April 3, 1951 A. J. KREINER 2,547,708

WASTE FLUSHING MECHANISM, INCLUDING A BACKFLOW PREVENTER

Filed Sept. 21, 1946

2 Sheets-Sheet 1

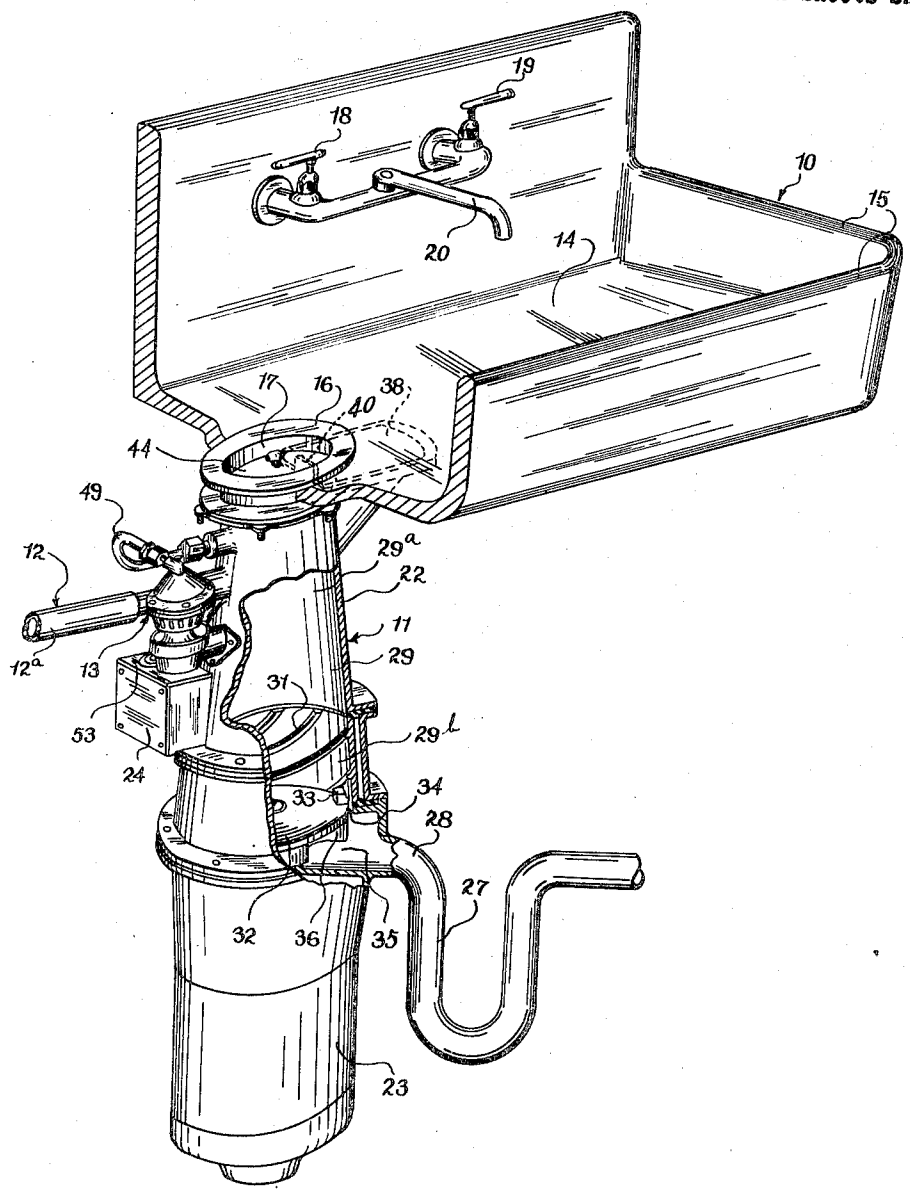


Fig. 1

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2 Sheets-Sheet 2

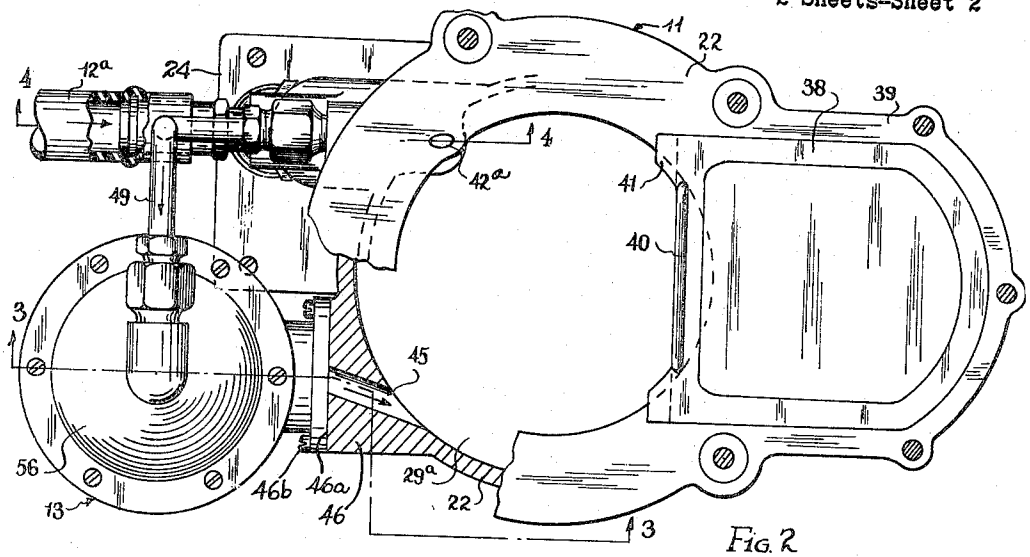


Fig. 2

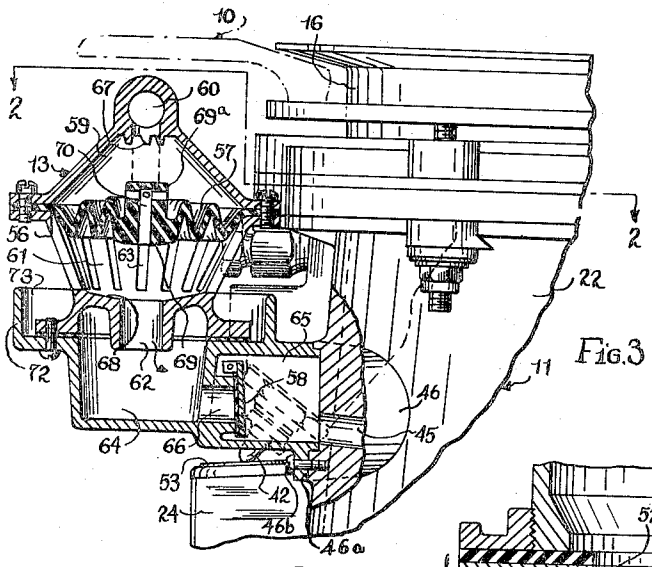


Fig. 3

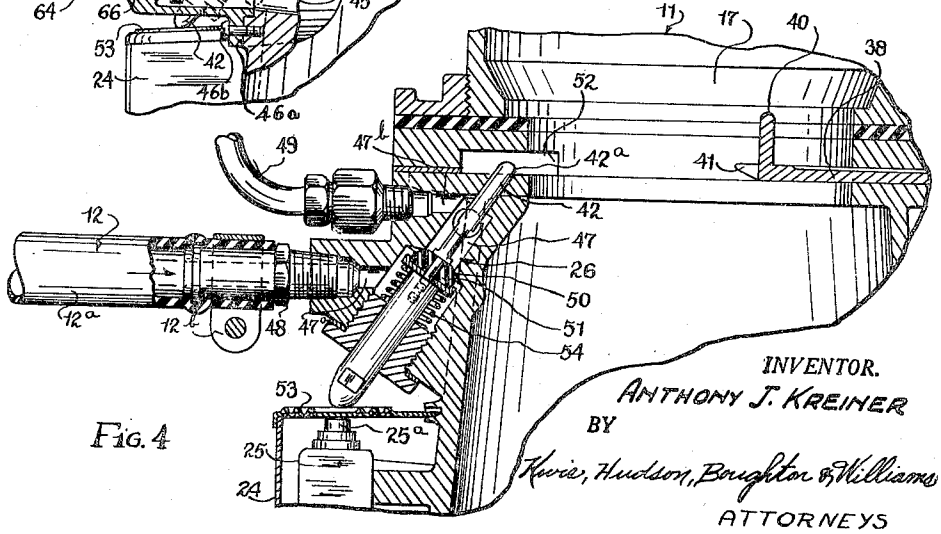


Fig. 4

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WASTE FLUSHING MECHANISM, INCLUDING A BACKFLOW PREVENTER

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Application September 21, 1946, Serial No. 698,528

2 Claims. (Cl. 4—187)

1

This invention relates to garbage disposal apparatus of the kind adapted to be connected to the drain opening of a kitchen sink or the like and which operates to grind or comminute kitchen waste material and to discharge the ground material into a drain pipe of the plumbing system.

