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J. F. DAUSTER
BREATHING APPARATUS

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3 Sheets-Sheet 1

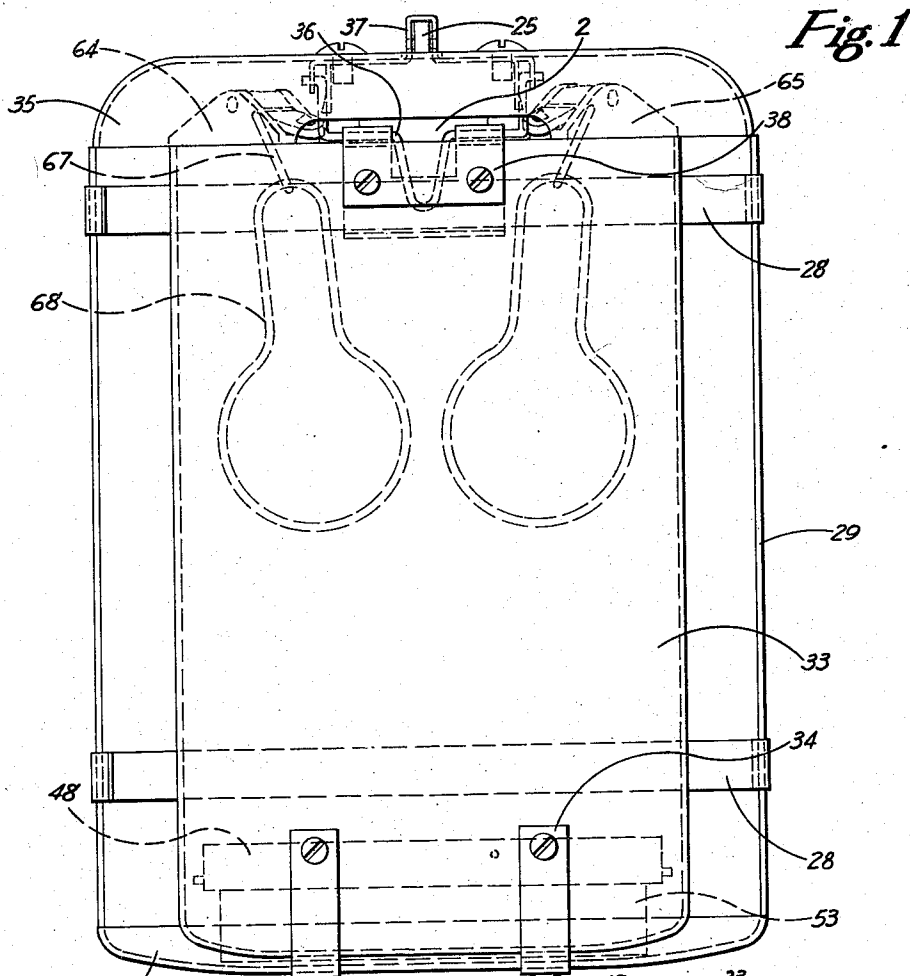


Fig. 1

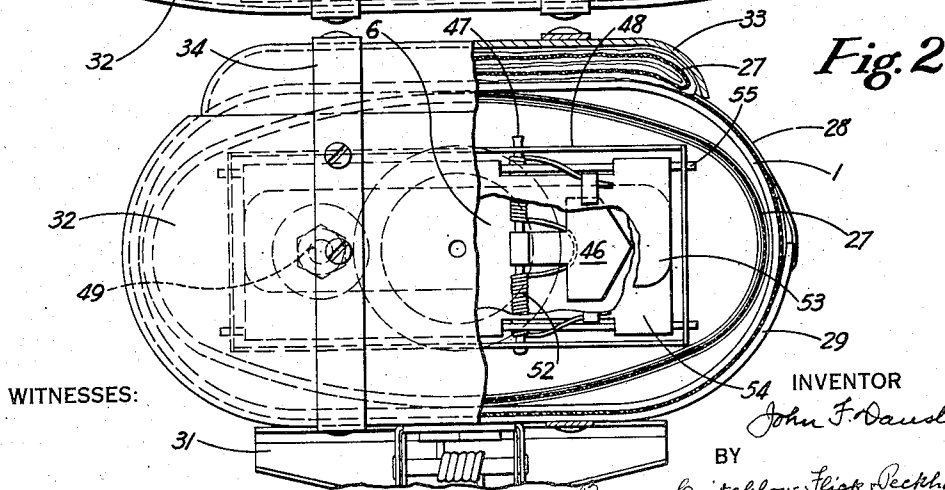


Fig. 2

WITNESSES:

