Oct. 20, 1970 K. R. CLARK 3,534,915

ICE CRUSHER

Original Filed May 31, 1967 3 Sheets-Sheet 1

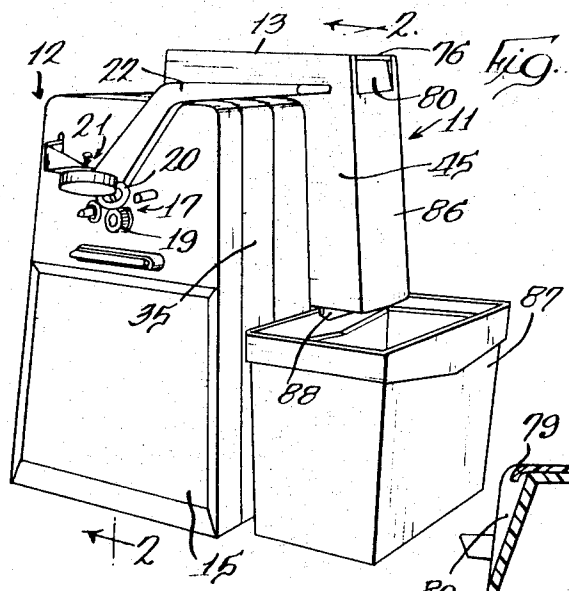

Fig. 1.

Fig. 3.

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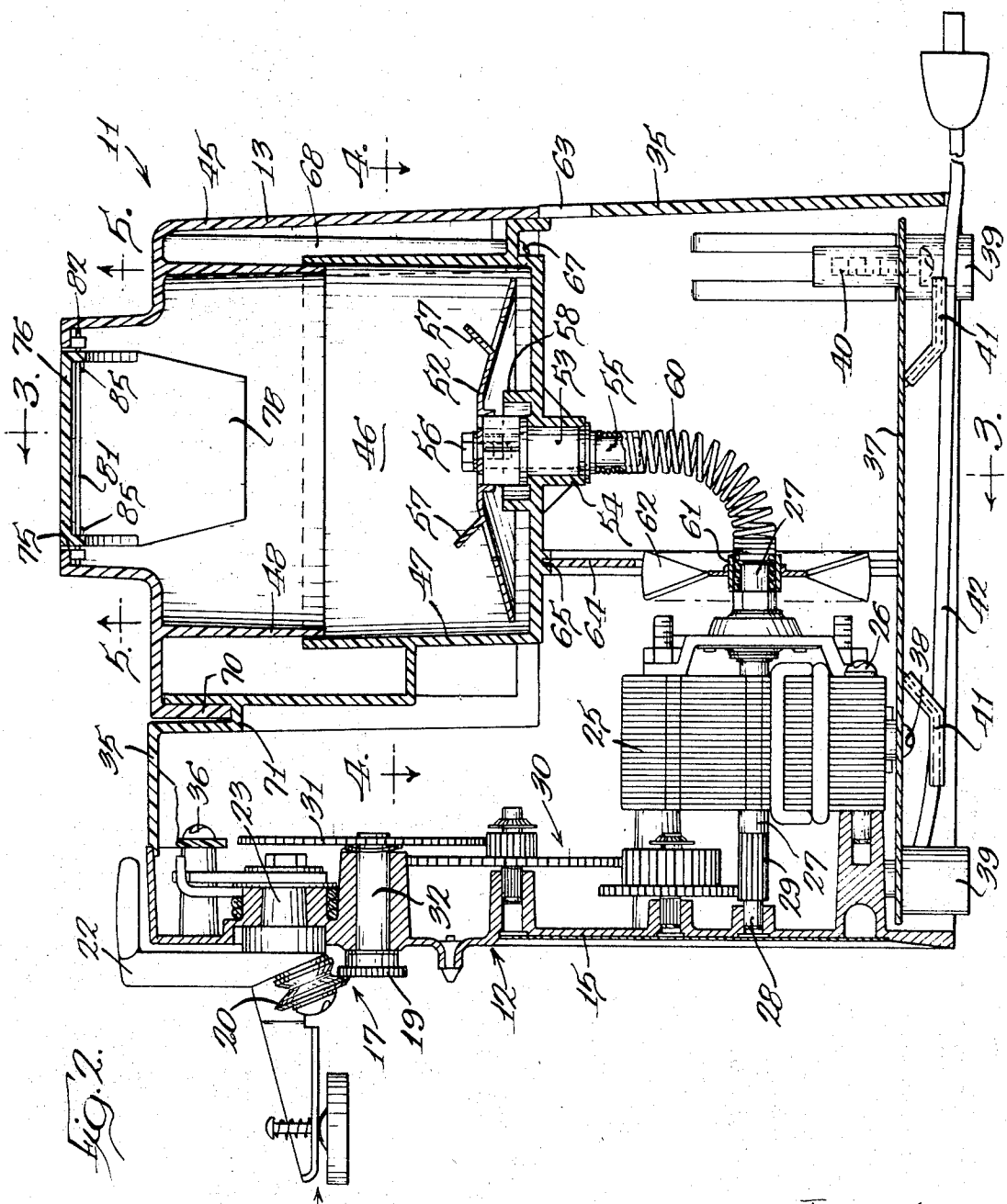

