

April 10, 1973

T. D. KACZMAREK
INERT PLASTIC FILM FOR SUPPORT AND PACKAGING
OF CHEMICAL SPOT TEST SYSTEMS
Filed July 6, 1970

3,726,645

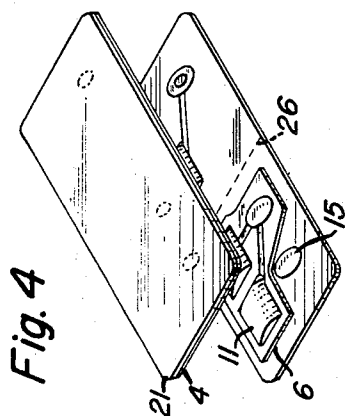


Fig. 4

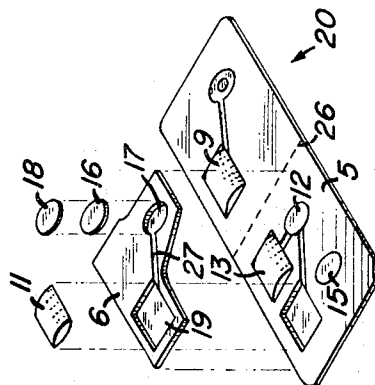


Fig. 3

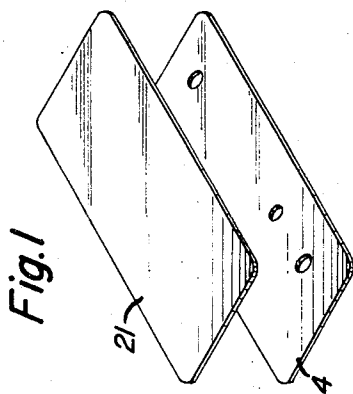


Fig. 1

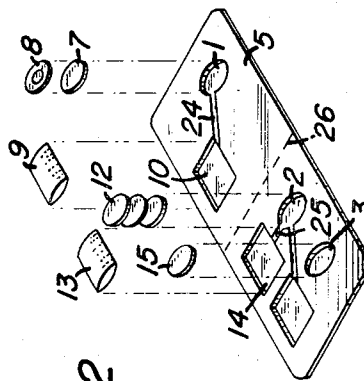


Fig. 2

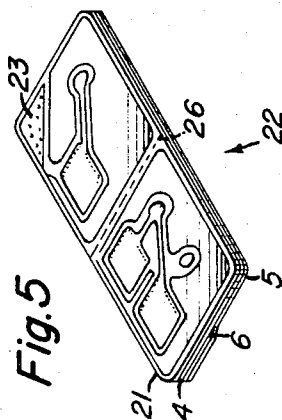


Fig. 5

BY

INVENTOR
Thomas D. Kaczmarek
Harry M. Saragovitz
Edward J. Kelly
Herbert Berl
Bernard J. Ohlendorf
ATTORNEYS

1

3,726,645

INERT PLASTIC FILM FOR SUPPORT AND PACKAGING OF CHEMICAL SPOT TEST SYSTEMS

Thomas D. Kaczmarek, Pittsburgh, Pa., assignor to the United States of America as represented by the Secretary of the Army

Filed July 6, 1970, Ser. No. 52,499

Int. Cl. B65d 79/00, 83/00; G01n 31/22

U.S. Cl. 23—253 TP

3 Claims

ABSTRACT OF THE DISCLOSURE

An apparatus, method, and material for the packaging and support of chemical spot test systems; the invention being utilized to eliminate any reaction between the chemical system and the container means. The container means containing a plurality of spot tests and the apparatus being sufficiently compact to carry in a jacket or shirt pocket.

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

My invention relates to a new apparatus, material, and method for the packaging and support of chemical spot test systems containing multiple spot tests enclosed in a container which can be carried in a jacket or shirt pocket.

The spot tests in the aforementioned systems are designed to detect chemical species down to 0.02 part per million in water and air and the packaging and support means are made of weldable and impermeable plastic film. All commercially available weldable and impermeable plastic films contain 50 to 100 parts per million of volatile low molecular weight fragments which adversely affect the aforementioned spot test systems which leads to false positive tests and/or completely inactive spots. My invention was conceived and reduced to practice to overcome the aforementioned packaging and support means problem and to satisfy the long felt need for a material to package and serve as a support means for chemical spot test systems without adversely affecting the chemical reactions of the spot test systems.

My invention has utility in any chemical system where reaction between the container means and the chemical system must be eliminated.

The principal object of my invention is to provide a reliable and effective means, material, and method for packaging and support means for chemical spot test systems without any adverse affect of the packaging and support material on the chemical reactions of the chemical system.

Other objects of my invention will be obvious or will appear from the specification hereinafter set forth.

FIG. 1 is a view showing an aluminum protective shield and a cover, made of plastic film, for the plastic film container means shown in FIG. 2; the view being prior to lamination.

FIG. 2 is an exploded view showing a container means made of plastic film and components to be assembled within the container means.

FIG. 3 is an exploded view showing the structure shown in FIG. 2 after assembly of the components therein with a module means, made of my plastic film, above the FIG. 2 structure and also showing components to be assembled within the module means.

FIG. 4 is an exploded view showing the structures shown in FIG. 1, after lamination, located above the structures shown in FIG. 3 preparatory to lamination of the entire system.

FIG. 5 is a view showing the entire assembly of structures shown in FIGS. 1 to 4 after lamination.

