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VENTING DEVICES FOR ELECTRIC STORAGE CELLS

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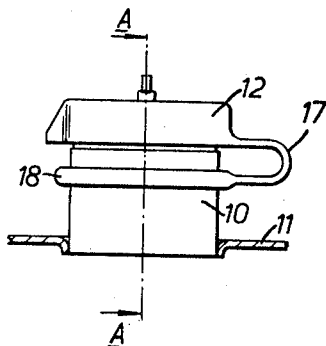


FIG. 1.

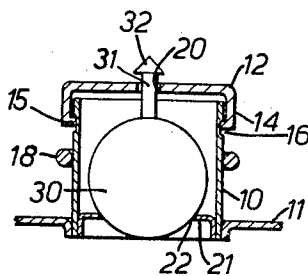


FIG. 2.

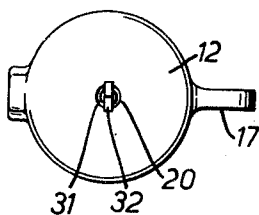


FIG. 3.

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VENTING DEVICES FOR ELECTRIC STORAGE CELLS

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1 Claim

ABSTRACT OF THE DISCLOSURE

A venting device for an electric storage cell in the form of a chamber, attached to the cell container, having at opposite ends a wide inlet into the container and a narrow outlet venting to the atmosphere. The outlet is formed in a removable lid and is partially obstructed by a pin extending through the aperture and secured to the lid. The other end of the pin is attached to a spherical valve member which rests on the surface of the inlet.

This invention relates to venting devices for electric storage cells, particularly though not exclusively alkaline storage cells.

According to the present invention an electric storage cell has a venting device comprising a chamber secured to the top of the cell container with an inlet opening through the bottom of the chamber into the container and an outlet to atmosphere formed in the top of the chamber, the overall area of the outlet being substantially less than that of the inlet; a valve member normally closes the inlet but is movable by gas pressure to open positions in which it still obscures any direct path from the inlet to the outlet.

Preferably the maximum cross-section of the valve member is substantially greater than the area of either the inlet or the outlet, and the valve member is guided so as to remain substantially centrally located between the centers of the inlet and the outlet. Thus the chamber may be substantially symmetrical about a vertical axis e.g. it may be cylindrical, the inlet and outlet being formed centrally in the top and bottom of it.

Various forms of venting device have previously been employed in electrical storage cells, including hinged flaps, spring loaded devices, and plugs with small venting holes. Especially in the case of alkali hydroxide electrolytes it is generally desirable to minimize access of air since the electrolyte may become contaminated by absorption of carbon dioxide from the atmosphere. Moreover the surface tension of alkali hydroxide electrolytes is such that metal surfaces are readily wetted, and bubbles are readily formed when gas is evolved from the surface of the liquid. Hence, when a cell is gassing on charge, droplets of electrolyte are liable to be carried away by the gases as bubbles and deposited in the small vent orifice from which they may be blown out with the gas.

In the preferred arrangement in accordance with the present invention, the inlet to the venting chamber is normally closed by the valve member so as to reduce to a minimum passage of air from the cell container to the atmosphere and vice-versa. When gassing occurs and the valve member is lifted from the seating it opens a comparatively large inlet to the chamber so that any bubbles or droplets are unlikely to be projected through it at a very high velocity. Moreover, any such bubbles passing through it cannot travel directly to the outlet but will first impinge either on the valve member or on the sides of the chamber, so that they are very unlikely to be carried out through the relatively small outlet.

Preferably, the valve member is movably attached to a removable lid which forms the top of the chamber and in which the outlet is formed. Thus the lid can be removed and will carry the valve member with it so as to leave the inlet exposed for pouring liquid into the cell container.

The lid is preferably formed of an elastomeric material integral with a flexible strap and a ring encircling the chamber to connect it thereto. Such an arrangement has no loose parts which are liable to be mislaid.

In a convenient construction the valve member is in the form of a ball movably secured to the top of the chamber by a pin integral with the valve member passing loosely through a hole in the top. In this case the clearance between the pin and the hole may form the outlet from the chamber. The pin is provided with a head, for example of arrow head form, which is sprung through the hole in the lid.

The invention may be put into practice in various ways but one specific embodiment suitable for use with an alkaline electric accumulator will be described by way of example with reference to the accompanying drawings in which:

FIGURE 1 is a front elevation of the venting device, FIGURE 2 is a sectional side elevation on the line A-A in FIGURE 1, and

FIGURE 3 is a plan view.