It has been recognized heretofore in connection with the operation of garbage disposal apparatus of this kind that it is desirable to supply water for mixing with the waste material during the grinding operation because the water and ground material form a sludge which will readily flow through the drain pipe without causing clogging thereof. The water also facilitates the grinding operation and serves to flush and cleanse the apparatus. Water under pressure is ordinarily available for this purpose in the usual domestic cold water supply pipe which extends to the cold water faucet of the sink with which the disposal apparatus is connected.

The domestic cold water supply pipe usually contains potable water and if a branch from this pipe is connected to the garbage disposal apparatus for supplying the water thereto a problem is presented because of the possibility that under certain conditions a backflow of water from the disposal apparatus into the supply pipe might occur and cause contamination of the potable water supply. Usually the grinding device of the garbage disposal apparatus is connected to the drain opening of the kitchen sink so that the chamber of the grinding device forms a downward continuation of this drain opening and hence, when a large volume of soiled water is allowed to flow out of the sink through the drain opening such as when a pan of dishwater is emptied into the sink or when the drain stopper is removed, it flows into the chamber of the grinding device more rapidly than it can flow out through the drain pipe and the level of the soiled water rises to a relatively high point in the chamber although it may remain at such a high level for only a brief interval. If a vacuum should exist in the potable water supply pipe during such a flooded condition of the chamber of the grinding device and if the valve controlling the flow of water to the grinding device from the supply pipe should be open at the same time, some of the soiled water will flow backwardly into the supply pipe and cause the above mentioned contamination of the potable water unless means is provided for preventing such backflow.

It is, therefore, an object of this invention to provide improved garbage disposal apparatus of this character and embodying a means for supplying water thereto but wherein means is employed for preventing a return flow of water from the disposal apparatus to the water supply means.

2

Another object of the present invention is to provide improved garbage disposal apparatus of the character mentioned which embodies a backflow preventing device for preventing such a return flow of water from the disposal apparatus.

A further object is to provide improved garbage disposal apparatus of this kind in which a control valve unit embodied in the grinding device controls the supply of the water thereto and a backflow preventing valve device associated with the control valve unit prevents a return flow of water from the grinding device into the water supply line.

The invention can be further briefly summarized as consisting in certain novel combinations and arrangements of parts hereinafter described and particularly set out in the appended claims.

In the accompanying sheets of drawings

Fig. 1 is a perspective view of garbage disposal apparatus embodying this invention, the apparatus being shown applied to a kitchen sink and with portions of the sink and grinding device broken away;

Fig. 2 is a sectional plan view of the apparatus taken at a point adjacent to but below the sink substantially as indicated by line 2—2 of Fig. 3;

Fig. 3 is a partial vertical sectional view taken through the backflow preventing device and an adjacent portion of the grinding device, the view being taken substantially as indicated by line 3—3 of Fig. 2, and

Fig. 4 is another partial vertical sectional view taken through the control valve unit of the grinding device as indicated by line 4—4 of Fig. 2.

In Fig. 1 of the accompanying drawings the improved garbage disposal apparatus is shown applied to a kitchen sink 10. The apparatus comprises, in general, a grinding device 11, an available supply of water under pressure and which is here represented by the supply pipe or conduit 12, and a backflow preventing device 13.

The sink 10 can be of a conventional construction and, as shown in this instance, may have a bottom 14 and side walls 15 defining a tank or washing space in which water is adapted to be confined. The bottom of the sink is provided with a drain fitting 16 having a relatively large drain opening 17 therein. The sink 10 may also be equipped with the usual hot and cold water faucets 18 and 19 and a water delivery spout 20.

The grinding device 11 is similar to the grinding device disc'osed in copending application Serial No. 667,811, filed May 7, 1946 now Patent No. 2,476,630 granted July 19, 1949, and comprises an upright main housing 22 and an electric driving motor 23. The grinding device also includes a switch housing 24 containing an electric control switch 25 for the electric motor 23 and a control valve unit 26 which, as shown in Fig. 4 and explained hereinafter, is embodied in the main housing of the grinding device. The discharge of ground material in sludge form from the grinding device 11 takes place through the drain pipe 27 which constitutes a part of the plumbing system and is connected to the discharge spout 28 of the main housing 22.

