June 17, 1952 H. A. LEHMAN ET AL 2,600,508

ICE-SIZING MACHINE

Filed Dec. 20, 1948 2 SHEETS—SHEET 1

Fig. 1.

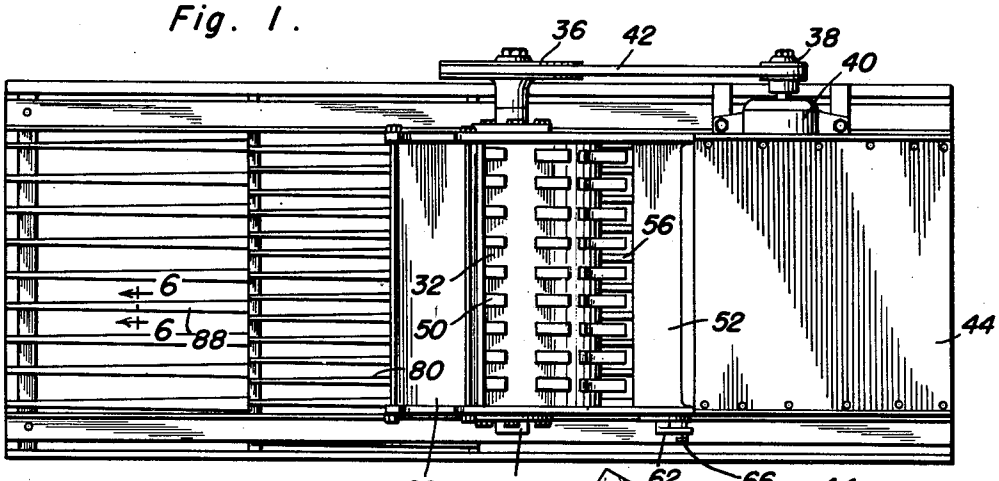
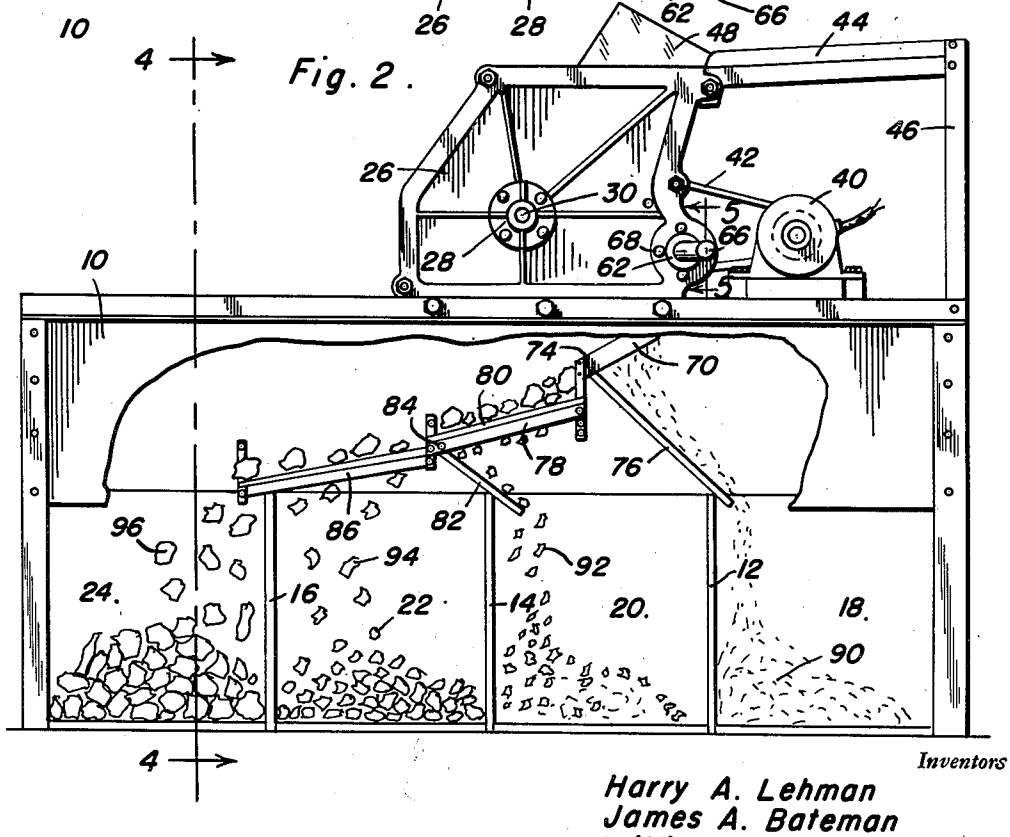


Fig. 2.



