Dec. 8, 1959 A. J. DETRIE ET AL 2,916,197

COMPARTMENTED CONTAINER

Filed May 6, 1957 2 Sheets-Sheet 1

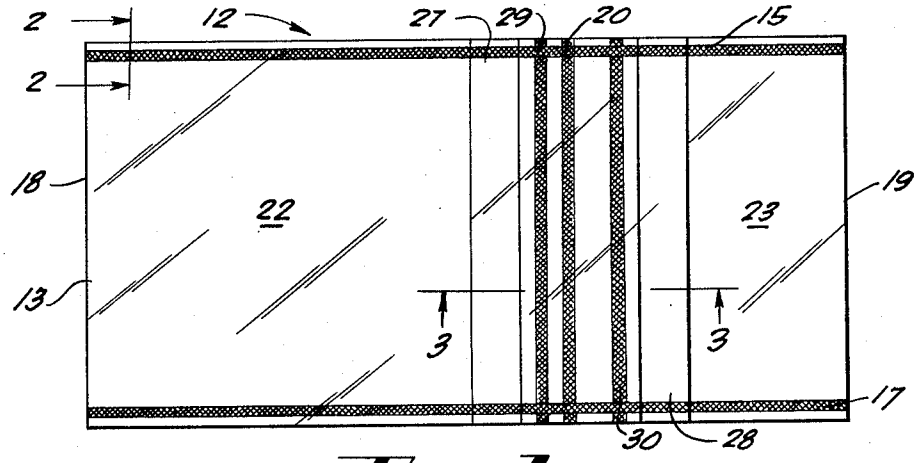


Fig. 1



Fig. 4



Fig. 2

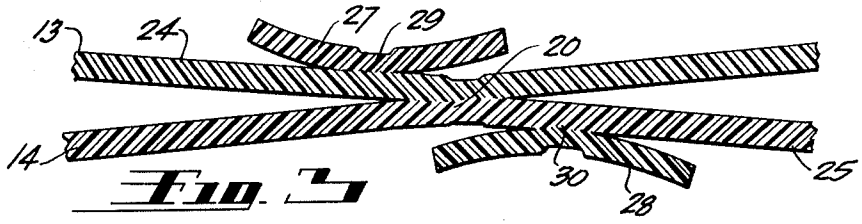


Fig. 3

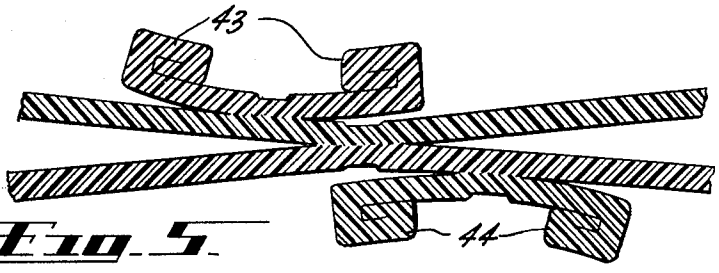


Fig. 5

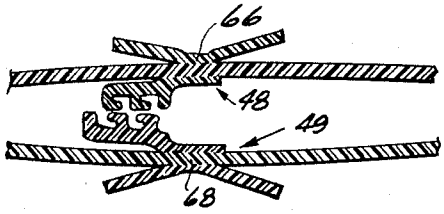


Fig. 8

INVENTORS
ARTHUR J. DETRIE
DANIEL J. LINGENFELTER
EUGENE J. O'NEIL
PAUL J. STAYBOLDT AND
EDGAR R. TROEGER
BY
J. Edwin Coates
ATTORNEY.

Dec. 8, 1959 A. J. DETRIE ET AL 2,916,197

COMPARTMENTED CONTAINER

Filed May 6, 1957 2 Sheets-Sheet 2

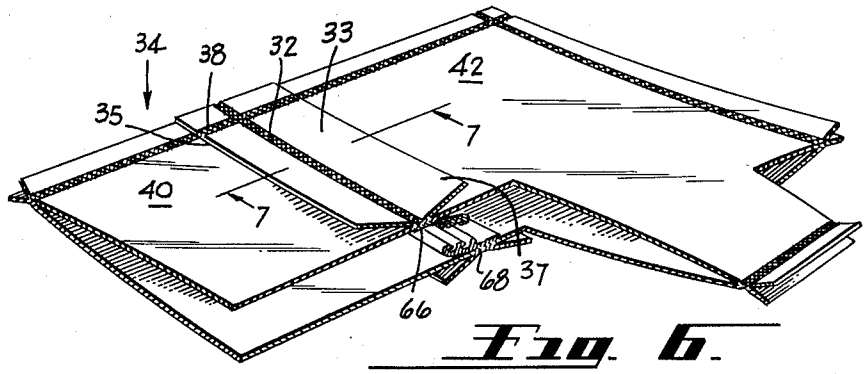


Fig. 6.

