Dec. 15, 1959 E. E. WIECZOREK 2,917,246

DISPOSAL UNIT

Filed April 16, 1958 2 Sheets-Sheet 1

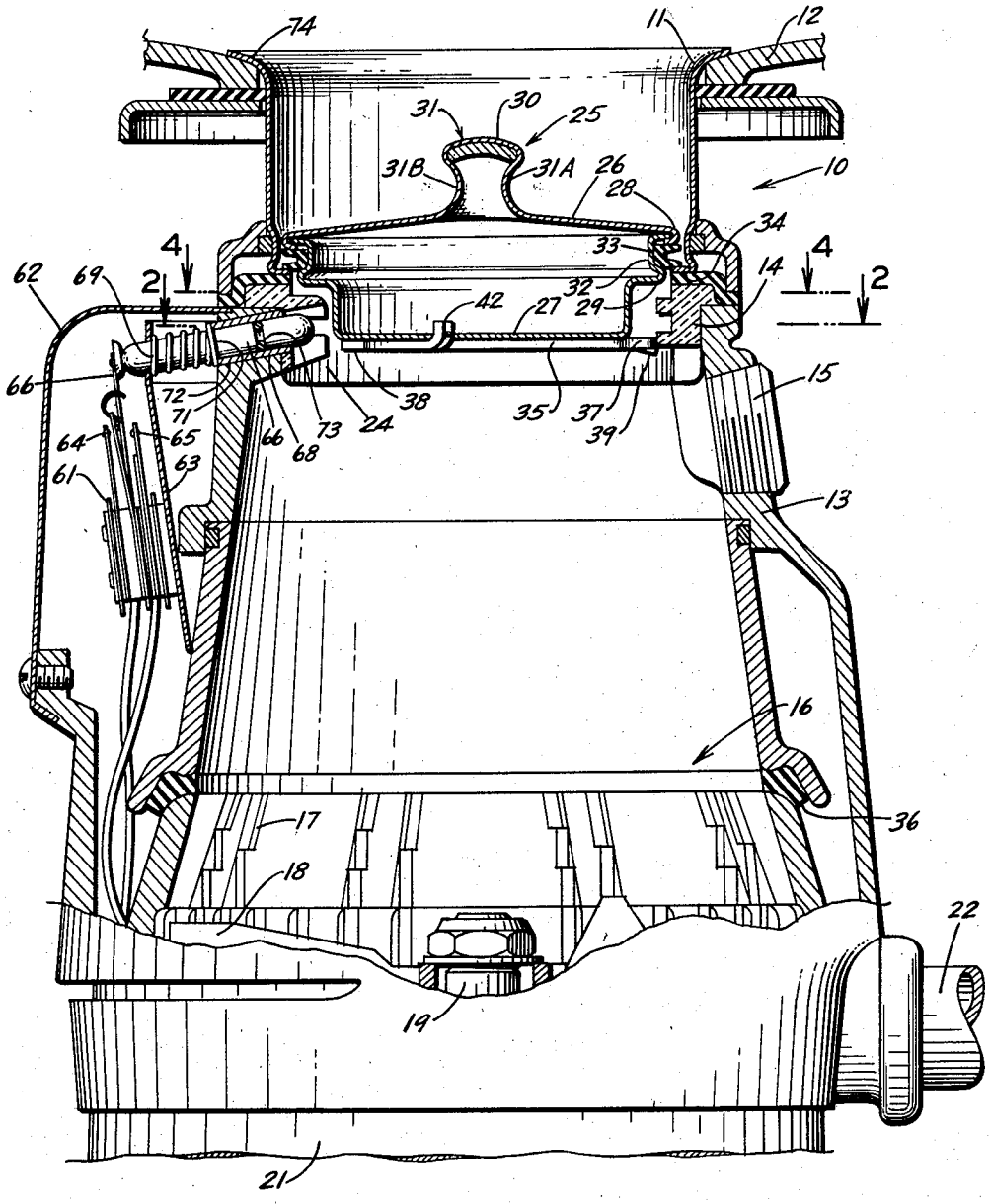


FIG. 1

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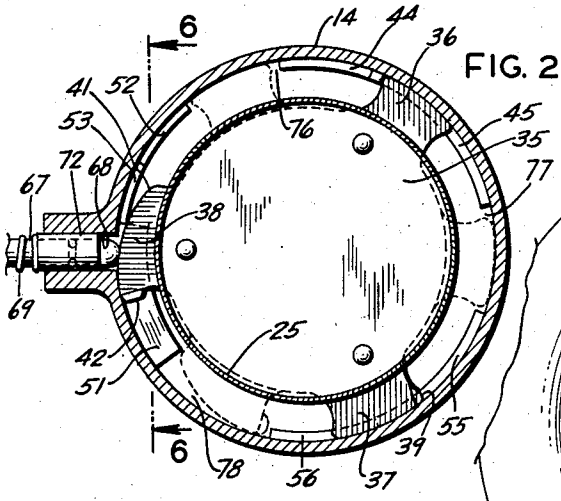


FIG. 2

FIG. 3

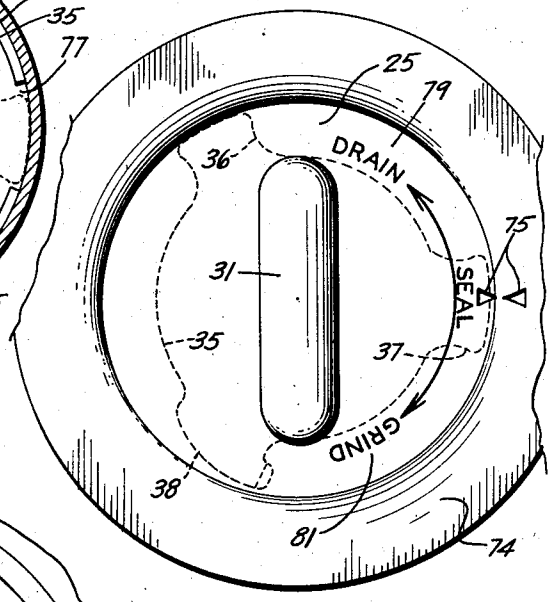


FIG. 4

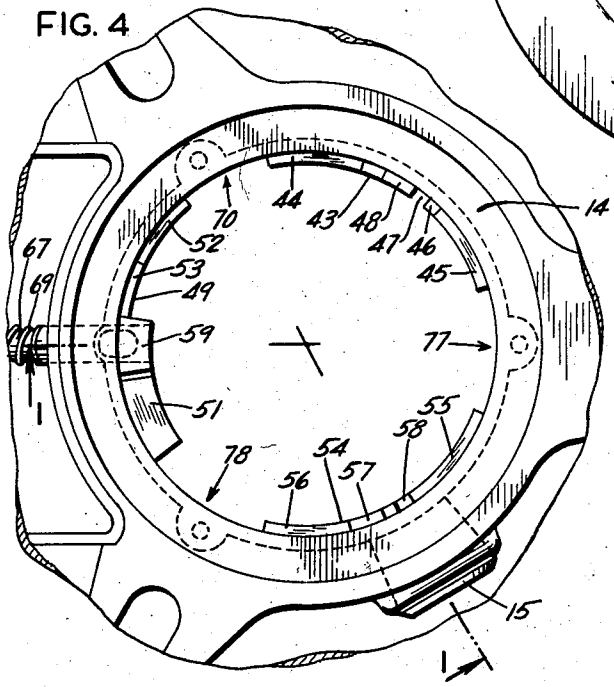
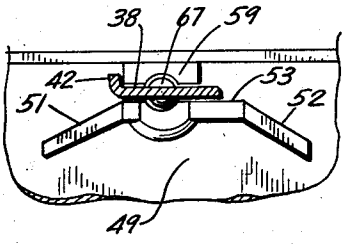


FIG. 6



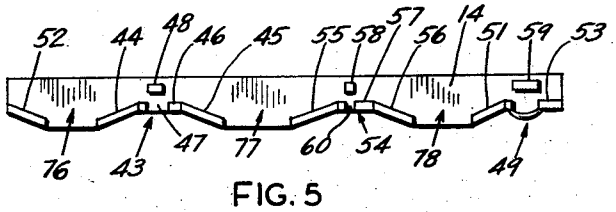


FIG. 5

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2,917,246

DISPOSAL UNIT

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Application April 16, 1958, Serial No. 728,850

4 Claims. (Cl. 241—32.5)

This invention relates to a new and improved waste disposal unit and more particularly to a combination stopper and control device for a waste disposal unit.

