April 25, 1939. A. ALEXAY 2,156,075

KITCHEN WASTE UNIT

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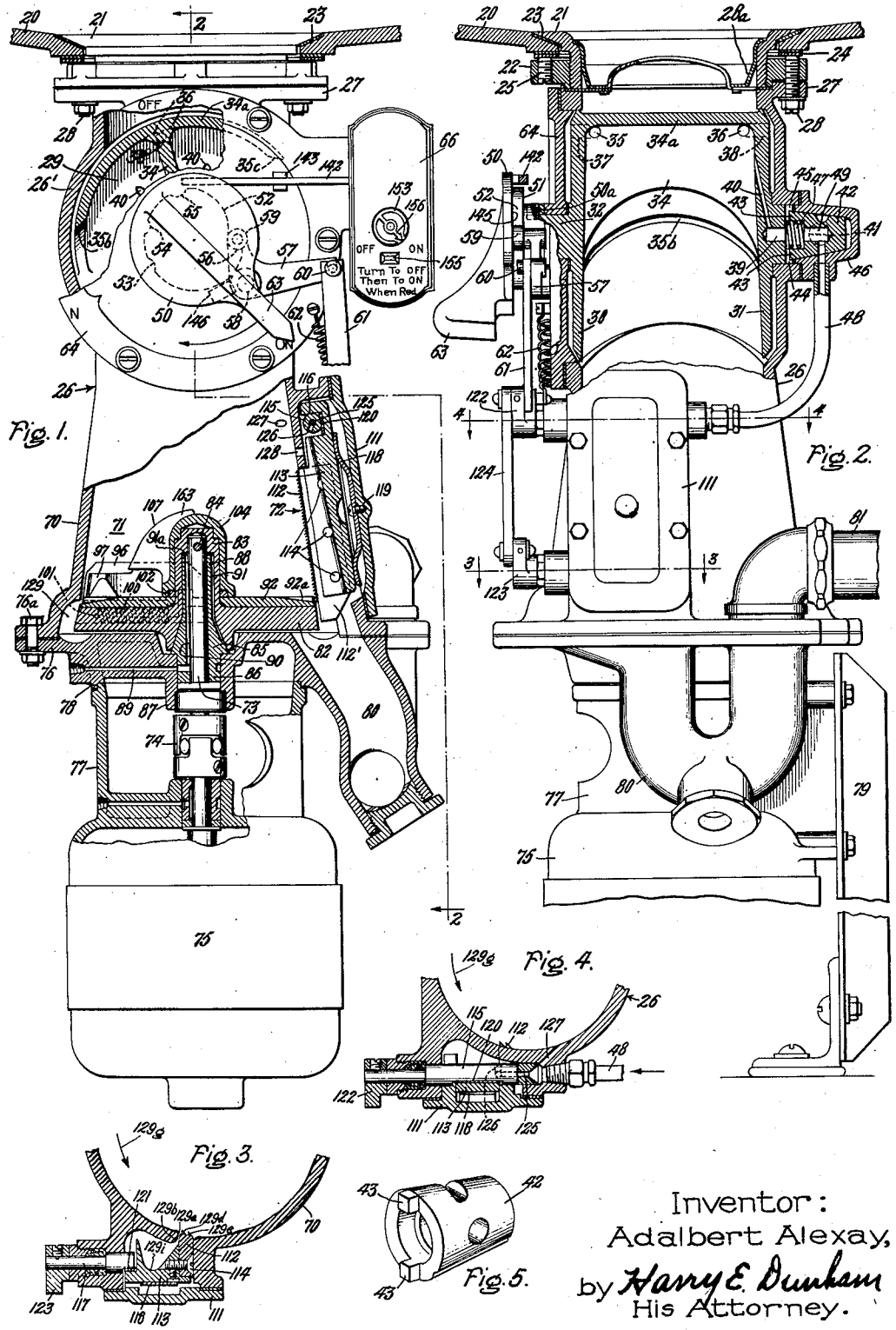

Fig. 1.

Fig. 2.

Fig. 4.

Fig. 3.

Fig. 5.

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Fig. 6.

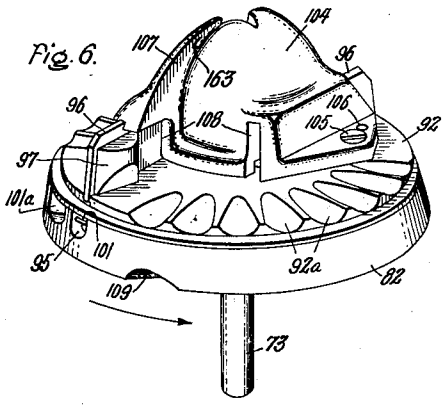


Fig. 7.

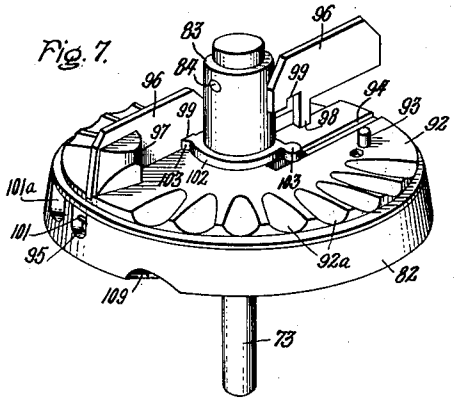


Fig. 8.

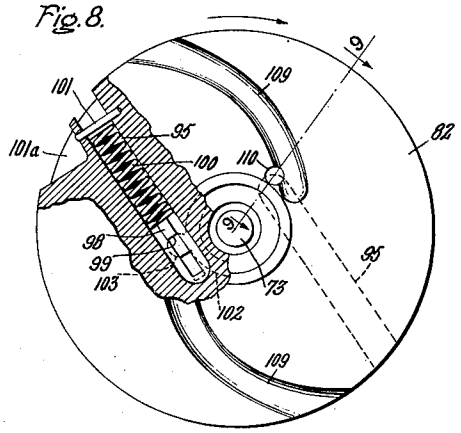


Fig. 19.

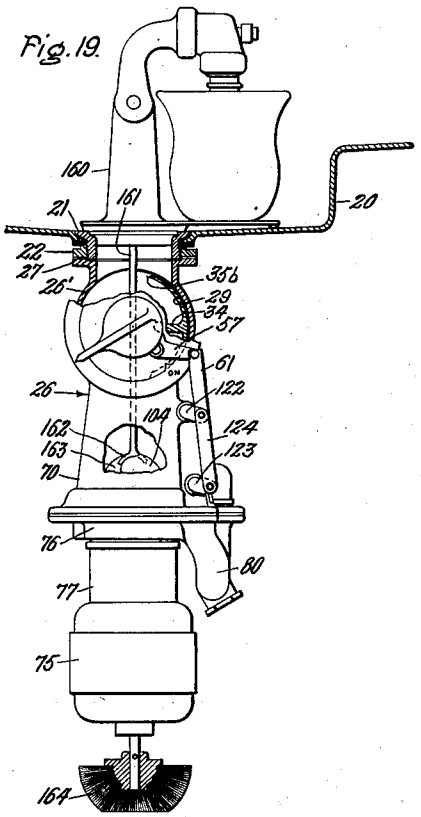


Fig. 14.

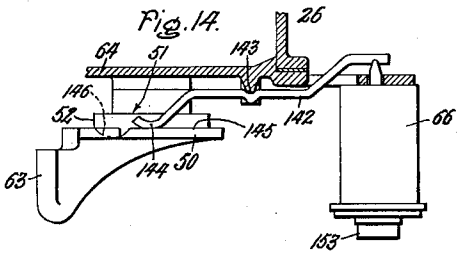


Fig. 9.

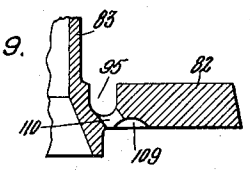
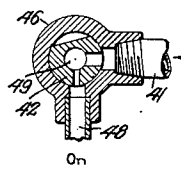
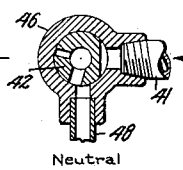


Fig. 10.



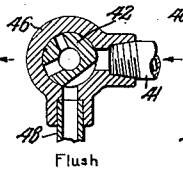
On

Fig. 11.



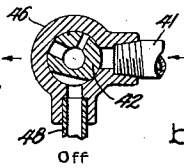
Neutral

Fig. 12.



Flush

Fig. 13.



Off

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Fig. 16.

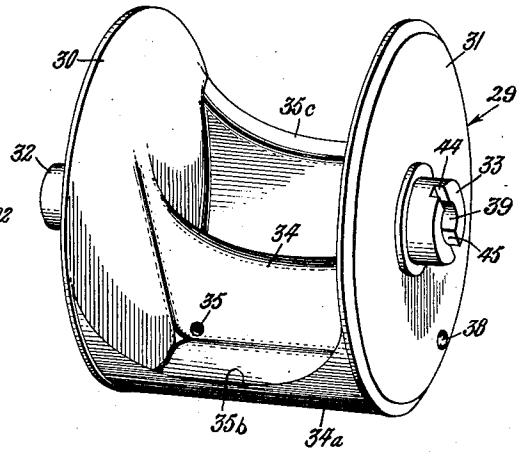


Fig. 21.

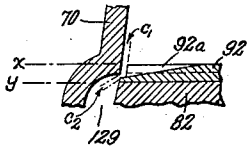


Fig. 20.

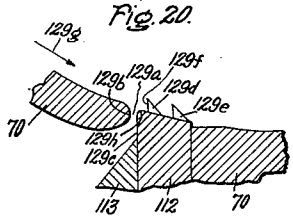


Fig. 17.

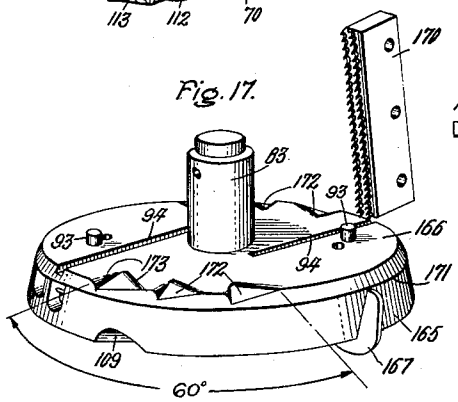


Fig. 18.

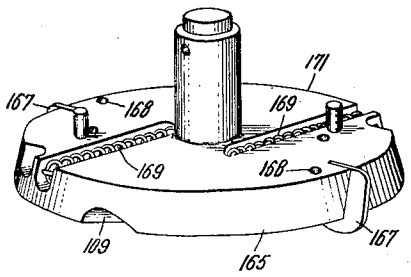
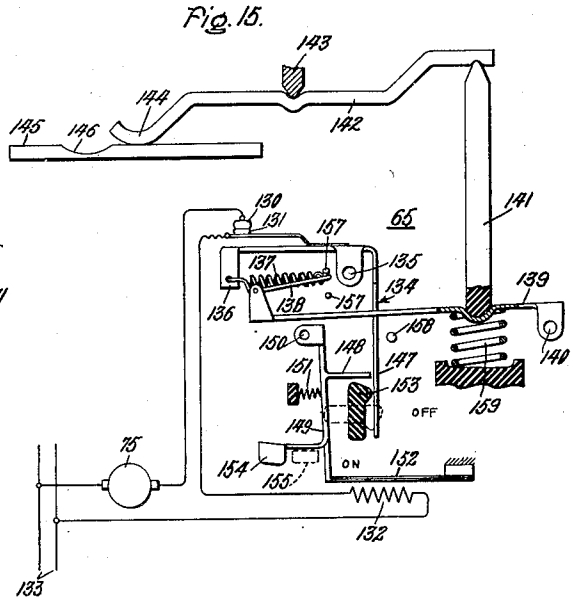


Fig. 15.



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KITCHEN WASTE UNIT

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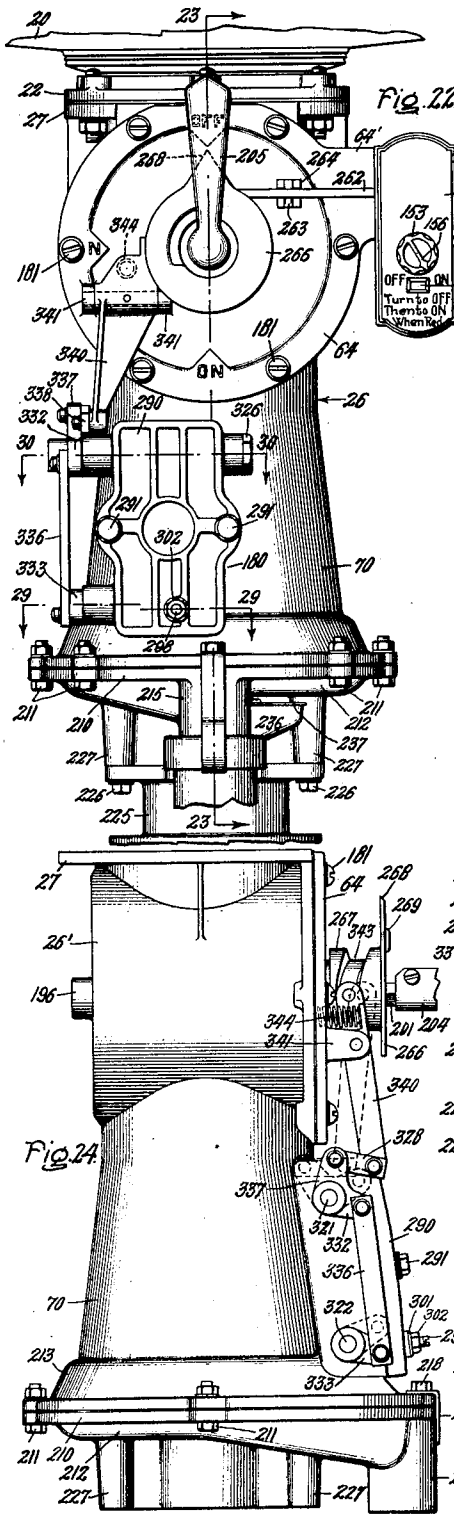

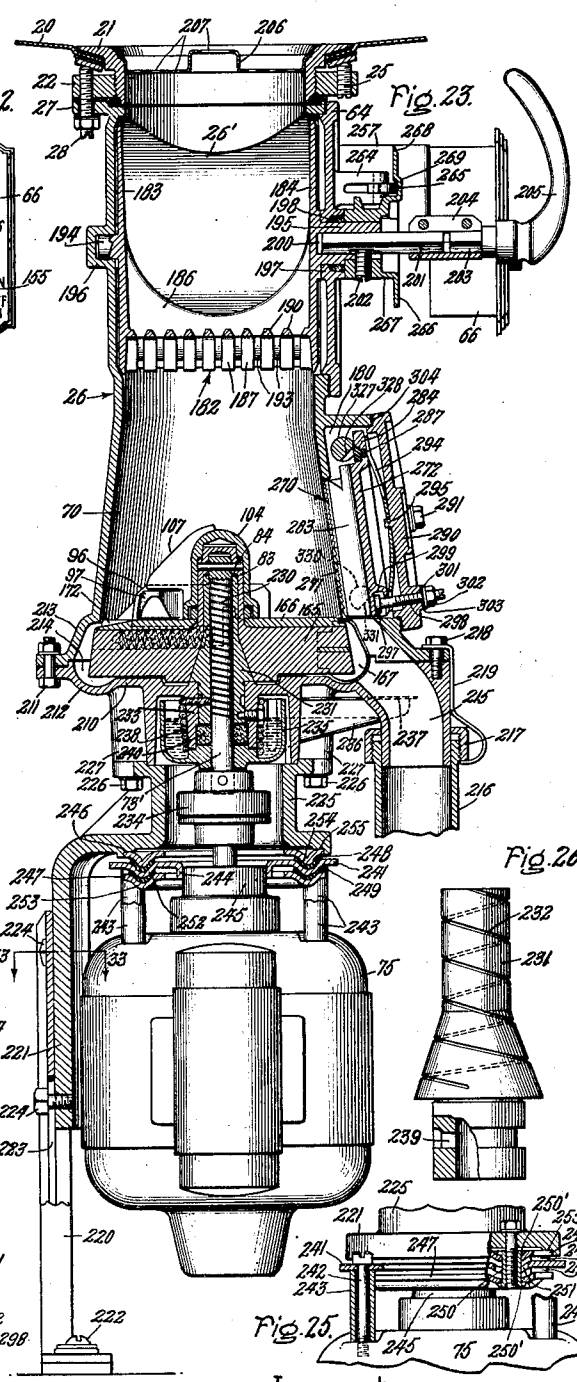

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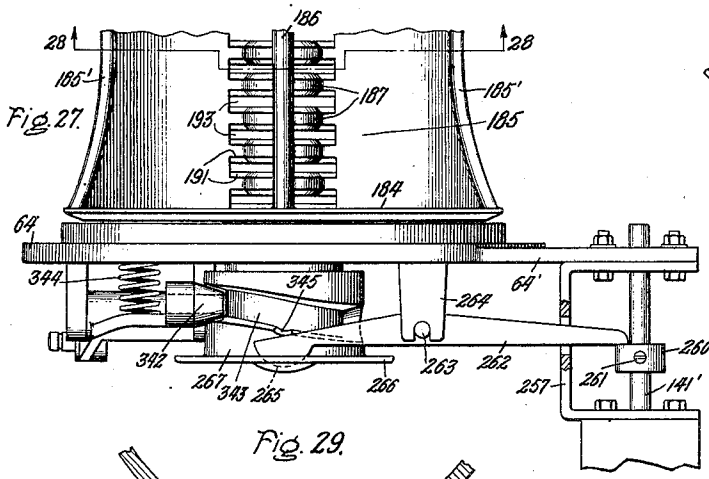

Fig. 27.

