

Dec. 29, 1953

H. JORDAN

2,664,247

WASTE DISPOSAL DEVICE

Filed Dec. 20, 1947

2 Sheets-Sheet 1

Fig. 1.

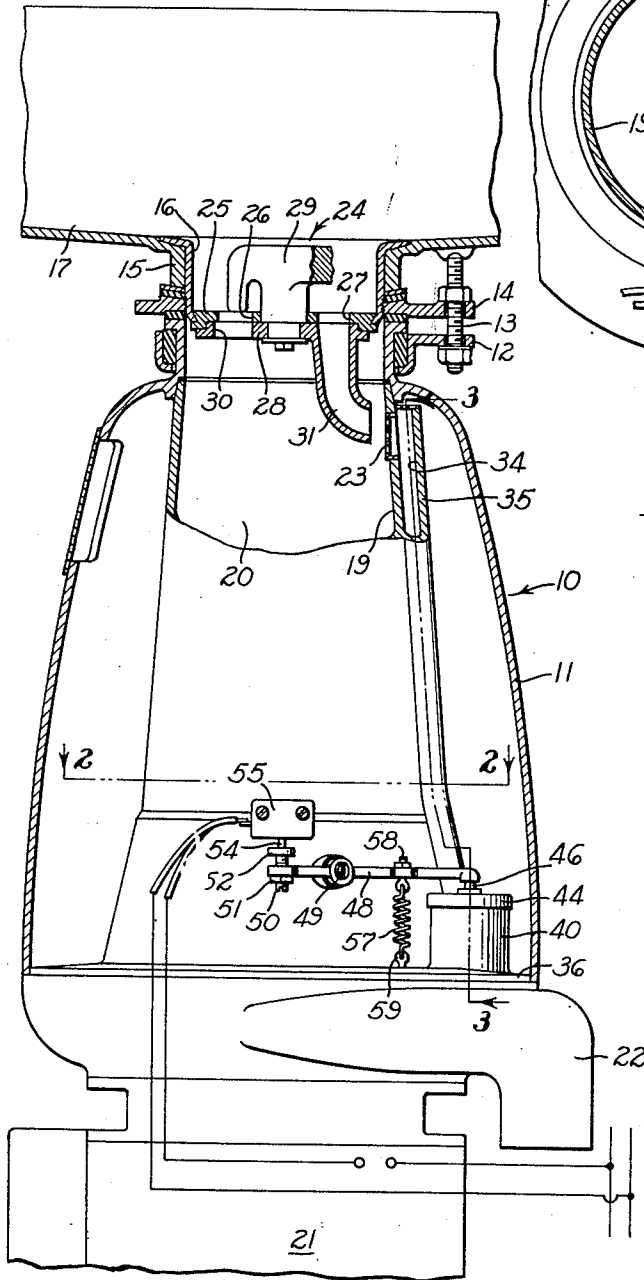


Fig. 2.

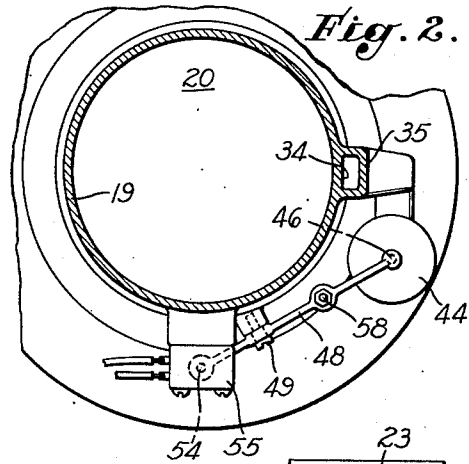
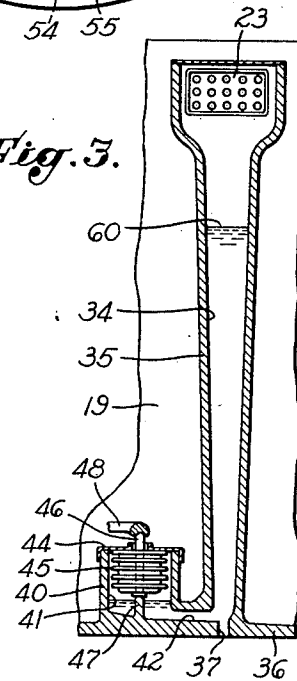
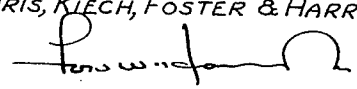


Fig. 3.