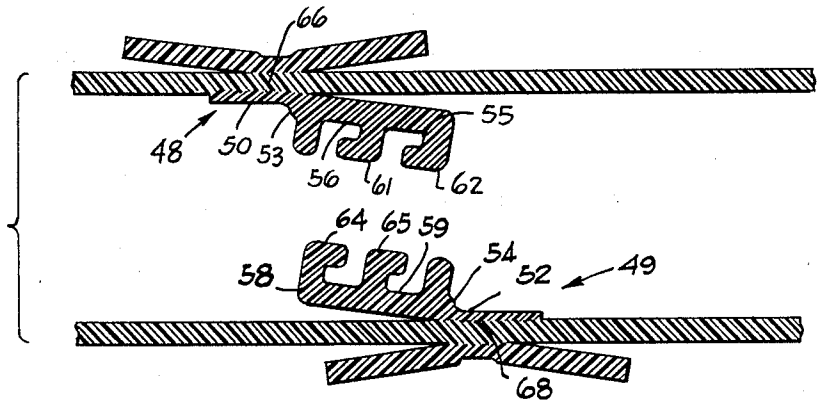


Fig. 7.

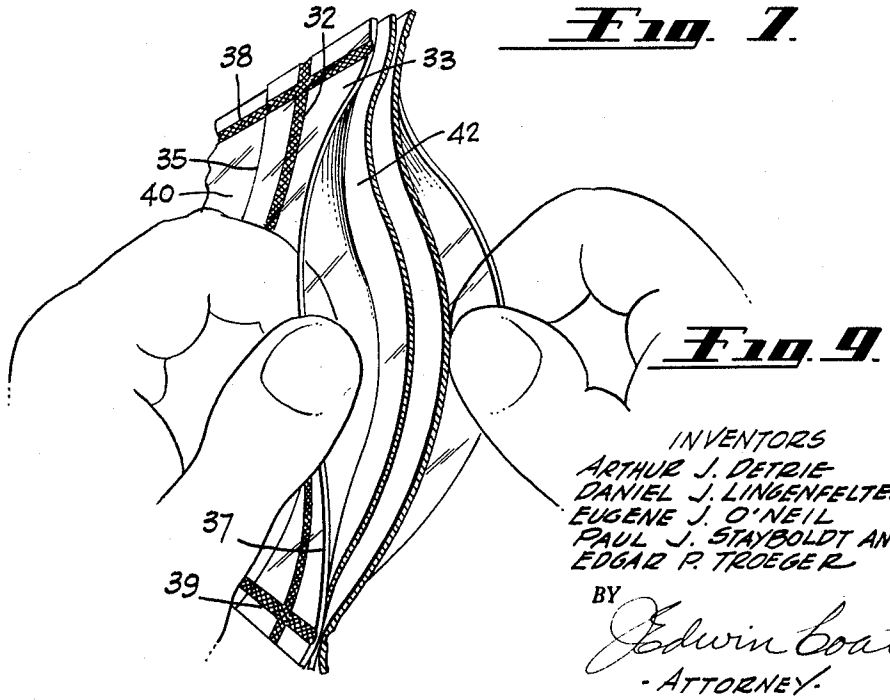


Fig. 9.

INVENTORS
ARTHUR J. DETRIE
DANIEL J. LINGENFELTER
EUGENE J. O'NEIL
PAUL J. STAYBOLDT AND
EDGAR P. TROEGER
BY
Edwin Coates
ATTORNEY.

United States Patent Office 2,916,197
Patented Dec. 8, 1959

2,916,197

COMPARTMENTED CONTAINER

Arthur J. Detrie, Ruston, La., and Daniel J. Lingenfelter, Glendale, Eugene J. O'Neil, Canoga Park, and Paul J. Stayboldt and Edgar P. Troeger, Los Angeles, Calif., assignors to Douglas Aircraft Company, Inc., Santa Monica, Calif.

