

Description

The present invention relates to a cylindrical alkaline battery comprising an uncovered battery body and a heat-shrinkable cover member such as a shrink label, a shrink tube or the like. More particularly, the present invention relates to a cylindrical alkaline battery comprising an uncovered battery body and a heat-shrinkable cover member, wherein short circuits caused by the contact between the positive electrode case and a bottom plate being the negative electrode terminal via a third electroconductive material are prevented, and which further possesses improved leakage resistance.

In alkaline batteries, in order that the cover can have a simplified structure and thereby allow the metallic battery case accommodating an electricity-generating element to have a larger diameter, the metallic battery case accommodating an electricity-generating element and functioning as the positive electrode terminal has been covered and insulated with a shrink label or tube having metal deposition on one side. This arrangement, when compared with a metallic battery case covered with a metallic can, enables the accommodation of a larger amount of an electricity-generating element inside the battery case, and provides a larger battery capacity. In the label-covered batteries, the shrink label is adhered to the outer surface of the battery case using an adhesive, and the projected portions of the label at the top and bottom ends of the case are subjected to shrinkage. However, in some cases, the label may peel at its ends due to deterioration of the adhesive or friction applied during transfer or storage of the battery.

For the tube-covered batteries wherein a battery case is inserted into a cylindrical shrink tube and the tube is heat-shrunk, there occurs at times during high temperature storage of the battery further heat shrinkage of the upper and lower ends of the shrunk tube leading to an increase in the extent of exposure of the top and bottom ends of the battery case and reduced strength of the cover. In these label- or tube-covered batteries, besides the above-mentioned peeling or abnormal shrinkage of the label or tube in the vicinity of the opening of the battery case, there tends to occur damage (e.g. peeling, cutting) to the label or tube by contacting with terminals of an electric apparatus using such a battery, at the time of insertion or removal of the battery into or from the apparatus. Therefore, there may be a tendency for exterior short circuits to occur between the caulked portion of the positive electrode case and the bottom plate being the negative electrode terminal which are both metallic and are located adjacent each other, when the battery is inserted into an electric apparatus or is placed on a metal plate with the positive electrode terminal directed upward, whereby rupturing of the battery or leakage is induced.

Generally, in alkaline batteries covered with a heat-shrinkable member, it is necessary to provide an exhaust port on the bottom plate being the negative electrode terminal to enable the discharge of gas generated inside the battery with a tiny explosion-proof mechanism having a thin nylon gasket breakable under increase in the internal pressure of the battery. In such alkaline batteries, when the sealing strength of the sealing gasket is weak, leakage of the electrolytic solution tends to occur along the sealing gasket during storage of the battery, because the caustic potash electrolytic solution used in alkaline batteries has a high creeping property. Hence, in order to obtain an alkaline battery of increased leakage resistance, there is generally adopted such a sealing structure as providing a metallic washer between the gasket and the bottom plate being the negative electrode terminal to increase sealing strength for the sealing gasket.

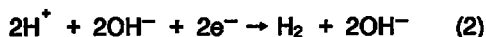
In an alkaline battery having such a sealing structure, however, potassium ion (K^+) permeates the nylon gasket according to the mechanism described later when the battery is stored under highly humid conditions (e.g. 90% relative humidity and $60^\circ C$); therefore, severe leakage occurs when the battery is stored under highly humid conditions over a long period of time such as one month or longer.

The reason for this is that when the above alkaline battery is stored under highly humid conditions, moisture in the atmosphere penetrates into the battery through the exhaust port on the bottom plate being the negative electrode terminal, reaches the space between the metallic washer and the nylon gasket, and causes dew condensation and as the result, the interface between the metallic washer and the nylon gasket is moistened by water and the gasket turns to a hydrous nylon, thereby forming an electrochemical reaction route.

The reaction mechanism is as follows. On the surface of the zinc present in the aqueous caustic potash solution, there occurs a zinc dissolution reaction represented by the following formula (1).