In any waste disposal unit, including units intended for both domestic and commercial use, it is desirable to afford a simple and convenient means for switching the unit off and on. Usually this means comprises an external electrical switch for the motor of the disposal device, since the unit is customarily mounted beneath a sink and is enclosed by a cabinet which makes access to the unit itself relatively inconvenient. For example, control switches are frequently mounted on a wall closely adjacent the sink in which the disposal unit is mounted or on the front of the sink cabinet.

A separate electrical switch of this kind, although not difficult in operation, does require that the user of the unit remember to turn the switch on and does constitute a separate operation in addition to the depositing of garbage or other waste material in the unit. In order to eliminate this additional operation and for the added convenience of the user, various devices have been proposed for automatically energizing or de-energizing the motor of the unit in accordance with the position of the stopper for the unit. In general, however, control devices of this kind have been relatively expensive and have therefore received only limited commercial acceptance. Furthermore, many such devices have presented substantial problems and disadvantages with respect to maintenance and unreliability of operation.

A primary object of the invention therefore, is to provide a new and improved control device for a waste disposal unit which operates automatically as an incident to the positioning of the stopper in the waste disposal unit.

A further object of the invention is a new and improved stopper-operated control device for a waste disposal unit which permits the use of a stopper of substantially unitary construction yet which affords maximum variability of control merely by rotation of the stopper.

A more specific object of the invention is a new and improved control device for a waste disposal unit which is actuated by means of relatively simple cam followers or lugs affixed to a stopper which may be extremely simple and inexpensive in construction.

The invention is directed to a waste disposal unit of the kind including a comminuting chamber, a throat for admitting waste into the comminuting chamber, a rotor disposed within the chamber, and an electrical motor connected to the rotor. A combination stopper and control device constructed in accordance with the invention comprises a sealing lip which is disposed within the throat of the disposal unit, and a cam member which is mounted within the throat and which is preferably axially displaced with respect to the sealing lip. The device further includes a stopper having a sealing surface for engaging the aforementioned sealing lip to close the same and thus prevent drainage of liquid from the sink in which the disposal unit is mounted. At least one, and preferably a

plurality of cam followers, are mounted on the stopper in position to engage the cam member. The cam followers and the cam member are effective to move the stopper axially of the disposal unit throat between a sealing position and an open position upon rotation of the stopper. In addition, the device includes switching means electrically connected to the motor for closing an electrical circuit to the motor in response to movement of the stopper between its sealing and open positions. Preferably, this switching means comprises an actuator which extends into the path of movement of some portion of the stopper such as one of the cam followers.

Other and further objects of the present invention will be apparent from the following description and claims and are illustrated in the accompanying drawings which, by way of illustration, show a preferred embodiment of the present invention and the principles thereof and what is now considered to be the best mode for applying those principles. Other embodiments of the invention embodying the same or equivalent principles may be used and structural changes may be made as desired by those skilled in the art without departing from the present invention.

In the drawings:

Fig. 1 is a partly sectional elevation view of a waste disposal unit including a combination stopper and control device constructed in acordance with one embodiment of the invention, the lower or motor portion of the disposal unit having been omitted from the drawing;

Fig. 2 is a sectional view of the disposal unit taken approximately along the line 2—2 in Figure 1, and shows the bottom portion of the stopper and a portion of the control device;

Fig. 3 is a plan view of the throat and stopper portions of the disposal unit;

Fig. 4 is a sectional view taken approximately along the line 4—4 in Fig. 1 with the stopper removed from the disposal unit to show the cam elements in the throat portion thereof;

Fig. 5 is a schematic, developmental diagram of the cam surfaces within the throat portion of the disposal unit, and

Fig. 6 is a detail sectional view taken approximately as indicated by line 6—6 in Fig. 2.

