

Nov. 16, 1965

R. L. LEE

3,217,871

PEELABLE SEAL PACKAGE

Filed May 6, 1963

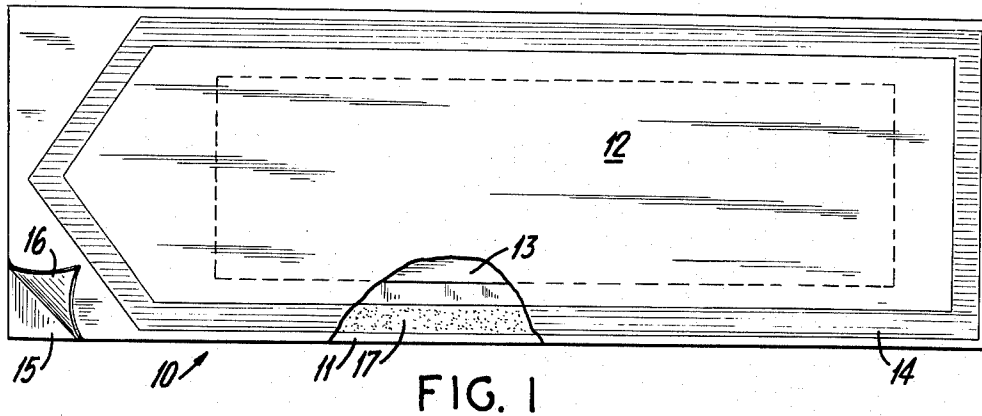


FIG. 1

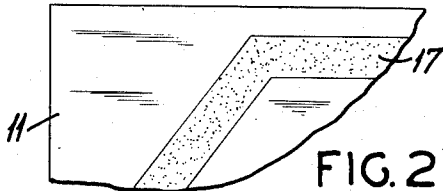


FIG. 2

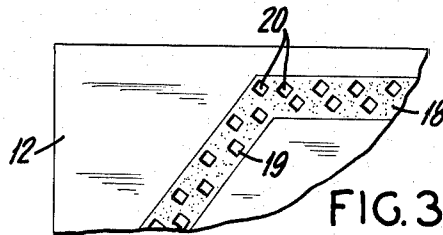


FIG. 3

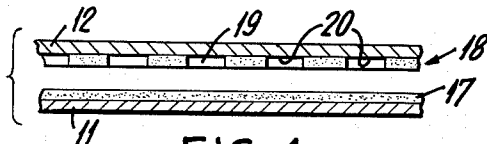


FIG. 4

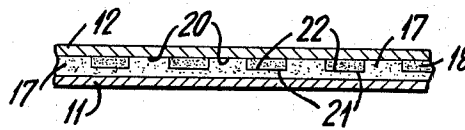


FIG. 5

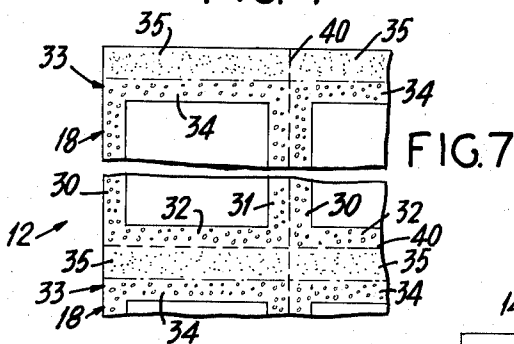


FIG. 6

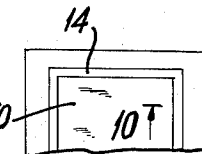
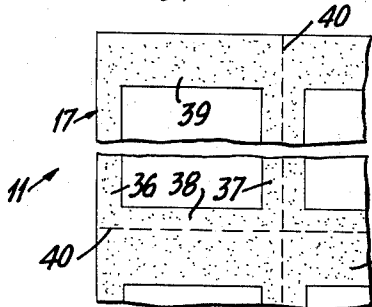


FIG. 8

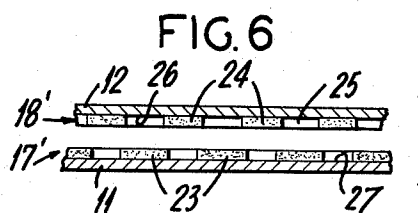


FIG. 9

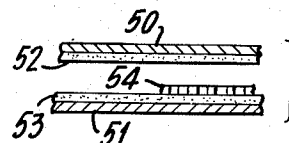


FIG. 10

INVENTOR.
ROBERT L. LEE

BY

Philip S. Hilbert

ATTORNEY.

