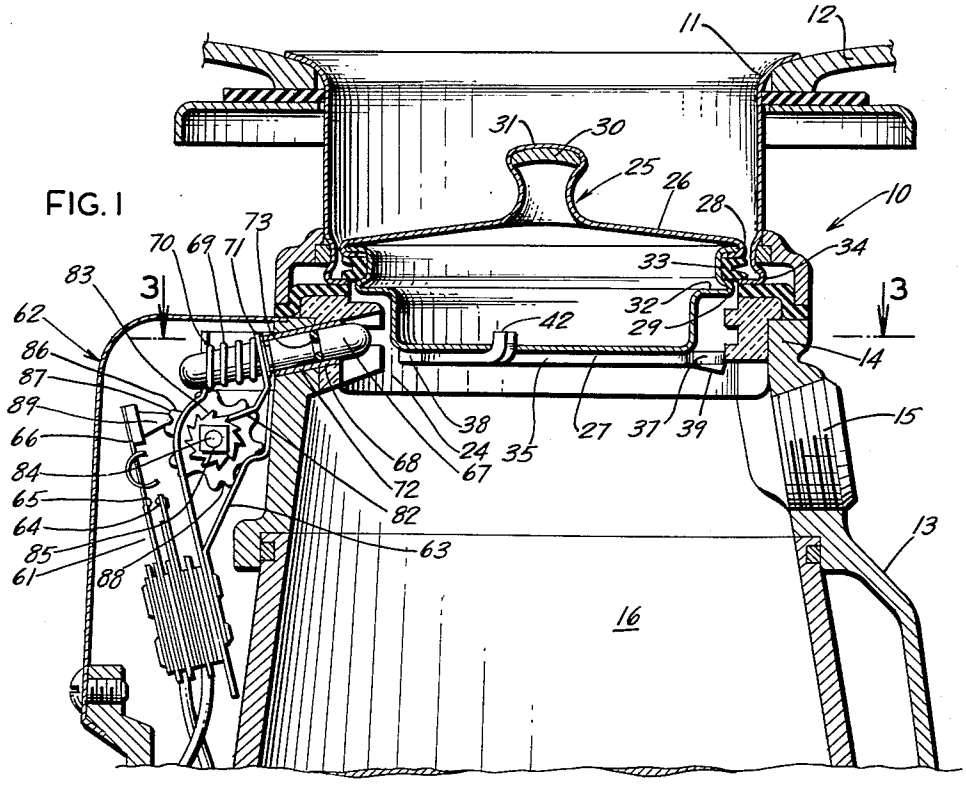
Nov. 22, 1960 E. E. WIECZOREK ET AL 2,961,172

CONTROL DEVICE FOR DISPOSAL UNIT - PROGRAMMED SWITCH

Filed July 25, 1958

FIG. 1



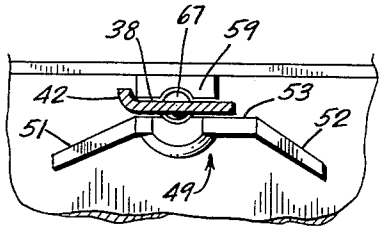


FIG. 2

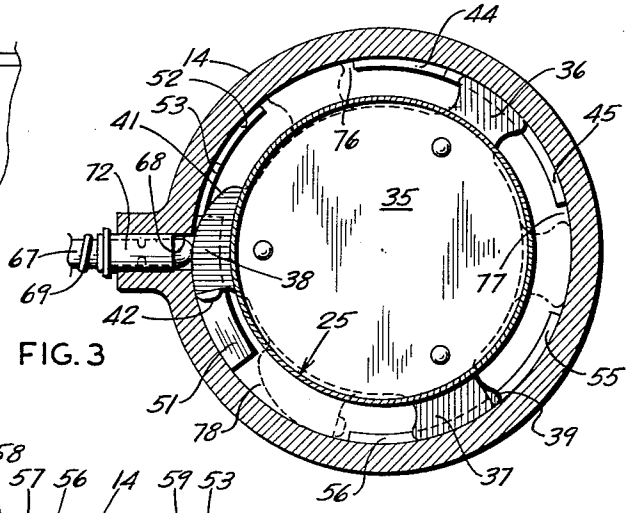
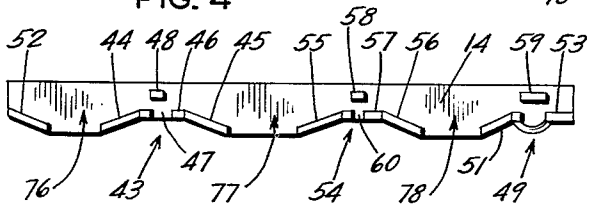


FIG. 3

FIG. 4



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CONTROL DEVICE FOR DISPOSAL UNIT-PROGRAMMED SWITCH

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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.

