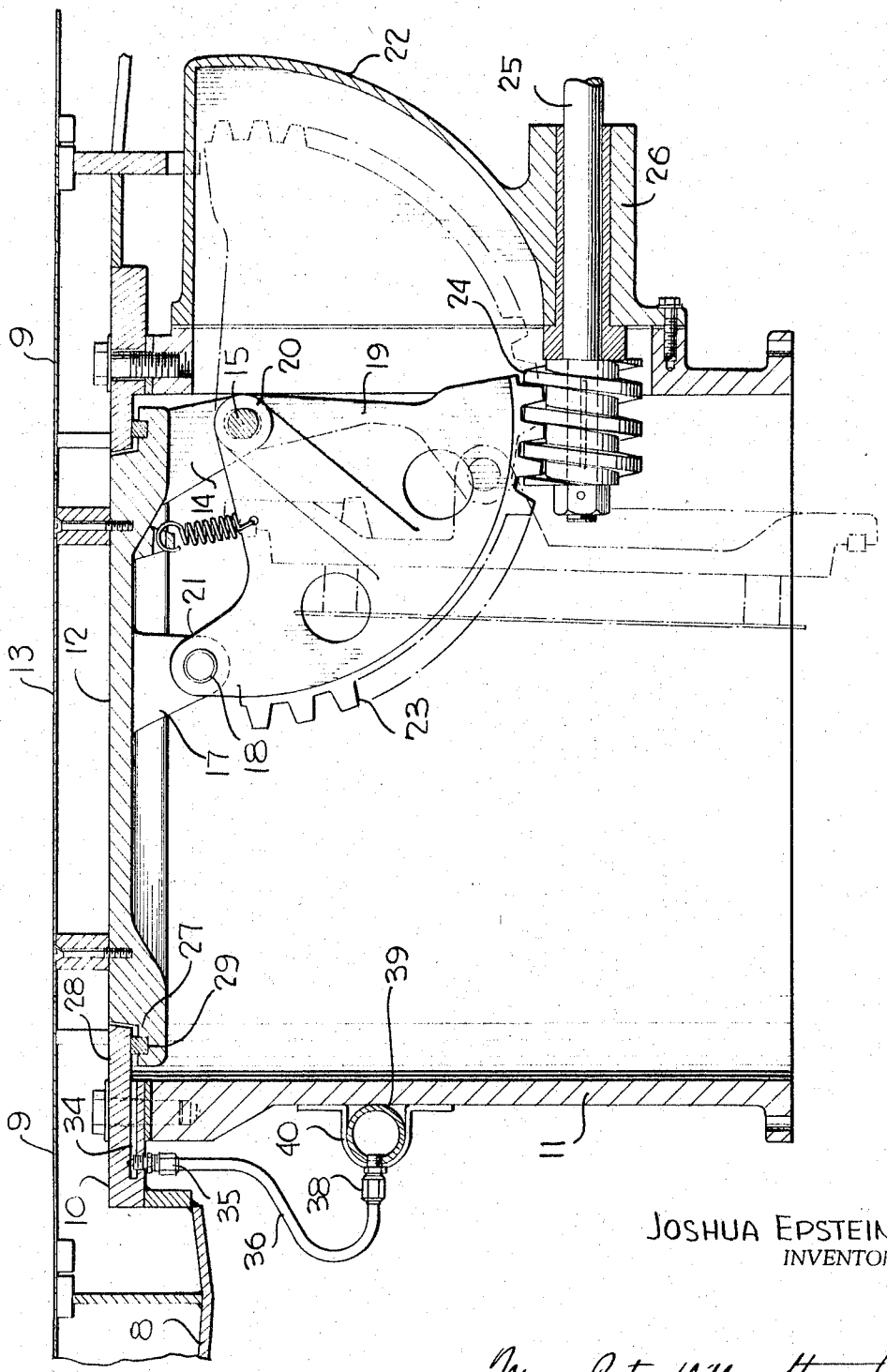
March 7, 1967 J. EPSTEIN 3,307,573

FLUSHING MEANS FOR A GRAIN DISCHARGE VALVE

Filed Nov. 8, 1963 4 Sheets-Sheet 1

Fig. 1



