June 18, 1940. J. C. SCHUMACHER 2,204,704

DOUBLE PAN HOPPER

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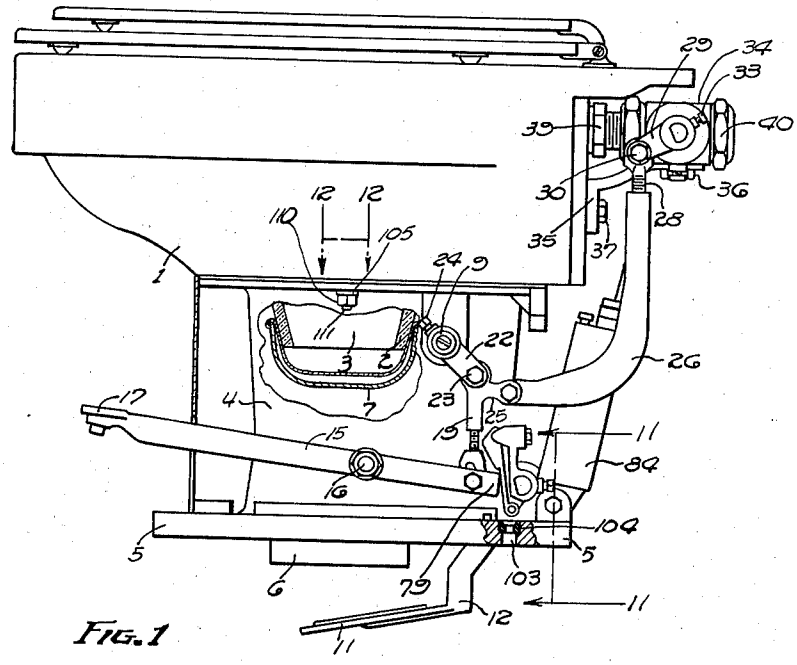


FIG. 1

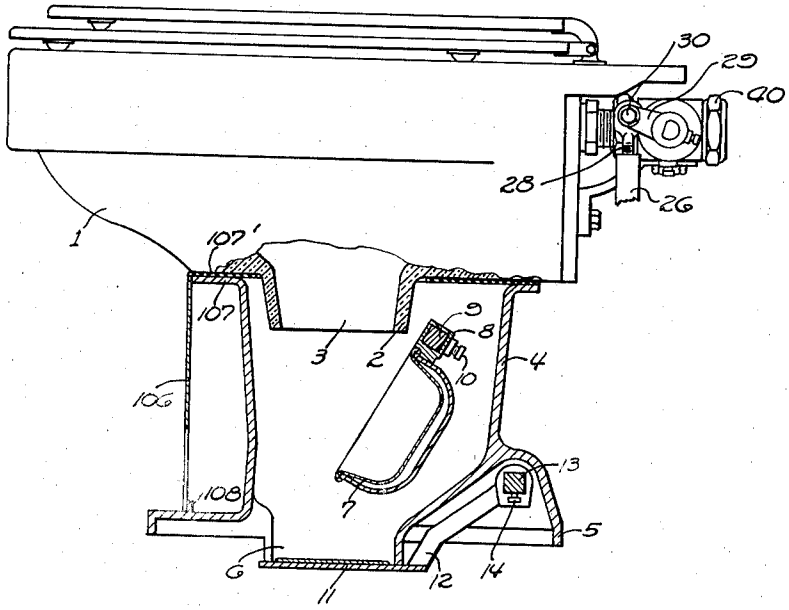


FIG. 2.

INVENTOR.
JOHN C. SCHUMACHER
BY John A. McLeran
ATTORNEY.

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DOUBLE PAN HOPPER

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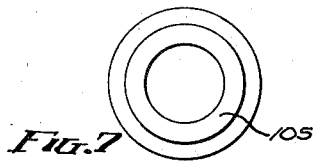


