

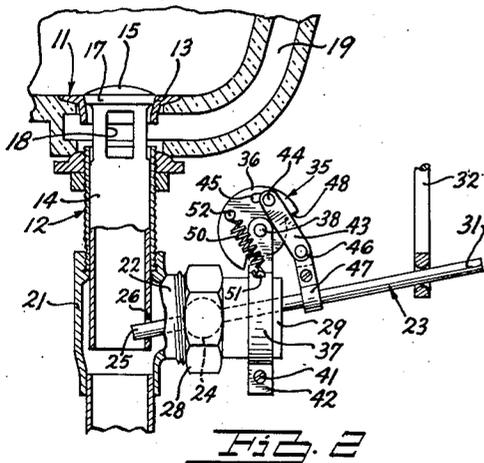
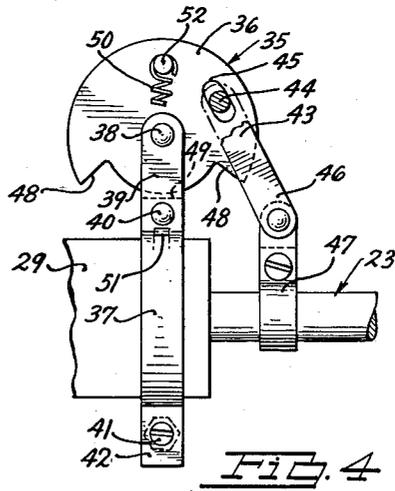
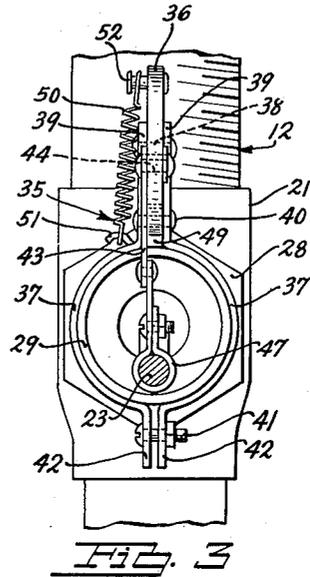
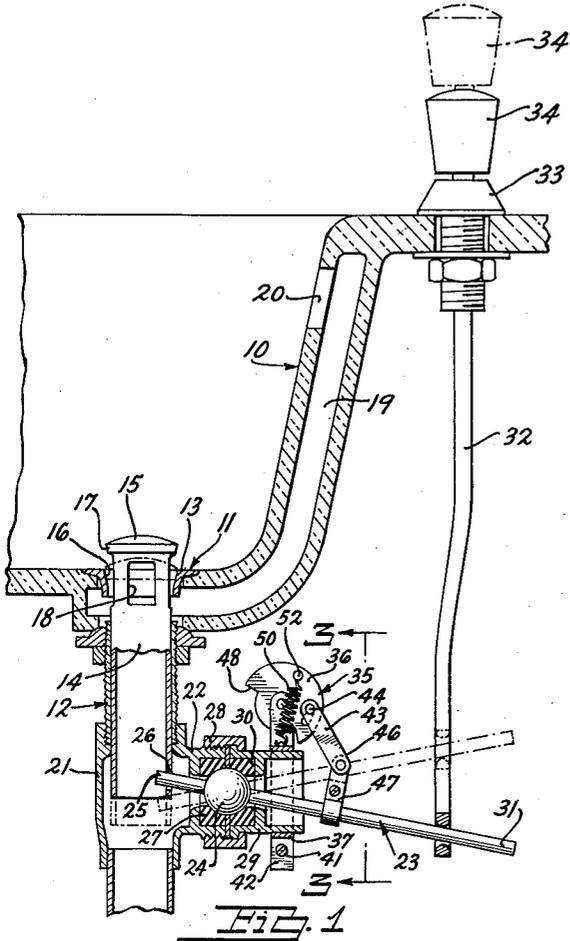
Oct. 30, 1956

L. SMITH

2,768,388

DRAIN VALVE MECHANISM

Filed March 17, 1955



INVENTOR.
LEONARD SMITH
BY
John Joseph Roethel
ATTORNEY

1

2,768,388

DRAIN VALVE MECHANISM

Leonard Smith, Detroit, Mich.