On the water-moistened surface of the iron constituting the metallic washer which is electrically connected to the zinc via the bottom plate being the negative electrode terminal, there occurs a hydrogen formation reaction represented by the following formula (2).



Concurrently with the above reactions, the hydrous nylon acts as a diaphragm through which K^+ migrates, and water present on the iron surface is gradually converted into an aqueous caustic potash solution ($\text{K}^+ + \text{OH}^-$), to finally turn the solution highly alkaline. The thus formed alkaline solution leaks out through the exhaust port on the bottom plate being the negative electrode terminal, thus causing severe leakage.

As mentioned above, conventional alkaline batteries covered with a heat-shrinkable member have various problems to be solved with respect to the reliability of cover, safety of battery and leakage.

German patent specification DE 2 321 842 shows a cylindrical alkaline battery comprising a positive electrode case of cylindrical form having an opening at one end and accommodating an electricity-generating element comprising a positive electrode, a negative electrode, a separator and an alkaline electrolytic solution, a gasket made of an electric insulating synthetic resin installed within the opening of the positive electrode case, a bottom plate being the negative electrode terminal electrically connected to the negative electrode in the electricity-generating element and installed on the gasket, wherein the opening of the positive electrode case is sealed by bending the open end inwardly and thereby tightening the bottom plate being the negative electrode terminal against the gasket, and a heat-shrinkable resin member covering the outer surface of the positive electrode case.

This battery does also include a cylindrical paper layer interposed between the positive electrode case and the heat-shrinkable resin member which acts to electrically insulate the positive electrode case should the heat-shrinkable resin member suffer damaged exposing the paper layer.

The present invention provides an electric insulating film on at least the sealed open end of the positive electrode case on the outer surface of a bent portion of said case adjacent said open end.

Therefore, if the heat-shrinkable resin member covering the positive electrode case is damaged adjacent the open end, contact by an electro-conducting object between the negative electrode terminal and positive electrode case at the point of damage to the heat-shrinkable member will not lead to an exterior short circuit because of the insulating effect of the electric insulating layer on the positive electrode case at that point.

The electric insulating film is constituted by a synthetic resin which differs from a fluid sealing material such as a fat, paraffin or a wax.

Preferably, the electric insulating film is an ultra violet curable resin.

It is an object of the present invention to provide a cylindrical alkaline battery with improved cover reliability, because conventional alkaline batteries covered with a heat-shrinkage member such as shrink label or shrink tube are inferior to metal-covered batteries with regard to their cover reliability. The battery according to appended claim 1 is believed to achieve this object.

Patent Abstracts of Japan Vol 9, No. 65 shows an alkaline battery comprising a positive electrode case of cylindrical form having an opening at one end and accommodating an electricity-generating element comprising a positive electrode, a negative electrode, a separator and an alkaline electrolytic solution, a gasket made of an electric insulating synthetic resin installed within the opening of the positive electrode case, a bottom plate being the negative electrode terminal electrically connected to the negative electrode in the electricity-generating element and installed on the gasket, wherein the opening of the positive electrode case is sealed by bending the opening end inwardly and thereby tightening the bottom plate being the negative electrode terminal against the gasket, and a heat-shrinkable member covering the outer surface of the positive electrode case.

This battery also includes an insulating washer placed over the open end of the positive electrode case after the case is sealed by bending the open end inwardly.

As a means of achieving the abovementioned object of the present invention, a second embodiment of the present invention is provided which provides an insulating ring adjacent a bent opening portion of the positive electrode case on the outside of the heat-shrinkable member.