The grinding device 11 is disposed in upright relation as shown in Fig. 1 and is usually connected with the sink 10 by being suspended from the bottom wall 14 thereof as by being connected with the drain fitting 16. The main housing 22 of the grinding device contains an upright chamber 29 which forms a downward continuation of the drain opening 17 of the sink. The chamber 29 includes a flared and downwardly enlarging feed passage 29a and a grinding chamber or compartment 29b which forms a downward continuation of the feed passage. The upper end of the feed passage 29a communicates directly with the drain opening 17 of the sink so that the latter constitutes the feed opening through which material to be ground is introduced into the feed passage of the grinding device.

The side wall of the grinding chamber 29b is provided with suitable comminuting means such as the shredding ribs 31 shown in this instance. The bottom of the grinding chamber is formed by a substantially cone-shaped disk or rotor 32 which is connected with the upright shaft of the motor 23 so as to be driven thereby and carries one or more projections or lugs 33 which cooperate with the shredding ribs 31 for subjecting the material to a comminuting or grinding action. The rim of the rotor 32 is spaced from the wall of the housing a small distance so as to provide an annular discharge passage 34 for the ground material and communicates with a discharge chamber 35 located beneath the rotor. The mixture of ground material and water is discharged from the chamber 35 through the spout 28 into the drain pipe 27, such discharge preferably being effected or accelerated by means of one or more vanes 36 located on the underside of the rotor.

The entrance opening 17 into the upper end of the feed passage 29a is controlled by a guard 38 of plate-like form which is slidably mounted in a projection 39 of the main housing 22 and is movab'e transversely of such entrance opening. The guard 38 is provided with an upstanding lug or hand'e 40 which is adapted to be manually gripped for sliding the guard to its open or closed positions. The guard also carries a cam projection 41 which is engageable with the actuating stem 42 of the valve device 26 when the guard approaches or reaches its closed position. The lower end of the actuating stem 42 is disposed in operative relation to the electric switch 25 so that downward movement of the stem will cause closing of the switch 25 and starting of the electric driving motor 23.

The guard 38 is normally in its open position as shown in Fig. 2 so that garbage or other waste material can be dropped from time to time into the chamber 29 of the grinding device 11. When

it is desirable to operate the grinding device to dispose of the material which has collected in the chamber thereof, the guard 38 is slid laterally to its closed position causing the cam 41 to engage and actuate the stem 42 so as to automatically start the electric motor 23. When the grinding operation has been completed, the guard 38 is slid to its open position thereby permitting a return movement of the actuating stem 42 and opening of the electric switch 25 to stop the electric motor 23.

The drain opening 17 of the sink 10 is preferably provided with a suitable stopper 44 which, as disclosed more fully in said earlier application, is adapted to occupy either a sealing position or a draining position, when located in the opening 17. The plug 44 is also entirely removable from the opening 17 to afford access to the chamber 29 of the grinding device for dropping garbage into the latter from time to time as explained above. When the stopper 44 is in its sealing position a supply of water can be retained in the tank of the sink 10 for use in washing dishes or vegetables or for other purposes. When the stopper is in a partially lifted or draining position it permits water to flow freely into the chamber of the grinding device 11 through an annular space extending between its outer edge and the side wall of the drain fitting 16.

As indicated in the early part of this specification it is desirable to supply water to the grinding device 11 during the operation thereof, such water being supplied from the pipe or conduit 12 for mixing with the material to be ground. This water supply enters the chamber 29 of the grinding device 11 through a water passage 45 suitably located in the side wall thereof and is controlled by the valve unit 26. The water thus supplied also passes through the backflow preventing device 13 which will be presently described in greater detail.

As shown in Figs. 2 and 3 of the drawings the main housing 22 is provided with a mounting means for the attachment of the backflow preventer 13 therewith in proper relation to the water passage 45. In this instance, the mounting means includes a boss or pad 46 formed integral with the main housing and having a flat face 46a against which a flanged portion of the backflow preventer seats, and screws or studs 46b for connecting the backflow preventer against such boss or pad. The outer end of the water passage 45 opens through the flat face 46a and is so located that the backflow preventer, when in its mounted position, will be in communication with this passage.

