March 15, 1966 A. M. ZROLKA 3,239,848

FLUSH CONTROL UNIT

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Fig. 1

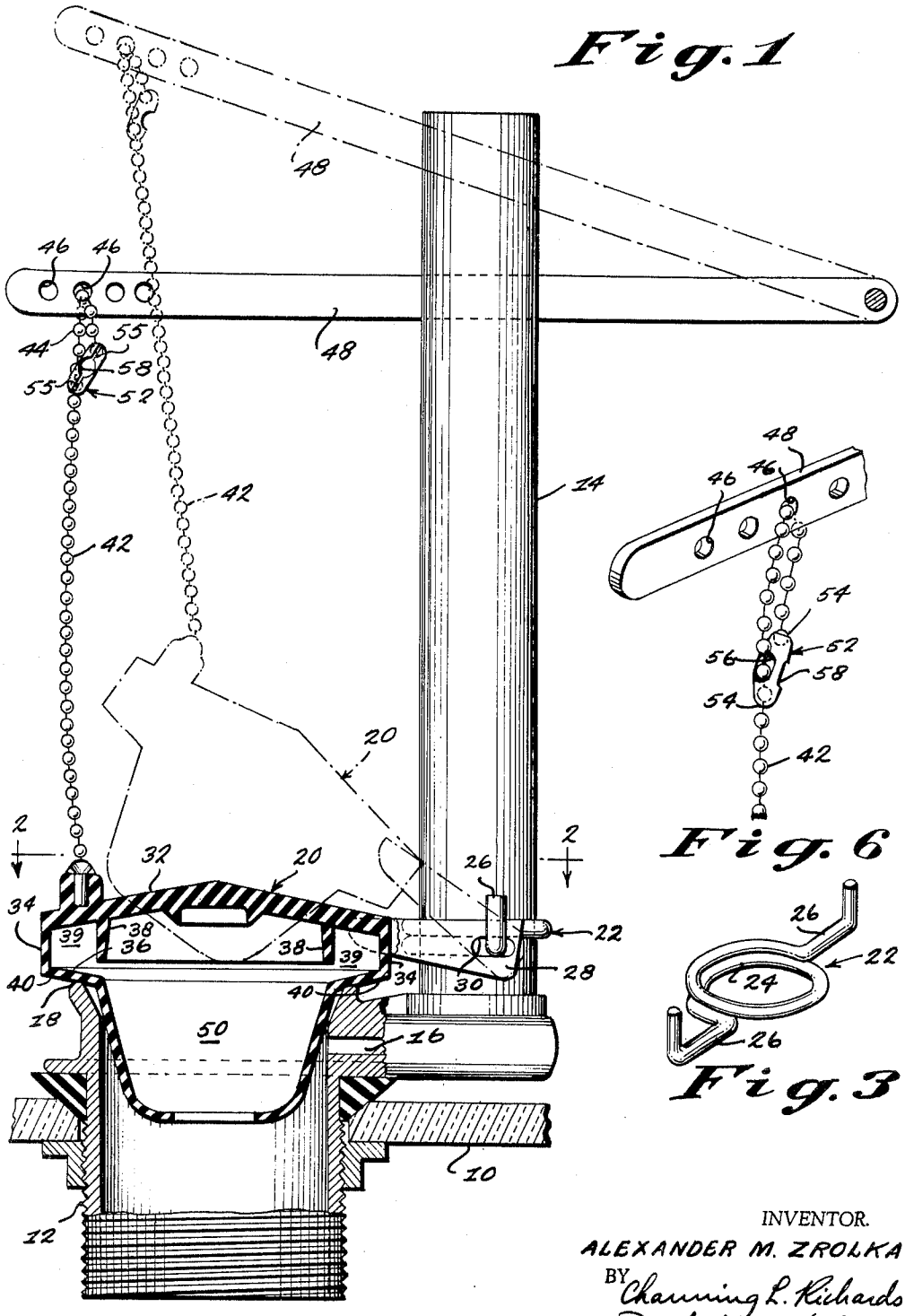


Fig. 6

Fig. 3

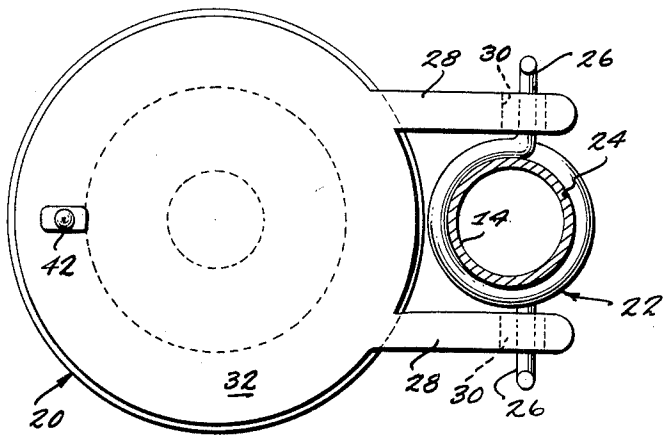
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Fig. 2



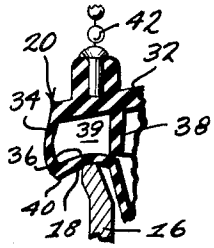
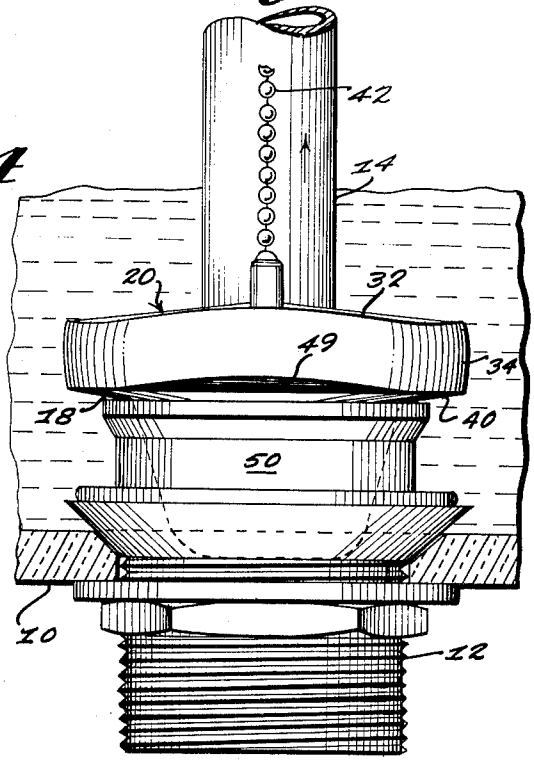


Fig. 4

Fig. 5



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FLUSH CONTROL UNIT

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6 Claims. (Cl. 4—57)

This invention relates to means for operating a toilet flush tank and more particularly to an improved tank ball structure which may be pivotally mounted for dependable operation without requiring precise alignment while also forming an exceptionally effective seal. This invention also provides an advantageous mounting arrangement by which the improved tank ball can be simply and easily installed for use.

Generally characterized, the present invention comprises a pivotally mounted tank ball formed with an annular cushion structure presenting an annular surface portion for sealing contact with the circumferential rim of a drain outlet in a flush tank and including means for concentrating the gravity head of water stored in the tank at opposite edges of the annular surface portion so as to deform this surface portion over the drain outlet rim for effective sealing thereat. In addition, particularly advantageous mounting means for the tank ball is provided comprising a resilient ring bracket biased inwardly and having a normal inner diameter slightly less than the diameter of the overflow stand pipe and including outwardly extending pivot lugs for pivotally supporting the tank ball.

These and other features of the present invention are described in further detail below in connection with the accompanying drawings, in which:

FIG. 1 is a right elevation view partially in section of a flush tank illustrating a flush control unit embodying the present invention;

FIG. 2 is a plan view of the flush control unit taken substantially along line 2—2 in FIG. 1;

FIG. 3 is a perspective view of the tank ball mounting bracket;

FIG. 4 is a detail sectional view illustrating a deformed condition of the tank ball;

FIG. 5 is a front elevation view of the flush control unit illustrated in FIG. 1; and

FIG. 6 is a detail view illustrating the adjustable pulling chain of the present invention.

Referring now in detail to the drawings, FIG. 1 illustrates the bottom wall **10** of a conventional flush tank supporting a drain outlet housing **12** with an overflow stand pipe **14** disposed thereon and formed in the conventional manner to include a passageway **16** through which the stand pipe **14** may by-pass overflow to the drain outlet housing **12**.