Application May 6, 1957, Serial No. 657,332

10 Claims. (Cl. 229—56)

This invention relates to containers and more particularly to compartmented containers for segregating various materials which may be readily combined before use without danger of contamination, change in proportions or, in the case of reactants, premature mixing.

The container of the present invention in the broadest aspects thereof consists of a flexible film envelope divided into a plurality of compartments by a rupturable divider or separable fastener either of which acting as a barrier will adequately separate such ingredients as solid, paste, liquid and powdered materials. The exterior of the container adjacent the divider or fastener is provided with tabs or wings which may be gripped to facilitate rupturing or separating the barrier which divides the container into plural compartments when it is desired to bring together and mix the contents of the various compartments.

Realization of the extensive utility of a compartmented container for distribution of single charges or doses has caused certain industries interested in such distribution to actively search for such an envelope or package. Prerequisites of such a container, lacking in those heretofore proposed, are that it be capable of reliably keeping premeasured ingredients separate, and that it be provided with means for insuring a positive and simple removal of the separating medium just prior to the use of the ingredients. Such a package insures that the several ingredient substances are combined in proper proportion and quantity without the user having to trouble to measure the portions of a mixture and even without his needing to know what the substances or their proportions are.

The present invention eliminates many problems connected with storage such as the presence of multiple containers requiring coordination. Aside from field applications it eliminates deterioration of stocks due to repeated opening of containers and also avoids the necessity for refrigeration of a mixed sealant.

The necessity of weighing scales with the attendant problems of trained operators to properly measure out ingredients is also obviated. Ready availability is also present for ingredients can be mixed ready for use in a few minutes time.

Such a multiple part package is particularly desirable in the aircraft industry for use with such materials as sealants, adhesives and potting compounds. In field operations it is essential that such materials be carried to remote spots and that the application be reliably and expeditiously completed. For example, a considerable degree of success has been achieved in industrial and field use of epoxy thermosetting plastic resins as insulating and sealing materials.

Various formulations and types of liquid and solid epoxy resins are now used by manufacturers for encapsulating and insulating many types of components and assemblies. As indicated, many field applications also exist, in which epoxy resins can be used to upgrade job quality and reduce cost through labor saving. The multiple bag container of the present invention is well adapted to such field use, for liquid epoxy resins require

the addition and mixing in of a suitable hardener, or catalyst, in order to react to the solid state. The compartmented field-use film package is thus adapted to permit handling and mixing of accurately proportioned amounts of resin and hardener. By means of the exterior tabs or ears the separating barrier is ruptured, or, if the barrier consists of the separable fastener, it is disengaged and mixing is accomplished by kneading the package with the hands until a satisfactory mixture is attained. One of the two components may contain a dye as an indicator of uniform mixing. Mixing is thus accomplished in a very short time without error or the requirement of special skill. Pouring of the resin can then proceed immediately around whatever component is to be insulated. Similar bags using sealant with a powdered accelerator have also been utilized successfully in field use.

Suggestions heretofore made for storing separately ingredients to be mixed before using have not met wide success because of the unreliability of the sealing medium, and the difficulty of providing a method of quickly and positively communicating the various compartments without danger of rupturing the containers themselves. These deficiencies have resulted from the fact that it was necessary to rupture the frangible barrier separating the plural compartments in one of two ways. Normally the medium dividing the compartments was removed by plucking at the sides of the container and pulling until the barrier joint failed. However, a second alternative has also been utilized; namely, squeezing one end of the envelope, thus urging the contents of one compartment pressurally against the barrier until the barrier ruptured. These methods were available because the membrane or bonded joint while supposedly sturdy enough to permit rough handling could be removed by plucking or squeezing. The deficiencies heretofore present become clear when it is realized, in either method of eliminating the dividing membrane, that the barrier had to be considerably weaker than the bag itself so as to avoid rupture of the main container when squeezing or plucking. In making the barrier weak, the problem frequently encountered was leakage through the division and consequent premature mixing. The present invention obviates these deficiencies by utilizing means on the exterior of the container to facilitate barrier removal, and also features a novel application of a separable fastener as the sealing medium, thereby appreciably increasing strength against leakage but permitting easy disengagement.

There is thus provided a container to hold materials of different kinds and types, and to retain them separately from each other so that the opportunity to combine ahead of time will be avoided; yet the structure is such that a minor mechanical manipulation will bring all the ingredients into contact with each other and made ready for use in their combined form and easily taken from the container to be put to that use.

