

UNITED STATES PATENT OFFICE.

HERBERT H. DOW, OF MIDLAND, MICHIGAN, ASSIGNOR TO THE DOW CHEMICAL COMPANY, OF MIDLAND, MICHIGAN, A CORPORATION OF MICHIGAN.

LACHRYMATORY GAS.

1,411,422.

Specification of Letters Patent.

Patented Apr. 4, 1922.

No Drawing.

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To all whom it may concern:

Be it known that I, HERBERT H. DOW, a citizen of the United States, and a resident of Midland, county of Midland, and State of Michigan, have invented a new and useful Improvement in Lachrymatory Gases, of which the following is a specification, the principle of the invention being herein explained and the best mode in which I have contemplated applying that principle, so as to distinguish it from other inventions.

The utilization of so-called "tear gases", or compositions of matter for producing a lachrymatory effect, is not necessarily confined to military operations or active warfare, but such compositions may be advantageously employed as a means for preventing burglaries, and particularly for protecting safes and vaults. Thus it has even been proposed to automatically release such a composition in the vicinity of a safe or vault upon the latter being tampered with, the result being to intimidate, if not to completely disable, the burglar.

The object of the present invention is to provide a suitable chemical composition for use in the manner stated, one of the conditions of such use being that the composition shall not decompose on standing, and another being that no fire risk shall attend its use or storage. To the accomplishment of the foregoing and related ends, the invention, then, consists of the ingredients hereinafter fully described and particularly pointed out in the claims, the following description setting forth in detail one approved combination of ingredients embodying my invention, such disclosed means constituting, however, but one of various forms in which the principle of the invention may be used.

Probably the most satisfactory and generally used chemical for producing a lachrymatory effect is brom-acetone ($\text{CH}_3\text{CO}\cdot\text{CH}_2\text{Br}$). While the latter is not sufficiently stable for a use such as referred to above, I have found that either alcohol, preferably ethyl alcohol ($\text{CH}_3\text{CH}_2\text{OH}$), or tetrachlor-ethylene (C_2Cl_4), or a mixture of the two, will serve satisfactorily as a stabilizing ingredient to prevent such decomposition of the brom-acetone on standing. In addition to such stabilizing ingredient, I also add a flash-point reducing ingredient which is neutral, so far as any chemical re-

action with the brom-acetone and such stabilizing ingredients or ingredients is concerned, but which will eliminate or so lower the flash-point of the brom-acetone as to practically remove all fire hazard. As a satisfactory ingredient for this last mentioned purpose, I employ carbon tetrachloride (CCl_4) or other equivalent halogenated hydrocarbon such as chloroform (CHCl_3) and di-chlor-methane (CH_2Cl_2).

A relatively small amount of the stabilizing ingredient mentioned is required, while of such flash-point reducing agent, the quantity employed will be gaged by the degree of safety desired. Preferably my improved composition of matter will consist of the foregoing ingredients in approximately the following proportions, viz. brom-acetone 40 per cent, alcohol 10 per cent, tetrachlor-ethylene 10 per cent, and carbon tetrachloride 40 per cent. All the foregoing ingredients are readily miscible, and, other than by dilution, they have no counter or negative reaction on the desired lachrymatory effect of the brom-acetone. At the same time they measurably increase the volatility of the active agent.

A convenient container for a tear gas of the foregoing composition may be made of cellulose acetate, since this material is not soluble in brom-acetone or the other ingredients stated, and will be of flexible or semi-flexible character, thus rendering the container less likely to be broken accidentally.

Other modes of applying the principle of my invention may be employed instead of the one explained, change being made as regards the materials employed, provided the ingredients stated by any of the following claims or the equivalent of such stated ingredients be employed.

I therefore particularly point out and distinctly claim as my invention:—

1. A composition of matter for producing a lachrymatory effect, including brom-acetone, and a flash-point reducing ingredient.

2. A composition of matter for producing a lachrymatory effect, including brom-acetone and a halogenated hydrocarbon adapted to reduce the flash-point of said brom-acetone.

3. A composition of matter for producing a lachrymatory effect, including brom-acetone and carbon tetrachloride.

4. A composition of matter for producing

a lachrymatory effect, including brom-acetone, a stabilizing ingredient, and a flash-point reducing ingredient.

5 5. A composition of matter for producing a lachrymatory effect, including brom-acetone, alcohol, and a halogenated hydrocarbon.

10 6. A composition of matter for producing a lachrymatory effect, including brom-acetone, alcohol and carbon tetrachloride.

7. A composition of matter for producing a lachrymatory effect, including brom-ac-

tone, alcohol, tetrachlor-ethylene and carbon tetrachloride.

8. A composition of matter for produc- 15
ing a lachrymatory effect, consisting of the
following ingredients in approximately the
proportions stated, viz. brom-acetone 40 per
cent, alcohol 10 per cent, tetrachlor-ethylene
10 per cent, and carbon tetrachloride 40 per 20
cent.

Signed by me, this 26th day of March,
1920.

HERBERT H. DOW.