

Aug. 11, 1959

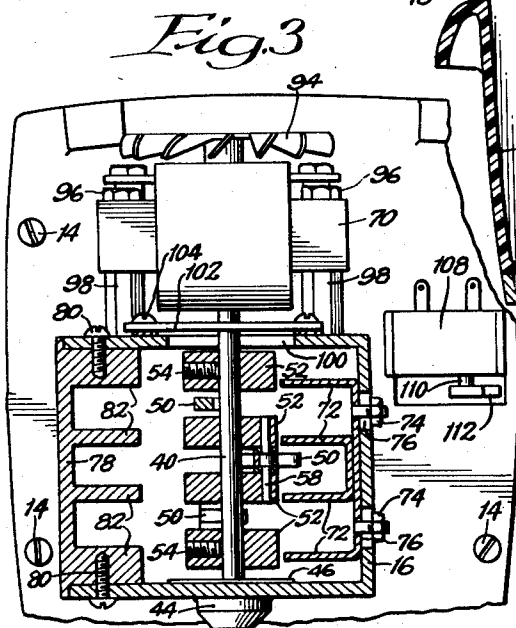
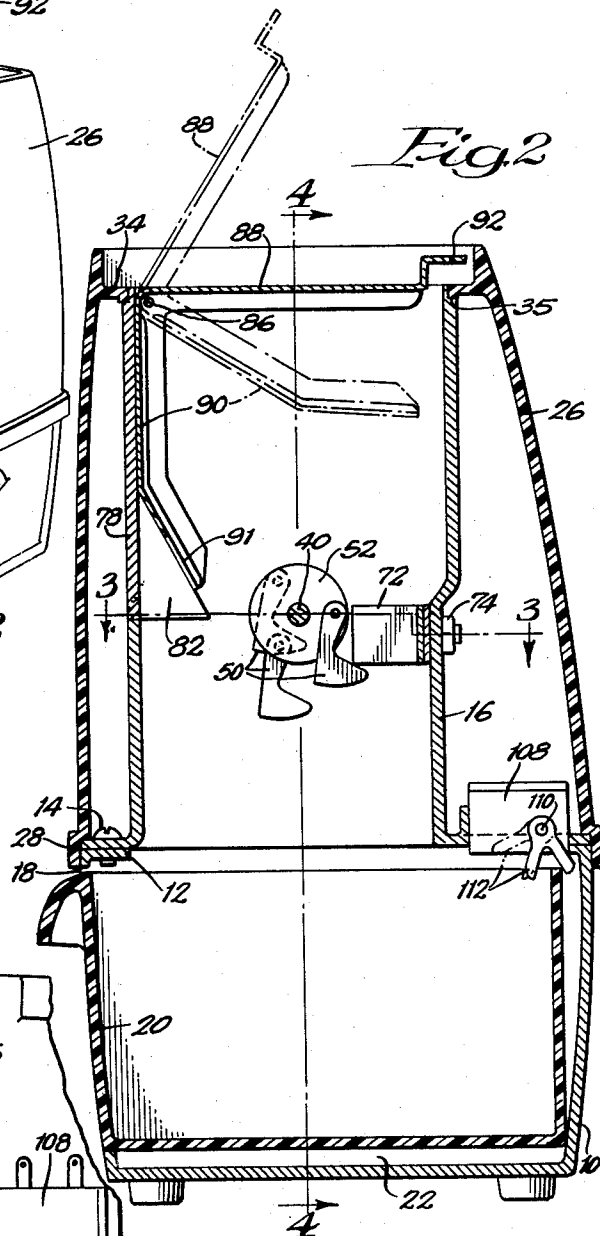
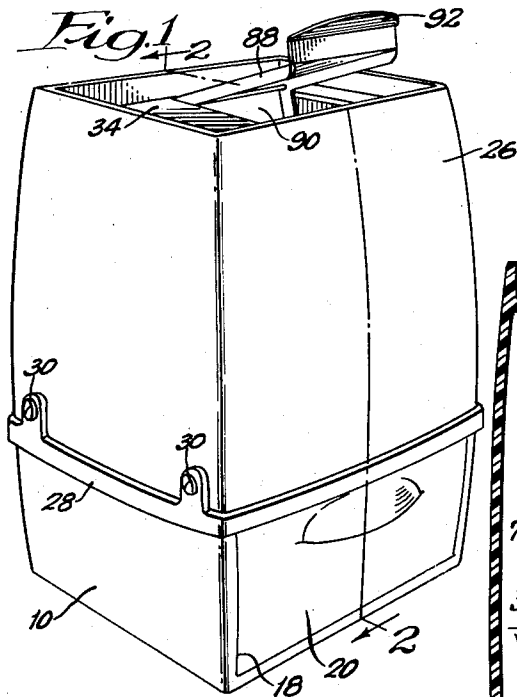
J. T. HELLYER

