May 28, 1968 M. J. McGOFF ETAL 3,385,672

OXYGEN GENERATOR

Filed April 22, 1965

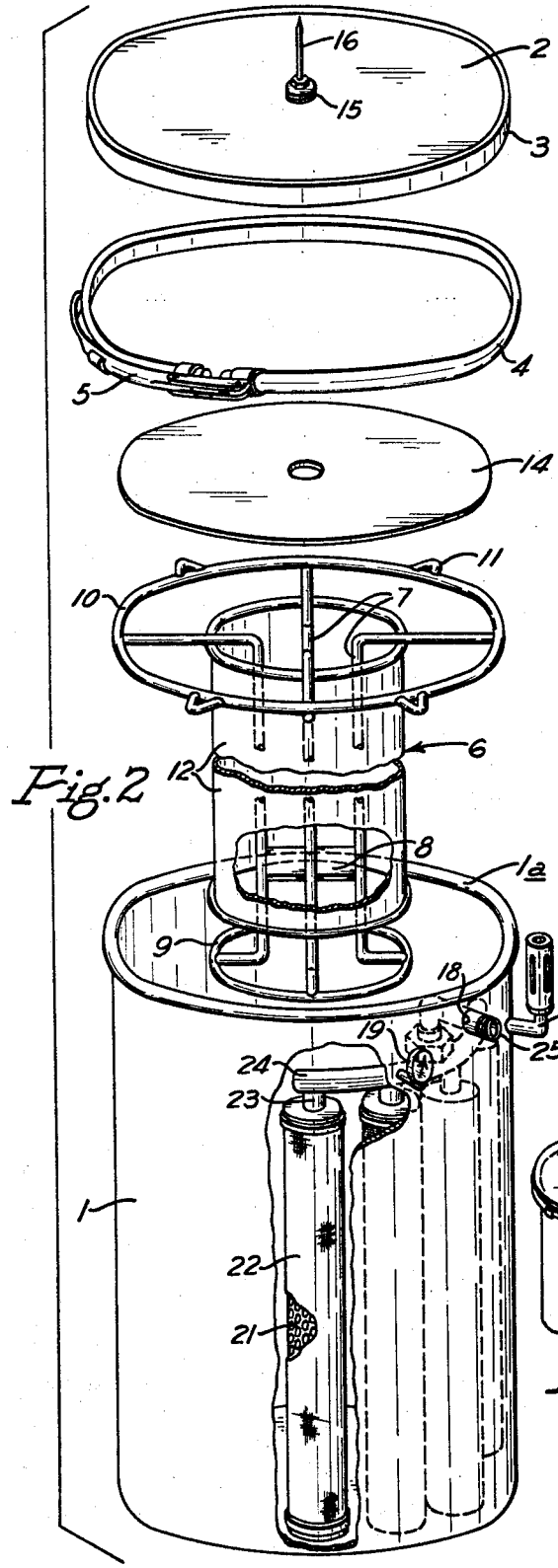

Fig. 2

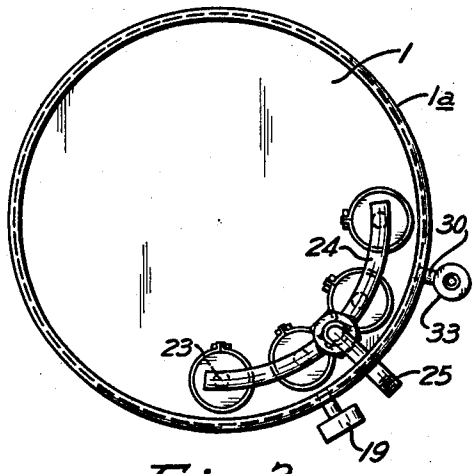

Fig. 3

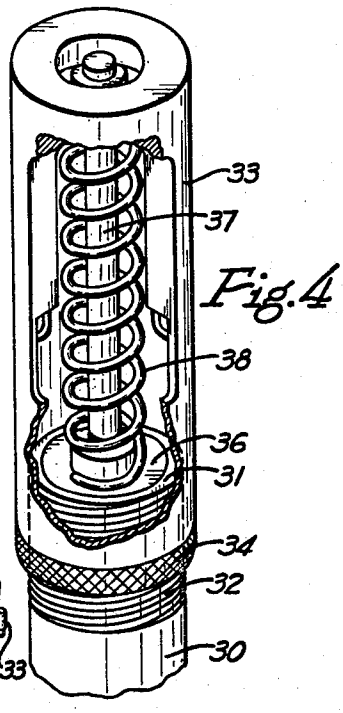

Fig. 4

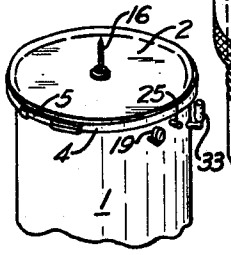

Fig. 1

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United States Patent Office 3,385,672 Patented May 28, 1968

3,385,672

OXYGEN GENERATOR

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Filed Apr. 22, 1965, Ser. No. 450,085
8 Claims. (Cl. 23—281)

This invention relates to oxygen generators, and more particularly to those in which chlorate candles are burned in order to liberate oxygen.