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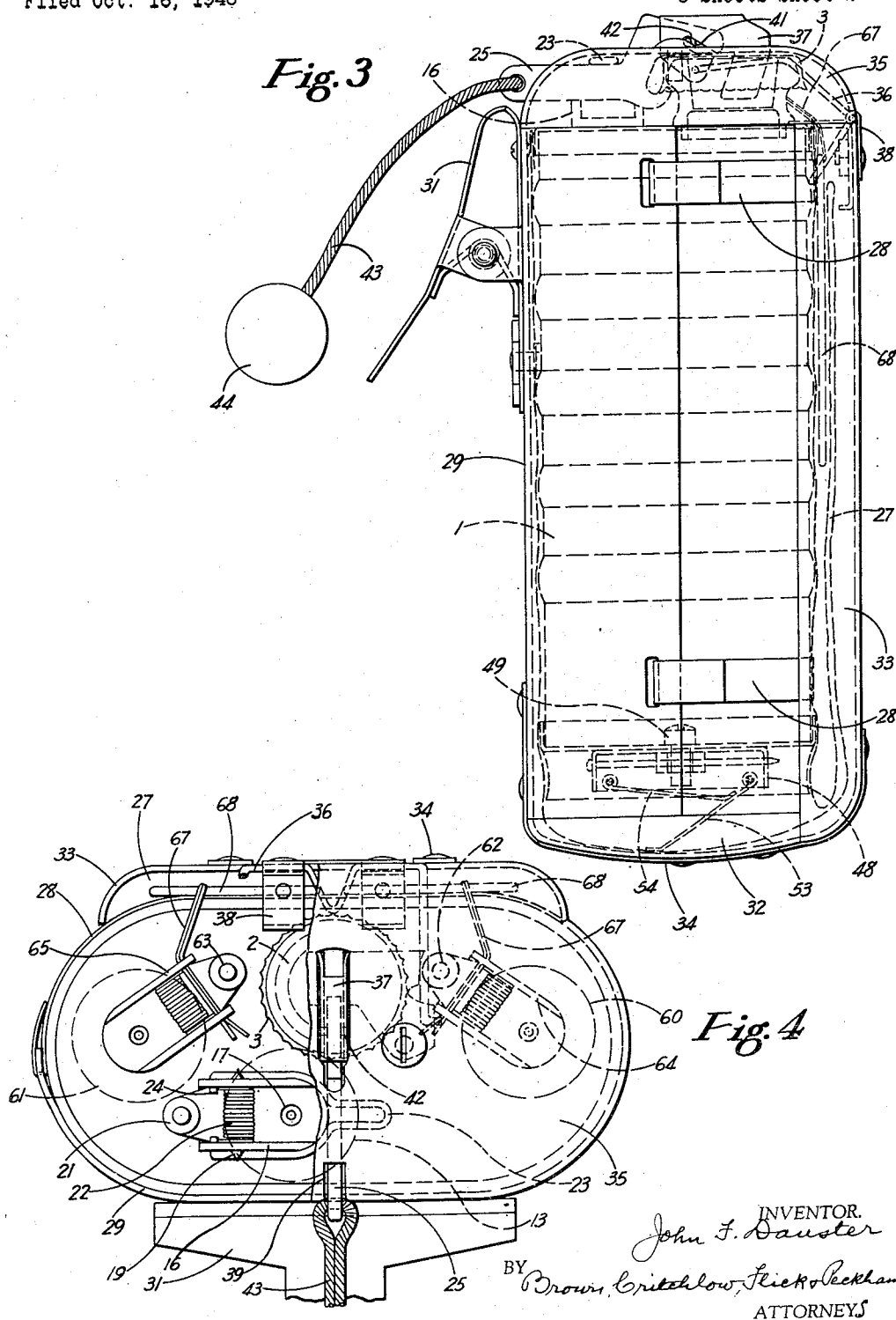
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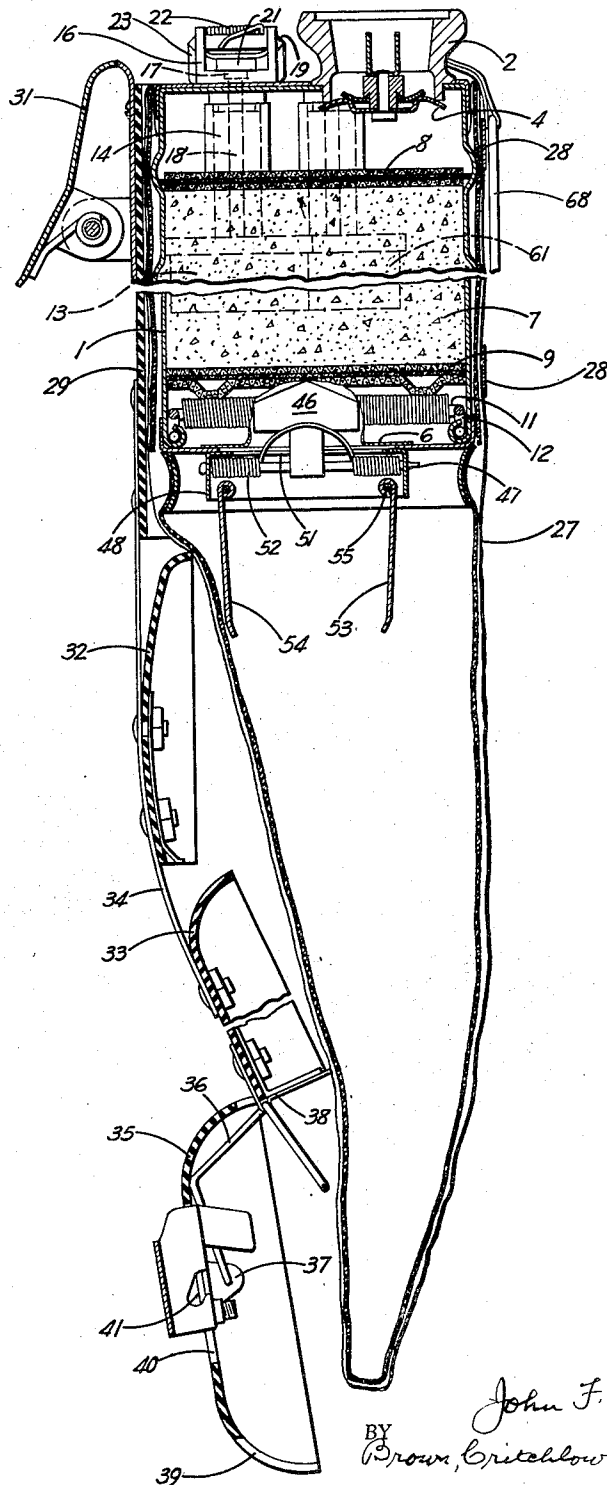


