May 17, 1932. J. E. MILLS 1,858,456

PHOSPHORUS CONTAINER

Filed Jan. 25, 1928 2 Sheets-Sheet 1

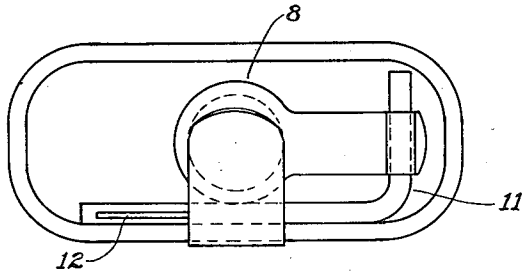


Fig 2

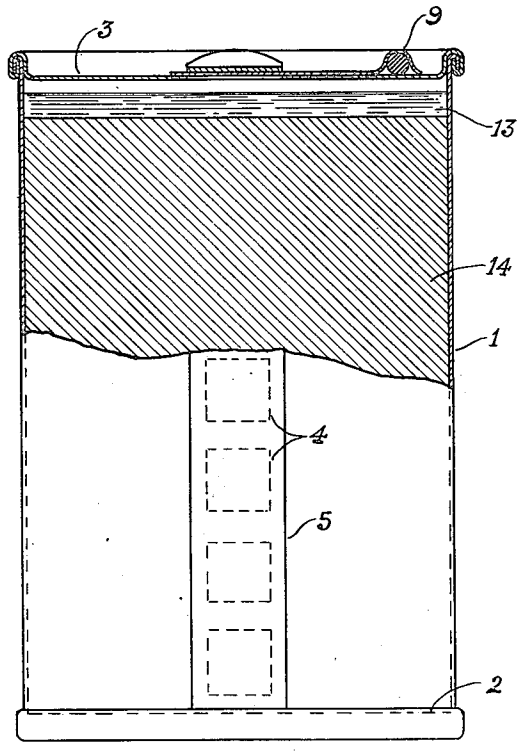


Fig 1

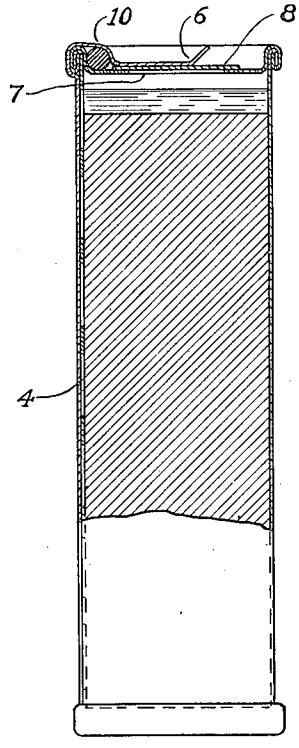


Fig 3

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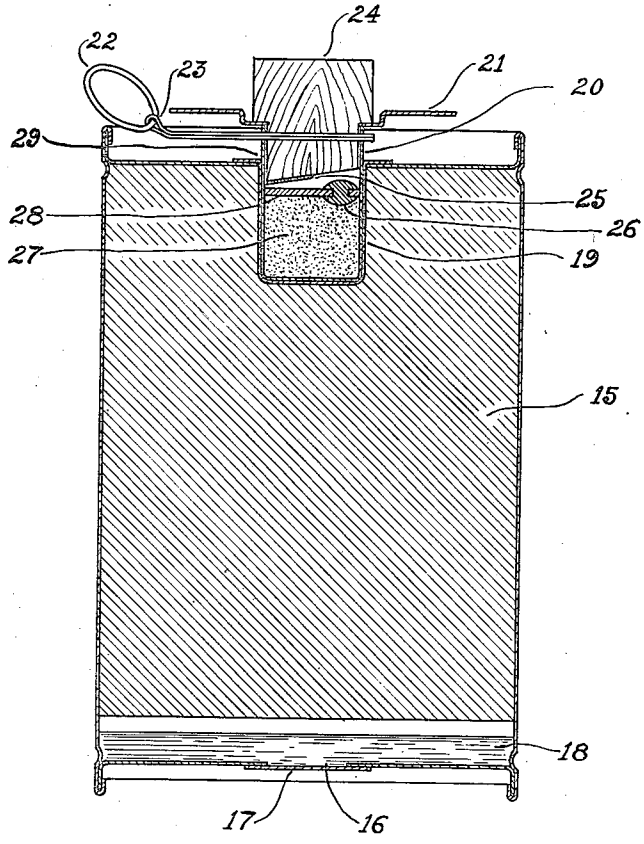