The control valve unit 26 comprises a valve chamber 47 formed in the wall of the main housing 22 of the grinding device and includes an inlet passage 47a and an outlet passage 47b. The water supply pipe or conduit 12 is connected with the inlet passage 47 as by means of the fitting 48. In this instance the water supply pipe or conduit is shown as consisting of or including a hose connection 12a which is secured on the fitting 48 by means of the clamp 12b. The outlet passage 47b is connected with the backflow preventing device 13 by the connecting pipe or conduit 49.

The control valve unit 26 also comprises an annular valve seat 50 located in the valve chamber 47 and a valve element 51 which is carried by the actuating stem 42 and cooperates with this seat. The stem 42 extends axially of the valve chamber 47 and is suitably guided so that its in-

ner end 42a extends into a recess 52 and is located in a position to be engaged by the cam 41 of the guard 38. The lower end of the stem 42 projects from the valve chamber and cooperates with the actuating member 25a of the switch 25 through a flexible diaphragm 53. A compression spring 54 disposed around the actuating stem 42 normally urges the same in a direction to sealingly engage the valve element 51 with the seat 50.

The backflow preventing device 13 is more fully disclosed in copending application Serial No. 698,527, filed September 21, 1946, now Patent No. 2,516,578 and comprises a casing 56 having therein a flexible diaphragm 57 and a check valve 58. The casing 56 contains a diaphragm chamber in which the diaphragm 57 is located. The upper portion of the diaphragm chamber forms a pressure compartment 59 with which an inlet passage 60 communicates and the lower portion of the diaphragm chamber forms a relief chamber 61 having an outlet passage 62. The relief chamber 61 is in direct communication with the atmosphere through one or more slots 63 formed in the side wall of the casing at a point below the diaphragm. The outlet passage 62 communicates with an outlet chamber 64 which in turn communicates with a discharge chamber 65 through a passage 66 which is controlled by the check valve 58. The discharge chamber 65 is in direct communication with the water passage 45 of the grinding device 11 by reason of the fact that the portion of the housing in which the discharge chamber 65 is located is secured against the side wall of the main housing 22 in surrounding relation to the outer end of the water passage.

The portion of the casing 56 of the backflow preventing device in which the inlet passage 60 is located carries projections 67 forming a non-sealing stop adapted to be engaged by the diaphragm 57 for a purpose to be explained hereinafter. The portion of the bottom wall of the diaphragm chamber surrounding the outlet passage 62 forms a valve seat 68 adapted to be engaged by a valve element 69 which is carried by the diaphragm centrally thereof and in this instance is formed by a thickened integral central portion of the diaphragm. The diaphragm has a connecting passage 70 extending through the valve element 69 thereof. The upper portion of this valve element is in the form of an axial stem 69a whose upper end is engageable with the stop projections 67.

In the operation of the disposal apparatus the closing of the guard 38 actuates the stem 42 to cause closing of the switch 25 and starting of the electric motor 23 as explained above. The movement thus imparted to the stem 42 also shifts the valve element 51 to its open position thereby permitting water from the supply pipe 12 to flow through the valve chamber 47 and through the connecting conduit 49 to the inlet passage 60 of the backflow preventing device 13. The water enters the pressure compartment 59 and exerts a downward pressure on the diaphragm 57 causing the valve element 69 of the latter to be sealingly pressed against the valve seat 68. As long as water pressure is supplied to the pressure compartment 59 the diaphragm will be retained in this extreme position and will interrupt communication between the outlet passage 62 and the atmosphere openings 63. While the diaphragm is in this position its connecting passage 70 is in communication with the outlet passage 62 so that water will flow through the diaphragm into the outlet chamber 64 and then past the check valve 58 and into the water passage 45 of the grinding device 11.

When the guard 38 is returned to its open position the release of the actuating stem 42 causes opening of the electric switch 25 to stop the motor 23 as explained above and also results in the valve element 51 being moved against its seat 50 to cut off the flow of water to the grinding device 11 from the supply pipe 12. The closing of the valve unit 26 disconnects the pressure compartment 59 of the backflow preventing device 13 from the supply pipe 12 whereupon the diaphragm 57 returns to its intermediate position in which it is shown in Fig. 3.

