May 9, 1967 W. E. ANDERSON 3,318,759

DUPLEX PACKAGING MATERIAL

Original Filed Dec. 30, 1963

FIG. 1

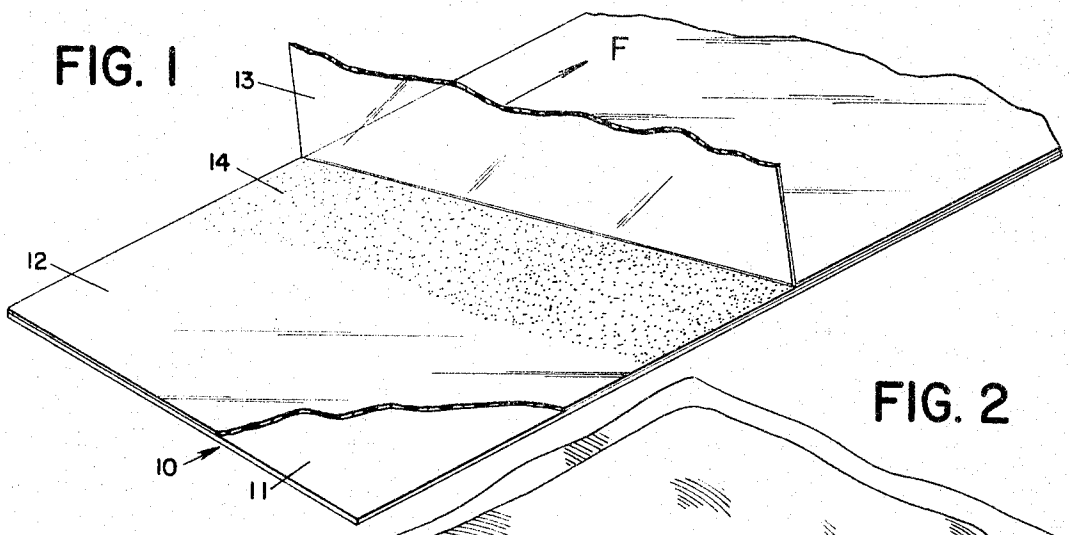


FIG. 2

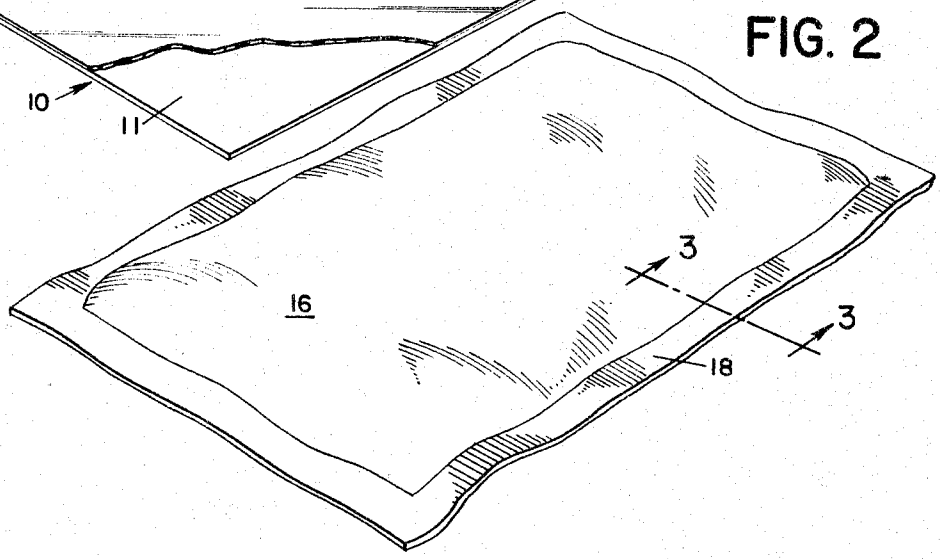
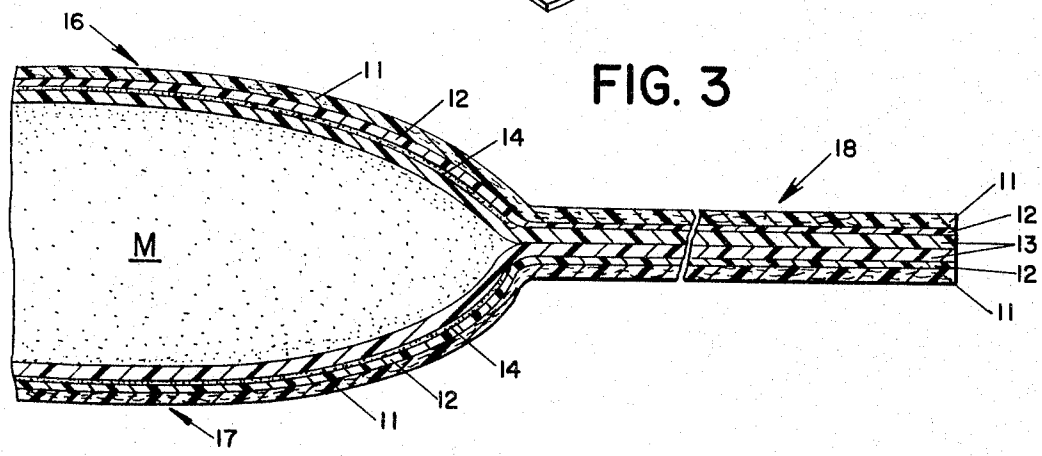


