

Aug. 11, 1953

F. R. LINDA

2,648,487

BAG FOR PACKAGING TACKY POLYMERIC MATERIALS

Filed July 25, 1947

4 Sheets-Sheet 1

Fig. 1.

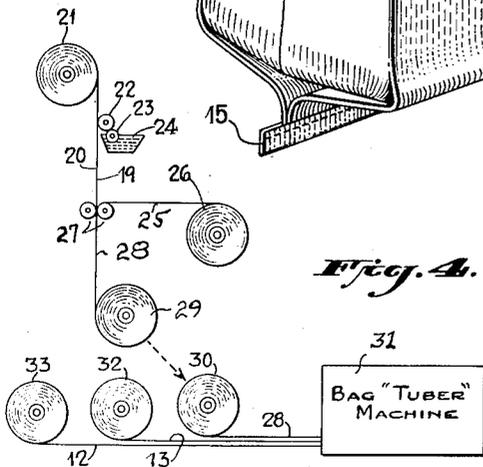
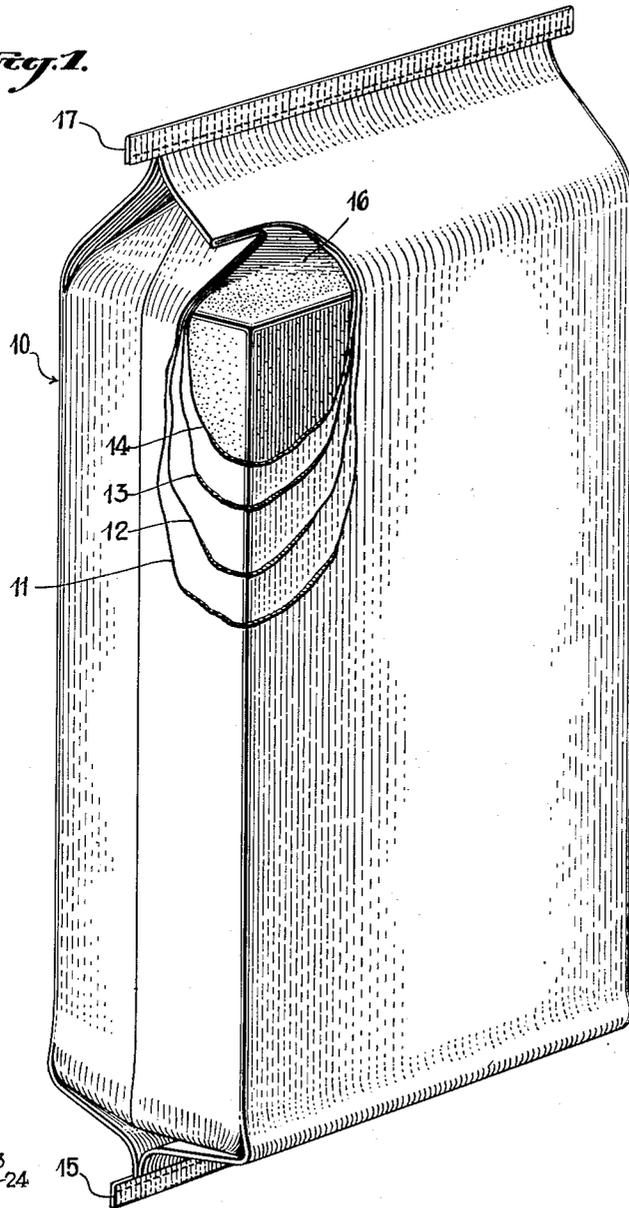


Fig. 4.

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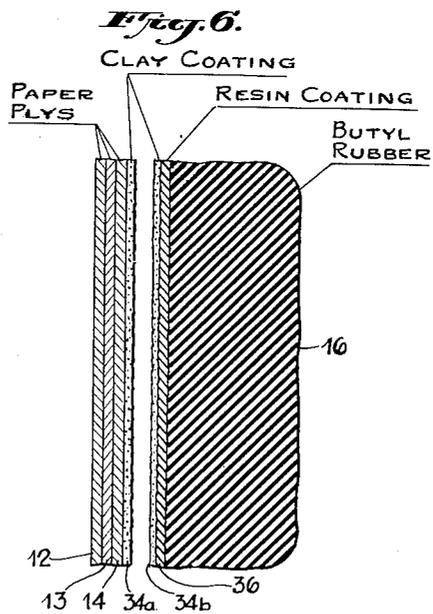
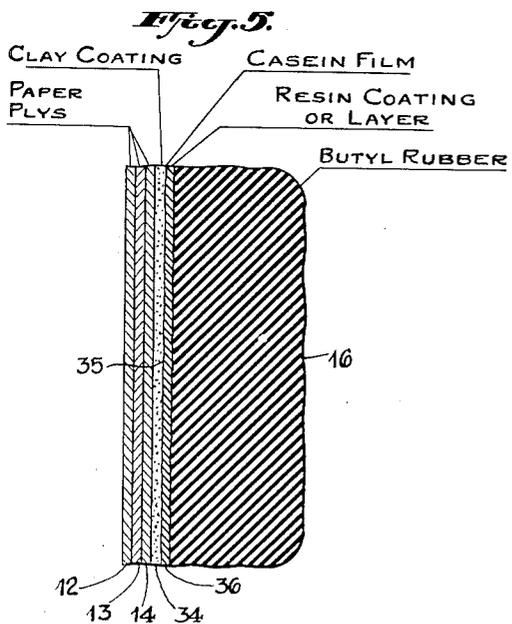
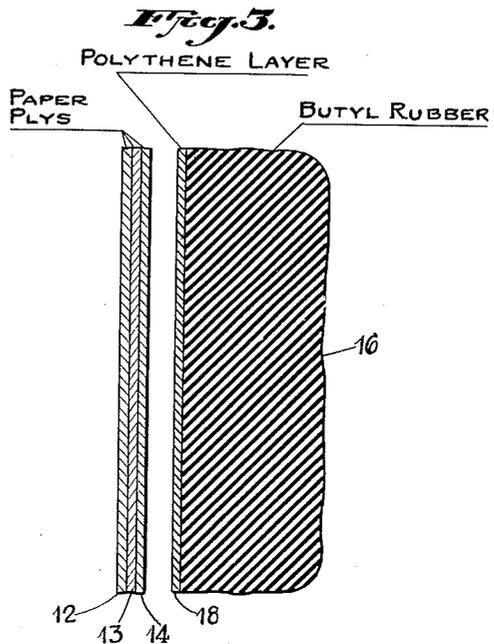
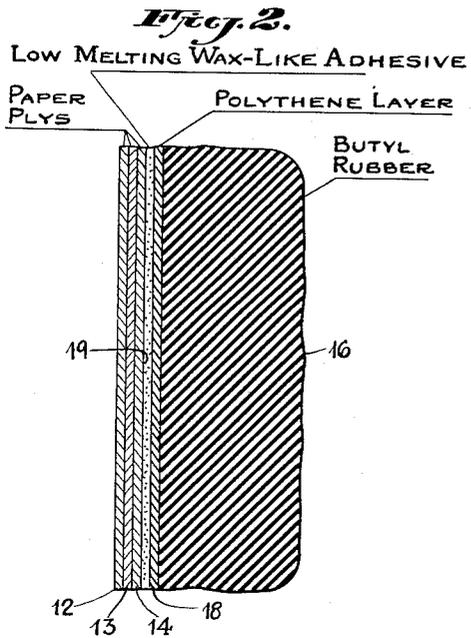
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BAG FOR PACKAGING TACKY POLYMERIC MATERIALS