FIG. 7

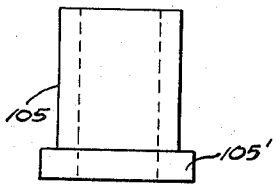


FIG. 8

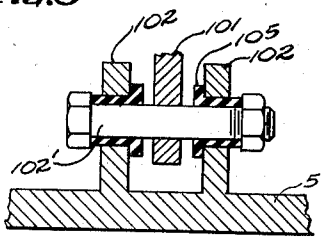


FIG. 11

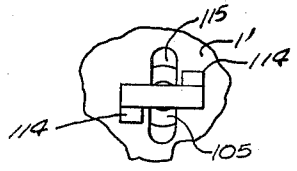


FIG. 12

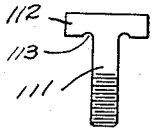


FIG. 13

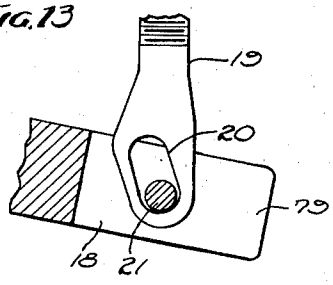


FIG. 6

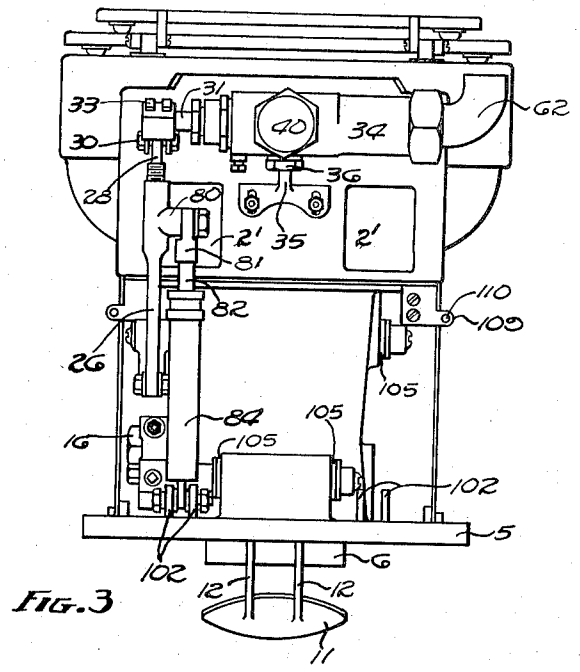


FIG. 3

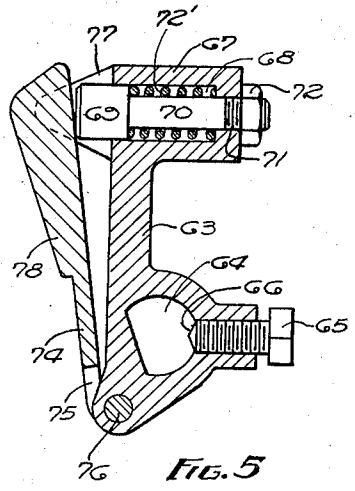


FIG. 5

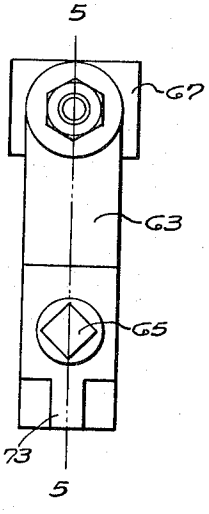


FIG. 4

INVENTOR
JOHN C. SCHUMACHER
BY John A. McLean
ATTORNEY

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DOUBLE PAN HOPPER

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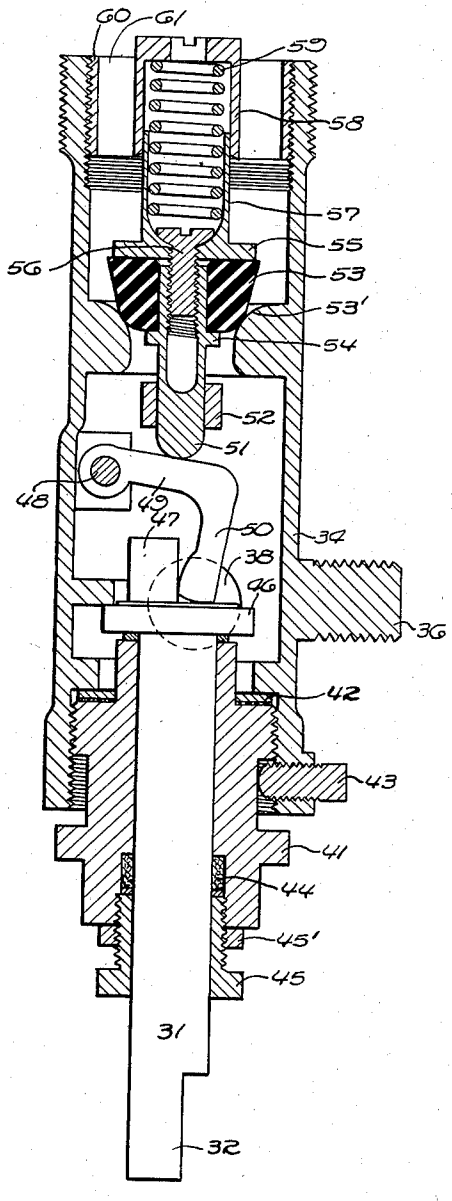