Other features and advantages of the present invention will be apparent from the following description taken in connection with the accompanying drawing in which:

Figure 1 is a plan view of the container of the present invention;

Figure 2 is a sectional view taken along the line 2—2 of Figure 1;

Figure 3 is a sectional view taken along the line 3—3 of Figure 1;

Figure 4 is a view similar to Figure 3 with the external tabs omitted showing a modified form of the barrier which divides the container into plural compartments;

Figure 5 is a view similar to Figure 3 showing a modified form of the external tabs;

Figure 6 is a perspective view of a modified form of

the present invention with portions broken away to more clearly indicate certain details;

Figure 7 is a sectional view taken on line 7—7 of Figure 6;

Figure 8 is a view similar to Figure 7 showing another embodiment of the present invention; and

Figure 9 is a fragmentary perspective view of the present invention showing the external tabs being gripped to exert a separating force on the dividing barrier.

Referring now to the drawing and particularly to Figures 1, 2 and 3 thereof, there is shown a bag or envelope **12** formed by uniting two opposing sheet members **13** and **14** of thin flexible material along two peripheral edges **15** and **17**. In these and other figures, the thickness of the sheets is exaggerated for clarity of illustration. Although polyethylene is now preferred, the container **12** may be of any flexible sheet material found suitable for holding and protecting the particular substances which are to be enclosed. Polyethylene, as indicated, or cellophane and the like cellulosic sheets are especially useful, because varieties which are impervious to humidity are available. Material of this type which is thermoplastic can be had so that two plies of such can be sealed together by heat and pressure, constituting a welding of the material as shown at **15** and **17**. If desired, crimping at the ends to strengthen such a heat and pressure seal is also easily done. Relatively long lengths of tubes of cellophane and the like material, are available commercially at low cost, being made by known machines. Such a tube of great length can be cut successively to provide a multiplicity of the container of Figure 1. If such tubes are utilized it is apparent that the two opposing sheet members **13** and **14** will form one integral piece with open ends **18** and **19**. The welds **15** and **17** depicted in Figures 1 and 2 would therefore be unnecessary.

In Figures 1 and 3 the container **12** has been subjected to heat and pressure along the path **20** to form a weld, thereby making opposite sides **13** and **14** of the container **12** adhere together strongly along this path and providing a separation of the interior of the container into two compartments **22** and **23**. Although in Figure 3, the barrier, separating compartments **22** and **23**, is shown as a line of adhesion between sheet members **13** and **14**, it will be understood, as shown in Figure 4, that the separating medium may consist of a piece of material **21** the same as or similar to the type used in the container **12** which may be fastened as at **26** and **31**, respectively, to the interior surfaces of opposing sheet members **13** and **14**, respectively, by means of a heat seal or otherwise, thus providing a membrane **21** dividing the container **12** into a multiple part package. Although external tabs or ears are omitted from the embodiment of the invention shown in Figure 4, it is understood that tabs similar to those depicted in either Figure 3 or Figure 5 are to be used in conjunction with the membrane **21**.

As shown in Figure 3, fastened to the exterior walls **24** and **25**, respectively, of sheet members **13** and **14**, respectively, adjacent the weld **20** are two tabs or ears **27** and **28**. These tabs are shown as elongate generally rectangular wings joined to the container **12** at **29** and **30**. The tabs **27** and **28** may be composed of any relatively thin flexible material and may be joined to the container **12** by any suitable attaching or bonding means. Applicants now prefer to make the tabs of polyethylene and to secure them to the container by the heat and pressure seal previously described and shown at **15** and **17** in Figures 1 and 2. If desired the tabs may be placed in position prior to forming the weld path **20** and one application of heat and pressure will cause sheet members **13** and **14** to adhere together and will also firmly affix the tabs to the exterior sides **24** and **25** in the correct position to be utilized as hereinafter set forth.