One device of this kind, which affords substantial operating and maintenance advantages as compared with previously known devices, is described and claimed in the co-pending application of E. E. Wieczorek, Serial No. 728,850, filed Apr. 16, 1958, now Patent No. 2,917,-246. The device described therein utilizes a simple two-part stopper and a cam control for the motor of the disposal unit, the cam control being arranged to afford drain, seal, and grind conditioning of the disposal unit merely by rotation of the stopper.

The Wieczorek device, in common with other prior art devices, conditions the disposal unit for batch-type operation. That is, the disposal unit is closed, insofar as admission of non-liquid waste is concerned, during the grinding operation; thus, the unit cannot conveniently be utilized for continuous feed operations. On the other handn, previously known arrangements suitable for continuous feed operation have not included any provision for stopper control.

A primary object of the invention, therefore, is a new and improved stopper-actuated control device for a waste disposal unit which is adapted to either batch or continuous feed operation.

A more specific object of the invention is a new and improved stopper-actuated control device for a disposal unit, in which the stopper is of simple, economical construction yet which provides for control of the disposal unit in accordance with a predetermined control program.

A further object of the invention is to combine the attributes of batch and continuous feed operation in a single disposal unit control device which is simple and economical in construction and which affords little or no maintenance difficulty.

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 the 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 fragmentary sectional elevation view of a disposal unit and a control device constructed in accordance with a preferred embodiment of the invention;

Fig. 2 is a detail sectional view of the switch actuator of the control device;

Fig. 3 is a sectional view taken approximately as indicated by line 3—3 in Fig. 1; and

Fig. 4 is a schematic developmental view of the surfaces within the throat portion of the disposal unit.

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 4. 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 which encompasses a rotor or comminuting member. The rotor is driven by an electrical motor. The motor rotor and comminuting ring are of conventional construction and have not been illustrated in the drawing.

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 electrical motor is energized to rotate the rotor. The rotor and the comminuting ring cooperate to grind the waste material, which is subsequently flushed out and discharged from the chamber through a suitable drain opening (not shown). 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 and particularly with a specific switching arrangement therefor. The device 24 comprises a stopper 25, the construction of which is best illustrated in Figures 1 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 being reversely bent and clinched over the flange 29. The central part of 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. A reinforcing plate 30 may be provided in the handle 31 of the stopper.

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 to 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 ears 42 as best indicated in Figures 1 and 2.

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, 3 and 4. In the illustrated embodiment the cam members 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 counterclockwise direction, as explained more fully hereinafter.

As best indicated in Figures 3 and 4, 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 motor of the disposal, and are mechanically connected to a control arm 66.

The switch mechanism also includes an actuator 67, shown in its normal or unactuated position in Figure 1. The actuator 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 an ear 70 on 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.

The switch actuator 67 is provided with an arm or pawl 82, which is mounted on the actuator and extends downwardly from the actuator toward engagement with a ratchet wheel 83 disposed within the switch enclosure 62. The ratchet wheel 83 is mounted upon a shaft 84, rotatably supported on a bracket 85, and a cam wheel 86 is also affixed to the shaft. The cam wheel 86 affords a series of projections 87, which are separated from each other by depressions or pockets 88. The cam wheel is aligned with an operating element 89, which is mounted on the operating arm 66 of 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 of the disposal unit sleeve 11.

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 viewed from the top of the unit. 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 viewed from the top. When the stopper is rotated in this direction from its "home" location to the position shown in Figure 3, 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 (see 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 disposal unit motor. Thus, the waste disposal unit 10 is activated to grind and dispose of whatever waste material has been deposited in the comminuting chamber 16. At the same time, the stopper is elevated, permitting the flow of water into the 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 2. Return movement of the stopper to the "home" position shown in Figure 1 and indicated in phantom outline in Figure 3 releases the lug 38 from engagement with the actuator 67, permitting the actuator to return to its normal position (Figure 1) under the biasing effect of the spring 69. The actuator member 67 operates on the switch 61 only through the medium of the mechanical connection afforded by the arm 82, the ratchet wheel 83 and the cam wheel 86. When the actuator 67 is moved outwardly of the aperture 68 by engagement with the ear 42 on the cam follower lug 38, the arm 82 moves the ratchet 83 through a relatively short arc in a counter clockwise direction. This movement of the ratchet wheel causes a corresponding rotation of the cam wheel 86. Assuming that the member 89 is in engagement with one of the projection 87 at the start of a given operating cycle, it is seen that the counter clockwise rotation of the cam wheel 86 disengages the member 89 from the projection 87 and permits the arm 66 to move to the right, as seen in Figure 1, moving the member 89 into one of the depressions 88. Subsequent disengagement of the actuator from the cam on the stopper does not change this condition but simply causes the arm 82 to move into engagement with the next subsequent tooth on the ratchet wheel 83.

