April 23, 1963 S. B. GROSS 3,086,218

ONE-PIECE TANK BALL

Filed Aug. 16, 1961 2 Sheets-Sheet 1

Fig. 1.

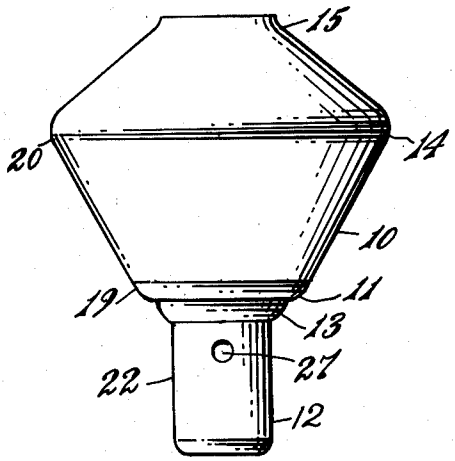


Fig. 2.

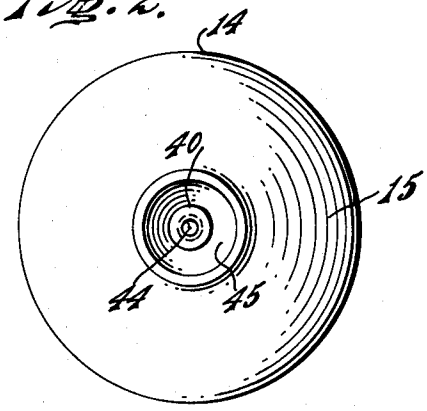


Fig. 5.

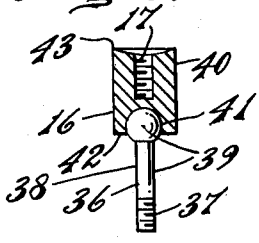


Fig. 3.

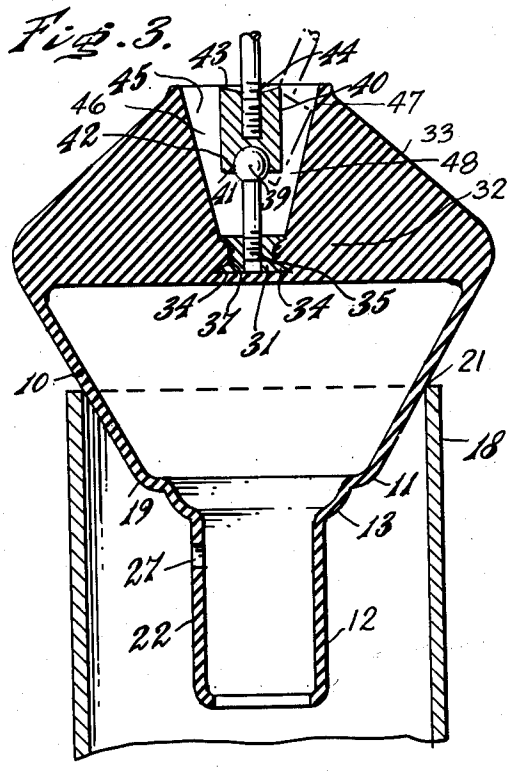
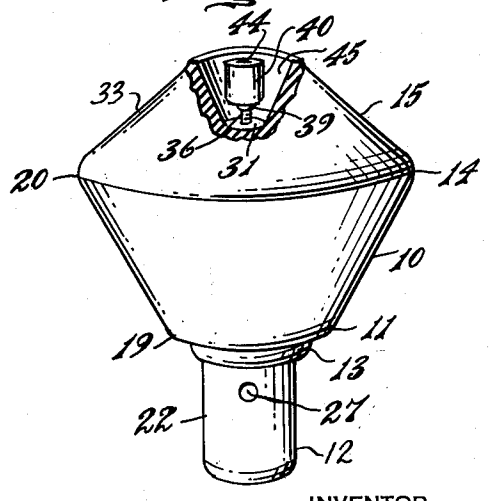


Fig. 4.