However it is preferable to fasten the container together along the weld **20** and then to fasten the tabs **27** and **28** to the container **12**, in a manner which will assure a firmer bond along the jointure lines **29** and **30** than that existing along the weld line **20**. In Figures 1 and 3 the jointure lines **29** and **30**, respectively, of the wings **27** and **28**, respectively, are shown offset to one side of the jointure line **20** which divides the container **12** into separate compartments. This assures that if a heat weld is used it will be possible to apply heat and pressure in a manner to secure a weld of greater strength at **29** and **30** than at **20**. This can of course, also be accomplished by utilizing a different adhesion or attachment method when securing the tabs than that used to fasten the sides of the container together along the path **20**. It is important that, when the tabs are pulled, the exerting force will not tear them loose from the container but rather that the separating barrier will be removed to permit the container's ingredients to be intermixed.

As shown more clearly in Figures 6 and 9, the line of jointure **32** of tab **33** extends the full width of the container **34** and the jointure line is placed intermediate the free ends **35** and **37** which can be gripped to exert the rupturing force. In Figures 6 and 9 the two ends **38** and **39** of the tab **33** are also affixed to the container **34**. This insures that the tabs are held close to the container, thereby avoiding the possibility of an inadvertent rupture yet permitting the free edges **35** and **37** to be gripped when it is desired to intercommunicate the two parts **40** and **42** of the container **34**. Such additional attachment also helps to assure the necessary bond between the tabs and the container.

In the embodiment of the present invention shown in Figure 5 the free ends of the tabs are shown as terminating in thickened portions **43** and **44** to permit a firmer grip by the user. The terminal portion may be formed by doubling the ends of the tab over and applying heat and pressure or by any other suitable means.

In the embodiment of the present invention shown in Figures 6 and 7 the barrier between the two compartments is provided by a separable fastener. The fastener comprises two identical strips **48** and **49** formed of a resilient material which may be molded or extruded into the desired finished shapes. Each strip **48** and **49** comprises a plane web portion **50** and **52**, respectively, and a thickened marginal portion **53** and **54**, respectively. Each of said thickened marginal portions is provided with parallel grooves, or channels **55** and **56**, and **58** and **59** respectively, and with parallel ridges, or projections, **61** and **62** and **64** and **65**, respectively. The channels **55** and **56** in the marginal portion **53** correspond with the ridges **64** and **65** in the marginal portion **54** and vice versa. The depth and height axis of said channels and ridges are perpendicular to the plane of their respective web portions **48** and **49**. The separable fastener is more fully shown and described in United States Patent No. 2,558,367 and United States Patent No. 2,637,085 both issued in the name of Borge Madsen.

The two strips **48** and **49** respectively are fastened by a heat seal or other bonding means to the interior of the container **34** as shown at **66** and **68** respectively in Figures 6 and 7. The external tabs are the same configuration as previously described. It has been found that it facilitates disengagement of the zipper or separable fastener when the tabs and strips **48** and **49** are positioned as shown in Figure 8 which permits the user to in effect unroll the interlocking grooves and ridges by exerting a force on the tabs outwardly and in a direction along the length of the container thereby in effect causing each zipper portion **48** and **49**, respectively, to release by pivoting about its line of connection **66** and **68** respectively to the container.

The container of Figure 1 is ready for its compartments to be filled and sealed in succession. Either compartment may receive its contents first through open end **18** or **19**. The end is then closed by being sealed tightly by any suitable means. The other compartment is then

filled and its end similarly sealed. A heat seal, adhesive gum, or stitching can be used if preferred.

The compartments may equal or vary from each other in capacity, as desired. When it is desired to combine and use the ingredient substances the exterior tabs are gripped as shown in Figure 9. If the barrier is composed of a heat seal or membrane as previously described the exerting force is normal to the container and applied by pulling in opposite directions on the tabs. As hereinabove pointed out, the indirect methods of rupturing the separating barrier in previous containers necessitated a barrier considerably weaker than the bag itself to insure that the barrier rather than the main container would rupture when the previously described squeezing or plucking techniques were utilized. Such a weakened barrier frequently resulted in leakage through the division and consequent premature mixing. Because of the positive separating action provided by the tabs or ears attached to the exterior walls of sheet members **13** and **14**, it is possible to provide a barrier, such as the membrane **21**, which is substantially stronger, relative to the strength of the material forming the sheet members **13** and **14**, than practicable in previous containers, thus eliminating the barrier leakage problem previously encountered.

If the barrier is composed of the separable fastener of Figures 6 and 7 it has been found to be easily disengaged by gripping the external tabs and sliding the interlocking portions of the zipper in opposite lateral directions. If the embodiment used is that pictured in Figure 8 the unfolding operation previously described is utilized.