Fig. 1 illustrates a waste disposal unit 10 which includes a combination stopper and control device constructed in accordance with one embodiment of the invention, the details of the control and stopper apparatus being illustrated in Figs. 2 through 6. The waste disposal unit 10 includes a sink sleeve 11 which is mounted within the usual drain opening in a sink 12. The mounting of the disposal unit within the sink opening is not critical with respect to the present invention; accordingly, the structural details of the mounting arrangement have been omitted from the drawings.

The waste disposal unit 10 further includes a housing 13, usually a casting, of conventional form having an upper portion 14 which is affixed to and forms a continuation of the sleeve 11. The portion 14 may be formed integrally with the remainder of the housing 13 or may constitute a separate substantially ring-shaped member mounted on the housing. In the preferred embodiment illustrated in the drawings, the housing portion 14 comprises an injection molded nylon ring. The housing portion 14 and the sleeve 11 are sometimes referred to hereinafter as the throat of the disposal unit. The housing 13 may be provided with a water inlet opening 15 in accordance with conventional practice and encloses a comminuting chamber 16. In the lower portion of the comminuting chamber 16 there is mounted a comminuting ring or stator 17 which encompasses a rotor or com-

minuting member 18. The rotor 18 is suitably mounted upon the shaft 19 of an electrical motor, the motor being generally indicated by reference numeral 21 in Figure 1. The lower portion of the comminuting chamber 16 communicates with a discharge opening 22.

The waste disposal unit 10, as thus far described, is substantially conventional in construction and in general operates in a conventional manner. Garbage and other waste material may be deposited in the comminuting chamber 16 through the sleeve 11. Once the material is deposited within the chamber 16, water is preferably discharged into the chamber and the motor 21 is energized to rotate the comminuting member 18 within the chamber 16. The rotor 18 and the comminuting ring 17 cooperate to grind the waste material, which is subsequently flushed out and discharged through the opening 22. The flow of water into the unit may be admitted through the throat 11, 14, or through the separate inlet opening 15, depending upon the manner in which the disposal unit is installed in the sink 12.

The present invention is concerned with the combination stopper and control device 24 located at the base of the throat 11, 14 of the disposal unit. The device 24 comprises a stopper 25, the construction of which is best illustrated in Figures 1, 2 and 3.

The stopper 25 includes an upper or cap portion 26 to which a bottom portion 27 is rigidly affixed. Each of the two sections 26 and 27 of the stopper may be conveniently and inexpensively formed from sheet metal as by a drawing operation. The upper and lower portions 26 and 27 of the stopper are provided with flange portions 28 and 29 respectively, the flange 28 on the cap portion 26 may be formed into a handle 31 to afford a convenient means for grasping the stopper 25 to manipulate the stopper as described more fully hereinafter. Preferably, a relatively small reinforcing plate 30 is mounted in the top portion of the handle 31, and the sheet metal of the cap portion 26 is formed around the reinforcing plate to afford the finger grip portions 31A and 31B. The reinforcing plate 30 is highly advantageous in affording a uniform configuration and appearance in the stopper handle; it is extremely difficult to hold this portion of the stopper to close tolerances unless the reinforcing plate 30 is incorporated therein. Moreover, in many instances it may be desirable to incorporate a relatively thin gasket or a layer of mastic or other sealing material between the two halves 26 and 27 of the stopper 25, to prevent water flowing into the stopper, particularly when the stopper is subjected to substantial pressure.

The medial part of the lower stopper portion 27 is provided with a flange 32 which affords a seat for a sealing ring 33. Preferably the sealing ring 33 is formed from Neoprene synthetic rubber or from some other suitable resilient material substantially resistant to water and other fluids which might be encountered in normal use of the waste disposal unit. The ring 33 extends radially outwardly from the stopper to a limited extent. When the stopper 25 is in sealing position in the sleeve 11, as illustrated in Figure 1, the sealing ring 33 rests upon a sealing lip 34 which extends completely around the internal surface of the sleeve 11. Thus, when the stopper 25 is in the position shown in Figure 1, it effectively closes off the sleeve 11, and prevents the drainage of water or other liquid from the sink 12.

