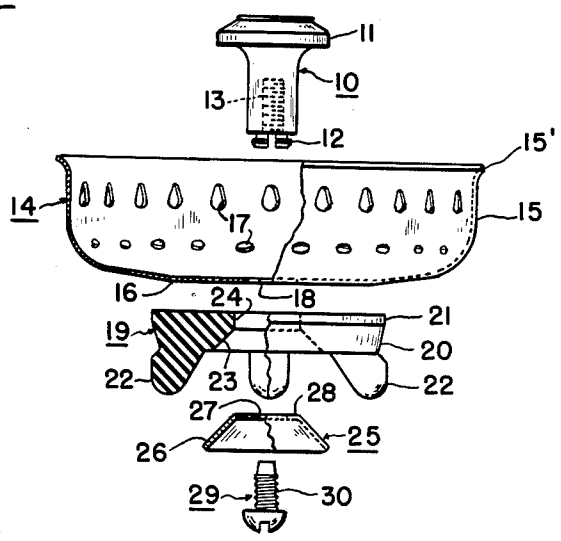
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DRAIN AND STOPPER ASSEMBLY

Original Filed Sept. 10, 1958

Fig. 1



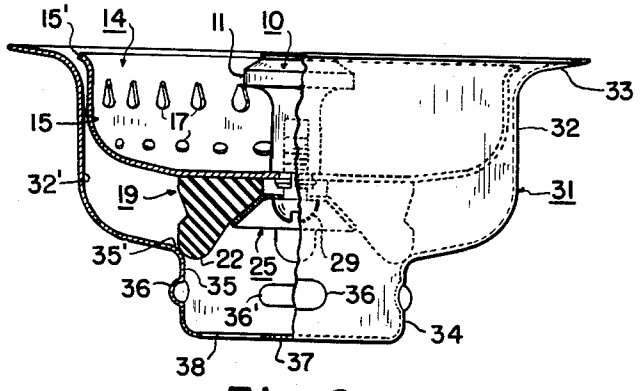


Fig. 2

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DRAIN AND STOPPER ASSEMBLY

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4 Claims. (Cl. 4—287)

This invention relates to a discharge drain assembly and more particularly, to a drain assembly mountable in a discharge outlet of a sink or the like having a strainer-stopper assembly cooperable therewith.

Strainer-stopper assemblies which have been used in the past in sink outlets, require rotational movement about the longitudinal axis of their handle stems, in order to seat the stoppers. This rotational movement is more or less a trial and error procedure, since the closure slot is hidden from the view of the operator, beneath the strainer basket. Other forms of stoppers have been devised which operate purely in a vertical direction within the drain body, utilizing a smooth-edged resilient stopper which is forced into a sealing engagement with a portion of the drain body. This type of stopper assembly is not completely satisfactory since it necessitates the use of additional means such as a friction fit or spring-snapping arrangement between the strainer and the body, in order to maintain the stopper in an open position.

A further type of stopper arrangement which has been used in the past incorporates the use of legs or feet projecting downwardly against a re-entrant beaded portion in the drain body to hold the stopper in an open position. When it is desired to close this type of stopper, pressure is applied to the top of its handle which forces the projecting legs or feet inwardly around the re-entrant bead and allows the stopper to seat within a neck portion of the drain body. This form of stopper has been fairly successful; however, after a period of time, it has been found that the projecting legs or feet become worn and lose their resiliency. As a result, the feet are no longer retained by the re-entrant bead, and the stopper assumes a closed position at all times.

It thus has been an object of our invention to provide a solution to the problems above enumerated;

Another object of our invention has been to provide a strainer-stopper assembly having expander means to pre-adjust projecting feet in a radially-outwardly-expanded position;

An additional object of our invention has been to provide an improved drain and stopper assembly having a new cooperable functioning relationship between the drain body member and expandable feet portions of the stopper member, wherein the outward expansion of the feet may be periodically adjusted and set to a desired pre-determined expansion to compensate for erosion and loss of resiliency in the feet;

These and other objects of our invention will appear to those skilled in the art from the following description and drawings in which:

FIGURE 1 is an assembly in elevation, partially in section, showing an exploded view of an embodiment of our strainer-stopper assembly; and,

FIGURE 2 is a side elevational view, partially in section, of a drain body embodying our invention showing a strainer-stopper assembly positioned therein in an open position.

