Oct. 5, 1971 I. HALDOPOULOS ET AL 3,609,776

DRAIN STOPPER FOR PLUMBING FIXTURES

Filed Dec. 12, 1969 2 Sheets-Sheet 1

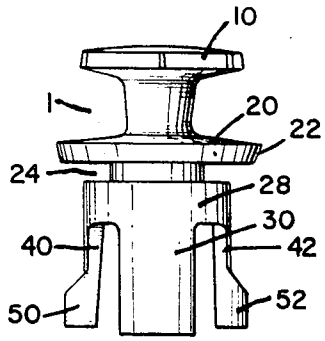


FIG. 1

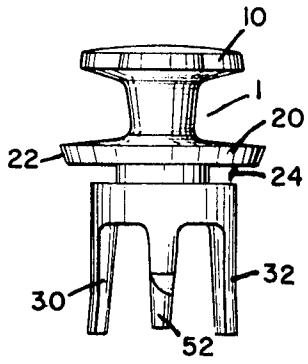


FIG. 2

FIG. 5

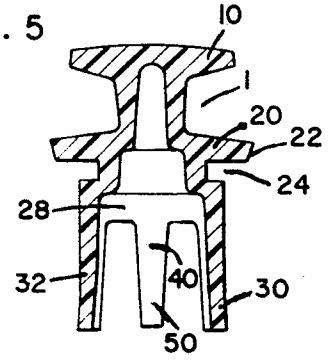


FIG. 4

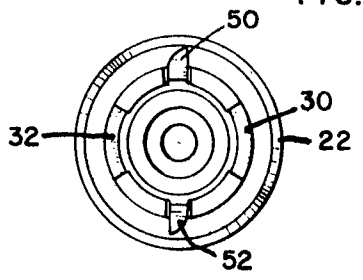
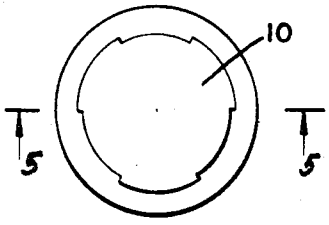


