

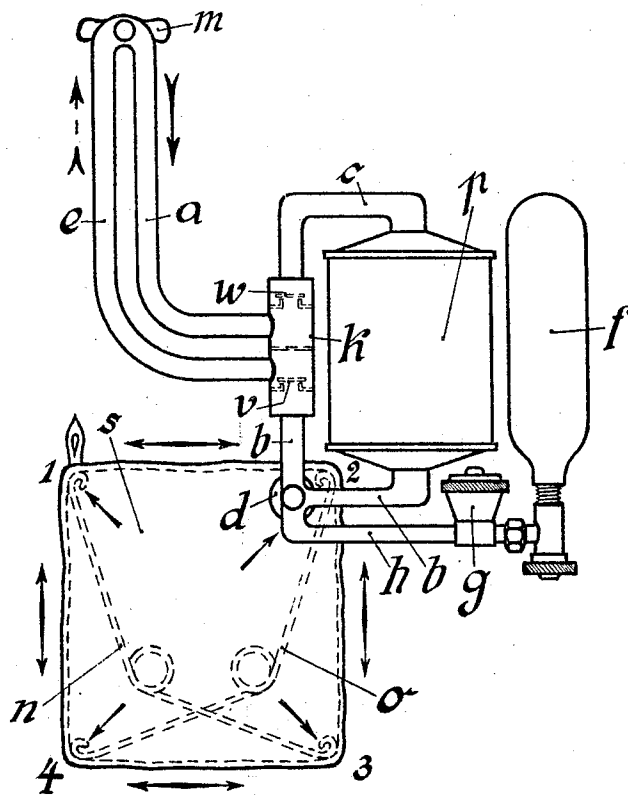
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SELF CONTAINED BREATHING APPARATUS

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SELF-CONTAINED BREATHING APPARATUS.

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To all whom it may concern:

Be it known that I, ALEXANDER BERNHARD DRÄGER, a citizen of Germany residing at Lubeck, Germany, have invented certain new and useful Improvements in Self-Contained Breathing Apparatus, of which the following is a specification.

This invention relates to self-contained breathing apparatus for use in noxious gases and the like, which is principally composed of a cartridge having an air purifying charge adapted for the absorption of carbonic acid from the exhaled air, breathing pipes controlled by breathing valves, an oxygen container and a breathing bag, which parts are so put together in the well known way that the exhaled air passes through or contacts the purifying charge and is breathed in again as purified air with or without revivifying oxygen, while any excess of the purified or revivified air passes into the breathing bag.

Before such an apparatus is put into use, the breathing bag, and the lungs also as much as possible must be emptied of ordinary respirable air, up to four fifths of which, as is well known, consists of nitrogen. The reason for this is that if too much nitrogen remains in the air within the apparatus, the person wearing the same is constantly subjected to a lack of oxygen, because, as soon as the oxygen in the breathing bag is used up he will then receive only nitrogen into his lungs. This deficient supply of oxygen to the blood will be manifested by the wearer of the apparatus soon becoming insensible.

Contamination of the air in the apparatus can also be caused by traces of poisonous gases getting into the apparatus from outside, when during inhalation a certain decrease or reduction of pressure is produced and the apparatus is not perfectly air tight all over in all its several parts. The traces of such inhaled poisonous gases may accumulate during the course of the action of breathing to a dangerous extent, especially since the poisonous gases entering the apparatus invariably remain therein. It must be remembered that it is possible for such a danger to occur in every self-contained breathing apparatus because a certain increase of pressure is produced on exhalation and a certain reduction of pressure on inhalation, as otherwise no movement of the air takes place.

These disadvantages can be obviated or at any rate reduced to a minimum, if the breathing bag be so constructed that it has a tendency and the power to set itself in a flat extended or deflated position and thereby automatically empty itself. In the breathing bags hitherto usually employed and not provided with any means of deflation, such automatic setting of the bag into the flat position is not possible. According to this invention the object aimed at is attained by providing the breathing bag with means combined with the bag in a manner to automatically deflate the same at the proper time and thereby expel its contents into the apparatus. The means in question may comprise springs carried by the bag and exerting a force whereby its deflation and the expulsion of its contents is brought about. In the illustrated example the bag is provided with suitably formed and arranged extending springs, which tend to set or spread the breathing bag in a flat position or hold it flat. Such a breathing bag will be entirely emptied of air by its own action at the beginning of the action of inhaling. On the other hand such a breathing bag provided with means for its automatic deflation, will, owing to its being still more or less inflated during the operation of breathing, immediately force air to support respiration into the apparatus when the reduction of pressure occurs due to inhalation and thereby prevent or obviate any injurious suctional action of the reduced pressure on any leaking places in the apparatus. In other words a pressure is applied to the contents of the breathing bag which is always above normal pressure and the fresh breathing gas is driven by this supernormal pressure into the lungs during the inhalation period and during the exhalation period the gas is expelled from the lungs against the supernormal pressure.

