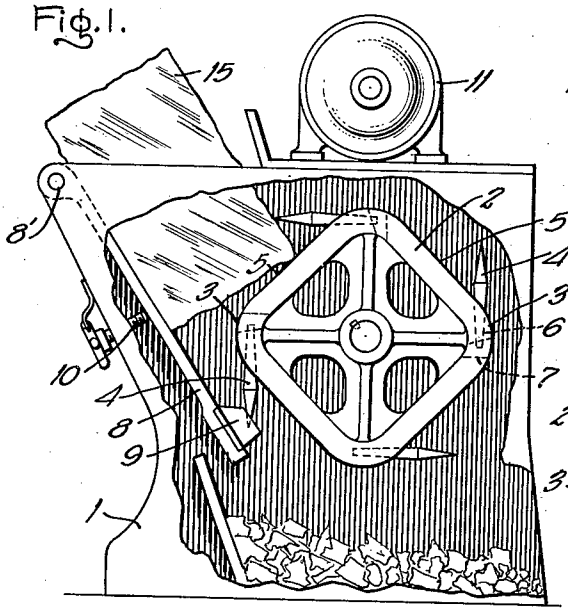


Fig. 2.

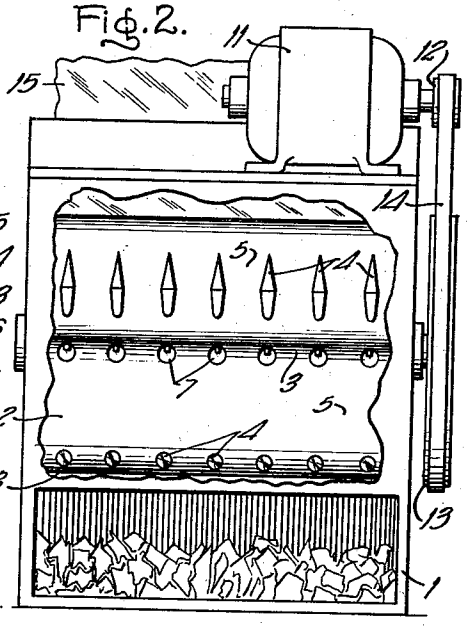


Fig. 3.

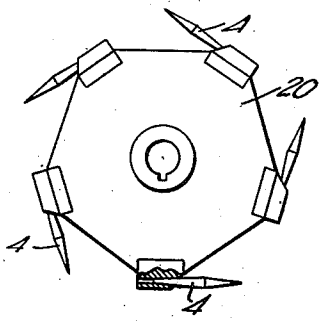


Fig. 4.

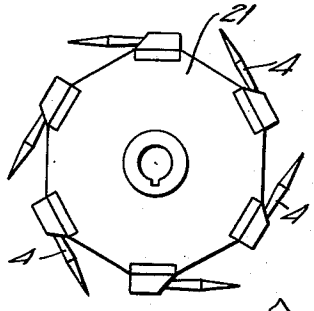
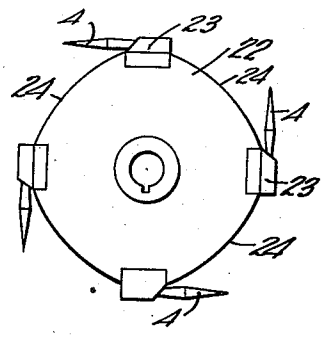


Fig. 5.



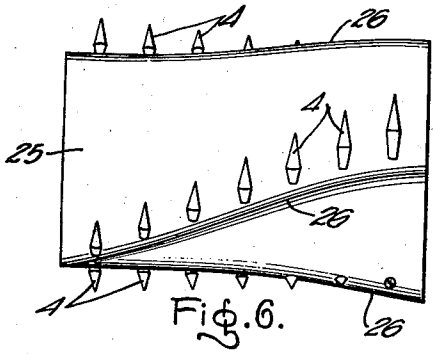


Fig. 6.

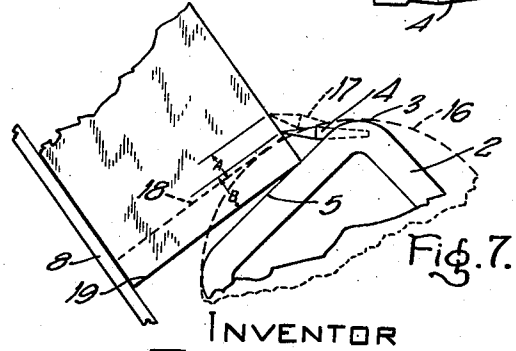


Fig. 7.