With the barrier removed mixing is accomplished by kneading the package with the hands until the desired mixing is obtained. The ingredients are then dispensed directly from the package after a corner has been cut away.

Although the now preferred embodiments of the present invention have been shown and described herein, it is to be understood that the invention is not to be limited thereto, for it is susceptible to changes in form and detail within the scope of the appended claims.

We claim:

1. A compartmented container comprising: two mutually overlying generally rectangular sheets of thin flexible material united at two opposite peripheral edges and adapted to be united at the two other opposite edges; internal dividing means secured to the interior wall of said sheets dividing said container into a plurality of compartments; said dividing means being formed of a resilient material and consisting of two mating members with opposed interlocking channels and grooves adapted to be forced together into an interlocked position to form a dividing barrier between said plurality of compartments, one of said members being secured to the interior surface of one of said sheets along a transverse jointure line and the other said member being secured to the interior surface of the other said sheet along another transverse jointure line, both of said jointure lines being located opposite one another on the same side of the barrier formed when said channels and grooves are in said interlocked position; and separating means fastened to the exterior sides of said sheets adjacent said internal dividing means, said separating means being formed as elongate generally rectangular strips of thin flexible material fastened at one portion to the said exterior sides and at least one portion of said strips remaining free to be gripped.

2. A compartmented container for packaging two or more components separately comprising: two mutually overlying sheets of thin flexible material united at their peripheral edges and separated into a plurality of compartments by internal dividing means; one of said components in each of said compartments; said dividing means being formed of a resilient material with interlocking channels and grooves; and separating means fastened to the exterior sides of said overlying sheets adjacent said internal dividing means, said separating means being formed as thin elongate strips of thin flexible material fastened at one portion to the said exterior sides and at least one portion of said strips remaining free to be gripped.

3. A compartmented container for packaging two or more components separately comprising: two mutually overlying generally rectangular sheets of thin flexible material united peripherally; internal dividing means secured to the interior wall of said sheets dividing said container into a plurality of compartments; one of said components in each of said compartments; said dividing means being formed of a resilient material and consisting of two mating members with opposed interlocking channels and grooves adapted to be forced together into an interlocked position to form a dividing barrier between said plurality of compartments, one of said members being secured to the interior surface of one of said sheets along a transverse jointure line and the other said member being secured to the interior surface of the other said sheet along another transverse jointure line, both of said jointure lines being located opposite one another on the same side of the barrier formed when said channels and grooves are in said interlocked position; and separating means fastened to the exterior sides of said sheets adjacent said internal dividing means, said separating means being formed as elongate generally rectangular strips of thin flexible material fastened at one portion to the said exterior sides and at least one portion of said strips remaining free to be gripped.

4. A compartmented container comprising: two mutually overlying generally rectangular sheets of thin flexible material united at two opposite peripheral edges and adapted to be united at the two other opposite edges; internal dividing means secured to the interior wall of said sheets dividing said container into a plurality of compartments; said dividing means being formed of a resilient material and consisting of two mating members with opposed interlocking channels and grooves adapted to be forced together into an interlocked position to form a dividing barrier between said plurality of compartments, one of said members being secured to the interior surface of one of said sheets along a transverse jointure line and the other said member being secured to the interior surface of the other said sheet along another transverse jointure line, said jointure lines being located on opposite sides of the barrier formed when said channels and grooves are in said interlocked position; and separating means fastened to the exterior sides of said sheets adjacent the respective jointure lines of said two mating members, said separating means being formed as elongate generally rectangular strips of thin flexible material fastened at one portion to the said exterior sides and at least one portion of said strips remaining free to be gripped.

5. A compartmented container comprising: two mutually overlying generally rectangular sheets of thin flexible material united at two opposite peripheral edges and adapted to be united at the two other opposite edges; internal dividing means secured to the interior walls of said sheets dividing said container into a plurality of compartments; said dividing means being formed of a resilient material and consisting of two mating members with opposed interlocking channels and grooves adapted to be forced together into an interlocked position to form a dividing barrier between said plurality of compartments, one of said members being secured to the interior surface of one of said sheets along a transverse jointure line and the other said member being secured to the interior surface of the other said sheet along another transverse jointure line, said jointure lines being located on opposite sides of the barrier formed when said channels and grooves are in said interlocked position; separating means fastened to the exterior sides of

said sheets adjacent the respective jointure lines of said two mating members, said separating means being formed as elongate generally rectangular strips of thin flexible material fastened at one portion to the said exterior sides and at least one portion of said strips remaining free to be gripped; and said strips having edge ridges along a thin portion to facilitate gripping to exert a transverse sliding separating force on said internal dividing means.

