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Sept. 28, 1948. P. F. DONAHUE 2,450,392

SINK STRAINER VALVE AND OPERATING MECHANISM THEREFOR

Filed July 19, 1944

Fig. 1.

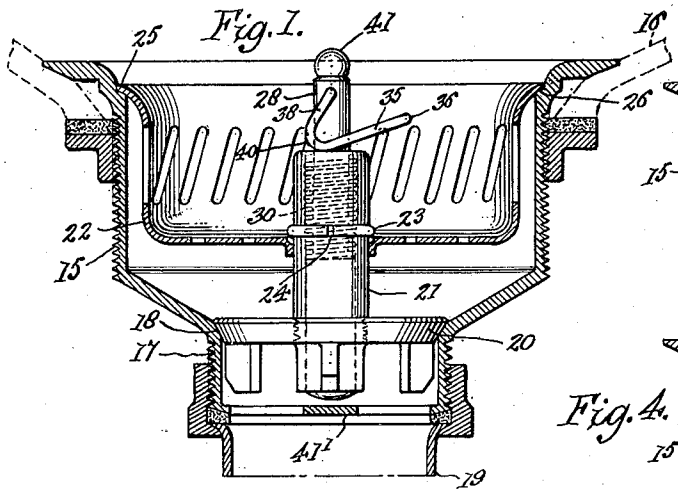


Fig. 2.

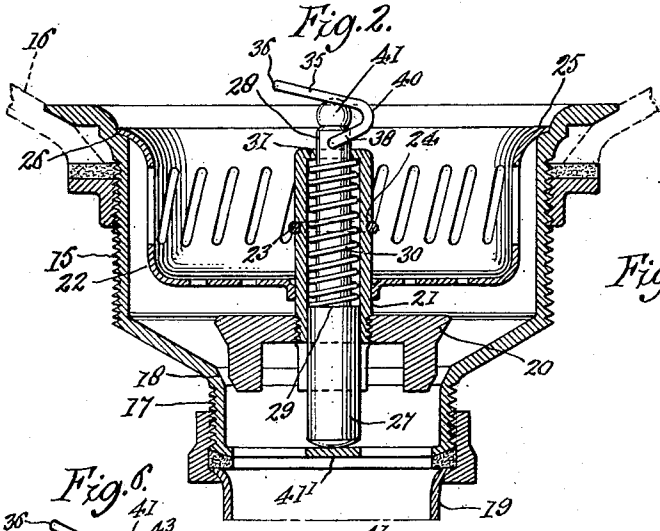


Fig. 3.

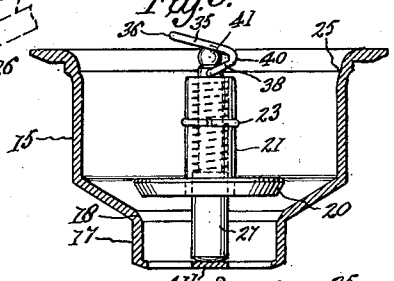


Fig. 4.

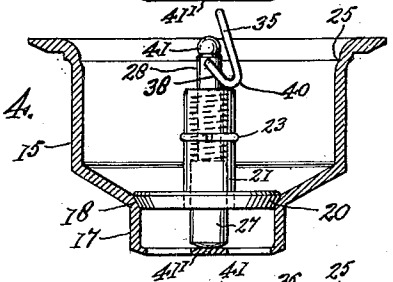


Fig. 5.

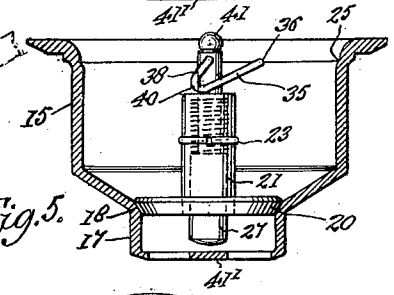


Fig. 10.

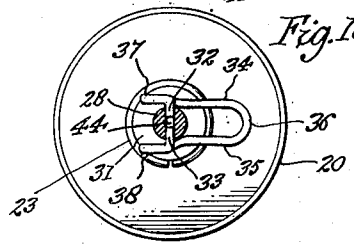


Fig. 6.

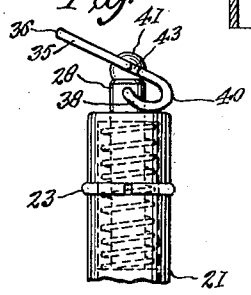


Fig. 8.