INVENTOR.
HANS JORDAN
BY HIS ATTORNEYS.
HARRIS, KIECH, FOSTER & HARRIS
BY 

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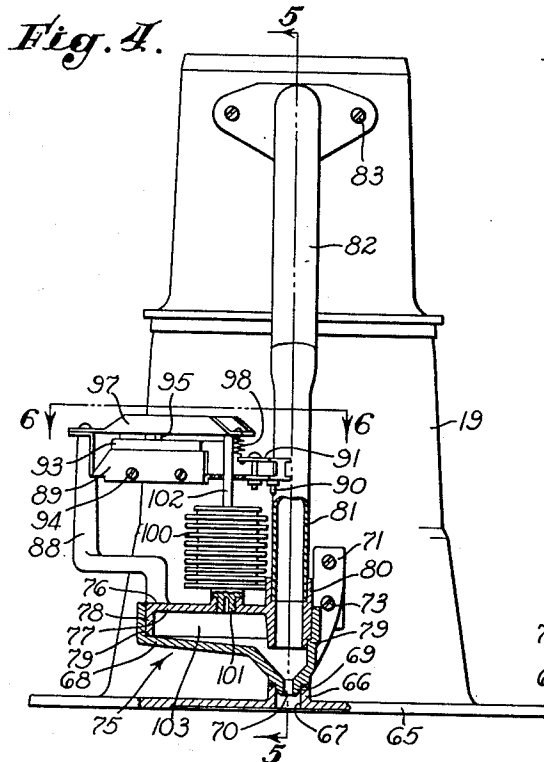
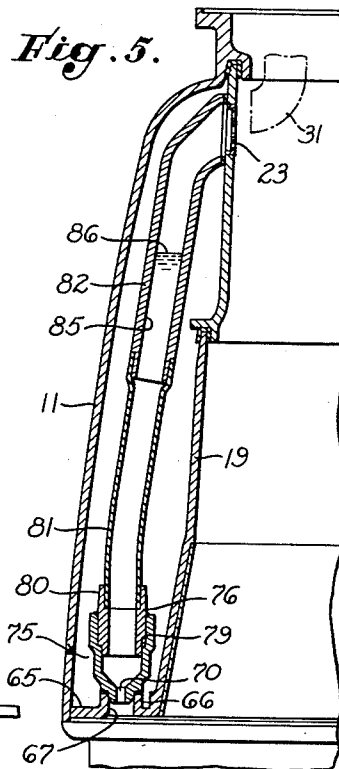
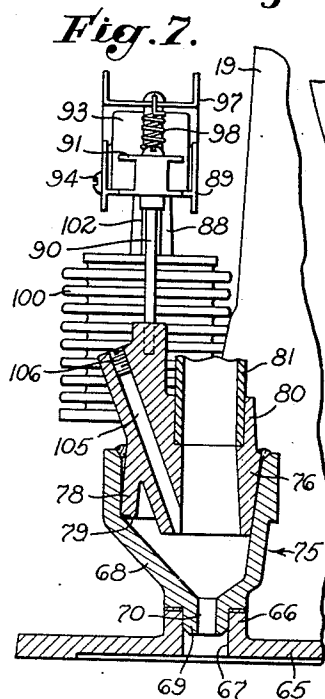
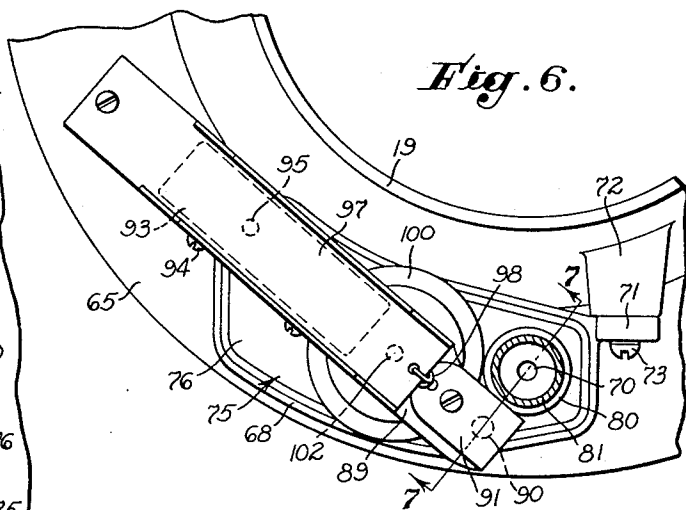
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2 Sheets-Sheet 2



INVENTOR.
HANS JORDAN
BY HIS ATTORNEYS.
HARRIS, KIECH, FOSTER & HARRIS
By *[Signature]*

UNITED STATES PATENT OFFICE

2,664,247

WASTE DISPOSAL DEVICE

Hans Jordan, Los Angeles, Calif., assignor, by
mesne assignments, to Given Machinery Com-
pany, Los Angeles, Calif., a copartnership

Application December 20, 1947, Serial No. 792,953

21 Claims. (Cl. 241—36)

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My invention relates to waste disposal devices of the type adapted for use in connection with conventional household sinks for comminuting waste material by electric comminution means. Specifically, the invention pertains to an electric switch mechanism for controlling the operation of the comminution means, said switch mechanism being actuated in a novel manner by a flow of the flushing liquid from the sink.

The present invention relates to control means for use in comminuting or waste disposal devices of the general type disclosed in my copending applications Serial No. 639,753 filed January 8, 1946, now Patent No. 2,442,812, and Serial No. 730,482 filed February 24, 1947. Waste disposal units of this type require a flow of water or other flushing liquid to the comminuting means during the operation thereof and it is desirable that the operation of the comminuting means be automatically started in response to the flow of the flushing liquid through the disposal device in order to prevent packing and jamming of the unit, which frequently results if the comminuting means is operated in the absence of a liquid flow. It is a primary object of my invention, therefore, to provide a waste disposal device in which the operation of the comminuting means is set in motion by the flow of liquid through the device and, conversely, is arrested at any time that the water or other flushing fluid ceases to enter the disposal device.

