United States Patent [19]

Brady, Jr.

[11] **3,896,246**

[45] **July 22, 1975**

[54] **STORAGE CARD FOR LABELS**

[75] Inventor: **William H. Brady, Jr.**, Milwaukee, Wis.

[73] Assignee: **W. H. Brady Co.**, Milwaukee, Wis.

[22] Filed: **Dec. 12, 1973**

[21] Appl. No.: **424,034**

Related U.S. Application Data

[63] Continuation of Ser. No. 237,816, March 24, 1972, abandoned.

[52] **U.S. Cl.** ..... **428/41**; 206/447; 428/77; 428/212; 428/352; 428/409; 40/2; 40/125 A

[51] **Int. Cl.** **B32b 33/00**; C09j 7/02

[58] **Field of Search** ..... 117/47 A, 38, 68.5; 161/406, 117, 167; 206/447, 460, 498; 40/2, 125 A

[56] **References Cited**

UNITED STATES PATENTS

2,434,545	1/1948	Brady et al.	206/447
2,831,277	4/1958	Strachan	206/447
3,038,597	6/1962	Brady	206/447
3,235,426	2/1966	Bruner	117/47 A
3,420,364	1/1969	Kennedy	117/68.5
3,568,829	3/1971	Brady	206/447
3,695,915	10/1972	Morris	117/47 A

Primary Examiner—George F. Lesmes
Assistant Examiner—R. J. Roche
Attorney, Agent, or Firm—Quarles & Brady

[57] **ABSTRACT**

A storage card for holding pressure sensitive adhesive articles (such as labels, tapes, etc.) which is made from flexible, non-fibrous, rectilinearly crackable synthetic plastic. An especially effective structure for a card made of such material is described, and a particularly useful class of plastic materials is disclosed.