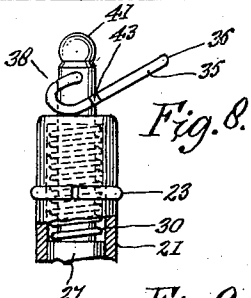


Fig. 7.

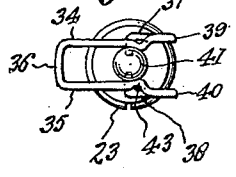


Fig. 9.

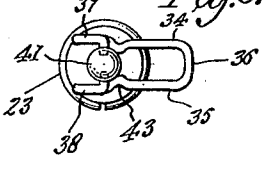
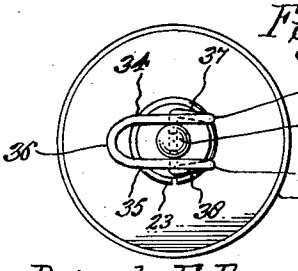


Fig. 11.



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SINK STRAINER VALVE AND OPERATING MECHANISM THEREFOR

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15 Claims. (Cl. 4—287)

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The present invention relates to improvements in sink strainer valves and operating mechanism therefor, and has for an object to provide an exceedingly simple form of mechanism associated with the strainer cups or baskets placed in the outlet openings of sinks for controlling such outlet opening to enable filling of the sink when desired and the evacuation of the dish water when the dish washing operation is completed.

Another object of the invention is to provide a mechanism of the above indicated character which may be moved to exert direct thrust in closing the drain valve or plug and in which the parts are normally biased by automatic spring action to the raised or open position of the drain plug.

A further object of the invention resides in providing a cooperative drain plug and thrust stem relatively movable and normally sprung to distended position, and of an operating mechanism constructed and arranged to push home by direct thrust the drain plug to a seated position but which may be thereupon further actuated to shift the thrust from the thrust stem to the drain plug, thus subjecting the drain plug, without interference from the thrust stem, to the action of the head of water in the sink which acts to tighten the closure of the plug in an equalizing manner throughout its entire area.

A still further object of the invention is to provide a cam mechanism for the operation of opening and closing the plug in that twin successive cam surfaces will act to sequentially close the plug and thereupon raise the lift stem from its cross bar abutment to transpose the entire weight of the device upon the plug insuring the closing thereof; and in which said cam lever may be modified in its construction to produce binding engagement upon the lift stem to hold such lever in an operative position; or in which said cam lever may be equipped with stop means cooperating with the lift stem to restrict the throw of the cam lever both in a clockwise and counterclockwise direction.

With the foregoing and other objects in view, the invention will be more fully described hereinafter, and will be more particularly pointed out in the claims appended hereto.

In the drawings, wherein like symbols refer to like or corresponding parts throughout the several views,

Figure 1 is a vertical central section taken through an improved device constructed in accordance with the invention, indicated as positioned in a drain opening of a sink and with the plug drain valve in the closed position.

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Figure 2 is a similar view with the drain plug open.

Figure 3 is a diagrammatic view with the strainer basket removed and with the plug valve guides omitted for clearness and showing the initial normal open position of the plug.

Figure 4 is a similar view showing the initially closed position of the plug with the lift stem still resting on the spider or cross bar.

Figure 5 is a view similar to Figures 3 and 4 showing the third phase of movement of the cam lever with the lift stem removed from the cross bar and the entire weight of the mechanism supported by the plug.

Figure 6 shows a fragmentary side elevation of the plug shank and lift stem with the cam lever in the raised position and the stops engaging the stem head.

Figure 7 is a top plan view of the parts in the position of Figure 6.

Figure 8 is a view similar to Figure 6 showing the cam lever in the operative position with the stops engaging the lift stem.

Figure 9 is a top plan of the device shown in Figure 8.

Figure 10 is a transverse horizontal section taken through the lift stem at the fulcrum zone of the cam lever with the lever in a lowered operative position, and

Figure 11 is a top plan view of the same with the lever thrown to its upper position.

Referring more particularly to the drawings 15 designates a body member or shell adapted to be fitted in a conventional manner in the drain opening of the sink indicated generally by the broken lines 16. Such shells of bowls 15 are reduced at their lower ends 17 at which they are customarily provided with valve seats 18. The reduced section 17 connects with a drain pipe 19 in the usual way.

The drain plug is indicated generally at 20 with its dependent guides adapted to slide up and down within the reduced section or neck 17 in the act of movement of the plug toward and from its seat 18.