Chlorate candles are used for supplying oxygen to closed spaces of various kinds where men must live but where there is little or no air for breathing. These candles are ignited at one end and liberate oxygen as they burn. As the temperature of the burning zone is approximately 600° C., it is necessary that the candles be housed in such a manner that adjacent personnel will not be burned. Also, particulate material should be filtered from the oxygen stream before it is piped to designated locations. Heretofore, the candles were burned in housings that have been awkward to handle and which permitted scattering of sodium chloride and hydroxide particles that are left when the candles have been exhausted of their available oxygen. The filters have been located outside the candle housings and have been of rather complex design and hard to clean.

It is among the objects of this invention to provide an oxygen generator which is simple and inexpensive in construction, which is safe to handle and use, which contains a filter of simple construction that is easy to clean, and in the use and maintenance of which sodium chloride particles and the like are not scattered about.

In accordance with this invention, an oxygen candle carrier is removably mounted in a closed vessel having an oxygen outlet. The carrier most suitably is formed from a wire rack having an oxygen candle-receiving portion that is spaced from the walls of the vessel. A candle igniter is supported by the vessel and is operable from outside of it. Before the oxygen that is liberated by the burning candle reaches the outlet of the vessel, it must flow through filtering means located inside the vessel beside the candle carrier. The vessel also is provided with a safety valve of special construction that can be adjusted for different pressures very easily.

The preferred embodiment of the invention is illustrated in the accompanying drawings, in which

FIG. 1 is a perspective view of the upper part of the oxygen generator;

FIG. 2 is an enlarged exploded view with part of the vessel's side wall broken away;

FIG. 3 is a top view of the filters in the vessel; and

FIG. 4 is an enlarged perspective view, partly broken away, of the safety valve.

Referring to the drawings, a hollow metal drum or container **1**, preferably cylindrical, has an open top which can be closed and sealed by a cover to form a closed vessel. The cover is formed from a metal plate **2** encircled by a gasket **3** and is attached to a flange **1***a* encircling the upper end of the container by means of a flexible clamping ring **4** that can be quickly opened and closed by a toggle lever **5**.

Inside the vessel there is a carrier **6** for an oxygen candle. This carrier most suitably includes a wire rack formed from a number of stiff wires. Three or four of the wires **7** have vertical portions that are spaced apart around the axis of the vessel to form a receptacle for a chlorate candle that will liberate oxygen while the candle is burning. The candle can rest on a metal plate **8** secured to these wires a short distance above their lower ends in order to space the candle from the bottom of the container. The

lower ends of these wires may be bent outwardly and secured to a metal ring **9** that rests on the bottom of the container. The upper end portions of the wires are bent radially outward and extend out to a large wire ring **10** close to the side wall of the container. The straight wires are secured to the ring. It is desirable to space ring **10** slightly from the surrounding wall to reduce thermal conductivity. This can be done by fastening wire lugs **11** to the outside of the ring. These lugs make only point contact with the container wall. The candle carrier also includes a splash shield **12**, which is a cylindrical sheet that may be solid or provided with minute perforations. The shield encircles the vertical portion of the wire rack, and is suspended by its upper end from the radial wires.

It also is desirable to lay a splash plate **14** on top of the wire rack. This plate and the cover above it are provided with aligned center openings. The cover opening contains a sealing gland **15**, in which a conventional candle igniter or ignition match **16** is slidably and rotatably mounted. By pressing the match down on the candle and rotating the match, its lower end can be caused to ignite the upper end of the candle in a well-known manner.

The wall of the vessel, preferably the side wall, is provided with an outlet **18** for the oxygen that is liberated by the burning candle. The outlet can be connected by a pipe or hose to any desired zone. The pressure of the oxygen inside the vessel can be observed by means of a pressure gauge **19** mounted on the vessel and communicating with the inside of it.