FIG. 9

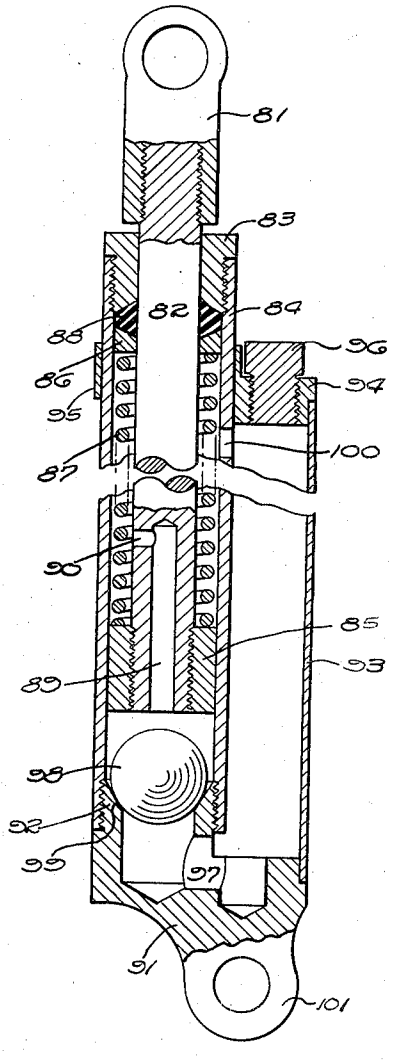


FIG. 10

INVENTOR
JOHN C. SCHUMACHER
BY John D. McLean
ATTORNEY

Patented June 18, 1940 2,204,704

UNITED STATES PATENT OFFICE

2,204,704

DOUBLE PAN HOPPER

John C. Schumacher, Dayton, Ohio, assignor to The Dayton Manufacturing Company, Dayton, Ohio, a corporation of Ohio

Application February 3, 1939, Serial No. 254,455

28 Claims. (Cl. 4—85)

This invention relates to improvements in water closets designed to be used in connection with transportation vehicles.

It is particularly an object of this invention to provide a hopper for a water closet in which all weights are eliminated.

It is also an object of this invention to provide a water closet having the usual flush pans which are positively operated and controlled so that all pan flopping is eliminated, and in which there is maintained a minimum water seal approximately double that previously obtainable.

It is also an object of this invention to provide a water closet having a plurality of pans for flushing purposes, one of said pans being in a normally closed position and forming a water seal while the other pan is in an open position.

It is also an object of this invention to provide a water closet having a pair of pans so constructed and operated that one is normally closed while the other is opened and maintained in these positions without any wabbling or flopping of the pans, so that a permanent water seal is maintained until the pans are operated for flushing purposes in which operation the open pan is first closed and thereafter the closed or water sealed pan is open.

It is also an object of this invention to provide a water closet having a plurality of flushing pans normally held in one operative position, and automatically return to said position after flushing operation.

These and other advantages will appear from the following description taken in connection with the drawings in which:

Figure 1 is a side elevation of the hopper with the parts thereof broken away to show the interior parts thereof with the pans in position for the last stage of dumping. In this view the upper pan is shown in closed position while the lower pan is shown in its lower open position. The parts are in their normal positions.

Figure 2 is a side elevation of the hopper with the lower part thereof in sections to show the relative positions of the pans after the lower one has been closed and the upper one lowered in the first step of flushing.

Figure 3 is a rear elevation of the hopper with the operating mechanism connected therewith.

Figure 4 is a rear view of an arm for raising the lower pan.

Figure 5 is a section on line 5—5 of Figure 4.

Figure 6 is a vertical section through one end of an operating lever showing the manner in which this lever is connected to an arm for moving one of the pans.