The stopper 25 further includes a cam plate 35 which is riveted, staked, or otherwise suitably affixed to the base portion 27 of the stopper. The cam plate 35 is provided with three cam follower lugs 36, 37 and 38 (see Figs. 2 and 3), which project radially outwardly from the stopper toward the inner surface of the throat portion 14 of the housing 13. Although the three cam follower lugs 36—38 are approximately equally angularly spaced with respect to each other, they are preferably somewhat different in configuration. Furthermore, it should be understood that the number of the cam follower lugs is not critical with respect to the present invention and that four or more lugs may be utilized as desired. Indeed, even one or two lugs may suffice, although at least three are preferred to afford an effective and uniform cam and support action upon rotation of the stopper as described in detail hereinafter.

The cam follower lug 36 is a simple planar radially projecting lug. The cam follower 37 is generally similar in configuration to the lug 36 but is provided with a downwardly projecting ear 39. The lug 38, on the other hand, is provided with a curved cam surface 41 which is not concentric with respect to the axis of the stopper 25. The lug 38 is also provided with an upwardly projecting ear 42 as best indicated in Figure 1.

The combination stopper and control device 24 also includes a composite cam member which cooperates with the cam followers 36, 37 and 38, and which is best illustrated in Figures 2, 4, 5 and 6. In the illustrated embodiment the cam member comprises the throat portion 14 of the disposal unit housing, and includes three separate cam elements which engage the cam followers on the stopper. The cam followers 36—38 and the cam projection portions of the throat or cam member 14 are effective to move the stopper 25 axially of the throat upon rotation of the stopper in either a clockwise or a counterclockwise direction, as explained more fully hereinafter.

As best indicated in Figures 4 and 5, a first cam element 43 extends along a minor arc of the interior of the disposal unit throat; the cam element 43 affords a pair of converging upwardly directed cam surfaces 44 and 45, which are bridged by a substantially horizontal surface 46. The surface 46 is not continuous but is provided with a relatively small gap 47. A stop member or lug 48 projects inwardly of the throat section 14 of the disposal unit housing immediately above the horizontal surface 46 of the cam element 43. Preferably, the stop member 48, like the cam element 43, is formed as an integral part of the disposal unit throat portion 14.

A second cam element 49 extends along a different arcuate portion of the interior of the disposal unit throat. Like the cam element 43, the cam element 49 affords a pair of upwardly directed converging cam surfaces 51 and 52 which are effectively bridged by a substantially horizontal surface 53. As clearly indicated in Figures 2 and 4, the cam surface 51 is preferably made somewhat wider than the cam surface 52 in order to assure positive engagement with the cam follower 38, since a portion of the cam follower 38 does not extend radially outwardly of the cam plate 35 to the same extent as the other cam followers 36 and 37.

A third cam element 54 is disposed between the cam elements 43 and 49. Like the other cam elements, the cam element 54 includes a pair of upwardly directed converging cam surfaces 55 and 56 which are interconnected by a substantially horizontal cam surface 57 having a gap 60. A stop member 58 substantially similar to the aforementioned stop member 48, may be disposed immediately above the horizontal surface 57 of the cam element 54. An additional stop element 59 is preferably located immediately above the horizontal surface 53 of the cam element 49.

The control device 24 further includes electrical switching means comprising a switch 61, which is mounted within a separate compartment 62, externally of the comminuting chamber 16 of the disposal unit. The switch 61 is of conventional construction and is supported upon a bracket 63 affixed to the housing of the disposal unit. The contacts 64 and 65 of the switch are electrically connected by suitable conductors to the disposal unit motor 21, and are mechanically connected to a control arm 66. The arm 66 in turn is engaged by an actuator member comprising a plunger 67 which extends through an aperture 68 in the throat portion 14 of the disposal unit housing.

The switch actuator 67 is shown in its normal or unactuated position in Figure 1, and is normally biased toward this position by a compression spring 69, which is disposed in encompassing relation to the actuator. One end of the spring 69 engages the bracket 63; the other end of the spring engages a washer 71 mounted in fixed position upon the actuator. A sleeve 72 is disposed within the housing aperture 68 in encompassing relation to the actuator member 67. A sealing ring 73 is preferably mounted on the actuator member in sealing engagement with that member and with the sleeve 72, to prevent any drainage of water or other fluid from the disposal unit into the compartment 62 housing the switch 61.