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4 Sheets-Sheet 2



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2,648,487

BAG FOR PACKAGING TACKY POLYMERIC MATERIALS

Filed July 25, 1947

4 Sheets-Sheet 3

Fig. 7.

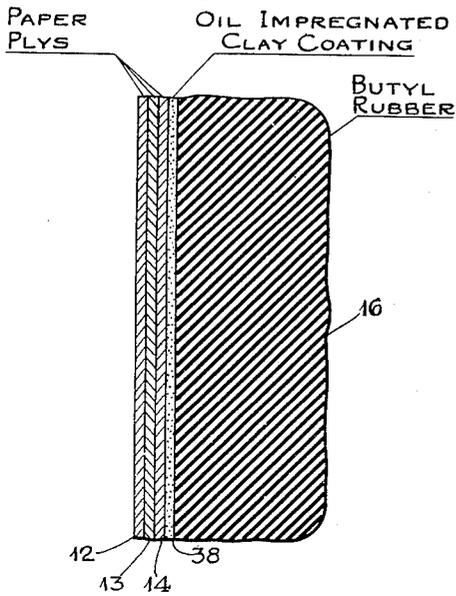


Fig. 8.

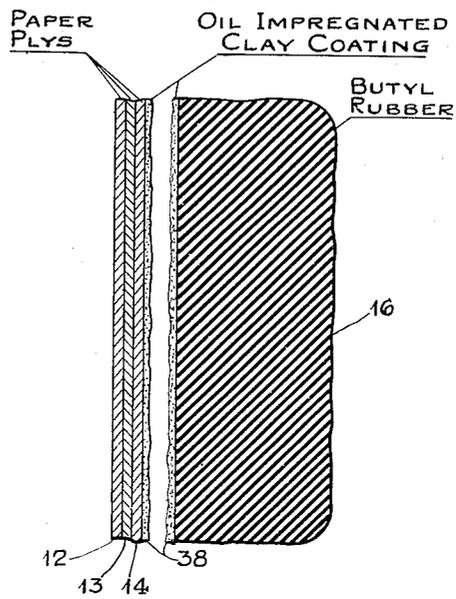


Fig. 11.

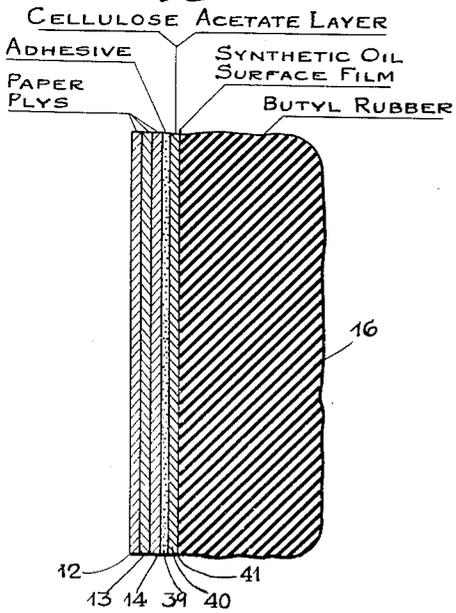
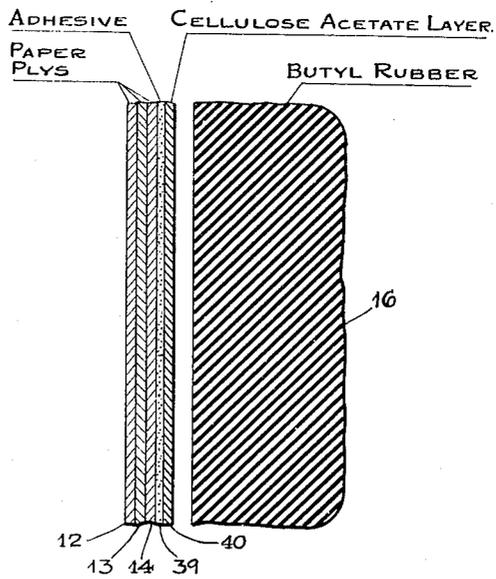


Fig. 12.