In the present invention, the foregoing object is accomplished by the use of a pressure-operated device, such as a bellows, which is actuated in response to the pressure of a head of the flushing liquid and adapted to actuate an electrical switch mechanism for controlling the energization of the electric motor for the comminuting device.

A further object of my invention is to provide a bellows-operated switch-actuating mechanism which is isolated and insulated from the comminuting chamber and reservoir into which an auxiliary flow of the flushing liquid is directed, the bellows itself being compressed or expanded in response to variations in air pressure, in an area adjacent the bellows, the air pressure varying in proportion to a variable head of the flushing liquid. By this provision, only the air contacts the bellows and the flushing liquid, while controlling the actuation of the switch means, never contacts the bellows. Thus, the bellows remains uncontaminated by dirt and waste material and remains stable in operation at any initial setting thereof.

A further object of the invention is to provide

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in such a switch mechanism, controlled by the flushing liquid, adjusting means capable of adjusting with precision the extent of movement of the bellows necessary to initially actuate the switch so that said switch may be accurately set to close in response to a very limited flow of the flushing fluid from the sink into the comminuting chamber of the waste disposal unit, the switch then remaining closed in response to a small flow of the fluid. By this provision, the possibility of waste material entering and compacting in the comminuting chamber, when the comminuting means is inoperative, is entirely avoided and the device is thus rendered more efficient in use. Moreover, since the operation of the bellows is controlled by a head of the flushing fluid which diminishes at a relatively slow rate after the flow of the fluid is shut off, the switch will remain closed and the operating motor will thus remain energized for a predetermined period of time after the flow of fluid is reduced to a minimum, or completely arrested, so that all waste material remaining in the chamber will be comminuted and disposed of. This constitutes an improvement over previous devices of a similar nature in which the comminuting means remains operative only when a relatively large volume flow of the flushing fluid is maintained, and in which the comminuting means may become inoperative even though waste material remains in the comminuting chamber.

A further object of the invention is to provide a waste disposal device having a control means for controlling the operation of the comminuting means which is extremely simple in construction and positive in action and one which will function over a long period of time without servicing.

Further objects of my invention will be apparent from the following specification and from the drawing, which is intended for the purpose of illustration only, and in which:

Fig. 1 is a part-sectional side elevational view of a waste-disposal device embodying my improved control means;

Fig. 2 is a cross-sectional view taken on line 2—2 of Fig. 1;

Fig. 3 is a vertical sectional view, taken on line 3—3 of Fig. 1;

Fig. 4 is a side elevational view of the housing of the waste-disposal device, illustrating a control means of modified construction, certain parts being shown in section to disclose the internal structure of the control means;

Fig. 5 is a vertical sectional view, taken on line 5—5 of Fig. 4;

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Fig. 6 is an enlarged sectional plan view, taken on line 6—6 of Fig. 4; and

Fig. 7 is a vertical sectional view, taken on line 7—7 of Fig. 6.

Referring to the drawing in detail, in Fig. 1 is shown a waste disposal unit 10 of the same general character as the unit disclosed in my prior patent applications, referred to previously and to which reference is made for a detailed description of the waste-comminuting means, the driving means and the water flow control means. Suffice it to state that the unit 10 includes a housing 11, the upper flanged end 12 of which is secured by bolts 13 to a ring 14 mounted against the lower end of an annular flange 15 defining the discharge opening 16 in the bottom of a conventional kitchen sink 17. The housing 11 has an inner annular wall 19 which provides a central comminuting chamber or hopper 20 in which rotary comminuting means, of the type disclosed in my prior applications, is disposed. The comminuting means is adapted to be operated by an electric motor 21 secured to the lower end of the housing 11.

Waste material may be inserted in the comminuting chamber 20 through the open upper end thereof and during the comminuting of the waste material, water flowing into the sink 17 from the usual tap (not shown), also flows downwardly into the hopper to flush away the particles of waste material reduced in the chamber, the material in suspension then passing outwardly through a discharge pipe 22 which may be connected to the usual conduit leading to a sewer or the like.

Disposed in the opening 16 of the sink 17 is a stopper device 24 which may be of a type shown in my prior applications and therefore not described in detail herein. The stopper device 24 includes a stationary seat element 25 having holes 26 and 27 therein through which flushing water may pass, and a rotary element 28 rotatable on the seat element 25 and provided with a handle 29. The element 28 has an opening 30 adapted to register with the opening 26 when the element 28 is rotated to one position so as to allow the flushing water to flow into the comminuting chamber 20. The element 28 also has a curved spout 31 which is adapted, upon rotation of the element 28 to register with the opening 27 to cause some of the flushing water to be directed laterally through a screened port 23 in the side of the inner annular wall 19 of the housing 11. The port 23 communicates with a substantially vertical reservoir 34 defined by the wall 19 and a wall 35, formed integral with and extending downwardly along the side of the wall 19 to the bottom wall 36 of the housing 11. The reservoir 34 communicates with the interior of the discharge pipe 22 by means of a restricted passage or bleeder hole 37 (Fig. 3).

