

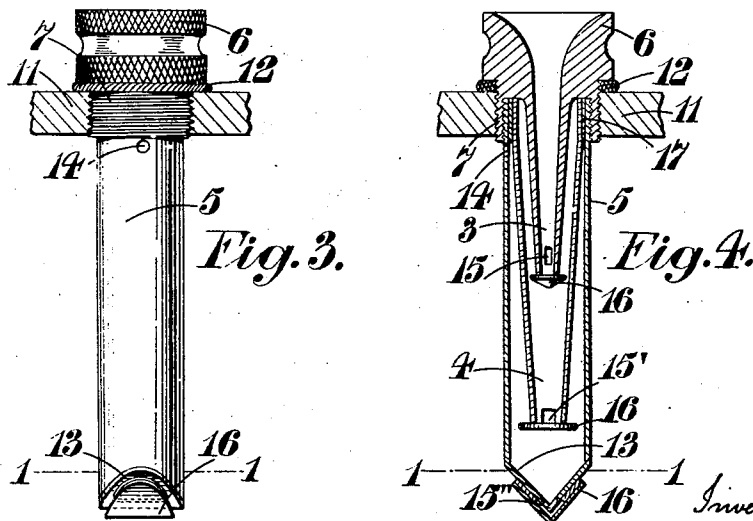
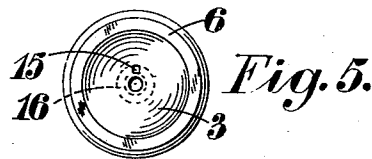
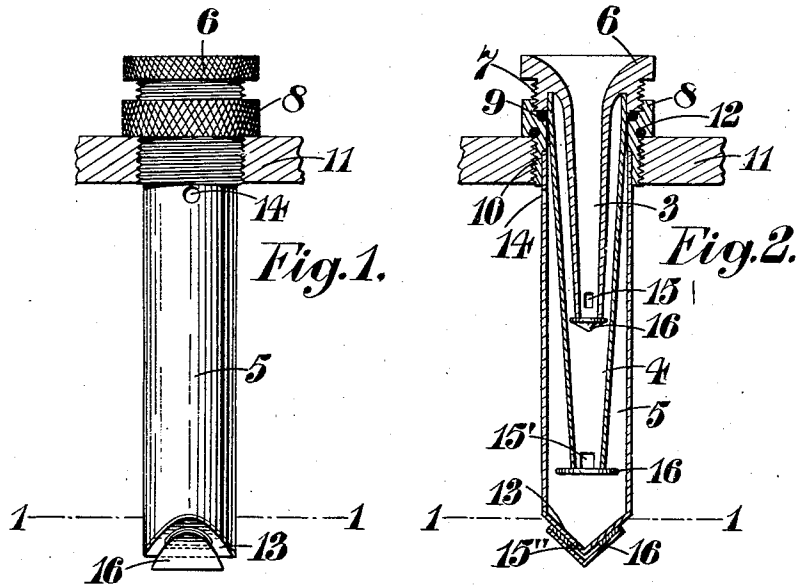
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VENT PLUG FOR ELECTRIC ACCUMULATORS AND THE LIKE

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UNITED STATES PATENT OFFICE.

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VENT PLUG FOR ELECTRIC ACCUMULATORS AND THE LIKE.

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This invention relates to improvements in vent plugs for electric accumulators and other liquid containers for permitting the escape of gas but preventing escape of the electrolyte or other liquid, and the invention has for its object to provide an improved construction which shall be efficient and reliable in any position which the container may occupy and which shall moreover be capable of being simply and cheaply made and fitted, and readily adjusted and repaired.

The invention is illustrated in the accompanying drawings, in which:—

Figure 1 is a front elevation, and

Figure 2 is a sectional side elevation of one form of construction;

Figures 3 and 4 are corresponding views of another form of construction, and

Figure 5 is a plan of the construction shown in Figures 3 and 4.

Like reference numerals indicate like parts throughout the drawings.