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ICE CRUSHER DIRECTLY DRIVEN BY ELECTRIC MOTOR

Filed July 9, 1956

2 Sheets-Sheet 1



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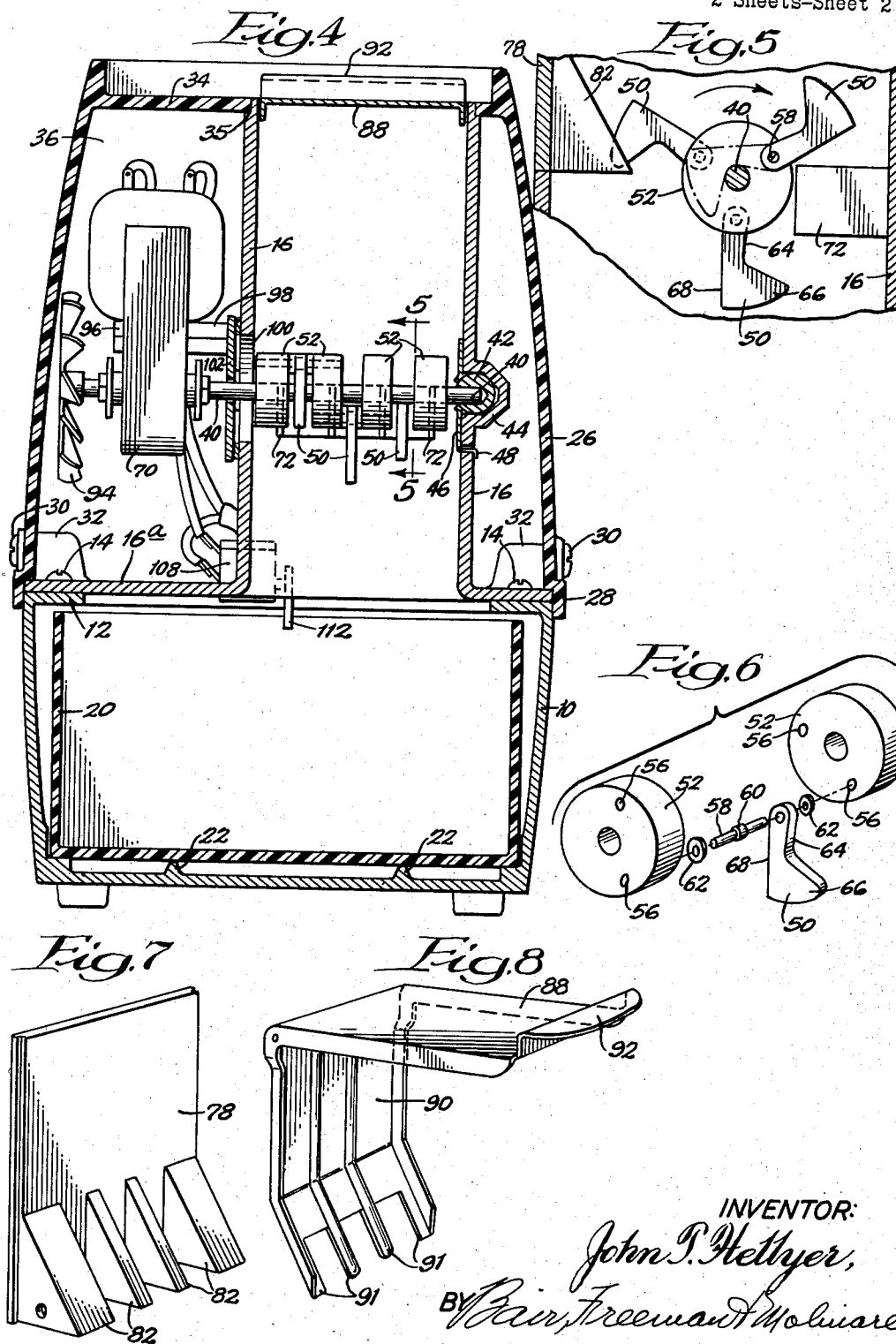
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ICE CRUSHER DIRECTLY DRIVEN BY ELECTRIC MOTOR