Referring to FIGURE 1, a strainer stem **10** has an outwardly-flared handle portion **11** and is provided with a split snap lock **12** at its lower end. The stem **10** is provided with an axially-extending bore **13**. As shown in FIGURE 1, the bore **13** may be threaded; however,

it may have a smooth surface for receiving a self tapping screw. A strainer basket **14**, preferably of an upwardly-open cup-shape configuration, has a cylindrical sidewall portion **15** which terminates at its upper end in a slightly outwardly-flared portion **15'**. The sidewall portion **15** terminates at its lower end in a bottom surface **16**. The strainer basket is provided with a plurality of drain holes **17** through cylindrical wall portion **15** and the bottom surface **16**. The bottom surface is provided with a center bore **18** positioned concentrically with relation to the cylindrical sidewall portions **15** to receive the split snap lock **12** of the strainer stem **10**.

A stopper **19**, made of corrosion-resistant resilient material, is provided with a plurality of adjustable feet **22**, depending therefrom. The stopper has an inverted frustro-conical wall portion **20** which functions as a sealing surface. The sealing surface **20** terminates into a relatively small annular portion **21**, adjacent the top of the stopper. A frustro-conical recess **23** is formed in the bottom of the stopper and terminates in an annular bore **24** adjacent the top thereof.

A downwardly-open hollow expansion cup **25** having frustro-conical sidewalls **26**, adapted to seat within the frustro-conical recess **23**, is provided with a smooth bore **27** extending axially through its top surface **28**. A retainer screw **29**, having an externally-threaded end portion **30**, is adapted to be received by bore **13** of strainer stem **10**. If the bore **13** is not threaded, a self tapping screw is utilized as the retainer screw **29**.

When assembling the strainer-stopper device, the snap lock **12** of strainer stem **10** is first snapped into center bore **18** of strainer basket **14**. The stopper **19** is then positioned beneath the basket **14** and the expansion cup **25** is positioned within recess **23** of the stopper. Retainer screw **29** is then slid through the bore **27** of the cup and threaded into the bore **13** of the stem **10**. It thus can be seen that the adjustable feet **22** may be pre-set or pre-expanded outwardly to any desired pre-determined position by adjusting the position of the retainer screw **29** within bore **13**. As the screw **29** is moved upwardly within the bore **13**, the cup **25** is pressed upwardly within the recess **23** of the stopper, thus expanding the feet **22** radially-outwardly.

Referring now to FIGURE 2, a drain body member **31** is formed with a cylindrical or annular sidewall portion **32** which terminates in a radially-outwardly-flared upper portion or annular flange **33**. The annular flange **33** is adapted to seat in a recess surrounding an outlet or discharge portion in the bottom of a sink. The cylindrical sidewall portion **32** curves inwardly at its lower end and terminates in a discharge end or annular tailpiece portion **34** of reduced diameter. A cylindrical or annular seating surface **35**, adapted to cooperably receive the inverted frustro-conical wall portion **20** of stopper **19** in a fluid-sealing relationship, is formed in tailpiece portion **34** adjacent the bottom of the cylindrical sidewall portions **32**. A rounded edge or shoulder portion **35'** formed adjacent the inwardly-curved lower end of the sidewall portion **32**, surrounds the seating surface **35** and provides a supporting surface for the adjustable feet **22** when the stopper is in its open position as shown in FIGURE 2.