The venting device consists of a cylindrical metal chimney 10 adapted to be attached to a filling hole in the top wall 11 of an accumulator casing and thus having an internal diameter of about 26 mm. in one particular case. The chimney can be attached to the filling hole by being a force fit in it or by suitable screw threads at its lower end or by welding.

The upper end of the chimney is closed by a removable lid 12 having a skirt 14 with an internal rib 15 which is a snap fit into a groove 16 in the outside of the chimney near its upper end. The lid is attached to the chimney by a connecting strap 17 affording a hinge and by a ring 18. The lid, strap and ring are formed integrally from a suitable elastomeric material. The ring is spring fit into an annular groove formed in the outside of the chimney adjacent its middle. A circular hole 20 about 4 mm. in diameter is formed in the center of the lid to provide an outlet.

The lower end of the chimney is partly closed by an annular bottom wall 21 which provides a large diameter inlet or seating 22 about 19 mm. in diameter, opening into the interior of the accumulator when the device is in position.

The lid, the chimney and the bottom wall provide a chamber, the axial distance between the inside of the lid and the end wall being about 22 mm.

Within this chamber is located a sphere 30 about 22 mm. in diameter provided with a pin 31 about 3 mm. in diameter extending away from it axially. At its end the pin has a head 32 formed as a straight sided flat arrow-head. The sphere and the pin are formed integrally of a suitable synthetic plastics material. The pin, it will be noted, is a loose fit in the hole in the lid and it is the clearance between the hole in the lid and the pin which provides the outlet. The arrowhead on the pin is a force fit through the hole in the lid and thus once it has been pushed through the hole the sphere is attached to the lid. The sphere, however, still has a certain freedom of movement both axially and from side to side.

In use, when gas is evolved in the accumulator, any rise in pressure within the casing lifts the sphere out of engagement with the seating where it will normally rest under gravity provided the accumulator is in an upright position. The gas can then escape past the clearance be-

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tween the sphere and the chimney and thence to the atmosphere through the outlet.

It will be appreciated that the dimensions of the device are such that the sphere always obscures any direct line of sight between the inlet seating and the outlet opening and in this particular embodiment also obscures any axial line of sight between the lid and the inlet opening. The sphere thus acts as a baffle to prevent droplets of moisture entrained in the escaping gases from reaching the outlet, or even the lid. The majority of the droplets will impinge on the sphere and drop back into the cell, and any which bounce off the sphere may be expected to be deflected onto the chimney or the end wall.

The inlet opening 22 is made as large as possible so that the velocity of gases passing through it is kept to a minimum and the force with which droplets of liquid are carried through the hole is lessened.

To add electrolyte to the cell the lid can be lifted off the chimney and the sphere attached to the lid is thus withdrawn from the chamber. The fact that the end wall opening is made as large as possible then facilitates the addition of electrolyte.

When the device is used with alkaline accumulators, which are liable to atmospheric contamination of the electrolyte, for example by carbon dioxide, it is found that provided the restricted orifice is suitably small for the conditions, for example, having an effective cross-section in the range 3 to 7 sq. mm., the rate of contamination of the electrolyte is not excessive and can be tolerated.

An advantage which stems from this is that the sphere does not have to seal in the end wall opening which need not be flanged and manufacturing tolerances can be relaxed. Of course if atmospheric contamination is to be minimized the sphere and the end wall opening can be made so as to form a seal and, in addition, a coiled light spring can be arranged around the pin to act on the inside of the lid and the upper half of the sphere so as to urge the sphere into engagement with the end wall opening.

It will be appreciated that the venting device in accordance with the present invention, while being an effective device in minimizing escape of electrolyte but permitting escape of gasses generated in the accumulator, and also keeping atmospheric contamination of the electrolyte

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within acceptable limits, is an extremely simple device, easily and cheaply manufactured and assembled.

What I claim as my invention and desire to secure by Letters Patent is:

1. A venting and filling device for an electric storage cell, comprising; a cell container, a substantially cylindrical chamber secured to the top of the cell container with its axis vertical and including a valve seat formed in the bottom of said chamber and having a coaxial inlet opening into said container,

a removable lid member removably engaging the top of the chamber by means of a snap fit therewith, said lid member including a centrally located aperture, said lid member further including a flexible strap and a ring-like member for encircling said chamber to connect said lid member thereto,

a substantially spherical valve member having a diameter slightly less than the internal diameter of the chamber but greater than said coaxial inlet opening, said valve member including an axially extending pin extending through said aperture and provided with a head portion larger than said aperture to secure said valve member to said lid,

said pin being spaced from the walls of said aperture to provide a gas outlet between its surface and the walls of said aperture.

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