United States Patent

Thompson

[15] **3,698,431**

[45] **Oct. 17, 1972**

[54] **WATER DISPENSER FOR ANIMALS**

[72] Inventor: **Earl Clayton Thompson,** Drawer A, Dallas, Tex. 76643

[22] Filed: **July 12, 1971**

[21] Appl. No.: **161,532**

[52] **U.S. Cl.** **137/604,** 119/72.5, 137/68, 138/45, 138/46, 222/541, 222/547, 251/118, 251/339

[51] **Int. Cl.** **A01k 7/00**

[58] **Field of Search** 137/68, 604; 119/72.5, 75; 138/45, 46; 222/541, 547; 251/118, 125, 339

[56] **References Cited**

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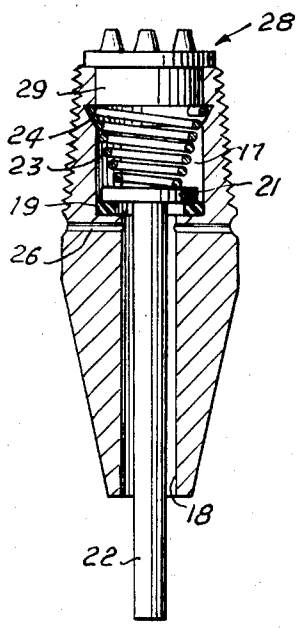
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Primary Examiner—Robert G. Nilson
Attorney—Cecil L. Wood et al.

[57] **ABSTRACT**

A dispensing valve for attachment to a water conduit includes an elongated housing having an external pipe thread at its inlet end. The housing provides an enlarged inlet chamber opening to the inlet end, and an axially aligned outlet passage of smaller diameter, defining an intermediate transverse shoulder. An annular gasket positioned on the shoulder defines a valve seat; and a closure member includes a head seating on the valve seat gasket and an elongated shank extending through the outlet passage and beyond the outlet end of the housing. The valve is opened by either tilting or lifting the closure member which is held against the seat by a spring in the inlet chamber. An orifice cap of a plastic material, for example, closes the inlet end of the inlet chamber and includes one or more bosses providing inlet passages. The bosses may be selectively sheared to change the area of the inlet passages.