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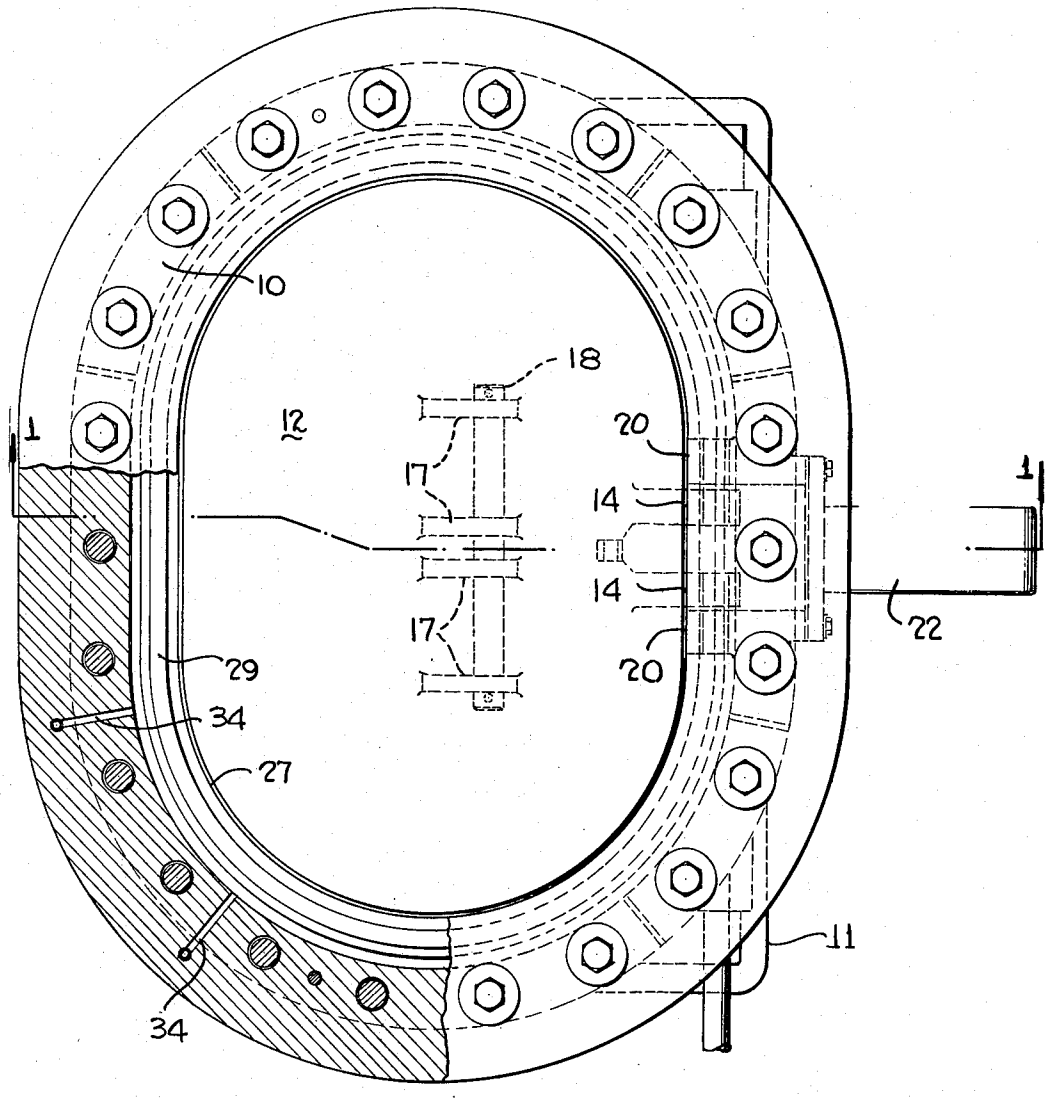
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FLUSHING MEANS FOR A GRAIN DISCHARGE VALVE