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1 Claim. (Cl. 241—190)

The present invention relates to a household appliance for comminuting various foodstuffs and the like, and particularly to devices suitable for crushing and chipping of ice.

Devices of the type embodying the present invention may be advantageously utilized in the preparation of various foods and beverages where it is desired to reduce the particle size of foods. For example, such devices are suitable for crushing or chipping of ice, celery, carrots and various other vegetables, fruits and frozen products, including various types of foods such as frozen dog food, etc.

Devices of the nature of crushers, chippers or choppers are now available for household use require a considerable amount of power to perform a proper operation upon various objects. Some of the presently available devices employ high speed chopping or chipping mechanisms of a type which reduces the object to such finely divided form as to substantially attain a state of liquification. Many of the presently available devices of this general class are hazardous to use and are apt to cause injury to an operator, such as when endeavoring to alleviate a jammed condition in the device.

One of the primary objects of this invention is to provide a novel and improved form of crushing device for crushing and chipping various objects, such as ice and various foodstuffs.

Another object is to provide a novel and improved crushing and chipping device having one or more impact hammers which are constructed and arranged so as to effect severance of the object into small, finely divided particles incident to one or more impact blows.

A further object is to provide a novel and improved crushing and chipping device having a novel combination of cover and chute elements for facilitating feeding of objects into the crushing mechanism, and which precludes possible physical contact by the hand of the operator with the crushing or chipping means.

Still another object is to provide a novel and improved crushing and chipping device of the character indicated having combination cover and chute elements constructed and arranged for measuring and limiting the quantity of the objects or material being fed to the crushing or chipping means.

A still further object is to provide a novel electrically driven crushing and chipping device of the character indicated having a drawer removably mounted therein for the reception of crushed or chipped material, together with a switch connected in circuit with the motor and having a control element positioned for closing of the switch when the drawer is in full inserted position in the device.

Other objects and advantages of this invention will be apparent from the following description, taken in connection with the accompanying drawings in which:

Figure 1 is a perspective view of the crushing and chipping device embodying the present invention.

Figure 2 is an enlarged vertical sectional view through

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the device, taken substantially as indicated at line 2—2 of Figure 1.

Figure 3 is a horizontal sectional view through the crushing and chipping mechanism, taken substantially as indicated at line 3—3 on Figure 2.

Figure 4 is a transverse, vertical sectional view through the device, taken substantially as indicated at line 4—4 on Figure 3.

Figure 5 is an enlarged fragmentary, elevational view of the crushing and chipping mechanism, guide and blades, with the impact hammers extended in operative position.

Figure 6 is a detailed, disassembled perspective view of a pair of cooperating hub elements and impact hammer.