Fig. 2.

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Fig. 4.

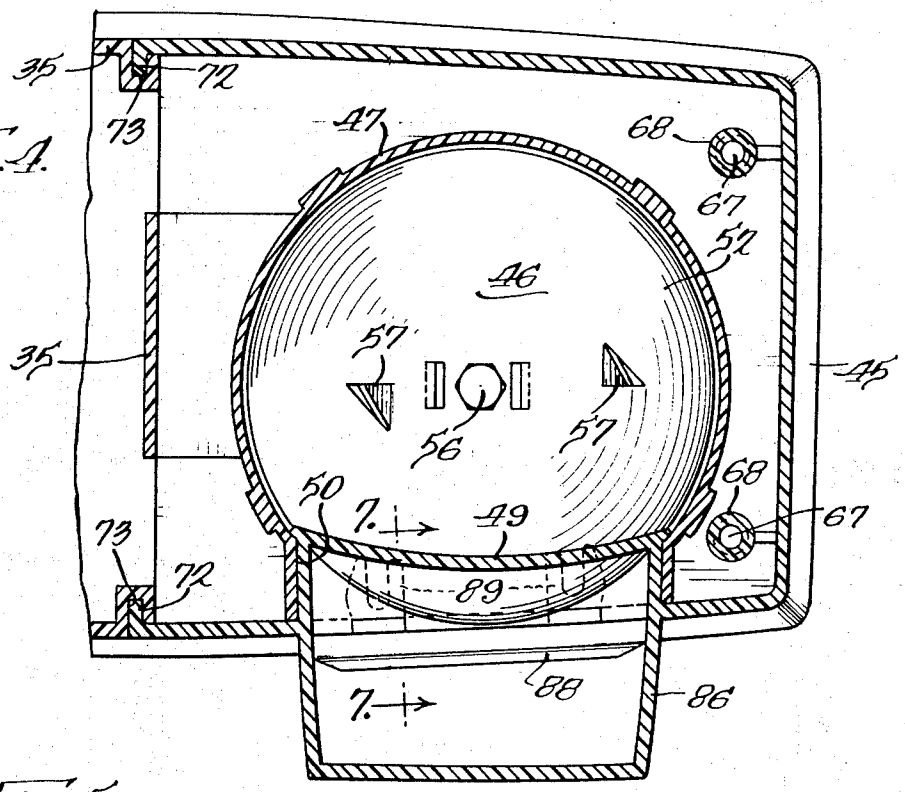


Fig. 5.

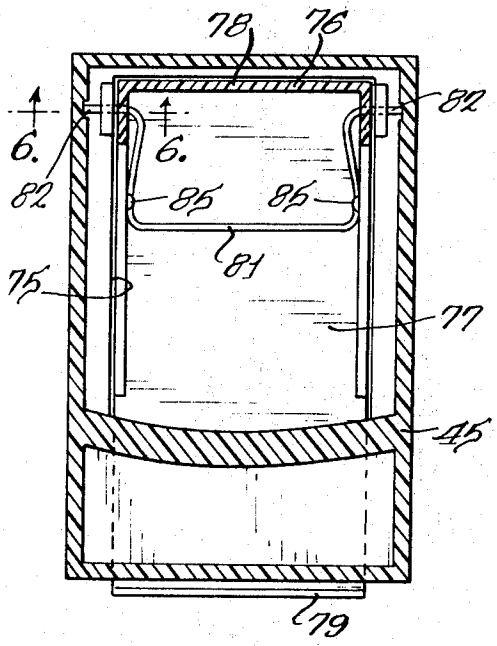


Fig. 6.