Referring firstly to Figures 1 and 2, the numeral 3 indicates a short truncated cone which is nested in a similar long cone 4, which in turn is nested in a long cylindrical casing 5. The short cone 3 is formed with a knurled head 6 and with a threaded boss 7. The latter is cemented or otherwise attached to the head of the long cone to support the latter, and is screwed into a gland or socket 8, formed with a knurled head, against a gasket ring 9 therein. The socket 8 has a threaded boss 10 which is cemented or otherwise attached to the head of the casing 5 to support the latter, and is screwed into the top 11 of the container against a second gasket ring 12. The lower end of the casing 5 is closed by inclined parts 13 and the upper end has a vent hole 14. 15, 15' and 15'' are vent holes at the lower ends of the cones 3 and 4 and casing 5, and 16 are baffle plates or strips below the holes.

When in situ in the container with the latter in its normal position, the vent 16 in the lower end of the casing 5 is preferably submerged in the liquid (say up to the level indicated by the line 1—1), but the vent 15' in the longer cone 4 is above the liquid level. The parts are also of such dimensions that on inverting the container (as may happen say if it is mounted in an aeroplane) the vent 15' in the longer cone 4 remains above the liquid level. Gas can thus always escape

through the vent 15 in the cone 4 to atmosphere by passing through either the vent 14 or the vent 15'' in the casing 5. The baffles 16 tend to prevent liquid being lost by splashing through the vents during tilting of the container, and the inner cone 3 forms, when the container is upturned, a trap for any liquid which by chance may find its way through the vent 15' in the cone 4. Furthermore, when the container is in normal position, the baffles tend to prevent bubbles or films of liquid driven up through the cones by escaping gas. If the lower end of the casing 5 is normally submerged this will prevent most of the bubbles entering the interior of the casing. Should any enter it, however, and also enter the vent 15' in the cone 4, they will usually be broken or burst by reason of the divergent arrangement of the walls of the cone. If by chance any should reach the end of the cone 3 while still unbroken, the pointed end of this cone will burst them. The wedge-shaped end of the casing 5 also operates to divert the liquid and bubbles and similarly the pointed end of the cone 3 will divert any liquid falling on to it if the container is inverted.

In the construction shown in Figures 3–5, the boss 7 is cemented or otherwise attached to the head of the casing 5 to support the latter, and the head of the long cone 4 is cemented or otherwise attached to a distance collar 17 which in turn is cemented or otherwise attached to the head of the casing 5 to support the long cone 4. The boss 7 is screwed into the top 11 of the container against a gasket ring 12.

In the construction of device shown in Figures 1 and 2 the parts may be readily dismantled, while in the other construction the cones and casing can be fixed together.

I claim.

1. A valveless vent plug and unspillable device for electric accumulators and other liquid containers, comprising a tubular member that is secured fluid-tight to the wall of the container, extends into the container, has a port at its inner end, and has at its outer end an unobstructed main vent, which member is of such dimensions and is so placed, and has its port so arranged in relation to the container and to the quantity of liquid therein that its said port is always situated above the level of the liquid whatever position the container takes up, in

combination with a casing in the container and surrounding the part of said tubular member therein, said casing extending beyond the inner end of the latter and having two ports, one or other of which is always above the level of the liquid.

2. A valveless vent plug and unspillable device for electric accumulators and other liquid containers, comprising a tubular member that is secured fluid-tight to the wall of the container, extends into the container, has a lateral port at its inner end, and has at its outer end an unobstructed main vent, which member is of such dimensions and is so placed, and has its port so arranged in relation to the container and to the quantity of a liquid therein that its port is always situated above the level of the liquid whatever position the container takes up, in combination with means closing the extreme inner end of said member, and a casing in the container and surrounding said member, said casing extending beyond the inner end of the latter and having two ports, one above and one below the former port, one or other of which said two ports is also always above the level of the liquid.

3. A valveless vent plug and unspillable device for electric accumulators and other liquid containers comprising a short inverted truncated hollow cone open at its upper end, a longer inverted truncated hollow cone in which is located the short cone, and a longer cylindrical casing in which the long cone is located so as to form chambers between the cones and between the outer cone and the casing, the lowest parts of the cones and casing being formed with vent holes and the casing being also formed with a vent hole near its upper part, the upper ends of the cones and casing being connected fluid-tight together, substantially as described.

