

Feb. 24, 1953

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GARBAGE DISPOSAL DEVICE

2,629,558

Filed May 19, 1948

3 Sheets-Sheet 1

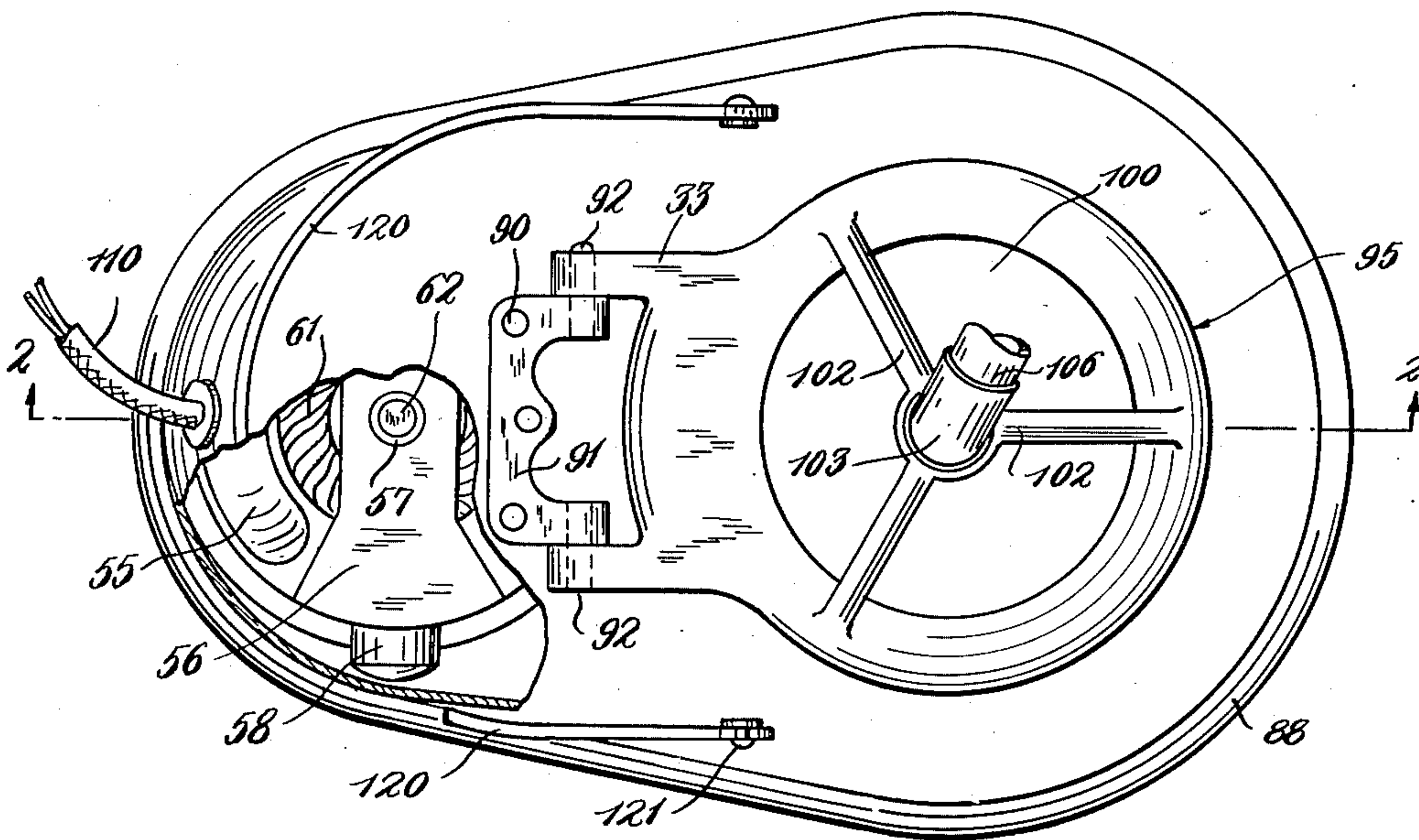


FIG. 1

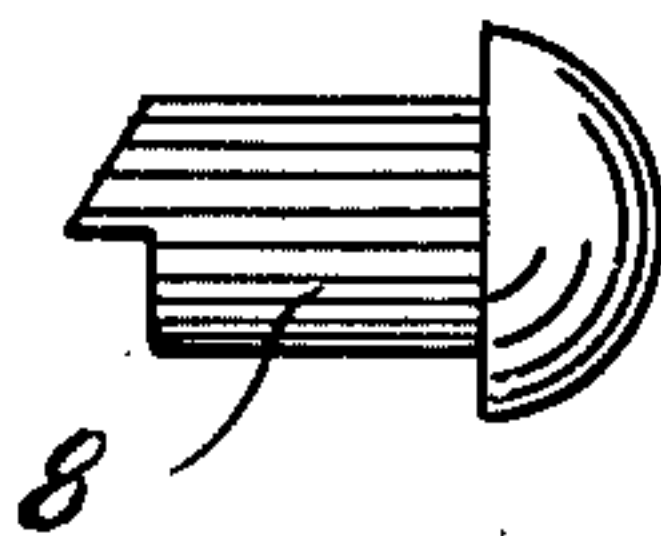


FIG. 5

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3 Sheets-Sheet 2