Figure 7 is a perspective view of a guide element for assisting in directing objects or material to the crushing or chipping means.

Figure 8 is a perspective view of the combination cover and chute element.

While the device embodying the present invention, by reason of its specific construction, performs both a chipping and crushing operation on various objects or materials, to reduce them to relatively finely divided particle size, the device, for convenience, is preferably referred to as a crusher.

The device comprises a hollow base 10, which is preferably a metallic casting of generally hollow, box-like formation, terminating at its upper end in a marginal flange 12, on which is fixedly secured, as by screws 14, an upright tubular duct or hopper 16. The lower open end of the hopper is in registration with the hollow interior of the base 10. One of the upright walls of the base is formed with a large opening 18, into which is removably mounted a drawer 20, for the reception of crushed or chipped material from the hopper or duct 16.

The drawer is preferably formed of a suitable insulating material, such as plastic, possessing the characteristic of low heat conductivity, for reducing the tendency of melting of certain chipped or crushed materials, such as ice. It will be noted that the drawer is dimensioned so that three upright walls thereof are spaced out of contact with the walls of the base 10, thereby providing air insulation around the drawer. To facilitate sliding of the drawer into and out of the base, and further to insulate the bottom of the drawer from the base, the bottom of the base is provided with a plurality of longitudinally extending ribs 22, which also serve to reduce the extent of physical contact of the drawer with the base.

Surrounding the tubular duct or hopper 16 is a decorative housing or shell 26, which may be formed of suitable plastic material. Said housing is of generally upright, tubular form and has its lower marginal edge formed with offset flanges 28 for seating and telescoping over the upper portion of the base 10. The housing is secured by screws 30 to lugs 32, extending upwardly from the horizontal flange portion 16a, at the lower end of the tubular duct or hopper. The upper end of the housing is provided with a top wall 34, having a material feeding opening, the edges of which are formed for seating cooperatively in a groove 35 formed in the upper end of the tubular duct or hopper 16. The housing is dimensioned and arranged with respect to the hopper 16 so as to provide, at one side, a chamber 36 for enclosing drive mechanism, as will hereinafter be described.

Crushing mechanism is mounted in the hopper 16, a substantial distance from the upper end thereof, and comprises a main shaft 40 extending transversely of the hopper, and having its free end journaled in a self aligning ball bearing 42, mounted in a socket 44 formed

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as a part of the wall of the hopper 16. The ball bearing is held in place in its socket by a retainer plate 46, having a plurality of tangs 48, extending through the wall of the hopper, as seen in Figure 4 of the drawings. Mounted on said shaft 40, are a plurality of axially spaced apart, impact hammers 50, herein shown as three in number. These hammers are each mounted between a pair of hub elements 52, carried on the shaft 40, and the two outermost hubs are fixedly secured to the said shaft by set screws 54. The opposing faces of each adjacent pair of hub elements are provided with a pair of aligned apertures 56, extending parallel to the axis of the shaft 40, for the reception of the opposite ends of a pin 58, which ends are press fitted into said apertures. An impact hammer is journaled on an enlarged portion 60, of the pin 58, and spacer washers 62, are positioned against opposite faces of the impact hammer and said enlarged portion 60, so that the hammer is freely rotatable about the axis of the pin 58.