FIG. 3



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FIG. 7

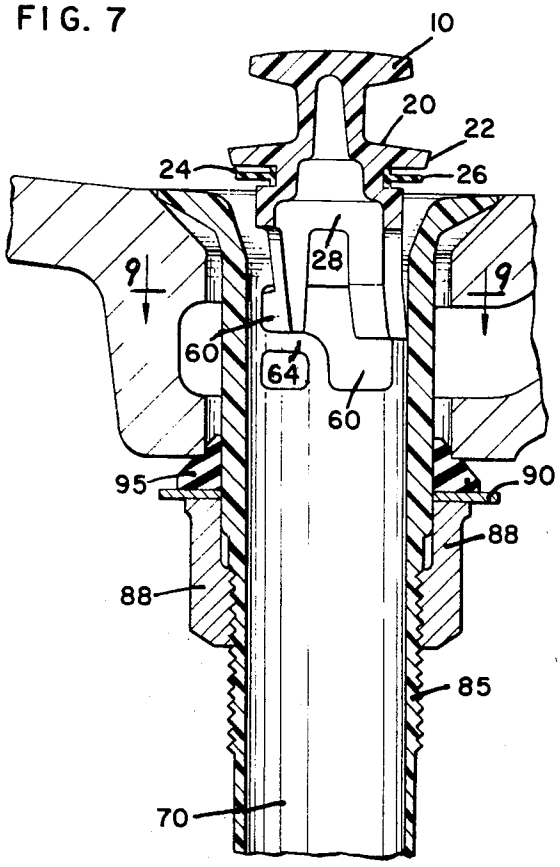


FIG. 6

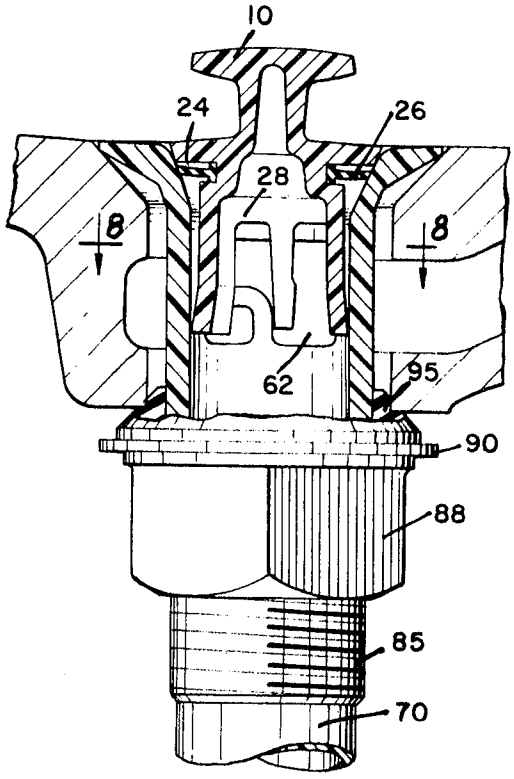


FIG. 8

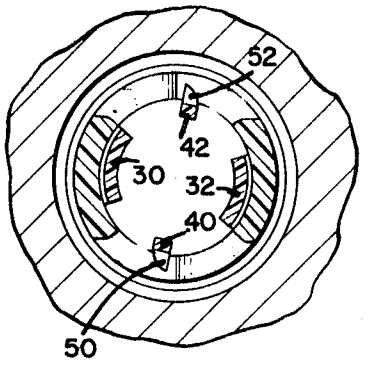
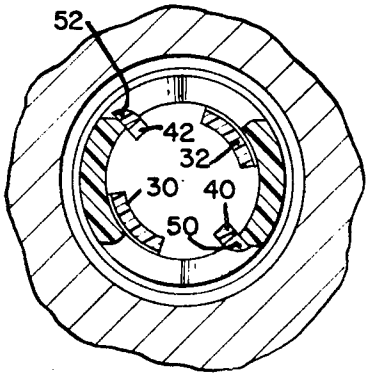


FIG. 9



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DRAIN STOPPER FOR PLUMBING FIXTURES

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U.S. Cl. 4—295 9 Claims

ABSTRACT OF THE DISCLOSURE

Covers a stopper mechanism for the drain port of a plumbing fixture, such as a lavatory. The stopper mechanism includes a skirt member having a plurality of arms, one or more of which have protruding fingers. The drain port of the plumbing fixture has a two-tier opening. By manipulating the stopper mechanism, the stopper mechanism may be inserted into the drain port so that the fingers of the stopper structure may be brought into position on a selected tier in the opening of the drain port so as to maintain the drain port open or closed as desired, or, if desired, the stopper mechanism may be removed from the drain port so that it may be cleaned.

This invention relates to drain stoppers and related mechanisms for lavatories and other plumbing fixtures.

In a conventional lavatory, for example, a drain stopper mechanism is usually located at the bottom of the basin of the lavatory so that the stopper mechanism may be manipulated to allow water received in the basin to freely exit through the drain port and into the sewer system or other disposal receptacle. One widely used arrangement for controlling the flow of fluid into the basin as well as out of the basin comprises a stopper which is available to seal the drain opening whenever water is to be accumulated in the basin during intervals when it is desired to wash one's hands or face, together with control mechanism consisting of a knob coupled by cable or levers to the movable stopper so that the knob may be manipulated to control the movement of the stopper. In such an arrangement, when it is desired to close the drain port so that water may be accumulated in the basin, the knob will be moved in one direction so as to allow the stopper to be lowered to block the flow of water out of the basin and through the drain port while, on the other hand when it is desired to release the water in the basin to the sewer system, the knob may be manipulated in the opposite direction so as to raise the stopper sufficiently to permit the free passage of water from the basin into the drain port and into the sewer system or other receptacle. In such conventional knob controlled plumbing fixtures, the coupling mechanism, whether in the form of levers or cables, will serve to translate the motion of the knob, whether it be a rotary device or a translatory device, into the vertical movement of the stopper to bring about the desired elevation within the basin of the fixture. It will be apparent that such mechanism, usually involving a considerable number of coupled parts, is not only expensive but also subject to faulty operation which oftentimes requires the repair, maintenance or replacement service of a plumber.

It is therefore one of the objects of the present invention to provide a stopper mechanism which is simple and low in cost and substantially free of any such remotely controlled stopper arrangements for lavatories.

