Oct. 12, 1965 H. N. BARNES 3,211,503

CONTAINER

Filed Jan. 9, 1963

Fig.1

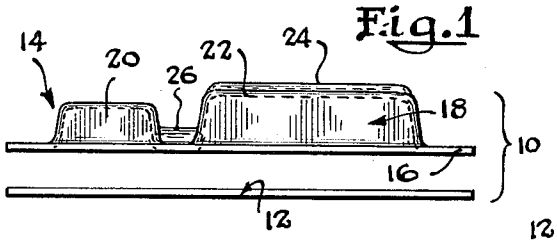


Fig.2

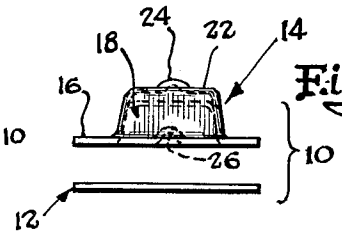


Fig.3

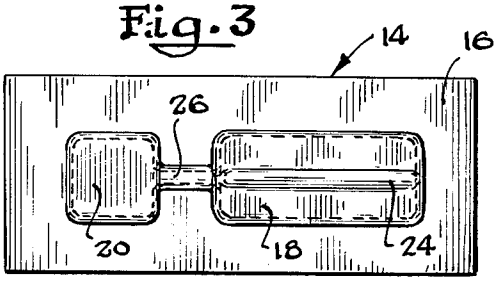


Fig.4

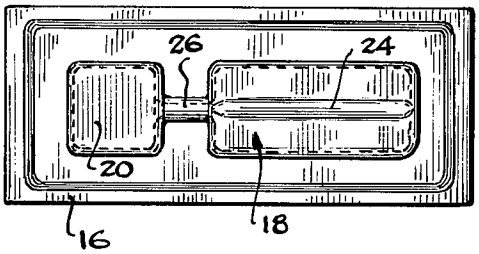


Fig.5

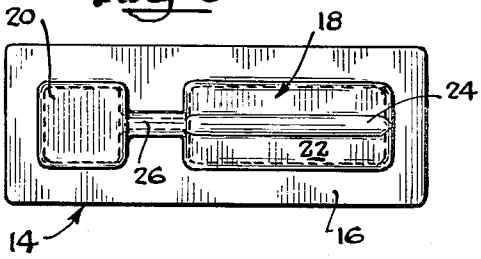


Fig.6

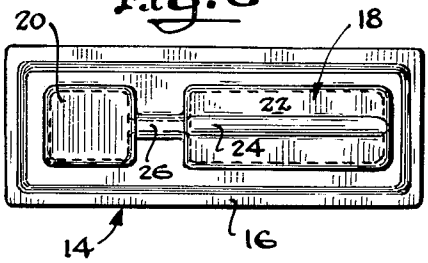


Fig.7

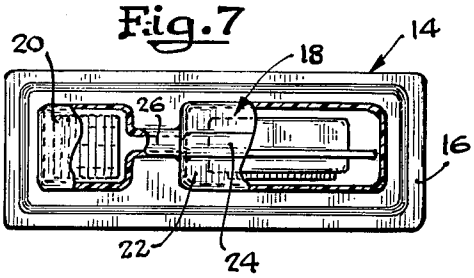
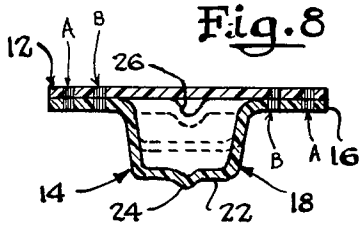


Fig.8



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3,211,503
CONTAINER

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1 Claim. (Cl. 312—31.2)

The present invention relates to a container and more specifically it relates to an improved semi-rigid container for packaging components.

The trend in the development of materials and equipment today is toward dependability coupled, of course, with economy. The dependability aspect of such materials becomes especially significant in industries associated with the development and production of military equipment. Very rigid inspection procedures are followed to assure that the materials employed in the manufacture of such military equipment meets rigid military specifications. In many instances, especially when the components are intended for use in rocketry or the like, the inspection of components is complete, that is one-hundred percent inspection. To this extent whatever steps that are taken to facilitate inspection of such components while still protecting the components from damage during shipping and storage thereof will greatly facilitate inspection time and materials rejections for damages incurred during shipment and storage of the materials.

The present invention is directed to the provision of an improved container adapted for shipment of components, wherein gross inspection thereof may be realized without breaking the package open and wherein the component may be reinserted within the package and the container resealed after removal of said component for functional inspection thereof.

A further aspect of the improved container of the present invention resides in the provision of means integral with the container for keeping the packaged components dry during shipment and storage within the container. This feature is particularly important in inhibiting the corrosive action of the elements during shipment or extended storage of the components.