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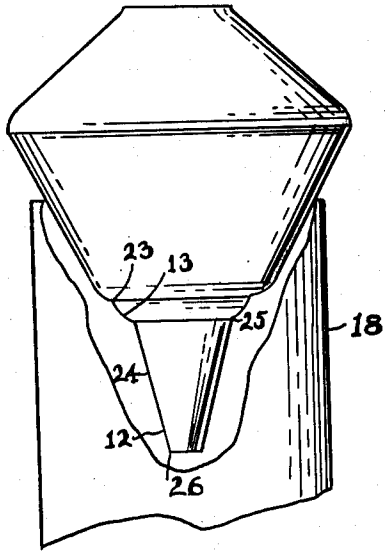


Fig. 6

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3,086,218

ONE-PIECE TANK BALL

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Filed Aug. 16, 1961, Ser. No. 131,827
1 Claim. (Cl. 4—56)

My invention relates to tank balls and more particularly to the type of tank ball molded entirely as one and designed for proper seating under all operating conditions.

Experience has shown that numerous designs and improvements have been made throughout the years in attempting to overcome the trouble and annoyance of dripping and leaking inherent in the operation of the conventional flush tank. These designs incorporate among others means to prevent collapse of the tank ball, to prevent the deterioration of the rubber body, to provide double and triple seal for positive closure and to provide multiple piece tank balls incorporating guides for effective closure. Despite all previous work in this field, there still is room for a design incorporating new features to assure a truly trouble-free device.

It is, therefore, an object of my invention to provide a tank ball molded in one piece incorporating a directional guide.

It is another object of this invention to provide a device to assure proper seating upon operation.

It is another object of this invention to incorporate a design to provide means to assure an upright float position of the device.

It is another object of this invention to incorporate universal connector means to insure positive seating.

It is another object of this invention to provide a device that can be readily used with conventional existing equipment.

It is another object of this invention to provide a device that is inexpensive in manufacture, rugged in construction and trouble-free in operation.

Other objects and a fuller understanding of the invention may be had by referring to the following description and claim, taken in conjunction with the accompanying drawing in which:

FIGURE 1 is a side elevation view of the tank ball.

FIGURE 2 is a top plan view of the tank ball.

FIGURE 3 is a vertical section taken along line **3—3** of FIGURE 2 of the tank ball when resting loosely on the valve seat.

FIGURE 4 is a perspective view of the tank ball partly broken away at the connector.

FIGURE 5 is a detail in cross section of the connector.

FIGURE 6 is a side elevation of an alternate construction.

Although specific terms are used in the following description for the sake of clarity, these terms are intended to refer only to the particular structure selected for illustration in the drawings and are not intended to define or limit the scope of the invention.

In FIGURE 4, I show a generally hollow, circular tank ball having an inclined seating surface **10** terminating in a guide member **12** at bottom **11** through adaptor piece **13**. The top **14** of seating surface **10** extends through inclined cover piece **15** and terminates in a universal connector assembly **16** providing a conventional threaded connector **17**.

The inclined seating surface **10** is round in shape to conform to round valve seat **18** and varies in diameter from its smallest dimension **19** at bottom **11** to its largest dimension **20** at top **14** of seating surface **10**. I have found that by inclining the seating surface as shown and described, my tank ball will have most universal use with new and existing equipment inasmuch as all variously

sized valve seats may be accommodated by the same device. The smaller the valve seat to be used, the nearer the bottom **11** of inclined surface **10** will be in contact to provide a seal **21**. As the size of the valve seat **18** increases, the nearer the top **14** of inclined surface **10** will come in contact to form a seal **21**. I prefer to construct my tank ball of hollow molded rubber of dimensions suitable for use with all known valve seats as above described. As can be readily seen, the dimensions of the inclined surface can be readily changed to accommodate all known equipment.

Immediately below bottom **11** of inclined surface **10**, I show a guide member **12** extending downward and connected through adaptor piece **13**. Guide member **12** is shown cylindrical **22** in shape and is smaller in diameter **23** than smallest dimension **19** of inclined surface **10**. The diameter **23** of guide member **12** is made smaller than any known valve seat so that guide member may readily fit within the valve seat **18** to guide and direct the seating surface **10** into proper sealing alignment to form a perfect seal **21** at all times. The guide member is preferably cylindrical **22** in shape, but any other shape may be used and still be within the scope of this invention so long as the guide member can fit entirely within the valve seat **18** and act as a guide to the remainder of the tank ball. As an alternate method of construction, in FIGURE 6, I show a tank ball with guide member **12** having generally conical configuration **24**. The largest diameter **25** of cone shaped guide member **12** corresponds in size to diameter **23** of cylindrical guide and is adjacent to adaptor piece **13**. The smallest diameter **26** is arranged at bottom of tank ball and first intersects plane of valve seat **18** upon operation. I have found this modified design further assures proper operation. A hole **27** is provided in upper portion of guide member **12** as shown in FIGURE 1. The hole is approximately one-eighth inch in diameter and extends entirely through wall **28** of guide member **12** and communicates with hollow interior **29**. I have found that a single hole **27** functions to maintain the tank ball in upright position **30** as shown in FIGURE 1 even when fully immersed in water, thereby further insuring proper operation.