Inventors

Harry A. Lehman
James A. Bateman
William W. Bateman

By Clarence A. O'Brien and Harvey B. Jacobson

Attorneys

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Fig. 6.

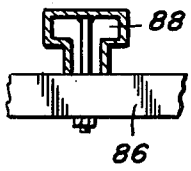
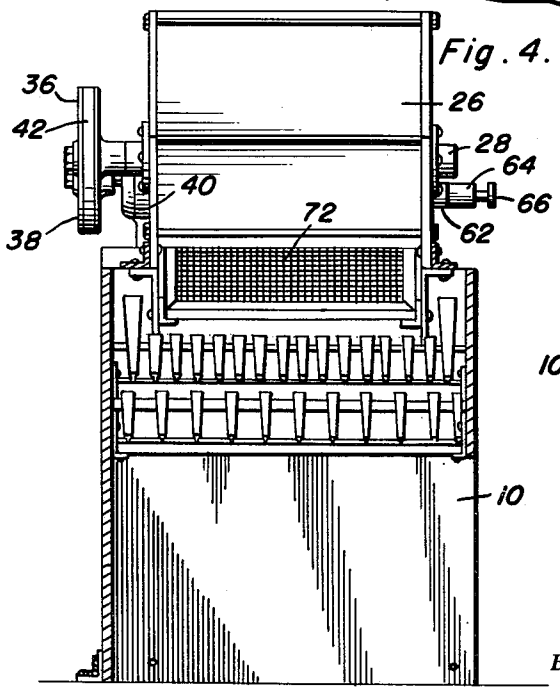


Fig. 3.

Fig. 4.



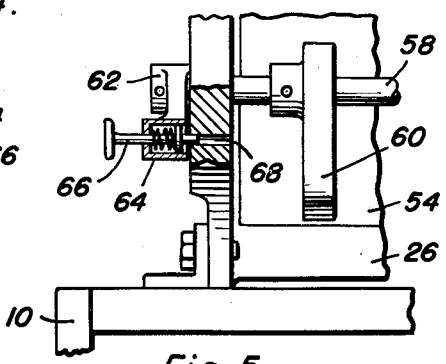


Fig. 5.

Inventors

Harry A. Lehman
James A. Bateman
William W. Bateman

By Clarence A. O'Brien and Harvey B. Jacobson

Attorneys

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ICE SIZING MACHINE

Harry A. Lehman, James A. Bateman, and William W. Bateman, Mineral Wells, Tex.

Application December 20, 1948, Serial No. 66,182

6 Claims. (Cl. 209—354)

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This invention relates to new and useful improvements in ice crushers and the primary object of the present invention is to provide a machine for crushing ice into relatively small particles and for dividing the particles, according to their size, into separate bins or compartments.

Another important object of the present invention is to provide a sizing device for ice crushers including novel and improved grader so constructed and arranged as to permit large particles of ice, or particles of ice that are too large to pass through the grader, to slide downwardly on the grader to another grader, without wedging or becoming lodged between the grader openings to restrict the normal movement of crushed ice upon the said grader.

A further object of the present invention is to provide an ice crushing and sizing machine including a plurality of vertically inclined stepped graders so disposed as to permit the crushed ice leaving the crushing chamber of the machine to slide downwardly from one grader to the next without the necessity of having to provide an attendant or conveying equipment for such an operation.

Yet another object of the present invention is the provision of a sizing machine for crushed ice and the like that will quickly and readily separate or grade ice particles into their respective sizes in a clean and sanitary manner.

A still further aim of the present invention is to provide a device of the aforementioned character that is simple and practical in construction, strong and reliable in use, highly efficient in operation, small and compact in structure, relatively inexpensive to manufacture, and otherwise well adapted for the purposes for which the same is intended.