FIG. 3



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DUPLEX PACKAGING MATERIAL

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Continuation of abandoned application Ser. No. 334,447, Dec. 30, 1963. This application Dec. 7, 1965, Ser. No. 517,150

7 Claims. (Cl. 161—235)

This is a continuation of my copending application Ser. No. 334,447, filed on Dec. 30, 1963. The present invention relates to flexible packaging and flexible packaging materials and, more particularly, to a new and improved duplex packaging material comprising a web of paper and a web of plastic film combined to have advantageous properties of strength and stretchability.

In the packaging of various foodstuffs and the like, multi-ply laminates of readily available materials have been developed to combine the advantageous properties of each of the plies into a single sheet or web of packaging material. These laminates are conventionally formed by the use of adhesives or like bonding agents and are characterized by their securely bonded plies. While these conventional laminates have proved satisfactory for many applications, it has been found that in certain instances a "loose-bonded" duplex, i.e., two plies of relatively stretchable and unstretchable material, positively and firmly bonded intermittently or at spaced surface areas, better utilizes the advantageous properties of each of the multiple plies. Such a "loose-bonded" packaging material is described in greater detail in the William E. Anderson et al. U.S. Patent No. 3,130,647, based on application Ser. No. 683,168, filed on Sept. 10, 1957, and, therefore, copending with the above-identified application Ser. No. 334,447.

The so-called "loose-bonded" packaging material has enabled bag manufacturers to produce a plural bag structure, i.e., a bag within a bag, by methods and machinery normally and readily available for the production of conventional single walled bags. Thus, one of the important characteristics of the "loose-bonded" material is its effective handleability as a single web of material, although, in fact, it comprises two separate webs having little integrity.

The present invention represents an improvement in and a departure from the aforementioned patented invention. Specifically, the extremely good and increased handleability of the new material and the increased ease with which it may be formed into a new and improved bag are important aspects of the present invention. Moreover, while providing increased handleability, as compared to the "loose-bonded" material, the new material offers substantial resistance to water vapor transmission.

In many packaging applications, a need has arisen for a material, such as the new and improved packaging material, having the general handling characteristics of the "loose-bonded" material in addition to certain properties of stability and water vapor impermeability. Accordingly, it is an object of the present invention to provide a new and improved packaging material, which will optimally combine the properties of the plies of a laminate into a material having the above-described desirable characteristics. Another object of the invention is to provide such an optimally combined laminate with the additional property of heat sealability. A more specific object of the invention is to provide a polyethylene-glassine laminate having great stretchability, great strength, water vapor impermeability, heat-sealability, and sufficient stability or "temporary integrity" to be readily formed into a completed package by conventional methods.

In accordance with the principles of the invention, a new and improved packaging material is provided by "weakly," i.e., temporarily or releasably and non-readherably, bonding a pair of plies of relatively stretchable and unstretchable packaging material in a manner in which the plies are, in fact, bonded in overall face-to-face contact but with minimum bonding strengths in order that the laminate may retain a substantially great degree of stretchability and a predetermined degree of "temporary integrity." The product of the invention is thus characterized as a "weak-bonded" or as a "temporary, readily releasably, non-readherably bonded" laminate which has sufficient stability and temporary integrity to be readily formed into a package while retaining unusually high degrees of both stretchability and strength due to the relatively great independence of it plies. The temporary bond between the two plies of packaging material is of a predetermined minimum strength less than the web strength of the plies in order that the bond will fail, accommodating separation of the plies, before either of the plies fails or tears. Moreover, in accordance with the invention, the temporary bonding agent provides water vapor impermeability to the "weak-bonded" structure.

For a more complete understanding of the present invention, reference should be made to the following detailed description, taken in conjunction with the accompanying drawing in which:

FIG. 1 is a perspective view of a new and improved heat-sealable "weak-bonded" duplex sheet material embodying the principles of the invention and partly broken away to show the components thereof;

FIG. 2 is a heat-sealed pouch fabricated from the material illustrated in FIG. 1; and

FIG. 3 is an enlarged cross-sectional view taken along line 3—3 of FIG. 2.