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3,217,871

PEELABLE SEAL PACKAGE

Robert L. Lee, Norwalk, Conn., assignor to Acme Backing Corporation, Stamford, Conn., a corporation of New York

Filed May 6, 1963, Ser. No. 278,374

9 Claims. (Cl. 206—63.2)

This invention relates to seal packages for sterilized or non-sterilized contents, and more particularly, concerns packages which are opened by peeling apart sections thereof to expose and render accessible the contents thereof.

Packages of the envelope type for carrying sterilized objects or materials, such as surgical instruments, dressings or the like have been proposed. Such packages are in the form of sheets or webs of appropriate size and configuration for enclosing the desired object or material, which sheets are sealed about the peripheral portions thereof. The sealing material is in the form of resin coatings which lends itself to package sealing operations by means of heated dies, rollers or bars.

With known packages of the rupturable and peelable seal type, it has been found that the seal has adhesion values of opposite extremes. On the one hand, the seal may have high adhesion values which are effective when the package is in storage, being transferred or otherwise, prior to opening the same. However, the high adhesion values tend to resist rupture when the package sections are to be peeled apart, making the package opening operation somewhat difficult.

On the other hand, the seal may have low adhesion values, which facilitates the peeling operation but provides a relatively low grade seal which may not be acceptable for most packaging operations. In the former case, the tendency to resist peeling, materially reduces the utility of the package, particularly when the package carries sterilized items such as surgical devices, dressings or the like which have to be accessible quickly when needed.

Accordingly, an object of this invention is to provide an improved envelope package having a peripheral seal structure which provides a relatively tight seal for the envelope sections which is highly resistant to delamination by forces applied substantially in the plane of the sealed areas, yet lends itself to rupture readily when the envelope sections are peeled apart by forces applied at right angles to the plane of the sealed areas, thus making the contents of such a package readily accessible when needed with minimal manipulative procedures for delaminating the envelope sections.

A further object of this invention is to provide an improved peelable package made up of opposed sheet sections carrying selected thermoresponsive coatings; such coatings allowing the sheet sections to be hot sealed about the periphery thereof to securely adhere to the sections together, yet being adapted to allow ready delamination upon peeling the sections away from each other.

Still another object of this invention is to provide an improved peelable package wherein the sections thereof are secured together by selected coatings applied to the respective sections, which coatings are correlated as to kind and structure as to provide a highly adherent seal resistant to ordinary delaminating forces yet readily rupturable in response to a peeling action invoking forces at right angles to the plane of the seal areas.

Other objects of this invention will in part be obvious and in part hereinafter pointed out.

In the drawing, FIG. 1 is a top plan view of a package embodying the invention, with parts broken away;

FIG. 2 is a partial, enlarged plan view of one of the

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package sections showing one element of the seal coating;

FIG. 3 is a partial, enlarged plan view of the other of the package sections showing another element of the seal coating;

FIG. 4 is an enlarged, transverse sectional view showing the opposed package sections before sealing;

FIG. 5 is a sectional view similar to that of FIG. 4, showing the package sections sealed to each other;

FIG. 6 is a sectional view similar to that of FIG. 4, showing another embodiment of the invention;

FIG. 7 is a plan view of one of the package sections of a package showing another embodiment of the invention;

FIG. 8 is a plan view of the other of the package sections to be registered with the section shown in FIG. 7;

FIG. 9 is a partial plan view of a package showing another form of the invention; and

FIG. 10 is a sectional view taken on the line 10—10 of FIG. 9.

Packages of the peelable seal type are usually in envelope form, being made of opposed webs or sheets of paper, foil, film or the like, in accordance with the object to be enclosed and the condition of sterility or non-sterility thereof.

