Nov. 6, 1956 W. L. GILL 2,769,452

WEIGHT AND VALVE STEM ASSEMBLIES

Filed June 1, 1955

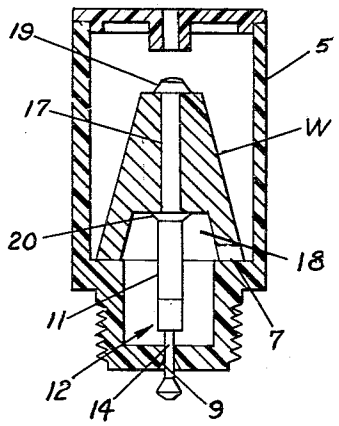



FIG. 1

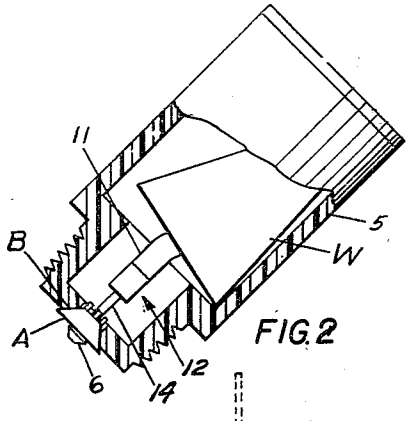



FIG. 2

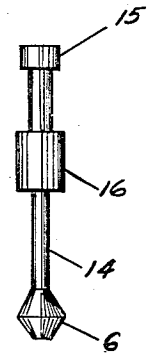



FIG. 3

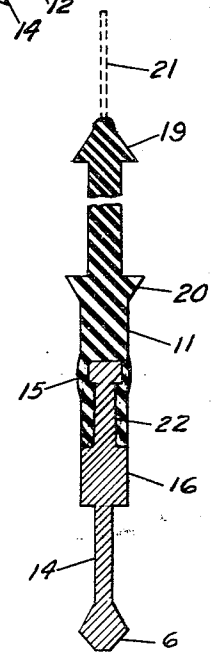



FIG. 4

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United States Patent Office 2,769,452 Patented Nov. 6, 1956



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# WEIGHT AND VALVE STEM ASSEMBLIES

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Application June 1, 1955, Serial No. 512,530

5 Claims. (Cl. 137—38)

This invention relates to a weight and valve stem assembly comprising a tipping weight and valve stem actuated thereby and to improved means for assembling and uniting the said weight and valve stem.

The purposes and advantages of the invention will be best understood by reference to the accompanying drawing wherein:

Fig. 1 is a vertical sectional view showing the tipping weight and the valve stem in upright position and in connection with a vent plug casing hereinafter described;

Fig. 2 is a partial sectional view of the vent plug casing with which the valve and weight coact, and with the structure and casing in tipped position;

Fig. 3 is a magnified side view of the metallic part of the valve stem; and

Fig. 4 is a magnified vertical sectional view of the complete rubber and metallic assembly comprising the valve stem proper.

Like numerals designate corresponding parts in all of the figures of the drawings.

In the drawings **5** designates the casing of a vent plug for wet storage batteries, and especially airplane batteries. Since airplane batteries are, in use, tilted to varying angles in all directions and are some times completely inverted, it is common practice to provide them with valved vent plugs so constructed as to permit the escape of gas during the upright or only slightly tipped position of the battery but arranged to prevent the escape of the electrolyte upon tipping of the battery beyond a predetermined degree.

The present application relates specifically to the tipping weight and its stem. This structure is of general application. To show that such is the case the assembly of this invention is illustrated in Fig. 1 in conjunction with a single valve seat on the vent plug casing while in Fig. 2 it is illustrated in conjunction with a casing with a high and low pressure valve arrangement wherein a small metallic valve **6** on the stem coacts with a valve seat on a larger rubber valve A, the latter valve in turn, coacting with a valve seat B on the vent plug casing, as in my copending application, Serial No. 456,098, filed September 15, 1954, of which this application is a continuation-in-part and which application has now matured into Patent No. 2,717,610, dated September 13, 1955.

In both of the described structures, a heavy frusto-conical, preferably lead, weight W rests when the battery is upright, upon an internal ledge **7** of casing **5**. Tipping of the casing, in any direction tips the weight from its seat upon ledge **7** and causes a valve head **6** of my improved valve stem to be drawn toward seat **9** of casing **5**, or toward a seating on valve A in Fig. 2.

