Aug. 16, 1949. L. FRANK 2,479,485

SELF-CLEANING STOPPER

Filed April 24, 1946

Fig. 1.

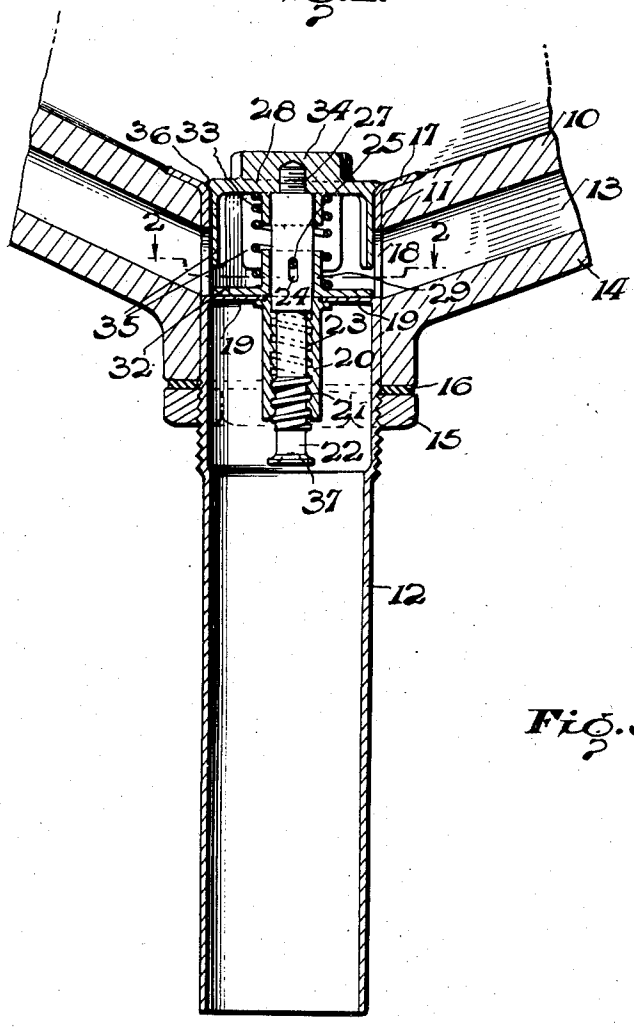


Fig. 2.

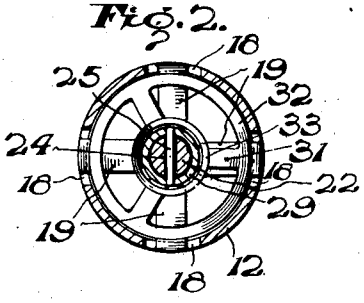
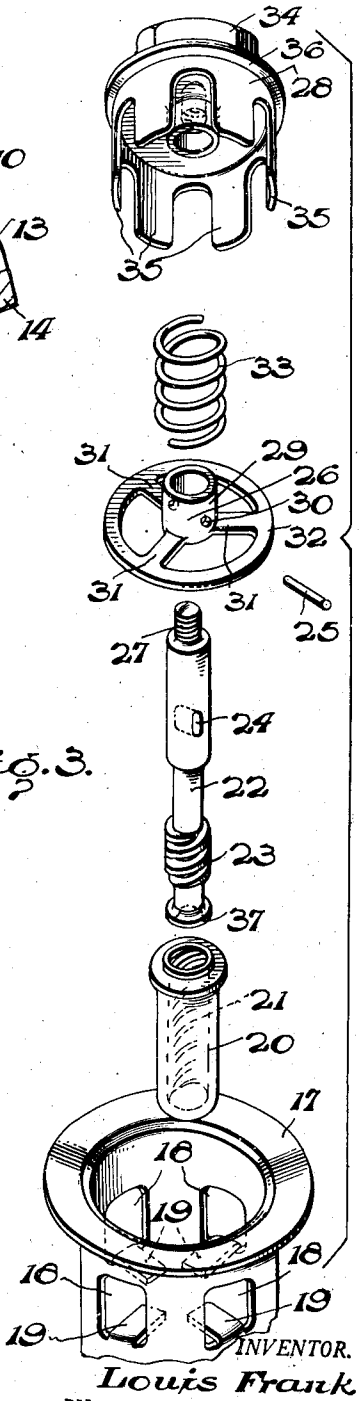


Fig. 3.



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SELF-CLEANING STOPPER

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12 Claims. (Cl. 4—287)

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This invention relates to plumbing fixtures and more particularly to mechanisms for closing the drains of tubs, basins, sinks and the like.