It, accordingly, is a general object of the present invention, to provide an improved semi-rigid container.

A further object of the present invention resides in the provision of an improved semi-rigid container for components wherein the components are received within protected recesses within the container.

Another object of the present invention resides in the provision of an improved semi-rigid container for components of a construction such that the container may be opened and resealed without destroying the effectiveness of the protective characteristics of the container.

An additional object of the present invention resides in the provision of an improved container having a plurality of recesses therein each interconnected by a shallow recess or depression to provide for gaseous or vapor communication between the recesses.

A further object of the present invention resides in the provision of an improved container having a plurality of recesses therein each interconnected to an adjacent recess for flow of air or vapor therebetween and of construction such as to permit opening and resealing of the container without destroying the effectiveness of the protective characteristic of the container.

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The novel features which are believed to be characteristic of the present invention are set forth with particularity in the appended claim. The invention itself, however, together with further objects and advantages thereof, will best be understood by reference to the following description taken in connection with the accompanying drawings, in which:

FIGURE 1 is an exploded frontal view of the container of the present invention;

FIGURE 2 is an exploded end view of the container as viewed from the right end of the container illustrated in FIGURE 1;

FIGURE 3 is a top plan view of the container;

FIGURE 4 is a top plan view of the container illustrating the sealing thereof;

FIGURE 5 is a top view of the container after severance of the container flange for initial opening thereof;

FIGURE 6 is a top view of the container after the second sealing operation;

FIGURE 7 is a top view of the container, partially broken away to show the components disposed within the recesses of the container; and

FIGURE 8 is an end view of the container schematically representing the sealing, opening and resealing feature feasible with this construction.

Referring more particularly now to FIGURE 1 of the drawings, the container is illustrated generally at **10**. The container, in gross, is comprised of a cover member **12** and a formed member, indicated generally at **14**. The cover member **12** is defined in flat plate-like form and is adapted to be received over the flange portion **16** of the formed member **14**.

As indicated in FIGURE 1 of the drawings the member **14** is provided with a large recess **18** and a small recess **20**. The material from which the container parts are formed preferably is a clear plastic substance that is formable under the application of heat and pressure, but that will resist cold flow and that is relatively rigid under atmospheric thermal and pressure conditions. The material at atmospheric conditions is semi-rigid in character and resists permanent deflection or destruction under application of light compressive or impact forces. One such material is a clear polyvinylchloride (PVC). PVC has the characteristics of being inert, non-toxic and sulfur free, each characteristic of which is important in materials for packaging purposes. A highly flexible bag or package generally is not satisfactory for shipment of electrical components, for example, in that the containers may be handled roughly during shipment and the prongs extending from electrical connectors may become damaged during such handling. A semi-rigid container of the type noted hereinabove will tend to protect the fragile contact elements on such connectors.

The recess **18** is substantially larger, in the embodiment illustrated herein, than the recess **20** of the formed member **14**. As shown in the drawings, the base **22** of the recess **18** is provided with a rib **24** extending in direction along the general longitudinal axis of the recess **18**. The rib **24** is adapted to absorb impact forces, for example, while preventing damage to the main body of the formed recess **18** thereby providing greater protection for the contents of the package.

The recesses **18** and **20**, respectively are interconnected by a shallow depression **26**. The depression or recess

26 defines an interconnection between said recesses 18 and 20 to provide for vapor interchange therebetween. It can readily be seen that with such provision a component may be stored in one recess of the package and a dessicant, humidity indicator, or the like, stored in the other recess of the container. With free interchange of the atmosphere or vapor trapped within the package the dessicant is available to remove moisture from the air and thereby to inhibit corrosion of the components within the package. The use of the humidity indicator, wherein the material changes color when a predetermined moisture level is reached within the container is of valuable assistance in warning the user of the existence of a potentially dangerous atmospheric condition. It should be observed that plastics are not absolutely vapor proof, however, the vapor transfer rate of polyvinylchloride, for example, is sufficiently low to permit long storage of the package without appreciable modification of the internal atmosphere. The package interior may originally be provided with an inert atmosphere. As the ambient conditions about the package vary there may be a tendency for the moisture in the atmosphere trapped within the package or container either to precipitate out (if the temperature is lowered below the dew point of the atmosphere within the container) or to go back into the vapor state. To this extent a separate means of controlling the humidity level of the trapped atmosphere in the package, as by including a dessicant therein, is desirable. The separate compartment for the dessicant or indicator provides additional protection for the packaged component in maintaining the dessicant out of direct contact with the component and thereby preventing possible damage to the component by this material.

Each of the recesses 18 and 20 of the formed member 14 define an open mouth lying in the general horizontal plane defined by the flange portion 16 of the member 14. The open mouths of each of the recesses define the perimeter of said recesses, the perimeter of said recesses being integral, and continuous with the flange portion adjacent thereto.