An additional problem is at times encountered in conventional plumbing fixtures, such as lavatories, whenever it is desired to remove the knob-controlled stopper mechanism from the drain port so that it may be cleaned

by removing hair, grime, grit and other foreign material which may have accumulated over a period of time. In such cases, the accumulation of foreign matter retards the flow of water from the drain port. The accumulation of such foreign matter may be so large as to render it virtually impossible for fluid to be freely exhausted through the drain port. Whenever such conventional mechanism controls the position of the stopper, the ability to remove the stopper for the purpose of cleaning out the accumulated foreign material from the drain port will ordinarily involve a rather difficult mechanical operation which may be beyond the ability or experience of the housewife. Because such accumulated foreign matter can develop quite frequently, it may be incumbent upon the user to call upon a plumber to do the cleaning, maintenance or repair job. This is, of course, quite costly and, at the same time, the plumbing fixture may be rendered unusable until the necessary cleaning service has been performed.

It is therefore another object of the invention to provide a stopper mechanism which can be easily removed by hand from the drain port whenever desired so that cleaning and other operations may be carried out promptly and efficiently even by inexperienced and non-technical people.

This invention will be better understood from the more detailed description hereinafter following when read in connection with the accompanying drawing in which FIG. 1 illustrates a front elevational view of the stopper mechanism or structure for a drain structure of this invention; FIG. 2 shows a side elevational view of the stopper mechanism of FIG. 1; FIG. 3 illustrates a top or plan view of the same stopper mechanism; FIG. 4 shows a bottom view of the same stopper mechanism; FIG. 5 depicts a cross-sectional view taken along the line 5—5 of FIG. 3; FIG. 6 shows a cross-sectional view of part of drain port or outlet mechanism of a plumbing fixture, such as a lavatory, together with the stopper mechanism of this invention in its closed position in the plumbing fixture; and FIG. 7 shows the stopper mechanism in its open position immediately adjacent the drain port or outlet mechanism of FIG. 6; and FIGS. 8 and 9 illustrate respective bottom plan views of the structures of FIGS. 6 and 7.

Referring to the drawing, FIGS. 1 to 5 show a form of the stopper mechanism **1** of this invention. It comprises a unitary structure which may be made of any material, whether metallic or non-metallic, but it is preferably made of a plastic material such as that known commercially as Celcon M90–04. The stopper mechanism includes a lobed handle **10**, a plan view of which is shown in FIG. 3, and it may be gripped conveniently by the fingers when the stopper mechanism is to be inserted or removed from the drain port mechanism. The handle **10** is positioned above a bevelled stopper **20** which is preferably circular throughout, the bevel surface being designated **22**. The bevelled surface **22** will make a fairly complete or sealed closure at the mouth of the drain port mechanism, as will be hereinafter explained. The stopper mechanism **1** also includes a skirt structure **28** having two pairs of circumferential or peripheral arms, one pair being designated **30** and **32** and the other pair designated **40** and **42**. Arms **30** and **32** may be segments of a hollow substantially circular cylindrical skirt, the external diameter of which is very slightly smaller than the internal diameter of the mouth of the drain port mechanism into which the stopper mechanism **1** may be inserted. The other two arms **40** and **42** respectively include tapered fingered segments **50** and **52** which are more clearly shown in FIGS. 1 and 7. These tapered fingered segments **50** and **52** extend radially outwardly

beyond the outer diameter of the cylindrical arms **30** and **32** and serve as gripping members or retainers which fit into the two enlarged openings **60** and **62** which are best shown in FIGS. 6 and 7.

The two openings **60** and **62** are positioned on opposite sides of the drain port structure **70**. Each opening includes an enlarged upper section having a platform **64** on which the finger members **50** and **52** may be positioned when the stopper **1** is to be in its upper or open position in order to permit water to be drained or exhausted from the drain port mechanism **70** and a smaller lower section into which the finger members **50** and **52** may be lowered when the stopper **1** is to be dropped into its closed position to sealingly shut off the exhaust port mechanism **70** against the efflux of water from the basin of the lavatory or other plumbing fixture.

Adjacent to and beneath the bevelled section **22** there is a circumferential groove or space **24** into which a washer **26** is positioned and retained, as shown more clearly in FIG. 7. The washer **26** is preferably made of a flexible material, such as rubber, and it aids in sealing the stopper mechanism **1** against the mouth of the drainport mechanism **70** whenever the stopper mechanism is moved into its lowest position as shown in FIG. 6, to bar the flow of water out of the basin and through the drainport mechanism **70**. The washer **26** is retained in its circumferential groove **24** at all times, being flexed peripherally during movements of the stopper mechanism **1** in the closing and opening operations of the drainport mechanism **70**. It will be apparent that when the stopper mechanism **1** is in its uppermost position, water will be released to flow from the basin into the drainport mechanism **70** over a path provided between the skirt segment **28** of the stopper mechanism **1** and the inner wall of the drainport mechanism **70**.