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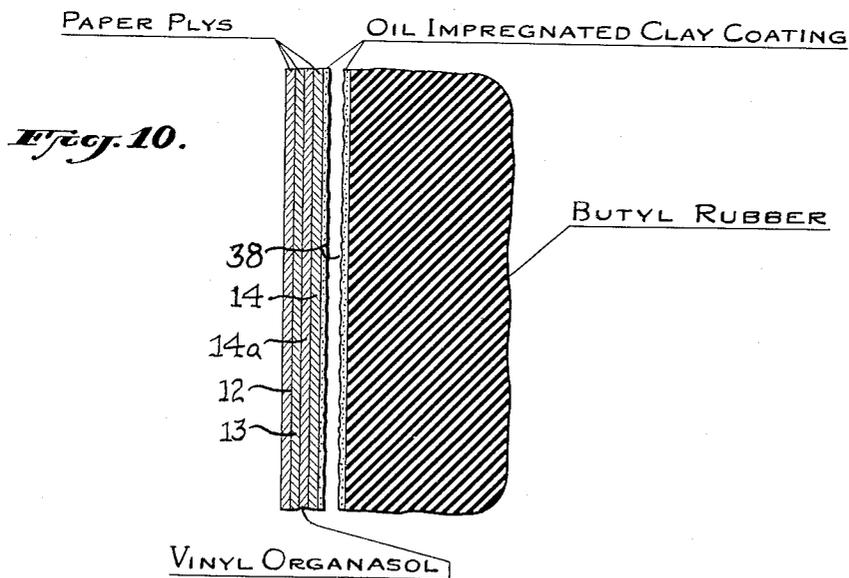
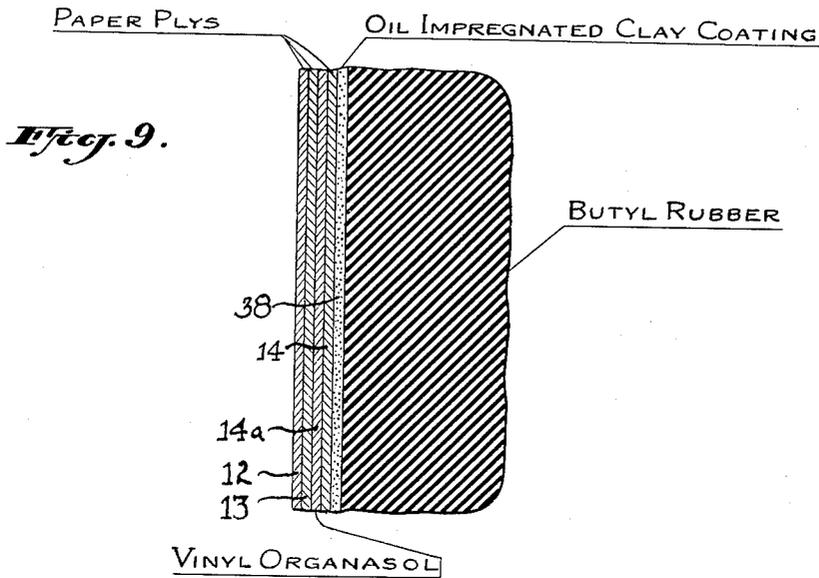
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BAG FOR PACKAGING TACKY POLYMERIC MATERIALS

Filed July 25, 1947

4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE

2,648,487

BAG FOR PACKAGING TACKY POLYMERIC MATERIALS

Frank Raymond Linda, White Plains, N. Y., assignor to St. Regis Paper Company, New York, N. Y., a corporation of New York.

Application July 25, 1947, Serial No. 763,688

10 Claims. (Cl. 229-55)

1.

This invention pertains to paper base laminates especially adapted for packing tacky, high-molecular, polymeric materials, which are subject to cold-flow, such as butyl rubber, and pertains, more especially, to multi-walled or multi-ply paper bags incorporating such laminates as an inner ply for packaging materials of the character aforesaid.

Extreme and serious difficulties have been encountered in devising suitable containers for packing and shipping tacky, high-molecular, polymeric substances, subject to cold-flow, such for example as butyl rubber, inasmuch as such substances are found to adhere to almost everything. If such materials are packed in ordinary paper bags, the paper becomes so firmly bonded to the polymeric material that it can not be stripped off, even by tedious manual operations, without leaving large quantities of the paper fibers embedded in the surface of the polymeric material. These paper fibers which are cellulose fibers, if left embedded in the material, impart highly injurious and deleterious properties to finished products made therefrom. For example, in the case of butyl rubber employed for making automobile tire inner tubes, the so-embedded paper fibers act as wicks in the completed tube, permitting the escape of air from the interior and the absorption of moisture, by capillary action, from the exterior to the interior of the tube. In order to remove the adhering paper fibers resulting from packing butyl rubber in ordinary paper bags or containers, expensive organic solvents, such as methyl ethyl ketone, are required, in addition to the labor expenses and delays involved in so treating the polymeric material, as well as the loss of the material itself due to solvent action.