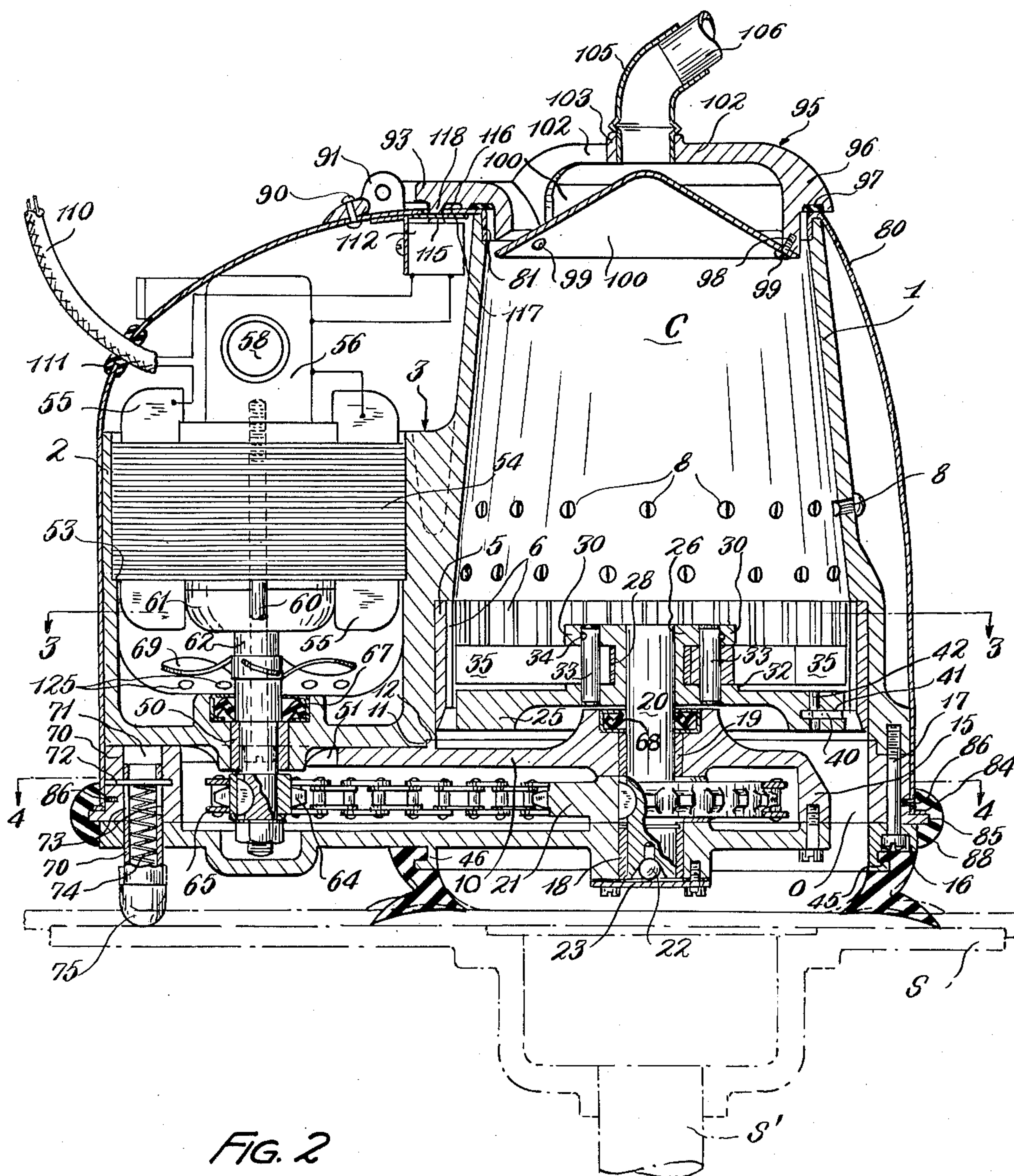


FIG. 2

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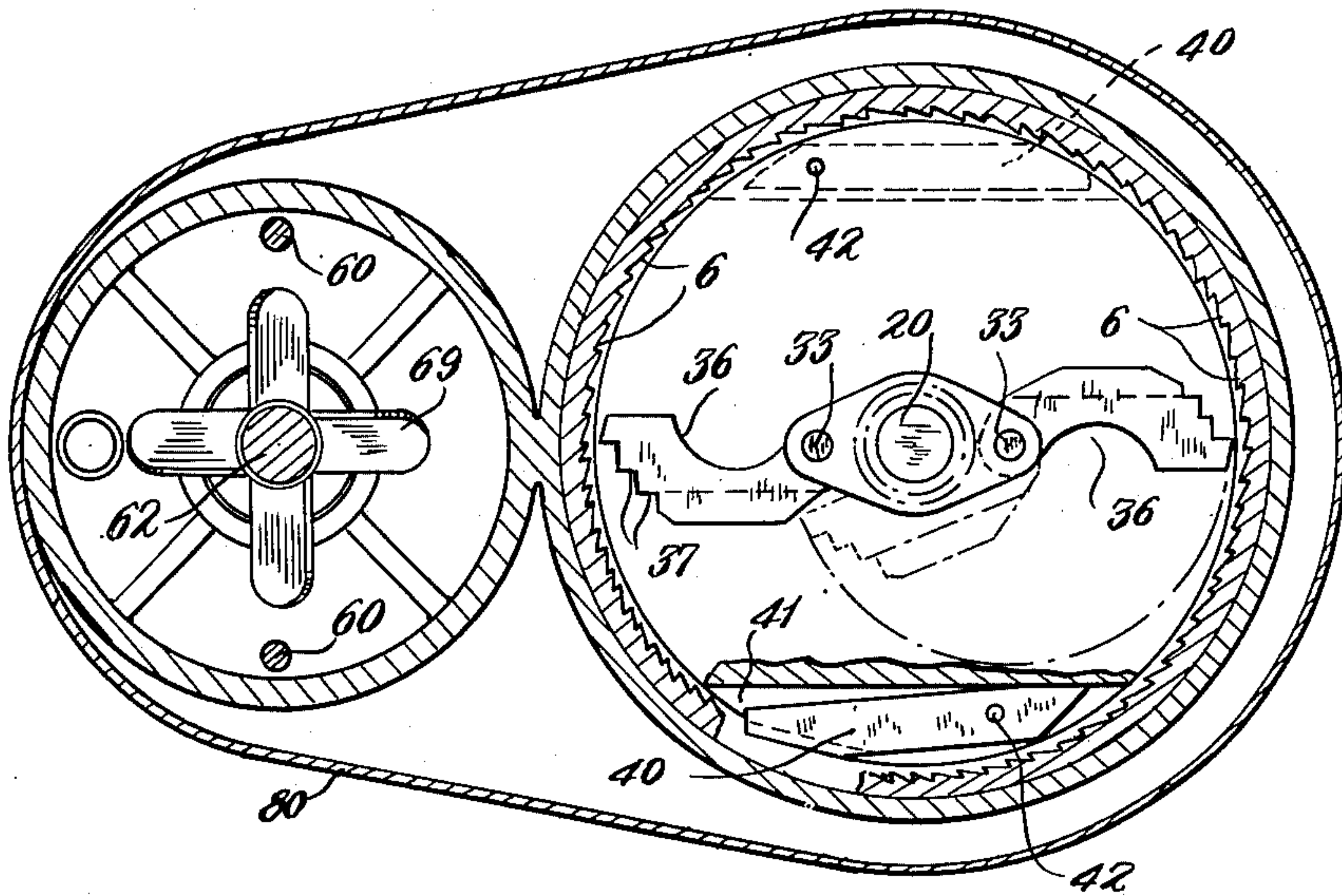