As in the waste-disposal units shown in my prior applications, it is desirable that the operation of the comminuting means be controlled by the passage of flushing water from the sink into the comminuting hopper. That is to say, during or following the insertion of the waste material into the comminution hopper 20, it is necessary to supply flushing water to the hopper for the purpose of flushing away the reduced particles of the waste material from the hopper, otherwise the particles might be compacted within the hopper to impair further operation of the comminuting means. In my prior devices, the operation of the comminuting means was ini-

tiated only after a relatively large quantity of liquid had flowed into the device. In other words, the comminuting operation was not started until after the liquid flow had been established for quite some time and had accumulated both in the comminuting hopper and in a float chamber or other receptacle where it actuated means for operating the motor switch. It is apparent, therefore, that considerable delay or time lag took place between the starting of the water flow and the actual starting of the comminuting operation. As previously explained, it is an important object of my present invention to provide a waste-disposal device which is more efficient than previous devices of similar types in that the comminuting mechanism is set in motion immediately following the start of flow of the flushing liquid. This object is accomplished by providing means, to be next described, which is operable, in response to the initial flow of flushing water into the device, to close the motor switch and thus effect operation of the comminuting means.

Referring particularly to Fig. 3, the wall 35 is extended laterally at the lower end of the vertical reservoir 34 to provide a boss 40 which is cored out to provide a cylindrical pressure chamber 41 and an opening 42 communicating between the chamber 41 and reservoir 34. Disposed in the pressure chamber 41 and retained in place by a suitable cap 44 is a bellows element 45 arranged with its axis vertical and having a spindle or stem 46 projecting upwardly through a central hole in the cap. When the bellows element 45 is contracted in length due to pressure within the chamber 41, its spindle 46 is projected upwardly and extension of the bellows element is limited by the engagement of the lower end of the element, or its spindle, with a lug 47 within the chamber 41.

The upper end of the bellows spindle 46 engages beneath one end of a switch-actuating lever 48 which is pivoted on a stud 49 screwed into a boss on the side of the circular wall 19. The opposite end of the lever 48 carried a headed screw 50 which is adjustably screwed through a tapped hole in the lever and retained in adjusted position by means of a lock nut 51. The head 52 of the screw 50 is adapted to engage the depending actuating plunger 54 of an electric switch attached to the side of the wall 19. The lever 48 is normally pivoted in a direction to cause the screw head 52 to force the plunger 54 upwardly, so as to maintain the switch 55 open, by means of a tension spring 57 having one end connected to an eye-bolt 58 carried by the lever and its other end connected to an eye-screw 59 screwed into the bottom wall of the housing 11. The switch 55 is connected in series with the electric motor 21 as indicated in Fig. 1.

As in the disposal units disclosed in my prior applications, the stopper element 28 can be rotated to a position to prevent flow of any water through the drain opening 16 so as to permit filling the sink compartment. The stopper element 28 can also be rotated to a second position wherein an opening (not shown) in the stopper element 28 is aligned with the opening 26 and the spout 31 is rotated out of alignment with the screened port 23. With the stopper element 28 adjusted to this second position, water present in the sink, or running from the tap, can flow down through the comminuting hopper 20 but since the spout 31 and port 23 are misaligned, no water will be directed through the port into the

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reservoir 34 and the electric motor 21 will remain de-energized.

To operate the disposal unit to process and flush away waste material, such as scraps of waste food removed from dishes, it is only necessary to rotate the stopper element 28 to the position shown in Fig. 1. Such rotation of the element 28 aligns its opening 30 with the opening 26 of the stationary seat element 25 so that the waste material and flushing water, flowing from the tap, can descend into the comminuting hopper 20. Since the spout 31 is now aligned with the port 23, some of the flushing water is directed through the port and into the vertical reservoir 34 where it accumulates to build up a head or column of the water as indicated at 60 in Fig. 3. Because the reservoir 34 is of comparatively small size in cross-section, the water head 60 is produced quickly, it being noted that the flow or "bleed" of the water from the reservoir through the bleed opening 37 is small when compared to the ingress of water at the upper end of the reservoir.

Referring to Fig. 3, it will be observed that when a head or column 60 of water builds up in the reservoir 34 it flows through the opening 42 into the bottom of the chamber 41 so that the air present in this chamber is forced upwardly and compressed, the degree of compression being proportional to the height of the water column. The bellows element 45 is thus compressed or contracted in length by the air pressure exerted thereagainst and its spindle 46 is moved upwardly to rotate the lever 48 in counterclockwise direction, as viewed in Fig. 1, against the action of the spring 57. By this action, the spring-actuated plunger 54 of the micro-switch 55 is released to permit it to move outwardly and thereby effect closing of the switch contacts. Thus, the electric circuit to the electric motor 21 is closed to energize the motor, which then functions to drive the comminuting means within the hopper 20 to comminute or disintegrate the waste material which is then flushed through the bottom of the housing 11 and its discharge pipe 22 by the tap water flowing into the hopper 20 by way of the openings 26 and 30.