The stand pipe **14** has a resilient ring bracket **22** mounted thereon which is a metal bar member formed to include a coiled center portion **24** (FIGS. 2 and 3) which is biased inwardly to a diameter slightly less than the diameter of the stand pipe **14** to assure a gripping fit thereon, and a pair of terminal portions which first extend outwardly from the center portion **24** in opposite relation and then upwardly to form pivot lugs **26**; the upwardly extending portions of the pivot lugs **26** providing handle means against which the fingers of the hand may be pressed using the stand pipe **14** as a fulcrum to move the pivot lugs **26** in a direction to overcome the inward bias of the center portion **24** for increasing its diameter so as to loosen the ring bracket **22** for installation, removal or adjustment on the stand pipe **14**.

The tank ball **20** is pivotally mounted on the pivot lugs **26** by a pair of pivot legs **28** which extend therefrom in spaced parallel relation and which are mounted on the outwardly extending portions of the pivot legs **28** by

aligned apertures **30** which form the pivot axis for the tank ball **20**; each of the pivot legs **28** is made sufficiently flexible to permit the extending ends thereof to be twisted approximately 90° so that the aperture **30** may be passed along the upwardly extending portion of one of the pivot lugs **26** to install the tank ball **20** on the ring bracket **22** or, similarly, to remove it therefrom.

The tank ball **20** is made of rubber or the like and includes an annular cushion structure formed by a circular top wall **32** joined at its outer edge to a peripheral wall **34** to which pivot legs **28** are connected and which, in turn, is joined to the outer edge of an annular bottom ball **36** extending in spaced relation to the top wall **32**, and an annular leg wall **38** depending from the top wall **32** concentrically with respect to the peripheral wall **34** and aligned so as to bear substantially at the inner edge of the bottom wall **36** to form an annular air space **39** for cushioning the bottom wall **36**. The bottom wall **36** of the annular cushion structure presents a substantially annular seating surface **40** at its bottom face for abutment with the drain outlet rim **18** when the tank ball **20** is in its seated position. The bottom wall **36** and the peripheral wall **34** are approximately one half as thick as the top wall **32** so as to be relatively flexible, and as the level of the stored water begins to rise above the tank ball **20**, the gravity head of the water acts downwardly against the relatively rigid top wall **32** causing the relatively flexible peripheral wall **34** to deform as illustrated in FIG. 4 until the leg wall **38**, which is normally spaced from the bottom wall **36** in the passive condition of the tank ball **20** (FIG. 1), abuts the inner edge of the bottom wall **36** and acts together with peripheral wall **34** to concentrate the gravity head of water at the inner and outer edges of the bottom wall **36** for effectively sealing the drain outlet rim **18** by stretching the seating surface **40** thereover as illustrated in FIG. 4.

The annular bottom surface **40** has a width which is considerably larger than the width of the rim **18** to obviate any necessity of precise alignment of the tank ball **20** for proper sealing at the rim **18**.

When it is desired to release the stored water through the drain outlet housing **12**, the seal at the drain outlet rim **18** must be broken to permit the tank ball **20** to be pivoted about the pivot lugs **26** to a displaced position clear of the drain housing **12** as shown by the dotted lines in FIG. 1. For this purpose, one end of a bead chain **42** is connected to the top wall **32** of the tank ball **20** at a position which is near the outer periphery thereof and oppositely located with respect to the pivot legs **28** so as to be remote from the pivotal mounting of the tank ball **20** and also in substantial alignment in the central plane of tank ball pivoting. The other end of the bead chain **42** has an adjustable loop portion **44** which is passed through one of the apertures **46** in a conventional lifting arm **48** so that when the arm **48** is pivoted, the bead chain **42** will cause a pulling force to be exerted on the top wall **32** adjacent the peripheral wall **34** for causing localized deformation of the relatively flexible bottom wall **36** and peripheral wall **34** which locally separates the annular sealing surface **40** from the rim **18** to break the seal thereat (identified by numeral **49** in FIG. 5). It is obvious, of course, that applying the pulling force to the flexible walls **34** and **36** so as to cause localized deformation of the seating surface **40** requires a considerably smaller force than if the pulling force acted to separate a more rigid sealing surface about its entire circumference or a large portion thereof.

