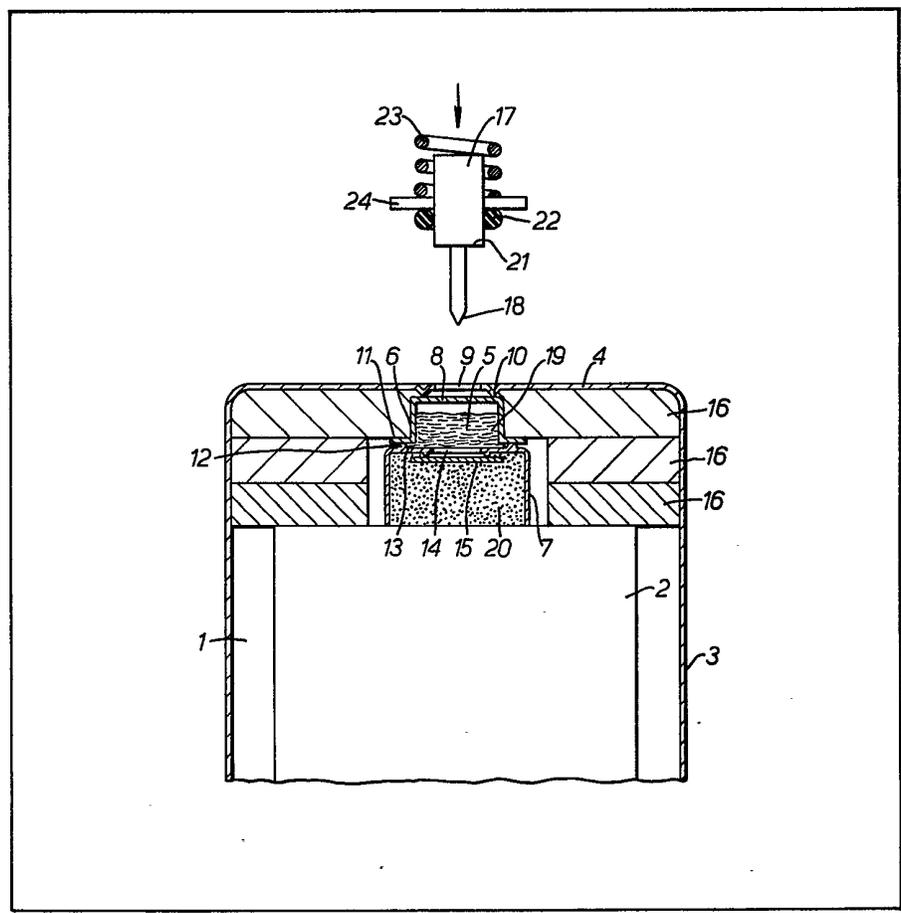


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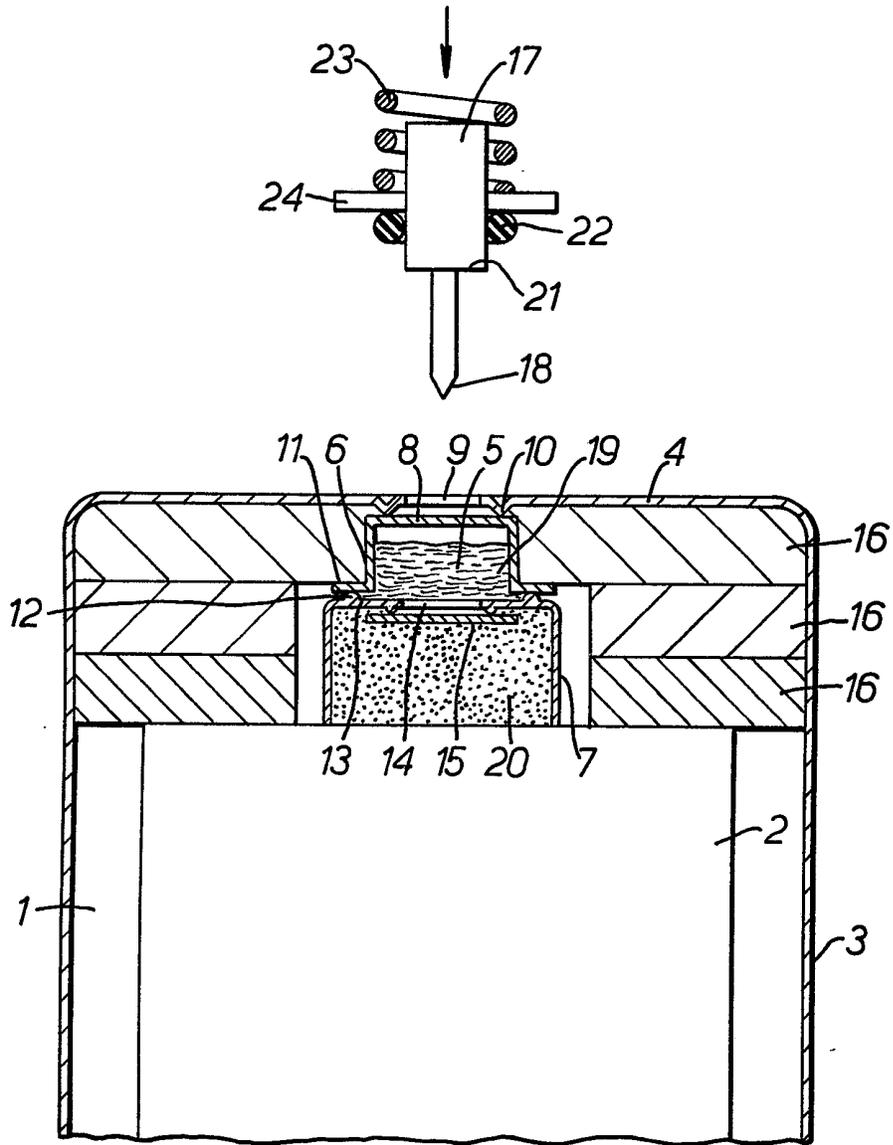
(54) Oxygen-regenerator

(57) A chemical oxygen-generating apparatus (1) comprises a housing (3) provided in one region with an opening (9), a chemical filling (2) housed in the housing (3) and capable of absorbing carbon dioxide to generate oxygen, and an oxygen-generating starting device (5) disposed within the housing and facing the opening. The starting device (5) comprises: a casing (6) which is formed of an impervious rupturable sheet material, faces the opening (9), partially defines a first chamber, and is attached to a portion of the housing around the opening (9); a container (7) which is adjacent to the casing (6) and partially defines a second chamber; a

rupturable member (15) which closes off an aperture (14) providing communication between the first and second chambers; a liquid (19) within the first chamber; and a substance (20) within the second chamber capable of reacting with the liquid to generate oxygen. Modest impact of the apparatus (1) should not rupture the casing (6) but in correct use the casing (6) can be ruptured. In use, a plunger (17) can be driven through the opening (9) to rupture both the casing (6) and the rupturable member (15) thereby causing the liquid (19) to flow into the second chamber and therein to react with the substance (20) to generate oxygen.



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SPECIFICATION

Chemical oxygen-generating apparatus

5 This invention relates to a chemical oxygen-generating apparatus with an oxygen-producing chemical filling in a container, which includes a starting device. The starting device includes a chamber which contains a fluid, is sealed and is destructible
10 from the outside and an ignition mixture which can be activated by the fluid to generate oxygen.

Chemical oxygen-generating apparatus contain the oxygen in a chemically fixed form. Respiratory apparatuses are known which use chlorate filling
15 and other respiratory apparatuses are known which use KO_2 cartridges.

After starting by means of a starting device, the oxygen-producing chemical filling supplies the oxygen continuously and as required by reacting
20 with carbon dioxide exhaled by a user. The KO_2 cartridge requires the carbonic acid and the moisture from the exhaled air for the reaction which generates oxygen. As this reaction can only get going properly after a few breaths from the user, an oxygen generat-
25 ing starting device supplies oxygen in apparatuses with KO_2 cartridges in each case until the KO_2 cartridge has been activated. The starting device generates oxygen independently of any carbon dioxide present.

