

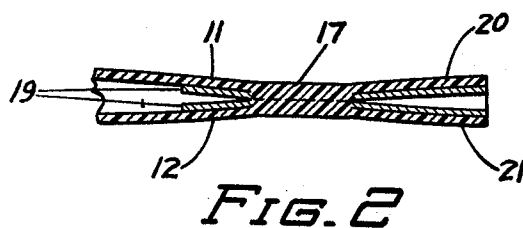
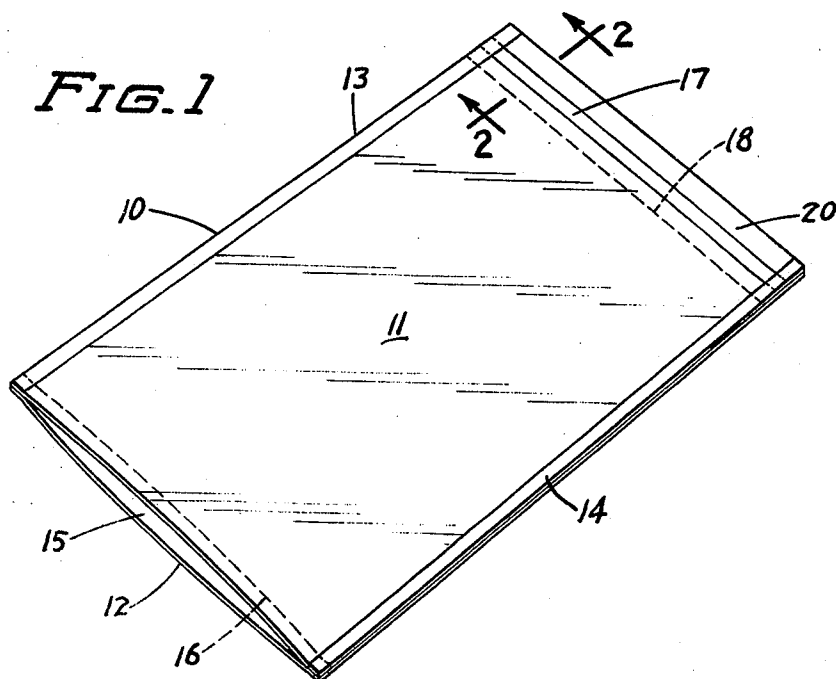
May 12, 1970

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3,511,746

EASY OPENING HEAT SEALED PACKAGE

Filed Sept. 12, 1966



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3,511,746

EASY OPENING HEAT SEALED PACKAGE

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Filed Sept. 12, 1966, Ser. No. 578,696

Int. Cl. B32b 7/14

U.S. Cl. 161-147

9 Claims

ABSTRACT OF THE DISCLOSURE

An easy opening heat sealed pouch or envelope having at least one edge having a tight heat seal formed by bonding together two abutting surfaces under influence of heat and pressure such that the bond may be broken and the package easily opened by the use of moderate force by grasping opposite sides of the pouch between thumb and fingers and pulling. Easy opening is achieved by interposing a coating between the heat sealable surfaces before bonding. The coating is formed from an organic ethylated cellulose in which is dispersed a metallic stearate, such as zinc stearate.

This invention relates to an easy opening pouch or envelope or similar package made from heat sealable sheet or film material. The invention also relates to sheet or film material for making such pouches, the method of making such sheet or film material susceptible to the formation of an easy opening heat seal and to the method of making such packages. For convenience the invention will be described with particular reference to so called "boil-in-bag" pouches, this being a type of package whose requirements are particularly stringent with respect to such factors as strength, integrity of seal, resistance to boiling water, resistance to dropping and the like. The invention is not limited to boil-in-bag pouches. It will be readily recognized that the easy opening heat seal feature is equally useful and adaptable to other packages subjected to less rigorous conditions in ordinary use.

The principal object of the present invention is to provide a heat sealed package in which at least one edge has a tight heat seal formed by bonding together two abutting surfaces under influence of heat and pressure such that the bond may be broken and the package opened by the use of moderate force by grasping opposite sides of the package between thumbs and fingers and pulling.

Other objects of the invention will become apparent as the description proceeds.

To the accomplishment of the foregoing and related ends, this invention then comprises the features hereinafter fully described and particularly pointed out in the claims, the following description setting forth in detail certain illustrative embodiments of the invention, these being indicative, however, of but a few of the various ways in which the principles of the invention may be employed.

The invention is illustrated by the accompanying drawings in which the same numerals are used to identify corresponding parts and in which:

FIG. 1 is an isometric view of one form of pouch according to the present invention; and

FIG. 2 is an enlarged fragmentary section on the line 2-2 of FIG. 1 and in the direction of the arrows showing details of construction of the pouch.