When it is initially desired to insert the stopper mechanism **1** into the opening at the mouth of the drain port, it is necessary only to grasp the handle **10** and push the stopper mechanism **1** downwardly into said mouth by applying a small amount of physical pressure to the stopper mechanism **1** to cause the projecting fingers **50** and **52** of the arms **40** and **42** to be moved past the mouth of the drainport structure **70** and into the region of the respective enlarged openings **60** and **62** of the drainport structure **70**. The user may then position the stopper mechanism **1** in two different vertical locations or elevations, the upper elevation being the one in which the finger members **50** and **52** are held above the shelf or platform **64** so that the basin of the plumbing fixture may be drained of water therein, or in its other and lowermost elevation in which the fingered members **50** and **52** are in the lower regions of the respective openings **60** and **62** of the drain mechanism **70** so that the stopper mechanism **1** will be held in sealed contact against the mouth of the exhaust port structure **70**. The bevelled section **22** of the stopper and the flexible washer **26** together will serve to provide a very close fit and seal against the correspondingly bevelled mouthed segment of the drainport mechanism **70**. Thus, the mere manipulation by the user of the handle **10** of the stopper mechanism **1** will cause the stopper mechanism **1** to assume either of two positions, (1) to enable water to be drained out of the basin, or (2) to seal the basin so that water therein may be retained at its assigned or desired level, or so that water may be fed into and accumulated in the basin.

Whenever it is desired to remove the stopper mechanism **1** from the drainport structure **70**, it is only necessary to grip the handle **10** and withdraw the stopper mechanism **1** by applying pressure upwardly toward the basin. The withdrawal of the stopper mechanism **1** by axial upward pressure will cause the arms **40** and **42** to be flexed or bent toward the axis of the stopper mechanism **1** by a desired or sufficient amount so as to have the respective fingers **50** and **52** sufficiently displaced and thereby readily removed by being pulled out of the mouth of the drainport mechanism **70**. The elongated arms **40** and **42** are of relatively small cross-section but they are sufficiently long so that they may be readily flexed by manual axial pressure without causing breakage of the arms. When sufficiently flexed so that the protruding fingers **50** and **52** can clear the bevelled mouth of the drainport mechanism **70** (and this may be accomplished by a flexure of no more than about ⅛″), the stopper mechanism **1** will be severed and separated from the drainport structure **70**. The inner cylindrical wall of the drainport mechanism **70** may then be cleaned if desired and after it is cleaned, the stopper mechanism **1** may be returned to its normal position, either in its upper elevated position for allowing water to drain through the drainport or in its lowermost position to be sealed against efflux of water to and through the drainport mechanism **70**.

While the stopper mechanism **1** of this invention has been shown and described as embodying a skirted structure having two fingered arms and two non-fingered arms, it will be apparent that the same objectives may be accomplished with a skirted structure having one fingered arm or more than two fingered arms, as well as with one non-fingered arm or more than two non-fingered arms. It is important to have the fingered arm or arms of sufficient flexibility and resiliency so that the stopper mechanism **1** may be pressed into any position as above described or pulled and axially withdrawn from any position when the stopper mechanism **1** is to be severed from the drainport structure **70**. It is equally important to have the non-fingered arm or arms **30** and **32** of sufficient cylindrical surface so that they may serve as guides and make good contact with the inner cylindrical wall of the drainport structure **70** to prevent tipping or wobbling or vibration of the stopper mechanism **1** whenever water is being drained from the basin.

It will be understood that the protruding fingers **50** and **52** are so shaped or tapered with respect to their lengths that they may be readily moved into position when manual pressure is applied to the handle **10** to cause the fingers **50** and **52** of the stopper mechanism **1** to be advanced past the upper region or mouth of the drainport structure **70** and to be easily moved in the opposite direction along the inner cylindrical wall of the drainport structure **70** by the application of relatively light manual pressure applied to the handle **10** for the removal of the stopper mechanism **1**.