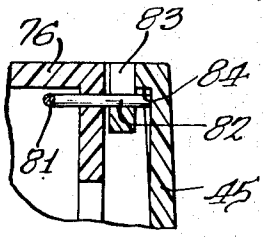
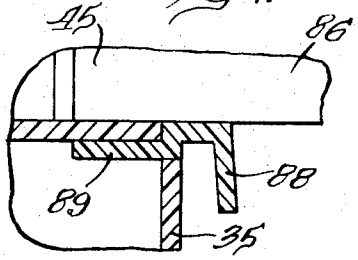


Fig. 7.



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3,534,915

ICE CRUSHER

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Original application May 31, 1967, Ser. No. 643,323. Divided and this application May 7, 1969, Ser. No. 824,025

Int. Cl. B02c *13/18, 18/12, 13/26*

U.S. Cl. 241—100 9 Claims

ABSTRACT OF THE DISCLOSURE

An appliance having can opening mechanism driven through reduction gearing and an ice crushing mechanism driven directly by the single motor. An ice crushing chamber is formed on the can opener housing by a cover member which, together with the can opener housing, forms an enclosure for a rotary driven ice chipping disc. The ice chipping enclosure has an opening with a pivotal lid which, when closed, completely blocks the enclosure opening and, when open, has a restriction portion which extends across the opening.

BACKGROUND OF THE INVENTION

This application is a division of U.S. application Ser. No. 643,323, filed May 31, 1967, and is assigned to the same assignee as the instant invention.

The power operated electric can opener has in recent years become extremely popular and is in widespread use in the kitchens of private homes. One example of such a domestic electric can opener is shown in Hubrich Pat. No. 3,254,406. Since the can opener is used so frequently in the kitchen, it must be necessarily be stored in a convenient location for easy access many times a day.

Another appliance which has come into increasing use in the home is the power driven ice crusher or ice chipper. An example of such an appliance is shown in Knapp et al. Pat. No. 3,171,605. The ice crusher is conventionally powered by a small electric motor which drives a disc having proections adapted to chip or crush the ice cubes made in an electric refrigerator. The degree of chipping or the size of the ice produced is governed primarily by the shape of the chamber in which the chipping occurs and the size and orientation of the discharge opening for the crushed or chipped ice.

One of the principal objections to the present day ice crushers is that they occupy a substantial amount of counter space in the kitchen and they are used only infrequently. As a consequence, the housewife has a tendency to store the ice crusher away in a cabinet where it is rarely used because of its lack of accessibility. Accordingly, it would be desirable to provide an ice crusher which would eliminate the storage and convenience problems associated with the present day ice crushers.

SUMMARY OF THE INVENTION

The invention is directed to a combined can opener and ice crusher wherein the ice crushing mechanism has been added to the conventional can opener structure. This combination has been accomplished in accordance with the present invention by interconnecting the outer end of the can opener motor shaft to an ice-crushing or chipping disc by means of a flexible shaft which drives the disc in rotation about a vertically disposed axis. A simple one-piece plastic cover cooperates with the can opener housing to form an ice crushing chamber within which the rotary disc is received. Cooperating portions of the can opener housing and the cover form the discharge opening and discharge passageway for ice expelled from the ice crushing chamber.

It is an object of the present invention to provide an improved appliance which performs the function of opening cans and crushing ice.

It is a further object of the present invention to provide an improved can opener which also is capable of performing the function of chipping or crushing ice.

It is another object of the present invention to provide an improved ice crusher which is formed by a simple two-part plastic housing and is driven by a shaded pole motor.

It is still another object of the present invention to provide an improved can opener having an ice crushing mechanism which rotates about a vertical axis and is connected to the can opener motor by means of a flexible shaft.

Further objects and advantages of the present invention will become apparent as the following description proceeds and the features of novelty which characterize the invention will be pointed out with particularly, in the claims annexed to and forming a part of this specification.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a combined can opener and ice crusher embodying my invention;

FIG. 2 is an enlarged vertical sectional view of the combined can opener and ice crusher of FIG. 1 taken on line **2—2** of FIG. 1;

FIG. 3 is a sectional view taken on line **3—3** of FIG. 2 assuming FIG. 2 shows the complete structure;

FIG. 4 is an enlarged fragmentary sectional view taken on line **4—4** of FIG. 2;

FIG. 5 is an enlarged fragmentary sectional view taken on line **5—5** of FIG. 2;

FIG. 6 is an enlarged fragmentary sectional view taken on line **6—6** of FIG. 5; and

FIG. 7 is an enlarged fragmentary sectional view taken on line **7—7** of FIG. 4.