On the next movement of the actuator 67, the same operation takes place except that the element 89 is moved outwardly from the depression 88 and is again engaged by one of the projections 87 on the cam wheel 86. Accordingly, the switch 61 is effectively programmed by the cam wheel 86, and changes its operating condition only on alternate operations of the actuator 67. This programmed switching arrangement is especially advantageous in a batch-type operation of the disposal unit, in which a substantial quantity of waste material is deposited in the disposal unit and operation is initiated with the stopper in the switch engaging or "grind" position. If it is desired to add additional waste material toward the end of the grinding operation, this may be accomplished simply by removing the stopper, adding the material through the throat 11, and replacing the stopper, since removal of the stopper does not shut off the motor. The motor is subsequently shut off by again turning the stopper to the switch engaging position. In this manner, the switch apparatus 24 effectively conditions the disposal for either batch or continuous operation, depending upon the requirements of the user.

Hence, while the preferred embodiment of the invention has been illustrated and described, it is to be understood that this is capable of variation and modification.

We claim:

1. In a waste disposal unit of the kind having a comminuting chamber, a throat for admitting waste into said comminuting chamber, and electrical drive means for a comminuting member disposed within said chamber, a combination stopper and control device permitting either batch or continuous operation and comprising: a sealing lip disposed within said throat; a cam member mounted within said throat; a stopper having a sealing surface for engaging said sealing lip to seal said throat; a cam follower mounted on said stopper in position to engage said cam member, said cam follower and said cam member being effective to move said stopper axially of said throat between a sealing position and an open position with respect to said sealing lip upon rotation of said stopper; a switch, electrically connected to said drive means; an actuator member extending into the path of movement of a portion of said stopper and actuatable thereby in one direction; and means mounted between said actuator and switch and operatively connected thereto in position to actuate said switch between open and closed position only on alternate actuations of said actuator in said one direction.

2. In a waste disposal unit of the kind having a comminuting chamber, a throat for admitting waste into said comminuting chamber, and electrical drive means for a comminuting member disposed within said chamber, a combination stopper and control device permitting either batch or continuous operation and comprising: a sealing lip disposed within said throat; a cam member mounted within said throat; a stopper having a sealing surface for engaging said sealing lip to seal said throat; a cam follower mounted on said stopper in position to engage said cam member, said cam follower and said cam member being effective to move said stopper axially of said throat between a sealing position and an open position with respect to said sealing lip upon rotation of said stopper; a switch, electrically connected to said drive means; an actuator member extending into the path of movement of a portion of said stopper; and means for mechanically connecting said actuator to said switch for actuating said switch to open or closed condition in response to movement of said stopper to one of said sealing and open positions in engagement with said actuator and for maintaining said switch in said condition until said stopper is disengaged from and subsequently reengaged with said actuator, said connecting means including a ratchet mechanism connected

to said actuator and a programming device connecting said ratchet mechanism to said switch.

3. In a waste disposal unit of the kind having a comminuting chamber, a throat for admitting waste into said comminuting chamber, and electrical drive means for a comminuting member disposed within said chamber, and a combination stopper and control device permitting either batch or continuous operation and comprising: a sealing lip disposed within said throat; a cam member mounted within said throat; a stopper having a sealing surface for engaging said sealing lip to seal said throat; a cam follower mounted on said stopper in position to engage said cam member, said cam follower and said cam member being effective to move said stopper axially of said throat between a sealing position and an open position with respect to said sealing lip upon rotation of said stopper; a switch, electrically connected to said drive means and having an operating arm movable between a first position and a second position to open and close the switch; an actuator member extending into the path of movement of a portion of said stopper for engagement therewith upon movement of said stopper to said open position, said actuator member having a pawl mounted thereon; a ratchet wheel disposed in engagement with said pawl for rotational movement in response to movement of said pawl; and a cam wheel mechanically connected to said ratchet wheel for rotation therewith and affording alternate projection and depression portions engageable with said operating arm to move said arm between its first and second positions in response to engagement of said actuator member by said stopper and to maintain said arm in a given position after each such engagement of said actuator member until the next subsequent engagement thereof.

4. In a waste disposal unit of the kind having a comminuting chamber, a throat for admitting waste into said comminuting chamber, and electrical drive means for a comminuting member disposed within said chamber, a combination stopper and control device comprising: a stopper; means for mounting said stopper within said throat for rotational movement between a first position, in which said stopper seals said throat from said chamber and in which said stopper may be removed from said throat, and a second position in which said throat is partially open to receive water and said stopper is held within said throat; a lug projecting from said stopper; an actuator member mounted in said throat in position to be actuated by said lug when said lug is disposed in said second position; a switch, electrically connected to said drive means; and a mechanical linkage connected to said actuator and to said switch in position to actuate said switch between open and closed position upon movement of said linkage through a complete predetermined path of movement, said linkage being movable by said actuator through one-half of said path of movement upon each actuation of said actuator by said lug.

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