Application March 17, 1955, Serial No. 494,902

6 Claims. (Cl. 4—200)

The present invention relates to an improvement in waste water outlet closure mechanisms for lavatories, bathtubs or the like of the type which are commonly called "pop-up" drain plugs.

The conventional waste water outlet closure mechanism for preventing the discharge of water from a lavatory, bathtub or the like until after the water has been used comprises a valve member movable into and out of seating engagement with a valve seat member. Movement of the valve member is accomplished through a linkage system having an actuating knob accessible at some convenient location at the upper surface of the lavatory, bathtub or the like. Generally, the actuating knob is adapted to be raised when it is desired to close the discharge outlet, this resulting in the drain plug or valve member being pulled downwardly into engagement with its seat. To open the discharge outlet, the actuating knob is pushed downwardly resulting in the drain plug being lifted off its seat. After some usage of the conventional mechanism of this type, it is found that the drain plug or valve member fails to seat properly or tightly enough resulting in an annoying loss of water from the lavatory, bathtub or the like.

The failure of the drain plug to seat properly may be due to a number of causes. After the various link connections and packing used in the mechanism become worn, the weight of the actuating knob and the linkage members may be sufficient to overcome the lessened friction of the worn connections and packing and thereby cause the drain plug or valve member to be lifted enough to allow seepage. Further, the absence of positive pressure holding the valve member or drain plug in contact with the seat permits dirt, soap, grease and the like to interfere with the seal between the valve member and its seat thereby permitting seepage. In some installations some form of toggle action device is included in the closure operating mechanism, which toggle action device functions to ensure the proper movement of the rocker arm used to translate the upward motion of the actuating rod to a downward motion of the valve member or drain plug. Generally, however, no pressure is exerted by the toggle action device to urge the drain plug downwardly into continuous tight engagement with its seat after the rocker arm has assumed its position corresponding to the closed position of the valve member or drain plug.

It is an object of the present invention to provide a spring actuated mechanism attachable to the rocker arm of the closure mechanism whereby the valve member or drain plug will be maintained in its open or closed position under pressure. Mechanism of this type heretofore have been proposed but usually were designed as an integral part of the closure operating mechanism on the lavatory, bathtub or the like as originally installed. It is a further object of the present invention to provide a pressure exerting mechanism which may be part of the original installation, but even more important, which is particularly adapted to be attached to existing lavatory

2

and bathtub installations whereby the original effectiveness of the valve member or drain plug in preventing the seepage of water may be restored.

Various features of the present invention will be explained in detail and other objects and advantages thereof will appear in the following description and appended claims, reference being had to the accompanying drawing forming a part of the specification wherein like reference characters designate corresponding parts in the several views.

Fig. 1 is a vertical section through a portion of a lavatory provided with a waste water outlet mechanism constructed in accordance with the present invention.

Fig. 2 is a view in part similar to Fig. 1 illustrating the mechanism of the present invention in a second position of operation thereof.

Fig. 3 is an elevation looking in the direction of the arrows 3—3 of Fig. 1.

Fig. 4 is a view in part similar to Fig. 1 illustrating the mechanism in enlarged detail and in a neutral or dead-center position during the operation thereof.

Before explaining in detail the present invention it is to be understood that the invention is not limited in its application to the details of construction or arrangement of parts illustrated in the accompanying drawings, since the invention is capable of other embodiments and of being practiced or carried out in various ways. It is also to be understood that the phraseology or terminology employed herein is for the purpose of description and not of limitation.

For purpose of illustration, the invention has been shown in the drawing as applied to a lavatory or wash basin 10 having a waste water outlet 11 in the bottom thereof communicating with a waste water pipe assembly, generally designated 12. As in most conventional installations, the waste water outlet 11 comprises a valve seat 13 adapted to cooperate with a valve member or drain plug 14 having an enlarged head 15 thereon. It will be noted that the valve seat 13 preferably is provided with a tapered wall 16 adapted to cooperate with a tapered lateral face 17 of the enlarged drain plug head 15 to provide an effective water seal. The drain plug 14 below its head 15 is tubular and is provided with lateral inlets 18 providing passageways for water flow from the basin 10 into the waste pipe 12 when the drain plug 14 is in its up position as shown in Fig. 1. The lateral inlets 18 communicate also with a passageway 19 formed in the wall of the basin, the passageway leading to an overflow aperture 20 near the upper portion of the basin.