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FIG. 2



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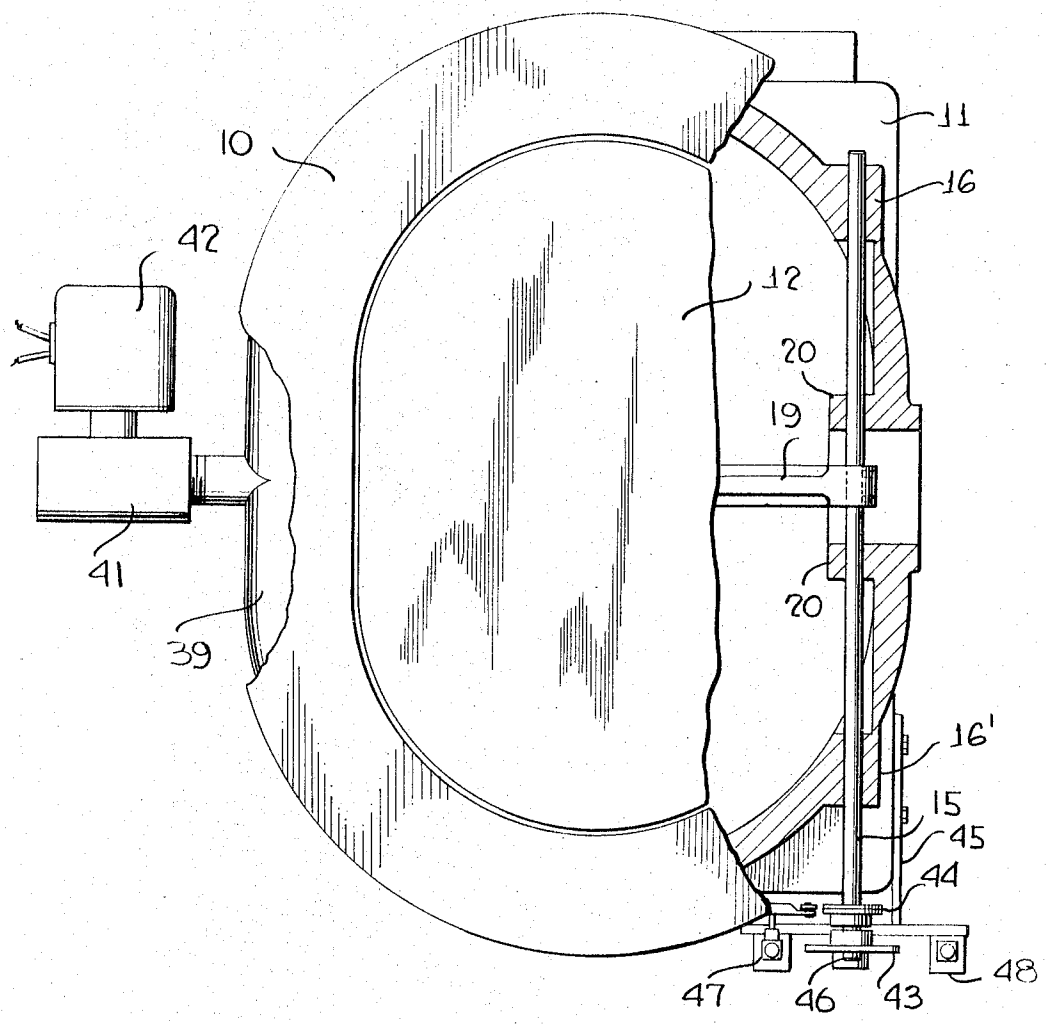
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FLUSHING MEANS FOR A GRAIN DISCHARGE VALVE