FIG. 3

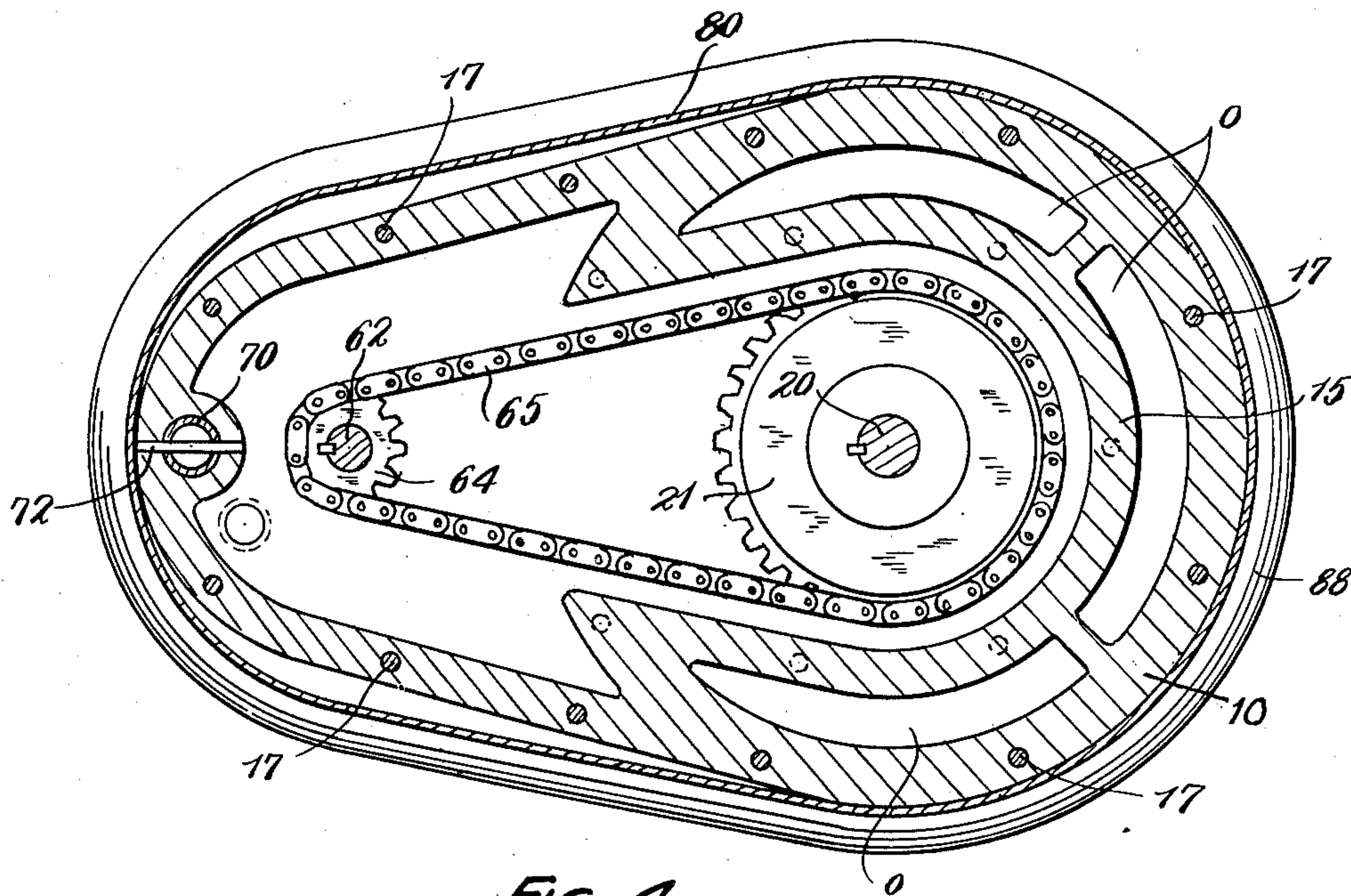


FIG. 4

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GARBAGE DISPOSAL DEVICE

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6 Claims. (Cl. 241—46)

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This invention relates to that class of devices used for comminuting food waste and other refuse and flushing the resultant disintegrated matter down a drain.

These devices are known as garbage disposal units, and those of prevailing type with which I am familiar require installation in sewer connections where running water is conveniently available, as, for example, in the drain connections of kitchen sinks, in which case the refuse and water are fed to the device through the sink outlet.

Garbage disposal units of the above character are not well suited to the needs of a substantial number of people because of the high cost of the machine, to which is added the cost of installation and, in case the purchaser is a renting tenant, he is liable to lose his investment under the law which provides that such installations become integral parts of the real estate and the property owner acquires title. Furthermore, without the landlord's consent, the renting tenant would not be at liberty to make such alterations in the structure of the plumbing as would be required for the installation of the unit. Also, lack of space may preclude the installation of a unit of the kind above described.

It is the fundamental purpose of my invention, therefore, to make available to all, especially to many people who would otherwise be denied such benefits, the convenience, sanitation, and general advantages of this modern means of food waste disposal by providing a portable device of the above mentioned class, thus broadening out the field of such devices to temporary residences, as renting property, cottages, camps, trailers, etc.

Such a portable unit as that provided by my invention may be used, if desired, during the preparation of a meal or at other times, as a garbage receptacle. Then, when it is desired to dispose of the garbage, the device may be placed in the sink, over or in communication with the outlet thereof, and supplied with water from the usual faucet, either directly, or through a suitable hose connection.

The grinding or comminuting mechanism of the device is desirably driven by an electric motor, as in the "permanently" installed types above referred to. Another object of my invention is to provide a low, compact, and relatively light weight portable garbage disposal unit, utilizing a relatively small high-speed motor, set off to one side of the grinding chamber, so that the unit may be conveniently placed in the sink (even though the sink be of small size) where flushing

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water may be supplied to the unit from the sink faucet.