In FIGURE 5, I show a preferred embodiment of the universal connector assembly **16** as provided in the inclined cover piece **15** of the tank ball. A brass insert **31** held in heavy rubber bonnet **32** forming top **33** of cover piece **15** is provided with extended mounting ears or flanges **34** and internal threads **35**. Said threads are standard 6–32 threads, approximately ¼ inch deep to conform to existing practice in the field. A short brass connecting rod having conforming external threads **37** at one end, a short shank portion **38** and ball joint **39** at other end is screwed into insert **31** and forms a universal joint attachment for operating member **40**. Brass operating member **40** is provided at one end **42** with a socket **41** which corresponds with ball joint **39** to form a universal joint capable of turning universally in all directions about connecting rod **36**. The opposite end **43** of operating member **40** is drilled and tapped with a standard 6–32 thread **44** approximately 3/16 inch deep to operate with conventional equipment (not shown).

Brass insert **31** is recessed a sufficient distance **45** below top of inclined cover **33** to permit mounting of connecting rod **36** and operating member **40** below top of inclined cover **33** when in operating position as shown. Recessed opening **46** is arranged with inclined sides **47** to provide sufficient clearance **48** for proper operation of universal connector assembly **16** in all directions.

In operation, the tank ball is connected to the flushing mechanism in the usual manner at internal threads **44** of operating member **40**. Upon flushing, the tank ball is

lowered in the usual manner so that inclined seating surface **10** engages valve seat **18** in complete sealing engagement. The shape of inclined seating surface **10**, the guide member **12**, the hole **27** in guide member and universal connector assembly **16** operating either in combination or individually assure proper seating at the valve seat **18** at each operation. I have found the corrective features built into the tank ball as part of my invention produce proper, leak-free operation at all times.

Although I have described my invention with a certain degree of particularity, it is understood that the present disclosure has been made only by way of example and that numerous changes in the details of construction and the combination and arrangement of parts may be resorted to without departing from the spirit and scope of the invention as hereinafter claimed.

What is claimed is:

In a one piece tank ball used for sealing a round valve seat, the combination of a body portion having an inclined, circular seating surface, a circular guide member extending below and connecting to bottom of said body portion, said guide member and body portion being concentric and a universal connector assembly inserted into top of and being concentric with said body portion; said body portion being of hollow construction with closed top of relatively thick material, said inclined sides having bottom and top diameters increasing from bottom to top, said bottom diameter being smaller than diameter of valve seat and said top diameter being greater than diameter of valve seat and said bottom of body portion being open and communicating with said guide member; said guide member being of hollow, cylindrical construction and having diameter equal to said bottom diameter of body portion, said guide member provided with a horizontal hole extending completely through cylindrical construction and communicating with said hollow interior, said hole being less in diameter than diameter of guide member, said guide member arranged to fit within said valve seat upon operation and said guide member extending from and formed in one piece with

said body member; said universal connector assembly comprising an inverted conical depression in said closed top of body member, said depression being less than thickness of material of said top and having circular width at top of diameter approximately equal to diameter of said guide member, a flanged insert molded into said top of body portion at base of said depression, said insert provided with an upwardly extending cylindrical hole and internal threads along said hole, said hole having lower terminus in said insert and upper terminus open and in communication with said depression, a vertical short connecting rod removeably attached to said insert having upper and lower ends, the lower of said ends provided with external threads and turned into said insert to form a threaded attachment and the upper of said ends terminating in a ball of diameter greater than said connecting rod, a vertical cylindrical operating member attached to top of said connecting rod having upper and lower ends, said lower end provided with a spherical socket of dimensions corresponding to said ball and said upper end provided with a vertical, upwardly extending, cylindrical hole and internal threads along said hole, said hole having a lower terminus in said operating member and said upper terminus open providing place of attachment for said tank ball, said socket fitting over an enveloping said ball whereby universal ball joint swivel action is provided and operating member is free to incline within confines of said conical depression.

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