A plurality of outwardly-expanded lugs **36** are formed in the tailpiece portion **34** below the seating surface **35** for mounting the drain body within a discharge outlet. The bottom of the drain body **31** is provided with cross bars **37** which form a secondary or safety strainer for discharge openings **38** extending through the bottom of the drain body. The internal surface **32'** of the cylindrical wall portion **32** is of a greater diameter than the external diameter of the outwardly-flared portion **15'** of strainer basket **14**, so that the strainer basket **14** does not friction-

ally engage the drain body 31, but the portion 15' is slidably guided in its vertical movement by the surface 32'. A plurality of internal recessed portions 36' are formed by the outwardly-expanded lugs 36.

The strainer-stopper assembly is moved to a closed position by merely pressing downwardly on handle 11. As shown, the strainer basket 14, itself, is fully-freely, vertically-movable in all positions to which it may be rotated or turned with respect to the drain body member 31. As the stopper assembly moves downwardly into its closed-sealing position, the adjustable feet 22 are urged radially-inwardly by the seating surface 35 and help guide the stopper into proper engagement with the seating surface. Sealing surface 20 is pressed into a fluid tight engagement with the seating surface 35 to seal-off fluid flow through the drain body member, and the adjustable feet 22 extend downwardly into the tailpiece portion 34. The feet 22 may or may not contact the internal recessed portions 36', depending upon the arcuate orientation of the stopper 19. It is, however, immaterial whether or not the adjustable feet 22 engage any of the recessed portions 36', since no useful purpose is obtained by such an engagement. The sealing action of the stopper is formed solely between the cooperative inverted frustro-conical sealing surface 20 and the seating surface 35, and the feet portions 22 merely provide a frictional engagement with the internal surface of the tailpiece portion 34 when the stopper assembly is in a closed position.

The adjustable feet 22 also function to maintain the stopper 19 in its open position by cooperatively engaging edge portion 35' above the seating surface 35. When the drain body is in its open position, the adjustable feet 22 of the stopper 19 are in their outermost pre-set radially-expanded position, and rest on or engage the edge portion 35' and maintain the stopper 19 in an axially spaced-apart relation from the seating surface 35, so that fluid flow may freely pass between the feet and through the drain. The arcuate orientation of the strainer-stopper assembly with respect to the drain body is immaterial in both the open and closed position of the stopper assembly, and therefore, rotation of the strainer-stopper assembly is unnecessary.

After an extended period of time, resilient materials such as stopper members have a tendency to lose a portion of their original resiliency due to surface or age hardening. Further, after considerable use, outer edge portions of the feet 22 become worn and the feet may no longer adequately contact the edge portion 35' of the drain body member 31 to maintain the strainer-stopper assembly in an open position. To compensate for this loss of resiliency and constant erosion of the feet 22, the feet may be adjusted and expanded radially-outwardly to a desired pre-set expansion. The strainer-stopper assembly is removed from the drain body by pulling upwardly on handle 11, and the retainer screw 29 is adjusted inwardly to expand the adjustable feet radially-outwardly to the desired pre-determined expansion so that the feet will adequately engage the edge portion 35' and maintain the strainer-stopper assembly in an open position.

This is a divisional application of our co-pending application Serial No. 760,232, filed September 10, 1958, and entitled "Drain and Stopper Assembly."

While the form of the invention here shown and described embraces our now preferred embodiment, it is to be understood that various changes may be made by those skilled in the art, without departing from the spirit of the invention within the scope of the appended claims.

What we claim is:

1. A drain and stopper assembly for use in a discharge outlet comprising, a drain body member positionable within a discharge outlet, said drain body member terminating at its lower end in a downwardly-extending substantially cylindrical tail piece portion of lesser diameter than the remainder of said drain body member, a substantially cylindrical stopper seating surface formed about an upper portion of said tail piece portion, a stopper retaining edge portion formed above said seating surface and adjacent the intersection of said tail piece portion with the drain body member, a stopper assembly operatively positionable within said drain body member, a stopper member forming a part of said stopper assembly and having a sealing surface cooperatively engageable with said seating surface to close-off fluid-flow through said drain body member, a plurality of radially-outwardly-expandable feet portions extending downwardly from said sealing surface to cooperatively engage said retaining edge portion and retain the stopper assembly in an open position permitting fluid flow through said drain body member, and means forming a part of said stopper assembly for providing a pre-adjustment of the outward radial expansion of said feet portions when said stopper assembly is withdrawn from said drain body member to position said feet portions for positive engagement with said retaining edge portion to maintain the stopper assembly in its open position while permitting said stopper assembly to be moved to its closed position.