Figure 7 is an end view of a bearing member or bushing composed of bakelite or some other material not a conductor of electricity.

Figure 8 is a side elevation of the bushing shown in Figure 7.

Figure 9 is a longitudinal vertical section through the valve mechanism controlling the admission of water to the hopper.

Figure 10 is a longitudinal vertical section through a dash-pot mechanism for regulating and controlling the return of the flush pans to their normal positions.

Figure 11 is a section on line 11—11 of Figure 1.

Figure 12 is a section on line 12—12 of Figure 1 showing the manner and means by which the bowl is attached to a supporting member.

Figure 13 shows the T belt used for attaching the bowl to its supporting structure and for attaching the valve structure to the bowl.

In Figures 1, 2 and 3 there is shown applicant's complete water closet structure, in which a bowl of vitreous earthenware or any other material is indicated by the numeral 1. This bowl has a downwardly extending central spout 2 which forms an outlet 3 into a lower compartment of cast aluminum alloy or any other material suitable for forming a base member 4 on which the bowl rests and which has at its lower end a base 5 and an outlet 6 immediately beneath the outlet 3. The outlet 3 of the bowl compartment may be closed by means of a cup-shaped pan 7 which in its closed position surrounds and fits over the spout at its lower end and contains water to form a water seal. On one side of the pan 7 is an extension 8 adapted to receive a shaft 9 suitably supported by bearings in opposite sides of the base member 4. The pan is held in position on the shaft as by means of a set screw 10.

The lower outlet 6 may be closed by means of a pan 11 which may be of any suitable shape or form to properly close the outlet. This pan 11 is provided with arms 12 which are formed to receive a shaft 13 and are held in suitable position thereon by means of set screws 14, one adjacent each arm. The shaft 13 and the shaft 9 are supported in bearings or bushings such as shown in Figures 7 and 8.

The base member 4 is provided at each side with means for supporting a lever 15, such as a pivot 16. These pivots may be studs projecting from the sides of the base member or other suitable structures. On the front end of the lever 15 is a foot-piece 17, while the rear end of the

lever is slotted at 18, as shown in Figure 6, to receive the lower end of a link 19 which is composed of two parts, one threaded into the other. One part has an elongated hole 20 therein to receive a pin 21 in the rear end of the lever 15. The other part of link 19 extends upwardly and has attached to its upper end one end of an arm 22 by means of a bolt or pin 23. The other end of the arm 22 from the bolt 23 is attached to one end of the shaft 9 for moving the pan 7. The connection between the shaft 9 and the arm 22 is such that whenever the arm 22 moves the shaft 9 is rotated.

The arm 22 may be adjusted longitudinally on the shaft 9 by means of a screw 24. Extending from the upper end of the link 19 and to the rear thereof is a projection 25 which is pivotally connected to one end of a link 26 by means of a bolt or other suitable instrumentality. Threaded into the upper end of the link 26 is a member 28 which is pivotally attached to one end of an arm 29 by means of a bolt or pin 30. The other end of the arm 29 is attached to one end of a valve stem 31 slotted at one side, as indicated by numeral 32, to receive the arm 29 which has therein a hole similar in shape to the end of the stem. The arm 29 is held against sliding movement on the valve stem by means of a screw 33. This valve stem is adapted to rotate in a valve casing 34 located at the rear of the bowl and supported thereon by means of a bracket 35 attached to the valve casing by means of a stud and nut mechanism 36 and attached to the bowl by means of bolts 37. The valve casing has oppositely disposed outlets 38 therein.

In Figures 1 and 2, one of these outlets is shown as being connected to the bowl by means of a suitable coupling 39, while the other oppositely disposed outlet is closed by means of a plug 40. One end of the valve casing has therein a hollow plug 41 which serves as a bearing and support for the valve stem 31. Between the inner end of the plug 41 and the casing is a packing 42 of any suitable material. This plug is threaded into the end of the valve casing and is held against movement therein by means of a screw 43. The outer end of the hollow plug 41 is enlarged so as to form space for a packing 44 and has threaded therein a sleeve member 45 adapted to hold the packing in place and force it against the surface of the valve stems. A locknut 45' is threaded on the sleeve member 45 for engagement with plug 41 to hold the sleeve member 45 in position in the plug 41 and against the packing 44.