The use of a breathing bag provided with automatic deflating means may under some circumstances render exhalation somewhat difficult. This disadvantage is however so small in comparison with the advantages secured that it can well afford to be ignored.

In the drawing is shown diagrammatically a constructional example of a breathing bag constructed according to this invention applied by way of example to a breathing apparatus constructed to be carried on the back and to which oxygen is continu-

ously supplied at a fixed pressure and in measured quantities during the action of breathing. Such breathing apparatus is sufficiently well known that to understand its construction and mode of action a brief explanation of the reference letters on the drawing will suffice here.

The mouth piece *m* is connected by a breathing pipe *a*, an exhalation valve *w* of the valve chest *k* and a pipe *c*, to the upper end of an air purifying cartridge or absorber *p*. The lower end of the absorber *p* is connected by a pipe *b*, an inhalation valve *v* and an inhalation pipe *e* to the mouth-piece *m*. To the breathing pipe *b* is connected on the one hand a breathing bag *s* by means of a connecting union *d* and on the other hand an oxygen bottle *f* by means of a pipe *h* in which a pressure reducing valve *g* is inserted.

In the interior of the breathing bag *s*, which is approximately rectangular in shape and connected to the air pipe *b*, are placed two extending springs *n* and *o*. Each spring consists of a wire coiled into the form of a loop with free arms which spring apart. The springs are inserted cross-wise in the bag and in such a way that the arms of the spring *n* bear interiorly against the corners 1 and 3 of the bag *s* and the arms of the spring *o* interiorly against the corners 2 and 4 thereof. By this arrangement the breathing bag is not only stretched tightly in the direction of its two diagonals, but also in the direction of its four side edges or in other words is stretched in two directions transverse to each other so that both its walls lie flat on each other or have a tendency to return to the flat position by a force which depends on the springs selected, when inflation ceases, and thereby a corresponding amount of air to support respiration is forced at a certain pressure into the air passage of the apparatus in order to prevent any undesirable suctional action due to reduced pressure at any points of the apparatus which may not be quite air-tight.

The arrangement of the springs selected or their equivalents ensures at the same time the breathing bag being sufficiently movable in all directions, so that the freedom of movement of the person carrying or wearing the apparatus is not in any way interfered with.

I claim:

1. In a self-contained breathing apparatus, the combination of an air-purifying device, an oxygen container, breathing pipes connected with said device and container, breathing valves controlling said breathing pipes, a breathing bag communicating with said pipes and arranged to receive revived

air, and means combined with said bag for automatically deflating the latter and expelling its contents into the apparatus.

2. In a self-contained breathing apparatus, the combination of an air-purifying device, an oxygen container, breathing pipes connected with said device and container, breathing valves controlling said breathing pipes, a breathing bag communicating with said pipes and arranged to receive revived air, and springs carried by said bag and exerting a force whereby the latter is automatically deflated to expel its contents into the apparatus.

3. In a self-contained breathing apparatus, the combination of an air-purifying device, an oxygen container, breathing pipes connected with said device and container, breathing valves controlling said breathing pipes, a breathing bag communicating with said pipes and arranged to receive revived air, and springs carried by said bag and arranged to spread the same to deflate it and expel its contents into the apparatus.

4. In a self-contained breathing apparatus, the combination of an air-purifying device, an oxygen container, breathing pipes connected with said device and container, breathing valves controlling said breathing pipes, an approximately rectangular breathing bag communicating with said pipes, and springs located within said bag and bearing interiorly against the corners thereof whereby said bag is stretched in two directions transverse to each other and deflated to expel its contents into the apparatus.

5. In an apparatus for providing breathing gas for the lungs, a breathing bag, and means carried by the latter for maintaining a superpressure in the breathing bag during the inhalation and exhalation periods.

6. In an apparatus for providing breathing gas for the lungs, a breathing bag, and a resilient member carried by the latter for maintaining a superpressure in the breathing bag during the inhalation and exhalation periods.

7. In an apparatus for providing breathing gas for the lungs, a breathing bag, a supply source for supplying gas into the bag, and means carried by the latter for maintaining the gas supply in the bag at a superpressure.

8. In an apparatus for providing breathing gas for the lungs, a breathing bag, a supply source for supplying gas into the bag, and resilient members carried by the breathing bag for maintaining the gas supply in the bag at a superpressure.

ALEXANDER BERNHARD DRÄGER.