Fig. 1 is a view of a cylindrical alkaline battery comprising a first embodiment of the present invention (partial sectional view of the left half); Fig. 2 is an enlarged sectional view showing the sealed portion of the battery in Fig. 1; Fig. 3 is a partial sectional view of a cylindrical alkaline battery providing a synthetic resin 14; Fig. 4 is a partial sectional view of a cylindrical alkaline battery illustrating one way of fixing an insulating ring (16) on bottom plate (6); Fig. 5 is a partial sectional view of a cylindrical alkaline battery showing an alternate means for securing an insulating ring; Fig. 6 is a drawing showing schematically electrochemical reaction occurring in a battery of the present invention; Fig. 7 is an enlarged sectional view showing the sealed portion of a cylindrical alkaline battery; Fig. 8 is a drawing showing schematically electrochemical reaction according to another embodiment of the invention.

The embodiments of the present invention are explained in detail referring to the accompanying drawings. In Fig. 1, 1 is a metallic battery case functioning as a positive electrode terminal, which contains a positive electrode mix 2 composed mainly of MnO_2 and moulded into a cylindrical shape, a bag-shaped separator 4 and a gel-like zinc negative electrode 3. Symbol 5 is a negative electrode collector. The bottom plate 6 acting as a negative electrode terminal is spot-welded to the end of the negative electrode collector 5 and has an exhaust port 7. This bottom plate 6 is held by caulking the opening 11 of the battery case inwardly and tightening the bottom plate 6 together with a metallic washer 8 provided between the bottom plate 6 and the nylon gasket 10 against a nylon gasket 10. As shown in Fig. 2, at least the open end 11 and the opening outer surface of the battery case 1 are covered with a ring-shaped electric insulating film 14. As shown in Fig. 3, the electric insulating film 14 may cover the entire outer surface of the battery case 1 from the caulked opening portion to the bottom end of the cylinder. Thereon, a shrink label or shrink tube 15 is applied as a cover. In such a structure, since the opening of the case is covered with the electric insulating film 14, good electric insulation can be maintained between the positive electrode case and the metallic bottom plate being the negative electrode terminal even when a portion of the label or tube covering the opening of the case undergoes peeling or damage due to deterioration during storage or friction, and this can prevent the rupture of the positive electrode case or the leakage of electrolytic solution which is induced by an exterior short circuit due to contact of a third electro-conductive material with both of the positive electrode case and the bottom plate being the negative electrode terminal. Incidentally, the electric insulating film 14 can be formed by, after caulking the opening 11 of the battery case 1 and sealing the opening 11 with the gasket, applying a synthetic resin coating (e.g. phenolic resin coating, epoxy resin coating) to the outer surface of the caulked portion of the battery case 1 and then drying the coating.

Thus, the battery of the present invention, wherein an electric insulating film 14 is formed on at least the open end and the opening outer surface of the positive electrode case and then a heat-shrinkable member is applied as the cover, not only solves problems of conventional alkaline batteries having only a resin film cover but also can prevent an exterior short circuit and provide the increased reliability. Therefore, the battery has a very high value.

In the present invention, it is possible to form an electric insulating film by applying and curing, in place of a synthetic resin coating requiring a long drying time, an ultraviolet-curable resin composed mainly of, for example, an epoxy acrylate or an aromatic monoacrylate curable in a short time by ultraviolet irradiation. That is, a synthetic resin coating requires about 30 minutes for drying and formation of film, however, an ultraviolet-curable resin can provide a cured film by ultraviolet irradiation of only about 3 seconds and can give substantially increased work efficiency.

In the present invention, as a means to prevent an exterior short circuit, an insulating ring 16 may be fixed onto the outer surface of the cover film 15 at the caulked portion of the positive electrode case 1 after the cover film 15 consisting of a shrink label or shrink tube has been applied on the entire outer surface of the sealed positive electrode case 1, as shown in Fig. 5. The presence of this insulating ring 16 can prevent the peeling or damage of the cover label or cover tube at the battery bottom, can maintain good electric insulation between the positive electrode case 1 and the metallic bottom plate 6 being the negative electrode terminal, and can sufficiently prevent exterior short circuit. Incidentally, the insulating ring 16 can be fixed, for example, by ultrasonic-bonding of an insulating ring 16 to the cover film 15 at the caulked portion of the positive electrode case 1 or by adhering an insulating ring 16 to the cover film 15 at the caulked portion of the positive electrode case 1 with an adhesive of solution type, aqueous dispersion type, reactive type or the like.

