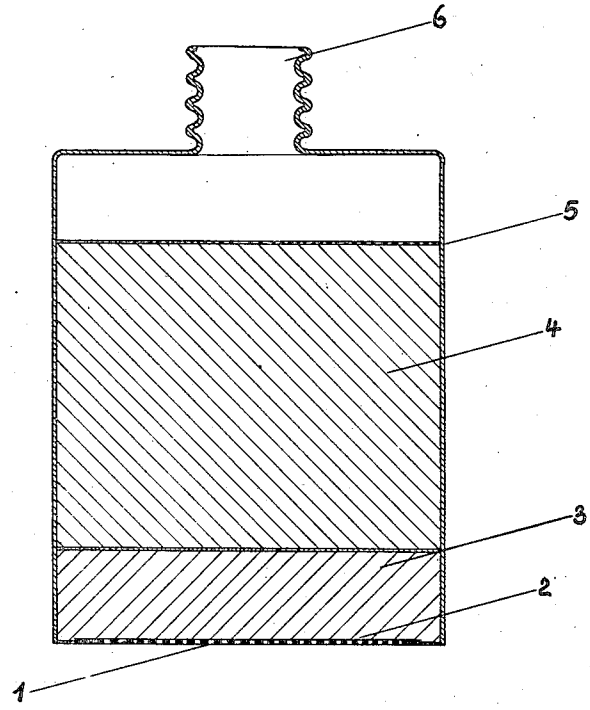
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F. KERSCHBAUM

FILLING FOR GAS PROTECTION APPARATUS

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FILLING FOR GAS PROTECTION APPARATUS.

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Gases and vapors such as hydrocyanic acid and other cyanogen compounds, which are very poisonous but are hardly perceptible by odor, have been used in combination with irritants and warning materials such as chloropicrin, esters of chloroacetic acid, etc. A very small percentage addition of irritant is usually sufficient. For combating noxious animals mixtures are generally used which contain only 1 to 10 parts of the admixtures, which affect the sensory organs and mucous membranes, to 100 parts hydrocyanic acid.

The extraordinary excess of the odorless poisonous gas, or that which has only a slight odor, brings the danger that the filling of the gas protection apparatus, such as a gas mask, may be exhausted by the absorption of these toxic gases, although the contents may still be selectively effective for the removal of the warning irritants mentioned. Thus the persons wearing the protection apparatus such as gas masks may run the risk of inhaling deadly quantities of hydrocyanic acid or similar gases, on account of the removal of the irritating action and the passage of the toxic gas.

This risk is lessened by this invention, in that packings are employed, in which agents for the removal of non-irritating gases such as HCN are combined with separate agents for the removal of irritants. The packing materials are proportioned so that the irritant absorbent will become saturated before the toxic gas absorbent becomes useless.

It is known that basic zinc carbonate or other basic metallic salts, mixed with a material such as infusorial earth, have been used as combining agents for hydrocyanic acid. Active adsorption agents, especially active carbon, are used as binding agents for irritants such as chloropicrin, ester of chloroacetic acid, etc. The process, according to this invention, consists in using the chemical binding agents in the most concentrated form in which they are active. This is done without diluting more than is necessary, so that large quantities of the carrying material can be used. Strongly active binding agents such as caustic alkali may be used in place of the basic zinc carbonate. When caustic alkali is used an arrangement is made so that the exhaled air does not pass thru the packing. This may be attained by use of the so-called regulated protection apparatus. Also the agents for binding the irritant are so chosen and applied in such a way that they will be exhausted before the chemical binding agent for the hydrocyanic acid becomes ineffective.

It has been shown that the combination of a layer of basic zinc carbonate as a chemical binding material for hydrocyanic acid and active carbon as an agent for binding the irritant requires a very considerable thickness of basic zinc carbonate layer and only a proportionally small thickness of layer of active carbon. This shows certain difficulties, as there is a danger, in using very dilute absorbing layers, that the irritant may pass thru spaces in this layer. Therefore the thickness of layer of the adsorption agent is so chosen that this danger is removed with surety. This purpose may be attained by providing suitable adsorbing materials. A preferable way is to use, instead of highly active carbon, that of a reduced degree of adsorption. The latter can thus be used in a layer of greater thickness. For this purpose, the preparation or activation of the active carbon may be undertaken under conditions which prevent the formation of highly active carbon. This may be done by using a suitable supply of air during or after the carbonization; or one may proceed with the usual active charcoal of high capacity of adsorption and adjust its activity to a desired degree by suitable treatment, e. g. with water or steam or suitable salt solutions, such as potassium carbonate or zinc chloride solutions.