In accordance with the invention a tubular shank 21 is affixed to the plug and moves up and down therewith, such shank 21 being slidably fitted through an opening made to accommodate the same in the central portion of the bottom of the basket strainer 22. The plug 20 serves as a stop to prevent the tubular shank 21 from being pulled upwardly through the strainer. A split spring

ring 23 fitting removably in a groove 24 of the tubular shank 21 acts as a stop to engage the interior of the bottom of the basket strainer 22 in the lowered position of the tubular shank 21. While the tubular shank 21 is fitted to slide up and down vertically in a free manner through the basket the basket strainer 22 will be preferably held in an immovable manner within the shell or body 15 and one form of construction for accomplishing this purpose is secured by the flanged rim 25 of the basket 22 fitting into a recess 26 of the body member 15.

A lift stem 27 is slidably mounted through the hollow shank 21 and projects at its lower end below the plug 20. The upper portion of the lift stem is reduced as shown at 28 providing a shoulder 29 against which one end of the coil spring 30 abuts. The upper end of the coil spring engages against the inturned flange 31 of the tubular shank 21. The normal expansive action of the spring against shoulder 20 and flange 31 is to tend to raise the tubular shank 21 and to lower the lift stem 27. A cam lever interposes an obstacle to the inturned flange 31 acting as a stop to limit this spring-influenced raising movement of the tubular shank 21. This cam lever may conveniently consist of a single strand of spring wire fashioned at its free ends in spaced axial alignment to provide the trunnions 32, 33, best shown in Figure 10, as being removably fitted in the opposite sides of a cross perforation 44 made in the upper portion of the reduced section 28 of the lift stem which lies above the hollow shank 21. The spaced parallel handle arms 34, 35 of the cam lever are connected by the bail 36 at their outer ends and at their inner ends they are connected with the trunnions 32, 33 by the cam lobes 37, 38, 39 and 40.

A ball configuration or sphere 41 is advantageously formed at the top of the lift stem above the fulcrum of the cam lever.

A cross bar or spider 41' constitutes the abutment for the lower end of the lift stem 27, this spider or abutment being fixed in the lower portion of the reduced neck 17 of the shell.

In Figures 10 and 11 the crosswise distance between the arms 34 and 35 is less than that of the diameter of the lift stem at its reduced section 28 which causes the lift arms 34 and 35 to frictionally and tightly embrace the lift stem when forced into the lower operative position indicated in Figures 1 and 10. In Figure 10 the crosswise distance between the cam lobes 37 and 38 is shown to be as great as or greater than the diameter of the lift stem reduced section 28 to enable these lobe sections to clear the stem and to be free thereof in the rotation of the cam lever about its fulcrum 32, 33.

Referring more particularly to Figures 7 to 9, the lever arms may be mutually crimped inwardly or indented as indicated at 43 which indentations form stops cooperating both with the ball 41 in the upper position and with the lift stem reduced section 28 in the lower operative position.

In the use of the device, the normal position of the parts is shown diagrammatically in Figure 3 where the cam lever is swung to the upper inoperative position, leaving the coil spring 30 free to exert its expansive action upon the tubular shank 21 and the lift stem 27. The bias of the spring is to force these two members apart, but inasmuch as the top flange 31 of the tubular shank 21 engages the trunnions 32, 33 the residual expansion of the coil spring 30 is directed to push the lift stem 27 downwardly. In this position of the parts the lift stem 27 rests upon the cross bar or spider 41' or other fixed abutment member. The projected length of the lift stem 27 being in excess of the depth of the reduced shell neck 17, the plug 20 is held elevated above its seat 18 and the water from the sink is free to drain out through the basket 22 and through the drain pipe 19.

When it is desired to build up a head or volume of water in the sink for the purpose of washing dishes, the cam lever is swung down by grasping the handle 34, 35 and swinging the same clockwise about the fulcrum 32, 33. During the angular progress of this movement the lobes 37, 38 first ride over the upper surface of the inturned flange 31 of the tubular shank 21, depressing such shank 21 relatively to the lift stem 27, 28. The lift stem 27, engaging the fixed abutment 41' acts as the thrust member and takes the entire thrust of this movement, which is a direct motion of the primary cam lobes 37, 38 acting to push the valve or plug 20 home against its seat 18. The coil spring 30 is further compressed incident to this movement. In function and operation the tubular member and plug 20 are unitary, are rigidly connected to both slide up and down relatively to the thrust member 27, and the action of the spring 30 is for the purpose of unseating the plug 20 acting on the plug 20 indirectly through the tubular member 21, so that the part 21 is a prolongation or shank of the plug 20.