With reference to FIG. 1, a new and improved "weak-bonded" duplex packaging material includes a relatively unstretchable base ply generally indicated by the reference numeral **10**, advantageously of a grease resistant or greaseproof paper **11** such as glassine or the like. In accordance with the invention, the base paper **11** may include a coating **12** of heat sealable thermoplastic material, for example, polyethylene, on its unprinted or unfinished side. As an important aspect of the invention, a relatively stretchable outer ply **13** of a thermoplastic film, such as a free film of polyethylene, is "weak-bonded" to the base ply **10** by a temporary or weak bonding layer **14**. It has been found that for the best results the "weak bond" should be of such nature that the thermoplastic film **13** is separable from the base sheet **10** with a predetermined limited pulling or separating force F exerted at a 180° angle, of not less than about 3 nor more than about 13 grams per inch of sheet width.

More specifically, a new and improved "weak-bonded" packaging material may be made in accordance with the principles of the invention by supplying a base sheet **11** of glassine having a basis weight on the order of 30 pounds per ream (3,000 sq. ft.) and extruding a coating of polyethylene having a weight on the order of 7.5 pounds per ream thereon. A separate outer web **13**, advantageously a free film of polyethylene or other thermoplastic material, having a basis weight on the order of 30 pounds per ream, is then temporarily and weakly bonded to the polyethylene coated side of the base sheet **10** by a bonding agent layer **14** having a weight of about 4 pounds per ream and typically comprising a mixture of 97 percent (by weight) paraffin wax and 3 percent butyl rubber, chewing gum grade, F.D.A. approved. As shown, the base ply **10** and the outer web **13** are maintained in overall face-to-face contact by the bonding layer **14**.

While the above described bonding agent has given

desired degrees of controllably weak bonding and desired properties of water vapor transmission resistance in the combination described, the releasability, i.e., the degree of tightness of the bond between the free thermoplastic film and the coated glassine base may be controllably varied to suit particular circumstances by using as little as zero percent, in some cases, or as much as 5 percent (by weight) butyl rubber in the wax-butyl rubber bonding agent. Moreover, while a preferred temporary bonding agent employs butyl rubber as a tackifier, other tackifiers, such as Elvax (vinyl acetate-ethylene copolymers), Vistanex, wax soluble resins, microwaxes, and the like may also be suitable in lieu of or along with the butyl rubber to controllably vary the degree of the "weak bond."

A typical weak bonding agent is prepared from commercially available products containing 30 percent butyl rubber and 70 percent paraffin wax, such as, for example, "5–85 Concentrate" sold by Boler Petroleum Co., Inc., Ardmore, Pa., or "Polafin B–30 CG" sold by Moore & Munger, New York, N.Y., which are combined with paraffin wax, for example "4312 wax" produced by the Sun Oil Co., in the appropriate proportions to yield a mixture having the desired (e.g., 97/3) wax-butyl ratio.

A duplex packaging material made in accordance with the above specifications will have an overall thickness of approximately 4.5 mils.

The new and improved duplex packaging material is adapted particularly for fabrication into packages in the nature of a pouch or bag, for example (FIGS. 2 and 3), of the type having two opposing walls **16**, **17**, heat sealed at its peripheral edges **18** and adapted to package safely a sensitive material M, such as a cake mix or the like, which must be maintained free of changes in moisture content. As shown in FIG. 3, the heat seal **18** may be effected between the polyethylene films **13** and the polyethylene coatings **12** by the application of heat and pressure thereto. In accordance with the invention, the heat sealing process will melt and displace the weak-bonding agent **14**, which has a lower melting point than the thermoplastic material, so that the films and coatings are fused by the heat and pressure. A significant function of the polyethylene coating **12** is to promote proper heat sealing of the base paper **11** with its associated film **13**, after displacement of the weak-bonding agent. Thus, if the base sheet **10** is formed of a material which will accommodate proper heat sealing without use of the coating, or if the finished, weak-bonded laminate were to be used in applications not requiring heat sealing, the coating **12** could be eliminated.

The new and improved packaging material and bags or the like fabricated therefrom will have great resistance to shocks and substantial resilience provided by the relatively stretchable thermoplastic film, while the relatively unstretchable paper base sheet provides substantial definition and static strength to the material. The realization of these advantageous properties is effected by maintaining the plies relatively physically independent, through the provision of a temporary or "weak bond," so that in the completed package, the stretchable material may be readily separated from and extended independently of the base sheet to absorb shock. By way of comparison, in a conventional lamination of relatively stretchable and unstretchable materials, any substantial extension of the stretchable material will result in the rupture of the relatively unstretchable material.