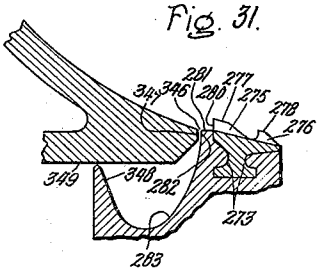

Fig. 31.

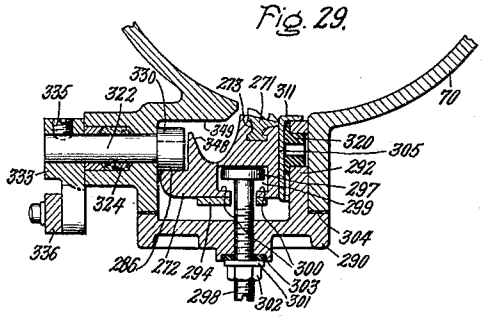

Fig. 29.

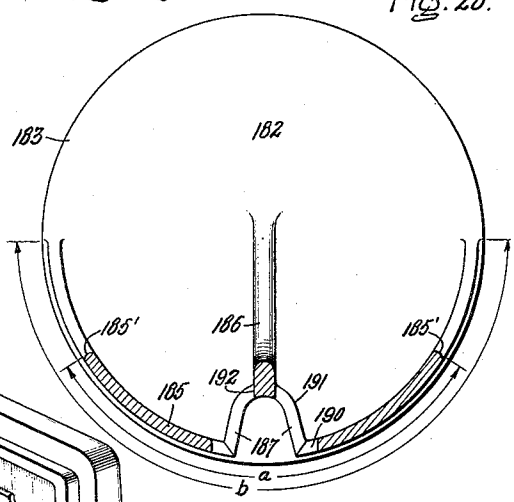

Fig. 28.

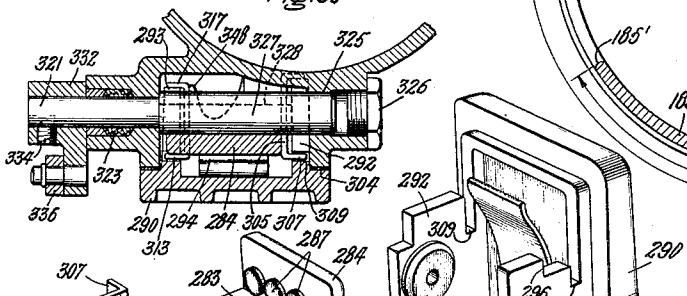

Fig. 30.

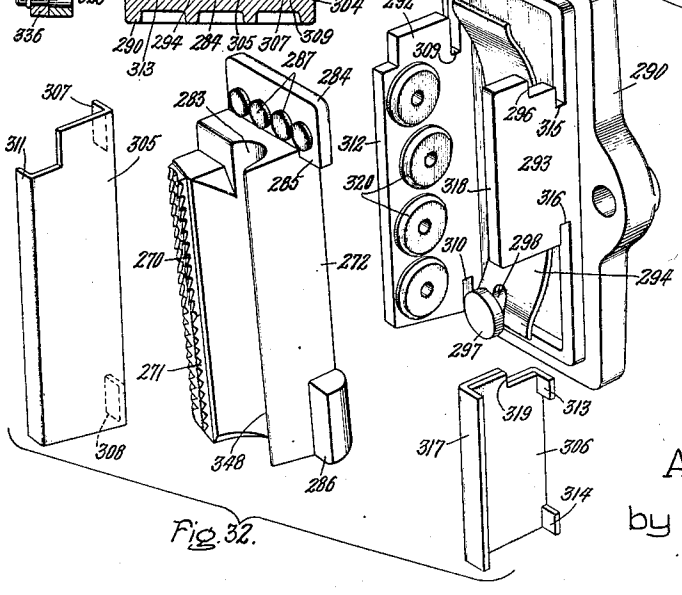

Fig. 32.

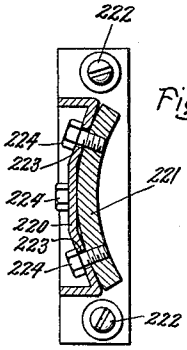

Fig. 33.

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UNITED STATES PATENT OFFICE

2,156,075

KITCHEN WASTE UNIT

Adalbert Alexay, Schenectady, N. Y., assignor to General Electric Company, a corporation of New York

Application March 27, 1936, Serial No. 71,156

54 Claims. (Cl. 146—192)

The present invention relates to apparatus for disposing of waste material and particularly to a unitary device suitable for household use for comminuting, by grinding, crushing or cutting, kitchen waste material or garbage in the form of vegetables, meat, bones and the like, and for flushing the comminuted material into a sewer system or the like by the aid of water conducted into the device.

This application is a continuation in part of my copending application, Serial No. 730,219, filed June 12, 1934, which is assigned to the assignee of the present invention, and, similarly to the invention of the original application, the present invention has for an important objective the provision of improvements in the construction and arrangement of apparatus for disposing of garbage and like material to the end that the apparatus may be extremely simple to operate and safe, efficient and dependable in operation, and that it may be manufactured at comparatively low cost.

For an understanding of other objects of the invention and of that which I believe to be novel and my invention, attention is directed to the following detailed description and the claims appended thereto taken in connection with the accompanying drawings.

In the drawings, Fig. 1 is a front elevation, partly in section, of a grinding apparatus embodying my invention; Fig. 2 is a side elevation partly in section along lines **2—2** of Fig. 1; Fig. 3 is a sectional view along line **3—3** of Fig. 2; Fig. 4 is a sectional view along line **4—4** of Fig. 2; Fig. 5 is a perspective view of a valve element shown in Fig. 2; Fig. 6 is a perspective view of a rotary cutter element shown in Fig. 1; Fig. 7 is an exploded view of certain parts shown in Fig. 6; Fig. 8 is a bottom view, partly broken away, of the cutter shown in Fig. 7; Fig. 9 is a section along line **9—9** of Fig. 8; Figs. 10, 11, 12 and 13 illustrate different operating positions of the valve element shown in Fig. 5; Fig. 14 is a top view, partly in section, of a switch mechanism shown in Fig. 1; Fig. 15 illustrates diagrammatically the electric circuit of the apparatus and the switch mechanism for opening and closing the circuit; Fig. 16 is a perspective view of a receptacle shown in Figs. 1 and 2; Fig. 17 illustrates a modified form and arrangement of the rotary and stationary cutting means shown in Figs. 1, 6 and 7; Fig. 18 shows certain details of a part of the cutting means illustrated in Fig. 17; Fig. 19 illustrates the manner of operating other apparatus in combination with the machine shown in Figs. 1 to 16, Fig. 20 is an enlarged view of a part of the mechanism illustrated in Fig. 3; Fig. 21 is an enlarged view of another part of the mechanism shown in Fig. 1; Fig. 22 is a front elevation of a modified form of apparatus embodying my present invention; Fig. 23 is a side sectional elevation taken along the lines **23—23** of Fig. 22, Fig. 24 is a side elevation of the apparatus illustrated in Figs. 22 and 23; Fig. 25 shows more in detail the motor mounting illustrated in Fig. 23; Fig. 26 shows in detail a modified form of bearing for the rotary cutting means; Fig. 27 illustrate certain details of the control for the modified apparatus of Figs. 22–24 and also illustrates in part a modified form of receptacle closure device; Fig. 28 is a sectional view taken along the line **28—28** of Fig. 27; Figs. 29 and 30 are sectional views taken along the lines **29—29** and **30—30** respectively of Fig. 22 to show the details of the arrangement and control of the stationary cutting means; Fig. 31 is an enlarged sectional view of part of the mechanism shown in Fig. 29, Fig. 32 is a perspective view of an exploded arrangement of the parts of the modified form of stationary cutting means incorporated in the apparatus of Figs. 22–24, and Fig. 33 is a section along the line **33—33** of Fig. 23. Wherein possible in the several figures like parts are designated by the same reference characters.

In general it may be said that the parts of my improved apparatus fall into four main divisions: adapter means for mounting the apparatus beneath a kitchen sink or the like, a main casing for receiving material to be ground and forming a grinding chamber having therein elements for properly grinding such material and discharging the ground material into a sewer system or the like, a prime mover such as an electric motor for operating the grinding mechanism, and mechanism for controlling the operation of the apparatus.

As shown in Figs. 1 and 2, the apparatus therein illustrated is adapted to be connected to a kitchen sink **20** by means of an adapter ring **21** and a ring nut **22** screwed to the adapter ring. Provided between the adapter and the sink **20** is a packing **23** and between the sink and the ring nut **22** is another packing **24**, the latter being held in position by means of set screws **25**. The apparatus has a casing **26** provided with an upper flange **27** fastened to the ring nut **22** by bolts **28**. With this arrangement the machine is fastened securely beneath the sink and the transmission of noise and vibration to the sink structure is considerably minimized by the provision of the packings **23** and **24**. The adapter ring **21** forms also the inlet opening of the grinding apparatus through which

material to be ground may be fed directly into the grinding chamber of the apparatus. This opening may be closed by a cover 28a suitably locked in position when the apparatus is out of operation.

An upper portion 26' of the casing 26 has cylindrically shaped side walls (see Fig. 1) to accommodate a closure device for the casing opening, which device is in the form of a rotatable receptacle 29 which in one position is adapted to receive material to be ground and which when turned into another position is adapted to empty such material into the lower portion of the casing 26 defining the grinding chamber. The receptacle (Fig. 16) is somewhat half-moon in shape with two end walls in the form of disks 30 and 31 provided with trunnions or stub shafts 32 and 33 which are supported in flanged openings in the upper walls of the casing 26. The receptacle has a cylindrically shaped bottom wall 34a and a central web 34 which is united with the side walls 30 and 31 and with the bottom wall. This arrangement provides for the rotatable mounting of the receptacle in such manner that the cylindrically shaped bottom wall 34a is in concentric relation with the adjacent curved side walls of the upper portion 26' of the casing 26. Web 34 is provided at opposite ends with openings 35 and 36 communicating with openings 37 and 38 in the end walls 30 and 31 respectively (see Figs. 2 and 16).

As will be seen readily from Fig. 16 of the drawings, the bottom wall 34a of the receptacle 29 is connected to peripheral portions of the disks 30 and 31. The opposite edges of the bottom wall are curved as shown at 35b and 35c so that the circumferential length of the intermediate portion of the bottom wall is less than the circumferential length of the outer portions of the bottom wall connected to the disks. The circumferential length of the bottom wall midway between the disks 30 and 31 should be about 180 annular degrees or less, and in Figs. 1, 2 and 19, in which a preferred embodiment of the receptacle is illustrated partially in cross section, the intermediate circumferential length is shown as being considerably less than 180°. This construction is provided to permit an operator to reach into the interior of the grinding chamber to remove non-grindable material when the receptacle is turned to an intermediate position as will be described fully hereinafter.

The trunnion 33 serves also for conducting water to the interior of the receptacle 29. To this end it is provided with an axial opening 39 communicating with the interior of the receptacle through a bore or bores 40 in the side wall 31 of the receptacle. In the present instance I have provided two bores 40 in the side wall 31 of the receptacle, one bore on each side of the rib 34. The ends of the two bores 40 are indicated in Fig. 1. Water is conducted to the opening 39 from a conduit 41 (Fig. 10) through a tapered water valve 42. The latter, as shown in Fig. 5, has lugs 43 projecting into recesses 44 and 45 (Fig. 16) respectively of the trunnion 33. The water valve 42 has a valve casing 46 which is fastened to the casing 26. The valve is held in engagement with the inner surface of the casing 46 by a spring 47 disposed in a central recess of the valve 42 and engaging the trunnion. The valve casing 46 is also connected to a pipe 48 for conducting water to another part of the device, as will be described hereinafter. The different operating positions of the water valve 42 are illustrated in Figs. 10 to 13 inclusive.

Fig. 10 represents the "on" position of the valve, that is, the position in which water is supplied through conduit 48 to a lower part of the machine, as well as through a central passage 49 of the valve and the bores 40 to the receptacle. The valve is in "on" position during grinding operation of the machine (Fig. 2).

Fig. 11 represents a neutral position of the valve in which the water supply is shut off. The valve is turned into this position when the receptacle 29 is rotated into the position illustrated in Fig. 19 to permit the manual removal of objects from the interior of the machine or the operation of other apparatus as will be set forth more fully hereinafter.

Fig. 12 represents the flush position in which water is supplied through conduit 48 to the lower part of the device, the supply through bores 40 to the receptacles being shut off in this position. The valve is turned into this position when the apparatus has to be cleaned by flushing water therethrough.

Fig. 13 shows the valve in the "off" position into which it is turned to stop the supply of water to all parts of the apparatus when the machine is rendered totally inoperative.

Turning of water valve 42 is effected through the connection of the lugs 43 thereof to the trunnion 33 so that the valve turns with the trunnion and receptacle 29. The latter is rotatable by a crank or handle 50 fastened to the trunnion 32 of the receptacle by a set screw 50a (Fig. 2). A rear portion 51 of the crank or handle 50 forms a control cam having a cam surface 52 with notches 53, 54, 55 and 56. As shown in Fig. 1, notches 53, 54 and 55 have the same depths and are relatively shallow while notch 56 is substantially deeper than the other three notches so as to provide a decreased cam radius at this point for reasons hereinafter set forth. A bell crank lever 57, pivotally mounted on a fulcrum 58, has one arm provided with a roller 59 engaging the cam surface 52 and another arm connected by a pin 60 to a link 61. The roller 59 of the bell crank lever is held in engagement with the cam surface 52 by a spring 62 which acts to bias the link 61 upwardly to its elevated position shown in Fig. 1. The handle 50 has a pointer 63 indicating on a front cover plate 64 of the machine the different positions of the receptacle and the water valve 42.