There appears to be no point in recounting the various unsuccessful attempts which have heretofore been made to provide suitable containers for packing and shipping tacky materials of the character above-mentioned. Suffice it to say that no satisfactory container for such purposes has been evolved prior to the present invention, in so far as I am aware. As a result of my experimental investigations in relation to this problem, I have worked out successful solutions thereof along several lines as follows:

In accordance with one modification of my invention, I propose to pack the tacky, high-molecular, polymeric material, such as butyl rubber, in multi-wall or multi-ply paper bags having for the inner ply a paper base laminate consisting of a layer of paper, the inner or exposed

2.

surface of which is faced with a thin layer of a non-tacky rubber-like polymeric material, such as polyethylene, bonded to the paper layer by means of an interposed layer of a relatively low-melting, wax-like adhesive. This inner layer of polymerized material must be a substance like polyethylene which provides a smooth, unctuous surface and hence which separates readily from the layer of paper without paper fibers adhering thereto, into which a block of the tacky, high-molecular, polymeric material, such as butyl rubber, may be easily slipped. It must also be a substance of such nature as to be compatible and miscible with the butyl rubber or the like, i. e., a substance which, when permanently incorporated therein, will not impart injurious or deleterious properties to the products made therefrom, such as tire inner tubes, gloves, rubber tubing, etc. In addition, it must be sufficiently tough, flexible and elastic as not to be ruptured by cold-flow of the tacky material, as otherwise such material would contact and adhere to the so-exposed portions of the paper base. Polyethylene, also called polythene, has been found ideally adapted for such purposes, although other polymeric substances having the above-mentioned characteristics may be employed.

The purpose of the low-melting, wax-like adhesive interposed between the paper base and the inner surface layer of the polymeric layer, such as polyethylene, is temporarily to bond the latter to the former for purposes of fabricating the bags and packing the butyl rubber or similar substances therein. Butyl rubber blocks or slabs are ordinarily packed while at a temperature somewhat above room temperature, for example, about 125° to 145° F. After being packed in multi-ply paper bags, in accordance with the aforesaid modification of my invention, the butyl rubber will become tenaciously bonded to the inner polythene or equivalent film of the paper base laminate, while the elevated temperature of the butyl rubber will melt the wax-like adhesive of the laminate sufficiently to cause the latter to bleed into the paper base, whereby the polythene film-encased butyl rubber slab will, due to cold-flow, strip freely away from the paper base of the laminate without carrying with it any adhering paper fibers, the paper base acting like a blotter to absorb the adhesive during this procedure. The result is a butyl rubber block encased in the tenaciously adhering polythene film, this combination becoming, thereupon loosely packed in the multi-wall paper bag. As above stated, the polythene film has inherently a smooth unctuous

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surface, which slips or slides freely against the paper base from which it has thus been separated, and which at the same time wholly encases and thus prevents the tacky surface of the butyl rubber from contacting and adhering to the paper. Accordingly, for purposes of unpacking, the paper bag need only be slit and the film-encased butyl block dumped out.

In accordance with a second modification of the invention, and one which is alternative to that above described, the inner ply of the multi-wall paper bag may again comprise a paper base laminate consisting, in this instance, of a paper base, over the inner surface of which is applied a slack-sized, clay coating, the clay coating being surfaced with a thin, relatively impervious film of a glue-like substance, such as casein, on top of which is applied a surface layer or coating composed of a synthetic hydrocarbon resin, which is compatible and miscible with the tacky, high molecular, polymeric material to be packed. Suitable synthetic resins for this inner surface layer of the laminate are, for example, polystyrene, styrene and polyethylene. As in the previous modification of the invention, the resin employed for the inner surface layer of the laminate must be sufficiently tough, flexible and expansible as not to crack under the cold-flow of the tacky polymeric material, and also such as to provide a smooth unctuous surface into which the tacky material to be packed may be easily slipped.

The function of the clay coating interposed between the paper base and the inner resinous surface layer of the laminate, is temporarily to bond the latter to the former for purposes of employing the laminate in paper bag manufacture, and subsequently filling these bags with the tacky material, butyl rubber or the like, without rupturing the resinous film and without stripping the film prematurely from the paper base. The function of the impenetrable glue-like or casein surface film on the clay coating is to prevent the resinous inner surface layer when applied from penetrating through the clay coating, and thus forming a bond with the paper base, as otherwise the undesired paper fibers would permanently adhere to the resinous inner surface layer of the laminate.

When a tacky, high molecular, polymeric material, such as butyl rubber, is packed in a container in accordance with this modification of the invention, the tacky material will adhere to the inner resinous layer of the laminate, and will also stretch the same due to the cold-flow of the tacky material and, in so doing, will strip the resinous layer of the laminate away from its paper base, owing to the weak bonding action of the interposed clay coating, thereby effecting complete separation between the two. As a result of this cleavage in the clay coating, some of the clay coating will adhere to the resin film encasing the tacky material, while some will adhere to the paper base. The portions of the clay coating adhering to the resinous layer, however, as well as the resinous layer itself, are not injurious or deleterious substances as embodied in the end products into which the tacky material or butyl rubber is fabricated, the resinous layer because it is of itself a rubber-like substance miscible and compatible with the tacky material or butyl rubber, and the clay coating because it acts as a filler in the end products similar to the other fillers, such as carbon black, calcium carbonate, etc., employed as filler materials in the manufacture of rubber goods.

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When the butyl rubber or other tacky substance packed in the container has thus stripped the inner resinous layer away from the paper base of the laminate, the interposed clay coating material which adheres to the contiguous paper and resin layer surfaces of the thus cloven laminate, will act as a friction-minimizing medium to facilitate the slipping or sliding of the resin layer-encased tacky material with respect to the paper base. Accordingly, the material may be unpacked by merely slitting the paper bag container and dumping the contents.