15 Claims, 11 Drawing Figures



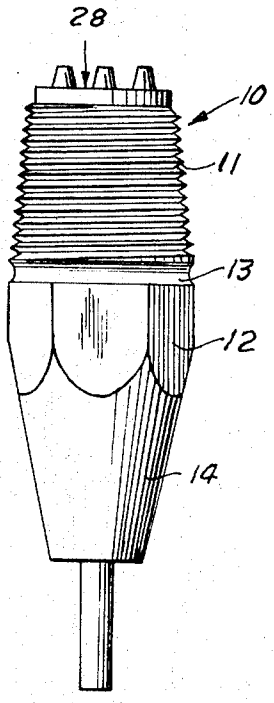


Fig. 1

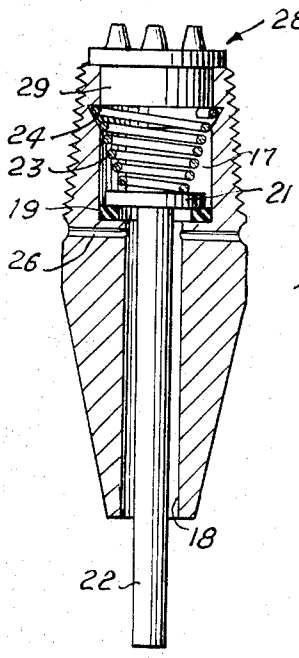


Fig. 2

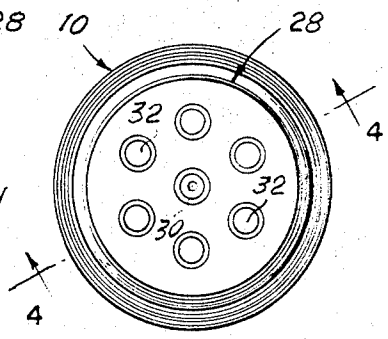


Fig. 3

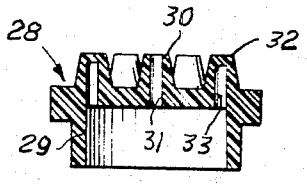


Fig. 4

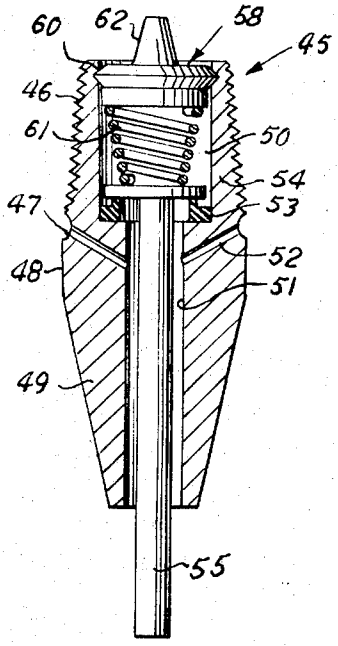


Fig. 7

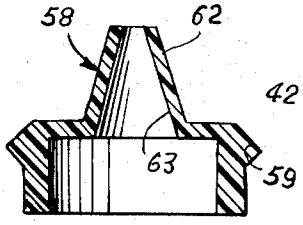


Fig. 8

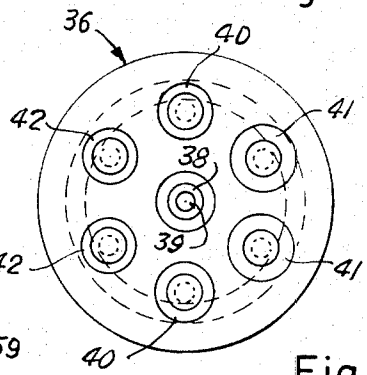


Fig. 6

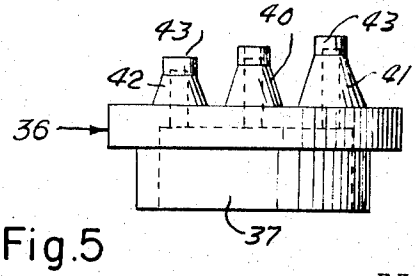


Fig. 5

INVENTOR
Earl Clayton Thompson

BY
Cecil E. Wood
Peter J. Murphy
ATTORNEYS

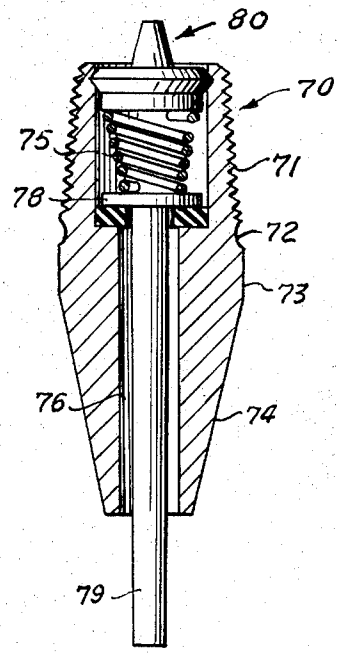


Fig. 10

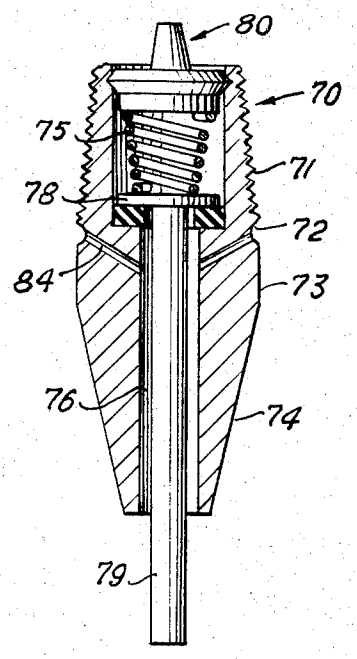


Fig. 11

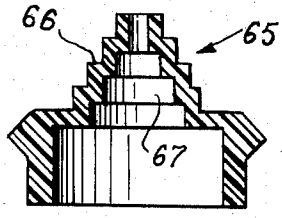


Fig. 9

INVENTOR
Earl Clayton Thompson
Cecil C. Nash
BY
Peter J. Murphy
ATTORNEYS

WATER DISPENSER FOR ANIMALS

BACKGROUND AND SUMMARY OF THE INVENTION

This invention relates to valves operable by swine or other animals for the dispensing of drinking water.

A principal object of this invention is to provide an improved construction of valves capable of operation by swine or other animals for releasing drinking water as needed.