On the inner end of the valve stem is a disc-like head 46 which has projecting therefrom a cam projection 47. Supported on a pin or other suitable means 48 in the casing is a lever which has adjacent its pivot 48 a transversely extending part 49 and remote from the pivot 48 and at right angles to the part 49 is a longitudinally extending part 50 adapted to be engaged by the cam projection 47 for operating a valve which has a valve stem 51 engaged by the part 50 of the lever. The stem 51 is guided and supported by means of a guide 52 attached to and supported by the valve casing.

On the end of the valve stem away from the lever is a valve member 53 composed of any suitable material. This valve member rests against a shoulder 54 formed around the valve stem and is held in position by means of a plate 55 attached to the valve stem by means of a screw 56 threaded into a longitudinally disposed hole in the valve stem. Extending from the plate 55 and longitudinally of the valve stem is a sleeve 57 which is adapted to move to and fro in a cup member 58. In the cup member 58 and the sleeve 57 is a spring 59 which tends to hold the valve against the valve seat 53'. The cup member 58 is located centrally of an annular member 60 threaded into the end of the casing 34 and is supported with relation thereto by means of radial arms 61. Suitably connected to the end of the casing 34 adjacent the cup member 58 is one end of an inlet L 62.

On one end of the shaft 13 is an arm 63 which has in the lower end thereof a substantially semi-circular-shaped hole 64 to receive a similarly shaped end of the shaft 13. This arm and its cooperating structures may be placed at either side of the hopper and for that purpose the lateral sides of the hopper are similarly constructed and similarly formed. The arm 63 is held against longitudinal movement on the shaft 13 by means of a screw 65 which has its inner end formed into a point 66 adapted to rest in a similarly shaped seat in the shaft 13. The upper end of the arm 63 has thereon a head 67 with a well 68 therein. In this well is a plunger 69 which has a stem 70 extending through a hole 71 in the bottom of the well. The outer end of the stem 70 is threaded to receive an adjusting nut 72. By means of this nut the tension of a spring 72' around the stem 70 may be adjusted and the extent of the projection of the plunger from the head may be adjusted.

The lower end of the arm 63 is provided with a lug 73 adapted to fit in a slot 75 in the lower end of a plate 74, pivoted to the lug 73 by means of a pin or bolt 76. The upper end of the plate 74 is guided in its movement in relation to the arm by means of a pair of spaced guides 77 extending from the head 67 on opposite sides of the plunger. The upper end of this plate 74 is located between the arms 77 and against the plunger 69. The forward face or surface of the plate 74 is formed of hard bronze or other suitable hard material so that it will resist wear.

In order to swing the pan 11 upward the rear end of the lever 15, indicated by the numeral 79, engages the forward hard surface 78 of the plate or arm 74.

Extending inwardly from the upper end of the link 26 is a boss 80 to which is pivotally connected one end of a head member 81, which has its other end threaded onto one end of a stem 82 located in a cylinder 84, closed at one end by means of a sleeve 83 through which the stem 82 passes. In the cylinder and on the end of the stem opposite the head 81 is a piston 85 which is engaged by one end of a spring 87. This spring is engaged at its other end by a shoulder 86 located within the cylinder adjacent the inner end of the sleeve 83 and between the sleeve 83 and the shoulder 86 is a packing 88 adapted to prevent the escape of any fluid from the cylinder. The end of the stem adjacent the piston 85 is provided with a longitudinal passageway 89 connected at its upper end by a transverse passageway 90 with the interior of the cylinder above the piston. At the lower end of the cylinder is a member 91 which has a threaded projection 92 extending into the lower end of the cylinder.

At one side of the cylinder is a barrel 93 which has in its upper end a head 94 attached to the cylinder by means of a strap 95. The head is provided with a threaded opening which is closed by means of a threaded plug 96. A passageway

from the lower end of the barrel into the lower end of the cylinder is indicated by the numeral 97 and is controlled by means of a ball valve member 98 adapted to rest on a valve seat 99 formed in the extension 92. The upper end of the barrel is provided with a passageway 100 leading into the cylinder so that fluid may pass from the barrel into the cylinder or from the cylinder into the barrel. The member 91 is provided at its lower end with a lug 101 adapted to fit between ears 102 of either pair of two pairs of ears located on the base, as is shown from Figure 3. The base is provided with a plurality of holes 103, as shown in Figure 1, for the purpose of attaching the apparatus to a suitable support, such as the floor of the vehicle. These holes are lined or have therein a lining of Bakelite or some other insulating material, as indicated by the numeral 104.