The pipe assembly 12 includes a fitting 21 having a lateral extension 22 thereon. The lateral extension 22 is illustrated as housing a laterally extending operating rod 23 therein. The operating rod 23 is illustrated as having a spherical ball portion 24 thereon near the left end 25 thereof as viewed in Fig. 1. The left end 25 of the operating rod projects into an aperture 26 in the tubular portion of the drain plug 14. The spherical ball portion 24 of the operating rod 23 is seated in a suitable packing body 27 which is effective to prevent unwanted discharge of water through the lateral extension 22 of the fitting 21. As illustrated, the lateral extension 22 of the fitting 21 has coupled thereto by a coupling device 28 an additional extension or nipple 29 housing a packing body 30 also effective to provide a support seat for the spherical ball portion 24 of the operating rod 23. A substantial portion of the operating rod projects to the right, as viewed in Fig. 1. The right end 31 of the operating rod is coupled in any convenient manner to a vertically extending rod 32 which projects through any convenient guiding and bearing means 33 at the upper

3

portion of the basin. The rod 32 terminates with an actuating knob 34 at the top thereof.

The foregoing structure has been described rather briefly since it is merely to provide the necessary background for the understanding of the purpose and object of the present invention. As viewed in Fig. 1, the drain plug 14 is shown in an up position or in a position in which any water in the wash basin 10 would be discharged through the waste pipe 12. The actuating knob 34 for closing the drain pipe is shown in a down position. To close the outlet 12 with the drain plug 14, it is necessary to raise the actuating knob 34 from its down position to the dotted line or up position shown in Fig. 1. The upward motion of the actuating knob 34 is transmitted through the vertical rod 32 to the lateral operating rod 23 swinging the same about the pivot axis formed by the spherical portion 24 thereof seated in the packing 27 and 30 thereby raising the right end 31 of the lateral operating rod 23 to the dotted outline position shown in Fig. 1. This brings the left end 25 of the rod 23 down and results in the drain plug 14 being moved downwardly to its dotted line position as shown in Fig. 1 or its solid line position as shown in Fig. 2.

In the foregoing arrangement, the drain plug 14 will provide an effective means of retaining the water within the wash basin as long as it is held in tight engagement with its seat. Generally, as the moving parts of the mechanism become worn in their connecting joints and as the packing about the spherical ball portion 24 of the operating rod 23 becomes glazed or smooth, the friction in the system decreases to the extent that it cannot be relied upon to maintain the parts in their closed position. In other words, referring to Fig. 1, the weight of the parts of the system to the right of the pivot axis of the spherical ball 24 generally is heavier than the weight of the parts to the left of that spherical axis. When the system is new, the friction therein is usually sufficient to overcome this weight differential and thereby prevents the weight of the parts of the mechanism to the right of the pivot axis causing the parts to the left of the pivot axis to be raised. However, the time is eventually reached when the frictional resistance is insufficient to hold the parts of the mechanism to the right of the pivot axis against downward movement. The mechanism to the left of the pivot axis will move up and the valve or drain plug will be raised slightly from its seat permitting waste water to seep thereunder. Further, frequently soap, grease, dirt or the like will accumulate on the tapered wall 16 of the outlet and interfere with the closing of the drain plug. In this case as the drain plug 14 is moved to its initial closing position the soap, grease or the like will generally be compressed slightly but as soon as the downward pressure on the actuating knob 34 is released the resiliency of the entrapped material will cause the drain plug to be raised slightly off its seat permitting seepage of water around the sides thereof.

Further, in conventional arrangements like the foregoing another difficulty sometimes presents itself. Oftentimes the discharge of the faucet of the basin is directly above the drain plug causing the water to impinge thereupon when the water is being run into the basin. When the mechanism is worn, the force of this impinging water is oftentimes sufficient to move the drain plug 14 into a closed position causing an unwanted filling up of the wash basin.

The present invention embodies a simple and efficient device for overcoming the foregoing difficulties.