The stopper mechanism **1** is constructed so that it will be held firmly and substantially free of unnecessary movement whenever the stopper mechanism **1** is raised to permit the passage of water through the drainport structure **70**, or lowered to seal the stopper mechanism **1** and washer **26** against the drainport structure **70** to prevent the drainage of water through the drainport structure. By employing a plastic material in the construction of the stopper mechanism **1** as a unitary device, the stopper mechanism not only has a desirable appearance, but it has flexibility and resiliency in the flexible arms **40** and **42** for easy insertion or removal of the fingers **50** and **52** of the mechanism. Furthermore, the stopper mechanism **1** is of simple construction and of low cost and, moreover, it is non-corrosive. Maintenance and repair problems are, therefore, minimized or virtually non-existent.

As shown in FIGS. 6 and 7, the drain structure **70** includes a metal liner **80** which may be sheathed in plastic material on both of its surfaces and on its tapered upper rim, except that a portion **85** of the external surface of the liner **80** may be unsheathed so that the metallic surface may be threaded to receive a threaded nut **88** which may also be made of plastic material. The threaded nut **88** may threadingly engage the threads of segment **85** so as to advance a metal washer **90** and a tapered gasket **95** of rubber or other resilient material against the underside of the basin of the plumbing fixture. The general structure of the drain port equipment is more fully shown and described in a companion application of the same inven-

tors which is assigned to the same assignee and was filed of even date herewith. Reference may be made to that application for added information that may be desired for a more complete understanding of the drainport mechanism.

Our stopper mechanism has advantages over other prior structures:

(1) Our stopper device eliminates lever control which wears rapidly and employs many parts and is costly.

(2) Our skirted structure has fingers which guide the device and still enable the device to be axially rotated and advanced or returned through the drain opening at the mouth of the drain port.

(3) Our skirted structure has elongated arms with protruding fingers which can be bent or flexed to change the elevation of the structure for changing the function of the stopper device.

(4) Our structure has reduced tendency to wobble.

(5) Our structure is simple, flexible and of good appearance and low in cost.

What is claimed is:

1. A stopper structure for the drain port of a plumbing fixture said drain port having a plurality of openings forming tiers in the side wall thereof comprising a substantially cylindrical skirted member which is cut away axially over the lower portion of the height of said skirt so as to form a plurality of elongated arms, one or more of which form radially outwardly protruding fingers, the fingered arms being resilient so that the spacing between them may be reduced when inserted into the drain port and such that said arms may expand again to substantially their original shape when said stopper structure is positioned within the drain port, said protruding fingers of said arms being insertable into said openings in said side wall of the drain port so that the stopper may be retained on a selected tier of the drain port.

2. A stopper structure acording to claim 1, in which the skirted member has a lobed handle so that the stopper structure may be manipulated and advanced in an axial direction.

3. A stopper structure according to claim 1, in which the stopper structure is made of a plastic material.

4. A unitary stopper structure for the drain port of a plumbing fixture said drain port having a plurality of openings forming tiers in the side wall thereof comprising a lobed handle, a bevelled stopper, the bevel of which corresponds to the bevel at the mouth of the drain port of the plumbing fixture, and a skirted member depending from said stopper, said skirted member being in the form of a hollow substantially cylindrical shape cut away axially over the lower portion of the height of said skirt so as to provide a plurality of first flexible elongated arms, the ends of which form radially outwardly protruding fingers at their lower ends, and a plurality of other elongated guiding arms, the fingers of the first flexible arms being insertable into any of the plurality of openings in the side wall of the drain port of the plumbing fixture.

5. A unitary stopper structure according to claim 4, in which the structure is made of plastic material.

6. A unitary stopper structure according to claim 4 including a groove immediately below the stopper, and a resilient washer retained within said groove.

7. A drain mechanism for a plumbing fixture comprising a substantially hollow elongated cylindrical drain port having an opening therein providing a plurality of tiers in the cylindrical wall of said port, a stopper structure having a handle and a skirted member substantially cylindrical in shape, the skirted member being cut away axially over the lower portion of the height of said skirt so as to form a plurality of flexible elongated arms forming radially outwardly protruding fingers at their lower ends, the fingers of said protruding arms being insertable within said opening in the wall of the drain port so as to be retained on a selected tier of said opening.

8. A drain mechanism according to claim 7, in which the stopper structure includes a stopper the edge of which is tapered to match the taper in the mouth of the drain port of the plumbing fixture.

9. A drain mechanism according to claim 8, in which the stopper structure has a circumferential groove and a resilient washer mounted and retained within said groove to seal the drain port opening when the stopper is brought into contact with the bevelled opening of the drain port.

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