In accordance with still another modification of the invention, the inner or exposed surface of the inner ply of a multi-wall paper bag, has applied thereto a slack-sized clay coating which is impregnated with an oil, preferably a synthetic oil, such as those marketed under the name "Ucon" oils, by Carbide & Carbon Chemicals Corp., for example, its Nos. LB-1145 (high viscosity) and LB-385 (low viscosity) synthetic oils, or its 50-HB series, which are water soluble. Either type may be employed although I prefer to use the "LB" or water-insoluble type. The number after the "LB" designates the viscosity in Saybolt seconds at 100° F. These synthetic oils are polyalkylene-glycol derivatives, and their properties are described in an article entitled "New Synthetic Lubricants" by J. C. Kratzer, D. H. Green and D. B. Williams, appearing in "The Petroleum Refiner" for February 1946.

It has been found by employing this modification of the invention, that butyl rubber blocks and the like may be easily slipped into the containers, whereupon the synthetic oil-impregnated clay coating serves as a weakly bonded separating and surfacing medium between the tacky material and the paper base. The surface of the tacky material, due to cold-flow, becomes completely coated with the oil-impregnated clay coating which adheres thereto, the cold-flow of the material serving also to cleave to the clay coating, and thus strip the so-coated material away from the paper base, in consequence of which the so-coated tacky material slides or slips easily with respect to the paper base, owing to the friction-minimizing action of the clay particles adhering to the paper base and to the tacky material respectively. Thus, the contents may be easily removed by slitting the multi-wall bag and dumping the contents.

This modification of the invention may be improved upon by applying to the opposite or non-exposed surface of the inner paper ply of the bag, a thin, impervious film of an organic material, such as vinyl organosol, cellulose acetate or the like. The purpose of backing the inner paper ply with an impervious film of this character is to prevent the oil of the oil-impregnated clay coating applied to the opposite surface thereof, from seeping or soaking through the outer paper plies of the bag, and thereby eliminating substantial quantities of the oil from the clay coating, in addition to weakening the multi-ply bag structure by the soaking action of the oil.

In accordance with a still further modification of the invention, the inner ply of the multi-wall bag again consists of a paper base laminate consisting of a thin film or layer of cellulose acetate or similar moisture impervious organic film, which is permanently glued to the paper base by means of a suitable interposed resinous or other suitable adhesive. It has been observed that when blocks of butyl rubber or similar tacky ma-

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terial are packed in bags of this character, although the butyl rubber adheres somewhat to the cellulose acetate film, nevertheless the bag may be slit and the bag material stripped away from the surface of the butyl rubber without tearing the acetate film, and hence without causing any adherence of the film or paper to the butyl rubber. The cellulose acetate or equivalent film acts as a tough, impervious and moisture-resisting shield between the butyl rubber and the paper, which does not tear or crack under the cold-flowing action of the butyl rubber.

Vast improvement in this modification of the invention is secured, in accordance with a further feature thereof, by the application to the exposed surface of the cellulose acetate layer, of a light film or coating of an oil, preferably one of the water-insoluble synthetic oils above referred to. Owing to the repellent action of such oils with respect to the surfaces of the butyl rubber, the tendency of the butyl rubber to adhere to the cellulose acetate layer is practically eliminated. Thus, the blocks of butyl rubber may be easily slipped into multi-wall bags, in accordance with this modification of the invention, and the bags as easily unpacked by merely slitting and dumping the contents. The surface film of synthetic oil is not injurious to the tacky material or to products made therefrom, in addition to being present in negligible amount.

Referring now to the drawings:

Fig. 1 is a perspective view of a block of tacky, high molecular, polymeric material, such as butyl rubber, packaged in a multi-wall paper bag or shipping sack, having sewn ends, in accordance with the invention, one corner of the bag being broken away to illustrate the multi-ply construction of the bag and the block of butyl rubber or the like packaged therein.

Fig. 2 is a fragmentary enlarged sectional view through a multi-wall bag in accordance with the first modification of the invention above described, wherein the inner ply of the bag comprises a paper base laminate having a polyethylene or equivalent rubber-like inner surface layer laminated to the paper base by means of an interposed low melting, wax-like adhesive, this view also illustrating a portion of the butyl rubber block contacting the polythene layer.

Fig. 3 is a view similar to Fig. 2, but illustrating the manner in which the butyl rubber block and adhering polythene layer of the paper base laminate strips away from the paper base of the multi-wall bag upon melting of the wax-like adhesive.

Fig. 4 illustrates diagrammatically a method of making multi-wall paper bags in accordance with the Figs. 2 and 3 modifications, as well also as in accordance with the remaining modifications of the invention above referred to and discussed more in detail below.

Figs. 5 and 6 are enlarged, fragmentary sectional views, similar to Figs. 2 and 3 respectively, but illustrating the modification of the invention wherein the inner ply of the multi-wall bag comprises a paper base laminate in which a resinous inner surface layer or coating is weakly bonded to the paper base with an interposed slack-sized clay coating carrying a surface film of an impenetrable glue-like substance such as casein. Fig. 5 illustrates the appearance of the bag when the butyl rubber block is first placed therein; while Fig. 6 illustrates the subsequent appearance when the butyl rubber block and adhering resin-

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coating have been stripped away from the paper plies by cleavage of the clay coating.

Figs. 7 and 8 are enlarged, fragmentary sectional views similar to Figs. 2 and 3, but illustrating the modification of the invention wherein the inner ply of the multi-wall paper bag has applied to its inner or exposed surface, a slack-sized clay coating impregnated with a synthetic oil as aforesaid. Fig. 7 illustrates the appearance of the bag and butyl rubber block assembly when the block has been first placed in the bag; while Fig. 8 illustrates the subsequent appearance when the butyl rubber block has subsequently stripped away from the paper bag by cleavage of the interposed oil-impregnated clay coating.