30 A known chemical oxygen-generating apparatus has an ignition mixture in a container which can be activated by water or similar and an oxygen-producing chemical filling which can be activated by the ignition mixture. A glass ampoule filled with
35 water is supported above the ignition mixture and underneath the cover of the container in the cavity of a pot-like impact casing. The impact casing has a deformable top which is curved outwards, in the manner of an elastic diaphragm. In the middle of the
40 container there is an aperture which is tightly sealed with a foil. In order to start the oxygen producer by activating the chemical filling, a plunger mounted on the cover of the container and to be operated from the outside is pressed down. It penetrates the foil
45 and then presses onto the curved base of the impact casing. As a result, this springs out of the normal position into a position which is curved inwards and in doing so destroys the glass ampoule. The emerging water activates the ignition mixture and with this
50 the oxygen producer. The disadvantageous aspect of the starting device of this oxygen producer is the sensitive glass ampoule. It must be arranged in the container between the chemical filling and the plunger so that it is secure against impact. At the
55 same time it must be kept in close contact with the ignition mixture. To this purpose a special arrangement is necessary in an additional structural part, which is not simple because of the construction of its base as elastic diaphragm (German Offen-
60 legungsschrift 26.20 300).

According to the present invention there is provided a chemical oxygen-generating apparatus comprising:-

65 a housing provided in one region with an opening;
a chemical filling housed in the housing and cap-

able of absorbing carbon dioxide to generate oxygen; and

70 an oxygen-generating starting device disposed within the housing and facing the opening, the device comprising: a casing which is formed of impervious rupturable sheet material, faces the opening, at least partially defines a first chamber, and is attached to a portion of the housing around the opening; a container which is adjacent to the
75 casing and at least partially defines a second chamber; a rupturable member which closes off an aperture providing communication between the first and second chambers; a liquid within the first chamber; and a substance within the second
80 chamber capable of reacting with the liquid to generate oxygen; the arrangement being such that, in use, a plunger can be driven through the opening to rupture both the casing and the rupturable member thereby causing the liquid to flow into the second
85 chamber and therein to react with the substance to generate oxygen.

Preferably the casing includes an outwardly projecting flange which is welded to an adjacent portion of the container to form an impervious seal between
90 the container and the casing.

Preferably the rupturable member comprises a foil for example a metal sheet, secured to the container to provide a barrier impervious to liquid and gas between the first and second chambers.

95 The container can be formed of a sheet material, and one or both of the casing and the container can be formed from a metal sheet.

Advantageously the casing is welded to the portion of the housing around the opening to form an impervious seal between the casing and the housing. The welded connection between the casing and the housing can be such that, in use of the starting device, the casing is torn away from the housing by the plunger.

100 The apparatus preferably includes a plunger acted on by a resilient biasing means.

Preferably the plunger is provided with a shoulder which, in use, after the casing and the rupturable member have been ruptured, compresses the casing to expel the liquid into the second chamber. The plunger can also be provided with a sealing ring, which, in use, seals the opening in the housing after the plunger has been driven through the casing and the rupturable member.

115 The fluid can comprise water.

In an apparatus according to the present invention the fluid capsule is made of an impervious rupturable sheet material. Thus the apparatus should be secure against damage due to impacts which can break the fluid capsule in known apparatuses. Such accidental breakage of the fluid capsule causes unintentional activation of the substance or ignition mixture.

120 For a better understanding of the present invention and to show more clearly how the same may be carried into effect, reference will now be made, by way of example, to the accompanying drawing which shows a section through chemical oxygen-generating apparatus according to the present invention.
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The chemical oxygen-producing apparatus generally denoted by the reference numeral 1 has an oxygen producing chemical filling 2 in a housing 3. A starting device 5 is mounted between a cover 4 of the housing 3 and the oxygen-producing chemical filling 2. The starting device 5 has a casing 6, made from metal sheet, above a container 7 also made of metal sheet for the ignition mixture. At the same time the container 7 for the ignition material bears against and is supported by the chemical filling 2. The casing 6 is arranged with its upper portion 8 below an opening 9 in the cover 4. The casing 6 is held there by the welded seam 10, which simultaneously serves to seal the inside of the housing 3 from the exterior. The bottom of the casing 6 is provided with an outwardly projecting flange 11 which is secured by way of a welded seam 12 to an upper portion 13 of the container 7 so that the casing 6 is sealed and is impervious. The upper portion 13 of the container 7 has a connecting aperture 14 which provides communication between a first chamber in the casing 6 and a second chamber in the container 7 and which is sealed by means of rupturable member comprising a foil 15. Filter mats 16 fill up the empty space between the cover 4 and the chemical filling 2, and can serve as shock absorbers and insulators.