Fig. 5

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BREATHING APPARATUS

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8 Claims. (Cl. 128—142)

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This invention relates to self-contained breathing apparatus.

It is among the objects of this invention to provide breathing apparatus which remains in compact form until used, which does not deteriorate materially with age, which can be set in operation quickly, which instantly starts to generate oxygen, and which is dependable in operation.

In accordance with this invention a canister is provided with a normally closed opening adapted when opened to be connected to a respirator mask, and with another normally closed opening for connecting the inside of the canister with the inside of a breathing bag which is secured to the canister. The canister contains a chemical that releases oxygen and absorbs carbon dioxide from the breath, and an oxygen-producing candle for priming the chemical. Connected to the canister are manually operable means for igniting the candle and for unsealing the two openings into the canister. Before this apparatus is used the breathing bag is held folded against the canister by means which, when released by the means that opens one canister opening, causes the other canister opening to be opened. The candle is ignited at the same time that the canister openings are unsealed. The canister also preferably contains one or more additional oxygen-producing candles which are ignited only when emergency members on the canister are actuated by the user of the apparatus.

The preferred embodiment of the invention is illustrated in the accompanying drawings in which Fig. 1 is a front view; Fig. 2 is a bottom view with parts broken away; Fig. 3 is a side view; Fig. 4 is a top view with part of the cover broken away; and Fig. 5 is a vertical transverse section with the apparatus open ready to operate.