Another object of this invention is to provide an improved construction of animal drinking valves having means for controlling or regulating water flow to prevent gushing when the valve is opened by the animal.

A further object of this invention is to provide such a valve wherein the flow of water through the valve can be readily changed by means of an adjustment at the valve.

Still another object of this invention is to provide a valve of this type which is self-cleaning.

These objects are accomplished in a valve comprising an elongated housing having passage means therethrough defined by an inlet chamber and a smaller axially aligned outlet passage providing a valve seat shoulder. A valve closure member includes an enlarged head seating on the shoulder and an elongated stem extending through and beyond the outlet passage. The water, or a spring, in the inlet chamber urges the head against the valve seat; and the valve is opened through engagement of the stem to tilt or lift the head. An orifice cap closing the inlet end of the chamber includes one or more outwardly projecting bosses each including an inlet passage extending at least to a point adjacent to the outer extremity, with the flow areas through the cap being varied by removing portions of the boss tips.

The novel features and the advantages of the invention, as well as additional objects thereof, will be understood more fully from the following description when read in connection with the accompanying drawings.

DRAWINGS

FIG. 1 is an elevation view of one form of dispenser valve according to the invention;

FIG. 2 is a longitudinal sectional view of the valve of FIG. 1 taken in an axial plane, with an inlet aperture cap shown in full;

FIG. 3 is a view of the aperture cap seen in FIGS. 1 and 2, as viewed from the inlet end of the valve;

FIG. 4 is a transverse sectional view of the aperture cap taken in the plane 4—4 of FIG. 3;

FIG. 5 is a side elevation view of an alternative form of valve aperture cap according to the invention;

FIG. 6 is a top view of the aperture cap of FIG. 5;

FIG. 7 is a longitudinal sectional view of another form of valve according to the invention, taken in an axial plane with the valve aperture cap being shown in full;

FIG. 8 is a transverse sectional view of the valve aperture cap shown in FIG. 7, taken in an axial plane;

FIG. 9 is a transverse sectional view of another form of valve aperture cap according to the invention;

FIG. 10 is a longitudinal sectional view of another form of valve according to the invention; and

FIG. 11 is a longitudinal sectional view of still another form of valve according to the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

One form of valve according to the invention is illustrated in FIGS. 1 through 4. The valve housing 10 is generally cylindrical in shape having a pipe thread 11 formed at its inlet end, a hex portion 12 formed intermediate the ends for engagement by a suitable wrench with the hex portion being separated from the pipe thread by an annular groove 13, and a conically tapered nose 14 formed at the outlet end. An inlet chamber 17 is formed from an enlarged axial bore formed from the inlet end; and an outlet passage 18 is formed by a smaller bore extending between the inlet chamber and the outlet end of the housing. A transverse annular shoulder formed between the inlet chamber and outlet passage defines a valve seat; and an annular resilient washer 19 disposed on the seat defines a sealing member for engagement by the valve closure member. As seen in FIG. 2 the gasket 19 has an outer diameter corresponding to the diameter of the inlet chamber, and an inner diameter which is larger than the diameter of the opening to the outlet passage.

The valve closure member includes a flat disc-like head 21 having a diameter somewhat less than that of the inlet chamber, and having an axially extending stem 22 which extends through the outlet passage 18 and beyond the end of the housing nose 24. The diameter of the stem 22 is less than that of the outlet passage to provide an annular flow passage for water when the valve is opened.

The respective diameters of the inlet chamber, outlet passage, closure member head, and closure member stem are such that movement of the closure member by the animals, as will be described, will result in engagement of the chamber sidewalls by the head to effect the cleaning of these walls and prevent a buildup of minerals or other sediment.

The closure head 21 is urged against the seat gasket 19 by a compression spring having a frusto-conical configuration with overlapping coils. The larger end of the spring has a normal diameter greater than that of the inlet chamber 17; and the walls of this chamber are provided with an annular groove 24 for the purpose of receiving and retaining the larger end of the spring. The smaller end of the spring then bears on the central portion of the head 21 to maintain the closure member in engagement with the valve seat.

Transverse aeration passages 26 communicate between the outlet passage 18 and the housing exterior groove 13, with the aeration passages opening to the outlet passage adjacent to the valve seat.