It is to be noted that the bellows element 45 is relatively weak in axial tensile strength so that it will compress readily in response to a slight pressure exerted thereagainst. It is apparent, therefore, that the switch 55 will be closed immediately the head or column 60 of water starts to build up in the reservoir 34 or, in other words, at the start of the flow of tap water from the sink 17 into the disposal device and thus the comminuting operation is initiated promptly. As another feature of the invention, only the air pocketed within the chamber 41 contacts the bellows element 45 so that the latter is not contaminated by small particles of waste material which might pass through the screened port 23 and into the reservoir 34 and efficient, trouble-free operation of the bellows element is thus assured.

As a further means for insuring prompt closing of the switch 55, the switch-actuating screw 50 may be minutely adjusted on the lever 48 so as to provide for immediate closing of the switch in response to a very slight movement of the plunger 54. During the comminuting operation, the water in the reservoir 34 bleeds out through the restricted bleed opening 37 at a relatively slow rate so that any particles of foreign matter are carried out of the reservoir. However, since the water is continuously replenished by the flow

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into the upper end of the reservoir 34, a head 60 is maintained to effect continuous operation of the comminuting means.

After the disposal device has been in operation for a period sufficient to completely process and flush away the waste material, the tap is closed to disrupt the flow of water through the stopper device 24 into the hopper 20 and reservoir 34. The column 60 of water will then diminish in height, due to the flow of the water through the bleed hole 37, so that eventually the pressure of the air within the bellows chamber 41 will be reduced to a force which is overcome by the force of the spring 57, which will then act to extend the bellows element 45 and restore the switch plunger 54 to first position so as to open the switch 55 and arrest the operation of the motor 21. If desired, the flow of flushing water from the sink may be maintained and the stopper element 28 merely rotated to a position wherein its spout 31 is moved out of alignment with the screened port 23 so as to disrupt the flow of water into the reservoir 34. By this provision, the operation of the comminuting means will be continued for a relatively short period of time, after the stopper element 28 is rotated, and during this interval the flow of flushing water through the hopper 20 will act to clean the surfaces of the comminuting means and flush away any remaining particles of waste material.

Attention is now directed to Figs. 4 to 7 wherein a control means of slightly modified construction is disclosed. As in the construction shown in Figs. 1 to 3, the alternative control means is located exteriorly of the inner annular wall 19 of the housing 11 and is operated in response to a flow of water through the screened port 23, the water being directed through the port by a spout 31. The inner wall 19 is provided with a horizontal flange 65 having a circular boss 66, the boss having a bore providing a discharge port 67. A tray-like member 68 has a depending projection 69 which is adapted to be disposed in the bore 67 of the boss 66 with the surrounding portion of the member 68 seated against the top of the boss as shown in Fig. 7, the projection having a relatively small hole 70 therein. The member 68 preferably has an extension 71 which is secured against a pad 72 on the wall 19 by means of screws 73.

The tray-like member 68 provides the lower portion of a housing 75 which also includes a top member or cover 76. The cover 76 is of inverted tray shape and has a top wall 77 and a depending rim 78 which is adapted to fit closely within the member 68 and to rest upon a seat 79 therein. The members 68 and 76 may be soldered or otherwise secured together. Adjacent one end of the cover 76 the top wall 77 has an annular boss 80, in the upper end of which is held the lower end of a flexible tube or hose 81. The upper end of the hose 81 encircles the lower end of a rigid tube 82, the upper end of which is attached to the side of the wall 19 by screws 83. The tube 82 is aligned with the screened port 23 and is adapted to receive water flowing therethrough, the tube 82 and hose 81 together defining a substantially vertical reservoir 85 adapted to contain a column or head of the water, indicated at 86 in Fig. 5, it being understood that the water in the reservoir can flow therefrom at a relatively slow rate through the restricted hole 70.

Formed integral with the cover 76 is a substantially vertical bracket arm 88, to the upper end of which is attached one end of a sheet metal

holder 89. The other end of the holder 89 is supported by a post 90 projecting upwardly from the cover 76 (Fig. 7). The end of the holder 89 adjacent the post 90 is bent upwardly and laterally to provide a horizontal tab 91. The holder 89 provides a support for an electric switch 93 which is held in place by screws 94 and which has an upwardly projecting actuating plunger 95 adapted, when in extended position, to close the contacts of the switch. The switch 93 is connected in the electric circuit for the operating motor 21 of the waste-disposal device in the same manner as previously explained in connection with the control means illustrated in Figs. 1 to 3.

The switch plunger 95 is normally maintained in depressed position by an actuating lever 97 which is made from spring metal and has an end fastened to the top of the bracket arm 88. The other or free end of the lever 97 overlies the tab 91 and a spring 98 connected between this end and the tab normally functions to bow the lever downwardly so as to maintain the switch plunger 95 depressed. The lever 97 is adapted to be bowed upwardly, however, under the action of a bellows element 100.