Figs. 9 and 10 are enlarged, fragmentary sectional views, similar to Figs. 7 and 8, but illustrating the further modification of the Fig. 7 construction, according to which the inner or non-exposed surface of the inner paper ply of the bag is backed by a thin film of vinyl organosol, cellulose acetate or the like, for preventing the oil in the clay coating, applied to the opposite surface of this inner paper ply, from soaking out into the outer paper plies of the bag. Fig. 9 illustrates the appearance of the bag and butyl rubber block assembly when the block has been first placed in the bag; while Fig. 10 illustrates the subsequent appearance when the butyl rubber block is subsequently stripped away from the paper bag by cleavage of the interposed oil-impregnated clay coating.

Figs. 11 and 12 are enlarged, fragmentary, sectional views similar to Figs. 2 and 3 respectively, but illustrating the modification of the invention wherein the inner ply of the multi-wall bag comprises a paper base laminate consisting of an inner surface layer of cellulose acetate permanently bonded to the paper base by means of an adhesive, the inner or exposed surface of the cellulose acetate layer carrying a surface film of synthetic oil to facilitate stripping of the butyl rubber block from the cellulose acetate layer. Fig. 11 illustrates the appearance of the bag when the butyl rubber block is first placed therein, while Fig. 12 illustrates the appearance when the butyl rubber block has subsequently stripped away from the cellulose acetate layer.

Referring now to Fig. 1, there is illustrated a multi-wall paper bag 10, made up of a multiplicity of paper tubes, such as 11, 12, 13 and 14, disposed one within another, these tubes being closed at the base by a sewn seam 15, the top being left open until the butyl rubber block 16 or other material to be packaged, has been placed therein, whereupon the top is likewise closed by means of a sewn seam 17.

Referring now to the modification of the invention illustrated in Figs. 2 and 3, the inner paper ply 14 of the multi-wall bag 12, 13, 14, has laminated to its inner surface a thin layer 18 of polyethylene or equivalent, this layer 18 being bonded to the paper layer 14 by means of an interposed layer 19 of a relatively low melting, wax-like adhesive which melts at a temperature slightly below the temperature at which the butyl rubber block 16 is packed. As above stated, butyl rubber ordinarily has a temperature of about 125° to 145° F. when packed, so that the wax-like adhesive should have a melting point slightly below this, for example, about 110° to 120° F.

The wax-like adhesive may consist, for example, of a microcrystalline wax, compounded

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with paraffin oil, for reducing the melting point as aforesaid, and containing, in addition, a tackifier, such for example as picolyte or a similar refined resin, for providing the necessary adhesion between the polythene film and the paper. A suitable microcrystalline wax is one composed of paraffin hydrocarbons, largely of the branched chain type, within the range of about $C_{34}H_{70}$ to $C_{43}H_{88}$.

A suitable formula for such a wax-like adhesive is the following:

	Per cent
Paraffin oil-----	1-5
Picolyte or similar refined resin tackifier---	1-5
Microcrystalline wax	
(M. P. 120-130° F.)-----	Balance

After the butyl rubber block 16 has been packaged in the multi-wall container 12, 13, 14, 18, 19, in the manner illustrated in Fig. 1, the cold-flow of the butyl rubber will cause this material to engage substantially the entire exposed surface area of the polythene layer 18, to which the butyl rubber tenaciously adheres. Likewise, the elevated temperature at which the butyl rubber is packed will melt the wax-like adhesive layer 19, causing the same to bleed or be absorbed into the paper plies 12, 13, 14, whereupon the butyl rubber block 16 encased in the adhering polythene surface layer 18 will strip away from the paper plies 12, 13, 14 in the manner illustrated in Fig. 3. Since, as above stated, the polythene film has a smooth unctuous surface, it will slide easily with respect to the inner paper ply 14, whereby upon slitting the paper plies, the butyl rubber and encasing polythene film may be easily dumped out.

Multi-ply paper bags, in accordance with Fig. 1, and employing the inner ply paper base laminate of Fig. 2, may be produced in the manner illustrated diagrammatically in Fig. 4. The paper base laminate may be produced by progressively feeding a continuous strip 20 of the paper base material from a supply roll 21 in engagement with a doctor roll 22, which applies thereto the low melting, wax-like adhering coating 19 from a transfer roll 23, which latter dips into a reservoir 24 of the adhesive material. At the same time, a continuous strip 25 of the polythene film is fed from a separate supply roll 26 and fed, together with the adhesive-coated paper strip 20, between a pair of compression rolls 27 for producing the laminated material 28, consisting of the paper base 20, the polythene film 25 and the interposed adhesive 19. The laminated material so formed is wound up in the form of a supply roll 29, and transferred thence, as at 30, to the entrance side of a bag "tuber" machine 31 of standard construction. The laminated material 28 is fed into the bag tuber from roll 30 as the inner ply of the multi-wall bag the remaining plies, such as 12 and 13, of which are concurrently fed from paper supply rolls, such as 32, 33.

Referring now to Figs. 5 and 6, according to this modification of the invention, the inner paper ply 14 of the multi-wall bag 12, 13, 14 has applied to its inner surface, a slack-sized double clay coating 34, as explained below, on the inner or exposed surface of which is sprayed or otherwise applied a thin impenetrable film 35 of a glue-like substance, such as casein, upon which in turn is applied a resinous coating or layer 36 consisting of a synthetic resin, which is compatible and miscible with the tacky, high molecular, polymeric material being packaged, for ex-

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ample, the butyl rubber block 16. As above stated, this resinous layer may consist, for example, of polystyrene, styrene or polyethylene.