Another object of the invention is to provide a resilient sealing ring that surrounds the discharge opening of the device and encompasses the sink outlet opening, all or a substantial part of the weight of the unit being sustained by said ring thereby to insure the latter's firm contact with the bottom of the sink. Another and related object is to so design said ring that a broad surface is presented to the bottom of the sink which is bounded by flexible lips to further enhance the sealing action.

In the present embodiment of the invention, the sealing ring is concentric with the discharge opening of the grinding chamber, and the electric motor by which the grinding mechanism is operated is arranged at one side of said chamber and therefore overhangs the adjacent side of the sealing ring; and it is a further object to provide a resilient leg or support for the overhanging portion of the device which will yield under the weight of the unit to about the same extent the sealing ring is compressed so that the auxiliary support will not interfere with the desired action of the ring.

Another object of the invention is to provide a garbage disposal device or unit in which the grinding mechanism is driven through speed reduction driving connection by a high speed motor, in contradistinction to the direct connection between motor and grinding mechanism of the installed type of machine, thereby permitting the use of a smaller motor with a corresponding reduction in weight. It may be mentioned in this connection that I prefer a grinding speed somewhat less than that used in the installed types of units because there is less likelihood of impaction or clogging of the drains, and this end is further advanced by the fact that, in the case of my machine only a limited quantity of garbage or waste is handled at any one time, such as may be accommodated by the grinding chamber. In the installed types of machines, the garbage or waste may be fed continually for any length of time, depending upon the amount to be disposed of.

Another object of my invention is to place the motor under the control of a switch that is actuated by the closure of the grinding chamber so arranged that current is supplied to the motor only when the grinding chamber is closed.

Another object of my invention is to provide reliable and effective grinding mechanism which will successfully comminute all kinds of garbage

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and waste that is intended to be handled by devices of this class and which mechanism, by reason of its construction and principle of operation, is not liable to clogging or stalling.

A further and more general object of the invention is to provide a relatively simple and inexpensive construction involving a minimum number of parts that are easy and convenient of assembly.

The foregoing objects and advantages, with others hereinafter appearing, are attained in the embodiment of the invention illustrated in the accompanying drawings, wherein like reference characters designate like parts throughout the several views.

In the drawings, Fig. 1 is a plan view of a portable garbage disposal device constructed in accordance with my invention, a part of the casing being broken away above the motor; Fig. 2 is a central vertical section through the device on the line 2—2 of Fig. 1; Figs. 3 and 4 are horizontal sections on the respective lines 3—3 and 4—4 of Fig. 2, and Fig. 5 is a detail of one of the abrading studs.

1 is the housing of a grinding chamber C, and 2 the housing of an electric motor, both housings, according to the present embodiment of the invention, consisting of integral parts of a body member or casting designated, generally, by the reference numeral 3. At its lower end, the chamber C is counterbored or otherwise given a cylindrical shape and into this enlarged end of the chamber is fitted a steel ring 5 having, on its inner face, sharp ridges or teeth 6, desirably spaced different distances apart, or irregularly, circumferentially of the ring. These ridges or teeth stop short of the lower end of the ring in a horizontal plane, below which the ring is shown as beveled.

Above the plane of the ring 5, the wall of the housing 1 is shown as having substantially radial bores or holes through which are pressed headed studs 8 whose inner ends are formed to provide abrading teeth, as best illustrated in the detail of Fig. 5.

10 designates a base member that is engaged with the bottom of the body member or casting 3 and has an annular flange 11 that is piloted in a rabbeted groove 12 formed in the bottom of the housing 1. This base member incorporates a transmission housing 15. Applied to the underside of the base member is a bottom plate 16. This plate and the base member have registering holes through which screws 17 extend that are threaded into tapped holes in the bottom of the body member 3, the holes in the bottom plate being enlarged at their ends to accommodate the heads of the screws. The bottom plate corresponds in outline with the base member 10 and includes a part which closes the bottom of the transmission housing 15, such part incorporating a bearing 18 that is in axial alignment with a bearing 19 of the base member.

Journalled within the bearings 18 and 19 is a shaft 20, the axis of which is coincident with that of the grinding chamber, and between the bearings 18 and 19, said shaft has keyed to it a sprocket wheel 21. The shaft is shown as supported by a ball 22 that is contained within an axial recess formed in the lower end of the shaft, said ball being supported by a plate 23 that is secured to the lower end of the bearing 18.

The grinding mechanism includes a disk 25 having an upstanding hollow central boss 26 that receives the upper end of the shaft 20, the disk being suitably secured against rotation to the

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shaft. The boss 26 has a circumferential groove or channel within which and snugly fitted about the boss, is a sleeve 28 of resilient material, such as natural or synthetic rubber. Diametrically opposed lugs 30 project radially from the upper end of the boss 26 in alignment with similarly shaped elevated portions 32 of the disk 25. Fitted within aligned apertures of the lugs 30 and the underlying portions of the disk 25 are the ends of stub shafts 33, and these stub shafts are held against longitudinal movement by cross pins 34 that are projected through holes in the lugs 30 and enter grooves in the sides of the stub shafts.

