

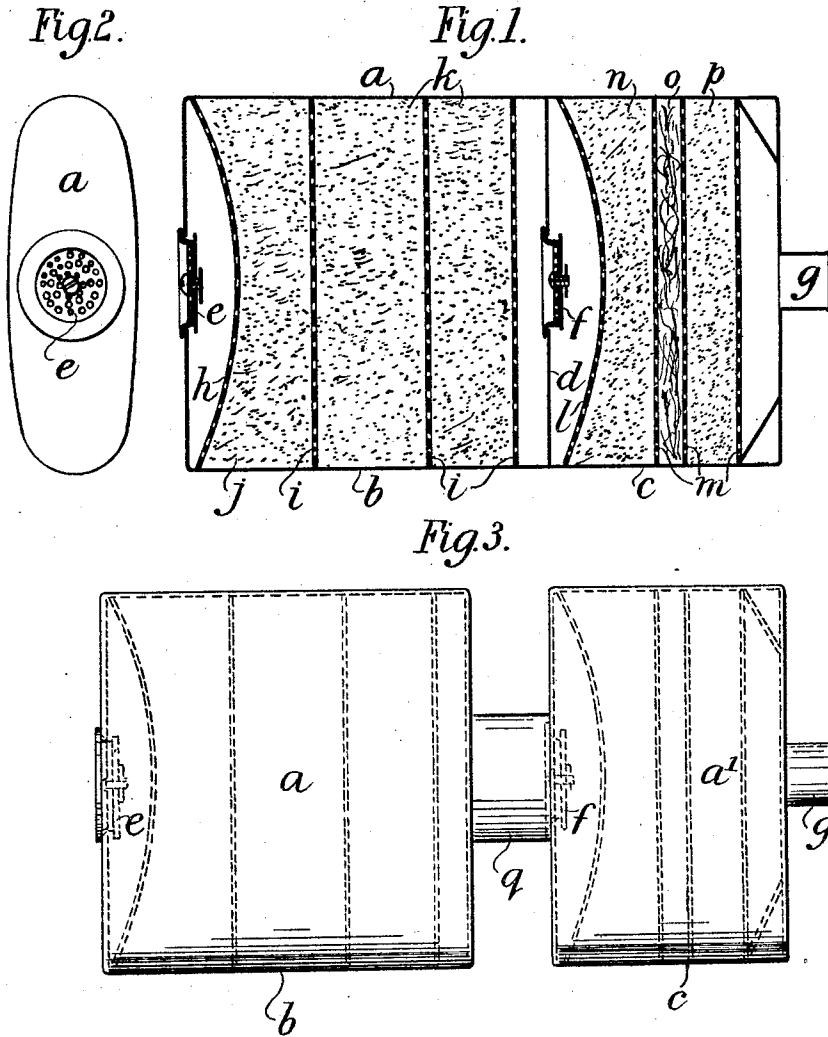
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APPARATUS FOR USE WITH RESPIRATORS FOR THE DETECTION OF SMALL
QUANTITIES OF CARBON MONOXIDE.

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1,414,194.

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UNITED STATES PATENT OFFICE.

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To all whom it may concern:

Be it known that I, LEONARD ANGELO LEVY, a subject of the King of Great Britain, residing at 31 Shoot-up Hill, Cricklewood, Middlesex, England, have invented new and useful Apparatus for Use with Respirators for the Detection of Small Quantities of Carbon Monoxide, (for which I have filed an application in Great Britain Feb. 9, 1920, Patent No. 163,102,) of which the following is a specification.

My invention relates to apparatus for use with respirators, for the detection of small quantities of carbon-monoxide.

As will be understood, in the case of respirators which are worn for the purpose of protecting the wearers against the effects of carbon-monoxide, when the respirator is approaching exhaustion, it become necessary for means to be provided whereby such exhaustion is made known to the wearer, as otherwise he would receive no warning and would be subjected to the toxic action of the gas.

The object of my invention, therefore, is to provide simple and efficient means for the detection of small quantities of the gas, and to this end I provide an appliance through which the air to be breathed passes and which is provided with a reagent, which, on contact with even small quantities of carbon monoxide, generates a small quantity of vapour which may be irritant or lachrymatory, or both. This vapour is preferably iodine, which, by its effects upon the eyes and nose particularly, and also to a less extent on the throat, gives ample warning to the wearer that his respirator is approaching exhaustion. At the same time the apparatus is so constructed that the traces of carbon monoxide which commence to pass are destroyed in the detector, and so rendered innocuous.