Alternatively, the insulating ring 16 can be fixed according to a method as shown in Fig. 4 wherein a lobe 6' is provided at the outer surface of the bottom plate 6 being the negative electrode terminal and an insulating ring 16 is fixed below the lobe 6'.

Thus, the battery of the present invention wherein an insulating ring is fixed onto the outer surface of the cover film at the caulked opening portion of the positive electrode case, solves the problem of conventional alkaline batteries having only a resin film cover, prevents exterior short circuit and provides increased reliability.

Next, an embodiment (case A) of the present invention wherein the leakage phenomenon caused by the above-mentioned electrochemical reaction is prevented is illustrated referring to the drawings. Fig. 2 is an enlarged sectional view of the sealed portion of a cylindrical alkaline battery of the present invention. In Fig. 2, 17 is an insulating film applied onto the upper surface of the metallic washer 8 and characterises the present embodiment. The constituting elements of this battery excluding the insulating film 17 are same as those of the battery of Fig. 1. This insulating film 17 insulates electrically the metallic washer 8 from the bottom plate 6 being the negative electrode terminal.

In the present embodiment, since the bottom plate 6 being the negative electrode terminal and the metallic washer 8 are electrically insulated from each other by the insulating film 17 applied onto the metallic washer 8, no leakage occurs, for example, even moisture reaches the space 13 between the nylon gasket 10 and the metallic washer 8, and the interface between them is wetted by water, when the battery is stored under highly humid condition. The mechanism for this electrochemical reaction is explained in Fig. 6 which illustrates a schematic case of the electrochemical reaction. In Fig. 6, 17' is an insulating film corresponding to the insulating film 17 of Fig. 2. In Fig. 6, since Zn and Fe are insulated electrically, any of the reactions of the formulae (1) and (2) do not proceed; there occurs no movement of K^+ into the water which wets the iron washer; accordingly, the water does not become alkaline. Thus, according to the fourth embodiment of the present invention, the application of the insulating film 17 onto the upper surface of the metallic washer 8 can prevent leakage even when the battery has been stored under highly humid conditions.

Fig. 7 is an enlarged sectional view of the sealed opening portion of a cylindrical alkaline battery (drawn in the form of an uncovered battery) as another embodiment (case B) of the present invention. In Fig. 7, 17 is an insulating film applied onto the lower surface and both ends of the metallic washer 8. The constituting elements of this battery excluding the insulating film 17 are same as those of the battery of Fig. 1. This film 17 cuts off the ionic conduction between the metallic washer 8 and the hydrous nylon gasket 10.

In the present embodiment, since the ionic conduction between the metallic washer 8 and the hydrous nylon gasket 10 is cut off by the insulating film 17 applied onto the lower surface and both ends of the metallic washer 8, no leakage occurs for example, even when the battery is stored under highly humid conditions and moisture reaches the space 13 between the nylon gasket 10 and the metallic washer 8. The mechanism for this electrochemical reaction is explained in Fig. 8 which illustrates a schematic case of the electrochemical reaction. In Fig. 8, 17' is an insulating film corresponding to the insulating film 17 of Fig. 7. In Fig. 8, since any portion of Fe is not in direct contact with water, the H_2 formation reaction represented by the formula (2) does not take place on the Fe surface, and accordingly, the reaction of the formula (1) does not take place, either; there occurs no movement of K^+ into the water which wets the washer; consequently, the water does not become alkaline. Thus, according to the fifth embodiment of the present invention illustrated in Fig. 7 the application of the insulating film 17 onto the lower surface and two ends of the metallic washer 8 can prevent leakage even when the battery has been stored under highly humid conditions.