When the pointer 63 of handle 50 indicates "off" on the dial of cover plate 64, roller 59 of the bell crank lever 57 is arranged to engage notch 53, and upon turning of the handle in a counterclockwise direction from this position the roller engages successively the notches 54, 55 and 56. The four positions of the handle and receptacle in which the roller engages notches 53, 54, 55 and 56 correspond to the water valve positions illustrated in Figs. 13, 12, 11 and 10 respectively. In Fig. 1, the pointer 63 is illustrated as pointing to "on" so that the roller is in engagement with the deep depression or notch 56. This position corresponds to the valve position shown in Fig. 10. The spring biased engagement of the roller with the four notches serves to restrain the receptacle from free rotation out of its corresponding positions when it is turned into such positions by an operator. Deep notch 56 has also a further function which will be described hereinafter. Also, a switch 65 having a casing 66, more fully described hereinafter, is fastened to the outer wall of the upper position of casing 26 for operation in accordance with

the position of the receptacle in a manner to be pointed out.

The lower portion 70 of the casing 26 is conically shaped with its inner diameter increasing in downward direction. This lower portion forms a grinding chamber containing cutting or grinding elements comprising a rotary cutter 71 disposed at the bottom of the casing and at least one stationary cutter 72 disposed in a lateral recess in the side wall of the casing. The rotary cutter 71 has a drive shaft 73 centrally arranged in the conically shaped portion of the casing and connected by a flexible coupling 74 to a prime mover, in the present instance shown as an electric motor 75. The rotary cutter 71 is supported on a bottom plate 76 which is secured to flanges of the lower casing portion 70 by bolts 76a. The motor 75 in the present instance has a casing provided with an extension 77 fitting into an annular recessed flange 78 of the bottom plate 76. The motor 75 is supported on a side wall or a floor by means of an adapter 79 (Fig. 2). The bottom plate 76 is integrally formed with a drain or discharge conduit 80 having a trap with an outlet 81 connected to any suitable discharge point such as a sewer line.

Referring now more specifically to the cutting elements, the rotary cutter 71 fastened to the shaft 73 comprises a rotatable, conically shaped, lower disk 82 provided with a central axial projection or hub 83 supported on the shaft 73. The upper end of the shaft 73 is connected to the hub 83 by a pin 84 (Figs. 1 and 7). To reduce vibration of the rotary cutter during operation, a special bearing is provided for supporting the lower disk 82 and the shaft 73. This bearing comprises a conical member 85 provided with a lower cylindrical portion 86 secured by a press fit in a flanged portion 87 of the bottom plate 76 and a sleeve-like upper extension 88. The central bore of the member 85 defines a bearing surface of considerable length for the shaft 73. Lubricant is supplied to this bearing surface from a radial channel 89 in the bottom plate 76 to an axial recess 90 in the bearing surface. The outer surface of the conical portion and the sleeve extension engages a corresponding surface of the disk 82, thus forming a bearing for this disk, lubricant being supplied to this outer bearing surface of the member 85 from the inner bearing surface thereof. As explained above, lubricant flows into the recess 90 in the inner bearing surface, whence it flows upwardly around the upper end face 91a of the sleeve extension 88 into a groove 91 in the outer bearing surface of the member 85. To permit the flow of a sufficient amount of lubricant from the inner bearing surface of bearing member 85 around its upper end face 91a to its outer bearing surface, said outer end face 91a is somewhat spaced from an adjacent shoulder defined in the bore of the hub 83.

The supporting disk 82 of the rotary cutter has a second disk 92 mounted on the upper surface thereof, this second disk having indentations 92a (see Fig. 7) on its upper surface and being secured to the disk 82 by means of pins 93. In the upper disk 92 are two slots 94 which extend in parallel communication with two recesses 95 (see Fig. 8) in the disk 82. Two bars or cutting elements 96 are disposed each with its lower edge slidable in one of the slots 94 to provide for movement of the bars longitudinally inward and outward with respect to the disk 92. A grinding or crushing head 97 is provided at the outer end of each of the bars. Extending downwardly from the lower edge of each of the bars is a projection 98 adjacent to which is provided a recess 99. The projection 98 of each bar extends into the corresponding recess 95 in the lower disk and is yieldingly engaged by one end of a compression spring 100 disposed in the recess 95. The other end of the compression spring bears against a pin 101 which is inserted transversely into the recess through an opening 101a. In order to insure equal movement of the bars so that they at all times assume corresponding positions, there is provided an equalizer or keeper 102 in the form of a ring rotatably mounted on the hub 83 of the lower disk and having two ears 103 engaging respectively the recesses 99 in the lower edges of the bars 96. Upon rotation of the disk 82, the action of centrifugal force tends to cause the bars 96 with the grinding or crushing heads 97 carried thereby to fly outwardly so that the outer cutting edges of the bars extend beyond the periphery of the disk 92. Spring 100 exerts an inwardly directed biasing force on the bars which is in opposition to the centrifugal force but the springs are so adjusted that they are capable of holding the bars in their withdrawn position only when the speed of the supporting disk 92 drops below a value which is suitable for proper operation of the rotary cutter. When the speed of rotation of the disk is at or above the proper operating value, the biasing action of the springs is overcome so that the bars and crushing heads are able to slide longitudinally outward in the slots 94, the sides of the slots serving to prevent angular displacement of the bars in the plane of rotation thereof so that they are not forced angularly backward by obstructing material. Hence during rotation of the supporting disk, the bars and crushing heads throw material to be ground outwardly against the walls of the grinding chamber and against the stationary cutter 72 when the latter is in its operative position as described more fully hereinafter. Under these conditions the heads 97 serve to crush large objects against the walls of the casing and against the stationary cutter while the outer cutting edges of the bars act in cooperation with the stationary cutter to cut and shred material to a finely divided form. An important advantage is derived due to the manner of mounting the bars as just described in that if during operation of the apparatus, the garbage or like material to be ground offers such high resistance to the bars and crushing heads that their rotation is impeded, the speed of the driving motor does not drop permanently but only for a relatively short period of time during which the action of the biasing springs 100 predominates to move the bars inward. This inward movement of the bars permits the motor to speed up again and assume its proper operating speed so that the bars and crushing heads fly outwardly again under the influence of centrifugal force and assume their proper extended grinding and crushing positions. Thus it will be seen that the manner of mounting the bars results in an automatic positioning thereof in accordance with the resistance met with during the grinding operation.

It is to be noted also, as shown best in Figs. 6, 7, 8, 17, and 18, that the lines of movement of bars 96 are parallel radial lines from the center of rotation of members 82 and 92, but that such lines of movement of the bars are displaced backwardly, relative to the indicated direction of rotation, from such radial lines with which the said lines of movement respectively are parallel.

This has the important advantage that, in case a solid object such as a bone, lodges between the end of one of the bars and the stationary cutter, the principal vector of force on the bar will be along the longitudinal axis of the bar, which axis slants backwardly at an acute angle relative to a radius extending from the center of rotation. Thus the force will tend to move the bar inwardly to relieve the congestion and prevent jamming of the rotating elements rather than angularly twisting the bar in a manner to cause binding of the bar against the walls of its supporting slots.

A propeller **104** is fastened to upper disk **92** of the rotary cutter by means of set screws **105**. Correct positioning of the propeller **104** is insured by the center pins **93** projecting into center holes **106** of the propeller. The latter, as best indicated in Fig. 6 has a wing **107** on each side for throwing the material to be ground in outward direction. The wings **107** have recesses **108** for receiving and guiding the upper edges of the slidable bars **96**.

The lower side of the lower disk **82** has curved recesses **109** communicating with the inner ends of the recesses **95** through passages **110** (Figs. 8 and 9). With this arrangement a continuous flow of air and water through the curved recesses **109** and the recesses **95** takes place due to centrifugal pump action of said recesses, eliminating clogging of the latter and thereby insuring uniform action of both compression springs **100**.

The stationary cutter **72** is arranged in a lateral recess in the side wall of the lower casing portion **70** covered by a plate **111**. The cutter comprises a toothed cutting member or knife **112** secured to a holder **113** by means of set screws **114**. The member **112** has a cutting edge or face which is maintained in parallel relation with a generatrix of the conical surface of the lower casing portion **70**. The holder **113** is arranged to be positioned by two shafts, an upper shaft **115** projecting through a recessed portion **116** of the holder and a lower shaft **117**, (Fig. 3). A flat spring **118** secured to the cover **111** by a screw **119** biases the holder **113** towards the shafts **115** and **117**. The arrangement is such that the holder with the cutter may be moved in and out to cause the cutting edge to project into the cutting chamber during the cutting operation and to be withdrawn from the cutting chamber during other operations. This is accomplished by the provision of cam members on the shafts **115** and **117**. In the present instance these cam members are defined by cut-away portions on the shafts **115** and **117**. The shaft **115** has an intermediate cut-away portion **120** and the shaft **117** has a cut-away end portion **121**, which portions define in substance eccentrics or cams. In Figs. 1, 3 and 4 the cutting edge of the cutter **112** is shown in a position in which it projects into the cutting chamber. In this case the cut-away portion **120** of the shaft **115** and the cut-away end portion **121** of shaft **117** engage the cutter holder **113**, permitting the cutter to assume a position in which the stationary cutting member projects into the cutting chamber. Turning of the shafts **115** and **117** causes the holder **113** to be moved radially outward against the biasing force of the spring **118**.

The end portions of shafts **115** and **117** are secured to short levers **122** and **123** respectively which are connected by link **124**. By this arrangement both shafts **115** and **117** are constrained to move simultaneously. The lever **122** is connected to crank arm **57** by means of link **61** (Fig. 2), whereby positioning of the stationary cutter **72** is effected in accordance with the positioning of the rotatable receptacle **29** by turning of the handle **50**.

As shown in Fig. 1, engagement of roller **59** with deep notch **56** of the control cam on the crank **50** permits the right-hand arm of bell crank **57** along with links **61** and **124** and levers **122** and **123** to assume their uppermost positions. Shafts **115** and **117** are turned thereby so that their flat faces **120** and **121**, respectively, are brought into contact with the face of holder **113** permitting the cutting member **112** to be projected into the cutting chamber to its most advanced position. Turning of the handle **50** in a clockwise direction out of the "on" position illustrated causes the roller **59** to be moved outwardly by the cam surface **52**, whereby the shafts **115** and **117** are turned and force the holder **113**, together with the cutting member **112**, outwardly to retract the cutting edge of the cutting member from the grinding chamber. Subsequent engagement of roller **59** with notches **55**, **54** and **53** produces insufficient movement of the linkage mechanism to cause the cutter to be projected into the grinding chamber since, as previously pointed out, these three notches are made shallower than notch **56** and serve only for restraining the receptacle in the corresponding three positions. Hence the cutter is maintained in a retracted position, withdrawn from the grinding chamber, when the receptacle is in any position except the "on" position wherein the roller engages the deep depression **56**.

The movability of the stationary cutter **112** necessitates slight clearances between it and the adjacent rim of the recess in the casing **70**. In particular, it necessitates a clearance **129***a* (Figs. 3 and 20) between the rim portion **129***b* of the recess and the leading surface or wall **129***c* of the cutter. The teeth of the cutter are arranged so that little or no material comminuted by the teeth is directed or forced into the clearance **129***a*, and hence clogging of this clearance is prevented and interference with the adjustability of the cutter is avoided. This is accomplished in the embodiment illustrated, in which the cutter is provided with two vertically extending rows of teeth **129***d* and **129***e* in parallel relation with the edge of the wall **129***c*, by arranging the rows of teeth so that the cutting edge **129***f* of the front row of teeth **129***d* is set back, that is, circumferentially spaced from the surface of the leading wall **129***c* of the cutter in the direction of rotation of the rotary cutter **71** as designated by arrow **129***g* in Figs. 3, 4, and 20. During operation of the rotary cutter, the material to be ground is rotated in the direction designated by the arrow and thrown against the cutting edge **129***f* of the teeth **129***d*. The comminuted material then is forced to pass downwardly along the portion **129***h* of the cutter since the bottom of the cutter is displaced outwardly due to its being disposed parallel to a generatrix of the conically shaped casing **70** as previously pointed out. This portion **129***h* may be termed an overhung portion or ledge with regard to the teeth. With this arrangement the amount of comminuted material entering the clearance **129***a* between the cutter and the rim portion **129***b* of the casing **70** is considerably reduced. Clogging of the clearance is further prevented by cutting away or rounding the edge of the rim portion **129***b* as illustrated in Figs. 3 and 20. Any small amounts of material which, in

spite of these provisions, slip through the clearance 129a, pass into the downwardly extending groove 129i formed in the cutter supporting member 113 from whence it is flushed, in a manner to be pointed out, down into the drain 80 without being permitted to come in contact with and clog the cam members 115 and 117.

The stationary cutting member 112 has a lower, toothless inner edge portion 112' adjacent the conical surface of the rotary cutter disk 82, which conical surface cooperates with the outer wall of the lower portion 70 of the casing 26 to form an annular recess 129. The toothless downward extension 112' of the cutting member 112 projects into this recess (Fig. 1). During operation of the rotary cutter, material contained in the recess 129 and contacting the rotary disk is carried along with the disk until it comes into engagement with the projection 112' and is directed downwardly thereby into the inlet of trap 80.

Disk 92, due to the manner in which it is mounted, performs an additional advantageous function which is that of a strainer for controlling the size of comminuted material which may pass from the grinding chamber into the recess 129. As will be seen from Fig. 1, and more clearly from the enlarged view of Fig. 21, the lower rim of the inner wall of the casing 70 extends below the level, indicated by broken line x, of the top surface of disk 92 but not down to the level, indicated by broken line y, of the bottom surface of the disk 92. The clearance, indicated at c_1, between the rim of the casing and the outer edge of the disk 92 and the clearance, indicated at c_2, between the rim of the casing and the bottoms of the depressions 92a determine the size of the comminuted material which may pass into recess 129, and hence these clearances are so adjusted that disk 92 acts as a strainer to limit the size of the material passing into the recess and thence to drain 80 to a size which it is determined can be satisfactorily handled by the sewer system to which the grinding apparatus of the present invention is to be connected.

When the handle 50 is turned to the "on" position, water is supplied through the water valve 42 (see Fig. 10) and the bores 40 into the upper space of the machine to flush the interior of the receptacle, which during this operation is in the position indicated in Figs. 1 and 2, as previously pointed out. Any material adhering to the inner walls of the receptacle is flushed down into the grinding chamber. The water in addition serves to facilitate the grinding operation when the rotary cutter is rendered operative in the manner hereinafter to be described. To this end, water is also supplied to the stationary cutter. The pipe 48, which at one end is connected to the water valve 42, has its other end connected to an intermediate portion of the grinding casing (Figs. 2 and 4). Water discharged from pipe 48 flows through a central bore 125 and a radial bore 126 in the shaft 115 towards the upper portion of the stationary cutter to aid the grinding operation and also to flush the groove 129i. In addition, water discharged from pipe 48 flows through a tangential channel 127 (Figs. 1 and 4) into the grinding chamber in the lower casing portion 70. A stream of water discharged from the channel 127 follows the surface of the grinding chamber in a helical or spiral path to insure removal of all material adhering to the inner wall surface of the grinding chamber. A drain passage 128 (Fig. 1) connecting the interior of the cutting chamber with the recess containing the stationary cutter permits water to be drained from the grinding or cutting chamber through the lateral recess into the drain conduit 80 in case an excessive amount of water is supplied to the grinding chamber. As soon as the water rises in the grinding chamber beyond the level of the drain passage 128 it is drained through the latter.