3 Claims, 10 Drawing Figures

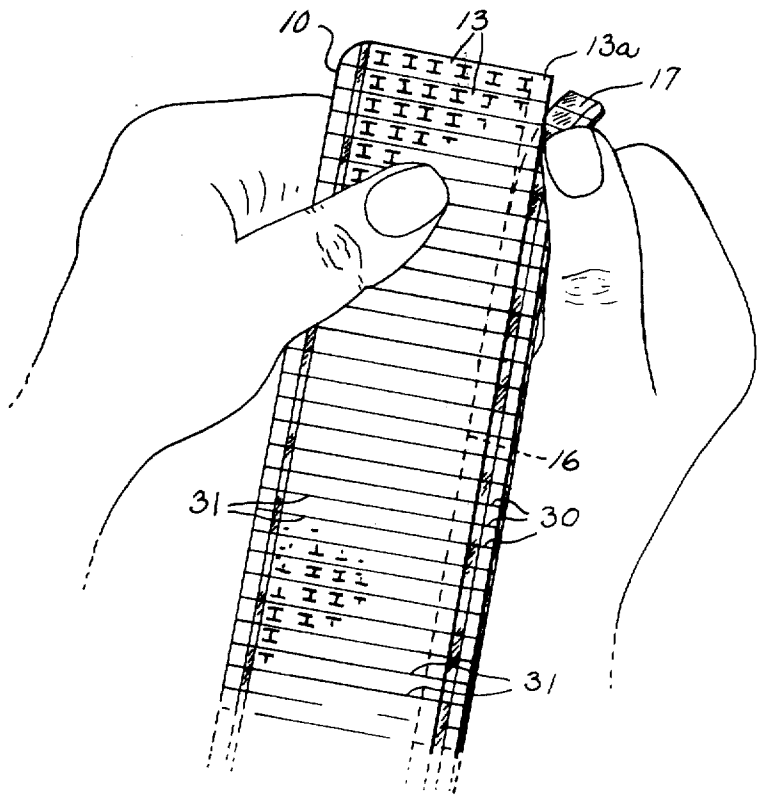


Fig. 1

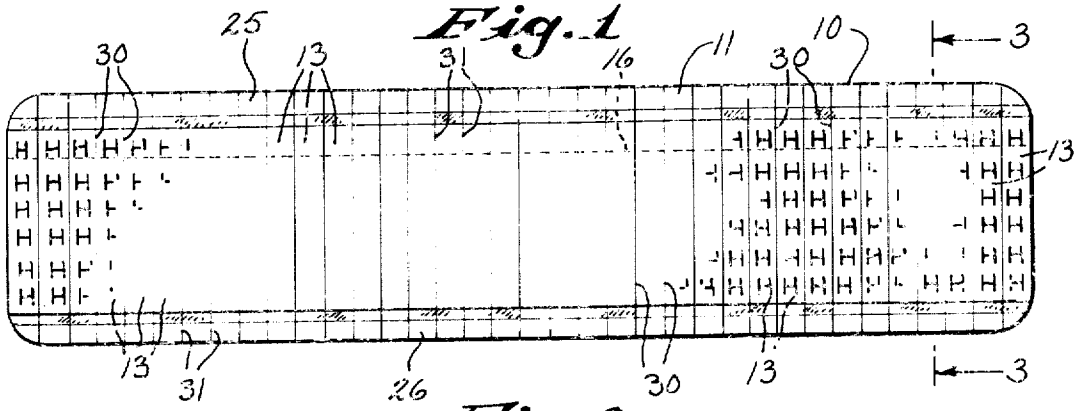


Fig. 2

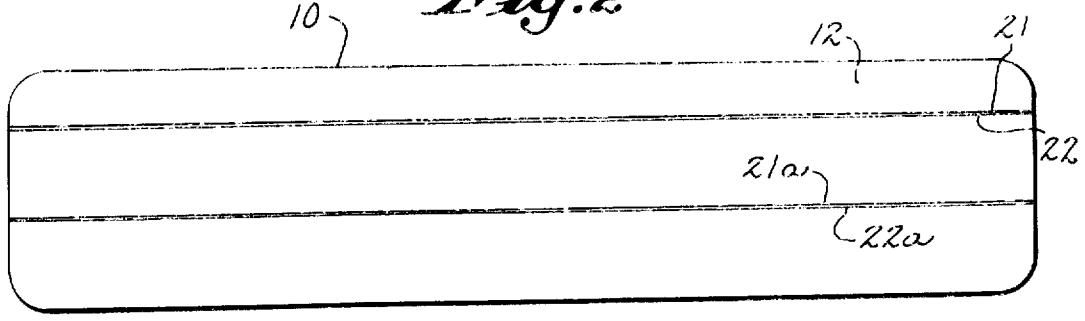


Fig. 4

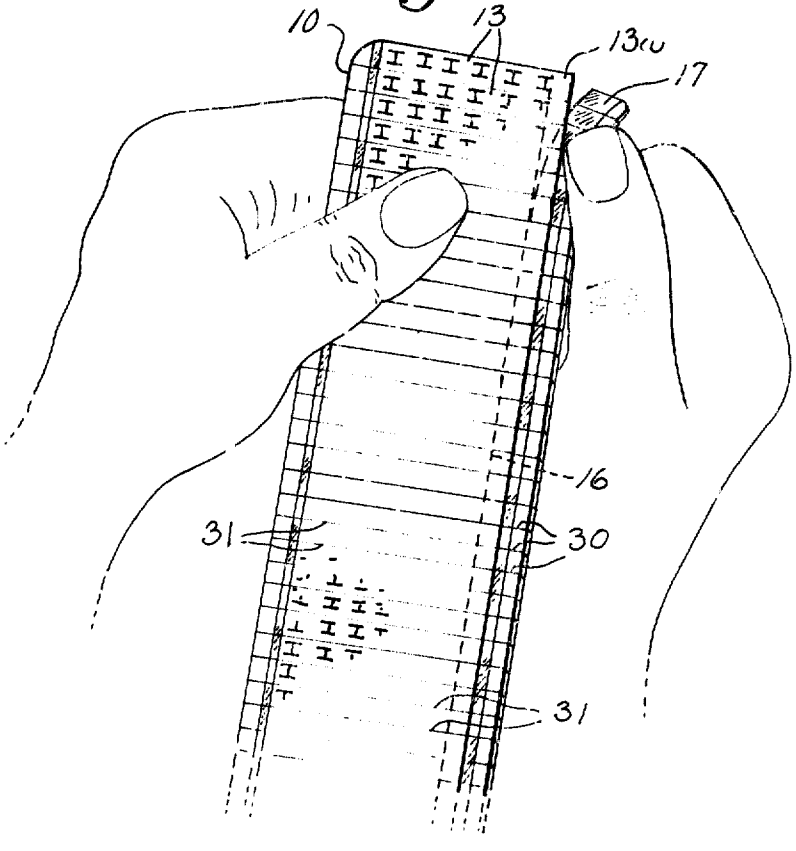


Fig. 3

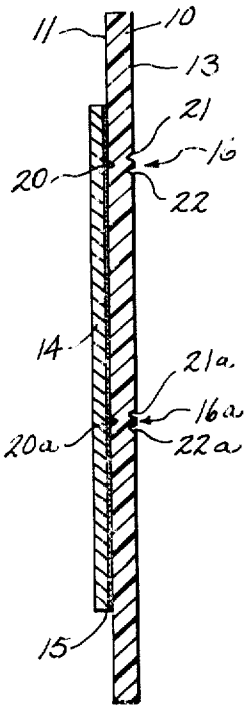


