

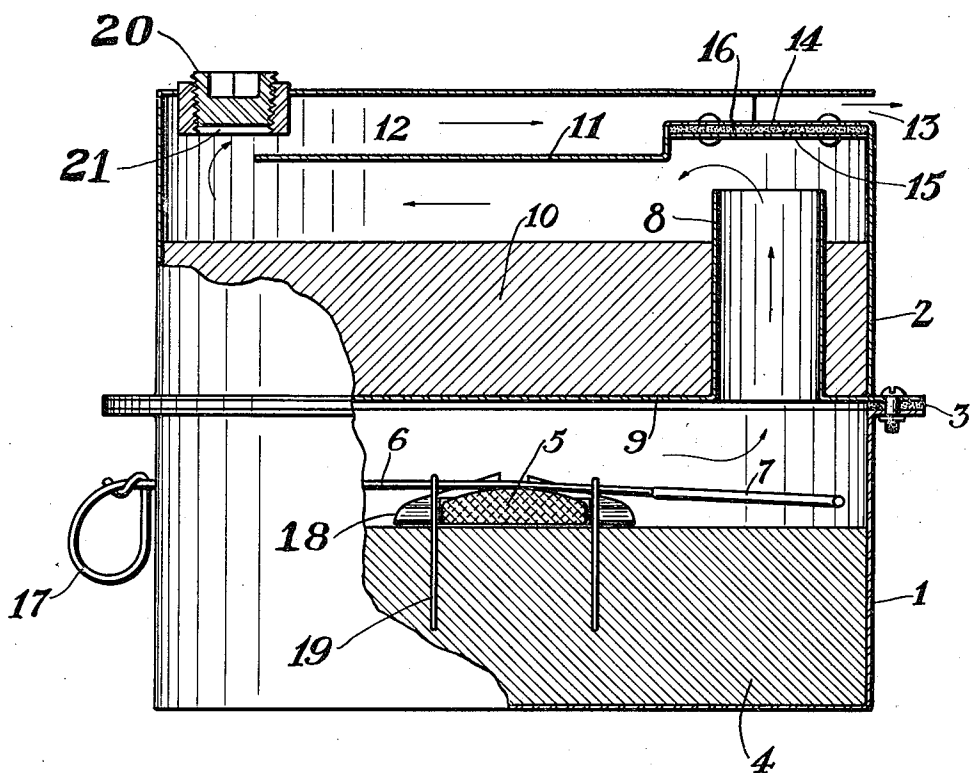
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METHOD AND APPARATUS FOR DISPERSING TOXIC AND OTHER IRRITANT SUBSTANCES

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## METHOD AND APPARATUS FOR DISPERSING TOXIC AND OTHER IRRITANT SUBSTANCES.

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*To all whom it may concern:*

Be it known that I, DONALD B. BRADNER, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Methods and Apparatus for Dispersing Toxic and Other Irritant Substances, of which the following is a specification.

This invention relates to the dispersion of toxic and irritant substances without substantial chemical decomposition.

Among the objects of this invention is to provide a process and apparatus for dispersing toxic and irritant substances, for example, diphenylaminechlorarsine and chloracetophenone, without producing substantial decomposition of the substances.

A further object of this invention is to provide a process and apparatus whereby toxic and irritant substances of the character heretofore described may be volatilized and dispersed in the air in a manner that avoids decomposition of a substantial portion of the evolved irritant or toxic material and whereby overheating of the toxic is practically reduced to a minimum.

A further object of this invention is to provide a portable apparatus serving as a candle, whereby a fuel therein may be readily ignited and the evolved combustion gases caused to pass over a body of the toxic or irritant in a manner to avoid overheating of the toxic or irritant and thus prevent raising the body of the irritant or toxic material or the evolved products therefrom to a temperature which would result in substantial decomposition of the irritant.

Other, further and more specific objects of the invention will become readily apparent to persons skilled in the art from a consideration of the following description when taken in conjunction with the drawing, wherein a specific form of a device for carrying out my invention is shown partly in elevation and partly in section, a portion of the device being broken away to illustrate the interior construction thereof.

This apparatus consists of a can having a lower compartment (1) bolted or otherwise fastened to the upper compartment (2), suitable packing material (3), for example asbestos paper, being provided to make a tight connection. At the bottom of

compartment (1) is placed a suitable fuel mixture (4) upon which is placed a match composition (5). This match composition is set off by pulling the rod (6) which brings the scratcher composition (7) in contact with the match composition (5), the latter being sensitive to frictional engagement with the scratcher composition (7). When this match composition burns it ignites the fuel mixture (4) and the products of combustion pass out through the stack (8).

The stack (8) is connected to the plate (9) forming the base of the upper compartment (2). Upon this plate (9) is placed the toxic or irritant (10). As the products of combustion of the fuel (4) leave the stack (8) they pass over the surface of the toxic or irritant (10), being deflected by the baffle plate (11) so as to travel over practically the entire surface of the toxic or irritant material. These combustion gases heat the toxic or irritant and cause same to volatilize and become entrained in the combustion gases and pass out therewith through the conduit (12) leading to the opening (13) at the top of the can.

The portion (14) of the baffle plate (11), which is directly over the mouth of the stack (8) from which the combustion gases issue, is preferably re-enforced by plate (15) and asbestos material (16) is inserted between plates (14) and (15). This portion of the plate (11) is also near the exit opening (13) of the can and it is desirable to prevent as much as possible the heating of these gases as they issue from the can. By providing this asbestos (16), excessive heating by the combustion gases of the plate (11) at this point is eliminated to a large extent, if not completely avoided.