Pivoted upon the stub shafts 33 are the inner ends of hammers 35. Said hammers have cylindrical recesses 36 on one side thereof which permit the hammers to assume a position, shown in broken lines in Fig. 3, in close proximity to the boss 26. The faces of the hammers are formed with teeth 37. When the hammers are extended to the position shown in full lines in Fig. 3, and in which they also appear in Fig. 2, the outer ends of the hammers are in about the vertical plane of the periphery of the disk 25, and, as best shown in Figs. 2 and 3, said disk approaches closely the ridges or teeth 6 of the ring 5. The narrow annular space between the periphery of the disk and the ring 5 provides the only outlet for the comminuted material from the chamber C.

The grinding mechanism desirably includes shearing means for cutting fibrous materials, such as corn silk or the like, that descends through the annular space between the periphery of the disk 25 and the ring 5, and such means consists of blades 40 that operate freely in kerfs 41 in the edge portion of the disk 25, said blades being pivoted on pins 42 fitted within holes in the disk. Considering the direction of rotation of the disk, the blades 40 are pivoted adjacent their advancing ends, and they are so shaped that they are permitted limited rocking movement on their pivots from a position entirely within the kerfs to one wherein their trailing ends extend beneath the lower ends of the ridges or teeth 6 of the ring 5. As best appears from Fig. 3, the trailing ends of the blades are cut off along one side at an angle and such angular portion is made sharp by beveling the underside of the blade throughout the length of said portion, as best appears in Fig. 2. The beveled portions of the blades coact under the influence of centrifugal force with the square cut lower ends of the ridges or teeth 6 to shear fibrous material.

I have already stated that the comminuted material is discharged from the grinding chamber through the narrow annular opening between the disk 25 and the ring 5, and in the operation of the device, which I shall presently describe more in detail, the ground material is discharged from the space below the disk 25, through arcuate slots 0 that are formed in the base member 10 and bottom plate 16, into the circular space enclosed by a resilient sealing ring 45, of natural or synthetic rubber or the like. This ring is formed at its upper end to bear against the bottom plate 16 and to interlock with an undercut annular flange 46 of said plate, this flange being substantially concentric with the axis of the grinding chamber. The lower end of the ring is formed in such manner as to provide a broad bearing surface, flanked throughout its circumference, along its inner and outer edge portions, by flexible lips that yield under the weight of the device and allow such surface to conform to the shape or contour of a supporting area, as the bottom of a sink upon

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which the device is placed. In Fig. 2 the bottom of a sink is indicated at S in broken lines, and the shape assumed by the sealing ring under the weight of the device, when resting on the bottom of the sink, is shown in dotted lines. When the device is positioned in a sink for operation, the sealing ring surrounds the outlet opening of the sink through which the space enclosed by the sealing ring communicates with the drain s'.

The motor housing 2 takes the place of the usual motor casing and consists of a cylindrical peripheral wall and a circular bottom wall, the latter incorporating a central hollow boss that projects into an opening 51 of the base member and provides a bearing 50. The interior of the housing is enlarged at its upper end to provide a shoulder 53, and fitting within said enlarged upper end, and resting upon the shoulder 53, is the laminated stack of the stator 54 of the motor, the same carrying the field windings 55. Surmounting the stack 54 in a cap 56 that contains a bearing 57 and carries the brushes that are enclosed by the thimbles 58. Long screws 60 are extended upwardly through aligned holes in the bottom wall of the housing 2 (within the area of the opening 51) and through the stack 54 and are threaded into the cap 56, thereby to secure the stationary elements of the motor assembly together. The armature 61 is carried by the motor shaft 62 that has its upper and lower reduced ends journaled, respectively, in the bearings 57 and 50. Below the bearing 50, the shaft has keyed or otherwise secured to it a sprocket pinion 64, about which, and the previously mentioned sprocket gear 21, is engaged a sprocket chain 65. A suitable lubricant is contained in the transmission casing 15, and above the bearings 50 and 19 and encircling the shafts journaled therein, are grease seals 67 and 68, respectively. An air impeller or fan 69 is secured to the motor shaft 62 between the armature 61 and the bottom wall of the motor housing.