In accordance with the instant invention, pairs of webs or sheets to be converted into packages, are respectively coated on one surface thereof with selected sealing materials which include thermoplastic resins or other suitable sealants. The coatings may extend over the entire surface of the sheets or webs, or may be restricted to the ultimate peripheral seal areas for each package, as by applying the coatings with patterned dies or rollers which are effective to imprint the coating only in the desired seal areas.

Thus, one of the pair of sheets which are to be opposed to form the package, is coated with one resin while the other of the pair of sheets is coated with another resin. The two resins are selected so that while each will tightly adhere to the respective sheets carrying the same, and the resin coating on one sheet will be adherent to the surface of the other sheet under sealing conditions; the two resins are non-adherent to each other at all times and under sealing conditions.

It has been found that the package sections may be sealed together to form an excellent seal resistant to rupture under normal conditions, yet the seal is readily ruptured when the sections are peeled apart. Such a seal is obtained when at least one of the coatings on the paired sheets is discontinuous so as to expose a large number of spaced areas of the one sheet surface carrying the coating. Thus, when the sheets are sealed together, they are adhered together at interrupted intervals where portions of the coating on the other sheet extend through the openings in the discontinuous coating on the one sheet to bond to the exposed surface areas of the one sheet.

As shown in FIG. 1, 10 designates a package embodying the invention. The same comprises a pair of opposed sheets of similar size and outline, which enclose an object 13 to be packaged, the sheets being indicated at 11 and 12 respectively. Object 13 may be of the type which is to be packaged under sterile conditions, as for example, a surgeon's scalpel, surgical dressing, or the like. It is understood that object 13 may be packaged in non-sterile form when the character thereof so dictates.

The sheets 11, 12 are sealed together about the peripheral margins thereof, as in a seal area 14 of limited width but of continuous peripheral extent. The seal area is located beyond the edges of object 13. The sheets 11, 12 are respectively precoated in peripheral areas corresponding to seal area 14, with selected compositions hereinafter described in detail. The sheets 11, 12 are sealed

together as an incident to the packaging operation, by appropriate heated dies, rollers or bars which register with or otherwise delineate the seal area 14.

Preferably, portions of sheets 11, 12 at one end thereof are left unsealed to provide tabs 15, 16 which are to be grasped and displaced away from each other in directions at right angles to the plane of the seal area 14, to effect a peeling action, thereby progressively opening the package 10 to expose object 13 for ready removal therefrom.

The sheet 11 has imprinted on one surface thereof a coating 17 of a selected thermoresponsive material which is not only adherent to sheet 11, but is also adherent to sheet 12. As shown in FIG. 2, coating 17 is continuous throughout its peripheral extent as well as its width. Coating 17 is applied to sheet 11 by an appropriate coating die or roller to provide the desired peripheral configuration which may include the usual chevron shaped end portion disposed at the tab end of the sheet.

Sheet 12 has imprinted on one surface thereof a coating 18 of a material different from that of coating 17; coating 18 being complementary in outline to coating 17 so that the coatings may be registered when sheets 11, 12 are in superposed, registered relation. Coating 18 is of a discontinuous character, having spaced openings 19 therein which correspondingly provide spaced exposed surface portions 20 on sheet 12. Discontinuous coating 18 is produced by an appropriate coating die which may be of the rotogravure type, with high and low portions. While one pattern of application of coating 18 to sheet 12 is shown in FIG. 3, it is understood that such coating may take other pattern forms.

The size and particular disposition of the exposed surface portions 20 on sheet 12 may be varied in accordance with the nature of sheet 12, the adherency of coating 17 to sheet 12, and the desired balance of adherency and rupturability as between sheets 11, 12.

When sheets 11, 12 are properly registered with object 13 therebetween, as an incident to the usual packaging operation, the peripheral coatings 17, 18 on the respective sheets will also be in opposed, registered relation. As the sealing operation takes place by means of the usual heated dies, rollers or bars, the thermoresponsive material of coating 17 will flow through the openings 19 in coating 18 to adhere to the exposed surface areas 20 on sheet 12, thereby bonding sheets 11, 12 interruptedly within the seal area 14. However, the openings 19 in coating 18 may be of such a size, configuration and spacing as to provide an adequate bond between sheets 11, 12.