Operation of the combined stopper and control device 24, is extremely simple and uniform yet affords a substantial degree of flexibility with respect to switching of the waste disposal unit motor 21. Insofar as closing of the throat 11 of the disposal unit is concerned, it is only necessary to place the stopper 25 in the throat in a position in which the cam follower lugs 36, 37 and 38 are aligned with the gaps 76, 77 and 78, between the cam elements 43, 49 and 54 (see Figures 2 and 4). With the stopper aligned in this angular position with respect to the throat 11, the cam follower lugs find no support within the throat, with the result that the stopper drops into the throat until the gasket or sealing ring 33 engages the sealing lip 34 as indicated in Figure 1. Preferably, this "home" location is identified for the housewife or other user of the disposal unit by suitable markings on the stopper 25 and on the rim 74 of the disposal unit throat as indicated by the indicia 75 in Figure 3.

When it is desired to drain water or other liquid from the sink 12 without removing the stopper 25 from the disposal unit throat, it is only necessary to turn the stopper in a counter clockwise direction as indicated by the legend 79 in Figure 3. When this is done, the cam followers 36, 37 and 38 ride upwardly upon the inclined surfaces 52, 45 and 56 respectively, and thus move the stopper 25 axially of the throat 11 to a non-sealing or "open" position in which the stopper is elevated above the sealing lip 34. The upward movement of the stopper permits water and other liquid material to flow around the stopper and into the comminuting chamber 16, the liquid being discharged from the disposal unit through the outlet opening 22. Movement of the stopper 25 in a counter clockwise direction is limited by the ear 39 on the cam follower 37 dropping into the slot 47 in the cam element 43. The slot 47 is located in a position such that counter clockwise movement of the stopper is arrested before the cam follower 36 engages the switch actuator 67; thus, the stopper is not effective to actuate the switch 61 when moved in a counter clockwise direction. The stop members 48, 58 and 59, engage the upper surfaces of the cam followers to hold the stopper in its open position.

Actuation of the switch 61 is effectively achieved by rotation of the stopper 25 in a clockwise direction as indicated by the legend 81 in Figure 3. When the stopper is rotated in this direction from its "home" location to the position shown in Fig. 2, the cam follower lugs 36, 37 and 38 ride upwardly on the cam surfaces 44, 55 and 51 respectively. Consequently, the peripheral cam surface 41 of the lug 38 is brought into engagement with the end of the switch actuator 67, and drives the switch actuator outwardly through the aperture 68 as seen in Figure 1. The outward movement of the switch actuator effectively changes the operating condition of the switch contacts 64 and 65 and, in the illustrated embodiment, closes the electrical operating circuit of the motor 21. By thus energizing the motor 21, the waste disposal unit 10 is activated to grind and dispose of whatever waste material has been deposited in the comminuting chamber 16.

Excessive movement in the clockwise direction is prevented by engagement of the ear 42 on the cam follower lug 38 with the stop member 59 as indicated in Figure 6. Return movement of the stopper to the "home" position shown in Fig. 3 and indicated in phantom outline in Fig. 2 releases the lug 38 from engagement with the actuator 67, permitting the actuator to return to its normal position (Fig. 1) under the biasing effect of the spring 69 and thus opening the switch 61.

The embodiment of the invention described hereinabove is specifically adapted to a waste disposal unit in which a grinding operation is effected only when the stopper 25 is in place. Thus, the switch 61 is actuated only when the stopper is turned to the "grind" position as illustrated in Fig. 2. In this position the stopper is open and permits the flow of water into the waste disposal unit to assist in the grinding operation and to flush the ground waste material from the comminuting chamber 16 of the unit. It is not possible, however, to introduce additional waste material into the comminuting chamber during the course of the grinding operation, since the stopper 25 still prevents the admission of solid materials into the disposal unit. An arrangement of this kind is desirable in many domestic installations since it positively prevents any injury to the user from chips or other small particles which might otherwise be impelled outwardly of the waste disposal unit during the grinding operation.