The slack-sized clay double coating 34 comprises two separately applied clay coatings, a first coating applied directly to the surface of the paper ply, on which first clay coating is superimposed a second clay coating, to which latter the resinous coating or layer 36 is, in turn, applied. For the first clay coating applied directly to the paper ply, a coating in accordance with the following formula is suitable:

Formula I

	Per cent
Talc -----	60-70
Bentonite -----	15-25
Defoamer (National Oil Products Co. #1338: "Nopco" Defoamer)-----	3-4
Ammonium stearate-----	3-4
Casein sizing-----	5-7

This clay coating may be applied in aqueous suspension to the paper comprising the inner ply of the multi-wall bag, in the manner illustrated in Fig. 4, by the elements 22-24 inc. It is preferably applied to the extent of about 20-30 lbs. of the clay coating per ream of paper, i. e., 3000 sq. ft.

For the outer clay coating, to which the resinous film is applied, the following formula is suitable:

Formula II

	Per cent
Talc -----	50-60
Bentonite -----	15-20
Nopco defoamer (supra)-----	3-4
Ammonium stearate-----	3-4
Casein -----	12-20

This clay coating is likewise applied in aqueous suspension to the previously clay-coated paper in the manner illustrated in Fig. 4 by the elements 22-24 inc. and to the extent of about 15 to 25 pounds per ream of paper.

The interposed clay coating 34, comprising the two coatings aforesaid, forms a weak bonding layer between the resinous layer 36 and the inner ply 14, such that when the tacky material or butyl rubber block 16 is packaged in the container and subsequently cold-flows, the resinous layer 35 will tenaciously adhere thereto and cause the butyl rubber block and resin-encasing layer 36 to strip away from the paper ply 14 by cleavage of the interposed weak clay coating 34, in the manner illustrated in Fig. 6. As shown in this figure, following the cleavage, portions of the clay coating 34 adhere both to the paper ply 14 and to the resinous layer 36, as illustrated at 34a and 34b. This clay coating, being a frangible or powdery material, thereafter serves as a friction-minimizing medium between the inner paper ply and the resin layer to facilitate slippage of one with respect to the other, whereby, upon slitting the bag, the resin layer encased butyl rubber block may be easily removed by dumping. As above stated, the resinous layer and clay coating adhering to the butyl rubber produce no injurious effects in products made therefrom.

Referring now to Figs. 7 and 8, the inner paper ply 14 may have applied thereto a slack-sized, clay coating 38 in accordance with Formula I given above, which is thereupon impregnated with an oil, preferably a water-insoluble, synthetic oil of the character aforesaid, and the butyl rubber block 16 or other tacky material packaged in the container as thus formed. Thereupon, the

tacky material 16 will split easily away from the oil-impregnated clay coating 38, as illustrated in Fig. 8.

Referring now to Figs. 9 and 10, the modification of Figs. 7 and 8 may be improved upon by applying to the inner or non-exposed surface of the inner paper ply 14, an impervious film 14a of an organic material, such as cellulose acetate or vinyl organosol. Vinyl organosol, which is put out by the Bakelite Corporation, is obtained by ball-milling vinyl resin with a plasticizer in a vaporizable organic liquid carrier, resulting in a suspension or emulsion of the vinyl particles and plasticizer in said liquid carrier. The resulting suspension or emulsion may be applied to the inner paper ply of the bag in the manner illustrated in Fig. 4 by the elements 22-24 inc. Following such application, the vaporizable liquid carrier evaporates leaving the resin particles deposited on the paper surface in the form of a coating, which is cured and fused to form a continuous surface film by passing the so-treated paper strip through a hot oven. Another resin which may be similarly applied in place of the vinyl organosol is vinyl butyral, also put out by the Bakelite Corporation. The opposite or exposed surface of the inner paper ply 14 is coated with the slack-sized clay coating 38, in the manner described with reference to Figs. 7 and 8, so that when the butyl rubber or equivalent material is initially packaged in the bag, it has the appearance of Fig. 9. The butyl rubber, due to cold flow, subsequently strips away from the bag by cleavage of the double clay coating 38, as illustrated in Fig. 10. As above stated, the purpose of backing the inner paper ply 14 with the impervious organic film 14a is to prevent the oil in the clay coating 38 from seeping through into the outer paper plies, such as 12, 13.

Referring now to the modification of the invention shown in Figs. 11 and 12, the inner paper ply 14 has permanently bonded thereto, by means of a layer 39 of a suitable adhesive, an inner surface layer or film 40 of cellulose acetate or the like. The cellulose acetate layer 40 forms a tough, impervious film between the tacky material 16 and the paper plies 12, 13, 14, which layer does not crack or break due to bending of the container or cold-flow of the packaged material 16. As above stated, the tacky material 16 may be packaged in the multi-wall bag so formed, although the material 16 is found to adhere somewhat to the cellulose acetate layer, requiring stripping for removal of the contents. However, by applying to the inner surface of the cellulose acetate layer a thin surface film 41 of an oil, such as a synthetic oil of the character aforesaid, it will be found that the butyl rubber block or equivalent tacky material will strip cleanly away from the cellulose acetate layer 41, in the manner illustrated in Fig. 12.

Suitable adhesives for applying the cellulose acetate layer to the paper ply are lacquers, such as Du Pont's #4661, vinyl acetate adhesives, as made by the Union Carbide or Bakelite companies; or adhesives made by National Oil Products Co. Also, in place of the cellulose acetate film, other equivalent materials may be employed such as vinyl butyral.

The apparatus diagrammatically illustrated in Fig. 4 may, by obvious adaptations, be employed for making multi-wall bags in accordance with any of the Figs. 5 to 10 modifications, as well as in accordance with that of Figs. 2 and 3 as above described.