6. A compartmented container comprising: two mutually overlying sheets of thin flexible material united peripherally along two opposite edges and adapted to be united along two other opposite edges and separated into a plurality of compartments by internal dividing means; said dividing means being formed of a resilient material with interlocking channels and grooves; and separating means fastened to the exterior sides of said overlying sheets adjacent said internal dividing means, said separating means being formed as thin elongate strips of thin flexible material fastened at one portion to the said exterior sides and at least one portion of said strips remaining free to be gripped.

7. A compartmented container for packaging two or more components separately comprising: two mutually overlying generally rectangular sheets of thin flexible material united peripherally; internal dividing means secured to the interior wall of said sheets dividing said container into a plurality of compartments; one of said components in each of said compartments; said dividing means being formed of a resilient material and consisting of two mating members with opposed interlocking channels and grooves adapted to be forced together into an interlocked position to form a dividing barrier between said plurality of compartments, one of said members being secured to the interior surface of one of said sheets along a transverse jointure line and the other said member being secured to the interior surface of the other said sheet along another transverse jointure line, said jointure lines being located on opposite sides of the barrier formed when said channels and grooves are in said interlocked position; and separating means fastened to the exterior sides of said sheets adjacent the respective jointure lines of said two mating members, said separating means being formed as elongate generally rectangular strips of thin flexible material fastened at one portion to the said exterior sides and at least one portion of said strips remaining free to be gripped.

8. A compartmented container for storing two or more components separately comprising: two mutually overlying sheets of thin flexible material united at their peripheral edges and separated into a plurality of compartments by internal dividing means; one of said components in each of said compartments; said dividing means being formed of a resilient material with interlocking channels and grooves; and separating means fastened to the exterior sides of said overlying sheets adjacent said internal dividing means, said separating means being formed as elongate rectangular strips of thin flexible material fastened transversely along their center portion to the said exterior sides and being fastened at opposite longitudinal ends to said exterior sides, the two remaining free ends each being formed with a thin portion and a relatively thicker portion to facilitate gripping to exert a releasing force on said internal dividing means.

9. A compartmented container for packaging two or more components separately comprising: two mutually overlying generally rectangular sheets of thin flexible material united peripherally; internal dividing means secured to the interior walls of said sheets dividing said container into a plurality of compartments; one of said components in each of said compartments; said dividing means being formed of a resilient material and consisting of two mating members with opposed interlocking channels and grooves adapted to be forced together into an interlocked position to form a dividing barrier between said plurality of compartments, one of said members being secured to the interior surface of one of said sheets along a transverse jointure line and the other said member being secured to the interior surface of the other said sheet along another transverse jointure line, said jointure lines being located on opposite sides of the barrier formed when said channels and grooves are in said interlocked position; separating means fastened to the exterior sides of said sheets adjacent the respective jointure lines of said two mating members, said separating means being formed as elongate generally rectangular strips of thin flexible material fastened at one portion to the said exterior sides and at least one portion of said strips remaining free to be gripped; and said strips having edge ridges along a thin portion to facilitate gripping to exert a transverse sliding separating force on said internal dividing means.

10. A compartmented container comprising: two mutually overlying sheets of thin flexible material united at two opposite peripheral edges and adapted to be united at the two other opposite edges and separated into a plurality of compartments by internal dividing means; said dividing means being formed of a resilient material with interlocking channels and grooves; and separating means fastened to the exterior sides of said overlying sheets adjacent said internal dividing means, said separating means being formed as elongate rectangular strips of thin flexible material fastened transversely along their center portion to the said exterior sides and being fastened at opposite longitudinal ends to said exterior sides, the two remaining free ends each being formed with a thin portion and a relatively thicker portion to facilitate gripping to exert a releasing force on said internal dividing means.

References Cited in the file of this patent

UNITED STATES PATENTS

2,245,738	Taylor	June 17, 1941
2,558,367	Madsen	June 26, 1951
2,676,702	Whitefoot	Apr. 27, 1954
2,756,874	Erickson et al.	July 31, 1956
2,756,875	Yochim	July 31, 1956
2,771,724	Hosier et al.	Nov. 27, 1956