When the grinding mechanism is put into operation, in a manner to be described, the resulting grinding operation may be briefly outlined as follows. Material to be ground is thrown against the knife or cutting edge 112 of the stationary cutter 72 by the action of the rotary cutter 71. This causes grinding, cutting and crushing of the material. It is important to note that the material is comminuted by both the individual and the combined action of the rotary cutter and the stationary cutter. As previously pointed out, the crushing heads 97 on the movable bars 96 of the rotary cutter impart a centrifugal force to material coming in contact therewith whereby the material is thrown outward against the walls of the grinding chamber and the cutting edge of the stationary cutter. Wings 107 of propeller 104 aid in the throwing of the material against the walls of the grinding chamber. The stationary cutter has an upper portion projecting above the level of the rotary cutter to insure cutting and crushing of material which is thrown upward by the rotary cutter and also to cooperate with the propeller 104 to effect an initial breaking or cutting of large size material such as bones, for instance, which do not pass immediately into the annular space defined between the stationary cutter and the rotary cutter. The size of the material which can be fed to the grinding machine is limited primarily, of course, by the dimensions of the receptacle 29 with its central web 34. The stationary cutter, more specifically the cutting member 112, is inclined, as previously described, towards the axis of the rotary cutter and has its cutting edge in parallel relation with a generatrix of the conically shaped surface of the grinding chamber 70 so that material thrown against and cut by the upper portion of the stationary cutter is directed downward into the annular space or channel defined between the lower portion of the stationary cutter and the rotary cutter. This downward directing of material to be ground by the stationary cutter is important in that it insures the comminuting of all material thrown into the grinding chamber. The location of the stationary cutter in alinement with the discharge conduit 80 facilitates the draining of comminuted material into the discharge conduit. The water supplied to the grinding chamber during the grinding operation facilitates not only the grinding of the material but also the flushing of the ground material into the discharge conduit.

With respect to the comminuting and disposing of garbage comprising vegetable and animal constituents, it is important to note that the propeller 104, which is driven at a comparatively high speed, draws a considerable amount of air into the grinding chamber. The air causes aeration of the water and the ground material. This is desirable because it accelerates considerably the process of decomposition of garbage in sewer plants. Thus, from another viewpoint, my invention comprises an improved method of disposing of garbage according to which water saturated garbage is comminuted and passed into a sewer together with a considerable amount of air, that is, in aerated form. I have found that good re-

sults in this respect are attained with a motor speed of the order of 1700 R. P. M.

Control of the operation of the electric motor 75 for driving the rotary cutter 71 is effected by means of the electric circuit and switch mechanism diagrammatically illustrated in Fig. 15. The electric circuit comprises the motor 75 connected through lead wires, contacts 130 and 131 and a heating element 132 to a source of electric energy 133. The switch mechanism, designated generally as 65, includes a contact arm 134 mounted on a pivot 135 and carrying the contact 131. A member 136 of the contact arm is connected by a snap action spring 137 to an over-center-link 138 which in turn is pivoted to the left-hand end of an actuating lever 139 having its right-hand end held on a fulcrum 140 and engaging at an intermediate point one end of a plunger member 141. The plunger has a knife-edged end which bears against the right-hand end of a lever 142.

All the switch parts so far described are located within the switch box 66 (see Figs. 1 and 14) with the exception of the knife-edged end portion of the plunger 141 which projects through an opening in the rear of the switch box 66. The lever 142 engaging the knife-edged portion of plunger 141 is mounted on a knife-edged bearing 143 and has a left-hand curved portion 144 engaging a disk 145 which forms an integral part of the handle 50. This disk has a recess or depression 146, permitting in a certain position of the disk, the curved portion 144 of the lever 142 to drop into the depression.

The contact arm 134 of the switch has a downwardly extending member 147 at its right-hand end adjacent a projection 148 of a trip arm 149. The latter is mounted on a fulcrum 150 and biased towards the right by a compression spring 151 forcing the lower end of the trip arm against the left-hand end of a bimetallic latch 152. The switch is manually operated by a manual control member 153, shown in full lines in "on" position and in dotted lines in "off" position. The bimetallic latch serves to protect the motor against overheating since during overload the bimetallic latch becomes overheated, whereby its left-hand end bends downward, thereby unlatching the trip arm 149, which latter under the action of spring 151 forces the member 147 to the right to effect opening of the motor circuit. Opening of the circuit is indicated by an indicator 154 which may be in the form of a red disk fastened to the trip arm 149. During opening of the circuit the trip arm, as pointed out above, swings to the right, thereby moving the indicator disk 154 back of a window 155 on the switch casing 66 (Fig. 1). When this occurs the operator reconnects the motor by first moving the manual control member, which has an indicator or knob 156, in front of the switch casing from "on" to "off" position. In the latter position the bimetallic latch 152, having cooled off, resumes its original position (Fig. 15) and permits reconnecting of the motor by returning the manual control member into "on" position.

Turning movement of the over-center-link 138 is limited by stops 157, and movement of the member 147 of the contact arm is limited by a stop 158. Engagement between member 141 and the levers 139 and 142 is maintained by a compression spring 159.

During operation of the grinding apparatus with the switch indicator 156 in "on" position, the circuit for motor 75 is closed in all positions of the receptacle with the exception of the "off" position, that is, the motor circuit remains closed as long as the curved portion 144 of the actuating lever 142 slides on the plane surface at the rim of the circular disk 145. As soon as the curved portion 144, however, is permitted to drop into the depression 146 under the action of the compression spring 159, as is the case when the receptacle reaches the "off" position, the motor circuit is automatically opened by the action of the switch mechanism. To make this clear, downward movement of the curved portion 144 (Fig. 15) into the notch 146 effects counterclockwise turning of the actuating lever 142 about the knife-edged bearing 143, whereby the lever 139 of the switch moves upward about its fulcrum 140. As soon as the left-hand end of the over-center-link reaches the other side of the spring center line, the spring effects counterclockwise turning of the contact arm 134, thereby removing the contact 131 from its engagement with the contact 130. Thus the motor is automatically disconnected when the receptacle is turned from the "on" position indicated in Fig. 1 into "off" position. This is done when the grinding operation is terminated or when the receptacle is returned into the position in which it may be refilled with material to be ground.

The complete operation of the grinding apparatus is as follows. First it will be assumed that the receptacle and the switch are in their "off" positions. This is the normal idle state of the apparatus in which all elements thereof are inactive. Receptacle 29 is in position to receive waste food material through the opening in the upper portion of casing 26 and while in this position may be utilized for the storage of such material preliminary to its disposal by the apparatus. The rotary cutter 71 is inactive and valve 42 is in the position illustrated in Fig. 13 so that no water is being supplied to any portion of the mechanism. Roller 59 is in engagement with shallow notch 53 so that the stationary cutter 112 is withdrawn from the grinding chamber 70 as previously set forth. Turning of the handle 50 from "off" to any other position fails under these conditions to start the rotary cutter since switch control knob 153 is in "off" position. For best operation of the apparatus it is preferred that the receptacle not be turned into "on" position to dump waste food material into the chamber 70 unless the switch is turned to "on" position for operation of the rotary cutter, since, when the rotary cutter is idle material dumped into the chamber tends to settle and to make subsequent starting of the rotary cutter very difficult or even impossible with the types of motors which are suitable for domestic use. However, with the rotary cutter idle, the receptacle, empty, may properly be turned for example to its "on" position to effect turning of valve 42 to its "on" position, illustrated in Fig. 10 to thereby cause water to be supplied to both the upper portion of the casing and the stationary cutter as previously outlined for complete cleaning and flushing of the various parts of the apparatus. When the receptacle is in the "on" position, roller 59 is in engagement with deep depression 56 so that the stationary cutter is advanced into the chamber 70 as previously outlined, but the wall 34a of the receptacle completely blocks the opening in the top of the casing 26 so that it is impossible for an operator to reach into the grinding chamber and come in contact with the stationary cutter.

With the switch control knob 153 still in its "off" position and the rotary cutter idle, the

handle 50 may be turned also into a so-called neutral position, designated on Fig. 1 by the letter "N". In this position of the receptacle the valve 42 assumes the position illustrated in Fig. 11 so that no water is supplied to any parts of the mechanism and roller 59 is in engagement with shallow notch 55 to cause retraction of the stationary cutter from the grinding chamber 70 as previously outlined. Furthermore, when the receptacle is in this neutral position, the peculiar shape of the receptacle, particularly the curved portions 35b and 35c of the bottom wall 34a, permits an operator without disassembling the machine to reach into the interior of the grinding chamber to remove therefrom any solid objects such as bottle caps or other pieces of metal or pieces of glass which may not be ground by the machine. In this position of the receptacle which is best illustrated in Fig. 19, the bottom wall 34a of the receptacle is on the same side as the stationary cutter and is disposed thereabove to render it difficult for anyone reaching into the grinding chamber to come into contact with the cutting face of the stationary cutter, especially in view of the fact previously pointed out that the stationary cutter is withdrawn from the chamber 70. Hence there is provided in this position of the receptacle a double safety feature for the protection of an operator.

A further advantage of the neutral position of the receptacle, in view of the peculiar construction of the receptacle, is that it permits the establishment of a connection between the motor and a drive member or members for other devices as illustrated clearly in Fig. 19. This feature of my invention makes it possible to utilize the driving motor of the grinding machine for other purposes. In Fig. 19 I have shown an arrangement in which the motor 75 serves to operate a whipping apparatus, such as a cream beater 160. The apparatus is centered on the adapter 21 of the grinding apparatus and is driven from the motor 75 through a shaft or drive member 161 having a lower forked portion or adapter 162. This adapter preferably is in the form of a fork with two prongs, each prong serving to engage a face 163 (Fig. 6) of one of the wings 107 of the propeller 104. The curved construction of the walls of the receptacle when in the neutral position allows sufficient space for the establishing of such connections with the propeller. The motor 75 may be used also to operate a brush 164 fastened to a lower extension of the motor shaft. The grinding of garbage necessitates a comparatively heavy motor of the order of ¼ H. P. for the average kitchen and the employment of this motor for driving other devices, which usually are operated by smaller motors, is advantageous in that it saves time and permits a more effective operation of such devices. The connecting of the auxiliary devices with the motor through a shaft extension 161 or the like is very simple and may even be performed without the operator reaching into the interior of the casing 26 of the grinding apparatus.

From the preceding description it will be seen that the receptacle has three important functions. In one position it permits the deposit therein of material to be ground and blocks off the opening into the interior of the grinding chamber; in another position it empties the material into the interior of the grinding chamber and at the same time blocks off the opening of the apparatus; and in a third or intermediate position, designated the neutral position, the receptacle permits the removal of undesirable material from the interior of the apparatus and permits also the connection of auxiliary devices to be driven by the motor 75.

The operation of the apparatus for the grinding of waste material or garbage will now be described. The switch control knob 153 is turned so that its pointer 156 indicates "on". Receptacle 29, filled with waste material to be ground, is turned into its "on" position indicated in Fig. 1 of the drawings. During the first degrees of turning movement of the receptacle the curved portion 144 is forced out of the depression 146 (Fig. 15), thereby causing the switch mechanism to effect closing of the motor circuit. It is important to note that the motor begins to operate immediately upon the turning of the receptacle out of its "off" position and during the first degrees of turning movement thereof, that is, before any of the material to be ground, or at least any large amount thereof, drops onto the rotary cutter. This permits the motor to reach normal speed during the period required for an operator to turn the receptacle from "off" to "on" and before the beginning of the actual grinding and cutting operation. When the receptacle is fully turned into the position indicated in Fig. 1 of the drawings, the garbage or waste drops into the grinding or cutting chamber. At the same time the water valve 42 has been turned into "on" position, illustrated in Fig. 10; admitting flushing water into the receptacle and into the cutting or grinding chamber. During the grinding operation, which has been described in detail hereinbefore, the bottom of the receptacle registers with or closes the opening in the upper portion of the casing of the grinding machine, thereby preventing excessive feeding and overloading of the apparatus and preventing also manual access to the grinding elements, thus protecting the operator against possible injury. When the material to be ground has been discharged through the discharge conduit 80, the receptacle may be returned to "off" position to receive further material to be ground. At the end of the grinding process the receptacle may be moved into its fourth or flush position, wherein valve 42 assumes the position shown in Fig. 12 to permit thorough flushing of the grinding chamber, whereby all ground material adhering to the walls, especially to the stationary and the rotary cutters, is removed and flushed into the discharge conduit 80. During flushing of the machine the stationary cutter 72 is removed from the cutting chamber since roller 59 is in engagement with shallow notch 54 as previously explained. With switch knob 53 in the "on" position, the motor circuit is closed during flushing operation, causing rotation of the rotary cutter whereby the water supplied to the grinding chamber is hurled against the different parts of the grinding mechanism effecting thorough cleansing thereof.

When it is desired to employ the apparatus for the operation of auxiliary devices as previously suggested, in which case the receptacle is turned into the neutral position, it is advisable and in fact almost necessary for the connections of the auxiliary devices to be made with the switch knob 153 in its "off" position so that the rotary cutter is idle. This is because, for obvious reasons, it is unsafe for an operator to reach into the grinding chamber while the rotary cutter is in operation even though the stationary cutter is withdrawn from the chamber as is the case when the receptacle is in the neutral position.

After the connections have been made with the rotary cutter idle, then switch knob 153 may be turned into its "on" position to energize the motor 75 to thereby drive the auxiliary devices. As previously explained, when the receptacle is in the neutral position, the valve 42 is in the position illustrated in Fig. 11 so that no water is being supplied to the apparatus and, furthermore, the stationary cutter is retracted from the grinding member.

Referring now to Figs. 17 and 18, which show a modification of the rotary and the stationary cutters, the rotary cutter has a lower disk 165 corresponding to the disk 82 in Fig. 7 and an upper disk 166 corresponding to the disk 92 in Fig. 7. Secured in recesses on the lower disk on diametrically opposite sides thereof are lateral projections 167 held in position by pins inserted through bores 168 from the top of the disk (Fig. 18). These projections 167 replace the lower, toothless portion of the cutting member 112 of the arrangement indicated in Fig. 1. During operation, the projections 167 are rotated with the disk filling substantially the recess 129 (Fig. 1) defined between the outer conical surface of the lower disk and the surfaces of the adjacent portions of the casing 70 and the bottom plate 76. Material contained in this recess is rotated by the wings 167 and flushed into the discharge conduit 80 of the apparatus. The wings 167 serve also as propeller vanes during operation of the rotary cutter with a resulting centrifugal pump action which aids in the discharge under pressure of the water with its suspended particles of comminuted material. Fig. 18 shows also springs 169 corresponding to the springs 100 of Fig. 8 for biasing the slidable members or bars 96 in inward direction against the centrifugal force exerted on the members.

Fig. 17 shows a stationary cutting member 170 in cutting posiiton in which the lower inner edge is positioned close to the upper edge 171 of the lower disk. The upper disk 166 differs from that indicated in Figs. 6 and 7 in that it has only a few indentations 172. I have found that with respect to certain material the best grinding effect is obtained by the provision of few indentations 172, preferably groups of three provided on diametrically opposite sides of the disk 166 with each group extending over approximately 60 angular degrees, as indicated in Fig. 17. Whereas the indentations 92a shown in Fig. 7 define sharp cutting edges, those of Fig. 17 have rounded edges 173. The rounded edges reduce the tendency of fibrous material adhering thereto, thus facilitating the cleaning or flushing of the grinding chamber. If the rotary cutter of Fig. 17 is employed in the grinding apparatus, it is mounted in a manner similar to the described in connection with the rotary cutter illustrated in Fig. 7 so that the lower rim of the casing portion 70 extends below the level of the top surface of disk 166 but not down to the level of the bottom surface of the disk 166 whereby the disk may perform, as previously set forth, as a strainer to limit the size of material passing into the recess 129.

Certain modifications of the apparatus previously described are illustrated in Figs. 22 to 33 inclusive. In the embodiment illustrated particularly in Figs. 22 to 24 inclusive, the casing 26 of the grinding apparatus is attached to a kitchen sink 20 in the same manner as described in connection with the embodiment shown in Figs. 1 and 2, and has the same form essentially as in the first described embodiment except that the lateral recess for the stationary cutter is displaced 90° to the front of the casing as indicated at 180 on Figs. 22, 23 and 24, the recess in the modified form being disposed directly beneath the front cover plate 64. This cover plate is secured to the casing by means of screws 181 so that it can be removed to provide ready access to the interior of the casing for installation, removal or repair of certain of the parts of the grinding apparatus.