By virtue of such interconnection of the hub elements in supporting the respective impact hammers, all of said hub elements and hammers are rotatable as a unit. As may be clearly seen in the drawings, and particularly Figure 5, the impact hammers are so mounted in the respective hub elements that they are spaced apart angularly relatively to each other, 120 degrees. Each of the impact hammers comprises a shank portion 64, and a head 66, and an impact edge 68. As may be seen in Figure 5, the heads 66 of the impact hammers are positioned so as to extend in a direction opposite to the direction of rotation of said hammers when the hammers assume their radially extended position, due to centrifugal force, incident to rotation of the shaft 40. Because of the special configuration of the impact hammers, said hammers may assume a position in recessed relation with respect to the hub elements 52, as clearly indicated in dot-dash outline in Figure 5, wherein the hammer is disposed substantially within the peripheral dimensions of the hub elements. This constructional feature is of great importance in that it permits the impact hammers to recede within the confines of the hub elements as a result of impact with an object disposed in its path of travel, in the event that said hammer does not exert adequate force on the object so as to permit passing therethrough. It is by virtue of the retractability of the impact hammers that jamming of the crushing or chipping mechanism is obviated.

By the reason of the novel form of the impact hammers and the heads thereof, satisfactory crushing or chipping action is attainable by the use of a relatively small amount of power. A relatively small electric motor 70, may be employed to operate the crushing mechanism. The motor may be a 20th or a 30th horsepower, operating at a speed in the general range of 3400 r.p.m.

Cooperating with the impact hammers are a series of horizontally spaced apart blades 72. The blades are interconnected as an assembly and are attached by bolts 74 to a sidewall of the hopper 16, with the bolts extending through horizontal slots 76, so as to permit limited transverse adjustment of the blades relatively to the impact hammers 50. By adjustment of the blades relatively to the impact hammers, it is possible to obtain variation in the particle size of the objects being crushed or chipped. The spacing of the blades determines the maximum particle size that may pass therebetween for discharge into the drawer 20.

On the wall of the hopper, opposite the blades 72, is a guide block 78, the marginal edges of which are shouldered for interfitting with the side walls of the hopper 16, and said guide block is fixedly secured in place by screws 80. The guide block is provided at its lower end with a plurality of inclined block-like ele-

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ments 82, positioned in cooperative relation to the crushing means to assist in directing the objects to be crushed into the path of travel of the impact hammers 50. The spacing of the block elements 82 is such as to permit free, unobstructed passage of the impact hammers therebetween.

Pivotaly mounted on a hinged pin 86 in the upper end of the hopper 16, is a cover element 88, preferably made of sheet metal, and formed, preferably as shown, integrally with the cover element, is a depending chute 90, which is so co-related to the cover element 88 that when the cover element is in closed position, as seen in Figure 2 of the drawings, the chute is positioned in contact with the guide element 78. The lower portion of the chute is inclined to correspond with the inclination of the separate guide blocks 82, and said lower end of the chute is formed with a series of spaced apart fingers 91 registering with the guide blocks 82, and providing spaces for the passage of the impact hammers between said fingers. When the cover element is raised to an open position, chute 90 extends across the hopper 16 above the crushing means, and precludes physical contact by the fingers of the operator with the crushing means. The chute in this position is adapted for the reception of objects or material to be crushed or chipped, and as the cover element is lowered to closed position, the objects are then discharged from the chute toward the crushing means in a position to be engaged by the impact hammers. The chute also serves as a means for measuring the quantity of material to be introduced at one time, into the hopper. Manipulation of the cover element may be utilized to cause the chute to readjust and move objects that may be lodged out of the path of the impact hammers. The chute when moved also serves to scrape off of the side walls of the hopper material adhering thereto. The free edge of the cover element 88 is provided with a rounded, upwardly offset finger engaging tab 92, by virtue of which the cover may be conveniently grasped for moving to an open position.

The shaft 40, carrying the crushing means, is also the main shaft of the motor 70, and the motor 70 and associated parts, is adapted to be positioned and enclosed within the chamber 36, formed between the hopper 16 and the outer wall of the shell or housing 26, as seen in Figure 1 of the drawings. The outer end of the motor shaft 40 is provided with a fan 94 for cooling the motor, and the entire motor assembly is attached by studs 96, and threaded sleeves 98, directly to the adjacent wall of the hopper 16. The wall of the hopper is formed with a relatively large opening 100, of a size so as to permit convenient passage therethrough of the entire assembly of the crushing or chipping means, and this opening is normally closed by a cover plate 102, secured in position against the wall of the hopper by screws 104. By virtue of this construction, the entire electric motor and crushing or chipping means may be assembled as a complete unit prior to mounting in place in the hopper of the device, which effects great economies in manufacture, as well as in repair or replacement of parts.