More particularly this invention relates to mechanisms for closing drains in which means are automatically actuated by the actuation of the closure mechanism to cut and shear any material caught in the closure mechanism or in the screen associated therewith so that this material will pass freely down the drain and not clog or choke the closure mechanism or drain.

Heretofore various closure mechanisms for drains have been proposed and at least one has suggested the use of a rotor driven by the escaping fluid to cut and shear any material lodged in the screen or closure mechanism. All of these are subject to criticism as either expensive to manufacture, too complicated in structure or without sufficient shearing and cutting force to insure uniform action under all conditions of operation.

It is an object of the present invention to provide a novel stopper for drains in which manual operation of the stopper will also cut and shear any material caught in the stopper or associated screen.

Another object of the present invention is to provide a novel stopper for drains which will have a positive and powerful cutting action under all conditions of operation, which will be of simple construction, inexpensive to manufacture and operable by untrained and inexperienced users.

An embodiment of the present invention is shown in the accompanying drawings and is described hereafter for the purposes of illustration only. To determine the scope of the present invention reference should be had to the appended claims.

In the several figures, in which like reference characters indicate similar parts:

Fig. 1 is an elevation in section of one embodiment of the present invention;

Fig. 2 is a sectional view of the novel embodiment of Fig. 1 on the line 2—2; and

Fig. 3 is an expanded view of the several parts of the novel embodiment of Fig. 1 in their relative positions.

With reference to these figures, 10 is the bottom of a basin, tub, sink or similar vessel provided with a drain opening 11 in which is mounted

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a tail pipe 12. The basin, tub, sink or similar vessel may be provided with overflow passages 13 and bottom walls 14. Tail pipe 12 may be secured in opening 11 by nut 15 and washer 16 acting against flange 17.

Tail pipe 12 is cut away at 18 to permit overflow passages 13 to have access thereto and the tabs 19 resulting from this operation are turned inwardly into tail pipe 12 until they all lie in the same plane and form a screen. Suitably secured to the inner ends of tabs 19 is internally threaded tubular member 20 having internal threads 21.

If no overflow passages are to be provided or if for any other reason it is not desirable to form the tabs 19 from cut portions of tail pipe 12 it is within the scope of the present invention to suitably form tabs 19 as a separate unitary structure carrying member 20 and to fix this unitary structure within the tail pipe 12.

Valve shaft 22 is mounted for rotary and reciprocal movement in tubular member 20 and is threaded at 23 to engage threads 21. Shaft 22 is slotted at 24 to receive pin 25 which secures cutting element 26 to shaft 22. Shaft 22 is threaded at 27 to receive valve element 28.

Cutting element 26 is designed to engage tabs 19 during cutting operation to form cooperating cutting and shearing members. It comprises a hub 29 sliding on shaft 22, bored at 30 to receive pin 25. Cutting members 31 radiate in the same plane from hub 29 and terminate in circular member 32 having an outside diameter slightly smaller than the inside diameter of tail pipe 12. Cutting members 31 and member 32 cooperate with tabs 19 in cutting and shearing action.

An expansion spring 33 surrounds hub 29 and shaft 22 and presses against the under side of valve element 28 and the top of cutting members 31.

Valve element 28 has a vane 34 formed across its top to assist in manual rotation of element 28. Element 28 is provided with downwardly depending skirt and cutting elements 35 whose outside diameters permit a close fit in tail pipe 12. Cutting elements 35 project into openings 18 when valve element 28 is in closed position. Annular shoulder 36 is formed about the top of valve element 28 for engagement with tail pipe

12 to form a fluid tight seal when valve element 28 is in closed position.

Shaft 22 may be expanded at 37 after assembly of the unit to prevent accidental disassembly of the same.

With the novel closure mechanism of the present invention assembled as above described and in closed position as illustrated in Fig. 1, to open the drain and institute cutting and shearing action vane 34 is grasped and rotated in a counter-clockwise direction as viewed in Fig. 2 thus rotating valve element 28 and shaft 22. Rotation of shaft 22 acting through pin 25 rotates cutting element 26 and cutting members 31 in engagement with tabs 19 to shear any hair, threads or other matter caught by tabs 19. Rotation of shaft 22 by reason of threads 23 and 21 raises valve element 28 and disengages shoulder 36 from tail pipe 12 and drainage commences. Further rotation of shaft 22 further raises valve element 28 but cutting element 26 remains in engagement with tabs 19 under pressure of spring 33 until pin 25 reaches the bottom of slot 24. Cutting element 26 is then raised from tabs 19 and the draining fluid is enabled to wash away the cut and sheared matter. The pitch of threads 23 and 21 is so chosen that valve member 28 is moved from completely closed to fully opened position in approximately a 360° rotation and slot 24 is given a length such that cutting element 26 remains in contact with tabs 19 during the greater part of this rotation.