Before the oxygen reaches the outlet of the vessel, it is filtered to trap any particulate material that may be in it. For this purpose, one or more vertical tubular filtering elements are disposed inside the vessel beside the candle carrier. Each filtering element may be formed from a rigid perforated tube **21** that is covered by suitable heat-resistant filtering material, such as Fiberglas cloth **22**. The lower ends of the tubes are closed, but their upper ends are connected by nipples **23** to a manifold pipe **24** which, in turn, is connected by a short pipe **25** to the outlet of the vessel. The manifold is curved so that the filtering tubes can fit in the arcuate space between the candle carrier and the encircling wall of the vessel. Periodically, a small back pressure can be delivered to the outlet in order to stretch the filter cloths **22** away from tubes **21** slightly so as to dislodge from them the particles that they have trapped. The particles will fall into the bottom of the vessel.

Another feature of this invention is that the vessel is provided with a safety valve of simple construction that is easily adjusted to open at any desired gas pressure inside the vessel. As shown in FIG. 4, the body of the valve includes a short pipe **30**, one end of which is mounted in a hole in the side of the vessel. The other or outer end of the valve is provided with a valve seat **31** encircled by a screw thread **32** extending a short distance along the pipe. A cage **33** is screwed onto the threads and can be locked at any desired position along them by means of a lock nut **34**. Inside the cage there is a closure member **36** for the valve seat, mounted on one end of a stem **37** that is slidably mounted in a hole in the outer end of the cage. The closure is pressed against the valve seat by a coil spring **38** compressed between the closure and the outer end of the cage. It will be seen that if the cage is screwed farther onto pipe **30**, the coil spring will be compressed more and therefore a greater oxygen pressure in the vessel will be required in order to open the valve. Of course, the opposite is true if the cage is screwed farther out along the pipe.

If desired, a suitable heat guard (not shown) can be placed around the vessel to protect those who brush against it from being burned.

According to the provisions of the patent statutes, we

have explained the principle of our invention and have illustrated and described what we now consider to represent its best embodiment. However, we desire to have it understood that, within the scope of the appended claims, the invention may be practiced otherwise than as specifically illustrated and described.

We claim:

1. An oxygen generator comprising a hollow container having an open top and an oxygen outlet, a plurality of stiff wires in the container having vertical portions spaced laterally from one another and from the side wall of the container to form a removable receptacle for an oxygen candle, a candle support in said receptacle supported by the wires, the upper end portions of the wires being bent outwardly to space said vertical portions from said side wall, a cover detachably mounted on top of the container, a candle-igniter supported by the cover and operable from above it, and oxygen-filtering means disposed inside the container between said receptacle and outlet.

2. An oxygen generator according to claim 1, including a splash shield surrounding said vertical portions of the wires and supported by said upper end portions.

3. An oxygen generator according to claim 1, in which a wire ring is secured to the upper ends of said wires and is spaced outwardly from said vertical portions.

4. An oxygen generator comprising a closed vessel having an oxygen outlet, an oxygen candle carrier disposed in the vessel, candle-ignition means supported by the vessel and operable from outside of it, oxygen-filtering means disposed inside the vessel beside said carrier, a safety valve connected to said vessel, said valve including a pipe having an inner end connected to the vessel and communicating with its interior, said pipe having an externally threaded outer end provided with a valve seat, a cage screwed onto said threaded pipe end, a closure member in said cage, and a coil spring compressed between the closure member and the outer end of the cage for normally holding said member on the seat, the cage being rotatable on the pipe to change the pressure of the spring against the closure member.

5. An oxygen generator comprising a closed vessel having an oxygen outlet, a wire rack disposed in the vessel and having an oxygen candle receiving portion to space a candle from all walls of the vessel, a splash shield surrounding the candle receiving portion of the rack, candle-ignition means supported by the vessel and operable from outside of it, and oxygen-filtering means disposed inside the vessel beside said carrier.

6. An oxygen generator comprising a closed vessel having an oxygen outlet, a wire rack removably disposed in the vessel and having an oxygen candle receiving portion spaced from all walls of the vessel, candle-ignition means supported by the vessel and operable from outside of it, and oxygen-filtering means disposed inside the vessel beside said carrier.

7. An oxygen generator comprising a closed vessel having an oxygen outlet, an oxygen candle carrier disposed in the vessel, candle-ignition means supported by the vessel and operable from outside of it, a tubular oxygen-filtering element inside the vessel entirely at one side of said carrier, and a conduit connecting the inside of said element with said outlet.

8. An oxygen generator according to claim 7, in which there is a plurality of said filtering elements spaced laterally from one another, and said conduit includes a manifold communicating with the inside of all of said elements and means connecting the manifold with said outlet.

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