As a closure for the opening in the upper portion of the casing, there is employed a modified form of receptacle 182 certain details of which are best shown in Figs. 27 and 28. The receptacle comprises mainly a pair of circular end plates 183 and 184 between which extends a semicylindrical bottom wall 185, the opposite sides of which are joined to the rims of the respective end plates, and a centrally disposed web 186 which also has its opposite ends joined to the respective end plates to strengthen and brace the plates in rigidly spaced apart relation. In a manner similar to that set forth in connection with the receptacle 29 shown in Figs. 1, 16 and 19, the free edges 185' of the bottom wall 185 of receptatcle 182 are inwardly curved so that the circumferential length, designated *a* in Fig. 28, of the bottom wall midway between the end plates is less than the circumferential length, designated *b* at the points of juncture of the bottom wall with the end plates, and is considerably less than 180 annular degrees. Integral with the bottom wall are formed ribs 187 having portions 190 extending parallel to the curved periphery of the bottom wall and other portions 191 inwardly bowed or U-shaped and joined at their apexes to the bottom of the web 186 as indicated at 192. Between the ribs are open slots or spaces 193, for a purpose to be set forth hereinafter, and web 186 serves to brace the ribs in rigidly spaced apart relation.

End plates 183 and 184 of the receptacle 182 are provided respectively with stub shafts or trunnions 194 and 195 which are rotatably supported in bearing seats 196 and 197 formed respectively in the back wall of the casing 26 and in the front cover plate 64, these bearing seats being so arranged that the receptacle is disposed coaxially with respect to the curved portions 26' of the casing. Stub shaft 195 extends outwardly through the cover plate and through a packing 198 and is provided with a central bore 200 into which extends an operating shaft 201 secured in the bore by means of set screw 202. An extension shaft 203 is connected to the outer end of shaft 201 by means of a clamping device 204 and has removably secured thereto an operating handle 205. Shaft 203 may be of any suitable length to insure that the handle 205 is in convenient position to be grasped by an operator.

Receptacle 182 is rotatable by means of handle 205 into three positions, the first of which is illustrated in Fig. 23 and is designated the "off" position with the handle pointing straight up as shown in Fig. 22. Cover plate 64 preferably is marked as shown in Fig. 22 to designate the various positions of the handle. When the receptacle is in the "off" position, material to be ground may be deposited therein for immediate emptying into the grinding chamber 70 of the casing 26 or may be stored in the receptacle until it is convenient to operate the grinding machine. While in this position the bottom wall

of the receptacle prevents manual access to the interior of the grinding chamber so that it is impossible for any one carelessly to come in contact with the grinding mechanism. At the same time the upper opening of the casing may be closed by means of a lid 206 provided with perforations 207 so that material stored in the receptacle will not be exposed offensively to view. If it is desired to reach into the interior of the grinding chamber for any reason such as for example to remove unground material therefrom, the lid 206 may be removed and the receptacle rotated 90° in a counterclockwise direction, as viewed in Fig. 22, by means of the handle 205 until the handle points to the letter "N" on the cover plate 64. This is termed the "neutral" position of the receptacle and corresponds to the neutral position of receptacle 29 illustrated in Fig. 19 and described hereinbefore. The peculiar curved construction of the free edges 185' of the bottom wall of the receptacle affords ready access to the interior of the grinding chamber while at the same time the bottom wall is disposed in front of the stationary cutter and its enclosing recess 180 in a manner similar to that illustrated in Fig. 19 so that it is rendered difficult for any one reaching into the grinding chamber to come in contact with the cutting face of the stationary cutter as previously pointed out. Rotation of the receptacle by means of handle 205 another 90° in a counterclockwise direction to its third or "on" position results in the emptying of any material contained in the receptacle into the grinding chamber. When the receptacle is in this position, the ribs 187 and intervening spaces 193 are displaced 180° from the position illustrated in Fig. 23 and the ribs serve to block the opening into the casing to prevent manual access to the interior of the grinding chamber while the spaces provide for the supplying of water therethrough to the grinding chamber from the faucet (not shown) of the kitchen sink 20 in a simple and convenient manner without the necessity for a positive connection of the device to the water mains. The amount of water supplied through the spaces in the receptacle may be suitably regulated at the faucet by the operator.

Casing 26 is closed at the bottom by means of a plate 210 fastened to the casing by means of bolts 211 and formed with a substantially circular depressed part 212 which cooperates with an outwardly flared skirt 213 on the bottom of the casing to provide a circular recess or chamber 214. Also, there is formed integrally with the bottom plate a discharge conduit or drain pipe 215 which communicates with the chamber 214. This drain pipe is adapted to extend slidably into the upper end of a sewer connection pipe 216 so as to take care of slight adjustments in the height of the grinding machine while the joint is sealed by a flanged ring nut 217 threadedly secured to the sewer connection pipe and snugly surrounding the drain pipe. Fastened to the casing by means of a screw bolt 218 is a spring clip 219 which engages the ring nut and serves to insure against separation of the drain and sewer connection pipes.

In order to provide an additional support for the grinding apparatus substantially to relieve the sink structure of the weight thereof, there is provided a supporting stand 220 which may be secured to the kitchen floor or wall, or the like and a hanger bracket 221 adapted to be secured to the grinding apparatus and adjustably mounted on the supporting stand. Stand 220 in the illustrated embodiment (see Figs. 23 and 33) is secured to the floor structure by means of screws 222 and has one or more vertically extending slots 223 for the vertically slidable connection thereto of bracket 221 by means of bolts 224. Bracket 221 has a hollow sleeve portion 225 provided with an outwardly extending flange at its upper end for the securing of the bracket to bottom plate 210 by means of bolts 226 which are screwed into lugs 227 formed integrally with the bottom plate. Because of the vertically adjustable connection between the stand 220 and the supporting hanger or bracket 221, the height of the mounting for the grinding apparatus may be adjusted in accordance with the height of the sink structure to which the upper end of the machine is connected.

In the bottom of casing 26 are disposed the rotary cutter and the stationary cutter which may be caused to cooperate to grind, cut and crush material in the grinding chamber portion 70 of the casing, set forth in detail elsewhere herein. The manner of mounting and operating the rotary cutter in the modified form of the grinding apparatus illustrated in Fig. 23 is substantially the same as that employed in the first embodiment previously described and illustrated in detail in Fig. 1. Propeller 104 is of the type illustrated in Figs. 1 and 6, while the supporting disks 165 and 166 for the cutter bars 96 correspond to the disks illustrated in Figs. 17 and 18, although it is to be understood that if desired the disks may be of the type illustrated in Figs. 6 to 9, inclusive. The details of these various parts have been described in detail in connection with the figures referred to. The centrally disposed vertical shaft which forms part of the connection between the rotary cutter and the driving motor 75 may be of the same form as that designated 73 in Fig. 1 but as illustrated at 73' in Fig. 23 is of a modified form having a spiral groove 230 for a purpose to be set forth hereinafter. As a bearing for the disk 165 of the rotary cutter there is provided a conical member 231 similar in form to the conical member 85 of Fig. 1 but provided preferably with a spiral groove 232 in its external surface as shown in Fig. 26. This bearing member is secured by a pressed fit in the downwardly extending annular flanged portion 233 of the bottom plate 210.

The rotary cutter is connected by means of shaft 73' and a flexible coupling device 234 to the drive shaft of motor 75. A modified system of lubrication is provided for the drive shaft and for the bearing member 231, the details of which system are shown in Fig. 23. To the lower end of the flanged portion 233 of bottom plate 210 there is secured a cup 235 which has a centrally disposed annular shoulder formed to fit tightly in the lower end of the flanged portion 233 with the walls of the cup extending upwardly around the flanged portion. The cup is provided also with a filling spout 236 which extends outwardly beneath the bottom plate and is provided with a cover 237 mounted to be swung into and out of closing positions with respect to the spout. A wicking 238 is wrapped spirally about the exterior of the annular flanged portion 233, the major portion of the wicking being disposed in the lubricant contained in the cup while the upper end of the wicking is made to pass through an opening in the flanged portion 233 and thence through a bore 239 in the bearing member 231 into contact with shaft 73'. In the interior of the lower end

of the flanged portion 233 and between the bottom of bearing member 231 and the attachment shoulder of cup 234 is disposed a body of packing material 240 to prevent the leakage of lubricant downwardly between the shaft and the wall of the centrally located aperture in the cup through which the shaft passes. By this arrangement lubricant is supplied from the cup or reservoir 235 through wicking 238 to the inner surface of bearing member 231 and the groove 230 in the shaft 73'. The lubricant is then carried upwardly by means of the groove to the top of the bearing member, thence outwardly between the bearing member and the hub 83 and downwardly between the outer surface of the sleeve-like upper extension of the bearing member and the inner surface of the hub 83 and disk 165, this latter downward travel being facilitated by the groove 232 in the bearing member. Any excess lubricant then leaks outwardly between the lower surface of disk 165 and the upper surface of bottom plate 210 and into the drain pipe 215. By this means there is secured at all times an efficient lubrication of the shaft 73' and of the bearing member 231, and reservoir 235 is such as to render it simple and easy to replenish the oil therein though such replenishment is required only infrequently.

In order to prevent transmission of vibration from motor 75 to the supporting stand 220 or to the grinding apparatus and the sink structure, there is provided a resilient mounting for the motor, the details of which mounting are shown in Figs. 23 and 25. To the top of the motor housing is secured a metallic disk 241 by means of screws 242 which have spacing sleeves 243 disposed therearound with the opposite ends of the sleeves respectively in abutment with the disk and the top of the motor housing. For added rigidity of connection between the disk and the motor, the disk has a centrally located cylindrical flange 244 tightly surrounding an upwardly projecting cylindrical extension 245 of the motor housing. Two metallic ring-shaped elements 246 and 247 are disposed respectively above and below the disk with two annular washers 248 and 249 of resilient material interposed respectively between the disk and the upper element 246 and betweeen the disk and the lower element 247. Hollow sleeves, one of which is shown at 250, extend through the disk and the elements 246 and 247 and have their ends riveted over, as shown at 250, to hold the ring-shaped elements, the disk and the resilient washers assembled in the relation above set forth. It will be seen from the drawings that the sleeves 250 pass freely through openings 251 in the disk 241 to provide for relative movement between the disk and sleeves. The resilient washers 248 and 249 are seated in annular grooves 252 and 253 provided in the disk 241 and the lower element 247 respectively and this arrangement in cooperation with a downwardly projecting ridge 254 formed in the upper element 246 serves to hold the washers firmly in place. Upper ring-shaped element 246 is tightly pressed into a circular recess 255 formed in the lower side of supporting bracket 221 and the unitary assembly of the ring-shaped elements, disks and washers are secured to the supporting bracket or hanger by means of bolts 256 which pass through the bracket and into screw-threaded engagement with the hollow sleeves 250. This arrangement forms in effect a chain mounting whereby the disk 241 which supports the motor is resiliently carried by the two ring-shaped elements 246 and 247 which in turn are supported by the supporting bracket or hanger so that any vibration of the motor is absorbed by the resilient washers and is not transmitted to the supporting bracket, grinding machine, sink structure or floor.

One arrangement of circuit connections and switching mechanism suitable for motor 75 has been described in detail previously in connection with the schematic showing of Fig. 15, but other suitable arrangements may be employed if desired. As was previously pointed out, the principal parts of the illustrated switching mechanism 65 are incorporated in a control box or casing 66. In the presently described modification, the casing 66 is mounted, as shown in Fig. 27, on a bracket 257 which is fastened to an extension arm 64' of front plate 64. Switch operating plunger 141' extends out from the rear of the casing and has a collar 260 securely fastened thereto by means of a set screw 261. This collar is arranged to engage one end of a control lever 262 which has pivot pin 263 intermediate the ends thereof for the mounting of the lever on a fulcrum 264 carried by the front plate 64. The other end of the lever is provided with a curved head 265 which is arranged to engage the rear face of a disk 266 carried by a control cam member 267 which is rigidly secured to operating shaft 201 by means of set screw 202 for rotation by means of handle 205. Plate 266 has an indicating pointer 268 and is provided also with a short arcuate recess or depression 269.

When handle 205 is in the position illustrated in Fig. 1 and pointer 268 indicates "off", the head 265 of lever 262 drops into the recess 269 and permits plunger 141' to move outwardly under the influence of spring 159 (see Fig. 15) disposed in the control box or casing 66. Under these circumstances, as previously pointed out in detail, the switching mechanism within the control box is operative to open the circuit of motor 75 so that the rotary cutter of the grinding machine is rendered inoperative even though the switch indicator 156 of control box 66 may be in "on" position. Upon turning of handle 205 in a counterclockwise direction as viewed in Fig. 22, the initial movement of disk 266 forces head 265 out of depression 269 so that lever 262 is rotated to force plunger 141' inwardly into casing 66 against the action of spring 159. If switch indicator 156 is in "on" position, this results in operation of the switching mechanism to effect starting of the motor to drive the rotary cutter, and, in a manner similar to that set forth in connection with the previously described embodiment, the starting of the motor is initiated immediately by initial turning of handle 205, and with it the receptacle 182, out of the "off" position. The motor then remains operative throughout further turning of the handle in the positioning of the receptacle. The advantage of this arrangement as previously pointed out is that the motor and the rotary cutter are permitted to attain normal operating speed before the receptacle reaches a position wherein it feeds or permits the feeding of material to the grinding chamber and the rotary cutter. Hence with proper operation of the apparatus it is impossible for an operator to clog up the grinding chamber with material until the motor has attained sufficient speed to take care of the impeding action of such material.

The general arrangement of the rotary cutter and the stationary cutter with respect to each other is similar to that described in connection

with Fig. 17. Furthermore, as shown in Fig. 23, the rotary cutter is so disposed that the lower rim of the casing portion 70 extends below the top surface of the disk 166 but not down to the level of the bottom surface of the disk 166 or the bottom of the indentations 172. This is similar to the arrangement shown in detail in Fig. 21 and enables the disk 166 to perform as a strainer to limit the size of material passing into the recess or chamber 214. Also the stationary cutter is adjustably mounted in recess 180 so that its cutting face is at all times maintained substantially parallel to a generatrix of the frusto-conical grinding chamber 70, and the upper portion of the stationary cutter extends above the level of the top of the rotary cutter and the propeller wings 107 so as to insure grinding and crushing of material thrown outwardly and upwardly during operation of the rotary cutter.

The details of the stationary cutter and the apparatus for mounting the same in recess 180 are best shown in Fig. 23 and in the exploded view of Fig. 32. The cutter comprises two toothed cutting members or knives 270 and 271 which may be secured to a holder 272 in any suitable manner but which preferably are secured to the holder by means of a dovetailed joint 273 with the material of the holder molded about the shanks of the cutting members. The cutting members may be made in a single piece and of a single material as in the first described embodiment but it is preferable that the lower cutting member 271, which is subjected to the greatest wear, be made of an extremely hard and long wearing material as for example one of the well known cemented carbides having characteristics similar to those disclosed in the Schröter patents, Nos. 1,721,416 and Re. 17,624, while the upper cutting member 270 may, if desired, be made of a less hard but long wearing and corrosion resisting material such as stainless steel. In order to provide a cutting edge or face, the two cutting members are formed with two longitudinally extending and aligned rows 275 and 276 of cutting teeth. As best shown in Fig. 31 the tops of the teeth are flattened as shown at 277 and 278 to strengthen the teeth and facilitate the cutting of material thereby, while the leading edge or face 280 of the front row of teeth 275 is set back to provide a shoulder or ledge 281 between this leading face and the front edge 282 of the holder 272.

Holder 272 is formed with a longitudinal groove 283 which extends parallel and adjacent to the leading edge of the cutting members 270 and 271. At the rear of the holder and extending upwardly therefrom is a bearing projection 284 which extends also outwardly to one side of the holder in the form of a depending shoulder 285. The holder is provided also with a bearing projection 286 extending outwardly from said one side of the holder adjacent the bottom thereof. Pressed into openings in the front face of projection 284 are a plurality of shock absorbing elements 287 of resilient material for a purpose set forth hereinafter.