The second phase of the lowered clockwise movement of the cam lever is shown in Figure 5 in which the primary lobes 37, 38 have passed off the shank flange 31 and the secondary cam lobes 39, 40 being now moved into contact with such flange which is the final position of the parts. In executing this final movement, the plug 20 having been previously seated, as in Figure 4, the further downward movement of the tubular shank 21 is arrested and the movement of the secondary cam is translated to the lift stem 27, 28, causing such stem to be lifted from the cross bar or abutment 41'. The coil spring 30 is still further compressed by this final operation. It will be noted from Figure 5 that all weight has been lifted off the stem 27 and its abutment 41' and transferred to the plug 20. The weight is thus effective to more tightly close the valve.

Also the head or weight of water in the sink in contact with all top areas of the plug 20 will be effective to tightly close the plug against its seat 18 and in this respect it will not be interfered with by any stop action because the lift stem 27 is raised above the abutment 41'.

In the position of Figure 5, the closely associated arms 34, 35 of the lever handle will frictionally grip the reduced section 28 of the lift stem and result in a binding engagement. In the upper position of the cam lever as shown in Figures 2 and 3, the handle arms 34, 35 will rest upon the ball 41 and retain the cam lever in a position of readiness of operation.

In the case of Figures 6 to 9 inclusive, the crimps 43 provide positive stops, the indentations being of such order that they will abut both the reduced section 28 of the lift stem and the ball 41 of such lift stem. These positive stops restrict the angular swinging movement of the cam lever handle in both directions.

In assembling the device, before the cam lever or snap ring 23 is put in place, the coil spring 30 is dropped over the reduced section 28 of the lift stem 27 until it rests upon the shoulder 29 and the lift stem is then thrust up through the plug 20 and tubular shank 21 until its ball end emerges

through the flange 31. Both the lift stem and shank are thereupon thrust up through the bottom opening of the strainer basket 22 after which the snap ring 23 is snapped into the groove 24 from the position inside the basket. The lift stem and shank are forced together to put the spring 30 under initial compression and to cause the transverse perforation 44 in the upper portion of the stem 27, 28 to be revealed above the shank; whereupon the trunnions 32 and 33 are sprung apart and snapped into opposite ends of the transverse aperture 44. Thus the stop cam lever acts as a stop to restrict the separating movement of the shank and stem which is constantly induced by the expansive action of the coil spring 30.

It is obvious that various changes and modifications may be made in the details of construction and design of the above specifically described embodiment of this invention without departing from the spirit thereof, such changes and modifications being restricted only by the scope of the following claims—

What is claimed is:

1. An operating mechanism for opening and closing a sink strainer plug with reference to its seat comprising a thrust member on which said plug is slidable, yieldable means between said thrust member and plug reacting against said thrust member for normally elevating the plug from its seat, and means carried by said thrust member in position to engage said plug for pushing the plug home against its seat.

2. In a drain device for sinks in which a plug is openable and closeable againt a seat in a body member disposed above a fixed abutment, plug operating means comprising relatively slidable members, one member carrying said plug, the second member adapted to rest on said abutment, yieldable means between said members biased to move said members relatively to open the plug, and means carried by one member and engageable with the other member for forcibly moving the members relatively in an opposite direction to close said plug against its seat.

3. The operating means as claimed in claim 2 further characterized by the fact that said last recited means is adapted to raise the second member from the fixed abutment after closing the plug to subject the plug to the entire weight of the mechanism in addition to the head of water in the sink.

4. For use in a sink drain construction in which a body member has a seat in spaced relation to a fixed abutment with a plug movable toward and from said seat, operating mechanism for said plug comprising relatively movable members, one such member affixed to the plug, the second member extending through the plug and adapted to rest on said abutment, resilient means between said members tending to relatively move said members to lift the plug from the seat by thrust developed through said second member and abutment, and cam means movably carried by one member and positioned to engage the other member and acting to relatively move the members in an opposite direction to lower the plug on the seat.

5. The operating means as claimed in claim 4 wherein said cam means has successive initial and final cam portions, the initial cam portion adapted to thrust the plug to its seat, the final cam portion adapted to lift the second member from said abutment.

6. An operating mechanism as claimed in claim 5 wherein said initial and final cam portions are lobes outstanding at differential distances from the center of cam movement, said lobes being constructed and arranged for sequential operation to first close the plug against its seat and finally lift the second member from the abutment to subject the plug to the entire weight of the mechanism in addition to the head of the water in the sink.