Referring now to the drawings, there is shown in FIG. 1 a combined can opener and ice crusher designated generally by reference numeral **11**. The combined appliance includes a generally forwardly located can opening portion **12** and an ice crushing portion **13** which is supported on the opposite end of the appliance from the can opening portion. The can opening portion **12** of the combined appliance may be conventional in form and in the disclosed embodiment is substantially identical to the structure shown in Hubrich Pat. No. 3,254,406.

Briefly, the can opening portion **12** is made up of a die cast frame **15** which extends vertically and supports at its upper end a can opening mechanism **17**. The can opening mechanism **17** includes a power driven serrated can drive or feed wheel **19** and a can cutting wheel **20**. For the purpose of retaining the can cover after it has been severed from the can, there is also supported on the upper end of the frame **15** a magnetic lid retaining means **21**.

An operating lever or handle **22** is provided which is pivoted to the frame **15** by an axle **23** and which supports the can cutting wheel **20** at a point displaced from the axis of the axle **23**. Thus, upon rotation of the operating lever **23** the can cutting wheel **20** may be moved away from the drive wheel **19** to permit the insertion of the end seam of a can therebetween. Upon return of the operating lever **22** to the position shown in FIGS. 1 and 2, the cutting wheel **20** pierces the cover of the can and is in position to make a continuous cut and thereby sever the cover or lid of the can from the body of the can.

In order to provide the force for rotating the can during the opening operation, there is provided an electric motor **25** which in this case is a shaded pole induction motor secured to the lower end of the frame **15** by means

of assembly screws 26, one of which is shown in FIG. 2. The motor 25 is provided with a rotor shaft 27 which supports a conventional shaded pole motor rotor which is not shown. The end of the shaft 27 adjacent the frame 15 is provided with a reduced diameter end portion 28 which is journaled in the frame 15 as shown in FIG. 2. Adjacent the end portion 28, the shaft 27 is formed with an integral gear 29 which drives the drive or feed wheel 19 through reduction gearing designated generally by reference numeral 30. The reduction gearing 30 includes spur gears which are supported on intermediate shafts as well as a single gear 31 which is carried by a drive wheel supporting shaft 32 which is also journaled in the frame 15. Thus, as the rotor shaft 27 rotates at fairly high speed, the can drive wheel 19 is rotated at a low speed by virtue of the driving connection through the reduction gearing 30.

As will be evident to those familiar with the can opener art, the operating lever 22 is conventionally designed to actuate a switch to energize the motor 25 as the can cutting wheel 20 is moved into the cutting position shown in FIG. 2. The motor then drives the drive wheel 19 causing the can to be rotated with the can cutting wheel 20 in piercing engagement with the cover. On completion of the circular cut on the cover of the can, the pressure on the operating lever 22 is released, thereby de-energizing the motor 25. The structure to perform these functions is more completely set forth and described in the above cited Hubrich patent. It should be understood that any can opener mechanism may be substituted for the mechanism described above without departing from the scope or spirit of the invention. In addition, various types of automatic actuating and cycle terminating means may be used in connection with the can opener mechanism.

For the purpose of supporting the can opener portion 12 and enclosing the motor 25 and reduction gearing 30, there is provided a housing 35. The housing 35 is secured to the frame 15 at the upper end by a pair of assembly screws 36, one of which is shown in FIG. 2. The lower end of the frame 15 and the housing 35 are secured together by means of a bottom closure plate 37. The frame 15 and the housing 35 together form a motor enclosing chamber which is open at the bottom. The closure 37 serves to complete the motor enclosure.

It should be noted that the closure 37 is assembled to the frame 15 by means of screws which extend through two rubber supporting feet 39. Similarly, there are two assembly screws extending through additional supporting feet 39 through openings in the closure 37 into threaded engagement with bosses 40 formed in the housing 35, one of which is illustrated in FIG. 2. As shown in FIGS. 2 and 3, additional assembly screws 38 positioned between the feet 39 extend through closure 37 into threaded engagement with the housing 35. It should be evident, therefore, that the bottom closure 37 serves to interconnect the bottom of the frame 15 and the housing 35 to form a rigid housing structure. The closure 37 is formed with a pair of spaced L-shaped integral tabs 41 which provide means for supporting the power cord 42 by coiling it around tabs 41.