The device embodying the present invention comprises a spring action mechanism, generally designated 35, adapted to be mounted on the nipple 29 through which the operating rod 23 projects. As shown in the enlarged views, Figs. 3 and 4, a partially circular plate member 36 is rotatably journaled on the pair of symmetrical clamp members 37 adapted to wrap around the

4

nipple 29. The plate member 36 is journaled on a shaft 38 extending between the vertically upwardly extending arms 39 of the clamp members 37. The clamp members are riveted together just above the lateral extension by a rivet 40 and are adapted to be held in clamping engagement with the nipple 29 by suitable screw and nut means 41 projecting through the vertically depending arm portions 42 of the clamp members 37 below the said nipple.

Near its periphery the plate member 36 has a link 43 connected thereto. The connection comprises a pin or rivet 44 having some freedom of movement in a slot 45 in the plate member. The link 43 is pivotally connected at its lower end 46 to a clamp device 47 which is wrapped around the operating arm or rod 26.

The plate member 36 was described as being only partially circular. It will be noted that the circular form is interfered with by a portion of the plate being of reduced diameter thus providing a couple of stop abutments 48. The stop abutments 48 may be engageable with a stop block 49 carried between the upstanding arms 39 of the clamp members 37 or may be twisted outwardly slightly to engage the edges of the arm portions 39. In the illustrated form the stop block 49 is mounted between the arms 39 being concentric with the rivet 40 and held in position thereby.

To complete the structure of the device, a coiled tension spring 50 is provided. The spring 50 extends between a tab or a hook 51 projecting upwardly from the upper portion of one clamp member 37 to a pin 52 projecting laterally of the plate member 36. The pin 52 is located on the plate member 36 in a position so that the dead center of the spring action should be substantially reached when the actuating knob 34 is substantially intermediate its uppermost and lowermost positions. As shown in Fig. 1, the pop-up drain is in its uppermost position. It will be apparent that the spring 50 is attempting to rotate the plate member 36 in a clockwise direction as therein viewed. The link 43 is thus being urged in a downward direction thereby to cause the operating rod 23 to be urged in a clockwise direction about its pivot axis. Therefore, the drain plug 14 is being urged toward its uppermost position. When it is desired to close the drain outlet, the following must occur. The actuating knob 34 must be raised to cause the operating rod 23 to be pivoted in a counterclockwise direction. Through the inter-engagement of the left end 25 of the rod 23 with the drain plug, the latter will be moved downwardly. The movement of the operating rod 23 in a counterclockwise direction exerts a force on the link 43 tending to raise the same thereby causing the link 43 to rotate the plate member 36 in a counterclockwise direction. The spring 50 will resist such counterclockwise rotation until its dead center position is reached as shown in Fig. 4. As stated above this dead center position should be reached when the actuating knob 34 is about half way up in its direction of movement. Once the dead center position is passed the spring 50 will then urge the plate member 36 in the counterclockwise direction of movement and cause the latter to pull the link 43 upwardly. In their final position, the parts of the device will be as appears in Fig. 2. In this position the plate member 36 and the link 43 are pulling the operating arm in an upward direction thereby ensuring that the drain plug 14 maintains a tight contact with its valve seat.

The stop abutments 48 are provided to prevent the plate member 36 from being rotated by the spring 50 a distance sufficient to completely remove the tension from the spring thereby permitting it to fall off the retaining pin. This could happen prior to installation of the mechanism on the nipple 29 and rod end 31 since after installation the plate member 36 is not intended to move a distance sufficient to cause the stop abutments 48 to become engaged with the stop block 50. Otherwise there

5

would be no assurance that the drain plug would be completely seated.

The pin 44 and slot 45 connection between the upper end of the link and the plate member provides a lost motion connection to ensure that the plate member will not jam at the dead center position thereof through resistance of the rod 23 to swinging movement.

From the foregoing description, it will be apparent that the present invention provides a simple and economical device readily attachable to any lavatory or bathroom drain plug actuating mechanism and one that will ensure tight seating of the drain plug with its valve seat. The mechanism ensures further that the drain plug when in an up position will remain there regardless of the force of the water pouring from the faucet and impinging thereon. The device has the important advantage that no mechanical changes in the structure of the conventional drain actuating mechanism is required. Thus, older units may be restored to full operability by the simple installation of the present invention thereon.