The bellows element 100 is arranged with its axis vertical and has a tubular axial extension 101 fitted in a hole in the top wall 77 of the cover 76. The bellows element 100 has an upwardly projecting spindle or stem 102; the upper end of which rests against the switch-actuating lever 97. The space within the housing 75 immediately below the bellows element 100 constitutes an air pressure chamber 103; the air being compressed within the chamber by the head 88 of water.

The alternative control means shown in Figs. 4 to 7 operates in a manner similar to that explained in connection with the control means disclosed in Figs. 1 to 3. Stated briefly, the bellows element 100 expands axially in response to air pressure developed within the chamber 103 under the compressive force exerted by the head of water within the reservoir 85. Expansion of the bellows element 100 causes upward movement of the spindle 102 so that the actuating lever 97 is bowed upwardly against the tension of the spring 98 to release the switch plunger 95. The plunger 95 then moves upwardly to effect closing of the switch 93 and energization of the electric motor 21 to initiate the operation of the waste-disposal means. During operation of the waste-disposal device, the water in the reservoir 85 bleeds through the restricted hole 70 and is constantly replenished by water flowing into the reservoir through the screened port 23. When the flow of water through the spout 31 is stopped, the bellows element 100 will remain active until the head of water in the reservoir diminishes to a point where it no longer exerts sufficient pressure to extend the bellows element, whereupon the element will contract, due to the action of the spring 98 which also functions to bow the actuating lever downwardly to open the switch 93 and de-energize the electric motor 21.

Referring to Fig. 7, the cover 76 is provided with a hole 105 through which a pipe cleaner or other cleaning instrument can be inserted and directed through the restricted opening 70 to clean the same. The hole 105 may be normally closed by a screw plug 106.

It will be observed from the foregoing that my invention provides a simple, yet highly efficient means for controlling the operation of a waste disposal device. As a particular feature of improvement, the invention provides a control

means which is actuated in response to a very small flow of water from the sink into the disposal device so that the operation of the device is started almost immediately the flow of flushing water is established. The invention further provides means for minutely adjusting the parts of the control means so that the switch for the operating motor is promptly closed in response to the initial flow of the flushing water. This constitutes an improvement over previous float-controlled devices which operate only after considerable water has flowed into the comminuting hopper. As a further feature of improvement, the flow-responsive means, that is the bellows, is not contacted by the water but by air trapped therebeneath so that contamination of the bellows by particles of waste material is avoided and the device is thus rendered proof against inoperativeness due to such cause.

While I have herein shown and described a preferred embodiment of the invention, by way of example, it will be apparent that various changes might be made in the construction of the device without departing from the spirit of the invention. Consequently, I do not wish to be limited in this respect, but desire to be afforded the full scope of the appended claims.

I claim as my invention:

1. In a waste-disposal device, the combination of: hopper means having an opening therein through which waste material and flushing fluid can be inserted into said hopper means; comminuting means in said hopper means; adapted to comminute waste material therein; power means for operating said comminuting means; switch means for energizing said power means; walls defining a reservoir adjacent said hopper means, said reservoir having means for discharging said reservoir; means for diverting a portion of the flushing fluid inserted through said opening into said reservoir; pressure-responsive means in association with said reservoir and adapted to be operated in response to static pressure created by a column of said fluid in said reservoir; and means operatively connecting said pressure-responsive means and said switch means so that operation of said pressure-responsive means effects operation of said switch means.

2. In a waste-disposal device, the combination of: hopper means having an opening therein through which waste material can be inserted into said hopper means; comminuting means in said hopper means; adapted to comminute waste material therein; power means for operating said comminuting means; switch means for energizing said power means; walls defining a reservoir adjacent said hopper means; said reservoir having means for discharging said reservoir; means for directing a portion of the flushing fluid inserted through said opening into said reservoir; extensible, contractable pressure-responsive means in association with said reservoir and adapted to be operated in response to static pressure created by a column of said fluid in said reservoir; and means operatively connecting said pressure-responsive means and said switch means so that operation of said pressure-responsive means effects operation of said switch means.

3. In a waste-disposal device, the combination of: hopper means having an opening therein through which waste material and flushing fluid can be inserted into said hopper means; comminuting means in said hopper means; adapted to comminute waste material therein; power means for operating said comminuting

means; switch means for energizing said power means; walls defining a fixed reservoir, said reservoir having means for discharging said reservoir; means for diverting a portion of the flushing fluid inserted through said opening into said reservoir; pressure-responsive bellows means in association with said reservoir and adapted to be operated in response to static pressure created by a column of said fluid in said reservoir; and means operatively connecting said bellows means and said switch means so that operation of said bellows effects operation of said switch means.

4. The combination defined in claim 1 in which a wall defining the lower end of said reservoir is provided with a bleed port comprising said reservoir-discharging means.

5. The combination defined in claim 1 in which said device is provided with walls defining a pressure chamber in fluid communication with said reservoir adjacent the bottom thereof, said pressure-responsive means being disposed in said pressure chamber and adapted to be operated in response to variations in pressure of air compressed within said chamber by said column of fluid in said reservoir.