An aperture cap 28 closes the inlet end of the inlet chamber to control the rate of water flow through the valve. This cap is preferably fabricated of a relatively soft material such as a plastic material. In the form illustrated in FIGS. 1 through 4, the aperture cap is a cup-shaped member with the base wall defining a flange dimensioned to seat on the inlet end of the valve housing, and has an axially extending cylindrical skirt or lip 29 dimensioned to be closely received within the inlet chamber. This skirt has a depth corresponding to the axial distance between the inlet end of the valve

housing and the spring retaining groove **24** so that, in assembly, the cap will assure seating of the spring within the groove.

The cap includes a central outward projecting boss **30** and six peripheral outward projecting bosses **32**. The central boss includes an inlet passage **31** extending therethrough, and the peripheral bosses each include an inlet passage **33** which extends from the interior of the cap to a point adjacent the tip or outer extremity of the boss. These passages **33** then are normally closed, but may be opened by shearing of the tips of the bosses to increase the flow capacity through the aperture cap. The inlet passages **31** and **33** are of generally uniform cross section.

FIGS. **5** and **6** of the drawings illustrate a modified form of aperture cap **36** which might be used in place of the aperture cap **28**. This cap is again a cup-shaped member having a skirt **37** similar to the skirt **29** dimensioned to fit snugly within the inlet chamber and, as shown, this cap also includes a central boss **38** having an inlet passage **39**, and six peripheral bosses each having an inlet passage terminating short of its tip. In this configuration, the bosses are of different heights, with a pair of peripheral bosses **40** having a height corresponding to that of the central boss **38**, a pair of peripheral bosses **41** being somewhat taller than the bosses **40**, and a pair of peripheral bosses **42** being somewhat shorter.

The different height bosses are provided for convenience in shearing the tips of the bosses for opening more of the boss passages to increase the overall flow capacity. For example, the tips of the taller bosses **41** would be sheared first, then the tips of the intermediate height bosses **40**, and lastly the tips of the shorter bosses **42**. To facilitate the shearing of the boss tips, each of the peripheral bosses includes a generally cylindrical tip **43** with the remaining portion of the bosses being conical in shape. A shoulder is then defined between the cylindrical tips and the conical bodies defining shear planes which lie below the upper extremity of the boss passages to assure that the passages will be exposed when the cylindrical tips are sheared from the bosses.

FIGS. **7** and **8** of the drawing illustrate another form of valve including a housing **45** having a pipe thread **46**, external groove **47**, hex **48** and nose **49**. An inlet chamber **50** and outlet passage **51** are formed in the manner described; and aeration passages **52** are inclined toward the outlet end from the housing groove **47** to the outlet passage **51**. The valve seat gasket **53** includes an inner axially directed lip for sealing engagement with the head **54** of the valve closure member, which includes a stem **55** having the form described. An aperture cap **58** is a cup shaped member, again preferably fabricated of a plastic material, having an annular rib or bead **59** of a maximum diameter slightly greater than that of the inlet chamber. The inlet chamber is provided with an inward facing annular groove **60** adjacent to the inlet end of the valve housing for receiving and retaining the aperture cap rib **59**, thereby retaining the aperture cap within the valve housing.

In this configuration, the larger end of the frusto-conical spring **61** has a diameter corresponding to that of the inlet chamber and is engaged by the skirt of the aperture cap **58** to retain the spring within the chamber and compress the spring to urge the closure member in sealing relation.

The aperture cap includes a single central boss **62** which is frusto-conical in shape and defining an inlet passage **63** which is also frusto-conical in section. With this configuration, the inlet opening defined by the inlet passage **63** may be enlarged by shearing or removing a portion of the boss tip.

FIG. **9** shows another form of aperture cap **65** with a single generally conical boss **66**. A changing diameter inlet passage **67** is formed by four successive bores of decreasing diameter, and the outer surface of the boss is also stepped. The successive annular shoulders defined by the stepped boss provide shear planes for progressive shearing of the boss **66** to provide a successively larger flow opening through the aperture cap.

FIG. **10** illustrates another form of valve according to the invention including a housing **70** similar to those already described including a pipe thread **71**, annular groove **72**, hex **73** and nose **74**, and being provided with an inlet chamber **75** and an outlet passage **76**. The valve seat is defined by a flat washer **77** seating on the shoulder between the inlet chamber and outlet passage; and a closure member similar to those already described includes a head **78** and stem **79**. An aperture cap **80**, having the configuration shown in FIG. **8**, is retained in the inlet chamber and retains the spring **81**.