The materials from which coatings 17, 18 are derived, are selected so that they are nonadherent to each other when in contacting relation, during the sealing operation as well as thereafter and over a relatively wide range of temperatures. Thus, as shown in FIG. 5, the surface portions 21 of coating 17 which are in contact with surface portions 22 of coating 18, after the sealing operation is completed, remain in non-adherent relation after the package has been completed.

Accordingly, when package 10 is to be opened to expose object 13, tabs 15, 16 may be grasped and pulled away from each other to effect a peeling action which separates sheets 11, 12 from each other. The interrupted adhesion of the sheets 11, 12 in the seal area 14, together with the non-adherent contacting areas of coatings 17, 18 facilitate the delaminating action produced by rupturing forces applied at right angles to the plane of the seal area 14.

Alternatively, as shown in FIG. 6, the coating 17' on sheet 11 may also be of a discontinuous character, like coating 18' on sheet 12. However, the areas 23 of coating 17' must overlap the edges of areas 24 of coating 18' and coating areas 23 will flow during the sealing operation through openings 25 in coating 18' to adhere to the spaced surface areas 26 on sheet 12.

In the seal shown in FIG. 6, it is preferable that coating 18' on sheet 12 be selected so that it is non-adherent

to the sheet 11 on the exposed surface areas thereof as at 27. The overlap of the coating areas 23, 24 may be produced by proper imprint of the respective coatings 17' and 18' on sheets 11, 12 and the desired registry thereof.

By way of example, a package 10 was formed wherein sheet 11 was cellophane and sheet 12 was paper. Sheet 11 was imprinted on one side thereof with a coating 17 of a low density polyethylene resin, the same being continuous throughout the seal area 14. Sheet 12 was imprinted on side thereof with a discontinuous coating 18 derived from a mixture of equal parts 1/2 second nitrocellulose and polyvinyl acetate admixed with a plasticizer of methyl phthalyl ethyl glycolate and a solvent of isopropyl acetate and toluene, all by weight.

The package 10 was formed on conventional packaging machinery, with object 13 suitably interposed between sheets 11, 12 and the seal 14 being formed by dies of suitable outline at a sealing temperature of about 325° F. The resultant package was resistant to delamination until tabs 15, 16 were pulled in opposite directions and at right angles to the plane of seal area 14.

It is understood that the sheets 11, 12 forming package 10, may be derived from various webs including paper, cellophane, plastic films such as Mylar or the like, metal foils including aluminum foil, and fabrics in woven or nonwoven form. The sheets 11, 12 are paired in accordance with the specifications of the package to be formed. The coatings 17, 18 or 17', 18' are paired from materials which are non-adherent while in contact either at sealing temperatures or temperatures to be encountered by the package in use. Preferably, only one of the pair of coatings is adherent to the surface of the sheet opposed thereto.

Thus, a continuous coating of polypropylene may be paired with a discontinuous coating of a vinyl copolymer; polyethylene paired with cellulose acetate; and a low melting point polyethylene paired with a high melting point polypropylene. Also, the same type of resin may be used in paired combinations wherein the respective components of the pair are of different degrees of polymerization, density, melting point or other characteristic which leaves the pair of resins in non-adherent relation although in contact, over a wide range of temperatures.

In addition to polyethylene and polypropylene, the continuous coating 17 or coating 17' may be derived from polyvinyl acetate-chloride copolymer or polyvinylidene chloride.

Typical formulations for the discontinuous coatings 18 or 18' include: (a) polyvinyl acetate-chloride copolymer 17.5%, mixed fatty amides 7.5%, and methyl ethyl ketone 75%; (b) polyvinyl acetate-chloride copolymer (VYNS) 15.0%, polyvinyl acetate-chloride copolymer (VYHH) 8.75%, mixed fatty amides 1.25% and 2-nitropropane 75.00%; (c) 18/25 cps. RS nitrocellulose 24.0%, polymethyl acrylate 8.0%, zinc stearate 3.0%, methyl ethyl ketone, 50.0% and isopropyl alcohol 15.0%; (d) cyclized rubber (Pliolite S-7) 10.0%, paraffin wax 6.0%, dimerized resin acids (Dymerex) 4.0% and toluene 80.0%; (e) cellulose acetate butyrate 9.80%, urea formaldehyde resin 16.30%, sucrose ester 11.30%, polymethyl styrene 6.40%, epoxy resin (Epon 836) 4.00%, silicone oil 0.05%, p-toluenesulfonic acid/n-butanol (50:50) 0.65%, toluene 24.30%; ethyl alcohol 16.70% and isobutyl alcohol 10.50%. All proportions in the foregoing formulations being by weight.