6. The combination defined in claim 1 in which said device is provided with walls defining a pressure chamber, the lower end of which is in fluid communication with the lower end of said reservoir, said pressure-responsive means being disposed within said pressure chamber at the upper end thereof and adapted to be operated in response to variations in pressure of air trapped within said chamber and compressed by said column of fluid in said reservoir.

7. In a waste disposal device, the combination of: hopper means having an opening therein through which waste material and flushing fluid can be inserted into said hopper means; comminuting means in said hopper means, adapted to comminute waste material therein; electric power means for operating said comminuting means; an electric circuit for said power means; a switch connected in said circuit for effecting energization and de-energization of said power means; lever means for actuating said switch; walls defining a fixed reservoir, said reservoir having a restricted bleed port adjacent its lower end; means for diverting a portion of said fluid inserted through said opening into said reservoir; and pressure-responsive means in association with said reservoir and adapted to be operated in response to static pressure created by a column of said fluid in said reservoir, said pressure-responsive means being operatively connected to said lever means for operating the same.

8. In a waste-disposal device, the combination of: a circular wall defining a hopper having an opening at its upper end through which waste material can be inserted into said hopper, said wall having a port adjacent its upper end; comminuting means in said hopper, adapted to comminute waste material therein; power means for operating said comminuting means; switch means for energizing said power means; walls defining, with said circular wall, a substantially vertical reservoir and an offset pressure chamber at the lower end of said reservoir and in fluid communication therewith, said port communicating between said hopper and said reservoir; means for introducing fluid into said hopper; means for directing a portion of the introduced fluid through said port into said reservoir, said reservoir having a bleed port, disposed adjacent

the bottom thereof, through which fluid can drain from said reservoir; pressure-responsive means disposed within said pressure chamber and adapted to be operated in response to variations in pressure of air compressed within said pressure chamber by a column of said fluid in said reservoir; and lever means operatively connecting said pressure-responsive means and said switch means so that operation of said pressure-responsive means causes operation of said switch means.

9. In a waste-disposal device, the combination of: a circular wall defining a hopper having an opening at its upper end through which waste material can be inserted into said hopper, said wall having a port adjacent its upper end; comminuting means in said hopper, adapted to comminute waste material therein; power means for operating said comminuting means; switch means for energizing said power means; walls defining with said circular wall, a substantially vertical reservoir having a restricted discharge opening at its lower end and an offset pressure chamber at the lower end of said reservoir and in fluid communication therewith, said port communicating between said hopper and said reservoir; means for introducing fluid into said hopper; means for directing a portion of the introduced fluid through said port into said reservoir; pressure-responsive means disposed within said pressure chamber and adapted to be operated in response to variations in pressure of air compressed within said pressure chamber by a column of said fluid in said reservoir; and lever means operatively connecting said pressure-responsive means and said switch means so that operation of said pressure-responsive means causes operation of said switch means.

10. In a waste-disposal device, the combination of: a circular wall defining a hopper having an opening at its upper end through which waste material can be inserted into said hopper, said wall having a port adjacent its upper end; comminuting means in said hopper, adapted to comminute waste material therein; power means for operating said comminuting means; switch means for energizing said power means; a stopper device in said opening of said hopper for controlling the introduction of fluid into said hopper; walls defining, with said circular wall, a substantially vertical reservoir having a restricted discharge opening at its lower end and an offset pressure chamber at the lower end of said reservoir and in fluid communication therewith, said port communicating between said hopper and said reservoir; means for introducing fluid into said hopper; means for directing a portion of the introduced fluid through said port into said reservoir; pressure-responsive means disposed within said pressure chamber and adapted to be operated in response to variations in pressure of air compressed within said pressure chamber by a column of said fluid in said reservoir; and lever means operatively connecting said pressure-responsive means and said switch means so that operation of said pressure-responsive means causes operation of said switch means.

11. In a waste-disposal device, the combination of: a circular wall defining a hopper having an opening at its upper end through which waste material can be inserted into said hopper, said wall having a port adjacent its upper end; comminuting means in said hopper, adapted to com-

minute waste material therein; power means for operating said comminuting means; switch means for energizing said power means; a stopper device in said opening of said hopper for controlling the introduction of fluid into said hopper, said device having a spout for directing fluid through said port; walls defining, with said circular wall, a substantially vertical reservoir having a restricted discharge opening at its lower end through which fluid can bleed from said reservoir and an offset pressure chamber at the lower end of said reservoir and in fluid communication therewith, said port communicating between said hopper and said reservoir; means for introducing fluid into said hopper; pressure-responsive means disposed within said pressure chamber and adapted to be operated in response to variations in pressure of air compressed within said pressure chamber by a column of said fluid in said reservoir; and lever means operatively connecting said pressure-responsive means and said switch means so that operation of said pressure-responsive means causes operation of said switch means.