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FIG. 3



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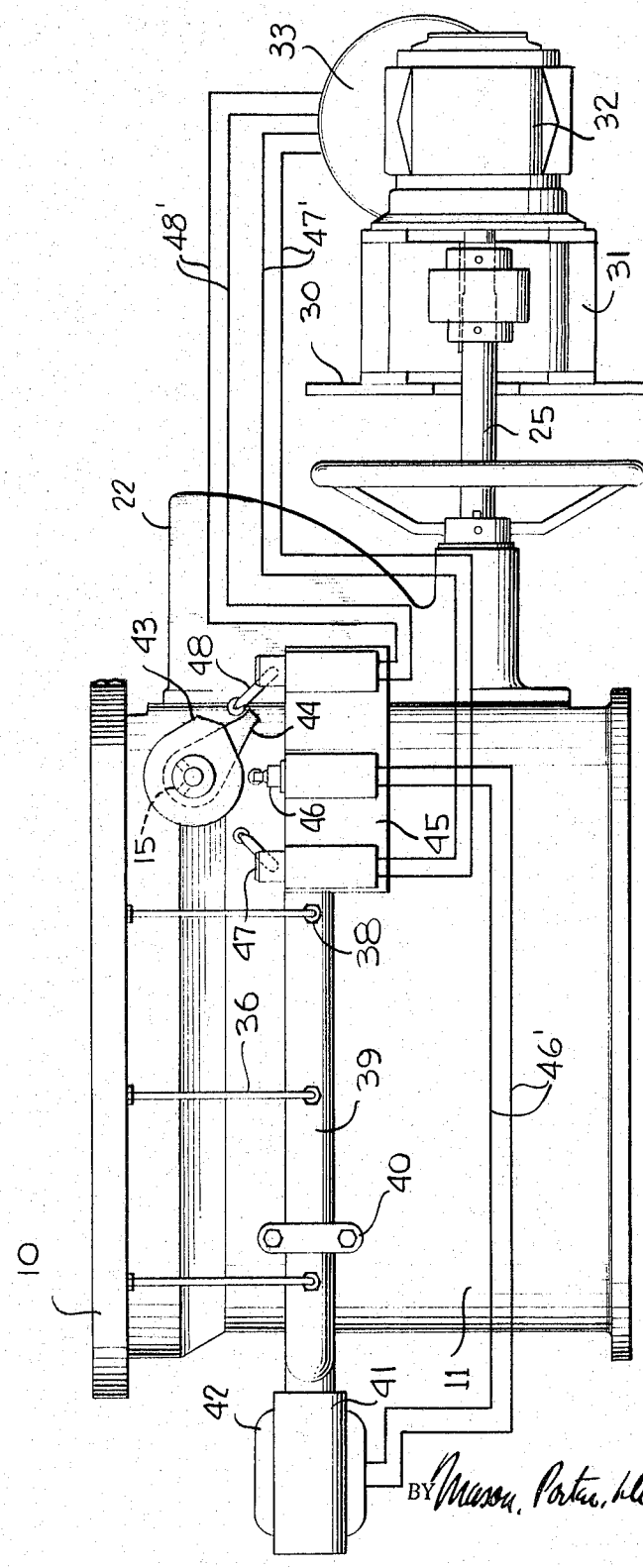
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FLUSHING MEANS FOR A GRAIN DISCHARGE VALVE

Filed Nov. 8, 1963 4 Sheets-Sheet 4

FIG. 4



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United States Patent Office

3,307,573

Patented Mar. 7, 1967

3,307,573

FLUSHING MEANS FOR A GRAIN DISCHARGE VALVE

Joshua Epstein, Oreland, Pa., assignor to Acme Process Equipment Company

Filed Nov. 8, 1963, Ser. No. 322,459
2 Claims. (Cl. 137—240)

The following specification relates to an improved flushing means for grain discharge valves. In brewery practice, after the grain has been suitably steeped, the liquid is drained from the spent grains, leaving the latter in a loose relatively dry mass which must be removed from the lauter or mash tub. As these grains are discharged from the bottom of the tub, it has been found necessary for the rim of the discharge and the pivoted discharge valve to be flushed entirely clear of all grain before it is possible to close the discharge valve preliminary to a subsequent mashing operation. This scavenging of the discharge port and valve is ordinarily done manually by a workman. He may even find it necessary to climb into the tub and sweep or flush the valve seat to be sure that the valve will close satisfactorily.

One of the objects of this invention is to provide means for flushing the valve and its seat so that satisfactory closure can be accomplished.

A further object of the invention is to provide the flushing uniformly around the greater perimeter of the valve seat.

A still further object of the invention is to provide means by which the flushing of the valve is controlled mechanically incidentally to the opening and closing movements of the valve.

Among the objects of the invention is to provide limit switches which are adjustable to control the extent of the opening and closing movements of the valve.