Broadly stated, the easy opening heat sealed package according to the present invention is composed at least in part of flexible sheet material having two abutting heat sealable surfaces joined together adjacent one edge in a relatively narrow easily opened heat sealed bond. At least one of the abutting heat sealable surfaces is provided with

a thin continuous uniform coating over at least the area of the easily opened heat sealed bond of an ethylated cellulose material containing a metallic stearate. The coating is different from the material of the sealable surfaces but is adherent to those surfaces. This coating when subjected to heat and pressure in the sealing process becomes part of the heat sealed bond. However, it has the property of permitting the bond to be broken upon application of moderate force less than the tear strength of the flexible sheet material while otherwise maintaining a strong tight sealing bond. The heat sealed bond is desirably spaced inwardly from the edges of the sheet material to leave unsealed edge tabs which may be grasped between thumbs and fingers so that force may be exerted on the sealed edge to break the bond. Then, once the bond has been actually broken the package may be opened by exerting further force to separate the sealed bond along its length.

Referring to the drawings, there is shown one form of pouch indicated generally at 10 and composed of a front sheet 11 and a back sheet 12. Sheets 11 and 12 are composed of heat sealable material or are provided with an adherent layer of sealable material on at least one of the abutting surfaces between them. The sheets are sealed together in the conventional manner along their opposite edges by means of heat sealed bonds 13 and 14. In the form of package illustrated, one end 15 is left to permit insertion of the material to be packaged therein, after which that end is sealed in the usual manner under heat and pressure generally in the area delineated between the broken line 16 and the end of the pouch. The opposite end is provided with an easily opened seal 17. The abutting surfaces of sheets 11 and 12 are provided with a thin uniform coating of ethyl cellulose and stearate in the area delineated between the broken line 18 and the end of the pouch.

This coating (FIG. 2) may be applied to either or both of the abutting heat sealable surfaces of sheets 11 and 12. If applied to both surfaces as illustrated, the coatings are thinner than if applied to one surface only. The coating 19 is desirably of a width somewhat greater than that of the heat sealed bond 17 so as to insure presence of the coating in the area of the bond without requiring maintenance of strict registration tolerances. The heat sealed bond 17 is desirably spaced inwardly from the end edge of the pouch so as to leave a pair of unsealed tabs 20 and 21 which may be readily grasped between thumbs and forefingers to initiate opening of the easily opened heat seal 17. Where such tabs are not provided the pouch may be opened by grasping the sheets 11 and 12 between thumbs and forefingers in the area spaced inwardly from the heat seal 17. Another typical form of pouch is formed by folding a web and the folded edge may be heat sealed or not as desired.

Zinc stearate is the preferred stearate for incorporation into the coating, this material having been approved by the U.S. Food and Drug Administration for direct contact with dry, greasy, fatty and high water content foods. Ethyl cellulose is an FDA approved non-toxic binder for the stearated zinc. Ethyl cellulose does not creep or crawl away from heat as heat builds up to form the seal of the plastic material. This is essential to the formation of an effective easy open seal. If the coating were to creep or crawl under heat it would then be useless as a release agent as the plastic substrate would adhere together in the areas of creep or crawl and render release difficult or impossible.

A preferred solvent for the ethyl cellulose is ethyl acetate because of its fast evaporation cycle. However, other volatile organic solvents such as ethylene dichloride, benzene, toluene, xylene, butyl acetate, acetone, ethanol, butanol and carbon tetrachloride may be used to dilute the resin-stearate combination.

The coating solution may be applied to the web from which pouches are formed on conventional gluing and printing equipment. Rotogravure and flexographic applicators, rubber roll applicators, spray equipment and the like may be used. On a weight basis the coating composition as applied contains from about 2 to 4% of ethyl cellulose and about 0.045 to 0.45 stearate radical (in the form of a metallic stearate) dispersed in the solvent. When the metallic stearate is zinc stearate it is present between about 0.050 and 0.50%.

The following examples are typical of formulations which have been tried and found useful for the production of easily opened boil-in-bag pouches, the parts being by weight:

Example No.	Ethyl Acetate (parts)	Ethyl Cellulose (parts)	Zinc stearate (part)	Observation
1-----	70	2	0.500	Weak bond and easy release.
2-----	70	2	0.200	Good bond and release.
3-----	70	2	0.100	Excellent bond and release.
4-----	70	2	0.050	Do.
5-----	70	2	0.025	Excellent bond and hard release.

Using the formulation of Example 3, boil-in-bag pouches were made from 2 mil medium density polyethylene extrusion coated on 50 gauge Type A Mylar, the polyethylene being on the product side. The pouch was heat sealed in the conventional manner on all sides except one, where a coating of ethyl cellulose and zinc stearate was applied in a stripe along the inside edge of the top of the bag where the heat seal was to be made. The pouches were filled with chili and sealed and then subjected to the following physical tests:

Boil test

To determine the effect of hot water on the easy open heat seal, the filled pouch was immersed in a gently rolling pot of boiling water and left for sixty minutes. The result was that the heat seal maintained its bond but afforded easy opening of the seal incorporating the ethyl cellulose-stearate coating.