The valve stem which comprises the essence of this invention and application is a two part stem, to wit, an upper rubber part **11** and a lower metallic part **12**. The term rubber is used in its generic sense and is intended to include any other substance having the desired flexibility, elasticity and extensibility as natural rubber. Neoprene



is one artificial product which may be used. The metallic part of the stem is preferably of stainless steel of an acid proof and non-corrosive nature. It comprises the valve head **6**, slender rod-like stem **14**, top protuberant head **15** and an intermediate abutment **16** that is preferably circular in form and presents a flat, upper face. The weight W has an axial channel **17** formed through its upper portion which extends from the top of the weight to the top of an underside cavity **18** formed in said weight and the presence of which cavity tends to raise the center of gravity of the weight. The rod-like upper portion **11** of the rubber portion of the valve stem carries a pair of integral rubber enlargements **19** and **20**, constituting abutments sufficiently larger in diameter than the channel **17** to function to respectively engage over the top of the weight and beneath the material of the weight at the top of cavity **18**. When the rubber stem is molded in manufacture an elongated integral rubber cord **21** is left attached to it. In assembling the device this rubber cord is passed upwardly through channel **17**, drawing the somewhat pointed upper abutment **19** and the rest of the stem with it.

When abutment or enlargement **20** engages the top wall of cavity **18** the lower part of the stem is brought to a stop. A further pull upon the rubber cord slightly stretches that portion of the stem between the abutments **19** and **20** until **19** clears the channel **17** and springs outwardly over the top of the weight. Then the pull on the cord is released and the weight is left elastically bound between abutments **19** and **20**. After this the rubber cord is cut off. The upper portion of the rubber valve stem is solid. Its lower portion is formed with an internal channel **22** into which the upper part of the metallic part of the stem is thrust until its abutment **16** is engaged with the lower end of the rubber portion of the stem. The protuberant head **15** will then be grasped and retained by the natural elasticity of the rubber, the channel **22** being only about the diameter of the lower portion of the metallic stem. Thus, the rubber will be distended by the presence of the head and the head will be grasped and retained by the said rubber portion. The portion **11** of the rubber portion of the valve stem must be of such size as to provide sufficient strength to support the weight when the device is wholly inverted and it must also be of sufficient diameter to receive, embrace and house the upper portion of the metallic part of the stem. At the same time, though, the rubber portion should be readily bendable (see Fig. 2) so that movement of the weight out of axial alignment with the casing will not cause so strong a tendency of the metallic stem and its valve, to move sidewise, as to cause cocking or binding of the valve with respect to its seat. It is clear that the degree of readiness of rubber stem to bend will be, in part, determined by the distance between the point at which the rubber portion **11** leaves the bottom of the weight and the head **15** of the metallic part of the stem. Since the first named point is at the top of cavity **18** and since this point is materially above the plane of the bottom of the weight and the seat from which the weight tips, it follows that the formation of said cavity **18** in the bottom of the weight not only raises the center of gravity of the weight to render it more sensitive to tipping influences but also materially increases the effective length of the bendable portion of the rubber part **11** of the stem. This permits desirable ease of bend with resultant lessened tendency for the metallic stem to follow the tipping movement of the weight.

The arrangement described protects that part of the stem which lies in channel **17** from contact by fumes or acids from the battery and thus long life of the connection between weight and stem is assured. The metallic parts themselves are acid proof under the conditions

of use. The described arrangement permits quick assembly of the parts by unskilled labor. The result is that marked economies in manufacture are had. The projection of the upper portion of the elongated metallic stem, upwardly into the lower part of the rubber portion, renders the lower part of the rubber portion, rigid. Thus, the rubber portion of the stem presents a structure that is, though of rubber, rigid throughout a section of its lower part; is secured fixedly in the weight and embodies a bendable part between the rigid part and the weight. The lower rigid part aids in maintaining axial alignment of the valve stem and the parts with which it coacts, to wit, seat **9** and valve A while the cavity **18** provides space within which the bendable part may be disposed and act.

The invention is not limited to the precise construction set forth but includes within its purview whatever changes fairly come within either the terms or the spirit of the appended claims.