The enclosure formed by the housing 35 and the frame 15 is somewhat L-shaped by virtue of the fact that the motor 25 protrudes outwardly from the base of the frame 15 while the reduction gearing 30 is fairly flat against the surface of the upstanding frame 15. The ice crushing portion 13 of the appliance 11 is positioned more or less above the base leg of the L in a manner so as to conserve or minimize the space required for the appliance. This aspect is, of course, particularly important in view of the fact that a can opener must be stored on the kitchen counter where it continuously occupies a certain space or counter area. By positioning the ice crushing structure above the motor 25 and adjacent the reduction gearing 30, the space occupied by the combination appliance 11 is reduced to a minimum.

For the purpose of simplifying the ice crusher structure as much as possible, the housing 35 itself forms a large part of the ice crusher structure. Assembled to the housing 35 is a cover 45 which cooperates with the housing 35 to form a generally cylindrical ice crushing chamber 46. The chamber 46 is formed by an upwardly extending cylindrical wall 47 and by downwardly extending cylindrical wall 48 formed integrally with the cover 45. The walls 47 and 48 are in overlapping or abutting engagement as is best shown in FIG. 2 with each of the cylindrical walls 47 and 48 comprising about half of the side wall area of the chamber 46. In the upper half of the chamber 46 the cylindrical wall 48 is bridged by a chordal wall 49 as is best shown in FIG. 4. The chordal wall 49 bridges or interconnects portions of cylindrical wall 48 which are spaced apart more than one quarter of the circumference of the chamber 46. The chordal wall 49 also extends downwardly beyond the bottom of the cylindrical wall 48 into the opening 50 formed in the cylindrical wall 47. There remains below the chordal wall 49 a discharge slot 51 defined by the sides of the opening 50 and the bottom edge of the chordal wall 49.

For the purpose of chipping or crushing ice within the chamber 46, there is provided a slighly conical disc 52 which is supported for rotation about a vertically extending journal bearing 53 received in a boss 54 formed integrally with the housing 35. The disc 52 is secured to the upper end of a stub shaft 55 by a retaining screw 56.

Positioned radially outwardly from the axis of rotation of the disc 52 are integrally formed projections 57 which extend upwardly from the disc for the purpose of chipping or crushing ice positioned within the chamber 46. As is evident from FIG. 4, the projections 57 are generally triangular in shape having sharp leading edges and upwardly projecting tips which engage cubes of ice and tend to reduce them in size through a chipping or crushing action.

Positioned under the disc 52 is an upstanding circular flange 58 which surrounds the bearing 53. The flange 58 is formed integrally with the bottom wall of chamber 46 and serves two very important purposes. It provides a barrier against water produced from melted ice, which water would tend to leak through the bearing 53. In addition, flange 58 prevents any oil or lubricant from bearing 53 from contaminating the ice produced in chamber 46. If any oil is thrown radially outwardly from the bearing 53, it is trapped within the flange 58 where it causes no problem.

In order to drive the disc 52, there is provided a flexible shaft 60 which interconnects the outer end of the motor 25 with the lower end of the stub shaft 55 which supports the disc 52. As may best be seen in FIG. 2, the flexible shaft 60 comprises a helical spring which is flexed through a ninety degree angle and which transmits torque between the horizontally extending rotor shaft 27 and the vertically extending disc supporting shaft 55. The end of the rotor shaft 27 remote from the frame 15 receives over its outer diameter the spring 60. A rubber supporting sleeve 61 is received on the shaft 27 over the spring 60 and serves to support a fan 62 which draws air inwardly through openings 63 in the housing 35. Extending partially around the fan 62 is a baffle 64 which is best shown in FIG. 3. The baffle 64 is received in grooves 65 in the housing 35 as shown in FIG. 2 and is retained upwardly assembled to the housing 35 by means of the bottom closure 37. The fan 62 is positioned within a cut out portion 66 in the baffle 64. As is obvious, the purpose of the baffle 64 is to increase the efficiency of the fan 62 and to direct the cooling air across the motor 25.