Drop test

A pouch filled with chili, sealed and boiled for sixty minutes is dropped from a height of about three feet onto a hard floor surface. The pouch was dropped once on the easy open heat seal. It was dropped once on the fold at the bottom of the pouch. It was dropped a third time on one of the conventionally heat sealed side seams. The result was that the pouch withstood the drop test without bursting on all drops.

Pat test

A pouch provided with an easy open heat seal was filled with chili and boiled for sixty minutes. The pouch was then removed from the water and placed on a flat surface. The pouch and ingredients were patted on the pouch surface to determine if pressure would burst the seams. The result was that after twenty-five pats neither the easy open heat seal nor the pouch corners or other portions of the pouch burst.

Pressure test

A formed pouch with easy open heat seal was subjected to 5 p.s.i. of air pressure at the rate of 2 p.s.i. per second reaching 5 p.s.i. and held for minimum of one minute. The test pouch held 5 p.s.i. over two minutes without rupturing.

Freeze-thaw test

A formed pouch with easy open heat seal was filled with water and placed in a freezer until the water was frozen. The pouch of frozen water was then placed in boiling water for sixty minutes. The pouch was then removed from the water and dropped as described in the drop test above. The result was that the pouch passed all drop tests without rupturing of seams.

Freeze drop test

A formed pouch with easy open heat seal was filled with water and placed in a freezer until the water was frozen. The pouch with frozen water was removed from the freezer and dropped in the frozen state as described in the drop test above. The pouch of frozen water passed all of these tests without any rupturing of seams.

It is apparent that many modifications and variations of this invention as hereinbefore set forth may be made without departing from the spirit and scope thereof.

I claim:

1. An easy opening heat sealed package having at least one easily opened edge seal:

(A) said package composed at least in part of flexible sheet material having two abutting heat sealable surfaces joined together adjacent one edge in a relatively narrow heat sealed bond;

(B) at least one of said abutting heat sealable surfaces having thereon, over at least the area of said heat sealed bond, a thin continuous uniform coating of an organic ethylated cellulose containing a metallic stearate dispersed therein;

(C) said cellulose coating being adherent to said heat sealable surfaces and composing part of said heat sealed bond; and

(D) said cellulose coating serving as a means for permitting the bond to be broken by application of moderate force less than the tear strength of the flexible sheet material while otherwise maintaining a strong tight sealing bond.

2. An easy opening heat sealed package according to claim 1 further characterized in that said heat sealed bond is spaced inwardly from the edges of said sheet material to permit grasping of said edges between thumbs and fingers to exert force to break said bond.

3. An easy opening heat sealed package according to claim 1 further characterized in that said heat sealable surfaces are polyethylene.

4. An easy opening heat sealed package according to claim 1 further characterized in that

(A) said package is a boil-in-bag pouch for packaging and heating food products,

(B) said flexible sheet material having a heat sealable surface is a high tensile strength polyester film having polyethylene laminated thereto, and

(C) said coating is applied to said polyethylene surface.

5. An easy opening heat sealed package according to claim 1 further characterized in that said metallic stearate is zinc stearate.

6. An easy opening heat sealed package according to claim 1 further characterized in that the stearate portion of the metallic stearate compound in said coating is present in amount from about 1.125 to 22.5% based on the ethyl cellulose.

7. A method of making an easy opening heat sealed package according to claim 1, said method comprising:

(A) applying a relatively narrow stripe of a solution of ethyl cellulose containing a dispersion of a metallic stearate adjacent at least one edge of a web of flexible sheet material having a heat sealable surface, said ethyl cellulose being applied to said heat sealable surface,

(B) forming said web into a pouch by bringing heat sealable surfaces into abutting relation along said one edge with said ethyl cellulose stripe therebetween,

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(C) applying heat and pressure to said pouch adjacent said edge carrying said ethyl cellulose stripe over a relatively narrow area overlying said stripe to form an easily opened heat sealed bond, and

(D) applying heat and pressure to other edges of said pouch to heat seal the same. 5

8. A method according to claim 7 further characterized in that said ethyl cellulose is applied from a volatile organic solvent containing about 2 to 4% ethyl cellulose and about 0.045 to 0.45% stearate radical in the form of a metallic stearate, and then dried before sealing.

9. A method according to claim 8 further characterized in that said solvent is ethyl acetate and said stearate is zinc stearate present in amount between about 0.050 and 0.50%.

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10 MORRIS SUSSMAN, Primary Examiner

U.S. Cl. X.R.

156—291; 229—62, 66, 87

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,511,746 Dated May 12, 1970

Inventor(s) John A. Davies

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 1, line 5, "Ohio" should be --New York--

SIGNED AND
SEALED

OCT 27 1970

(SEAL)

Attest:

Edward M. Fletcher, Jr.

Attesting Officer

WILLIAM E. SCHUYLER, JR.
Commissioner of Patents