7. For use in a sink drain construction having a body member with a seat, a fixed abutment, and a plug movable toward and from the seat, operating mechanism for the plug comprising a thrust member normally supported on said abutment and projecting through the plug, said plug having a shank member, resilient means confined between said members and biased to relatively move the members to lift the plug from the seat by force developed through said thrust member, and means carried by one member and engageable with the other member acting to relatively move the members in an opposite direction to an initial degree to close the plug on its seat and to a final degree to lift said thrust member from the abutment by thrust action transferred to the seated plug.

8. Operating means as claimed in claim 7 in which said last recited means comprises a cam lever fulcrummed on the thrust member and having successive lobes sequentially movable against the shank member by the rotation of said cam lever.

9. Operating means as claimed in claim 8 in which said cam lever comprises resilient members straddling said thrust member and having portions spaced closer than the width of the thrust member to bind on said thrust member.

10. For use in a sink drain construction having a body member with a seat, a fixed abutment, and a plug movable toward and from the seat, operating mechanism for the plug comprising a thrust member normally supported on said abutment and projecting through the plug, said plug having a shank member, resilient means confined under tension between said members biased to relatively move the members and lift the plug from the seat by force developed through said thrust member, and a cam lever pivoted on the thrust member and positioned to engage an end portion of said shank member to force the plug against its seat in opposition to said resilient means, and stop means on said lever positioned to engage said thrust member for restricting the movements of said lever.

11. For use in a sink drain construction having a body member with a seat, a fixed abutment, and a plug movable toward and from the seat, operating mechanism for the plug comprising a thrust member normally supported on said abutment and projecting through the plug, said plug having a shank member, resilient means confined under tension between said members biased to relatively move the members and lift the plug from the seat by force developed through said thrust member, and a cam lever pivoted on the thrust member and positioned to engage an end portion of said shank member to force the plug against its seat in opposition to said resilient means, said thrust member having a ball at its upper end portion, said cam lever having spaced operating arms constructed and arranged to grip said ball when in the upper position and the sides of the thrust member when in the lower position.

12. For use with a sink having a drain basket

carried in a body member having a seat and a fixed abutment, and a plug movable toward and from the seat, said plug having a shank member, operating means for the plug comprising a thrust member adapted to normally rest on the fixed abutment and extending slidably through the plug and shank member, resilient means confined under tension between said shank and thrust members tending to relatively move said shank and thrust members to raise the plug off its seat, said shank member fitted slidably through said drain basket, means to retain said shank member against separation from the basket, and means on said thrust member constructed and arranged and positioned relatively to engage said shank member for relatively moving the shank and thrust members in the opposite direction to cause closing of the plug on its seat.

13. For use in a sink having a water outlet with a valve seat controlling the same and an abutment extending across the outlet, and a plug valve movable up and down toward and from the seat; an operating means for the valve comprising a thrust member constructed and arranged to freely rest by gravity on the abutment and adapted to pass loosely through the valve, a tubular shank member adapted to be connected at its lower portion to the valve and fitted slidably about said thrust member, said members having opposed shouldered portions with a confined space therebetween, a spring under tension in said space abutting against the opposed shouldered portions tending to expand to raise the valve off its seat when the thrust member reposes on the abutment, and a cam lever pivoted to the upper portion of said thrust member having a lobe constructed and arranged to engage the upper portion of said shank member when the lobe is lowered to move the valve down toward its seat, said cam having a second lobe further removed from the pivot point than the first lobe acting to lift the thrust member from the abutment after the valve has been seated.

14. In a sink having a drain and a valve seat, a plug valve movable toward and from said seat, a shank member movable with said plug, a thrust member, resilient means confined under tension between said members urging said members to

initial relative positions where the plug valve is open, means pivoted to one member and positioned to engage the other member for urging said plug valve to a closed position in opposition to the action of said resilient means, said members and said plug valve removable from the sink, a strainer basket having a part to engage the sink to hold the same in proper position in said sink, said strainer basket slidingly receiving said members, means carried by one of the members to hold the basket in unitary association with said members and plug valve for removal together from the sink, said last named means spaced suitably from said plug valve to allow of the sliding movement of the members through the basket in opening and closing said valve without disturbing said proper position of the basket in the sink.

15. An operating means for a plug drain valve having a tubular shank member in which the plug axially moves to and from its seat comprising a thrust member slidable through the plug and its shank member, spring means between said shank and thrust members tending to constantly separate said members, and a cam lever carried by said thrust member and reactive on its high point against said shank member for moving the members together in opposition to said spring to close the plug, said cam lever so related to said plug as to shift the plug axially in its seating movement.

PATRICK F. DONAHUE.

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