In this configuration the outlet passage **76** may be slightly larger relative to the closure member stem **79** to provide a larger annular flow passage from the valve seat. The seat washer **77** has an outer diameter corresponding to the diameter of the inlet chamber, and has an inner diameter less than the diameter of the outlet passage **76**. With this arrangement, when the valve is opened, the water flowing through the annular passage between the seat washer and the valve stem will move into a larger annular chamber immediately beneath the seat washer, and will flow down the walls of the passage or along the stem without filling the annular flow passage. It has been discovered that the water emerging from the seat washer mixes with air in the area immediately beneath the seat washer to produce an aeration of the water and a freshening of the water. The air mixing with the water is carried out of the valve along with the water flow, thereby creating reduced pressure at the upper end of the inlet passage; and this air is replaced by air flowing upward through the outlet passage;

FIG. **11** illustrates a valve identical to that shown in FIG. **10** except that aeration passages **84** are provided communicating the upper end of the outlet passage **76** with the exterior of the valve housing at the groove **72**. This arrangement improves the above described aeration effect since the passages **84** provide for additional air flow into the area of reduced pressure immediately below the seat washer **77**.

What has been described is an improved water dispensing valve for animals having means for varying the flow capacity of the valve. The described forms of valves, according to the invention, include a number of features for improving the performance of the valves.

A principal feature is the aperture cap which may be provided in several forms to provide means for varying the flow capacity through the valve. In all the forms,

the inlet passages are formed through bosses which project outwardly from the aperture cap to obviate the clogging of the aperture passages by deposits of minerals or sediment on the inlet side of the aperture cap. In the form of aperture cap illustrated in FIGS. 1 through 6, the multiple bosses provide for considerable variation in the flow capacity of the valve. The flow capacity is increased, of course, by shearing the tips of more of the bosses. Conversely, if it is desired to reduce the flow capacity selected ones of the relatively smaller inlet passages may be plugged by means of readily fashioned wooden tapered plugs or available makeshift plugs such as round toothpicks for example. Additionally, this form of aperture cap, having relatively small inlet passages, functions as a filter to prevent the passage of large particles which may tend to interfere with the operation of the valve closure member.

In the configuration of FIGS. 7 and 8, the aperture cap fabricated from a suitable resilient plastic material for example may function as a retainer ring for self-retention within the inlet chamber and also as a retainer ring for the valve spring.

In the configurations of FIG. 6 and FIG. 9, shoulders are provided on the valve bosses to assist the user in shearing of the boss tips to enlarge the flow capacity of the valve.

The provision of the spring assures closing of the valve even under low water pressure; and this provision along with the flow control aperture cap tends to prevent gushing of the water from the valve under higher pressure by providing more resistant to opening of the valve with the aperture cap restricting the flow after the valve is opened.

Aeration passages may be provided to assist in freshening the water to make it more palatable to the animals. An additional feature, for agitating the water and assisting in aeration, is the stepped arrangement of the valve seat provided by the valve gasket having a larger inner diameter than that of the outlet passage.

An additional aeration feature is the provision of a valve seat gasket having a smaller diameter than that of the adjacent opening to the outlet passage, which creates an area of reduced pressure underneath the seat gasket providing for mixing of the water and air in this area with replacement air being drawn to the area either through the outlet passage or through aeration passages.

The valve may be self-cleaning if the parts are dimensioned as described, in that the closure member head will engage the sidewalls of the inlet chamber when the valve is operated normally either by the tilting of the closure member or by the axial lifting of the closure member against the force of the spring. The annular spacing between the head and inlet chamber must, of course, be sufficiently large to permit the maximum desired water flow; however the closure member has sufficient lateral movement within the valve housing to permit this cleaning action.

The spring serves the additional purpose of providing a cushioning stop for limiting axial movement of the closure member and thereby reducing wear or damage to the valve seat due to impact of the closure member on the seat. The spring, having an interfering coil configuration, prevents the closure member from being pushed too far into the housing, with possible resulting hangup of the head to prevent closure. Additionally, where the spring is seated in the retaining groove, it prevents the closure member from dislodging the orifice cap. The spring closes the valve quickly allowing little waste of water, and speeds the buildup of water pressure to seat the valve firmly. Additionally, the spring serves to prevent the valve from opening without activation, which opening may occur with certain pressure conditions and with certain softer gasket seat materials which may produce an oscillating rocking of the closure member resulting in leakage and excessive wear of the seat gasket.