If a large volume of soiled water is permitted to flow from the sink 10 through the drain opening 17 into the chamber 29 of the grinding device 11 it will temporarily rise to a relatively high level in this chamber, as previously mentioned herein, but this flooded condition will usually exist for only a short interval and until the water is carried away by the drain pipe 27. During the existence of this flooded condition some of the soiled water will flow backwardly through the water passage 45 into the discharge chamber 65 of the backflow preventing device 13. The check valve 58 being normally in engagement with its seat will prevent a surge of such soiled water from flowing beyond the check valve into the outlet and diaphragm chambers of this device. If the flooded condition exists in the chamber of the grinding device for an abnormal period some of the soiled water may travel past the check valve 58 into the outlet chamber 64 but if this backflow of soiled water is in sufficient volume to rise upwardly through the outlet passage 62 it will not travel through the connecting passage 70 of the diaphragm 57 because it will escape freely through the atmosphere opening 63 and contamination of the water in the supply pipe 12 will be prevented. If desired, the casing of the device 13 can be provided with an external annular lip 72 extending therearound adjacent the atmosphere openings 63 and which will form an overflow chamber 73 adapted to collect and retain water which overflows through the atmosphere openings.

If a vacuum condition should exist in the supply pipe 12 at the same time that the above described flooded condition occurs in the chamber of the grinding device 11, none of the soiled water will reach the supply pipe because the vacuum condition will shift the diaphragm 57 to an upwardly deflected extreme position in which the top of the stem 69a will engage the stop projections 67. While in this position the diaphragm cooperates with the stop projections in providing a baffled passage which connects the inlet passage 60 with the atmosphere openings 63. This baffled passage permits air from the atmosphere to enter the supply pipe 12 thereby relieving the vacuum. Because of the baffled condition of the vacuum relieving passage thus established and the fact that any soiled water backing up into the diaphragm chamber of the device 13 will freely escape through the atmosphere openings 63, it will be seen that none of this water will get into the supply pipe 12.

From the foregoing description and the accompanying drawings it will now be readily understood that this invention provides an improved garbage disposal apparatus in which water for assisting in the grinding action and in the discharge of the ground material can be safely supplied to the grinding device from an available

supply pipe containing potable water without danger of a contaminating backflow of soiled water from the grinding device into the supply pipe. It will be seen moreover that the embodiment of the backflow preventing device in the disposal apparatus effectively prevents such contamination of the potable water supply. It will also be seen that by providing the grinding device with an automatically actuated valve device the supply of water to the grinding device can be controlled so that it will pass through and actuate the backflow preventing device in such a manner that the operator need only actuate the guard and the other functions of starting and stopping the electric driving motor and starting and stopping the supply of water and the prevention of a backflow of soiled water will all take place automatically.

Although the improved garbage disposal apparatus of this invention has been illustrated and described herein to a detailed extent. it will be understood of course that the invention is not to be regarded as correspondingly limited in scope but includes all changes and modifications coming within the language of the appended claims.

Having thus described my invention, I claim:

1. Waste flushing mechanism comprising, an upright member having therein a chamber provided with an inlet at its upper end and an outlet at its lower end, said member having a mounting means thereon and a water passage therein leading from said mounting means into said chamber, a control valve unit carried by said member and having an inlet and an outlet, means for connecting an available supply of potable water under pressure with the inlet of said valve unit, means connecting the outlet of said valve unit with said water passage, said valve unit being operable to control the flow of water into said chamber, and a backflow preventer valve device in the last mentioned connecting means and mounted in fixed relation on said member by engagement with said mounting means and being operable to prevent a return flow of water from said chamber to said available potable water supply, said preventer valve device having an inlet connected with the outlet of said control valve unit and an outlet connected with said water passage through said mounting means.

2. Waste flushing mechanism comprising, an upright member having therein a chamber provided with an inlet at its upper end and an outlet at its lower end, a guard mounted on said member for movement transversely of said inlet for controlling the same, said member having a mounting means thereon and a water passage therein leading from said mounting means into said chamber, a control valve unit carried by said member and having an inlet and an outlet, means for connecting an available supply of potable water under pressure with the inlet of said valve unit, means for causing an automatic actuation of said valve unit in response to the movement of said guard, and means connecting the outlet of said valve unit with said water passage including a backflow preventing device mounted in fixed relation on said member by engagement with said mounting means and operable to prevent a return flow of water from said chamber to said available potable water supply, said backflow preventing device having an inlet connected with the outlet of said control valve unit and an outlet connected with said water passage through said mounting means.

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