2

My invention, as shown in FIGS. 1 to 5, will now be described in detail as follows.

The plastic film to produce cover 4, package 11, and module 6, shown in FIGS. 1 and 3, was produced by subjecting a commercially available chlorofluorocarbon film of the general formula $(CF_2-CFCl)_x$ to a vacuum of approximately 1 millimeter of mercury at 195° F. until the volatile content of the film was reduced to no greater than 0.05 part per million when measured at 150° F. under a vacuum of approximately 1" of mercury; the measurement at 150° F. being made in the conventional manner. The resulting vacuum treated film remained pliable, weldable, and impermeable. While any part configuration for any desired chemical system application can be stamped from the above described plastic film, exemplary configurations are demonstrated by aforementioned structures 4, 11, and 6. Also, while the above described plastic film is suitable for any applicable chemical system, an exemplary system for detection of nerve agent present in air or water is provided by inserting sintered glass disc 7 in recess 1 and superimposing an enzyme spot disc 8 on disc 7, the enzyme spot being any conventional composition such as that impregnated in the enzyme paper described in U.S. Pat. Ser. No. 3,049,411; inserting a buffer in a plastic film package 9, the buffer being a composition as described in the aforementioned U.S. patent, in recess 10; inserting aluminum discs 12 in recess 2; inserting $CuCl_2$ in a plastic film package 13 in recess 14; and inserting in recess 3, a substrate 15 of composition such as described in U.S. Pat. Ser. No. 3,515,644. A system for detecting mustard agent in air or water can be provided in combination with the above described nerve agent detection system by inserting a plastic film disc 16, made of my plastic film, in recess 17 of module 6 and superimposing on disc 16 a mustard agent spot test 18 of composition 4-nitrobenzyl pyridine impregnated in a conventional substrate; inserting package 11, made of my plastic film, containing K_2CO_3 within recess 19; and superimposing module 6 on section 5 of the container shown at 20 in FIG. 3. My plastic film has particular utility regarding the mustard agent detection system, because this system is very sensitive to contamination by volatile matter within commercially available plastic film. After assembly of the nerve agent system components and mustard agent system components as described above; container 20 with module 6 superimposed thereon, cover 4 superimposed on container 20 and module 6, and aluminum shield 21 superimposed on cover 4 are laminated together utilizing conventional laminating technique to form the integral chemical system unit shown at 22 in FIG. 5. While not a part of this invention, the operation of the above described exemplary nerve agent and mustard agent detection systems will be described as follows to render the application complete in all respects. To test the environment for nerve agent presence, shield 21 is peeled off by means of serrulated corner 23 as shown in FIG. 5 and the shield discarded; package 9 is ruptured by squeezing to cause the buffer solution content to flow through channel 24 to thoroughly wet disc 8; unit 22 is exposed to the environment containing suspected nerve agent and/or mustard agent for approximately six minutes; package 13 is ruptured and the $CuCl_2$ solution squeezed along channel 25 to contact aluminum discs 12 to generate sufficient heat to achieve adequate sensitivity for the mustard agent spot test, completion of the mustard agent test being subsequently described; unit 22 is folded along line 26 and spot disc 8 held against substrate 15 for approximately two minutes; upon folding unit 22 back to the position shown in FIG. 5, no color on spot disc 8 indicates presence of nerve agent which has inhibited the enzyme action, and, if no agent is present, a blue color results in

3

disc 8 as a result of the substrate-enzyme reaction. To complete the test of the environment for mustard agent presence, after all of the steps described above regarding nerve agent detection have been performed, package 11 is ruptured and the K_2CO_3 solution squeezed along channel 27 to wet spot 18; no color change in spot 18 after wetting by K_2CO_3 indicates no mustard agent is present, and a change to a purple color, after spot 18 is wetted by K_2CO_3 , indicates the presence of mustard agent.

It is obvious that other modifications can be made of my invention, and I desire to be limited only by the scope of the appended claims.

I claim:

1. An apparatus for detection of environment toxic agent contamination comprising a protective shield means; a plastic film container; a plastic film cover means located between the shield means and said plastic film container means; said plastic film container means having a plurality of recesses formed therein to receive a plurality of toxic agent chemical detection components; a plastic film module means located between the said plastic film cover means and the plastic film container means; and a plastic film package means containing a chemical component to cooperate in toxic agent detection, the plastic film package being adapted to be located within a recess formed in the plastic film module means; wherein the improvement in combination therewith is a pliable, weldable, and impermeable plastic film of the for-

4

mula $(CF_2-CFCl)_x$ when measured at 150° F. under a vacuum of approximately one inch of mercury; the vacuum treated plastic film being used to form the plastic film cover means, the plastic film module means, and the plastic film package means.

2. The apparatus of claim 1 wherein the protective shield means, the cover means, the container means, and the module means are laminated together to form an integral unit.

3. The apparatus of claim 1 wherein the chemical component contained within the plastic film package means is K_2CO_3 .

References Cited

UNITED STATES PATENTS

2,785,057	3/1957	Schwab et al.	23—253 TP
3,018,611	1/1962	Biritz	23—253 TP
3,036,894	5/1962	Forestiere	23—230 R
3,476,515	11/1969	Johnson et al.	23—230 R

MORRIS O. WOLK, Primary Examiner

R. M. REESE, Assistant Examiner

U.S. Cl. X.R.

206—47 A, 56 A, 56 AA