It will now be apparent that by virtue of the construction embodying the present invention, the objects or material to be crushed or chipped, when discharged into the hopper, will be engaged by a series of impact blows imparted by the impact hammers 50, tending to chip or crush the object or material, and as the object is reduced in particle size, the impact hammers, in further cooperation with the blades 72, tend to further crush and chip to reduce the particle size of the objects. It will be noted that the dimensions of the spaces between the blades 72, determine the maximum size of particles of ice or other objects being chipped or crushed which will be permitted to pass downwardly through the hopper for discharge into the drawer 20. It will also be apparent that the blades 72 perform a cooperating crushing

and chipping action on the objects, particularly when the objects are thrown by impact there-against due to the action of the rapidly rotating impact hammers 50. It will be seen that the operative edges of the blades 72 are disposed approximately in horizontal alignment with the shaft 40 so that the impact hammers will force the objects being processed against the blades during the movement of the hammers through the upper rear quadrant of their cycle of rotation, in clockwise direction, as seen in Figure 5 of the drawings.

For purposes of safety, and in order to insure that the objects or material being crushed or chipped are not discharged other than in the drawer 20, I provide an electric switch 108, connected in circuit with the motor 70. Associated with the switch is a rotatable shaft 110, on which is mounted a bifurcated, depending control element 112, comprising a pair of spaced fingers which are adapted, when the drawer is removed from the base, to assume the dot-dash outline position in Figure 2 of the drawings, at which time the switch is in an open position. When the drawer is fully inserted within the base 10, the rear upper edge of the drawer engages the bifurcated element 112, and rotates it, to the full line position, seen in Figure 2, for effecting closure of the switch, and thereby making it possible for the motor to be actuated for driving the crushing means.

The terms "impact hammer" and "impact member," as used herein is intended to define a movable member for directly contacting the material being worked upon.

Although I have herein shown and described a preferred embodiment of my invention, manifestly it is capable of modification and rearrangement without departing from the spirit and scope thereof. I do not, therefore, wish to be understood as limiting this invention to the precise embodiment herein disclosed, except as I may be so limited by the appended claim.

I claim:

A material crusher comprising a tubular duct open at opposite ends, ice crushing means disposed in said duct, intermediate its ends, and comprising a shaft journaled at one end in one wall of said duct and the opposite portion extending through an enlarged opening in the opposite wall of said duct, material crushing elements mounted on said shaft, shear blades carried on the interior of the duct and positioned in cooperating relation to said crushing elements, an electric motor mounted on said duct and operably connected to said shaft and providing journal support for said opposite portion of the shaft, said opening in the wall of the duct being of a size to permit said crushing elements and shaft in assembled relation to be passed therethrough, and a sealing plate secured to the wall of the duct covering said opening and surrounding said shaft.

References Cited in the file of this patent

UNITED STATES PATENTS

411,571	Bergtold	Sept. 24, 1889
629,262	Lombard	July 18, 1899
1,200,384	Marquette	Oct. 3, 1916
1,241,935	Dellert	Oct. 2, 1917
1,700,819	Bert	Feb. 5, 1929
2,169,684	Erickson	Aug. 15, 1939
2,187,102	Schuhmann	Jan. 16, 1940
2,195,363	Fegley et al.	Mar. 26, 1940
2,297,604	Bateman	Sept. 29, 1942
2,509,242	Miller	May 30, 1950
2,554,888	Wood	May 29, 1951
2,568,203	Pattinson	Sept. 18, 1951

FOREIGN PATENTS

847,456	France	July 3, 1939
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