As is understood from the above embodiments of the present invention, in a cylindrical alkaline battery wherein a washer 8 is provided between the nylon gasket 10 and the bottom plate 6 being the negative electrode terminal each acting as a sealant for the opening of the positive electrode case 1, leakage occurring when the battery has been stored under highly humid conditions can be prevented by insulating the bottom plate 6 being the negative electrode terminal and the metallic washer 8 by (1) applying an insulating film onto the metallic washer 8, (2) placing a ring-shaped insulating washer between them, or (3) using an electric insulation as the metallic washer 8, or by electrically or ion-conductively insulating the metallic washer 8 and the nylon gasket 10 by placing a chlorosulfonated polyethylene film between them. As a result, excellent cylindrical alkaline batteries can be provided. Table 1 shows the results of leakage resistance when alkaline batteries meeting the IEC standard, LR 6 were stored under conditions of 60°C and 90% relative humidity. As is clear from Table 1, the alkaline batteries of the embodiments (cases A, B) and the above-mentioned other embodiment of the present invention, as compared with a conventional alkaline battery of same size, show remarkably improved leakage resistance.

Table 1

Run No.	Storage period, days				
	7	14	21	28	56
1 (case A)	0	0	0	0	0
2 (case B)	0	0	0	0	0
3 (other embodiment)	0	0	0	0	0
4 (conventional battery)	0	5	50	90	100



Claims

1. A cylindrical alkaline battery comprising
 - a positive electrode case (1) of cylindrical form having an opening (11) at one end and accom-
 - modating an electricity-generating element comprising a positive electrode (2), a negative electrode (3),
 - a separator (4) and an alkaline electrolytic solution,
 - a gasket (10) made of an electric insulating synthetic resin and installed within the opening (11) of
 - the positive electrode case (1),
 - a bottom plate (6) being the negative electrode terminal electrically connected to the negative
 - electrode in the electricity-generating element and installed on the gasket,
 - wherein the opening of the positive electrode case (1) is sealed by bending the open end (11)
 - inwardly and thereby tightening the bottom plate being the negative electrode terminal (6) against the
 - gasket (10),
 - and a heat-shrinkable resin member (15) covering the outer surface of the positive electrode case
 - (1),
 - the battery being characterised in that an electric insulating film (14) constituted by a synthetic
 - resin, which differs from a fluid sealing material such as a fat, paraffin or a wax is provided on at least
 - the open end of the positive electrode case (1) on the outer surface of a bent portion of said case
 - adjacent to the open end.
2. The cylindrical alkaline battery according to claim 1, characterised in that the electric insulating film
- (14) is made of an ultraviolet-curable resin.
3. The cylindrical alkaline battery according to claim 1, characterised in that the electric insulating film
- (14) is formed continuously on the outer surface of the positive electrode case (1) from the open end to
- the other end thereof.
4. The cylindrical alkaline battery according to claim 1, characterised in that a metallic washer (8) is
- provided between the synthetic resin gasket (10) and the bottom plate being the negative electrode
- terminal (6).
5. A cylindrical alkaline battery comprising
 - a positive electrode case (1) of cylindrical form having an opening (11) at one end and accom-
 - modating an electricity-generating element comprising a positive electrode (2), a negative electrode (3),
 - a separator (4) and an alkaline electrolytic solution,
 - a gasket (10) made of an electric insulating synthetic resin and installed within the opening (11) of
 - the positive electrode case (1),
 - a bottom plate being the negative electrode terminal (6) electrically connected to the negative
 - electrode in the electricity-generating element and installed on the gasket (10),
 - wherein the opening of the positive electrode case (1) is sealed by bending the opening end
 - inwardly and thereby tightening the bottom plate being the negative electrode terminal (6) against the
 - gasket (10),
 - and a heat-shrinkable member (15) covering the outer surface of the positive electrode case (1),
 - the battery being characterised in that an insulating ring (16) is provided adjacent a bent opening
 - portion of the positive electrode case (1) on the outside of the heat-shrinkable resin member (15).
6. The cylindrical alkaline battery according to claim 5, characterised in that a metallic washer (8) is
- provided between the synthetic resin gasket (10) and the bottom plate being the negative electrode
- terminal (6).
7. The cylindrical alkaline battery according to claim 5, characterised in that the insulating ring (16) is
- provided outside of the heat-shrinkable resin member and is adhered thereto.
8. The cylindrical alkaline battery according to claim 5, characterised in that the insulating ring (16) is
- provided outside of the heat-shrinkable resin member and is fixed in position adjacent a bent opening
- portion of the positive electrode case by means of a lobe (6') on the bottom plate (6).