The various shafts are supported in bushings or bearings made of Bakelite or of like suitable material. These bearings are shown in Figures 7 and 8 and have a cylindrical part 105 with a head-like projection 105' at one end. Each of the shafts 9, 13, 16 and a brass bolt 102' passing through the ears 102 and the lug 101, as shown in Figure 11, is provided with these bushings or bearings. By means of these bushings or bearings and a gasket 107' the various parts of the apparatus are insulated from one another so the apparatus may be protected from possible electrolysis.

Around the base member of the apparatus is a skirt or apron 106 which fits at its upper end against a flange 107 forming a shoulder beneath the bowl and at its lower end against a shoulder 108 formed on the base. This skirt may be easily removed or placed in position whereby access to the working mechanism is possible. For the purpose of holding the apron or skirt in position there is provided on the skirt at each side of the hopper means for receiving a bolt or screw 110 which engages suitable arms or projections 109 attached to the rear part of the hopper in any suitable manner.

The bowl rests upon the gasket 107' which is between the bowl and the upper part of the bowl support, and is attached thereto by means of a T-shaped bolt which has a stem 111 and a head former of lateral projections 112 which have depressions 113 adjacent the stem. When this bolt is applied to the hopper for holding the bowl in place, the wings or projections 112 engage studs such as 114 shown in Figure 12, for preventing the rotation of the bolt.

For the purpose of supporting the valve casing 34 on the hopper, the rear of the bowl is provided with a false back 1' which has a space between it and the main back part of the bowl which is entered by means of openings 2' as shown in Figure 3. This false back has a pair of vertical slots, one of which is illustrated, or shown in Figure 12. Through these slots, the heads 12 of T-shaped bolts are inserted. After these bolts have their heads inserted through the slots 115, the bolts and heads are rotated until the heads engage the studs 114. After this, the nuts are applied to the bolts for holding the valve casing properly positioned on the rear or back of the bowl.

Through the operation of the mechanism shown in Figure 10 the pans are returned to and maintained in the positions shown in Figure 1 where one pan has a sufficient amount of water therein that a water seal is formed between the pan and the spout 3.

When it is desired to flush the hopper the front end of the lever 15 is pressed down by placing the foot on the part 17. In this operation the end 79 of this lever engages the surface 78 of the plate 74 so that through the movement of the arm 63 pan 11 is first raised into engagement with the lower edge of the spout 6. Thereafter by a continued movement of the lever 15 the pin 21 is brought into engagement with the link 19 at the upper edge of the elongated hole 20 so that the link 19 is forced upward thereby lowering the pan 7 and through the link 26 operating the arm 29 to open the valve for admitting water into the hopper to be supported by the closed pan 11. During the time that the matter is dumped from pan 7 into pan 11, pan 11 is held in place by means of the arm 63, the plate 74 and the spring operated plunger 69 acting upon the plate 74 to hold the pan 11 in its closed position so that no air can enter the lower part of the bowl through the opening adapted to be closed by the pan 11. The tension tending to keep the pan 11 closed may be increased or regulated by means of the nut 72 and the spring 72'.

The tension of the spring 72' may be regulated or adjusted through the nut 72 on the end of the bolt 70 and when properly adjusted the water accumulating in the hopper may by its weight slightly lower the pan 11 through its weight so that the water will escape through the bottom of the hopper and not over-flow the top of the bowl. By this adjustment, a desired water level may be maintained in the bowl and an over-flow of the water prevented in the event that the foot lever be held in a lower position for any unusual length of time.

When the foot is removed from the lever 15 the operation of the spring in the cylinder 84 acts to close the pan 7 about the spout 3 and to permit the lowering of the pan 11 by its own weight. Before the valve is completely seated, a sufficient amount of water escapes into the pan 7 for the purpose of forming the close water seal. The time in which the pans are returned to the position shown in Figure 1 from the position shown in Figure 2, is determined by the speed with which the parts shown in Figure 10 operate. The spring 87, acting upon the piston 85, tends to return the pans to the position shown in Figure 1. The presence of a fluid in the cylinder 84 and in the barrel 93 tends to retard the movement of the piston in the cylinder. This retardation action of the fluid may be varied by varying the size of the hole 90 and the passageway 97.