Referring to the drawings, a metal canister 1 is provided in its top with an opening in which a neck 2 is mounted. Closing the top of this neck is a friction cap 3 like those used on bottles. As shown in Fig. 5, inside the neck there is a normally closed valve 4 of conventional form which is pressed downwardly to open it when a respirator mask hose (not shown) is connected to the neck after the cap has been removed. The bottom of the canister is provided with an opening that is closed by a thin metal disc 5 welded to the bottom. Inside the canister there is a supply of alkali metal peroxide 7 which, when warmed, will react with the moisture in the breath of the user to produce oxygen and to ab-

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sorb carbon dioxide. This material is supported between upper and lower filter members 8 and 9 so that it cannot escape through the canister openings when they are unsealed. The lower filter member 9 is pressed upwardly in the canister by means of a rectangular frame 11 formed from stiff wire and having downwardly inclined legs 12 at its corners engaging the bottom of the canister and pressing upwardly on the frame.

Embedded in the chemical is an oxygen-producing candle 13, such as the well-known chlorate candle, which is connected by a tube 14, to the top of the canister. A bracket 16 is soldered on top of the canister and is provided near one end with a recess that is connected by a perforation in the canister top with the upper end of the tube. Disposed in this recess is an ignition cap 17 for igniting a suitable fuse 18 in the tube connecting the cap with the candle. As shown in Fig. 4, the bracket has spaced parallel side walls provided with aligned openings in which a pivot pin 19 is mounted. The opposite ends of this pin project from the walls and are pointed. A firing member or hammer 21 is pivotally mounted on the pin between the bracket walls for detonating the cap. A coil spring 22 urges the hammer toward the cap, but a trigger 23 normally keeps the hammer retracted against the resistance of the spring. This trigger is formed from a wire bent double with its ends extending into apertures provided in the bracket walls behind the pivot pin. These ends 24 project a short distance across the retracted hammer to hold it in cocked position. The sides of the trigger extend beneath the pointed ends of pin 19, and the free end of the trigger extends across the top of the arm of a cap-removing member 25 in the form of a bottle opener which grips cap 3.

The side wall of the canister is surrounded by a breathing bag 27 the major portion of which hangs down below the canister when this device is in operation. This bag has a rubberized impervious inner layer and an outer layer formed of cloth. The upper part of the bag is bound tightly around the canister by means of a pair of metal straps 28 the ends of which are connected to the opposite edges of the rear section 29 of a cover for the canister. This section extends about halfway around the canister and conforms to its shape. Fastened to the rear section of the cover is a spring clip 31 so that the canister can be hung from the clothing or other suitable support. Separate bottom and front sections 32 and 33 of the cover are hinged together and to the back section by means of flex-

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ible metal straps 34 attached to all three. The bottom and front sections of the cover bulge outwardly to provide, between them and the canister, room for receiving the free portion of bag 27 which is folded up against the front of the canister when the cover is closed. A convex top section 35 of the cover is hinged to the upper edge of the front section for protecting the various elements on top of the canister. The hinge includes a wire 36, the ends of which are attached to a bracket 37 mounted inside the top section of the cover. The wire also is pivotally mounted in another bracket 38 attached to the front section of the cover, and has a downwardly and rearwardly inclined central portion which presses against the front of the canister to hold the cover down tight on top of the canister.

The rear edge of the top section of the cover is provided with a slot 39 that receives the arm of the cap remover 25, while the head of the cap remover extends up into a reversely bent portion of bracket 37 that projects through another slot 40 in the top of the cover. This portion of the bracket is provided with inclined rearwardly extending notches 41 in which pins 42 on the cap remover project. This arrangement keeps top section 35 of the cover from moving forward and thereby prevents it from swinging up. However, a wire 43 attaches a pull knob 44 to the projecting rear end of the cap remover so that when desired it can be swung upwardly to pry cap 3 off the neck of the canister. When this is done the cap remover simultaneously lifts the top section of the cover and allows it and the front section 33 to swing forward and down so that the folded bag will be released and will fall below the canister as shown in Fig. 5. Also, at the same time, the free end of trigger 23 is lifted by the arm of the cap remover, and the side arms of the trigger engage the pointed ends of pivot pin 19 and are spread apart thereby. This causes trigger ends 24 to be moved outwardly away from hammer 21 which thereby is released and is snapped by spring 22 over against ignition cap 17 in order to light candle 13. As soon as cap 3 on the neck of the canister is removed, the wearer of this apparatus connects the hose of his breathing mask to the neck. If the mask is provided with an exhalation valve, that valve must be held closed in some manner so that exhalation will take place into the canister.