9. The cylindrical alkaline battery according to claim 5, characterised in that the insulating ring (16) is provided outside of the heat-shrinkable resin member (15) and is fixed onto the outer surface of the positive electrode case (1) in a form of a bottomless cup.

5 10. The cylindrical alkaline battery according to claim 5, characterised in that the insulating ring (16) is provided outside of the heat-shrinkable resin member and is adhered thereto by ultrasonic bonding.

Patentansprüche

- 10 1. Zylindrische Alkalibatterie, mit
einem positiven Elektrodengehäuse (1) zylindrischer Form, das eine Öffnung (11) an einem Ende hat
und ein Elektrizität erzeugendes Element mit einer positiven Elektrode (2), einer negativen Elektrode
(3), einer Scheidewand (4) und einer alkalischen Elektrolyt-Lösung beherbergt,
einer aus elektrisch isolierendem synthetischen Harz hergestellten Dichtung (10), die innerhalb der
15 Öffnung (11) des positiven Elektrodengehäuses (1) angebracht ist,
einer den negativen Elektrodenanschluß bildenden Bodenplatte (6), die elektrisch mit der negativen
Elektrode in dem Elektrizität erzeugenden Element verbunden ist und die auf der Dichtung angebracht
ist,
wobei die Öffnung des positiven Elektrodengehäuses (1) durch Umbiegen des offenen Endes (11) nach
20 Innen und dadurch Befestigen der den negativen Elektrodenanschluß bildenden Bodenplatte (6) gegen
die Dichtung (10) abgedichtet ist und
ein wärmeschrumpfbares Harzelement (15) die Mantelfläche des positiven Elektrodengehäuses (1)
einfäßt,
wobei die Batterie dadurch gekennzeichnet ist, daß ein von einem synthetischen Harz, das sich von
25 einem Flüssigdichtungsmaterial, wie etwa Fett, Paraffin oder Wachs unterscheidet, gebildeter elektrisch
isolierender Film (14) mindestens auf dem offenen Ende des positiven Elektrodengehäuses (1) auf der
Außenfläche des umgebogenen Abschnitts des Gehäuses benachbart dem offenen Ende vorgesehen
ist.
- 30 2. Zylindrische Alkalibatterie nach Anspruch 1, dadurch gekennzeichnet, daß der elektrisch isolierende
Film (14) aus einem ultraviolett-härtbaren Harz hergestellt ist.
3. Zylindrische Alkalibatterie nach Anspruch 1, dadurch gekennzeichnet, daß der elektrisch isolierende
Film (14) durchgängig auf der Mantelfläche des positiven Elektrodengehäuses (1) von dessen offenem
35 Ende zu dessen anderem Ende ausgebildet ist.
4. Zylindrische Alkalibatterie nach Anspruch 1, dadurch gekennzeichnet, daß eine metallische Unterleg-
scheibe (8) zwischen der synthetischen Harzdichtung (10) und der den negativen Elektrodenanschluß
bildenden Bodenplatte (6) vorgesehen ist.
- 40 5. Zylindrische Alkalibatterie, mit
einem positiven Elektrodengehäuse (1) zylindrischer Form, das eine Öffnung (11) an einem Ende hat
und ein Elektrizität erzeugendes Element mit einer positiven Elektrode (2), einer negativen Elektrode
(3), einer Scheidewand (4) und einer alkalischen Elektrolyt-Lösung beherbergt,
45 einer aus elektrisch isolierendem synthetischen Harz hergestellten Dichtung (10), die innerhalb der
Öffnung (11) des positiven Elektrodengehäuses (1) angebracht ist,
einer den negativen Elektrodenanschluß bildenden Bodenplatte (6), die elektrisch mit der negativen
Elektrode in dem Elektrizität erzeugenden Element verbunden ist und die auf der Dichtung (10)
angebracht ist,
50 wobei die Öffnung des positiven Elektrodengehäuses (1) durch Umbiegen des öffnenden Endes (11)
nach Innen und dadurch Befestigen der den negativen Elektrodenanschluß bildenden Bodenplatte (6)
gegen die Dichtung (10) abgedichtet ist und
ein wärmeschrumpfbares Element (15) die Mantelfläche des positiven Elektrodengehäuses (1) einfäßt,
wobei die Batterie dadurch gekennzeichnet ist, daß ein Isolerring (16) benachbart einem gebogenen
55 öffnenden Abschnitt des positiven Elektrodengehäuses (1) auf der Mantelfläche des wärmeschrumpfbaren
Harzelementes (15) vorgesehen ist.