In addition to the formulations noted above, the coatings 18 or 18' may also be derived from starch; casein; a mixture of kaolin clay and casein; sodium silicate or bone glue. It will be apparent that in some instances, the paired coatings may be in interchanged relation. Thus, the polyethylene or polypropylene used for coatings 17 or 17' may be replaced by selected formulations from (a) to (e) set forth above, in which case the coatings 18 or 18' are selected accordingly to provide the combinations described above.

It will thus be apparent that when sheets 11, 12 have been selected for the object 13 to be packaged, the appropriate coatings applicable to the seal areas of the sheets are selected so that they are (1) non-adherent though in contact over a wide range of temperatures including the sealing temperature; (2) one coating is adherent to the surface portions of the sheet opposed to the sheet carrying the one coating; and (3) the other coating is non-adherent to the sheet opposed to the sheet carrying the other coating.

The exposed surface areas 20 on sheet 12 within the seal area 14 may amount to about 50% of the total area of said seal area 14. However, such exposed surface area may range from about 25% to about 75% in accordance with the desired balance of adherency and peelability of the resultant seal.

While the seal coatings 17, 18 are shown as being limited to the seal area 14 on the respective sheets 11, 12 and defined by an appropriate sealing die, rollers or bar; it is understood that such coatings may be applied uniformly over the entire surface of the respective sheets 11, 12 or the webs from which such sheets are derived. In such case, the coated sheets paired as described above may be used in making packages having varied seal area configurations and of varied transverse dimension. Thus, the peripheral seal area 14 may be completely rectangular in configuration, rather than having a chevron portion at one end thereof, as shown in FIG. 1; or the frame portion enclosed by seal area 14 may be varied in extent to accord with the extent of the particular object 13 being packaged.

The sheets 11, 12 may be in the form of continuous webs of selected paired materials with repeat imprints thereon of coatings 17, 18 respectively; the same being arranged in side by side or end to end relation. Such continuous webs may then be fed into packaging machines, not shown, wherein the objects 13 are properly located between the webs and within the respective seal areas. Appropriate heat sealing dies, rollers or bars are then operative to produce packages 10 in a continuous or semi-continuous manner.

To facilitate the seaming operations, particularly when using heated rollers to form transverse seams in packages 10; the seam coatings may be applied to the opposed sheets 11, 12 as shown in FIG. 7.

Sheet 12 carries coating 18 in repeated, adjacent patterns in rectangular frame form, representing multiple package sections. Each frame comprises side areas 30, 31 and end areas 32, 33. The coating in areas 30, 31 and 32 are of a discontinuous character to provide spaced, exposed surface areas in the seal area of sheet 12, as previously described. End area 33 comprises an inner transverse end portion 34 which is of a discontinuous character, similar to that of areas 30-32, and an outer transverse end portion 35 wherein the coating is of a continuous character. The coating die used to apply the coating material 18 is formed accordingly to deposit the discontinuous and continuous coating portions corresponding to the several frame areas 30-35.

The opposed sheet 11 carries coating 17, in repeated, adjacent patterns in rectangular frame form for registry with the patterns on sheet 12. Each frame on sheet 11 comprises side areas 36, 37 and end areas 38, 39, with the coating thereof being continuous in character as previously described in connection with the showing in FIG. 2. End area 39 has a width equal to the combined width of area portions 34, 35 on sheet 12.

It will be apparent that when sheets 11, 12 pass through the usual packaging machinery, sealing of the opposite ends of the packages 10 may be performed by heated rollers contacting said sheets in the areas 34, 35; 39, as well as 38. Thus, end areas 32, 38 are sealed together at one end of the package, while at the other end thereof, area 34 of sheet 12 is sealed to the inner portion of area 39 on sheet 11. This leaves area 35 on sheet 12 in non-sealed relation to the outer portion of area 39 on sheet 11,

to thereby provide tab portions for peeling the package sections apart to expose the packaged object 13. The multiple patterns imprinted on sheets 11, 12 representing adjacent packages may be separably defined by perforation lines as at 40, formed during the packaging operations, in a manner known in the art.