In a suitable arrangement of the invention, the inspired air, after passing through the respirator, is caused to flow over a layer of pumice granules treated with a mixture of iodine pentoxide and fuming sulphuric acid. This reagent oxidizes any monoxide present to dioxide and liberates iodine, which, by the above mentioned effects, on the nose and eyes, gives prompt warning of the failure of the absorbent. In practice

the layer of pumice containing the reagent may be succeeded by a second layer of pumice granules impregnated with sulphuric acid to keep it dry, a filtering body of suitable material, such as cotton-wool or cellulose wadding being finally added for the purpose of removing any sulphur trioxide fumes, which may be evolved.

Carbon monoxide respirators are usually provided with a drying agent so that the inspired air is in a dry and generally warm condition (owing to heat of oxidation) after having passed through the respirator and before reaching the detector. In the case of a respirator, however, which is not provided with such a drying material, the detector itself should be furnished with a suitable drying agent, such as pumice granules impregnated with sulphuric acid, which would then form the first layer of the detector.

A carbon monoxide respirator which functions catalytically may pass a little carbon monoxide at the commencement of its operation and also possibly small traces continuously. As it is not advisable that the detector should respond to this passage of gas, we may provide for holding back or preventing the passage of the iodine vapour which is thus developed, this being preferably effected by the provision of a layer of granules of relatively low absorbing value and capable of absorbing a very small quantity of iodine, such, for instance, as inactive wood-charcoal or animal-charcoal or granules composed of alkaline constituents and binding medium. This layer should be placed immediately after the layer containing the detector reagent.

To enable the invention to be fully understood, I will describe it by reference to the accompanying drawing, in which:—

Figure 1 is a section elevation of a respirator furnished with a carbon monoxide detector in accordance with the invention, and

Figure 2 is an end elevation thereof.

Figure 3 is an elevation illustrating a modification.

Referring first to the construction illustrated in Figures 1 and 2, *a* indicates the metal canister or casing which is divided transversely into two parts, namely the purifying appliance *b* and the detector *c* by means of the transverse partition *d*. *e* is an

inlet valve which is fitted to one end of the casing or canister *a* and through which the impure air is breathed and *f* is a valve which is fitted in the partition *d* and which controls communication between the compartments *b* and *c*.

g is the outlet for the purified air, which outlet is in communication with the face-piece or breathing mask.

10 The purifying chamber *b* is divided by a series of perforated transverse partitions *h* and *i* into a series of sub-divisions containing, respectively, the drying layer *j* which can be composed of calcium chloride
15 granules and layers *k* which eliminate any carbon monoxide present in the air passing through the apparatus. The partition *h* is advantageously made of the curved shape shown in Figure 1 so as to leave a free
20 space above and around the valve *e* and to facilitate a uniform flow of air through the canister.

The compartment *c* is similarly sub-divided by means of transverse partitions *l*
25 and *m*, the sub-divisions being filled, respectively, with a layer *n* of a substance or mixture, which, on contact with the carbon monoxide oxidizes the latter and liberates iodine. Such substance may, for example,
30 be composed of a mixture of iodine pentoxide and fuming sulphuric acid. The compartment adjacent to that containing the mixture *n* is filled with a filter *o* such, for example, as cotton wool or cellulose wadding
35 for the purpose of eliminating sulphur trioxide fumes where such are generated.

The sub-division adjacent to the filter *o* is filled with a substance *p* which serves to absorb any small quantity of iodine (or other) vapour, which may be evolved, chiefly at the commencement of the operation. In the case of iodine, such an absorbent may, as above described, consist of granules of low absorption value such as inactive wood or animal charcoal or
45 alkaline granules and a binding medium.

The modification of the apparatus, shown in Figure 3, is similar to that above described with reference to Figures 1 and 2, and differs therefrom only in the fact that
50 the compartments *b* and *c* are contained in separate casings or canisters *a*, *a'* which are connected together by a neck *q*. This form of the apparatus functions in a precisely similar manner to that hereinbefore described.
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Claims.

1. The combination with a respirator of apparatus for the detection of small quantities of carbon monoxide comprising a chamber enclosing a reagent which, on contact with carbon monoxide, generates a small quantity of irritant or lachrymatory vapour, which travels with the inspired atmosphere and by its effect on the wearer indicates the
65 approaching exhaustion of the respirator, substantially as hereinbefore described.

2. A respirator as claimed in claim 1, having a weak absorbent for the irritant vapour generated, substantially as herein described.
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