As described above, cutting elements 35 fit closely in tail pipe 12 and extend partially across openings 18 when valve element 28 is in closed position. As valve element 28 is rotated and shoulder 36 lifted from contact with tail pipe 12 drainage begins. Cutting elements 35 in rotation cooperate with the vertical edges of openings 18 and with the upper end of tail pipe 12 to cut and shear foreign matter before it reaches cutting element 26 and tabs 19.

Closing of valve element 28 from its open position is effected by clockwise rotation of the same as seen in Fig. 2. Shortly after this rotation is commenced cutting element 26 comes in contact with tabs 19 and cutting and shearing occurs during the rest of the rotation, pin 25 riding upward in slot 24, and spring 33 is compressed. During the entire closing rotation skirt members 35 cooperate first with the upper end of tail pipe 12 and later, in addition, with the vertical edges of openings 18 for cutting and shearing action.

It will now be apparent, that by the present invention I have provided a novel drain closing mechanism having a powerful cutting action during the opening and closing of the drain to shear any foreign matter which might clog the closure mechanism or drain. It is further apparent that this mechanism is of simple and inexpensive construction and operable by untrained users.

To those skilled in the art changes in or modifications of the above described illustrative embodiment of the present invention may now be suggested without departing from the present inventive concept. Reference should therefore be had to the appended claims to determine the scope of this invention.

What is claimed is:

1. In a closure for drains, a drain pipe, cutting members carried internally of said pipe, a cutting element for cooperation with said cutting members, a closure member opened and closed by rotation, cutting skirts depending from said closure member for rotation in and against said drain pipe, and means connecting said closure member and said cutting element and so constructed and arranged that when said closure member is rotated said cutting element rotates in cutting engagement with said cutting members.

2. In a closure for drains, a drain pipe, cutting members carried internally of said pipe, a cutting element mounted in said pipe for cooperation with said cutting members, a closure member opened and closed by rotation, a shaft connecting said closure member and said cutting element, and means securing said cutting element for rotation on said shaft and allowing longitudinal movement thereon whereby when said closure member is rotated said cutting element rotates in cutting engagement with said cutting members during the greater part of the rotation of said closure member.

3. In a closure for drains, a drain pipe, cutting members carried internally of said pipe, a cutting element mounted in said pipe for cooperation with said cutting members, a closure member opened and closed by rotation, cutting skirts depending from said closure member for rotation in and against said drain pipe, a shaft connecting said closure member and said cutting element and means carried by said cutting element allowing longitudinal movement of said cutting element on said shaft whereby when said closure member is rotated shearing action occurs between said pipe and said skirts and between said cutting element and said cutting members.

4. In a closure for drains, a drain pipe, cutting members carried internally of said pipe, overflow openings in said pipe above said cutting members, a cutting element mounted in said pipe for cooperation with said cutting members, a closure member opened and closed by rotation, cutting skirts depending from said closure member for rotation in and against said drain pipe, a shaft connecting said closure member and said cutting element and means carried by said cutting element allowing longitudinal movement of said cutting element on said shaft whereby when said closure member is rotated shearing action occurs between said pipe and said skirts, between the edges of said overflow openings and said skirts and between said cutting element and said cutting members.

5. A closure as defined in claim 2 in which a hollow internally threaded sleeve is carried centrally of the pipe by the cutting members and the shaft is threaded for engagement with the internally threaded sleeve.

6. A closure as defined in claim 2 in which a resilient member urges the cutting element against the cutting members during the greater part of the rotation of the closure member.

7. A closure as defined in claim 3 in which a hollow internally threaded sleeve is carried centrally of the pipe by the cutting members and the shaft is threaded for engagement with the internally threaded sleeve.

8. A closure as defined in claim 3 in which a resilient member urges the cutting element against the cutting members during the greater part of the rotation of the closure member.

9. A closure as defined in claim 4 in which a hollow internally threaded sleeve is carried centrally of the pipe by the cutting members and the shaft is threaded for engagement with the internally threaded sleeve.

10. A closure as defined in claim 4 in which a resilient member urges the cutting element

against the cutting members during the greater part of the rotation of the closure member.

11. In a closure for drains, a drain pipe, a closure member opened and closed by rotation and cutting skirts depending from said closure member for rotation in and against said drain pipe whereby when said closure member is rotated shearing action occurs between said pipe and said skirts.

12. In a closure for drains, a drain pipe, a closure member opened and closed by rotation, cutting skirts depending from said closure member for rotation in and against said drain pipe, an internally threaded element carried by said drain pipe and a threaded shaft engaging said threaded element and secured to said closure member

whereby when said closure member is rotated shearing action occurs between said pipe and said skirts.

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