While preferred embodiments of the invention have been illustrated and described, it will be understood by those skilled in the art that changes and modifications may be resorted to without departing from the spirit and scope of the invention.

What is claimed is:

1. A water dispensing valve for animals comprising

an elongated housing; passage means extending longitudinally through said housing including an inlet chamber of larger cross section opening to the housing inlet end, and an outlet passage of smaller cross section opening to the housing outlet end; transverse shoulder means between said inlet chamber and outlet passage defining a valve seat;

a valve closure member comprising an elongated stem of smaller cross section than that of said outlet passage, and an enlarged head for sealing engagement with said valve seat; said stem extending through said outlet passage and beyond the housing outlet end;

an orifice cap closing the inlet end of said inlet chamber having one or more raised bosses projecting toward the valve inlet end; said bosses enclosing inlet passages extending at least to a point adjacent to the tips thereof; and said boss tips being removable to increase the cross section of the orifice cap inlet passages.

2. A valve as set forth in claim 1

a resilient annular gasket disposed on said valve seat for sealing engagement with said closure head; said gasket having an internal diameter greater than that of said outlet passage.

3. A valve as set forth in claim 1

wherein said inlet chamber is circular in cross section; wherein said closure head is circular in cross section having a diameter only slightly less than that of said valve chamber, whereby the closure head during operation of the valve engages the chamber walls in an abrasive relation.

4. A valve as set forth in claim 1

including spring means disposed in said inlet chamber for urging said closure member head into engagement with said valve seat.

5. A valve as set forth in claim 4

wherein said spring means is a frusto-conical shaped spring, having its smaller end bearing on said closure cap;

said inlet chamber being provided with an internal annular groove adjacent to the inlet end of said housing; and the larger end of said frusto-conical compression spring being dimensioned to seat in said groove for retaining said spring within said inlet chamber.

6. A valve as set forth in claim 5

wherein said orifice cap includes an annular rib for engagement with the inlet end surface of the valve housing, and an annular axially extending skirt dimensioned to fit closely to the walls of said inlet chamber; and said skirt having a depth corresponding to the axial distance between the housing inlet end and said annular retaining groove.

7. A valve as set forth in claim 1

wherein said inlet chamber is provided with an annular retaining groove adjacent to the inlet end of the valve housing; wherein said orifice cap is fabricated from a resilient material and is dimensioned to be received within said inlet chamber, said cap being provided with an annular rib having a normal maximum diameter greater than the diameter of said chamber whereby said rib is urged into said retaining groove to retain said orifice cap.

8. A valve as set forth in claim 1

including one or more transverse aeration passages communicating between said outlet passage, adjacent to said valve seat, and the exterior of said housing.

9. A valve as set forth in claim 1

wherein said orifice cap includes a single bore defining an inlet passage of larger cross section at the base thereof and reducing to a smaller cross section at the outer extremity thereof.

10. A valve as set forth in claim 9

wherein said inlet passage is defined by stepped bores; and wherein the outer surface of said boss is stepped to define axially spaced annular shoulders.

11. A valve as set forth in claim 1

wherein said orifice cap includes a plurality of bosses projecting from a generally planar surface, each of said bosses having an inlet passage of generally uniform cross section; and the tips of said bosses being removable selectively to expose the respective inlet passages.

12. A valve as set forth in claim 11

wherein each of said bosses is provided with a transverse shoulder adjacent to its outer extremity, said shoulders being related to the outer extremities of the respective inlet passages to define a shear plane to expose the respective passages.

13. A valve as set forth in claim 11

wherein said bosses have different height relative to said planar surface to facilitate the selective shearing of the tips of said bosses.

14. A valve as set forth in claim 1

a resilient annular washer disposed on said valve seat for sealing engagement with said closure head; said washer having an internal diameter smaller than that of said outlet passage, defining an enlarged reduced pressure chamber in said passage adjacent to said valve seat.

15. A valve as set forth in claim 14

including one or more transverse aeration passages communicating between said outlet passage, adjacent to said valve seat, and the exterior of said housing.

* * * * *

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,698,431 Dated October 17, 1972

Inventor(s) Earl Clayton Thompson

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

On the cover sheet [72] the address for the inventor should read -- Drawer A, Hewitt, Texas 76643 --.

Signed and sealed this 20th day of March 1973.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents

USCOMM-DC 60376-P69
* U.S. GOVERNMENT PRINTING OFFICE : 1969 O—366-334.