Fig 4

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Patented May 17, 1932 1,858,456

UNITED STATES PATENT OFFICE

JAMES E. MILLS, OF EDGEWOOD, MARYLAND

PHOSPHORUS CONTAINER

Application filed January 25, 1928. Serial No. 249,480.

(GRANTED UNDER THE ACT OF MARCH 3, 1883, AS AMENDED APRIL 30, 1928; 370 O. G. 757)

This invention described herein may be manufactured and used by or for the Government for Government purposes, without the payment to me of any royalty thereon.

This invention relates in general to chemical containers and more particularly to a container for white phosphorus or other reacting substances better known in the art as a candle.

There has not been provided in the art prior to this time any simple portable means for generating, without the use of an explosive charge, white phosphorus smokes, generally used in warfare for producing smoke screens. The several methods heretofore employed have proved generally unsatisfactory and in some instances highly dangerous.

White phosphorus has been enclosed in a container adapted to be ruptured by an explosive charge. It may be readily perceived that such a method of dispersion is inefficient from the very nature of the material in that the rate of reaction of the phosphorus with the oxygen and moisture of the air is almost an instantaneous one, the phosphorus being practically atomized by the explosive charge. The resultant smoke is necessarily produced instantly and soon drifts away with the wind since means for renewing the smoke concentration are lacking. Also explosive dispersion of white phosphorus results in throwing a large part of the phosporus and resulting smoke too high into the air, with consequent loss of efficiency. In dispersing the phosphorus in such a manner the use of an unnecessarily large quantity of material is required to provide sufficient smoke for a satisfactory screen.

White phosphorus has also been placed in shallow pans on the ground and there ignited or allowed to kindle. By using such a method, the phosphorus burns more slowly and gives forth a more concentrated smoke cloud for a longer period of time but the handling of the substances in this manner is necessarily a dangerous operation, unwieldly and impractical, likewise if too great a quantity of phosphorus is burned in a pan of insufficient size, localization of the heat causes a large upward dispersion of the smoke and a resultant loss of the desired screening effect.

Containers provided with a covered opening at the top have also been provided, the cover being designed to be released when the use of the phosphorus is required. In such containers the smoke produced from the phosphorus is emitted through the single opening, reacting for a greater period of time than the first mentioned process and less dangerous than the second, but due to the absence of sufficient air containing oxygen within the container to support the free combustion, the amount of smoke given forth through the opening in a given time, has proved to be insufficient in quantity.

An object of this invention is to provide a portable container or candle for reacting chemical substances having particular reference to white phosphorus, that will allow a safe means for producing efficient concentrated smoke screens.

Another object of this invention is to provide a container or candle for reacting chemical substances having particular reference to white phosphorus that has means incorporated therein to physically unite the reacting substances with a sufficient quantity of air to support the combustion of the substances and still produce smoke at sufficiently low temperatures to prevent too high upward dispersion of the smoke.

The container used in carrying out this invention consists, in general, of an air-tight container or candle constructed of thin tinned sheet metal with tightly soldered seams having provided on one side a plurality of apertures for the escape of the contents. There is designed to be super-imposed over the openings a metallic strip of like character to the metal of the candle and soldered to the sides thereof to effectively seal the openings. On the top there is provided an inlet having a cover adapted to be soldered after the candle is charged. The cover of the inlet is adapted to receive a flange member which in conjunction with the free end of the strip is designed to secure an opening key adapted to serve the purpose, when ready for use, of engaging the end of the strip and by winding the same in the conventional manner, exposing the apertures.