At the same time that the cover is released, the metal disc 6 that seals the opening in the bottom of the canister is broken so there will be a passage connecting the canister with the inside of bag 27. The user of the apparatus therefore exhales through the canister and into the bag and inhales from the bag back through the canister. The lighted candle 13 starts to give off oxygen at once, but it also primes the peroxide 7 by heating it so that the latter, which functions much longer than the candle, will start to produce oxygen and absorb carbon dioxide.

Breaking of disc 6 is accomplished by a spring-actuated perforating member 46, shown in Figs. 2 and 5 which normally is held in retracted or cocked position by the bottom section 32 of the cover before the cover is released. The perforator is mounted on a pivot pin 47 disposed in the narrow side walls of a rectangular metal box 48 attached to the bottom of the canister by a bolt 49. The top of the box is provided with an opening 51 in alignment with the frangible disc above it. The perforator is adapted to be swung up through this opening by the central portion of a

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strong spring 52 wound around pivot pin 47. The ends of this spring are connected to a pair of vanes 53 and 54 which are mounted on pins 55 pivotally mounted in the opposite ends of the box near its opposite sides. Accordingly, the ends of the spring help to swing the vanes downwardly. When this breathing apparatus is assembled, perforator 46 is swung down away from opening 51 in the top of the box and back up against that top where it is held by swinging the vanes upwardly in overlapping relation to form a bottom for the box. The vanes are held in this position by the bottom section of the cover for the canister. When the cover is released at the time cap 3 is removed from the canister neck and the candle is ignited, the cover releases the vanes which thereby permit spring 52 to forcefully swing the perforator around and up into the opening in the box to cut through metal disc 6 as shown in Fig. 5, thereby unsealing the passage that connects the canister with the bag.

Provision is made for continued use of this apparatus for a short time after the chemical 7 has been expended. Thus, a couple of additional chlorate candles 60 and 61 are imbedded in the chemical for emergency use. These are ignited in the same general way as candle 13 by means of firing hammers 62, and 63 pivotally mounted in brackets 64, and 65, respectively, secured to the top of the canister. The hammers are held in cocked position by light cotter pins 67 which extend through openings in the side walls of the brackets above the hammers. These cotter pins extend to the front of the canister where they support pull rings 68 behind front cover section 33. If during use of this apparatus the breathing bag should collapse completely, indicating that the chemical 7 has been exhausted, one of the rings 68 is pulled to withdraw a cotter pin 67 from a bracket and thereby release the adjoining hammer so that one of the emergency candles will be ignited. As each candle lasts only a few minutes, the user must be prepared to change to another oxygen system soon after he pulls the second ring.

It will be seen that this oxygen producing apparatus is small and compact and remains sealed until used. It always is ready for instant use by merely pulling on ball 44. There are no valves to manipulate, and the apparatus is practically fool-proof.

According to the provisions of the patent statutes, I have explained the principle and construction of my invention and have illustrated and described what I now consider to represent its best embodiment. However, I 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.

I claim:

1. Self-contained breathing apparatus comprising a canister provided with an opening adapted to be connected to a respirator mask, a breathing bag connected to the canister, said canister being provided with an opening connecting it with the inside of said bag, a cap clamped on the canister to close said first-mentioned opening, means closing the other opening, manually operable means connected to said cap for removing it, an oxygen producing candle in the canister, spring-biased means mounted on the can beside said cap for igniting the candle, a trigger en-

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gaging said cap-removing means for normally holding said spring-biased means retracted, said trigger being adapted to be actuated to release said spring-biased means when said cap-removing means is actuated to remove the cap, and means for opening said last-mentioned opening upon removal of said cap.

2. Self-contained breathing apparatus comprising a canister provided with an opening adapted to be connected to a respirator mask, a breathing bag connected to the canister, said canister being provided with an opening connecting it with the inside of said bag, a cap clamped on the canister to close said first-mentioned opening, a frangible member closing the other opening, a spring-biased member for breaking said frangible member, manually operable means connected to said cap for removing it, an oxygen-producing candle in the canister, spring-biased means mounted on the can beside said cap for igniting the candle, a trigger engaging said cap-removing means mounted on the can beside said cap for normally holding said spring-biased means retracted, and means holding the bag folded against the canister and also holding said spring-biased member retracted, actuation of said cap-removing means to remove the cap serving to release said trigger and said bag-holding means, whereby the candle is ignited and said frangible member is broken.