12. In a waste-disposal device, the combination of: a circular wall defining a hopper having an opening at its upper end through which waste material can be inserted into said hopper, said wall having a port adjacent its upper end; comminuting means in said hopper, adapted to comminute waste material therein; power means for operating said comminuting means; switch means for energizing said power means; a stopper device in said opening of said hopper for controlling the introduction of fluid into said hopper, said device having a spout for directing fluid through said port; walls defining, with said circular wall, a substantially vertical reservoir having a restricted discharge opening at its lower end through which fluid introduced into said reservoir through said port can bleed from said reservoir, and a pressure chamber offset laterally from said reservoir, and in fluid communication therewith; bellows means disposed within the upper end of said pressure chamber and adapted to be compressed in response to variations in pressure of air compressed within said pressure chamber by a column of said fluid in said reservoir, said bellows means including an axial spindle projecting from said pressure chamber; and lever means operatively connected between said spindle and said switch means so that operation of said pressure responsive means causes operation of said switch means.

13. In a waste-disposal device, the combination of: hopper means having an opening therein through which waste material and a fluid can be inserted into said hopper means; comminuting means in said hopper means adapted to comminute waste material therein; electric power means for operating said comminuting means; an electric circuit for said power means; a switch connected in said circuit for effecting energization and de-energization of said power means; a lever for actuating said switch; a housing detachably connected to said hopper means and having a restricted bleed port in its bottom; a substantially vertical, tubular member connected to said housing with its upper end communicating with said opening of said hopper means, said member providing a reservoir; means for directing a portion of the fluid from said opening into said reservoir; walls in said housing defining a pressure chamber, the lower end of which is in fluid communication with the lower end of said reservoir;

a pressure-responsive element on said housing and adapted to be operated in response to variations in pressure of air trapped within said chamber and compressed by said column of fluid in said reservoir; and means formed integral with said element and operatively connected to said switch actuating lever so that operation of said element effects actuation of said lever.

14. In a waste-disposal device, the combination of: hopper means having an opening therein through which waste material and fluid can be inserted into said hopper means; comminuting means in said hopper means adapted to comminute waste material therein; electric power means for operating said comminuting means; an electric circuit for said power means; a switch connected in said circuit for effecting energization and de-energization of said power means; a resilient lever for actuating said switch; a housing detachably connected to said hopper means and having a restricted bleed port in its bottom; a substantially vertical, tubular member connected to said housing with its upper end in fluid communication with said opening of said hopper, said member providing a reservoir; means for directing a portion of the fluid from said opening into said reservoir; walls in said housing defining a pressure chamber, the lower end of which is in fluid communication with the lower end of said reservoir, a pressure-responsive element on said housing and adapted to be operated in response to variations in pressure of air trapped within said chamber and compressed by said column of fluid in said reservoir; and a spindle carried by said element and adapted to contact said lever to move the lever to switch closing position in response to operation of said pressure-responsive element due to pressure developed within said chamber.

15. In a waste-disposal device, the combination of: hopper means having an opening therein through which waste material and fluid can be inserted into said hopper means; comminuting means in said hopper means adapted to comminute waste material therein; electric power means for operating said comminuting means; an electric circuit for said power means; a switch connected in said circuit for effecting energization and de-energization of said power means; a resilient lever for actuating said switch; a housing detachably connected to said hopper means and having a restricted bleed port in its bottom; a substantially vertical, tubular member connected to said housing and having an upper open end in fluid communication with said opening, said member providing a reservoir; means for directing a portion of the fluid from said opening into said reservoir; walls in said housing defining a pressure chamber, the lower end of which is in fluid communication with the lower end of said reservoir; a pressure-responsive element on said housing and adapted to be operated in response to variations in pressure of air trapped within said chamber and compressed by said column of fluid in said reservoir; means formed integral with said element and operatively connected to said switch actuating lever so that operation of said element effects actuation of said lever; and spring means operative to move said lever to switch-opening position.

16. A device as defined in claim 13, in which said tubular member is at least partly flexible.

17. A device as defined in claim 15, in which said switch, switch actuating lever and spring means are carried by said housing.

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18. A device as defined in claim 15, in which said housing is provided with a hole in its side through which a cleaning implement can be inserted and directed through said restricted bleed port to clean the same without requiring disconnection of said tubular member.

19. In a waste disposal device, the combination of: hopper means having an opening therein through which waste material and flushing fluid can be admitted into said hopper means; fluid discharge means leading from said hopper means; comminuting means in said hopper means, adapted to comminute waste material therein; power means for operating said comminuting means; reservoir means apart from said fluid discharge means to receive a head of said flushing fluid; means for diverting a portion only of the flushing fluid flowing through said opening into said reservoir means to form said head of fluid; and pressure-responsive means operatively connected to said power means and responsive to the pressure of a predetermined head of said flushing fluid in said reservoir means for controlling the operation of said power means, said last-named

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means being operable automatically upon creation of such predetermined head to energize said power means.

20. A combination as in claim 19 including: means for discharging said fluid head following cessation of flow of flushing fluid to said reservoir means.

21. A combination as in claim 20 wherein said pressure-responsive means includes switch means for said power means and means connected with said switch means and operable by said pressure of said predetermined head of fluid.

HANS JORDAN.

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