From the foregoing description it is apparent that the combination stopper and control device of the invention is relatively simple and inexpensive in construction, and therefore highly advantageous in an economic sense, as compared with previously known devices which afford similar control functions. By the same token, the simplicity of construction of the device substantially minimizes maintenance and operational difficulties. The cam plate 35 is easily and economically formed from sheet metal by a simple punching operation. The switch and switch actuator are correspondingly simple and economical in construction and do not require any complex rotating parts or other members which may give rise to maintenance and other operational difficulties. The stopper 25, with its unitary sheet metal construction, is also considerably less expensive to manufacture than other comparable devices.

While preferred embodiments of the invention have been described and illustrated, it is to be understood that these are capable of variation and modification.

I claim:

1. In a waste disposal unit of the kind having a comminuting chamber, a throat for admitting waste into said comminuting chamber, a motor, and a comminuting member disposed within said chamber and driven by said motor, a combination stopper and control device comprising: a sealing lip projecting inwardly of said throat; a cam member mounted within said throat in axially displaced relation to said sealing lip; a stopper having a sealing surface for engaging said sealing lip to seal said throat; a plurality of cam followers comprising lugs mounted on said stopper and projecting radially thereof in position to engage said cam member, said cam followers and said cam member being effective to move said stopper axially of said throat between a sealing position and two different partially open positions with respect to said sealing lip upon rotation of said stopper through a minor arc; retaining means, comprising at least one member mounted on said cam member, for frictionally engaging the upper surface of at least one of said lugs to maintain said stopper in at least one of said open positions and prevent dislodgement of said stopper in response to water flowing around said stopper or vibration of said disposal unit; and switching means, electrically connected to said motor, including an actuator member extending into the path of movement of one of said cam followers, for closing an electrical circuit to said motor in response to movement of said stopper to one of said open positions.

2. A waste disposal unit as set forth in claim 1 in which said stopper comprises a pair of complementary cup-shaped sheet metal shells affixed to each other and a sealing ring mounted upon one of said shells to afford a sealing surface for engaging said sealing lip to seal said throat.

3. In a waste disposal unit of the kind having a comminuting chamber, a throat for admitting waste into said comminuting chamber, a motor, and a comminuting member disposed within said chamber and driven by said motor, a combination stopper and control device comprising: a sealing lip comprising a shoulder formed integrally with and projecting inwardly of said throat; a cam member comprising a plurality of cam elements and a plurality of retainer elements formed integrally with and projecting inwardly of said throat; a stopper having a sealing surface for engaging said sealing lip to seal said throat and having a projection extending radially therefrom; a plurality of cam followers mounted on said stopper in position to engage said cam elements, said cam followers and said cam elements being effective to move said stopper from a sealing position in contact with said sealing lip to either one of two open positions axially displaced from said sealing lip upon rotation of said stopper in opposite directions from a given angular alignment with respect to said throat, said retainer elements being positioned to contact said followers in frictional engagement to releasably hold said stopper in either of said open positions and prevent movement of said stopper caused by water flowing around said stopper or by vibration of said disposal unit; and switching means, electrically connected to said motor, including an actuator member extending into the path of movement of said stopper projection, for opening or closing an electrical circuit to said motor in response to movement of said stopper between said sealing and a selected one of said open positions.

4. In a waste disposal unit of the kind having a comminuting chamber, a throat for admitting waste into said comminuting chamber, a motor, and a comminuting member disposed within said chamber and driven by said motor, a combination stopper and control device comprising: a sealing lip projecting inwardly of said throat; a cam member mounted within said throat in axially displaced relation to said sealing lip and comprising three inwardly-projecting cam surfaces of inverted V-shaped configuration; a stopper having a sealing surface for engaging said sealing lip to seal said throat; three cam followers mounted on said stopper in position to engage said cam member, said cam followers and said cam member being effective to lift said stopper from a sealing position to a first open position upon rotation of said stopper in a clockwise direction with respect to a given home location and to a second open position in response to rotation of said stopper in a counter clockwise direction; retaining means, comprising at least one member mounted on said cam member, for frictionally engaging the upper surface of at least one of said lugs to maintain said stopper in at least one of said open positions and prevent dislodgement of said stopper in response to water flowing around said stopper or vibration of said disposal unit; and switching means, electrically connected to said motor, including an actuator member extending through said throat into the path of movement of a portion of said stopper for opening or closing an electrical circuit to said motor in response to movement of said stopper to only one of said open positions.

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