There is provided a modification of this

invention consisting of an ignition mechanism adapted to be seated within the candle, comprising a thimble constructed of fusible metal adapted to contain a pyrotechnic mixture and a disk supporting a combustible compound. A plug having an abrasive substance incorporated on the inner end is adapted to fit within the thimble and be secured therein by a cotter pin.

With these and other objects in view which may be incident to my improvements, the invention consists in the parts and combinations to be hereinafter set forth and claimed, with the understanding that the several necessary elements comprising my invention may be varied in construction, proportions and arrangement, without departing from the spirit and scope of the appended claims.

In order to make my invention more clearly understood, I have shown in the accompanying drawings means for carrying the same into practical effect, without limiting the improvements in their useful applications to the particular constructions, which, for the purpose of explanation, have been made the subject of illustration.

In the drawings forming a part of this specification:

Figure 1 is a side elevation partly sectional view of the candle forming the subject matter of this invention;

Figure 2 is a top plan view of the candle showing the method of securing the opening key thereto;

Figure 3 is a side elevation partly sectional view of the candle;

Figure 4 is a side elevation sectional view showing a modification of Figure 1 having an ignition mechanism incorporated therein.

Referring by numerals to the drawings, wherein the same numerals denote the same elements throughout, in Figure 1 is shown the candle forming the subject matter of this invention comprising a body 1 preferably constructed of thin tinned metal having securely soldered seams and provided with a bottom portion 2 and a top portion 3. Across the front of the candle are provided a plurality of apertures 4 designed to allow the escape of the contents when ready for use. Super-imposed over the apertures 4 so as to effectively seal the same is a strip 5 preferably constructed of material similar to that of the candle body. One end of the strip 5 better shown in Figures 2 and 3 is adapted to fit over the top 3 so as to rest above an inlet 7. Super-imposed over the inlet 7 and under the end 6 of the strip 5 there is adapted to be secured a cover 8 soldered thereto, so as to effectively seal the inlet 7 after the candle is charged.

A flange member 9 is adapted to be secured by the cover and in cooperation with the portion 10 of the strip 5 is adapted to secure an opening key 11 provided at one end with a longitudinal slot 12 adapted to engage the free end of the strip 5.

The container 1 is designed to receive a small amount of water content 13 and a chemical reaction substance 14 when charged.

The operation of this device may be readily understood having reference to Figure 1. The candle 1 is charged by first filling the same with warm water and then displacing the water with molten phosphorus, leaving, however, a small layer of water on top for additional protection against accidental ignition. It is then removed from the bath and allowed to cool. The material is poured into the candle through the inlet 7 and when charged the cover 8 is super-imposed over the hole and soldered so as to effectively seal the opening.

When it is desired to ignite the candle the aperture 12 of the key 11 is placed in engagement with the top 6 projecting from the strip 5, and the strip is rolled over the key or is removed with a slow steady pull. The white phosphorus coming into contact with the oxygen of the air will ignite spontaneously or if the temperature below the reaction may be initiated by applying heat, such as by a match or any other means of ignition. The heat of the combustion will gradually melt the remainder of the charge so that it will run on the ground or on any other surface where it may be placed until all of the contents has been converted into smoke. The deposition of the white phosphorus over considerable area of ground permits the rapid dissipation of the heat produced and so provides a smoke cloud with a minimum initial rise. It likewise makes possible the combustion of sufficient white phosphorus in a given length of time to produce a most effective obscurance.