6. Zylindrische Alkalibatterie nach Anspruch 5, dadurch gekennzeichnet, daß eine metallische Unterlegscheibe (8) zwischen der synthetischen Harzdichtung (10) und der den negativen Elektrodenanschluß bildenden Bodenplatte (6) vorgesehen ist.
- 5 7. Zylindrische Alkalibatterie nach Anspruch 5, dadurch gekennzeichnet, daß der Isolerring (16) außen bezüglich dem wärmeschrumpfbar Harzelement vorgesehen und daran angeheftet ist.
8. Zylindrische Alkalibatterie nach Anspruch 5, dadurch gekennzeichnet, daß der Isolerring (16) außen bezüglich des wärmeschrumpfbar Harzelementes vorgesehen ist und mittels einer Nase (6') auf der
10 Bodenplatte (6) benachbart einem gebogenen öffnenden Abschnitt des positiven Elektrodengehäuses in Position befestigt ist.
9. Zylindrische Alkalibatterie nach Anspruch 5, dadurch gekennzeichnet, daß der Isolerring (16) außen bezüglich des wärmeschrumpfbar Harzelementes (15) vorgesehen und an der Mantelfläche des
15 positiven Elektrodengehäuses (1) in Form einer bodenlosen Manschette befestigt ist.
10. Zylindrische Alkalibatterie nach Anspruch 5, dadurch gekennzeichnet, daß der Isolerring (16) außen bezüglich des wärmeschrumpfbar Harzelementes vorgesehen und daran mittels Ultraschallverbindens angeheftet ist.