As the piston moves outwardly in the cylinder, fluid is drawn from the barrel into the cylinder by the ball valve 98 and the fluid from the part of the cylinder above the piston 85 may either pass through the hole 100 into the barrel or through the hole 90 and passageway 89 into the part of the cylinder beneath the piston. The speed with which the spring moves the piston and the parts connected thereto may be varied by using fluids of different viscosity. Light oils would permit a more rapid movement of the piston in the cylinder than would heavy oil.

The valve in the valve casing 34 is so positioned with relation thereto that the valve casing after the hopper has been flushed is substantially free of any water therein so that there is no danger of the valve casing being injured by water freezing.

What I claim and wish to protect by Letters Patent is:

1. In a water closet, a hopper having a flush pan, an arm for operating said pan, and a member engaging said arm and operable to move along the surface of said arm for moving the arm and operating said pan, said member comprising a lever having at one end a foot piece.

2. In a water closet, a hopper having a flush pan, an arm having thereon an adjustable member for operating said pan, and a member engaging and moving along the surface of said adjustable member for moving the arm and operating the pan.

3. In a water closet, a hopper having a flush pan, an arm having thereon an adjustable member for operating said pan, means adapted to move along the surface of said adjustable member for moving the arm and operating the pan, and means tending to urge the adjustable member away from said arm and against said first named means.

4. In a water closet, a hopper having a flush pan, means to move said pan into closing position, and dashpot means for moving said pan to open position and for regulating the speed at which it moves to open position.

5. In a water closet, a hopper having a flush pan and a connection to a supply of water, means operating at first to move the pan into closing position and thereafter to admit water to the hopper, and means acting on the release of the first named means to automatically cut off the water and to move the pan to open position.

6. In a water closet, a hopper having a flush pan and a connection to a supply of water, means operating at first to move the pan into closing position and thereafter to admit water to the hopper, and means to automatically move the pan to open position and cut off the water, said last named means comprising a cylinder, a piston in the cylinder and a spring in the cylinder operating on the piston.

7. In a water closet, a hopper having a flush pan and a connection to a supply of water, means operating at first to move the pan into closing position and thereafter to admit water to the hopper, and means to automatically move the pan to open position and cut off the water, said last named means comprising a cylinder having a fluid therein, a piston in the cylinder, a spring in the cylinder operating on the piston and a by-pass for the fluid.

8. In a water closet, a hopper having a flush pan and a connection to a source of water, means to move the pan to flushing position and at the same time to admit water to the hopper, and means connected to the pan to automatically shut off the water and to move the pan into position to close the hopper.

9. In a water closet, a hopper having a flush pan and a connection to a source of water, means to move the pan to flushing position and at the same time to admit water to the hopper, and means to automatically shut off the water and to move the pan into position to close the hopper, said last named means comprising a cylinder, piston in the cylinder and a spring in the cylinder acting on the piston.

10. In a water closet, a hopper having a flush pan and a connection to a source of water, means to move the pan to flushing position and at the same time admit water to the hopper, and means to automatically shut off the water and to move the pan into position to close the hopper, said last named means comprising a cylinder having a fluid therein, a piston in the cylinder, a spring in the cylinder acting on the piston and a by-pass for the fluid.

11. In a water closet, a hopper having a pair of flush pans, an arm for each pan, a lever in sliding engagement with one arm for moving it, and a loose link connection between the lever and the other arm, whereby a movement of the lever will by sliding engagement with said one arm cause one pan to move to a closing position and thereafter will by the loose link connection cause the other pan to move to an open position.

12. In a water closet, a hopper having a pair of flush pans, an arm on each pan, a link connected to one arm, and a member slidably engaging the other arm to move it and having a loose connection with the link whereby a movement of said member will cause said other arm to be moved to first close one pan and the link to be moved to thereafter open the other pan.

13. In a water closet, a hopper having a pair of flush pans, said pans having an initial flushing position and a final flushing position, means to move said pans to initial flushing position and admit water into the hopper and means on release of first named means to automatically move said pans from the initial flushing position to final flushing position.

14. In a water closet, a hopper having a pair of flush pans, said pans having an initial flushing and a final flushing position, means to move said pans to initial flushing position and means on release of first named means to automatically move said pans from the initial flushing position to final flushing position, said last named means comprising relatively movable members, a spring for moving said members and a fluid for regulating the movement of said members.

15. In a water closet, a hopper having a pair of flush pans, means to move said pans to initial flushing position and means to move said pans from the initial flushing position to final flushing position, said last named means comprising a cylinder, piston in the cylinder, a spring acting on the piston and a fluid in the cylinder to retard the movement of the piston in the cylinder.