Once the seal between the sealing surface **40** and the rim **18** is broken, the air trapped in a buoyance compartment **50** attached at the inner periphery of the bottom wall **36** and in the air space **39** will cause the tank ball **20** to float to its displaced position thereby permitting the

stored water to be released through the drain housing **12**. The air space **39** is particularly effective in floating the tank ball **20** to its displaced position because of the substantial air volume held at the enlarged diameter of the space **39**.

The bead chain **42** is fitted with a retaining clip **52** (FIG. 6) which is flanged inwardly at its end portions **54** for engaging bead elements of the chain **42** passed through conventional access slots **55** (FIG. 1) leading thereto, and which has apertures **56** and **58**, respectively, in its opposite side walls to permit the chain **42** to be trained therethrough. The adjustable loop **44** is formed by passing the chain **42** through the apertures **56** and **58** in the clip **52** and then through one of the apertures **46** in the lifting arm **48** and inserting the terminal bead element of the chain **42** in one of the end portions **54** for engagement thereby; the chain **42** is then trained through the apertures **56** and **58** until the loop **44** is of such size as to permit a slight slack in the chain **42** between the tank ball **20** and the lifting arm **48** (FIG. 1) whereupon the bead element most nearly adjacent the other end portion **58** is engaged thereby to fix the loop **44** at its desired extent.

The present invention has been described in detail above for purposes of illustration only and is not intended to be limited by this description or otherwise except as defined in the appended claims.

I claim:

1. In a flush control unit for installation in a toilet flush tank to control the release of flush water therefrom by providing a tank ball pivotally mounted on an overflow stand pipe in said tank for selective pivoting between a first position seated on and sealing the circumferential rim of a drain outlet in said tank and a second displaced position clear of said drain outlet and the rim thereof, the improvement which comprises the formation of said tank ball with an annular cushion structure presenting an annular surface portion for sealing contact with said drain outlet rim, said surface portion being substantially wider than the width of said rim, and said annular cushion structure additionally incorporating means for bearing at the opposite annular edges of said annular surface portion to concentrate the gravity head of water stored in said tank substantially at the opposite edges of said annular surface portion and thereby deforming said surface portion over said rim for effective sealing thereat.

2. In a flush control unit of the character described, the improvement defined in claim **1** and further characterized in that said annular surface portion is presented at the bottom face of an annular bottom wall portion of said cushion structure, and in that said gravity head concentrating means includes a peripheral wall portion

joined at and extending uprightly from the outer edge of said annular bottom wall portion, a tank ball top wall joined at the upper edge of said peripheral wall portion in spaced relation above said bottom wall portion, and an annular leg portion depending from said top wall concentrically with respect to said peripheral wall portion and aligned for bearing substantially at the inner edge of said annular bottom wall portion.

3. In a flush control unit of the character described, the improvement defined in claim **2** and further characterized in that said bottom and peripheral wall portions are proportioned in thickness for relatively greater flexibility than said tank ball top wall so as to deform under the force of said gravity head until said annular leg portion is seated in bearing abutment at said inner edge of said annular bottom wall portion.

4. In a flush control unit of the character described, the improvement defined in claim **3** and further characterized in that said tank ball top wall has pulling means connected thereto adjacent said peripheral wall portion for breaking the seal of said annular surface portion at said drain outlet rim through localized deformation of said relatively flexible bottom and peripheral wall portions under the pull of said means to separate said surface locally from said rim.

5. In a flush control unit of the character described, the improvement defined in claim **4** and further characterized in that said pulling means is connected to said top wall remotely with respect to the tank ball pivot mounting and in substantial alignment in the central plane of tank ball pivoting.

6. In a flush unit of the character described, the improvement defined in claim **4** and further characterized in that said pulling means comprises a bead chain fitted with a tubular retaining clip having opposite side wall portions thereof apertured to allow training of said bead chain laterally therethrough, having both ends thereof flanged inwardly for retaining engagement with the bead elements of said bead chain, and having an access slot extending to each of said flanged end portions from one of said side wall apertures, whereby said bead chain may be engaged by said retaining clip with a loop formed therein of desired extent.

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