4. A valveless vent plug and unspillable device for electric accumulators and other liquid containers comprising a short inverted truncated hollow cone open to the atmosphere at its upper end, a longer inverted truncated hollow cone in which is located the short cone, a longer cylindrical casing in which the long cone is located so as to form chambers between the cones and between the outer cone and the casing, the lowest parts of the cones and casing being formed with vent holes and the casing being also formed with a vent hole near its upper part, the upper ends of the cones and casing being connected fluid-tight together, and baffle plates one below each of said vent holes, said casing and short cone having pointed lower ends substantially as described.

5. A valveless vent-plug for electric accumulators and other liquid containers, comprising in combination a plurality of nested

tubes secured fluid tight together at their upper ends and having an unobstructed main vent at the upper end of the innermost tube, each tube except the outermost tapering conically downwards and having its lower portion spaced apart from the next outer tube, each inner tube having a port at its lower end, and the outermost tube having a port at its lower end and having also in its side a port situated above the port at the end of the next inner tube, substantially as described.

6. A valveless vent-plug for electric accumulators and other liquid containers, comprising in combination a plurality of nested tubes secured fluid-tight together at their upper ends and having an unobstructed and uncontrolled main vent at the upper end of the innermost tube, each tube except the outermost tapering conically downwards and having its lower portion spaced apart each from the next outer tube, each inner tube having one or more lateral ports at its lower end, baffle plates, one for each inner tube, closing the lower end thereof and extending laterally beyond the sides thereof, the outermost tube having a relatively small port in its otherwise closed end, and having also in its side a port situated above the port at the end of the next inner tube, and a baffle plate below the end of the outermost tube, substantially as described.

7. In an electric accumulator, the combination with a container adapted to receive an electrolyte, of a valveless vent-plug therefor comprising a plurality of nested tubes secured fluid-tight together at their upper ends and having an unobstructed main vent at the upper end of the innermost tube and extending into said container through the top thereof, each tube except the outermost tapering conically downward and having its lower portions spaced apart each from the next outer tube, each inner tube having at its lower end a port situated above the level of said electrolyte, and the outermost tube having at its lower end a port situated below the level of said electrolyte and having also in its side a port situated above the port at the end of the next inner tube, substantially as described.

8. In an electric accumulator, the combination with a container adapted to receive an electrolyte, of a valveless vent-plug extending fluid-tight through the top thereof, which vent-plug comprises a plurality of nested tubes secured fluid-tight together at their upper ends and having an unobstructed and uncontrolled main vent at the upper end of the innermost tube above the top of the container, each tube except the outermost tapering conically downwards and having its lower portion spaced apart each from the next outer tube, each inner tube having at its lower end one or more lateral ports

situated above the level of said electrolyte, baffle plates, one at the end of each inner tube above the level of said electrolyte, closing the lower end of each inner tube and extending laterally beyond the sides thereof, the outermost tube having in its otherwise closed end a relatively small port situated below the level of said electrolyte, which outermost tube also has in its side a port 10 situated adjacent to the inner face of the top of the container, and a baffle plate below the end of the outermost tube, substantially as described.

9. A valveless vent plug for electric accumulators and other liquid containers, comprising in combination a plurality of nested tubes spaced apart but secured fluid-tight together at their upper ends and having an unobstructed main vent at the upper end of 20 the innermost tube, each inner tube opening at its lower end into the next outer tube, and the outermost tube having a port at its lower end and having also in its side a port situated at its upper end, said outermost tube being of such dimensions, and so 25 placed in relation to the container with

which it is to be used, that one of its ports will always be above the level of the liquid whatever position the container takes up.

10. A valveless vent plug and unspillable 30 device for electric accumulators and other liquid containers, comprising a tubular member that is secured fluid-tight to the wall of the container, extends into the container, has a port at its inner end, and has 35 at its outer end an unobstructed main vent, which member is of such dimensions and is so placed, and has its port so arranged in relation to the container and to the quantity of liquid therein that its said port is always situated above the level of the liquid whatever position the container takes up, in combination with a casing in the container and surrounding the part of said tubular member therein, said casing extending beyond 45 the inner end of the latter and having two ports, one of which ports is always above and the other of which ports is always below the level of the liquid when the container is in its normal vertical position.

In testimony whereof I affix my signature.

ALBERT LEWIS DAVIS.