3. Self-contained breathing apparatus comprising a canister provided with an opening adapted to be connected to a respirator mask, a breathing bag connected to the canister, said canister being provided with an opening connecting it with the inside of said bag, a cap clamped on the canister to close said first-mentioned opening, a frangible member closing the other opening, a spring-biased member for breaking said frangible member, manually operable means connected to said cap for removing it, an oxygen-producing candle in the canister, spring-biased means mounted on the can beside said cap for igniting the candle, a trigger engaging said cap-removing means for normally holding said spring-biased means retracted, means holding the bag folded against the canister and also holding said spring-biased member retracted, and means connecting said bag-holding means to said cap-removing means, whereby upon actuation of the latter to remove the cap, the trigger and said bag-holding means are released.

4. Self-contained breathing apparatus comprising a canister provided with an opening adapted to be connected to a respirator mask, a breathing bag connected to the canister, said canister being provided with an opening connecting it with the inside of said bag, means normally sealing both canister openings, an oxygen-producing candle in said canister, a removable cover for the canister normally holding the bag folded against the canister, manually releasable means holding said cover in bag-folding position and adapted to unseal said first-mentioned opening, means operable by said releasable means for igniting said candle, and means actuated upon release of said cover for unsealing the other opening.

5. Self-contained breathing apparatus comprising a canister provided in its top with an opening adapted to be connected to a respirator mask, a cap closing said opening, a breathing bag connected with the bottom of the canister, said bottom being provided with an opening connect-

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ing it with the inside of the bag, means closing the bottom opening, an oxygen-producing candle in the canister, means at the top of the canister for igniting the candle, a jointed cover connected to the back of the canister and extending across the canister bottom and up its front and across its top to hold said bag folded against the front of the canister, manually releasable means at the top of the canister holding said cover folded around the canister, said releasable means being adapted to remove said cap and actuate said candle igniting means, and means at the bottom of the canister adapted to be actuated upon release of said cover for opening the bottom opening.

6. Self-contained breathing apparatus comprising a canister provided in its top with an opening adapted to be connected to a respirator mask, a cap closing said opening, a breathing bag connected with the bottom of the canister, said bottom being provided with an opening connecting it with the inside of the bag, means closing the bottom opening, an oxygen-producing candle in the canister, means at the top of the canister for igniting the candle, a jointed cover connected to the back of the canister and extending across the canister bottom and up its front and across its top to hold said bag folded against the front of the canister, a cap-removing member engaging said cap beneath the top of the cover and holding the cover folded around the canister, means connected to said member for actuating said candle igniting means, manually operable means connected to said member for lifting it to remove said cap and ignite the candle and release said cover from bag-holding position, and spring-biased means at the bottom of the canister adapted to be released by release of said cover for opening the bottom opening into the bag.

7. Self-contained breathing apparatus comprising a canister provided with an opening adapted to be connected to a respirator mask, a breathing bag connected to the canister, said canister being provided with an opening connecting it with the inside of said bag, means normally sealing both canister openings, a pair of oxygen-producing candles in said canisters, fuses for igniting said candles, ignition caps for igniting the fuses, spring-pressed firing members for detonating the caps, a trigger holding one of said members retracted, manually operable means for unsealing said openings and for actuating said trigger to release the adjoining spring-pressed member, and manually removable means for holding the other spring-pressed member retracted until it is desired to release it.

8. Self-contained breathing apparatus comprising a canister provided with an opening adapted to be connected to a respirator mask, a breathing bag connected to the canister, said canister being provided with an opening connecting it with the inside of said bag, means normally sealing both canister openings, an oxygen-producing candle in said canister, a bracket mounted on the canister and having spaced parallel walls provided with aligned apertures, a pivot pin mounted in said aperture and having tapered ends projecting therefrom, a member mounted on said pin between said walls for igniting said candle, a spring urging said member toward candle-igniting position, a trigger in the form of a wire having ends extending inwardly through apertures provided in said

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bracket walls behind the pin, said ends projecting a short distance across said member to hold it in cocked position, manually operable means for moving the trigger against the tapered ends of said pin to spread said trigger ends apart to thereby release them from said member, said trigger moving means being connected to open one of said canister openings, and means controlled by said trigger moving means for opening the other canister opening when said igniting member is released.

JOHN F. DAUSTER.

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