16. In a water closet, a hopper having a pair of flush pans and a connection to a water supply, means to move the pans and to open the connection for flushing the hopper, and means cooperating with the first named means to make regular and smooth the movements of the pans, said last named means comprising a dash-pot structure between the first named means and the hopper.

17. In a water closet, a hopper having a pair of pans, means tending to hold each pan in one position, and means to move each pan to another position for flushing the hopper, and means to admit water to the hopper for flushing purposes, said first means acting to return each pan to its first position in a regular and even manner, and acting to regulate and to smooth the action of the second named means.

18. In a water closet, a hopper having a pair of pans, an upper and a lower, and a connection to a water supply, means movable to first close lower pan by its initial movement and to keep lower pan in firm position and thereafter on further movement to open upper pan and open water connection for flushing while lower pan remains closed and means cooperating with the first named means to make regular and smooth the movements of both pans, said last named means

comprising a dash-pot structure between the first named means and the hopper.

19. In a water closet, a hopper having a lower pan, an upper pan and a connection to a water supply, movable means adapted on its initial movement to close lower pan and thereafter on further movement to open the upper pan and open the water connection to flush hopper, while holding the lower pan in a closed position, and means to make regular and smooth the movements of both pans, said last named means also acting to close the upper pan and open the lower pan.

20. In a water closet, a hopper having a lower pan, an upper pan and a connection to a water supply, means operable first to close lower pan and thereafter to open the upper pan and open the water connection to flush the hopper while holding the lower pan in a closed position, and means to make regular and smooth the movements of both pans, said last named means also acting to close the upper pan and open the lower pan, said last named means comprising a dash-pot structure acting on the first named means.

21. In a water closet, a hopper having a base, a valve mechanism for admitting water to the hopper, a pan for flushing the hopper and automatic means attached to the base and operating on the valve mechanism to cut off the water from the hopper and on the pan to bring the pan to and hold it in a closed position.

22. In a water closet, a hopper having a base, a valve mechanism for admitting water to the hopper, a pan for flushing the hopper, a connection between the valve mechanism and the pan, and means attached to the base and connected to said connection for automatically operating the valve mechanism to shut off the water from the hopper and the pan to bring the pan to closed position and to hold the pan in closed position.

23. In a water closet, a hopper having a flush pan, an arm for moving the flush pan to open and close the hopper, a plate mounted on the arm, an adjustably and resiliently mounted member for holding the plate in spaced relation to the arm, and means to engage the plate for operating the arm to open and close the pan.

24. In a water closet, a bowl having a flush pan, an arm adapted to operate the pan to open and close the bowl, a plate mounted on said arm, resilient means to hold the plate in spaced relation to the arm, and a lever pivotally mounted on the hopper with one end engaging the plate for operating the arm to move the pan to open and close the hopper.

25. In a water closet, a bowl, a shaft rotatably mounted on said bowl and having its ends projecting beyond the bowl, a flush pan on the shaft adapted to open and close the bowl, an arm having in one end a hole to receive one end of the shaft, means to prevent the movement of the arm on the shaft, a plate adjustably and resiliently mounted on the arm, a pivot member on each side of the bowl, and a lever adapted to be pivotally mounted on either of the pivot members and having an end engaging the plate whereby on operation of the lever the arm is oscillated for moving the pan to open and close the bowl.

26. In a water closet, a hopper having an outlet, a pan to close the outlet and a water inlet, a valve to admit water through said inlet to the hopper, and dashpot means acting to simultaneously close the valve and move the pan to close the outlet.

27. In a water closet, a hopper having a discharge passageway, a pan adapted to close at one point said passageway and a water inlet valve to admit water to the hopper, means acting to close the valve and move the pan to close the passageway, a second pan adapted to close said passageway at another point, and means acting to first move the second pan to close the passageway and thereafter acting against the first named means to open the valve and to move the first named pan to open the passageway.

28. In a water closet, a hopper having a pair of compartments, means to admit water to one compartment and cause the material therein to be discharged into the other compartment and temporarily retained therein, means to cut off the water and shut off the said one compartment from the other and thereafter to cause the material in said other compartment to be dumped out, said last named means acting to retard and make smooth the operation of the first named means.

JOHN C. SCHUMACHER.