I claim:

1. In combination a valve stem of the character described comprising a rubber body portion anf a lower acid resistant metal portion, said metal portion comprising a valve head upon its lower end, a protuberant head upon its upper end and an intermediate abutment, the upper portion of the rubber body portion being solid and provided with spaced upper and lower laterally protuberant integral abutments, the metal portion above its abutment, entering and lying axially within the rubber portion with the lower end of the rubber portion in contact with the upper face of the abutment of the metal portion of the stem.

2. In combination a valve stem of the character described comprising a rubber body portion and a lower acid resistant metal portion, said metal portion comprising a valve head upon is lower end, a prouberant head upon its upper end and an intermediate abutment, the upper portion of the rubber body portion being solid and provided with spaced upper and lower laterally protuberant integral abutments, the metal portion above its abutment entering and lying axially within the rubber portion with the lower end of the rubber portion in contact with the upper face of the abutment of the metal portion of the stem, the lower portion of the rubber body portion of the stem being provided with a preformed axial bore of a diameter to cause the rubber of the walls thereof to snugly receive the upper part of the metal portion of the stem and to be distended by the protuberant head to thereby grip and hold said head.

3. In combination a weighted tiltable body having an axial channel formed in the upper portion thereof which is open at top and bottom, a two part valve stem comprising a flexible and resilient rubber part and a metallic depending stem, the rubber part being solid and extending through the channel of the weighed body and being provided with spaced integral protuberant extensions which extend laterally beyond and engage the material of the weight at the upper and lower ends of the said axial channel, the metallic portion of the stem having a valve upon its lower end, a protuberant head upon its upper end and an intermediate transverse abutment which has a flat upper face, the upper end of the metallic part of the stem lying within a preformed channel of the lower part of the rubber portion of the stem and with the lower end of the said rubber portion in contact with the upper face of the said transverse abutment.



4. In combination a weighed tiltable body, a two part valve stem comprising a relatively thick, flexible and resilient upper portion of rubber and a relatively slender, rod-like and acid-proof metallic lower portion, means for securing the thick upper portion axially and against movement in the weight, with its lower part projecting downwardly below said weight, the upper end of the rod-like metallic portion projecting upwardly into the lower end of the rubber portion, said metallic portion having a protuberant head upon its upper end, and an intermediate transverse abutment against which the lower end of the rubber portion abuts, the protuberant head being resiliently gripped within the rubber portion whereby to resist endwise movement of the metallic portion with respect to the rubber portion, said metallic portion carrying an enlarged valve forming member at its lower end the upper face of which is shaped to engage a valve seat when the valve stem is pulled upwardly under the tipping action of the weight, the height at which the metallic portion terminates within the rubber portion being at such a material distance below the point at which the rubber portion leaves the weight as to leave such a length of the rubber portion between the top of the metallic portion and the weight that said rubber portion may bend when the weight is tipped out of axial alignment with the metallic part.

5. In a weight and valve stem assembly of the type in which the tipping action of a weight draws an upwardly facing valve into engagement with a valve seat, the combination with a tiltable weight having an underside cavity extending a material distance above the lower edge of the weight, an elongated two part valve stem and valve depending from the underside of the top of the cavity said weight and comprising an upper, relatively thick, elongated rubber portion of a length to extend well below the bottom of the weight, means for securing said upper portion axially within said weight, an elongated slender, rod-like, lower portion of acid resistant metal having an enlarged valve forming head a its lower end which head is shaped to present an upwardly facing valve seat engaging portion, the upper end of said rod-like metallic portion engaging the lower part of the downwardly extending rubber portion to an extent to render the lower end of said rubber portion rigid, means for securing the metallic portion to said rubber portion against endwise movement of the metallic portion with respect to the rubber portion to thereby positively move the valve upwardly when the weight is tipped and downwardly when the weight moves toward upright position, the point at which the top of the metallic portion of the stem terminates, lying far enough below the point at which the rubber portion leaves the top of the cavity of the weight, to leave a substantial length of the rubber portion between said points that is capable of bending as the weight tips.

**References Cited** in the file of this patent

UNITED STATES PATENTS

| | | |
|---|---|---|
| 2,118,300 | Ford | May 24, 1938 |
| 2,124,455 | Hopkins | July 19, 1938 |
| 2,181,900 | Langdon | Dec. 5, 1939 |
| 2,457,800 | Allen | Jan. 4, 1949 |