The casing 6 is filled with a fluid 19, and the container 7 is filled with an ignition mixture 20, which is capable of reacting with the fluid 19 to produce oxygen.

A plunger 17, above the capsule, has a pointed end 18 and an annular shoulder 21. A helical spring 23 is maintained in compression against an annular washer 24, or the like, secured to the plunger 17. Immediately below the washer 24, a resilient sealing ring 22 is provided around the plunger 17. For clarity the plunger 17 and associated components are displaced upwards from their normal position. In their normal position, the pointed end 18 of the plunger 17 is disposed close to, but spaced apart from, the upper portion 8 of the casing 6. A releasable locking device (not shown) prevents the spring 23 urging the plunger 17 downwards.

When it is required to use the chemical oxygen-producing apparatus 1, the releasable locking device is released so that the spring 23 urges the plunger 17 downwards through the opening 9. As the plunger 17 travels downwards, the pointed end 18 penetrates the upper portion 8 of the casing 6 and ruptures the foil 15 thereby causing the fluid 19 to flow into the container 7 and react with ignition mixture 20. The plunger 17 continues to travel downwards until the shoulder 21 reaches the upper portion 8 of the casing 6. The upper portion 8 is torn away from the welded seam 10 and forced downwards which causes the casing 6 to be compressed and the fluid 19 to be completely driven into the container 7. The downward movement of the plunger 17 is ended, when the sealing ring 22 comes up against portion of the cover 4 defining the opening 9. The sealing ring 22 is then maintained against the cover 4 by the spring 23 to seal the opening 9.

The oxygen which is released after the oxygen-producing chemical filling 2 has been activated issues through an opening (not shown) in the con-

tainer 3 provided for this, and is then directed to a respiratory apparatus (also not shown). The opening 9 could be used for this purpose, although a different construction would be required.

70 CLAIMS

1. A chemical oxygen-generating apparatus comprising:—
 - a housing provided in one region with an opening;
 - a chemical filling housed in the housing and capable of absorbing carbon dioxide to generate oxygen; and
 - an oxygen-generating starting device disposed within the housing and facing the opening, the device comprising: a casing which is formed of an impervious rupturable metal sheet material, faces the opening, at least partially defines a first chamber, and is attached to a portion of the housing around the opening; a container which is adjacent to the casing and at least partially defines a second chamber; a rupturable member which closes off an aperture providing communication between the first and second chambers; a liquid within the first chamber; and a substance within the second chamber capable of reacting with the liquid to generate oxygen; the arrangement being such that, in use, a plunger can be driven through the opening to rupture both the casing and the rupturable member thereby causing the liquid to flow into the second chamber and therein to react with the substance to generate oxygen.
2. An apparatus as claimed in claim 1, wherein the casing includes an outwardly projecting flange which is welded to an adjacent portion of the container to form an impervious seal between the container and the casing.
3. An apparatus as claimed in claim 2, in which the rupturable member comprises a foil secured to the container to provide a barrier impervious to liquid and gas between the first and second chambers.
4. An apparatus as claimed in claim 3, in which the foil comprises a metal sheet.
5. An apparatus as claimed in claim 1, 2, 3 or 4, in which the container is formed of a sheet material.
6. An apparatus as claimed in claim 5, in which one or both of the casing and the container is/are formed from a metal sheet.
7. An apparatus as claimed in any preceding claim, in which the casing is welded to the portion of the housing around the opening to form an impervious seal between the casing and the housing.
8. An apparatus as claimed in claim 7, in which the welded connection between the casing and the housing is such that, in use of the starting device, the casing is torn away from the housing by the plunger.
9. An apparatus as claimed in any preceding claim, which also includes a plunger acted on by a resilient biasing means.
10. An apparatus as claimed in claim 9, in which the plunger is provided with a shoulder which, in use, after the casing and the rupturable member have been ruptured, compresses the casing to expel the liquid into the second chamber.
11. An apparatus as claimed in claim 9 or 10, in which the plunger is provided with a sealing ring,

which, in use, seals the opening in the housing after the plunger has been driven through the casing and the rupturable member.

5 12. An apparatus as claimed in any preceding claim, in which the fluid comprises water.

13. A chemical oxygen-generating apparatus substantially as hereinbefore described with reference to, and as shown in, the accompanying drawing.

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