Turning attention again to the cover 45 which, with the housing 35, forms the ice crushing chamber 46, we note that the cover is retained in assembled engagement with the housing 35 by means of assembly screws 67 which extend upwardly from within the housing 35 into threaded engagement with the bosses 68 formed on the cover 45.

To retain the edges of the cover **45** remote from the assembly screws **67** in engagement with the cover **35**, there is provided a tongue and groove engagement involving a tongue **70** and groove **71** formed on the cover **45** and the housing **35** respectively as best shown in FIG. 2. In addition, the adjacent portions of the housing **35** and cover **45** are formed with shallow ribs **72** and grooves **73** respectively as are best shown in FIG. 4. When the assembly screws **67** are securely tightened into engagement with the cover **45**, the cover is drawn down into rigid assembled engagement with the housing **35**.

The upper wall of the cover **45** is formed with an opening or passageway **75** which is closed by means of a pivotally mounted lid **76**. As is best shown in FIG. 3, the lid **76** is a somewhat L-shaped member having a closure portion **77** and a restriction portion **78**. As shown in solid lines in FIG. 3, the lid **76** is in its closed position with the closure portion **77** completely blocking the openng **75** wth an outer end **79** extending into a groove **80** where it is readily accessible for lifting or pivoting the lid **76** to the ice loading position.

For the purpose of supporting the lid **76** for pivotal movement, there is provided a U-shaped spring **81** which has trunnion portions **82** extending outwardly through openings in the side walls of the lid **76** as is best shown in FIGS. 5 and 6. The trunnion portions **82** extend outwardly into engagement with integrally molded pivotal supports on the cover **45**. These supports each consist of an upwardly facing slot **83** and an opening **84** through which the trunnions **82** extend to prevent their upward displacement.

Turning again to FIG. 3, attention is directed to the dotted line showing of the lid **76** where it is located in the open or ice loading position. In this position, the restrction portion **78** extends across and partially obstructs the opening **75**. In order to load ice into the chamber **46**, cubes of ice may be positioned on the portion **78** and when the lid is partially closed, such ice cubes will be dispensed into the chamber **46**. This lid structure with the closure portion **77** and the restriction portion **78** permits loading of limited quantities of ice at any one time into the chamber **46** and prevents one from inserting hands or fingers into the chamber **46** where they might be injured severely by the projections **57** on the rotating disc **52**. The spring **81** is deformed to assemble it to the lid **76** with its trunnion portions **82** extending outwardly through openings in the wall portion and the bight portion snapped beneath integral projections **85**, as best shown in FIG. 5.

Integrally formed on the side of the cover **45** is a vertically extending conduit or passageway **86**. Communicating with the lower end of the passageway **86** is the ice discharge slot **51**. The passageway **86** is open at its lower end thereby permitting the chipped ice to be discharged downwardly into a suitable ice receiving container **87**. It should be noted that the housing **35** is provided with an overhanging retaining ledge **88**, as is best shown in FIGS. 3, 4, and 7. The retaining ledge **88** is positioned at the bottom of the discharging pasageway **86** and provides means for assuring that all of the discharged ice is received in the container **87**.

As is evident from FIGS. 4 and 7, the ledge **88** is formed with assembly projections **89** which extend into the interior of the housing **35** and are cemented to the upper wall of the housing to prevent detachment of the ledge **88** from the housing **35**. The container **87** is retained snugly against the side of the housing **35** by means of the overhanging retaining ledge **88**. Thus, the chipped ice passing out of the discharge slot **51** passes across the ledge **88** and into the container **87**. The discharge passageway **86** serves to direct the chipped ice downwardly and eliminates the possibility of any chipped ice being hurled outwardly through the discharge slot **51** at a speed such that it would not fall into the container **87**.

While the action of the ice crushing disc **52** is well-known in the art, brief mention will be made of the operation of the device. As ice cubes are inserted into the chamber **46** through the opening **75**, the motor **25** is energized by means of a switch **90** shown in FIG. 3. The motor through its flexible connection **60** causes the disc **52** to rotate at high speed. The chipping projections **57** engage the ice cube breaking off chips of ice and causing it to bounce around within the chamber **46**. As the pieces of ice become small enough to pass through the discharge slot **51**, they are ejected into the container **87**. The chordal wall **49** serves to aid in the chipping operation thereby preventing ice from moving around a perferctly circular path and causing the ice to move radially thereby increasing the chipping action.