Other objects and advantages reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming part hereof, wherein like numerals refer to like parts throughout, and in which:

Figure 1 is a top plan view of the present invention;

Figure 2 is a side elevational view of Figure 1 and with parts broken away for the convenience of explanation;

Figure 3 is an enlarged fragmentary side elevational view of the present invention, showing parts of the ice crushing compartment broken away, and the device in operation for crushing ice;

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Figure 4 is a transverse vertical sectional view taken substantially on the plane of section line 4—4 of Figure 2;

Figure 5 is an enlarged fragmentary sectional view taken substantially on the plane of section line 5—5 of Figure 2; and,

Figure 6 is an enlarged sectional view taken substantially on the plane of section line 6—6 of Figure 1.

Referring now to the drawings in detail, wherein for the purpose of illustration, there is disclosed a preferred embodiment of the present invention, the numeral 10 represents an open top, elongated container or receptacle that is provided with a plurality of spaced parallel, relatively short, vertical walls or partitions 12, 14 and 16 that divide the container into a plurality of ice receiving bins or compartments 18, 20, 22 and 24.

Detachably secured to the upper portion of the container 10, and at one end thereof, there is provided a crushing compartment or casing 26 having bearings 28 on its side walls that rotatably support a shaft 30. A cylindrical drum 32 having an axial hub 34 is mounted on the shaft 30 and one end of the shaft 30 supports a pulley 36 that is connected to a further pulley 38, on a preferably electric motor 40, by an endless belt 42.

An inclined guide table 44 is supported above the container 10 by legs 46 and communicates with the chamber 26 so that a block or cake of ice 48 may slide downwardly upon the table 44 to enter the chamber 26. Obviously any suitable conveying means may be incorporated to deliver the ice blocks to the table 44 although the same may be applied manually to the table.

A plurality of circumferentially and longitudinally spaced cutter blades 50 are suitably fixed to the drum 32 and the same are disposed tangentially to the drum as shown best in Figure 3 of the drawings.

A fixed guide plate or panel 52 is mounted in the chamber 26 and inclines forwardly and downwardly toward the drum 32 so that the ice block will slide downwardly on the plate 52 against the cutter blades 50 as the drum 32 is rotated.

Pivotally or swingably mounted in the chamber 26, beneath the plate 52, is an elongated support panel 54 to which there is fixed a plurality of longitudinally spaced claws or guide plates 56 between which the blades 50 are movable.

Means is provided for retaining the support 54 disposed in an adjusted position with respect to the drum 32 whereby the largest particles of ice crushed will be controlled, and this means com-

prises a shaft 58 that is journaled on the side walls of the chamber 26 rearwardly of the support 54.

A cam 60 is suitably fixed to the shaft 58, or a plurality of cams, and this cam 60 is adapted to contact the support 54 and swing the same upwardly as the shaft 58 is rotated.

In order to retain the shaft 58 in a selected rotated position, a lateral arm 62 projects from one end of the shaft 58 and supports a housing 64. A spring urged locking pin or plunger 66 is slidably retained on the housing 64 and one end thereof is adapted for reception in a selected one of a plurality of apertures or openings 68 formed in one side wall of the chamber 26.

Extending downwardly and forwardly from the chamber 26, is an initial grader or guide track 70 that is disposed partially over the compartments 18 and 20 and which includes a relatively fine screen 72 through which fine particles of crushed ice pass. Pivoted as at 74 to the lower end of the initial grader 70, is one edge of a baffle plate or delivery chute 76 the free lower end of which extends rearwardly and is supported on the upper edge of the partition 12 so that fine particles of crushed ice passing through the screen 72 will slide downwardly and rearwardly on the baffle plate 76 to enter the compartment 18.

Suitably secured to the side walls of the container 10, is a further and intermediate grader 78 including a plurality of spaced downwardly inclined and tapered rails or hollow T-shaped bars 80. The intermediate grader 78 is disposed partially over the compartments 20 and 22, and the upper rear portion of the grader 78 is spaced beneath the lower forward portion of the grader 70.