While the discontinuous coatings 18, 18' are shown as being applied to one of the sheets forming the package having a peelable seal; it is understood that such coatings 18, 18' may be directly coated or imprinted on the continuous coatings 17, 17' in proper position for the heat sealing operation.

In another embodiment of the invention, shown in FIGS. 9, 10; a peelable seal is formed between opposed package sheet sections 50, 51 in a seal area 14 of selected geometrical outline. Each sheet section 50, 51 is pre-coated on one side throughout the surface thereof with a thermoplastic resin layer such as polyethylene to provide opposed coatings 52, 53 when said sheet sections are in opposed relation; such coatings 52, 53 being continuous throughout their extent.

A coating 54 of silicone (organochlorosilanes) is imprinted on one of the coatings 52, 53 in the seal area 14. Coating 54 is discontinuous so as to provide closely spaced openings or spaces. Upon heat sealing the sheet sections 50, 51 together in seal area 14, the coatings 52, 53 will fuse together through the openings or spaces in coating 54.

Since the coating 54 is non-adherent to coatings 52, 53, the bond between sheets 50, 51 in seal area 14 will be interrupted at intervals corresponding to the portions of said coatings 52, 53 in contact with coating 54, thus providing a peelable seal whereby the package is readily opened when the tab portions thereof are pulled in opposite directions.

The sheets forming the package of the instant invention and the several coatings thereon, may be selected to allow for sterilization of the package contents after the packaging operation, by means of ethylene or propylene oxide, in a manner known in the art.

As various changes might be made in the embodiments of the disclosed invention without departing from the spirit thereof, it is understood that all matter herein described or shown shall be deemed illustrative and not limiting except as set forth in the appended claims.

What is claimed is:

1. A package for an object comprising a pair of opposed sheets for enclosing the object therebetween with peripheral portions of said sheets extending beyond the edges of said object, and bonding means for securing the opposed marginal portions of said sheets about the periphery thereof, said bonding means comprising a pair of opposed thermoresponsive coatings applied to at least the marginal portions of the respective sheets, at least one of said coatings being discontinuous to expose closely spaced small surface portions of the sheet bearing said one coating, the coating on the other of said sheets having spaced portions thereof adherent to the exposed surface portions of said first mentioned sheet, the opposed contacting portions of said coatings being in non-adherent relation to each other over a wide range of temperatures the spacing of the adherent areas of said sheets providing a seal resistant to delamination by forces applied in the plane of the seal areas yet permitting said sheets to be delaminated and progressively separated from each other to expose the enclosed object upon displacing opposed portions of said sheets away from each other and peeling said displaced sheet portions away from each other and in directions at right angles to the plane of the bonded sheet portions.

2. A package for an object comprising a pair of opposed sheets for enclosing the object therebetween with peripheral portions of said sheets extending beyond the edges of said object to provide opposed marginal sheet portions, a coating of thermoplastic material on the inner

surface of each of said sheets at said opposed marginal portions thereof, one of said coatings being discontinuous to provide a large number of closely spaced surface portions on the one sheet carrying said one coating, the other coating on the other sheet having a plurality of spaced portions thereof in sealed relation to the exposed surface portions on said one sheet and a plurality of spaced portions thereof in contacting relation to opposed portions of the one coating on said one sheet, the contacting portions of the coatings on said sheets being in non-adherent relation whereby said sheets are sealed together at the peripheral margin portions thereof discontinuously to form a bond therebetween which is resistant to delamination but which is ruptured upon pulling opposed marginal sheet portions away from each other in directions at right angles to the plane of the sealed areas thereof.