INVENTOR
FERDINAND FINK,
BY
HIS ATTORNEY.

Patented Apr. 7, 1942

2,279,116

UNITED STATES PATENT OFFICE

2,279,116

ICE BREAKER

Ferdinand Fink, Irvington, N. J., assignor to Gifford-Wood Company, Hudson, N. Y., a corporation of New York

Application May 9, 1940, Serial No. 334,102

4 Claims. (Cl. 83—63)

My invention particularly resides in an ice breaking machine comprising a drum, carrying a plurality of ice picks, which is rotatably mounted in the ice breaking machine, the picks being so mounted on the drum that when rotated adjacent a cake of ice the ice cake will be reduced to fragments.

Ice breaking machines have heretofore comprised a cylindrical drum to which are secured a plurality of ice picks or sharp pointed, ice-cutting tools. These machines are so arranged that a cake of ice inserted therein is fed under gravity to and bears against the cylindrical surface of the drum as the drum is rotated and the rows of picks thereon successively strike the cake and break it up into small pieces or fragments.

It is desirable, in an ice breaking machine of this character, to move the ice picks into engagement with the sides of a cake of ice with their axes disposed as nearly as possible perpendicularly to the side of the ice cake in order that the sharp cutting ends of the picks may be used to their full advantage and also to relieve the picks as much as possible from strains. At the same time, it is desirable so to arrange the picks relative to the drum surface against which the bottom of the ice cake rests during operations of the machine that the picks will engage the side of the ice cake as far removed as is practical from the bottom of the cake in order to increase the capacity of the machine. When the ice picks are arranged as above indicated, the proportion of extremely fine ice in the cracked ice produced by the machine is materially reduced.

When cylindrical drums are employed, the picks, even when set at such an angle to the drum that they are subjected to considerable strains, lie at a comparatively small angle to the surface of the drum. Therefore, in ice breaking machines in which cylindrical drums are employed, not only are their capacities quite limited but also the ice picks are subjected to a considerable strain and an undesirable, large quantity of very fine or snow ice is produced therein.

My invention has for its primary object the provision of an ice breaker comprising a rotatable drum which is of such shape in cross section that, as compared to a cylindrical drum, ice picks may be secured thereto at a much greater angle to the surface thereof against which the ice cake may rest, while, when the drum is rotated, the picks will engage the side of the ice cake with their axes more nearly approaching the perpendicular thereto, whereby the picks will be subjected to less strains and will engage the side of the ice cake in zones more remote from the bottom of the ice cake than is practically possible when cylindrical drums are employed.

More particularly, an object of my invention resides in providing a drum for an ice breaker having a transverse section comprising a plurality of sides and having a plurality of ice picks secured thereto with the ends thereof disposed above said sides whereby to provide, as compared to cylindrical drums, a greater angle between the ice picks and the sides of said drum while the picks may strike the sides of an ice cake with their axes more nearly perpendicular to the side thereof. A further object resides in providing a drum having a plurality of helical edges extending generally axially thereof and disposed at a greater radial distance from the axis of the drum than the surface portions thereof intermediate said edges and having a plurality of ice picks secured to said drum in helical rows substantially in the zones of said edges.

With these and other objects in view, the following description of my invention will best be understood by reference to the accompanying drawing showing various embodiments of the drum of my invention, and in which—

Fig. 1 is a side elevation view of an ice breaker with a side thereof broken away to show the interior;

Fig. 2 is an end elevation of the ice breaker of Fig. 1, partially broken away to show the drum mounted therein;

Figs. 3, 4 and 5 are end elevation views of modified forms of drums;

Fig. 6 is a side elevation view of a still further modified form of drum; and

Fig. 7 is a more or less schematic view illustrating, for comparison purposes, the relationship the ice picks may bear to a drum of my invention and to a cylindrical drum.

Referring to the drawing and first to Figs. 1 and 2, 1 indicates generally the frame of an ice breaker machine within which is rotatably mounted a drum indicated generally at 2. In this embodiment of my invention, the drum is generally square in cross section with rounded edges 3. A plurality of ice picks 4 are secured to the drum in the zones of the edges 3 with their pointed ends disposed above the sides 5 of the drum. I have shown for illustration purposes ice picks of the type having tapered shanks which adapt them to be driven into tapered sockets 6 in the drum. Openings 7 at the inner end of the sockets are provided in the drum which permit

a wedge to be driven therein for loosening the pick when it is to be removed.