For supporting the holder 272 and the cutting members 270 and 271 in the recess 180, there is provided a plate 290 which is arranged to be secured to the side of the casing 26 by means of screw bolts 291 to form a removable outer wall for the recess 180. The inner face of plate 290 is provided with two spaced apart parallel and longitudinally extending projections 292 and 293 between which holder 272 is adapted to fit with sufficient clearance for the slidable movement of the holder toward and away from the inner face of the plate. A leaf spring 294 having a perforation substantially at its midpoint is mounted on a projection formed on the inner face of plate 290, as shown at 295 in Fig. 23. The ends of this spring are arranged to bear against the rear surface of holder 272 to resiliently force the holder away from plate 290, while the movement of the holder away from the plate is limited at the top by engagement of the shoulder 285 of the holder with a shoulder 296 formed on the projection 293 and at the bottom by means of the flanged head 297 of an adjusting screw 298 supported by and extending through the plate 290, which said head 297 is disposed in a recess 299 formed in the lower portion of the holder. (See Figs. 23 and 29.) The lower end of recess 299 is open as shown most clearly in Fig. 23. Adjusting screw 298 may be screwed inwardly or outwardly so that by engagement of its head 297 with the flanges 300 of recess 299, the outward movement of holder 292 in recess 180 can be limited as desired, and the adjusting screw may be locked when set as desired, by means of washer 301 and lock nut 302. In order to insure against transmission of vibration to plate 290 by chattering of holder 272 against the head 297 of screw 298, there may be provided as shown in Fig. 29 a resilient gasket 303 which preferably is pressed into a recess in the outer wall of the plate. This gasket insures also an effective seal around the adjusting screw while a gasket 304 is provided to seal the joint between the plate and the rim of the casing 26 extending around the recess 180.

In order to insure easy sliding of holder 272 between the projections 292 and 293 of plate 290 when the stationary cutter is completely assembled, there are provided two bearing plates 305 and 306. Bearing plate 305 is secured to projection 292 by means of ears 307 and 308, which fit into recesses 309 and 310 respectively formed at the top and bottom of the projection 292, and by means of a flange 311 which fits over the outer edge 312 of the projection 292. Bearing plate 306 is secured to projection 293 by means of ears 313 and 314, which fit into recesses 315 and 316 respectively formed in the top and bottom of projection 293, and by means of flange 317 which fits over the outer edge 318 of the projection 293, while this bearing plate is provided with a shoulder 319 to correspond with the shoulder 296 of the projection 293.

In the assembly of the stationary cutter unit, the bearing plates 305 and 306 are mounted upon their cooperating projections 292 and 293 respectively with the ears 307 and 308 engaging the recesses 309 and 310 respectively and the ears 313 and 314 engaging the recesses 315 and 316 respectively. Holder 272 is then pressed between the bearing plates and projections and forced back against spring 294 until it is possible to slide the holder downwardly to effect engagement of the shoulder 285 thereon with the shoulder 296 on projection 293 and engagement of the head 297 of the adjusting screw with recess 299. The holder is held firmly thereby between the spring on one side and the shoulder 296 and the head 297 on the other side. Sunk into projection 292 are a plurality of shock absorbing elements 320 of resilient material which, as will be seen most clearly from Fig. 29, have bumper heads disposed between projection 292 and bearing plate 305 to act as a silencing arrangement

and to dampen shocks produced by any possible sidewise chattering of the holder 272, the bearing plate 305 between the holder and the resilient elements serving to prevent these elements from interfering with the easy sliding of the holder. With the stationary cutter assembled as described in this paragraph it may be inserted as a unit into recess 180 with its supporting plate 290 fastened as previously described to close the outer wall of the recess.

Control of the positioning of the stationary cutter is effected in accordance with the positioning of the receptacle 182 by means of cam 267 in combination with a linkage and cam mechanism now to be described. Two shafts 321 and 322 are mounted rotatably in and extend through one side wall of recess 180 and are sealed by means of packings 323 and 324 respectively. Shaft 321 extends across the recess into bearing seat 325 in the other wall of the recess, the outer end of which bearing seat is closed by means of screw cap 326. The inner portion of the upper shaft 321 is in the form of a cam 327 which for the most part is cylindrical but which is provided with a flat bearing face 328 on one side thereof. This cam is arranged to engage the upper projection 284 of holder 272 and particularly to bear against the shock absorbing elements 287 so that noise and shock are not transmitted thereto due to chattering of the stationary cutter. The lower shaft 322 has a cam 330 formed on the inner end thereof and provided with a flat bearing face 331 which is arranged to engage the lower side projection 286 of the holder 272. On the outer ends of the shaft 321 and 322 are fastened levers or cranks 332 and 333 respectively by means of set screws 334 and 335 respectively. In order that the cams 327 and 330 may be rotated concurrently and the flat faces 328 and 331 thereof brought into simultaneous engagement with the cutter supporting member 272, the levers are connected together by means of a link 336.

When the levers 332 and 333 and link 336 are in their lowermost positions as illustrated in full lines in Figs. 22 and 24, the cams 327 and 330 are in such position that their curved portions engage holder 272 to force this member into its innermost position in recess 180 so that the cutting members 270 and 271 are completely withdrawn from the grinding chamber 70 as shown in Figs. 23, 29 and 30. Movement of the levers to their uppermost positions as indicated in dotted lines in Fig. 24 causes rotation of the cams so that their flat faces 328 and 331 are brought opposite holder 272 thereby allowing spring 294 to force the holder outwardly so that cutting members 270 and 271 project into the grinding chamber to their fullest extent as illustrated in Fig. 31. The extent to which holder 272 is permitted to move may be adjusted by means of adjusting screw 298 so that the holder may be moved by spring 294 until it comes into engagement with the flat cam faces 328 and 331 or so that its lower end is stopped short of engagement with lower cam face 331 by the head 297 of the adjusting screw. Such provision is made for properly setting the cutting members 270 and 271 for most efficient cooperation with the rotary cutter and also for taking care of any wearing down of the cutting edges.

Lever 332 has an upwardly projecting arm 337 which is pivotally connected to a horizontal link 338 which in turn is pivotally connected to a lever arm 340 pivotally supported by fulcrum arms 341 carried by front plate 64. The upper end of lever 340 has affixed thereto a conically shaped head 342 which is arranged to engage slidably a spiral groove 343 in the cam 267 which is rotatable with receptacle 182 as previously pointed out. A compression spring 344 is disposed between the front of the front plate 64 and a rear surface of lever 340 to bias the upper end of the lever outwardly and maintain head 342 in firm engagement with the outer wall of groove 343. As previously pointed out, cam 267 is rotatable by means of handle 205 concurrently with receptacle 182 and dial plate 266 on shaft 201. When the handle is in the "off" position illustrated in Fig. 22 so that the receptacle is in the receiving position best shown in Fig. 23, groove 343 is so arranged that it forces the upper end of lever 340 backwardly to its innermost position so that the lower end of lever 340 is moved to its outermost position to rotate lever 332 in a clockwise direction as viewed in Fig. 24, thereby causing the cams 327 and 330 to force the stationary cutter holder 272 to its innermost position in recess 180 as illustrated in Fig. 23. Thus it will be seen that when the receptacle is in its receiving position, the cutting edges or teeth of members 270 and 271 of the stationary cutter are completely withdrawn from the grinding chamber 70. Rotation of handle 205 in a counterclockwise direction as viewed in Fig. 22 causes groove 343 and spring 344 to move the upper end of lever 340 gradually outward so that arm 337 of lever 332 is moved gradually inward, thereby producing rotation of shafts 321 and 322 in a counterclockwise direction as viewed in Fig. 24 to bring the flat faces 328 and 331 of the cams 327 and 330 opposite the stationary cutter supporting holder 272. Groove 343 of cam 267 is so arranged that when handle 205 is in the neutral position cams 327 and 330 have been rotated only sufficiently to permit partial advancement of the stationary cutter by means of spring 294 and the cutting members 270 and 271 still do not project, or project only to a very slight degree, into the grinding chamber 70. As previously pointed out, when the receptacle is in its neutral position it is possible due to the peculiar construction of the receptacle for an operator to reach into the grinding chamber. However, under these conditions the wall of the receptacle is so disposed as to render it difficult for any one reaching into the grinding chamber to come in contact with the teeth of the stationary cutter. This is similar to the condition illustrated in and described in connection with Fig. 19. The above described arrangement of the cam groove 343 provides a further protection to the hands of an operator in that when the receptacle is in its neutral position the teeth of the stationary cutter do not project into the grinding chamber to a sufficient extent to injure the operator especially in view of the protection offered by the wall of the receptacle.

Further counterclockwise rotation of handle 205 from the position marked "N" to the position marked "on" causes the receptacle to assume its complete emptying position. At this point the spring 344 and the groove 343 of cam 267 have forced the upper end of lever 340 to its outermost position with a consequent rotation of arm 337 to its innermost position causing levers 332 and 333 and link 336 to move to their uppermost positions indicated in the dotted lines in Fig. 24. This produces rotation of cams 327 and 330 so that their flat faces 328 and 331

are opposite the bearing projections 284 and 286 respectively of holder 272 and permit spring 294 to move this holder outwardly to the extent permitted by adjusting screw 298. Hence when the receptacle is rotated to its "on" or emptying position the cutting teeth of the stationary cutter are projected to their operating positions in the grinding chamber 70, but under these circumstances the bottom wall 185 of the receptacle and the ribs 187 thereof prevent an operator reaching into the grinding chamber so that it is impossible for injury to occur due to contact with the teeth of the stationary cutter. The outer wall of groove 343 is provided with notches, such as that indicated at 345, which engage the head 342 in each of the three positions of the receptacle and, due to the outward pressure on lever 340 by spring 344, serve to prevent free rotation of the receptacle and controlling cam out of the positions in which they are set.

Due to the adjustability of the stationary cutter, it is necessary to provide, as best shown in Fig. 31, a clearance 346 between the front edge 282 of the holder 272 and the edge 347 of the portion of the casing 70 which forms the rim of the recess 180. In a manner similar to that described in connection with the embodiment shown in Fig. 20, the ledge 281 between the leading face 280 of the front row of teeth 275 and the front edge 282 of the holder 272 serves to prevent the forcing of ground material into the clearance 346 to impede the movability of the holder. And as previously set forth, any material which does get through the clearance is trapped in the groove 283 in the holder and forced downwardly into the drain conduit 215. Holder 272 is so formed as to provide a projecting shoulder 348 on one side of groove 283, which shoulder, when the holder is in its advanced position, substantially abuts against the front wall 349 of the recess 180 as shown in Fig. 31 to thereby prevent ground material from escaping into the recess proper where there would be danger of clogging the cutter operating mechanism as for instance the cam 330 which engages shoulder 286.

Although it is believed that the operation of the various parts of the second embodiment of my improved grinding apparatus has been made clear in the preceding description, this operation will now be summarized. When it is desired that the apparatus stand idle, the parts thereof normally assume the positions illustrated in Fig. 23 and the switch indicating pointer 156 is turned to the "off" position. Under these circumstances, the receptacle may be left in its receiving or "off" position for the deposit and storing therein of material to be ground and the material receiving opening of the casing may be closed by means of cover plate 206 so that the sink 20 appears to be of the ordinary type. However, with the indicating pointer 156 in "off" position, handle 205 may be rotated in a counterclockwise direction to effect rotation of the receptacle to its neutral position permitting an operator to reach into the grinding chamber to remove non-grindable material therefrom. Under these circumstances the rotary cutter is not in operation and the stationary cutter is sufficiently withdrawn from the grinding chamber that the hand of the operator is adequately protected therefrom by the bottom wall of the receptacle. For proper operation of the apparatus, material to be ground should not be placed in the grinding chamber when the rotary cutter is not in operation since packing down of such material may render subsequent starting of the rotary cutter difficult unless an impractical size driving motor is employed.

In order to render the apparatus operative for the grinding of garbage and like material, indicating pointer 156 is turned to "on" to thereby prepare the switching mechanism and motor circuit for subsequent energization. With the cover plate 206 removed, material to be ground is placed in the receptacle which for this purpose is disposed in its "off" position. The receptacle may serve the purpose of limiting the size and amount of material to be fed to the grinding chamber. For emptying the material to be ground into the grinding chamber, handle 205 is turned in a counterclockwise direction as viewed in Fig. 22 to rotate the receptacle into its emptying or "on" position. One of the important safety features of my improved device as previously pointed out is that immediately upon rotation of the receptacle out of its "on" position, the head 265 of switch operating lever 262 is moved out of the notch 269 in the dial plate 266 and the right-hand end of the switch control lever is moved downwardly as viewed in Fig. 27 to cause energization of the motor circuit. The motor and the rotary cutter are thereby permitted to attain their normal operating speed before the receptacle is sufficiently rotated to effect emptying of the material therefrom onto the rotary cutter. During the turning of the receptacle towards its "on" position, the stationary cutter is gradually advanced in the manner previously set forth in detail. When the receptacle finally reaches its "on" position the teeth of the stationary cutter project into the grinding chamber and are in proper position to cooperate with the rotary cutter for the shredding and cutting of the material to be ground. The manner in which the rotary cutter, the propeller and the stationary cutter cooperate in the crushing, shredding and cutting of the material has been described in detail hereinbefore and will not now be repeated. The grinding operation and the carrying away of the ground material are facilitated in the second described form of machine by the supplying of water from the faucet of the sink through the spaces 193 between the ribs 187 of the receptacle and into the grinding chamber. The amount of water supplied may be regulated at will and in accordance with the operator's experience to insure proper and complete grinding and complete removal of the ground material from the grinding chamber through discharge conduit 215 into sewer connecting pipe 216. When all of the material in the grinding chamber has been completely ground, the receptacle may be left in its "on" position and the water from the faucet may be left running to flush out and clean the grinding chamber, the rotation of the rotary cutter during this operation serving to agitate the water supplied to the grinding chamber to facilitate the cleaning process.

After the grinding and cleaning operations, the receptacle is turned to either its neutral position to permit the removal of unground material such as bottle caps, glass and the like from the grinding chamber or may be turned to its receiving position for the deposit therein of additional material to be ground. It will be evident that an important feature of my improved grinding apparatus is that an operator or any one else is prevented from carelessly coming into contact with the grinding mechanism at all times since

when the receptacle is in either "on" or "off" positions the ribs 187 prevent access to the interior of the grinding chamber and when the receptacle is in its neutral position, in which case the motor should be rendered inoperative, the operator's hand is protected from contact with the teeth of the stationary cutter.

As will be seen from the foregoing description, my invention provides an improved construction and arrangement for a grinding apparatus especially adapted for domestic use to grind the garbage and like waste material. The design and the operation of the device are very simple so that the device may be operated without special skill and experience. The only elements to be manipulated for controlling the operation of the device are the indicating knob 153 and the handle 50 or 205 in accordance with which one of the devices is employed.

Having described the method of operation of my invention together with the apparatus which I now consider to represent the best embodiments thereof, I desire to have it understood that the apparatus shown is only illustrative and that the invention may be carried out by other means.

What I claim as new and desire to secure by Letters Patent of the United States, is:

1. In an apparatus for grinding garbage and other waste material, a casing defining a grinding chamber and having an opening for the feeding of such material to said chamber, means for mounting the casing beneath a kitchen sink or like structure with said opening in registry with an opening provided in said structure, grinding means in said chamber, means for operating the grinding means, said casing opening providing manual access to said chamber and grinding means for the removal of unground material, a receptacle movably mounted in said casing adjacent said casing opening for movement into a plurality of positions including a position in which the receptacle provides a depository for garbage or other waste material and another position for emptying the deposited material into the grinding chamber, and means operative upon movement of the receptacle into certain of said plurality of positions for blocking said casing opening to prevent the feeding of material and manual access to said chamber.