It will be appreciated that the new and improved "weak-bond" duplex packaging material possesses desirable strength and stretchability properties similar to those found in "loose-bonded" materials according to the beforementioned Anderson et al. U.S. Patent No. 3,130,647, in addition to possessing particularly desirable physical and handling characteristics and advantageous properties of water vapor transmission resistance, stability, and heat sealability, all of which properties are especially advantageous in the packaging of many materials. By utilizing a weak, temporary overall bond between the plies of the packaging material, the strength properties of relatively unstretchable glassine and the stretchability properties of a polyethylene or similar film will be realized to optimum advantage. These desirable properties of the individual ply are not reduced or compromised (as is the case with a conventional laminate) due to the relatively great degree of physical independence retained by each ply of the new laminate through the use of a weak bond in accordance with the principles of the invention.

It is to be understood that the "weak" or "temporary, releasable, non-readherent" bond contemplated in the application, in its theoretically ideal or optimum form, should provide sufficient integrity for the stretchable and unstretchable plies of the packaging material to be handled as a single entity during bag-forming operation, and thereafter should provide no bond whatever. Thus a theoretically ideal weak bond would provide absolute independence of the plies of the packaging material after bag formation, leaving two absolutely independent bag walls. At present, a theoretically ideal weakly bonded packaging material is not yet capable of manufacture by the art. However, it should be appreciated that the applicant's new and improved packaging material represents the most practical, workable, and efficient approximation of the theoretical ideal developed to date. Accordingly, the applicant's inventive concept in its broadest form entails the provision of a composite packaging material having relatively stretchable and relatively unstretchable plies maintained in as maximally an independent relation as is feasibly possible while having a uniform overall, bare minimum of adhesion which provides a predetermined degree of stability for handling the two independent plies as one during a bag-forming operation.

It should be understood that the products and methods herein illustrated and described are intended to be representative only, as certain departures may be made therefrom within the clear teachings of the invention. Accordingly, reference should be made to the following appended claims in determining the full scope of the invention.

I claim.

1. A pre-assembled, flexible duplex packaging material weakly bonded without any heat sealing for the subsequent formation of bags or the like having at least two separable walls, comprising

(a) a first ply of material intended for the exterior of the bag having a property of non-stretchability similar to that of paper;

(b) a second ply of material intended for the interior of the bag having a property of stretchability similar to that of a free thermoplastic film, whereby said second ply is substantially more stretchable than said first ply;

(c) said first and second plies being permanently heat sealable but not being heat sealed to each other;

(d) a releasable bonding agent substantially uniformly joining with minimum limited adhesion said two plies in substantially complete edge-to-edge contact by a temporary and weak bond of sufficient weakness to accommodate a complete and permanent separation of said first and second plies;

(e) said weak bond being of a predetermined minimum strength less than the web strength of the first and second plies in order that the bond will fail, accommodating separation of the plies, before either of the first and second plies fails or tears, and also being of less strength than any subsequently formed heat seal bond at a seam or joint of the bag or the like;

(f) said temporary and weak bond thereby maintaining said two plies in a substantially minimally adhered, temporarily integral relationship having sufficient stability for handling;

(g) said bonding agent alone being the sole source of said limited adhesion of said first and second plies and being applied as a unitary composition coating to at least one of the plies; and

(h) said bonding agent being non-tacky unless heated.

2. The duplex packaging material of claim 1, in which

(a) said weak bonding agent is applied in overall face-to-face contact between said plies and provides resistance to the transmission of water vapor through said first ply.

3. The duplex packaging material of claim 1, in which

(a) said first and second plies are separable by a predetermined limited separating force exerted on one of said plies at substantially a 180° angle relative to the other ply, said separating force being not less than about 3 nor more than about 13 grams per inch of width of said plies.

4. The duplex packaging material of claim 1, in which

(a) said first ply is a glassine paper material having an extruded polyethylene coating thereon;

(b) said second ply is a polyethylene plastic film material; and

(c) said weak bonding agent includes paraffin wax,

(d) said extruded polyethylene coating thereby accommodating the formation of permanent heat sealed bag seams between said first and second plies.

5. The duplex packaging material of claim 4, in which

(a) said weak bonding agent includes butyl rubber in

percentages not in excess of 5 percent by weight of said bonding agent.

6. The duplex packaging material of claim 4, in which

(a) said glassine paper material has a basis weight on the order of 30 pounds per 3,000 square feet;

(b) said polyethylene film ply has a weight on the order of 30 pounds per 3,000 square feet;

(c) said weak bonding agent has a weight on the order of 4 pounds per 3,000 square feet; and

(d) said extruded polyethylene coating on said glassine has a weight on the order of 7.5 pounds per 3,000 square feet.

7. A flexible packaging material in accordance with claim 1, in which

(a) said weak bonding agent comprises paraffin wax and a tackifier not in excess of 5 percent by weight.

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