A further baffle plate or delivery chute 82 is pivoted as at 84 to the forward end of the intermediate grader 78, extends downwardly and rearwardly, and is supported on the upper edge of the partition 14 so that particles of crushed ice passing through the grader 78 will slide downwardly upon the plate 82 to enter the compartment 20.

A final grader 86 is mounted in the container 10, partially over the compartments 22 and 24. The rear portion of the final grader 86 is supported beneath the grader 78 and the forward portion of the grader 86 is supported on the upper edge of the partition 16.

The final grader 86 is constructed similarly to the intermediate grader 78 and includes a plurality of spaced, hollow, T-shaped rails or bars 88 (see Figure 6) that taper toward their lower ends to prevent particles of ice from wedging between adjacent bars to restrict the normal sliding movement of ice particles on the graders.

Obviously, the rails 88 of the final grader are spaced a greater distance apart than the rails 80 of the intermediate grader.

All of the graders are vertically inclined and the same are also inclined relative to each other with initial grader inclined the most and the final grader the least. The angular positioning of the graders may be conveniently adjusted, due to their mounting, however, the relative inclination of the graders remain constant since it is desired to slow the relative large particles of crushed ice during their downward progress.

In practical use of the present invention, fine or snow ice 90 will pass through the screen 72 into the compartment 18; small ice 92 will pass through the grader 78 into the compartment 20, medium size ice 94 will pass through the grader 86 into the compartment 94, and large particles of ice 96, or particles that have not passed through the graders, will then enter the compartment 24.

In view of the foregoing description taken in conjunction with the accompanying drawings it is believed that a clear understanding of the device will be quite apparent to those skilled in this art. A more detailed description is accordingly deemed unnecessary.

It is to be understood, however, that even though there is herein shown and described a preferred embodiment of the invention the same is susceptible to certain changes fully comprehended by the spirit of the invention as herein described and the scope of the appended claims.

Having described the invention, what is claimed as new is:

1. In a crushing machine, a device for grading the ice leaving the machine comprising a vertically inclined initial grader through which fine ice passes, a vertically inclined intermediate grader through which certain sizes of the ice leaving the machine passes, a vertically inclined final grader through which certain sizes of the ice leaving the machine passes, and a compartment communicating with the final grader and adapted to receive crushed ice that has not passed through the said graders, said graders being inclined relative to each other and disposed in stepped relationship, the angle of inclination of said initial grader and said intermediate grader being progressively increased over the angle of inclination of said final grader.

2. In a crushing machine, a device for grading the ice leaving the machine comprising an initial vertically inclined grader through which fine ice passes, a final vertically inclined grader, an intermediate vertically inclined grader through which certain sizes of the ice leaving the machine passes, a first compartment underlying said initial grader and adapted to receive ice passing through said initial grader, a second compartment underlying the intermediate grader and adapted to receive ice passing through said intermediate grader, a third compartment underlying the final grader and adapted to receive ice passing through said final grader, and a fourth compartment adapted to receive ice that has not passed through said graders, said graders being inclined relative to each other and progressively decreasing in their angle of inclination from the initial grader to the final grader.

3. The combination of claim 2 wherein said final grader includes a plurality of hollow, downwardly T-shaped, tapered spaced guide rails.

4. An ice sizing apparatus comprising at least three vertically inclined graders, said graders being fixed inclined relative to each other and arranged in stepped relationship, the angle of inclination of said graders being progressively reduced from the uppermost of the graders to the lowermost of the graders, said graders having openings therein, the openings in said graders being of progressively increased size from the uppermost grader to the lowermost grader, the relative inclination of said graders being constant.

5. An ice sizing apparatus including a downwardly inclined initial grader, a downwardly inclined intermediate grader having its upper end underlying the lower end of the initial grader, and a downwardly inclined final grader having its upper end underlying the lower end of the intermediate grader, said graders being inclined relative to each other.

6. The combination of claim 5 and a vertically inclined guide plate carried by and underlying each of said initial and intermediate graders, and a vertical wall engaging each plate and aiding in supporting the initial and intermediate graders.

HARRY A. LEHMAN.
JAMES A. BATEMAN.
WILLIAM W. BATEMAN.

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