The shallow depression or recess 26 extending between the recesses 18 and 20 is formed in direction away from the general plane defined by the flange 16 said depression 26 being formed in the same direction away from said flange as are the recesses 18 and 20. The recess 26, as indicated, defines a continuous channel interconnecting the spaces defined within the recesses 18 and 20, respectively, to provide for free vapor interchange between said recesses.

In use of the package the components are positioned within the recess 18, for example, the cover 12 positioned over the flange 16 of the formed member 14 and the interfacial area between the cover and the formed member sealed by the application of heat under pressure. The cover member 12 is positioned over the flange such that the open mouths of the depression are completely covered thereby. The periphery of the cover 12 extends a substantial distance outboard of the periphery of the open mouths of the recesses 18 and 20 in substantially mating relation with the periphery of the flange 16 of the formed member 14.

With the components positioned within the recesses of the formed member the cover member 12 may be sealed to the flange 16 of the formed member 14. With the use of PVC as the material for manufacture of the container disclosed herein sealing may be realized with the application of heat. Time, temperature and pressure are all variables in sealing such material. In one specific sealing application it was noted that a suitable container seal could be developed by holding the cover 12 and flange 16 in mating relation at 225 degrees F. for 15 seconds with the application of 40 pounds per square inch pressure. The time and pressure variables may be reduced by increasing the temperature variable to, for examples, approximately 300 degrees F. at which temperature the time may be reduced to a very few seconds. In high speed operations such sealing flexibility is important in packing components.

As indicated in FIGURE 4 of the drawings, the first (initial) seal of the container is defined about a narrow rim, substantially rectangular in shape, which rim is adjacent the outer periphery of the cover 12 and mating flange 16 of the container. A molded die heating member (not shown) may be employed for sealing of the container to assure definition of the rim seal about the proper area of the mating flanges.

The package, as illustrated herein, may be opened for inspection if required by severing the sealed rim on the mating flanges and then separating the cover and formed members. The severed container member is illustrated in FIGURE 5. After functional inspection of the components they are repositioned within the container and the container resealed along a smaller rim area as illustrated in FIGURE 6. The second sealing rim is substantially closer to the periphery of the open mouths of the recesses 18 and 20 of the container 10. There is relatively little danger from heat damage to the packaged components during the sealing operation due to the relatively low level of heat applied to the flange area for only a very brief period of time. The PVC is a relatively poor thermal conductor and the heat is dissipated from the plastic surface by the convection currents in the external atmosphere.

The package and container may be stored in the last noted condition awaiting use. When the component is to be used the flange of the container is severed and the cover member 12 and formed member 14 separated, the component removed and the package discarded. It should be observed that the cover 12 may remain affixed to the member 14 by leaving one edge thereof affixed to the member 14. The cover is lifted in "flap" manner with this arrangement to remove the contents.

The sealing areas and initial container opening areas are schematically illustrated in FIGURE 8 of the drawings. The first seal A, as indicated, is located on a narrow rim area toward the outboard portions of the mating flanges, while the second seal B is defined along a similar narrow rim area toward the open mouths of the recesses 18 and 20 of the formed member.

While I have shown and described a specific embodiment of the present invention it will, of course, be understood that other modifications and alternative constructions may be used without departing from the true spirit and scope of this invention. I therefore intend by the appended claim to cover all such modifications and alternative constructions as fall within their true spirit and scope.

What I claim as new and desire to secure by Letters Patent of the United States, is:

A semi-rigid container for packaging articles comprising:

a first member defining a pair of cup-shaped depressions therein for receiving gas and articles, each of said depressions having an open mouth extending in a common plane, said member having a flange extending outwardly from the peripheries of the open mouths of said cup-shaped depressions, said flange having a shallow recess connecting said depressions so that there may be an interflow of gas between said depressions, said member having a bottom portion and side wall portions defining each of said depressions and shallow recess;

and a cover member received on the flange of said first member and extending over the open mouths of said depressions and the shallow recess in said flange, the flange engaging surface of said cover member being in spaced relation to said bottom portions of said shallow recess and the cup-shaped depressions,

respectively, the extremities of said cover member and flange extending outwardly away from the open mouths of said depressions for a substantial distance, said first member and the cover member being of heat sealable composition whereby upon the application of heat thereto the mating surfaces between the flange and cover member bond together to define an air-tight package seal, the mating surfaces of the flange and cover member being such that they may be first sealed along the periphery thereof for a predetermined distance inwardly toward said depressions, the first seal severed and the package opened for inspection of the articles, the package resealed along the cut periphery of the cover-flange mating surfaces and the package subsequently reopened for use of the articles.

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