It has been found in the past that small fractional horsepower shaded pole motors, such as motors **25**, are unsuitable for use in disc type ice crushers unless they are provided with flywheels to maintain speed under conditions of load. The reduction gearing of the can opener serves a flywheel effect and eliminates the necessity for an additional flywheel mechanism. Accordingly, the ice crusher comprises a simple and very compatible combination to the conventional can opener structure. The mode in which the ice crusher has been integrated with the can opener housing is significant in minimizng the space requirements of the combnation appliance. In addition, the use of the flexble shaft coupling **60** between the horizontally disposed armature shaft **27** and the vertically disposed disc supporting shaft **55** provides the ultimate in simplicity as far as a power connection between the shafts is concerned.

While there have been shown and described several embodiments of the present invention, it will be apparent to those skilled in the art that numerous changes and modifications may occur, and it is intended in the appended claims to cover all such changes and modifications which fall within the true spirit and scope of the present invention.

What is claimed as new and desired to be secured by Letters Patent of the United States is:

1. An ice crusher of the type having a conical disc with at least one projection for chipping ice, the improvement comprising a two-piece plastic housing including a base and a cover, means in said base journaling said disc for rotation about a vertical axis, a cylindrical flange extending upwardly from said base and positioned in closely spaced relation to the periphery of said disc, an opening formed in said flange for the discharge of chipped ice, said cover having a downwardly extending cylindrical flange which abuts said base flange to form a generally cylindrical ice crushing chamber, a vertical chordal wall on said cover extending across between spaced portions of said cover flange, said chordal wall extending downwardly into said opening to close the upper part thereof leaving a narrow ice discharge slot adjacent the periphery of said disc.

2. The ice crusher of claim **1** wherein said housing is formed with a vertical passageway communicating with said chamber through said discharge slot, said passageway receiving radially discharged chips of ice and directing them downwardly.

3. The ice crusher of claim **2** having a frame which supports a motor, said base and said frame forming a motor enclosure, means drivingly interconnecting said motor and said disc.

4. The ice crusher of claim **1** wherein said slot occupies more than one quarter of the periphery of said chamber, and said chordal wall extending across above said disc and being closely spaced thereto to limit the size of chipped ice discharged from said ice crushing chamber.

5. The ice crusher of claim **1** wherein said cover cylindrical flange extends into said base flange whereby

the bottom of said cover flange is nested inside and below the top of said base flange.

6. The ice crusher of claim 1 wherein said means includes a horizontal wall and an integral boss extending normal thereto, a bearing positioned in said boss and rotatably supporting said disc, an electric motor secured to said base and having a rotor shaft disposed parallel to said wall, a helical spring flexible shaft in power transmitting relationship between said disc and said rotor shaft.

7. The ice crusher of claim 1 wherein said means includes a horizontal bottom wall and a bearing secured thereto for rotatably supporting said disc, an upstanding circular collar integral with said bottom wall and surrounding said bearing to provide a barrier against water produced from melted ice from leaking through said bearing.

8. The ice crusher of claim 1 including a cup-shaped container for receiving chipped ice from said discharge slot, said container adapted to interlock with said base for holding said container in proper position to receive the chipped ice.

9. In an ice crusher comprising a housing enclosing an ice crushing chamber and forming an opening to said chamber, a lid secured to said housing and movable between a closed position and an ice loading position, said lid including a closure portion completely blocking said housing opening when said lid is in the closed position and a restriction portion which extends across said opening when said lid is in the ice loading position, said restriction portion being angularly disposed with respect to said closure portion whereby ice is insertable into said chamber by placing the ice on the restriction portion when said lid is in the loading position and moving said lid to said closed position, said lid having an L-shaped configuration and being pivotally mounted to said housing so that said lid is pivotal between the closed and loading positions, a U-shaped spring having trunnion portions extending through spaced apertures in side walls of said lid closure portion, said trunnion portions extend outwardly into engagement with integrally formed pivotal supports in said housing, said supports including an upwardly facing slot and an opening through which said trunnion portions extend to prevent their upward displacement, said closure portion formed with spaced integral projections under which the bight portion of said U-shaped spring snaps for rigidly locking said spring to said closure portion whereby said lid can freely pivot with respect to said housing.

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U.S. Cl. X.R.

241—188, 285