Adjacent the drum 2 is mounted an adjustable comb plate 8 which carries at its lower end a comb 9 between the teeth of which the ice picks are adapted to travel as the drum 2 is rotated. The upper end of plate 8 is pivoted to the frame of the machine as indicated at 8' and a suitable adjusting screw 10 is provided whereby the inclination of the comb plate 8 may be varied to adjust the angle at which the cakes of ice are fed to the drum. An electric motor 11 serves through the medium of pulleys 12 and 13 and belt 14 to drive the drum 2, pulley 12 being secured to the motor shaft and pulley 13 being secured to the shaft, journalled in suitable bearings in the sides of the machine, to which the drum is keyed.

In operation, a cake of ice such as indicated at 15 is passed through an opening in the top of the frame of the machine and slid under gravity upon the comb plate 8, into engagement with the drum 2. Ordinarily, the drum is rotated at a speed of the order of 75 to 100 R. P. M. since appreciably higher speeds produce an undesirable large portion of very fine ice or snow ice in the chips.

It will be noted that with a drum of the foregoing character the picks may be mounted thereon at an appreciable angle to the sides 5 of the drum and, at the same time, they will be so positioned as to strike the side of an ice cake with their axes more nearly perpendicular thereto than in the case of cylindrical drums.

The marked advantages secured with the drums of the character contemplated in this invention over a cylindrical drum will best be understood by referring to Fig. 7. The cylindrical drum indicated in dotted lines at 16 has secured thereto an ice pick 17. The bottom of a cake of ice indicated in dotted lines at 18 will rest against the drum surface and the pointed end of the pick will engage the block in a zone spaced the distance A from the bottom thereof. However, the bottom 19 of a block of ice resting against the side 5 of drum 2 will be engaged by the end of pick 4 a distance B from the bottom thereof. In practice, it has been determined that though the pick 17 is so arranged that it will strike the side of an ice cake at a more acute angle to the side thereof than will the pick 4, the distance A will be appreciably less than the distance B. For example, tests have shown that with the cylindrical type of drum, a pick can be arranged to engage the side of an ice cake at a point approximately 2" above the bottom thereof while with the drum 2 a pick may be arranged to strike the side of the ice cake at a point spaced approximately 2.5 inches above the bottom of the cake; and, though an increase in the size of the "bite" is obtained with the drum of my invention, additionally, the pick 4 is presented to the side of the ice cake with its axis more nearly perpendicular thereto than in the case of the pick 17 secured to the cylindrical drum. Therefore, the pick 4 is not subjected to the strains to which pick 17 is subjected.

In Fig. 3, I have shown a modified form of drum which has the shape of a pentagonal prism 20, in the zones of the edges of which are secured the picks 4; and in Fig. 4 I have shown a drum having a shape of a hexagonal prism.

In Fig. 5, I have shown a drum 22 of modified shape in cross section comprising the generally axially extending edges 23 and in which the drum surfaces 24 intermediate these edges are generally cylindrical and are disposed at lesser radial distances from the axis of the drum than the edge portions 23.

While I have shown in Figs. 3, 4 and 5 a slightly different arrangement for mounting the picks at the edges of the drums, it will be understood that the edges of these drums may be rounded in substantially the same manner as the edges 3 of drum 2.

In Fig. 6 I have illustrated a further modified form of drum, indicated generally at 25, which in cross section is similar to drum 2 but in which the edges 26, extending generally axially of the drum, are helical. With this arrangement, the ice picks 4 are secured to the drum in the zones of the edges thereof and are disposed in helical rows. Of course, a drum arranged with helical edges extending axially thereof may conform in cross section to the other shapes of drums herein described with picks secured thereto in the manner herein described.

It will be noted that in the ice breaker of my invention the generally axially extending edges of the drums are disposed at a greater radial distance from the axes of the drums than the surface portions thereof intermediate said edges and that said intermediate surface portions are so spaced from the axes of the drums as to support an ice cake and prevent the intermediate surface portions of the drums from striking the side of the ice cake as the drums are rotated. This drum construction affords substantially unimpeded rotation of the drums so far as rotation of the intermediate surface zones thereof is concerned in engagement with the bottom of an ice cake and an ice breaking machine is provided having an increased capacity and with less fine or snow ice produced while the ice picks of said machine are subjected to less strain.