3. A sealed package for enclosing an object comprising a pair of sheets in opposed relation with said object therebetween, said sheets having opposed peripheral marginal portions extending beyond the edges of said object, means for sealing the marginal portions of said sheets to each other around the periphery of the enclosed object, said sealing means comprising a first thermoplastic resin layer on the inner surface of one of said sheets on at least the peripheral marginal portion thereof and a second thermoplastic resin layer on the inner surface of the other of said sheets and in opposed relation to said first resin layer, one of said resin layers being discontinuous to expose a large number of closely spaced small surface portions of the sheet carrying said one resin layer, the other of said resin layers having a large number of closely spaced portions in heat sealed relation to the exposed surface portions of said one sheet and a plurality of spaced portions in contact with opposed portions of said one resin layer, said contacting resin portions being non-adherent to each other at sealing temperatures, whereby said sheets are sealed to each other at the peripheral portions thereof, said seal being rupturable upon pulling opposed marginal portions of said sheets away from each other.

4. A sealed package for an object comprising a pair of opposed sheets for enclosing the object and having peripheral marginal portions extending beyond the edges of the enclosed object to dispose said peripheral marginal sheet portions in opposed relation, a peripheral seal between said opposed marginal sheet portions, said seal comprising a first thermoresponsive coating adherent to the inner surface of one of said sheets at the marginal portions thereof and a second thermoresponsive coating adherent to the inner surface of the other of said sheets and in opposed relation to said first coating, said coatings having spaced contacting portions in non-adherent relation over a wide range of extreme temperatures, one of said coatings being discontinuous to expose a large number of closely spaced small surface portions along the entire periphery of the one sheet carrying said one coating, the other of said coatings including a large number of closely spaced portions in sealed, adherent relation to the exposed surface portions of said one sheet, said exposed surface portions on said one sheet being sufficiently close to each other to provide a seal between said sheets which offers substantial resistance to rupture by forces applied substantially within the plane of the seal yet being rupturable upon application of delaminating forces substantially at right angles to the plane of the seal and in opposite directions.

5. A sealed package as in claim 4 wherein the exposed surface portions on said one sheet constitute from about 25% to about 75% of the total area of said one coating on said one sheet.

6. A sealed package as in claim 4 wherein the exposed surface portions on said one sheet constitute about 50% of the total area of said one coating on said one sheet.

7. A sealed package as in claim 4 wherein the other of said coatings is discontinuous to expose surface portions of the sheet carrying said other coating, the spaced coating portions on the respective sheets being in displaced, overlapping relation to each other, the spaced portions of said other coating being in sealed adherent relation to the exposed surface portions of said one sheet, and the spaced portions of said one coating on said one sheet being in contacting, non-adherent relation to the exposed surface portions of said other sheet.

8. A sealed package for contents thereof comprising a pair of sheets with the contents therebetween, the edges of said sheets overlapping and extending beyond the edges of the contents, thereby providing edge portions of said sheets around the edges of the contents, each of said sheets in said edge portions thereof having a thermoplastic resin coating on the inner surface thereof, one of said coatings being discontinuous to provide a large number of closely spaced small exposed surface portions on the one sheet carrying said one coating, the other of said coatings on the other sheet having spaced surface portions thereof extending through the discontinuities in said one coating and in thermally bonded relation to the exposed surface portions of said one sheet, said other coating further including spaced portions thereof in contacting relation to opposed portions of said one coating, the contacting portions of said coatings being in non-adherent relation to each other over a wide range of extreme temperatures.

9. A sealed package as in claim 8 wherein said one sheet includes at one end thereof a transversely extending inner coating portion which is discontinuous to provide a plurality of spaced exposed surface portions of said one sheet and a transversely extending outer coating portion extending to the outer edge at said one end of the one sheet, said outer coating portion being continuous, the other sheet including at one end thereof a continuous coating portion in opposed relation to the inner and outer coating portions on said one sheet, said last mentioned continuous coating portion including an inner portion having spaced portions extending through the discontinuities in the opposed inner coating portion on said one sheet and in adherent relation to the spaced exposed surface portions of said one sheet, said last mentioned continuous coating portion further including an outer portion in opposed, non-adherent relation to the opposed outer coating portion on said one sheet whereby to provide separable sheet portions in said sheets at said one end thereof.

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JOSEPH R. LECLAIR, *Primary Examiner.*

70 FRANKLIN T. GARRETT, *Examiner.*