2. In an apparatus for grinding garbage and other waste material, a casing defining a grinding chamber, means for grinding such material in the chamber including a first cutting device mounted for rotation in the chamber and a second cutting device mounted for cooperation with said first cutting device, means for rotating said first cutting device, means providing an opening in said casing for admitting material to be ground to the chamber and providing for manual access to said grinding means, means for feeding material to be ground to said grinding means including a receptacle movably mounted for receiving material when in one position and for emptying the material into the grinding chamber when in another position, means including a portion of said receptacle for preventing manual access to said grinding means when the receptacle is in said other position, and means for moving said receptacle from one of said positions to the other.

3. In a grinding apparatus, a casing defining a grinding chamber having an opening providing for manual access to the interior of the chamber, grinding means in the chamber, a receptacle pivotally supported by said casing in line with said opening for operation into one position to receive material to be ground and into a second position to empty such material into said chamber, and means including a portion of the wall of said receptacle for blocking said opening to prevent manual access to the interior of the chamber when the receptacle is operated into said second position.

4. In a grinding apparatus, the combination of a casing defining a grinding chamber having a material receiving opening providing for manual access to the interior of the chamber, grinding means in the chamber, a receptacle movably supported for operation into a plurality of positions including a position for receiving material to be ground and a position for emptying such material into said chamber, means operative upon movement of said receptacle into certain of said plurality of positions for blocking said opening and means operative upon movement of the receptacle into other of said plurality of positions for affording manual access through said opening to the interior of said chamber.

5. In a grinding apparatus, a casing defining a grinding chamber having a material receiving opening providing for manual access to the interior of the chamber, grinding means in the chamber, a receptacle movably supported adjacent said opening for operation into a plurality of positions including one position for receiving material to be ground and another position for emptying such material into said chamber, and means including cooperating wall portions of said receptacle and wall portions of said casing adjacent said opening for blocking the opening when the receptacle is in certain of said plurality of positions, said receptacle having also wall portions cooperative with wall portions of said casing adjacent said opening for providing manual access to the interior of said chamber when the receptacle is in other of said plurality of positions.

6. In a grinding apparatus, a casing defining a grinding chamber having a material receiving opening providing manual access to the interior of said chamber, means for grinding material in the chamber, a receptacle supported pivotally by said casing adjacent to and in line with said opening for rotation into a plurality of positions including a first position for the deposit therein of material to be ground and a second position for emptying such material into said chamber, and means including portions of the walls of said receptacle for blocking said opening when the receptacle is in said first position and said second position, said receptacle having also wall portions formed to afford manual access to said chamber through said opening when the receptacle is rotated into a third one of said plurality of positions.

7. In a grinding apparatus, a casing defining a grinding chamber having an opening providing manual access to said chamber and having means operable for grinding material therein, a receptacle having end walls and substantially cylindrically shaped side walls therebetween with portions of said side walls cut away to provide a receptacle opening, means for mounting the receptacle adjacent to and in line with said casing opening with the end walls thereof pivotally supported by the casing walls for rotation of the receptacle into a plurality of positions including a first position wherein said receptacle opening is in registry with said casing opening for the deposit in the receptacle of material to be ground

and a second position for the emptying of such material into said chamber, and means for rotating the receptacle, the receptacle having wall portions arranged to cooperate with the rim of said casing opening to block off the casing opening when the receptacle is in said first and said second positions, said cut away portions of the receptacle being formed for cooperation with the rim of said casing opening to afford manual access therethrough to said chamber when the receptacle is rotated into a third of said plurality of positions.

8. In an apparatus for grinding garbage and like material, a casing defining a grinding chamber having an opening for the feeding of material into said chamber, means for mounting the casing beneath a kitchen sink or like structure with said opening in communication with a drain opening in the sink or like structure, means for grinding material in said chamber, a receptacle movably supported by the casing in line with said casing opening for operation into a plurality of positions including one position to receive material to be ground and a second position to empty such material into said chamber, and means including wall portions of the receptacle for blocking said casing opening to prevent access to the grinding chamber when the receptacle is in certain of its said plurality of positions, said wall portions having apertures for the passage therethrough of water from said sink or like structure into the grinding chamber.

9. In a grinding apparatus, a casing having a grinding chamber and having an opening for admitting material to be ground to said chamber, means for grinding material in the chamber, a receptacle movably mounted for operation into a plurality of positions including one position for receiving material and a second position for emptying the received material into said chamber, means for supplying water to said casing, valve means operable into a plurality of positions for controlling the water supply, and means operatively interconnecting said receptacle and said valve means for effecting control of the positioning of the valve means in accordance with the positioning of the receptacle.

10. In a grinding apparatus, a casing having an opening, a grinding chamber in the casing, cutting means including a stationary cutter mounted in a lateral recess in the casing and a rotary cutter having a vertical shaft mounted on the bottom of the casing, a receptacle having two trunnions mounted in an upper portion of the casing with the trunnions supported in bores of the casing, a crank for turning the receptacle fastened to one of the trunnions, and means for conducting water to the receptacle comprising a valve mechanically connected to the other trunnion.

11. A garbage grinding apparatus adapted for installation beneath a kitchen sink having a drainage opening, said apparatus including a casing defining a substantially frusto-conical grinding chamber having a garbage receiving opening in the smaller end thereof, means for supporting said casing beneath said sink with said receiving opening in registry with said sink drainage opening and the axis of said chamber substantially vertical, a receptacle mounted in said casing for rotation into one position for receiving garbage through said openings and into a second position for discharging the garbage into said chamber, said receptacle having a wall portion operative to block said openings when the receptacle is in said second position to prevent access to said chamber, garbage grinding means in said chamber including stationary cutting means disposed at the side of the chamber and rotary cutting means supported by the bottom of said casing with the axis thereof vertical, a vertical axis motor supported beneath said casing and connected to drive said rotary cutting means, switching means for controlling the operation of said motor, a handle for positioning said receptacle, and means operatively associated with said handle for actuating said switch in accordance with the positioning of the receptacle.

12. In a grinding apparatus, a casing defining a grinding chamber and having a material receiving opening in one wall thereof providing for manual access directly into the interior of the chamber, grinding means in said chamber, a closure device for said opening comprising a receptacle mounted in said casing for movement into one position to receive material to be ground and into another position to discharge the received material directly into said chamber, said receptacle having wall portions arranged to prevent access to said chamber when the receptacle is in discharging position, a motor for operating said grinding means, switch means operable for controlling said motor, and means operative responsively to movement of said receptacle for actuating said switch means to effect operation of said motor when the receptacle is in discharging position and for actuating said switch means to stop operation of said motor when the receptacle is in receiving position.

13. In a grinding apparatus, a casing having a grinding chamber therein and an opening for admitting material to be ground to said chamber, grinding means in the chamber, a motor for driving the grinding means, a receptacle mounted in said casing for rotation into one position to receive material through said opening and into another position for discharging the received material into said chamber, said receptacle having wall portions arranged to prevent the feeding of material through said opening into the grinding chamber when the receptacle is in receiving position, a cam device connected for rotation concomitantly with said receptacle, a power circuit for said motor including switching means arranged for actuation by said cam device to control the energization of said motor, said cam device including means for actuating said switching means to stop said motor when the receptacle is in receiving position and including also means for actuating the switching means to start said motor in response to initial turning movement of the receptacle out of receiving position and before the receptacle reaches its discharging position.

14. In a grinding apparatus, a casing having a grinding chamber therein and an opening in direct communication with said chamber to provide for manual access thereto, means for grinding material in said chamber, a closure device movably supported by the casing for movement into a plurality of positions including a position for blocking said opening to prevent access to the grinding chamber, a cam device connected for movement concomitantly with said closure device, and control means for said motor including switching mechanism connected for actuation by said cam device in accordance with the positioning of the closure device.

15. In a grinding apparatus, a casing defining a grinding chamber having an opening providing

for manual access to the interior of the chamber, means for cutting material in said chamber including a pair of cutting elements at least one of which is movable alternately into and out of cooperative cutting relation with the other of said elements, means for rendering said cutting means operative when said elements are in said cooperative cutting relation, a closure device mounted for movement into a first position to block said opening and for movement into a second position for rendering the interior of said chamber accessible through said opening, and means operative responsively to movement of said closure device for effecting movement of said one element into and out of said cooperative relation upon movement of said closure device into said first position and said second position respectively.

16. In a grinding apparatus, a casing defining a grinding chamber having an opening providing for manual access to the interior of the chamber, grinding means including a cutting element movably mounted for alternate advancement into and retraction from said chamber through a second opening provided in a wall of said casing, a closure device movably supported by said casing and operative in one position to block said first opening, said device being movable into a second position for affording access to said chamber through said first opening, and means operative responsively to operation of said closure device into said first position for effecting advancement of said cutting element into said chamber and operative responsively to operation of said closure device into said second position for effecting retraction of said cutting element from said chamber.

17. In a grinding apparatus, a casing defining a grinding chamber having an opening provided for manual access and the admission of material to be ground into said chamber, means providing a recess in the wall of the casing in communication with said chamber, a receptacle movably supported by the casing and operable into a plurality of positions including a position for receiving material and a position for emptying the received material into said chamber, said receptacle being operative when in certain of said plurality of positions to block said opening and operative when in other of said plurality of positions to permit access to said chamber, means for grinding material in said chamber including a retractable cutter mounted for movement alternately into and out of said recess, means for moving the retractable cutter, means for moving the receptacle, and linkage mechanism operatively interconnecting said two last mentioned means for effecting movement of said cutter into said recess in response to movement of the receptacle into a position in which it permits access to the grinding chamber.

18. In a grinding apparatus a casing defining a grinding chamber having an opening provided for manual access and the admission of material to be ground into said chamber, a receptacle movably mounted in the casing and operable into a plurality of positions including a position for receiving material and a position for emptying the received material into said chamber, said receptacle being operative when in certain of said plurality of positions to block said opening and operative when in other of said plurality of positions to render said chamber accessible through said opening, means for grinding material in said chamber including a cutting element supported for operation in the chamber, and means for rendering said cutting element substantially inaccessible upon movement of the receptacle into a position affording access to the chamber including a portion of the wall of the receptacle disposed in position to shield an operator reaching through said opening from contact with the cutting element.

19. In a grinding apparatus, a casing defining a grinding chamber having a recess in the wall thereof in communication with the chamber, means operable for cutting material in the chamber including a stationary cutting element, means for mounting said element movably in said recess for alternate advancement into an operative position in said chamber and retraction from its operative position, power means operable for effecting operation of said cutting means, control means for starting and stopping said power means, and a master control device connected for actuating both said mounting means and said control means to insure operation of said power means when said element is advanced into its said operative position in said chamber and to insure retraction of said element from its said operative position when said power means is inoperative.

20. In a grinding apparatus, a casing having a grinding chamber therein and an opening providing for access to the grinding chamber, means for grinding material in said chamber including a cutting element mounted for movement alternately into and out of operative cutting position in said chamber, a motor connected for effecting operation of said grinding means, a closure device rotatably supported by the casing for movement into a plurality of positions including a position for blocking said opening, a cam device connected for rotation concomitantly with said closure device, means for controlling the positioning of said cutting element, means for controlling the operation of said motor, and means interconnecting said cam device with both said controlling means for effecting control of said motor and the positioning of said cutting element in accordance with the positioning of said closure device.

21. In a grinding apparatus, means providing a grinding chamber, means for grinding material in said chamber including a cutting element mounted for movement alternately into and out of operative cutting position in said chamber, power means for operating said grinding means, means operable alternately for effecting withdrawal of said element from said cutting position and for effecting advancement of said element into said cutting position, and means cooperative with said last mentioned means upon advancement thereby of said element for automatically rendering said power means operative a substantial time interval before said element reaches said operative cutting position.

22. In a grinding apparatus, a casing defining a grinding chamber having an opening providing for manual access to the interior of the chamber, means including a pair of cooperative cutting elements operable for cutting material in the chamber, means for actuating said cutting means, a movable closure device operable into one position for blocking said opening and operable into another position for rendering said chamber manually accessible through said opening, means for rendering said cutting means operative in response to movement of the closure device into its blocking position and means automatically operative for rendering said cutting

means inoperative and at least one of said cutting elements substantially inaccessible through said opening upon movement of the closure device into its said other position.

23. In a grinding apparatus, a casing defining a grinding chamber having an opening in the upper portion thereof for the admission of material to be ground, a receptacle movably mounted for receiving material when in one position and for discharging such material into said chamber when moved into another position, cutting means operable for comminuting material in said chamber including a rotatable cutting element mounted for rotation in said chamber and a stationary cutting element adjustably mounted for alternate movement into and out of a position to cooperate with the rotatable cutting element in the cutting operation, means for controlling the positioning of said stationary cutting element, motor means for driving said rotatable cutting element, means for controlling the operation of said motor means, and means operative in accordance with the positioning of said receptacle for effecting predetermined operations of both said controlling means.

24. In a grinding apparatus, a casing defining a grinding chamber and having means operable for grinding material therein, means providing for the admission of material to be ground to said chamber including a receptacle mounted for movement relative to said casing for receiving material when in one position and for feeding such material to said grinding chamber when in another position, means for supplying water to said chamber, and means operative responsively to and in accordance with the positioning of said receptacle for controlling both the operation of said grinding means and the supplying of water to said chamber.

25. In a grinding apparatus, a casing having an opening, a grinding chamber in the casing, cutting means including a stationary cutter mounted in a lateral recess in the casing and a rotary cutter having a vertical shaft mounted on the bottom of the casing, a receptacle having two trunnions mounted in an upper portion of the casing with the trunnions supported in bores of the casing, a crank for turning the receptacle fastened to one of the trunnions, means for conducting water to the receptacle comprising a valve mechanically and hydraulically connected to the other trunnion, means for moving the stationary cutter into and out of the grinding space including a holder, a shaft having a cut-away portion engaging the holder and a lever mechanism connected to the shaft and including a roller engaging a cam defined by the crank.

26. In a grinding apparatus, a casing having an opening, a grinding chamber in the casing, cutting means including a stationary cutter mounted on a side wall of the casing and a rotary cutter having a vertical shaft mounted on the bottom of the casing, a motor for driving the rotary cutter, a receptacle having two trunnions mounted in an upper portion of the casing with the trunnions supported by the casing, a crank for turning the receptacle fastened to one of the trunnions, means for conducting water to the receptacle comprising a tapered spring pressed valve mechanically connected to the other trunnion, means for moving the stationary cutter into and out of the grinding chamber including a holder, a shaft having a cut-away portion engaging the holder and a lever mechanism connected to the shaft and including a roller engaging a cam defined by the crank, and means for conducting water from said valve through a bore in said shaft into the grinding chamber.

27. In an apparatus for grinding garbage and like material, a casing defining a substantially vertical axis frusto-conical grinding chamber having a material receiving opening in the reduced upper end thereof, means for grinding material in the chamber including a member having an extended cutting face and movably mounted in a recess in the wall of said chamber for advancement of said cutting face into the chamber, spring means operable for advancing said member, means for maintaining said cutting face substantially parallel to a generatrix of the wall of said chamber when the cutting face is advanced into the chamber, a propelling device centrally mounted in said chamber for rotation about a substantially vertical axis to throw material outwardly against said cutting face, and means for rotating said propelling device.

28. In a grinding apparatus, a casing defining a grinding chamber the walls of which form a section of a vertical axis cone having its smaller end up and having an opening for the admission of material to be ground, a cutting device mounted in said chamber for rotation about a vertical axis and means for rotating said device, a stationary cutting device having a cutting face mounted substantially parallel to a generatrix of the wall of said chamber and in position to cooperate with said rotary cutting device, and a propelling device mounted above said rotary cutting device for rotation therewith to throw material outwardly against the downwardly flaring walls of said conical chamber.