20 Revendications

1. Pile alcaline cylindrique, comprenant
un boîtier-borne positive (1), de forme cylindrique, présentant une ouverture (11) à l'une de ses
25 extrémités et logeant un élément générateur d'électricité qui comprend une électrode positive (2), une électrode négative (3), un séparateur (4) et une solution électrolytique alcaline,
un joint d'étanchéité (10) fait d'une résine synthétique d'isolation électrique et disposé dans l'ouverture (11) du boîtier-borne positive (1),
une plaque de fond (6) qui constitue la borne négative, connectée électriquement à l'électrode
30 négative dans l'élément générateur d'électricité et qui est disposée sur le joint d'étanchéité,
l'ouverture du boîtier-borne positive (1) étant fermée hermétiquement par rabattement de l'extrémité ouverte (11) vers l'intérieur et, de la sorte, serrage de la plaque de fond qui constitue la borne négative (6) contre le joint d'étanchéité (10),
et un élément en résine thermorétractable (15) recouvrant la surface extérieure du boîtier-borne
35 positive (1),
la pile étant caractérisée en ce qu'un film d'isolation électrique (14), constitué par une résine synthétique, qui diffère d'une matière fluide d'étanchéité telle qu'une graisse, une paraffine ou une cire, est formé, au moins sur l'extrémité ouverte du boîtier-borne positive (1), sur la surface extérieure d'une partie rabattue de ce boîtier adjacente à l'extrémité ouverte.
- 40 2. Pile alcaline cylindrique selon la revendication 1, caractérisée en ce que le film d'isolation électrique (14) est fait d'une résine durcissable à l'ultraviolet.
3. Pile alcaline cylindrique selon la revendication 1, caractérisée en ce que le film d'isolation électrique
45 (14) est formé sans interruption sur la surface extérieure du boîtier-borne positive (1), depuis l'extrémité ouverte de celui-ci jusqu'à son autre extrémité.
4. Pile alcaline cylindrique selon la revendication 1, caractérisée en ce qu'une rondelle métallique (8) est disposée entre le joint d'étanchéité en résine synthétique (10) et la plaque de fond qui constitue la
50 borne négative (6).
5. Pile alcaline cylindrique, comprenant
un boîtier-borne positive (1), de forme cylindrique, présentant une ouverture (11) à l'une de ses extrémités et logeant un élément générateur d'électricité qui comprend une électrode positive (2), une
55 électrode négative (3), un séparateur (4) et une solution électrolytique alcaline,
un joint d'étanchéité (10) fait d'une résine synthétique d'isolation électrique et disposé dans l'ouverture (11) du boîtier-borne positive (1),
une plaque de fond (6) qui constitue la borne négative, connectée électriquement à l'électrode



5 négative dans l'élément générateur d'électricité et qui est disposée sur le joint d'étanchéité (10),

l'ouverture du boîtier-borne positive (1) étant fermée hermétiquement par rabattement de l'extrémité ouverte vers l'intérieur et, de la sorte, serrage de la plaque de fond qui constitue la borne négative (6) contre le joint d'étanchéité (10),

et un élément en résine thermorétractable (15) recouvrant la surface extérieure du boîtier-borne positive (1),

la pile étant caractérisée en ce qu'un anneau isolant (16) est disposé à proximité immédiate d'une partie rabattue de l'ouverture du boîtier-borne positive (1), à l'extérieur de l'élément en résine thermorétractable (15).

10 6. Pile alcaline cylindrique selon la revendication 5, caractérisée en ce qu'une rondelle métallique (8) est disposée entre le joint d'étanchéité en résine synthétique (10) et la plaque de fond qui constitue la borne négative (6).

15 7. Pile alcaline cylindrique selon la revendication 5, caractérisée en ce que l'anneau isolant (16) est disposé à l'extérieur de l'élément en résine thermorétractable et y adhère.

20 8. Pile alcaline cylindrique selon la revendication 5, caractérisée en ce que l'anneau isolant (16) est disposé à l'extérieur de l'élément en résine thermorétractable et est fixé en place au voisinage immédiat d'une partie rabattue de l'ouverture du boîtier-borne positive au moyen d'un bossage (6') formé sur la plaque de fond (6).

25 9. Pile alcaline cylindrique selon la revendication 5, caractérisée en ce que l'anneau isolant (16) est disposé à l'extérieur de l'élément en résine thermorétractable (15) et est fixé sur la surface externe du boîtier-borne positive (1) sous la forme d'un godet sans fond.

30 10. Pile alcaline cylindrique selon la revendication 5, caractérisée en ce que l'anneau isolant (16) est disposé à l'extérieur de l'élément en résine thermorétractable et est fixé à celui-ci par soudage par ultra-sons.