A modification of the invention is shown in Figure 4 designed to contain a like chemical substance 15. The bottom portion of this container is provided with an inlet 16 adapted to have a cover 17, super-imposed thereunder and securely soldered so as to effectively seal the same when the container is charged. The top of the container is provided with an opening adapted to receive a flanged thimble 19 constructed of any desired fusible metal. Within the thimble 19 there is adapted to be fitted a cup 20 having flanges 21. A ring 22 is designed to engage a cotter pin 23 which is adapted to pass through openings provided for that purpose in the cup 20. A collared plug 24 having an oblique inner end is adapted to be partially fitted in the cup 20 allowing the collar to rest on the flanges 21 and held by the cotter pin 23. The oblique end is provided on the end with an abrasive mixture 25. A combustible composition 26 is held in place by a disk 28 or is by any other suitable means secured within

the cup 20, the cup 20 being designed to contain a pyrotechnic mixture 27.

By this modification the candle is provided with a fusible head having some form of ignition mechanism incorporated thereon to permit the igniting of the phosphorus at low temperatures or at any other unfavorable conditions when the spontaneous combustion may be delayed. It is manifest that any of several types of mechanical or chemical starter sets could be incorporated on the top or on any other convenient place on the candle body. The candle shown in this modification is equipped with a conventional ignition device well adapted to serve as both an opening means for the container and accelerator for the combustion of the phosphorus, so that it will flow from the container. In operation this embodiment of the container is adapted to be laid on its side, allowing the content during combustion to flow to the ground.

When it is desired to ignite the phosphorus the ring 22 is pulled thereby withdrawing the cotter pin 23 from the receptacle 20 and the plug 24 allowing rotation of the same. The plug 24 is provided with an oblique end portion having an abrasive substance 25 thereon. The abrasive substance on rotation of the plug will be brought into frictional contact with the combustion composition 26 causing the later to ignite, the combustion of which will in turn be transmitted to the pyrotechnic mixture 27. The burning of the pyrotechnic will cause the receptacle 19 and the thimble 20 as well as the entire top, to melt, these members being preferably constructed of a readily fusible material, such as zinc, though any other suitable metal may be employed, thereby causing the same to melt and allowing the phosphorus to flow from the container to the ground during the combustion through the top 29, the opening being resultant of the fusing of the same and melting of the receptacle 19 and the thimble 20.

There is accomplished by this invention a candle or container for white phosphorus possessing efficiency in charging, safety in transport, and storage, and a high degree of efficiency in operation, and so constructed as to afford a predetermined rate of flow of the content inasmuch as the quantity of phosphorus which may flow from any one of the apertures is known and hence by opening the desired number of the same the phosphorus may be allowed to flow out of the container and ignite on contact with air, in suitable quantities. There is further accomplished an adaptation of an ignition mechanism in combination with a candle designed to initiate the combustion of the substances contained at low temperatures or under unfavorable conditions.

While I have shown and described the preferred embodiment of my invention, I wish it to be understood that I do not confine myself to the precise details of construction herein set forth, by way of illustration, as it is apparent that many changes and variations may be made therein, by those skilled in the art, without departing from the spirit of the invention, or exceeding the scope of the appended claims.

I claim:

1. A candle comprising an air-tight casing having a sealed inlet, a plurality of sealed outlets extending the length of the casing and means to open the outlets successively.

2. In a candle embodying a casing having an inlet and a plurality of outlets sealed by a superimposed strip, means to open the outlets comprising a key adapted to engage the strip.

3. In a candle embodying a casing having an inlet provided with a cover, a plurality of outlets sealed by a superimposed strip having one end extending over the cover, and a key adapted to engage the strip, means to secure the key to the casing comprising a flange member secured to the cover, the flange member and the extending end of the strip being adapted to secure the key.

4. A process of producing white phosphorus smoke screens comprising, storing the white phosphorus in an airtight container, exposing the white phosphorus to the atmosphere, causing it to ignite, the heat of combustion melting the white phosphorus and delivering it from the container at a predetermined rate of flow.

In testimony whereof I affix my signature.

JAMES E. MILLS.