As illustrating the invention I have shown the preferred form on the accompanying drawings in which:

FIGURE 1 is a vertical section of the improved grain discharger valve taken on the line 1—1 of FIGURE 2;

FIGURE 2 is a plan view of the same partly in horizontal section;

FIGURE 3 is a similar plan view of the valve and

FIGURE 4 is a side elevation of the valve showing the flushing means and its control.

Briefly described, the invention consists in modifying the seat or rim of the valve to provide a series of channels through which jets of water are projected inwardly so as to impinge upon the upper surfaces of the valve and over the edge of the valve seat. In this manner the meeting surfaces are adequately scavenged so that they may be brought together and a satisfactory leak proof seal provided.

To accomplish this result the supply of flushing water is controlled by a solenoid-operated switch actuated in turn by the downward and opening swinging movement of the valve. Likewise the period during which the flushing takes place is controlled by limit switches actuated by the opening and closing movements of the valve.

The drawings show the bottom 8 of a typical mash tub or the like in which the grain has been steeped. The bottom of this tube has a false bottom 9 in the form of a horizontal screen supported in spaced arrangement above the bottom of the tub. Centrally of the bottom 8, a valve seat 10 is built into the bottom. This seat consists of a metal plate or casting. While it has been shown as oval, it may also be round if found more desirable.

This valve seat forms a discharge port through which the spent grain is dropped. In other words, the intention is to provide a trap door in the bottom of the tub through which the spent grains may be delivered by gravity to a discharge chute 11.

The discharge valve 12 is in the form of a hinged trap door. It has a screen 13, mounted parallel to the upper surface and in the same plane as the false bottom 9 of the tub.

The discharge valve 12 forms a cover plate that may be swung up into the plane of the bottom 8 and close the discharge port. The cover plate 12 has ears 14 extending down from one part of the edge. These ears are rigidly attached to a hinge pin 15. This in turn is journaled on brackets 16 and 16' on either side of the chute 11.

At an intermediate point the lower surface of the cover plate has a series of lugs 17. These form bearings for a pivot pin 18.

A gear sector 19 is fixedly mounted by two central ears 20 on the hinge pin 15. One end of the gear sector 19 carries a plurality of eyelets 21 which are journaled on the aligned pivot pin 18. The gear sector is movable into a housing 22, fixed to one side of the chute 11.

The gear sector 19 has a series of gear teeth 23. These mesh with a worm gear 24 on the end of a shaft 25. The shaft 25 is in a journal bearing 26 running through the housing 22.

It will be seen from FIGURE 1 that the cover plate has a ledge 27 which underlies a peripheral flange 28 on the valve seat 10. The ledge 27 has a peripheral gasket 29 for sealing engagement with the underside of the flange 28.

The above construction follows the design described in detail in the patent granted to Joshua Epstein, April 11, 1950, No. 2,504,070, to which reference is made for further information.

An adapter plate 30 is fixedly mounted opposite the shaft 25. The plate carries a clutch assembly 31 to which is connected a gear reduction unit 32 and a motor 33. The shaft 25 is connected to the clutch assembly 31 in the manner shown in FIGURE 4.

A series of channels or passageways 34 extend substantially radially around the valve seat 10. Each is individually connected by a fitting 35, tubing 36 and fitting 38 to a manifold 39. The manifold is in the form of a pipe attached by pipe straps 40 or the like to the outer side walls of the chute 11.

As shown in FIGURE 3, manifold 39 is connected to a supply pipe 41. This supply pipe is controlled by solenoid volve 42. By actuating the valve 42, water under pressure is delivered to the manifold 39 and thence through channels 34 to the space beneath the overhanging flange 28 of the seat and above the ledge 27 on the cover plate.

The shaft 15 projects beyond the chute 11, as shown in FIGURE 3. The shaft is there provided with an adjustable cam 43. Inwardly of the cam 43, shaft 15 also carries an actuating lever 44 which is also adjustable in position around the shaft 15.