I claim:

1. A multi-wall paper bag for packaging tacky, high molecular, polymeric materials, in such manner that said materials may be easily removed from said bag, said bag comprising a multiplicity of paper tubes, disposed one within another, said tubes being secured together at one end thereof to form a closure, the inner paper tube of said bag being faced with a substantially impervious superimposed continuous, non-tacky layer of a tough and flexible polymeric substance loosely bonded to said paper with an interposed bonding medium of low tensile strength such that said polymeric layer may be easily stripped from said paper tube.
2. A multi-wall paper bag for packaging tacky, high molecular, polymeric materials, in such manner that said materials may be easily removed from said bag, said bag comprising a multiplicity of paper tubes, disposed one within another, said tubes being secured together at one end thereof to form a closure, the inner paper tube of said bag being faced with a substantially impervious superimposed continuous layer of a tough and flexible polymeric substance bonded to said paper with an interposed bonding medium of low strength such that said layer of polymeric substance may be easily stripped from said inner tube, the exposed surface of said polymeric layer being coated with an oleaginous film.
3. A multi-wall paper bag for packaging tacky, high molecular, polymeric materials, in such manner that said materials may be easily removed from said bag, said bag comprising a multiplicity of paper tubes, disposed one within another, said tubes being secured together at one end thereof to form a closure, the inner paper tube of said bag being faced with a substantially impervious superimposed continuous layer of a tough and flexible polymeric substance bonded to said paper with an interposed layer of a low melting, wax-like adhesive having a strength less than that of said layer of polymeric substance, said polymeric layer being adapted to engage and adhere to said tacky, high molecular, polymeric material, whereby, upon packaging said material while at a temperature above the melting point of said adhesive, said material and adhering polymeric layer will, after packaging, strip away from said inner paper tube.
4. A multi-wall paper bag for packaging tacky, high molecular, polymeric materials, in such manner that said materials may be easily removed from said bag, said bag comprising a multiplicity of paper tubes, disposed one within another, said tubes being secured together at one end thereof to form a closure, the inner paper tube of said bag being faced with a superimposed continuous, non-tacky layer of a tough and flexible polymeric substance bonded to said paper with an interposed layer of a pulverulent bonding medium having a strength less than that of said layer of polymeric substance, said polymeric layer being adapted to engage and adhere to said tacky, high molecular, polymeric material, whereby said material and adhering polymeric layer may be easily stripped from said inner paper tube by cleavage of said pulverulent bonding medium.
5. A multi-wall paper bag for packaging tacky, high molecular, polymeric materials, in such manner that said materials may be easily removed from said bag, said bag comprising a multiplicity of paper tubes, disposed one within another, said tubes being secured together at one end thereof to form an end closure, the inner

paper tube of said bag being faced with a superimposed continuous, non-tacky layer of a tough and flexible polymeric substance bonded to said paper with an interposed layer of a relatively weak bonding agent, said polymeric layer being adapted to engage and adhere to said tacky, high molecular, polymeric material, whereby said material and adhering polymeric layer may be easily stripped from said inner paper tube.

6. A multi-wall paper bag for packaging tacky, high molecular, polymeric materials, in such manner that said materials may be easily removed from said bag, said bag comprising a multiplicity of paper tubes, disposed one within another, said tubes being secured together at one end thereof to form an end closure, the inner paper tube of said bag being faced with a superimposed continuous layer of a polyethylene bonded to said paper with an interposed layer of a low melting, wax-like adhesive having a strength less than that of said layer of polyethylene, said polyethylene layer being adapted to engage and adhere to said tacky, high molecular, polymeric material, whereby, upon packaging said material while at a temperature above the melting point of said adhesive, said material and adhering polyethylene layer will, after packaging, strip away from said inner paper tube.

7. A multi-wall paper bag for packaging tacky, high molecular, polymeric materials, in such manner that said materials may be easily removed from said bag, said bag comprising a multiplicity of paper tubes, disposed one within another, said tubes being secured together at one end thereof to form a closure, the inner paper tube of said bag being faced with a superimposed, continuous layer of polyethylene bonded to said paper with an interposed layer of a pulverulent bonding medium having a strength less than that of said polyethylene layer, said polyethylene layer being adapted to engage and adhere to said tacky, high molecular, polymeric material, whereby said material and adhering polyethylene layer may be easily stripped from said inner paper tube by cleavage of said pulverulent bonding material.

8. A multi-wall bag for packaging tacky, high molecular, polymeric materials, in such manner that said materials may be easily removed from said bag, said bag comprising a paper tube having a closed end and a further tube of a tough and flexible polymeric substance, said further tube being a continuous, unitary, non-tacky film of said substance and having a closed end and said further tube being disposed within said paper tube and bonded thereto by a bonding medium of a tensile strength less than that of

said tubes whereby said further tube may be separated as a unit from said paper tube.

9. A multiwall container for packaging tacky, high molecular, polymeric materials, in such manner that said materials may be easily removed from said container, said container comprising a tube having a closed end and a layer of a substance which is compatible and miscible with said polymeric materials, said layer being a continuous, non-tacky film of said substance in the shape of a tube having a closed end, said layer being disposed within said first-mentioned tube and being bonded thereto by a bonding medium of a tensile strength less than that of said layer and said first-mentioned tube whereby said layer may be separated as a unit from said first-mentioned tube.

10. A multiwall container for packaging tacky, high molecular, polymeric materials, in such manner that said materials may be easily removed from said container, said container comprising a tube having a closed end and a cellulose fiber free layer of a flexible polymeric substance which is compatible and miscible with said polymeric materials, said layer being a continuous, non-tacky film of said substance in the shape of a tube having a closed end, said layer being disposed within said first-mentioned tube and being bonded thereto by a bonding medium of a tensile strength less than that of said layer and said first-mentioned tube whereby said layer may be separated as a unit from said first-mentioned tube.

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