In order to facilitate the operation of the rod (6) carrying the scratcher composition (7), one end of rod (6) is provided with a handle (17). The match composition (5) is kept in position by means of a zinc strip (18) and the anchor wires (19) embedded in the fuel (4).

The fuel (4) may be a suitable explosive such as black powder, nitrocellulose, a mixture of nitrocellulose and nitroglycerine, a mixture of charcoal and  $\text{NH}_4\text{NO}_3$  or a mixture of charcoal and  $\text{NaNO}_3$ .

A suitable match composition consists of

KClO<sub>3</sub> (5 parts) and black antimony sulphide (2 parts) bound together by dextrine (1 part).

The scratcher composition may consist of 5 red phosphorous (6 parts) and fine sand (3 parts) bound together by dextrine (2 parts).

The irritant is introduced into the upper compartment (2) by removing the plug (20) and pouring the molten or liquid irritant 10 through the opening (21). This irritant may be either solid or liquid at ordinary temperatures. I prefer to use this device with such solid toxics as diphenylamine-chlorarsine or such solid irritants as chlor-15 acetophenone although I may also use bromacetophenone, p-bromchloracetophenone, iodoacetophenone, chloracetotoluene, capsaicin or diphenylchlorarsine.

The device is operated by drawing the 20 scratcher over the match composition, causing the latter to ignite and fire the fuel (4). The combustion gases of this fuel pass over the surface of the body of irritant, thereby heating and volatilizing the irritant. This 25 exchange of heat raises the irritant to a temperature permitting the fuel gases, as they pass over the surface of the irritant, to carry off a considerable amount of the irritant vapors. The combustion gases are 30 also partially cooled by this exchange of heat, thus preventing objectionable or serious decomposition of the irritant gases. The net effect of this lengthy passage of the 35 irritant is to accomplish the distillation of the irritant at a much lower temperature than would occur by direct heating and thereby avoiding exposure of the evolved irritant to temperatures promoting decom-40 position or chemical reaction rendering the volatilized material unfit for the purposes desired.

The present invention is not limited to the specific details set forth in the foregoing 45 examples which should be construed as illustrative and not by way of limitation, and in view of the numerous modifications which may be effected therein without departing from the spirit and scope of this invention, 50 it is desired that only such limitations be imposed as are indicated in the appended claims.

I claim as my invention:

1. In a method of dispersing an irritant 55 without substantial chemical decomposition, passing a stream of hot fuel gases over the surface of a body of said irritant and carrying off the volatilized irritant as an entrained component of said fuel gases.

2. In a method of dispersing a toxic sub-60 stance without substantial chemical decomposition, passing a stream of hot fuel gases over the surface of a body of said toxic and carrying off the volatilized toxic as an en-65 trained component of said fuel gases.

3. In a method of dispersing a solid, or-70 ganic irritant without substantial chemical decomposition, passing a stream of hot fuel gases over the surface of a body of said irritant and carrying off the volatilized irritant as an entrained component of said fuel gases, the temperature and rate of flow of said fuel gases being regulated so that said irritant will not be heated to a temperature promoting substantial chemical decomposi-75 tion thereof.

4. In a method of dispersing an organic, toxic irritant without substantial chemical decomposition, passing a stream of hot fuel 80 gases over the surface of a body of said irritant and carrying off the volatilized irritant as an entrained component of said fuel gases, the temperature and rate of flow of said fuel gases being regulated so that said irritant will not be heated to a temperature 85 promoting substantial chemical decomposition thereof.

5. In a portable apparatus for dispersing an irritant without substantial chemical de-90 composition thereof, a compartment for holding fuel, another compartment for holding the irritant, means for delivering the combustion gases from the first compartment to the surface of the irritant within the 95 second compartment and an exit passage for gases issuing from the said second compartment.

6. In an apparatus for dispersing an irri-100 tant without substantial chemical decomposition thereof, a compartment for holding fuel, another compartment for holding the irritant, means for delivering the combustion gases from the first compartment to the surface of the irritant within the second 105 compartment, said means comprising a conduit extending from the upper portion of the first compartment to the upper portion of the second compartment, an exit passage for gases issuing from the said second com-110 partment and means for igniting the fuel in the first compartment.

7. In a portable apparatus for dispersing an irritant without substantial chemical de-115 composition thereof, a lower compartment for holding fuel, an upper compartment above the first-named compartment for holding the irritant, means for conducting the exit gases to the surface of the irritant within the upper chamber and means for effecting a tortuous passage of the exit gases 120 from the upper compartment.

8. In an apparatus for dispersing an irri-125 tant without substantial chemical decomposition thereof, a lower compartment for holding fuel, an upper compartment above the first-named compartment for holding the irritant, means comprising a stack communi-130 cating with the top of the lower compartment and extending into the upper portion of the upper compartment for conducting

the exit gases to the surface of the irritant within the upper chamber and means comprising a baffle plate for effecting a tortuous passage of the exit gases from the upper  
5 compartment.

9. In an apparatus for dispersing an irritant without substantial chemical decomposition thereof, a compartment containing fuel, another compartment containing the  
10 irritant, means for delivering the combustion gases from the first compartment to the surface of the irritant within the second compartment and an exit passage for gases issuing from the said second compartment.

15 10. In an apparatus for dispersing an ir-

ritant without substantial chemical decomposition thereof, a lower compartment for holding fuel, an upper compartment above the first-named compartment for holding the irritant, means comprising a stack communi-  
20 cating with the top of the lower compartment and extending into the upper portion of the upper compartment for conducting the exit gases to the surface of the irritant within the upper chamber and means com-  
25 prising a baffle plate for effecting a tortuous passage of the exit gases from the upper compartment.

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