29. In a grinding apparatus, a casing having a bottom and a side wall defining a grinding chamber, means for conducting material to be ground to the grinding chamber, grinding means in the chamber comprising a rotary cutter mounted on the bottom and a stationary cutter in a lateral recess of the casing, and means for flexibly mounting the stationary cutter and adapted to move the stationary cutter in and out of the recess, the mounting means comprising a holder for the stationary cutter, cam members for supporting the holder and a spring biasing the holder towards the cam members, the cutting edge in a certain position of the cam members projecting into the cutting chamber and in another position of the cam member being disposed within said lateral recess.

30. In a grinding apparatus having a casing with a bottom plate and a side wall defining an opening at its upper end through which material to be ground is conducted, cutting means having a cutting edge mounted on the side wall, means for throwing material to be ground towards said cutting edge comprising a propeller, means for mounting the propeller on said bottom plate, and means for driving the propeller, the mounting means including a vertical shaft, a disk having a hub fastened to the shaft and to the propeller and a bearing for the shaft and the disk comprising a sleeve having a conical portion secured at its lower end to the bottom plate, the inner bore of the sleeve defining a comparatively long bearing surface for the shaft and the outer surface of the sleeve defining a bearing surface for the disk, the disk having a conical bore engaging the conical portion of the sleeve.

31. In a grinding apparatus, a grinding chamber, a rotary cutter in the chamber, a motor for driving the cutter, means for feeding material to

be ground to the chamber, means for automatically conducting water into the chamber during the grinding operation, the rotary cutter including a disk, members flexibly mounted on the disk and a propeller centrally arranged with and secured to the disk, the propeller having two wings arranged to form a connection with a drive member for other devices whereby the motor may be used as a power agency for such other devices.

32. In a grinding apparatus, a grinding chamber, a stationary and a rotary cutter, and a motor for operating the rotary cutter, the rotary cutter comprising a disk, at least two members flexibly mounted on the disk and adapted to move radially outward under the action of centrifugal force, means for biasing the members inward against the action of centrifugal force, and an equalizer engaging the two members to insure equal movement thereof.

33. In a grinding apparatus having a grinding chamber, the combination of a stationary cutting device disposed in said chamber, a disk mounted for rotation in said chamber in proximity to said device, means for rotating the disk, a cutting element supported movably on the disk for movement outwardly under the influence of centrifugal force into cooperative relation with said stationary cutting device, and a propelling member mounted on said disk for rotation therewith to throw material outwardly towards said stationary cutting device, said propelling member having means engaging said outwardly movable cutting element for guiding said cutting element in its outward movement.

34. In a grinding apparatus, a grinding chamber, a stationary and a rotary cutter, and a motor for operating the rotary cutter, the rotary cutter comprising a disk, at least two members flexibly mounted on the disk and adapted to move radially outward by the action of centrifugal force, an equalizer engaging the two members to insure equal movement thereof, and a propeller secured to the disk and having recesses for guiding said members.

35. In a grinding apparatus, a grinding chamber, a stationary and a rotary cutter, and a motor for operating the rotary cutter, the rotary cutter comprising a disk, at least two toothed members flexibly mounted on the disk and adapted to move radially outward by the action of centrifugal force, an equalizer engaging the two members to insure equal movement thereof, and a propeller on the disk for throwing material to be ground outwardly towards the stationary cutter.

36. In a grinding apparatus having a grinding chamber, the combination of means including a rotatable cutting device for grinding material in said chamber, means for rotating said device, said device including a member mounted for rotation in said chamber and having a cutting element movably mounted thereon for movement outwardly under the influence of centrifugal force, a propelling device mounted on said member for rotation therewith to throw material outwardly toward the walls of said chamber, means providing for the feeding of material to be ground to said chamber, and means operative for supplying water to the chamber during operation of said rotating means.

37. In a grinding apparatus, a casing defining a grinding chamber having an opening for receiving material to be ground and having a recess communicating with the chamber through an aperture in the wall of the chamber, a member having means providing a cutting edge on one face thereof, means for supporting said member movably in said recess and for advancing the member toward the chamber to cause projection of said cutting edge through said aperture into the chamber, said member having such size as to provide clearance between the side walls thereof and the rim of said aperture, and means in said chamber operable for forcing material to be ground against said cutting edge, the leading face of said cutting edge with respect to the direction of movement of said material being set back from the edge of the adjacent side wall of said member to minimize the forcing of comminuted material into the clearance between said last mentioned side wall and the rim of said recess.

38. In a grinding apparatus, a casing defining a grinding chamber having an opening for receiving material to be ground and having a recess communicating with the chamber through an aperture in the wall of the chamber, a member mounted in said recess and having means providing on the inner face thereof a cutting edge projecting into said chamber, and means for forcing material to be ground against said cutting edge, said member being mounted also to provide a clearance between the leading edge thereof with respect to the direction of movement of said material and the adjacent rim of said aperture and said cutting edge being disposed in a manner to provide a space between the cutting edge and said leading edge of said recess whereby comminuted material is restrained from entering said clearance.

39. In a grinding apparatus, a casing defining a grinding chamber having an opening for receiving material to be ground, a member mounted in a recess in the wall of said chamber with a clearance space between one wall of the member and the adjacent wall portion of said recess, a row of cutting teeth mounted on said member and projecting into said chamber, said row of teeth being disposed substantially parallel to and set back from the edge of said member adjacent said clearance, and means for forcing material to be ground transversely across said row of teeth from the general direction of said clearance, the space between the leading edge of the teeth and the edge of the clearance forming an overhung portion to prevent material comminuted by said teeth from being forced into the clearance.

40. In a grinding apparatus including a casing defining a grinding chamber, a grinding unit comprising a holder having cutting teeth thereon, a supporting member for said holder adapted to be removably secured to said casing, and means carried by said supporting member for movably mounting said holder on said supporting member with said teeth directed toward the grinding chamber, said supporting member and said mounting means constituting substantially the sole support for said holder, said mounting means including resilient elements interposed between the holder and supporting member for minimizing the transmission of shock from the holder to said casing during the grinding operation.

41. In a grinding apparatus, the combination of a casing defining a substantially vertical axis circular cross-section grinding chamber having substantially smooth side walls and a circular rimmed opening in the bottom thereof, a stationary cutting element disposed at the side of said chamber, a member rotatable in the bottom of said chamber coaxially of said opening and having a substantially flat top disk-like outer portion with a substantially circular outer rim, and a cut-

ting element supported for rotation with said member and for movement relative to said member and having a portion projecting above said flat top portion of said member adjacent the outer edge thereof for cooperation with said stationary element in the comminution of material, the rim of said member extending into close proximity with the rim of said opening thereby to define a clearance for controlling the size of comminuted material passing from said chamber.

42. In a grinding apparatus, the combination of a casing defining a grinding chamber having a circular rimmed opening in the bottom thereof, a stationary cutting element disposed at a side of said chamber, a member rotatable in the bottom of said chamber coaxially of said opening and having a substantially flat top disk-like outer portion with a substantially circular outer rim, the outer rim of said member having a plurality of indentations therein and extending into close proximity with the rim of said opening, and a plurality of cutting elements supported for rotation with said member and movable relative to said member to positions adjacent the outer edge of the member for cooperation with said stationary cutting element.

43. In an apparatus for disposing of garbage and like waste material, the combination of a sink or like structure having an opening in the bottom thereof, grinding apparatus including a casing providing a substantially vertical axis grinding chamber connected at the top to said structure for receiving material to be ground through said opening and having means for grinding material in said chamber including a vertical axis rotatable material impelling device, means for the discharge of ground material from said casing, a supporting stand having a floor mounting portion at the bottom thereof and having adjacent the top thereof a horizontally extending bracket portion connected to said casing, a motor for driving said impelling device, means resiliently suspending said motor beneath said casing, with the axis of the motor extending vertically, and a flexible coupling interconnecting said motor and impelling device, said stand having means for adjusting the height of said bracket portion.

44. In a grinding apparatus, the combination of a casing defining a grinding chamber adapted to have water and material to be ground supplied thereto and having in one wall thereof a substantially circular opening for the outward passage of water and ground material, means for grinding material in said chamber including an element mounted for rotation in said grinding chamber substantially coaxially of said opening, means providing a substantially annular chamber in communication with and substantially coaxial of said opening for receiving water and ground material from said grinding chamber, a discharge conduit connected with said annular chamber, a second element connected for rotation with said first element and having a plurality of vanes rotatable in said annular chamber for impelling water and ground material from said annular chamber into said discharge conduit, and mechanical power means for rotating said two elements.

45. In a grinding apparatus, the combination of a casing defining a grinding chamber adapted to have water and material to be ground supplied thereto and having in one wall thereof an opening for the outward passage of water and ground material, means for grinding material in said chamber including an element mounted for rotation in said grinding chamber, means providing a second chamber in communication with said grinding chamber for receiving water and ground material from said grinding chamber and having a discharge conduit connected therewith, a fluid impelling device rotatable in said second chamber for producing a centrifugal pump-like action to force water and ground material from said second chamber into said discharge conduit under pressure, and power means for rotating said elements.

46. In a waste disposal apparatus, the combination of a casing providing a grinding chamber having a material admission opening capable of affording manual access to the interior of the chamber, grinding means in said chamber, means for operating the grinding means, closure means for said opening including a receptacle supported for movement into a plurality of positions including a position wherein the receptacle affords a depository for waste material and another position for emptying such material into said chamber, and means including said receptacle operative upon movement of the receptacle into certain of its said plurality of positions for blocking said opening to prevent feeding of material and manual access to said chamber.

47. In a waste disposal apparatus, the combination of a casing providing a grinding chamber having a material admission opening capable of affording manual access to the interior of the chamber, grinding means in said chamber, power means operable for effecting operation of said grinding means, closure means for said opening including a receptacle supported for movement into a pluality of positions including a receiving position wherein the receptacle affords a depository for waste material and another position for the feeding of such material to said chamber, means including said receptacle operative to prevent manual access and feeding of material to said chamber when the receptacle is in certain of its said plurality of positions including its said receiving position, and control means operable dependently upon the positioning of the receptacle for controlling the operation of said power means, said control means being operative responsively to movement of said receptacle from its said receiving position to its said other position for initiating operation of said power means an appreciable time interval before the receptacle reaches its said other position for the feeding of material to said chamber.

48. In a waste disposal apparatus, the combination of a casing providing a chamber having an opening for admission of material to the chamber, means for comminuting material in said chamber including a pair of elements at least one of which is supported for movement alternately into and out of a position for cooperation with the other of said elements in the comminution of material, power means for effecting operation of said comminuting means, a closure device supported for movement into a plurality of positions including a position for blocking said opening and another position for the feeding of material to said chamber, and means automatically operative to control the positioning of said one of said elements dependently upon the positioning of said closure device.

49. In a waste disposal apparatus, the combination of a casing providing a chamber of considerable depth having a discharge opening at the bottom, the lower portion of the casing having

vertical axis circular cross-section, a stationary cutting and shredding element supported to one side and adjacent the bottom of the chamber, means including a member having a substantially flat top disklike outer portion rotatable at the bottom of the chamber about a vertical axis, power means for driving said rotatable means at relatively high speed, and a plurality of material impelling elements supported by said rotatable means for rotation in the bottom of the chamber and arranged for cooperation with said stationary element in the comminution of waste material, said plurality of elements being in angularly spaced relationship around said outer portion of said member and projecting above the flat top of said outer portion only a relatively small distance compared to the depth of said chamber.

50. In a waste disposal apparatus, a casing providing a chamber for receiving waste material and water and having a discharge opening at the bottom, the lower portion of the chamber having vertical axis circular cross-section, a stationary cutting and shredding element supported to one side and adjacent the bottom of the chamber, means rotatable at the bottom of the chamber about a vertical axis and including a member having a substantially flat top disklike outer portion, the periphery of said member extending in close proximity with the rim of said opening to define a restricted clearance for outward passage of water and comminuted material, power means for driving said rotatable means at relatively high speed, a plurality of elements supported by said rotatable means in angularly spaced relationship around said member and being arranged to project above said outer flat top portion of said member for cooperation with said stationary element in the comminution of material, said plurality of elements being movable approximately radially outward to operative positions under the influence of centrifugal force, and biasing means operative to restrain said elements in inwardly retracted positions when said rotatable means is at rest and operative to delay movement of said elements to outward operative positions until said rotatable means attains a predetermined speed.

51. In a waste disposal apparatus, a casing providing a grinding chamber of substantial depth and having a discharge opening at the bottom, a stationary cutter supported to one side of said chamber, rotatable means including a member supported at the bottom of said chamber for rotation about a vertical axis, power means operable for driving said rotatable means, a plurality of elements supported in angularly spaced relationship by said rotatable means for cooperation with said stationary cutter in the comminution of material, said elements being movable outwardly to operative positions under the influence of centrifugal force and being restrained against substantial angular movement relative to said member in horizontal planes, said elements being arranged to project above said member adjacent the periphery of the member to impel material against said stationary cutter, and means operative to restrain said elements in inwardly retracted positions when said rotatable means is at rest and operative to delay movement of said elements to their outward operative positions until said rotatable means attains a predetermined speed.

52. In a waste disposal apparatus, a casing providing a grinding chamber having a discharge opening at the bottom, the lower portion of the chamber being of vertical axis circular cross-section, a stationary cutter supported at one side of said chamber, means rotatable at the bottom of said chamber about a vertical axis and including a member having a top surface at least approximately coextensive with the cross-section of said chamber so as to form a support for material in the chamber, means for driving said rotatable means, a plurality of elements movably supported by said rotatable means in angularly spaced relationship around said member and arranged to project above said member adjacent the periphery of the member for cooperation with said stationary cutter in the comminution of material, said elements being movable approximately radially outward to operative positions under the influence of centrifugal force and being restrained from substantial angular movement relative to said member in horizontal planes, and means operative to restrain said plurality of elements in inward positions when said rotatable means is at rest and operative to delay movement of said elements to outward operative positions until said rotatable means attains predetermined speed.

53. In a waste disposal apparatus, a casing providing a grinding chamber having a discharge opening at the bottom, a stationary cutter supported to one side of said chamber, rotatable means including a member supported for rotation at the bottom of said chamber about a vertical axis, means for driving said rotatable means, a plurality of barlike elements slidably supported by said rotatable means in angularly spaced relationship around said member and arranged to project above the top of a portion of said member adjacent the periphery of the member for cooperation with said stationary cutter in the comminution of material, said barlike elements being slidable longitudinally and approximately radially outward to operative positions under the influence of centrifugal force, and biasing means operative to restrain said barlike elements in inwardly retracted positions when said rotatable means is at rest and operative to delay sliding of said elements to outward operative positions until said rotatable means attains predetermined speed.

54. In a waste disposal apparatus, a casing providing a grinding chamber, a stationary cutter supported to one side of said chamber, means rotatable in said chamber adjacent said stationary cutter, means operable for driving said rotatable means at substantial speed, and a plurality of material impelling elements supported by said rotatable means for movement from inwardly retracted positions to outward operative positions wherein the said elements are cooperative with said stationary cutter for the comminution of material, said elements being constrained by said rotatable means to move inwardly and outwardly along lines which are parallel to radial lines from the axis of rotation of the rotatable means, but which lines of movement of said elements are displaced backwardly, relative to the direction of rotation, from radial lines with which the said lines of movement respectively are parallel.

ADALBERT ALEXAY.

CERTIFICATE OF CORRECTION.

Patent No. 2,156,075. April 25, 1939.

ADALBERT ALEXAY.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 1, second column, line 11, for the word "illustrate" read illustrates; page 3, second column, line 70, after "parallel" insert to; page 8, first column, line 10, for "member" read chamber; line 60, for "to the" read to that; page 10, second column, line 22, after "has" insert a; page 14, first column, line 1, after the word "either" insert its; page 15, first column, line 53, claim 10, after "casing" insert a comma; page 17, second column, line 38, claim 29, for "slde" read side; page 18, first column, line 15, claim 32, after "force" insert a comma; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 20th day of June, A. D. 1939.

Henry Van Arsdale

(Seal) Acting Commissioner of Patents.