Since the intermediate surface zones of the drums are substantially free from obstructions and are so spaced from the axis of the drum as to be adapted to support a cake of ice, an ice cake may freely slide in contact with said surface zones from one edge of the drum or zone of greater radius to another, as the drum is rotated, and the bottom of said cake will be so supported by said intermediate surface zones of the drum with relation to the pointed ends of the ice picks that as the drum is rotated a larger "bite" will be obtained with the picks subjected to less strain than if, for example, a cylindrical drum were used.

While I have described my invention in its preferred embodiments, it is to be understood that the words which I have used are words of description rather than of limitation. Hence, changes within the purview of the appended claims may be made without departing from the true scope and spirit of my invention in its broader aspects.

What I claim is:

1. An ice breaker of the character described comprising means forming an inclined guide upon which an ice cake may slide under gravity, a drum-like element and means for rotatably mounting said element adjacent said guide means, said element having a plurality of generally axially extending surface zones disposed at a greater radial distance from the axis of said drum-like element than the surface zones intermediate thereof, said intermediate surface zones being substantially free from obstructions throughout the length of said element and so

spaced from said axis as to support said ice cake freely to slide in contact with the surface of said element from one zone of greater radius to another as said element is rotated, and a plurality of rows of ice picks having pointed ends respectively secured to said drum-like element substantially in the said zones of greater radius thereof with their pointed ends overlying an adjacent intermediate surface zone, the axis of the pointed ends of said picks forming an acute angle with the said adjacent intermediate surface zone; said element being mounted to rotate in the path of downward movement of said ice cake and to the side thereof opposite to that engaged by said guide means; whereby, when said element is rotated, the pointed ends of said picks will initially engage the side of said cake.

2. An ice breaker of the character described comprising means forming an inclined guide upon which an ice cake may slide under gravity, a drum, and means for rotatably mounting said drum adjacent said guide means, said drum having the shape of a polygonal prism, the edges thereof between adjacent sides of said prism being all disposed at a greater radial distance from the axis of said drum than the sides thereof, said sides being substantially free from obstructions throughout the length of said drum and so spaced from said axis as to support said ice cake freely to slide in contact with the surface of said element from one edge of said drum to another as said drum is rotated, and a plurality of rows of ice picks having pointed ends secured respectively to said drum substantially in the zones of its edges with their pointed ends overlying an adjacent side of said drum, the axis of the pointed ends of said picks forming an acute angle with the said adjacent side of the drum; said drum being mounted to rotate in the path of downward movement of said ice cake and to the side thereof opposite to that engaged by said guide means; whereby, when said drum is rotated, the pointed ends of said picks will initially engage the side of said cake.

3. An ice breaker of the character described comprising means forming an inclined guide upon which an ice cake may slide under gravity, a drum, and means for rotatably mounting said drum adjacent said guide means, said drum having the shape of a prism, the edges of said drum being disposed at a greater radial distance from the axis thereof than the sides thereof intermediate said edges and the sides of said drum being substantially flat from one edge to the other and free from obstructions throughout the length of said drum whereby to support said ice cake freely to slide thereon as said drum is rotated, and a plurality of rows of ice picks having pointed ends secured respectively to said drum substantially in the zones of its edges with their pointed ends overlying an adjacent side of said drum, the axis of the pointed ends of said picks forming an acute angle with the said adjacent side of the drum; said drum being mounted to rotate in the path of downward movement of said ice cake and to the side thereof opposite to that engaged by said guide means; whereby, when said drum is rotated, the pointed ends of said picks will initially engage the side of said cake.

4. An ice breaker of the character described comprising means forming an inclined guide upon which an ice cake may slide under gravity, a drum, and means for rotatably mounting said drum adjacent said guide means, said drum having the shape of generally a square prism, the sides of said drum being adapted to support said ice cake freely to slide in contact therewith from one edge of said drum to another, and a plurality of rows of ice picks having pointed ends secured respectively to said drum substantially in the zones of the edges thereof with their pointed ends overlying an adjacent side of said drum, the axis of the pointed ends of said picks forming an acute angle with the said adjacent side of said drum; said drum being mounted to rotate in the path of downward movement of said ice cake and to the side thereof opposite to that engaged by said guide means; whereby, when said drum is rotated, the pointed ends of said picks will initially engage the side of said cake.

FERDINAND FINK.