I claim:

1. In a drain valve control mechanism, a control rod, a control rod housing, means within said housing pivotally supporting said control rod intermediate the ends thereof, said control rod being adapted to be operatively connected at one end thereof to a drain valve member and at its other end to an actuating rod, said control rod having a drain valve closed position and a drain valve opened position, a control member, means pivotally supporting said control member on said housing, link means, means pivotally connecting said link means at one end thereof to said control member eccentrically of the pivot axis thereof, means pivotally connecting said link means at the other end thereof to said control rod, and spring means fixed relative to said housing at one end thereof and connected at the other end thereof to said control member and effective to maintain the latter and thereby said control rod fully into drain valve opened position when said control rod is in such position and to maintain said control member and thereby said control rod fully into drain valve closed position when said control rod is in such position.

2. In a drain valve control mechanism, a control rod, a control rod housing, means within said housing pivotally supporting said control rod intermediate the ends thereof, said control rod being adapted to be operatively connected at one end thereof to a drain valve member and at its other end to an actuating rod, said control rod having a drain valve closed position and a drain valve opened position, a control member, means pivotally supporting said control member on said housing, link means, means pivotally connecting said link means at one end thereof to said control member eccentrically of the pivot axis thereof, means pivotally connecting said link means at the other end thereof to said control rod, and spring means fixed relative to said housing at one end thereof and connected at the other end thereof to said control member at a point eccentrically of the pivot axis thereof, said spring means in one position of said control member being effective to urge the same and thereby the control rod fully into drain opened position and in another position of said control member being effective to urge the same and thereby said control rod fully into drain closed position.

3. An attachment for controlling the actuation of a lavatory pop-up type drain valve mechanism, which mechanism includes a control rod pivotally mounted within a housing, comprising a support member adapted to be mounted on said housing, a control member, means pivotally mounting said control member on said support

6

member, link means pivotally connected at one end thereof to said control member and adapted to be connected at the other end thereof to said control rod, and spring means extending between said support member and said control member and effective to maintain the latter on one side or the other of a dead center position whereby said control rod when connected to said control member would be urged and maintained fully in either a drain valve opened or a drain valve closed position.

4. An attachment for controlling the actuation of a lavatory pop-up type drain valve mechanism, said mechanism including a control rod pivotally mounted within a housing, comprising a support member adapted to be mounted on said housing, a control member, means pivotally mounting said control member on said support member, link means pivotally connected at one end thereof to said control member eccentrically of the pivot axis thereof and adapted to be connected at the other end thereof to said control rod, and spring means extending between said support member and said control member and effective to maintain the latter on one side or the other of a dead center position whereby said control rod when connected thereto by said link means would be urged and maintained fully in either a drain valve opened or a drain valve closed position.

5. An attachment for controlling the actuation of a lavatory pop-up type drain valve mechanism, said mechanism including a control rod pivotally mounted within a housing, comprising a support member adapted to be mounted on said housing, a control member, means pivotally mounting said control member on said support member, link means pivotally connected at one end thereof to said control member eccentrically of the pivot axis thereof and adapted to be connected at the other end thereof to said control rod, and spring means attached to said support member and to said control member at a point spaced from the pivot axis thereof and effective to maintain the latter on one side or the other of a dead center position whereby said control rod when connected thereto by said link means would be urged and maintained fully in either a drain valve opened or a drain valve closed position.

6. An attachment for controlling the actuation of a lavatory pop-up type drain valve mechanism, said mechanism including a control rod pivotally mounted within a housing, comprising a support member adapted to be mounted on said housing, a control member, means pivotally mounting said control member on said support member, link means pivotally connected at one end thereof to said control member eccentrically of the pivot axis thereof and adapted to be connected at the other end thereof to said control rod, and spring means attached to said support member and to said control member at a point spaced from the pivot axis thereof and effective to maintain the latter on one side or the other of a dead center position whereby said control rod when connected thereto by said link means would be urged and maintained fully in either a drain valve opened or a drain valve closed position, said dead center position occurring when the points of attachment of the spring means to the housing and the control member and the pivot center of the latter lie on the same straight line.

References Cited in the file of this patent

UNITED STATES PATENTS

1,483,850	Kaufman	Feb. 12, 1924
1,758,226	Kaufman	May 13, 1930
2,689,959	Holycross, Jr. et al.	Sept. 28, 1954