In the present embodiment, wherein the sealing ring 45 is made concentric with the grinding chamber, the motor housing projects a considerable distance beyond one side of the ring, and this overhanging portion of the device is yieldingly sustained by a tubular leg 70 that is slidable in a bore 71. A pin 72, carried by the base member, extends diametrically across the bore 71 and through slots 73 in the wall of the tubular leg 70. A helical spring 74 is contained within the tubular leg and is compressed between an abutment at the lower end of the leg and said pin 72. Accordingly, said spring tends to hold the leg depressed. A pad or foot 75, desirably of resilient material, such as rubber or the like, is applied to the lower end of the leg, for contact with the bottom of the sink or other supporting surface.

Disposed over the body member or casting 3, so as to enclose the grinding chamber and motor housings, is a shell or casing 80 of sheet metal, plastic, or other suitable material. An opening in the top of the shell registers with the grinding chamber and is surrounded by a depending flange 81 that fits within a rabbeted groove on the interior of the upper end of the housing 1. At its lower end the shell or casing is provided with a flange 84 that bears on a peripheral flange 85 of the base member 10. The shell or casing is secured to said base member by screws 86 and forms a watertight enclosure protecting the motor, switch and electrical connections. A resilient band 88, of rubber or the like, surrounds the device in the region of the joint between the base

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member 10 and bottom plate 16. This band, desirably, is semi-circular in cross section and has a groove on its inner side to accommodate the flanges 84 and 85 by which the band is held in place. The band 88 not only enhances the appearance of the device by concealing the joint between the base member and the bottom plate, but serves as a bumper to protect the device and any object against which the device might accidentally be struck.

Secured to the top of the shell, by fastening means or rivets 90, is a hinge member 91, to the end portions of which is pivoted, on pins 92, an extension 93 of a closure designated, generally, by the reference numeral 95. This closure includes a ring 96, having a peripheral portion that overhangs the part of the casing or shell 80 that surrounds the top of the grinding chamber housing 1 and desirably carries a washer 97 of resilient material that engages the underlying portion of the casing or shell. This washer serves the dual purpose of better closing the joint between the casing and the closure and of preventing rattle which might result from vibration when the motor and grinding mechanism are in operation. Legs 98 depend from and are spaced apart about the ring 96 and have secured to them, by screws 99, a shallow conical baffle 100. Spokes 102 extend radially inwardly from the ring 96 and join a central hub 103 having an aperture directly above the apex of the baffle 100. Into this aperture is fitted the lower end of an elbow 105 that is carried by a hose 106. This hose, which is of suitable length, and may be of natural or synthetic rubber or other appropriate material, is equipped at its end remote from the elbow 105 with a socket (not shown) which may be of any well known type for connection to the faucet of a sink.

Electric current is supplied to the motor through a cable 110 that enters the casing or shell 80 through an aperture containing a rubber bushing 111 that seals the aperture about the cable. The circuit, indicated diagrammatically in Fig. 2, includes a switch 112 of conventional type which is biased toward open position but is closed by the depression of a button 115. This button is beneath an opening 116 in the shell or casing, and a patch of flexible material 117, such as rubber, is cemented or otherwise secured to the inside of the casing over said opening for preventing the entrance of water. A projection 118, on the underside of the closure extension 93, is so arranged as to extend through the opening 116 and, by engaging and flexing the patch 117, depress the button 115 and close the switch 112. Accordingly, when the closure is swung to open position, the switch 115 will automatically open and break the circuit to the motor.

A bail 120 is pivotally connected at its ends to the opposite sides of the shell or casing 80 by pivotal means 121, the pivotal axis being so located that when the device is suspended from the bail it will hang with the axes of the grinding chamber and motor substantially vertical. By means of the bail, the device may be readily lifted from place to place and properly positioned within a sink.

When it is desired to use the device, it is placed in a sink with the sealing ring 45 surrounding the sink outlet or drain. With a quantity of garbage or waste in the grinding chamber C, and the cable 110 connected to a source of current, as by means of the usual plug and house socket (not shown), the closure 95 may be swung over to effective position, as illustrated in Figs. 1 and 2,

to close the switch 112 and start the motor. At the same time water is supplied through the hose 106 from the sink faucet. The water impinges against the baffle 100 and is deflected thereby toward and against the peripheral wall of the grinding chamber, so as to fall upon the mass of garbage or waste in the region of the annular discharge opening between the periphery of the disk 25 and the ring 5. With the motor operating, it will drive, through the connections including the pinion 64, chain 65, and sprocket wheel 21, the disk 25. The speed of the disk will cause the garbage and waste to be thrown outwardly against the ridges or teeth of the ring 5, and to be whirled around the peripheral wall of the housing 1. During this action the abrading studs 8 will have a shredding effect upon the mass of material within the zone of said studs and as the material works down it will be further disintegrated or ground by the ridges or teeth of the ring 5. The material immediately adjacent the disk will be acted upon by the hammers 35, as the hammers are swung outwardly by centrifugal force about the pins 33. As the hammers are retarded by accumulation of material ahead of them they will swing back toward center, during all of which time the teeth 37 of the hammers will be further comminuting the material. The garbage and waste, as it is thus reduced to fine particles and fibers, will be flushed by the descending water through the narrow annular space between the periphery of the disk 25 and the ridges or teeth of the ring 5. At the same time, any shreds or fibers depending through said space will be cut into small pieces by the action of the blades 40, as their cutting portions swing outwardly under centrifugal force beneath the lower ends of the ridges or teeth 6 with a shearing action. The saturated comminuted material will flow through the slots 0 and, being confined by the sealing ring 45, will pass through the outlet of the sink and down the drain s'.