2. A drain and stopper assembly for use in a discharge outlet comprising, a drain body member positionable within a discharge outlet, said drain body member having a lower downwardly-extending substantially cylindrical tail piece portion of reduced diameter, a substantially cylindrical stopper seating surface formed about an upper portion of said tail piece portion, a stopper-retaining edge portion formed above said seating surface and adjacent the intersection of said tail piece portion with the drain body member for retaining a stopper assembly in an open position; a stopper assembly operatively positionable within said drain body member, said stopper assembly comprising, a stopper member, a strainer stem, and a basket strainer; said basket strainer removably secured to said strainer stem above said stopper member, said stopper member having a sealing surface cooperatively engageable with said seating surface when said stopper assembly is in a closed position to close-off fluid-flow through said drain body member, radially-outwardly-expandable feet portions formed on and extending downwardly from said stopper member engageable with said stopper-retaining edge portion to maintain said stopper assembly in an open fluid-flow position, a frusto conical recessed portion formed within said stopper member, a hollow expansion cup having frusto conical side walls positioned within said recessed portion, and means for pre-setting the radially-outward expansion of said feet portions to compensate for erosion and loss of resiliency of said feet portion and maintain said stopper assembly in an open position with said feet portions engaging said stopper-retaining edge portion while permitting said stopper assembly to be moved downwardly into its closed position by pre-adjusting the axial position of said expansion cup within said recessed portion when said stopper assembly is withdrawn from said drain body member.

3. A drain and stopper assembly as defined in claim 2 wherein said strainer stem has an outwardly-flared handle portion at one end and a split snap-lock at the other end rigidly engaging said basket strainer, said strainer stem is internally threaded, and screw means engages said internally-threaded strainer stem to adjust the axial position of said expansion cup within said recessed portions, whereby the feet portions may be periodically pre-adjusted radially-outwardly to compensate for loss of resiliency and erosion of said feet portions so that said feet portions may be set to cooperatively engage said retaining edge portion and retain said stopper assembly in a fluid-passable open position.

4. A drain and stopper assembly for use in a discharge outlet comprising, a drain body member positionable within a discharge outlet, said drain body member having an enlarged upper annular wall portion and an annular tailpiece portion of lesser diameter than said enlarged an-

nular wall portion and projecting downwardly therefrom, an annular stopper seating surface formed about an upper area of said tailpiece portion, a stopper retaining shoulder carried by said tailpiece portion adjacent said stopper seating surface, a basket strainer fully-freely vertically-movable in all positions to which it may be turned within said enlarged upper annular wall portion, an operating stem centrally secured and projecting upwardly within said basket member to raise and lower it within said enlarged upper annular wall portion, a stopper assembly operatively positioned within said drain body member and secured to and projecting centrally-downwardly from a bottom portion of said basket strainer for raising and lowering movement therewith, a resilient stopper member forming a part of said stopper assembly and having a sealing surface cooperatively engageable with said seating surface to close-off fluid flow through said drain body member, a group of peripherally spaced-apart and radially-outwardly expandable resilient feet portions projecting downwardly and

radially-outwardly from said sealing surface to cooperatively engage said retaining shoulder and retain the stopper assembly in an open position permitting fluid flow through said drain body member, and means forming a part of said stopper assembly for pre-adjusting outward radial extension of said feet portions when said stopper assembly is withdrawn from said drain body to position said feet portions for positive engagement with said retaining shoulder and maintain the stopper assembly in its open position while permitting it to be moved to its closed position by a lowering force applied by said stem to said basket strainer.

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