As it is desirable to so measure the total strength of the packing that the passage of respiratory air will not be obstructed substantially, the combination of both of the previously specified ways is recommended; namely, the use of a highly efficient binding agent for hydrocyanic acid in proportionally small thickness of layer in combination with the use of proportionally weakly active binding agents for the irritants. The latter may then be used in proportionally greater thickness of layer. The size of the respective layers of the binding material reacting with the poisonous gases such as hydrocyanic acid and the adsorbent for the irritant depends on the one hand upon the efficiency of the absorbing and reacting materials to retain the poisonous gases and the irritants. These qualities are, as stated above, subject to the activity of the charcoal and to the concentration of the salts which serve to bind the poisonous gas. They depend on

the other hand upon the ratio with which the poisonous gas and the irritant are present in the gas mixture to be used. The following example refers to a gas mixture which contains 10 parts chloropicrin to 100 parts hydrocyanic acid; but I want it to be understood that I do not restrict myself either to the ratio of gases present in the gas mixture I have mentioned above, or to the special concentration of the binding material nor to the retentivity of active carbon indicated.

A cylindrical gas mask canister 10 cm. in diameter is filled as shown in the attached drawing, Fig. 1. At the air entrance 1 is first placed a screen distributor 2. On this screen distributor is placed a layer of active carbon 3. The thickness of the carbon layer is 2 cm. and should be capable of retaining 0.8 grams irritant by either specially selecting the active carbon accordingly or treating it preliminarily with steam or suitable salt solutions such as sodium carbonate or zinc chloride so that a layer of the active carbon 1 cm. thick will retain 0.4 gram irritant. On the layer of active carbon 3 is placed a layer 4 for the absorption of hydrocyanic acid 5 to 6 centimeters thick and consisting of a granular material such as pumice treated with basic zinc carbonate. The concentration of the granular inert mass in relation to the reacting basic zinc carbonate ought to be such that a layer 1 cm. thick of the readily prepared adsorbent should retain 2.5 to 3 grams of hydrocyanic acid.

On the top of the layer 4 is placed another screen distributor 5. 6 is the screw by means of which the canister is fixed in the gas mask.

What I claim is:

1. A filling for gas protection apparatus which comprises a layer of adsorbent for irritants and a layer of adsorbent for poisonous gases the adsorption power of the layers being proportioned in such a way as regards thickness and adsorbing quality that the adsorbent layer for the irritant becomes exhausted before the adsorbent layer for the poisonous gases.

2. A filling for gas protection apparatus which comprises a layer of adsorbent for irritants and a layer of adsorbent for poisonous gases the adsorption power of the layers being proportioned in such a way as regards thickness and adsorbing quality that the poisonous gases are still absorbed by the corresponding layer whilst the irritant permeates already the exhausted absorbent.

3. A filling for gas protection apparatus which comprises a layer of active carbon and a layer of adsorbent for poisonous gases the absorptive power of the layers being proportioned in such a way as regards thickness and absorbing quality that the active carbon becomes exhausted before the absorbent layer for the poisonous gases.

4. A filling for gas protection apparatus which comprises a layer of active carbon and a layer of absorbent for hydrocyanic acid gas the absorptive power of the layers being proportioned in such a way as regards thickness and absorption quality that the hydrocyanic acid is still absorbed when the irritant permeates already the exhausted absorbent.

5. A filling for gas protection apparatus which comprises a layer of active carbon and a layer of absorbent containing basic zinc carbonate the absorptive power of the layers being proportioned in such a way as regards thickness and absorption quality that the hydrocyanic acid is still absorbed when the irritant permeates already the exhausted absorbent.

6. A filling for gas protection apparatus which comprises a layer of active carbon and a layer of absorbent containing basic zinc carbonate the thickness and concentration of the latter layer and the retentivity and the thickness of the former being proportioned in such a way that the hydrocyanic acid is still absorbed when the irritant permeates already the exhausted active charcoal.

7. A filling for gas protection apparatus which comprises a layer of active carbon and a layer of absorbent for hydrocyanic acid the thickness of the active carbon layer being two or three times shorter than the absorbent layer for hydrocyanic acid when the absorptive power and retentivity of the active carbon is 0.4 grams irritant for 75 cb. cm. of the absorbent and the absorptive power and retentivity of the absorbent layer for hydrocyanic acid is 2.5 to 3 grams of hydrocyanic acid for 75 cb. cm. of absorbent, the amount of irritant in the gas mixture being 10 parts to 100 parts hydrocyanic acid.

8. A filling for gas protection apparatus which comprises a layer of active carbon and a layer of absorbent containing basic zinc carbonate the thickness of the active carbon layer being two to three times shorter than the absorbent layer for hydrocyanic acid when the absorptive power and retentivity of the active carbon is 0.4 grams irritant for each 75 cb. cm. of the absorbent and the absorptive power and retentivity of the absorbent layer for hydrocyanic acid is 2.5 to 3 grams of hydrocyanic acid for each 75 cb. cm. of absorbent, the amount of the irritant in the gas mixture being 10 parts to 100 parts hydrocyanic acid.

Signed at Frankfort o/m. Germany, in the country of Germany this 30th day of March A. D. 1926.

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