The air enclosed by the shell or casing 30 will be chilled by contact with the peripheral wall of the housing 1, it being remembered that the water is deflected by the baffle 100 against the inner surface of said wall, such water being supplied from the cold water faucet. The chilled air will settle toward the bottom of the shell or casing and, by the action of the fan 69, will be drawn in through holes 125 near the bottom of the motor housing and will be impelled upwardly by the action of the fan between and about the motor parts. Because of the fact that the motor is positioned with its shaft vertical, an upward flow of the air through the motor would result, to a certain extent, from natural thermosiphon circulation.

Having thus described my invention, what I claim is:

1. A portable garbage disposal device comprising a housing enclosing a grinding chamber and having a filling opening adjacent the top and a discharge opening at the bottom thereof, grinding mechanism arranged to comminute material placed in said chamber, an electric motor situated closely adjacent the housing and attached thereto, driving connections between the motor and grinding mechanism, the chamber being adapted to receive running water during operation of the grinding mechanism, and a sealing and support ring of resilient material attached to the housing about the discharge opening and disposed in a substantially horizontal plane, the sealing and support ring, in radial cross section, being relatively broad at top and bottom and

narrow therebetween, with the inner and outer edge portions of the bottom tapering to relatively thin flexible lips.

2. A portable garbage disposal device comprising a housing enclosing a grinding chamber and having a filling opening adjacent the top and a discharge opening at the bottom thereof, grinding mechanism arranged to comminute material placed in said chamber, an electric motor situated closely adjacent one side of the housing, driving connections between the motor and grinding mechanism, the chamber being adapted to receive running water during operation of the grinding mechanism, and a sealing ring of resilient material attached to the housing about the discharge opening and disposed in a substantial horizontal plane, said ring constituting a support for the device and adapted to be compressed under the weight thereof against the supporting surface, the sealing ring having a bottom face that is relatively broad in a radial direction and that recedes slightly from the plane of its inner and outer edges, the cross section of the ring tapering toward said edges to provide comparatively thin lips for contact with the supporting surface.

3. In a garbage disposal device, a housing enclosing a grinding chamber that is open at top and bottom, grinding mechanism disposed within the open bottom of said housing and including a vertical shaft extending downwardly therefrom, a motor housing adjacent one side of and connected to the first mentioned housing, an electric motor contained in the motor housing and arranged with its shaft vertical and with the lower end thereof in substantially the horizontal plane of the corresponding end of the former shaft, driving connections between the lower ends of the shafts, and a bottom structure applied to the lower ends of said housings and including a casing enclosing said driving connections, the bottom structure having a discharge opening communicating with the open bottom of the first mentioned housing.

4. In a garbage disposal device according to claim 3, wherein the bottom structure includes an undercut flange surrounding said discharge opening, and an elastic sealing ring having a part embracing said flange and interlocking therewith.

5. In a garbage disposal unit according to claim 3, an open bottom shell engaged over the housings and terminating at its lower end in about the plane of the joint between the housings and said bottom structure, and a bumper of elastic material surrounding the bottom of the shell and the adjacent part of the bottom structure and concealing said joint, the shell having an opening registering with the open top of the grinding chamber.

6. A portable garbage disposal device comprising a housing enclosing a grinding chamber and having a filling opening adjacent the top and a discharge opening at the bottom thereof, the longitudinal axis of the chamber being vertically disposed; grinding mechanism including a vertically disposed shaft and arranged to comminute material placed in said chamber, an electric motor situated closely adjacent one side of the housing with its shaft substantially parallel to the axis of said chamber, driving connections between the motor shaft and the shaft of the grinding mechanism, the chamber being adapted to receive running water through said filling opening during operation of the grinding mecha-

nism, a sealing ring of resilient material attached to the housing about the discharge opening and disposed in a substantially horizontal plane, said ring constituting a support for the portion of the device thereabove and adapted to be compressed under the weight thereof against a supporting surface, the portion of the device occupied by the electric motor overhanging one side of the sealing ring, and a support depending from the overhanging portion of the device for sustaining the same, said support being yielding to compensate for compression of the sealing ring and inclination of the supporting surface.

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