A bracket 45 is mounted on the outer wall of the chute 11. The bracket carries a push roller switch 46. This is connected to the solenoid valve 42. When the motor 33 drives the worm shaft 25 to raise the cover plate 12 from its open position, the cam 43 rides over the switch 46. This opens the solenoid 42 and supplies water under pressure from the supply pipe 41 to the manifold 39. The delivery of water through the passageways 34 continues until the cover plate is brought up into tight sealing engagement under the flange of the valve seat. During this operation, the water jets have sufficient force to flush the ledge of the valve plate and make possible the proper sealing of the gasket 29 against the flange 28.

The cam 43 then rides up off the switch 46 and the solenoid valve closes.

The limit switches 47 and 48 are provided on the

bracket 45, one on each side of the switch 46. These limit switches are within the path of movement of the actuating lever 44 as it is oscillated with the shaft 15. As the cam 43 operates to close the switch 46, the limit of movement brings the lever 44 into contact with the limit switch 47 and closes solenoid 42 and the supply of water.

In the opening movement, the shaft 15 oscillates in the opposite direction. This releases the limit switch 47 as the lever 44 travels to the right as shown in FIGURE 4. The cam 43 will incidentally close switch 46 temporarily and provide a flushing stream through the pipe 39 until the lever 44 actuates limit switch 48. This closes the supply of water and simultaneously stops the motor. In the meantime cam 43 releases switch 46 to resume its normal open position. Limit switches 47 and 48 are connected to motor 33 by electrical conductors 47' and 48' in the manner well known to those skilled in the art to perform the above described stoppage of motor 33 when its open and closed limits are reached.

The operation of the gear sector 19 by the motor 33 is of course subject to manual control of the latter in each direction.

By the novel features of this arrangement, the switch valve or cover plate on being opened will allow discharge of the spent grain from the mash tub. This is accompanied by flushing jets of water under pressure above the open valve plate. Whenever the valve is moved upwardly into the valve seat, the water jets are again directed over the surface of the valve. The valve is thus flushed or scavenged so that no part of the spent grain adheres. The final movement of the valve into sealing position is thus insured.

The control of the flow of scavenging jets is actuated by the movement of the valve in each direction.

The example illustrated and described is that of the preferred form of the invention. It is, however, possible to make minor changes in design and arrangement of parts within the scope of the following claims.

What I claim is:

1. In a steeping tub having a bottom, an annular valve seat attached to said bottom, a hinged valve cover attached to said bottom and movable between a closed position in which said valve cover engages said valve seat and an open position in which said valve cover is disengaged from said valve seat, said valve seat having an overhanging peripheral flange and said valve cover having a peripheral ledge positioned to engage said peripheral flange in the closed position of said valve cover, and means for moving said valve cover between the open and closed positions thereof, the improvement comprising a plurality of passageways formed in said annular valve seat, said passageways being directed between said peripheral flange and said peripheral ledge, an annular manifold attached to said bottom, a plurality of conduits each connected between a corresponding one of said passageways and said annular manifold, a source of fluid under pressure coupled to said manifold, flushing valve means coupled between said fluid source and said manifold, a solenoid valve actuator connected to said flushing valve means for opening and closing said flushing valve means, cam means coupled to said hinged valve cover and movable therewith, switch means engageable by said cam means to be actuated thereby when said valve cover approaches its closed position and to be de-actuated thereby when said valve cover reaches its closed position, and said switch means being electrically coupled to said solenoid valve actuator to open said flushing valve means in response to the actuation of said switch means and to close said flushing valve means in response to the de-actuation of said switch means, thereby automatically flushing said peripheral flange and peripheral ledge with jets of fluid directed thereto by said passageways prior to the closing of said valve cover.

2. The combination defined in claim 1 wherein said hinged valve cover is rigidly attached to a shaft, said shaft being journaled to said bottom, said cam means being attached to said shaft and being movable therewith, said means for moving said valve cover between the open and closed positions thereof comprising an electric motor, gear means coupled between said motor and said valve cover, a lever attached to said shaft and movable therewith, a pair of limit switches mounted adjacent to said lever, one of said limit switches being positioned to be actuated by said lever when said valve cover reaches its closed position, and the other of said limit switches being positioned to be actuated by said lever when said valve cover reaches its open position, and said limit switches being electrically connected to said motor to automatically stop said motor when said valve cover reaches its fully opened or fully closed position.

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