Fig. 5

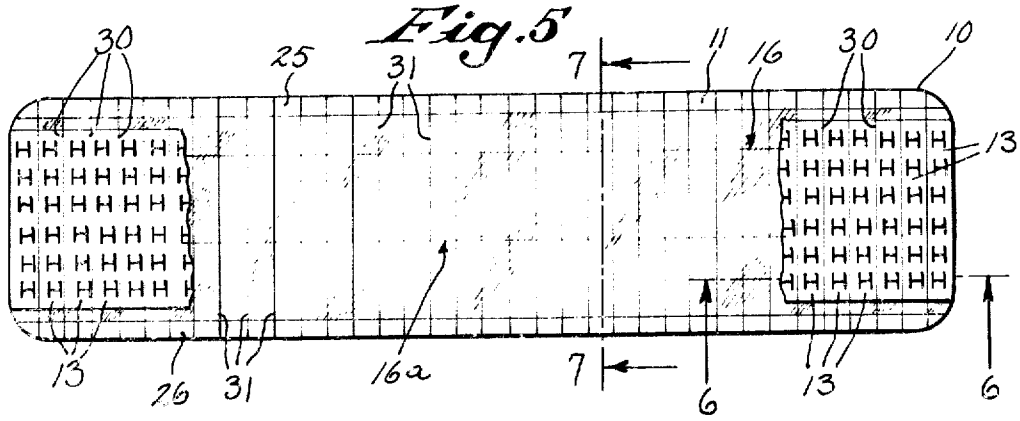


Fig. 6

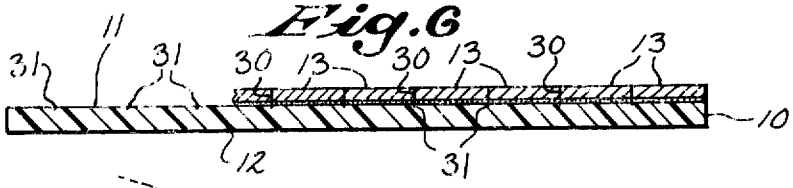


Fig. 7

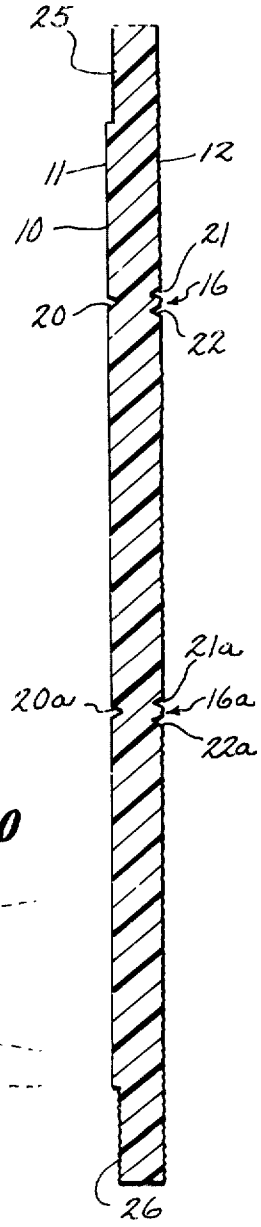


Fig. 8

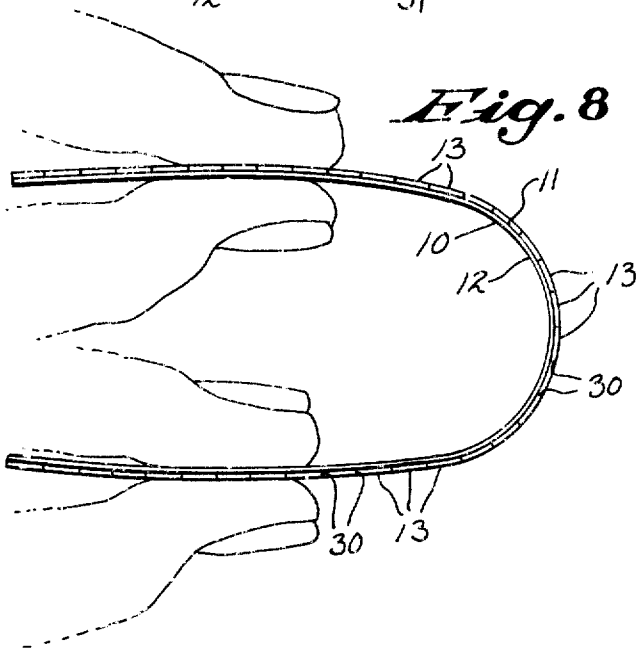


Fig. 9

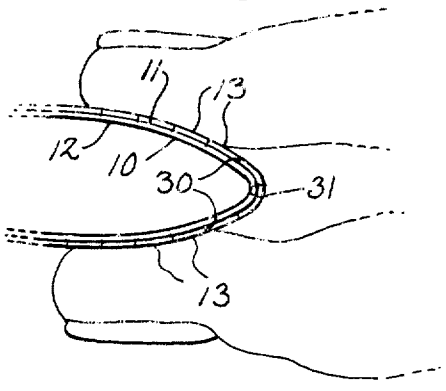
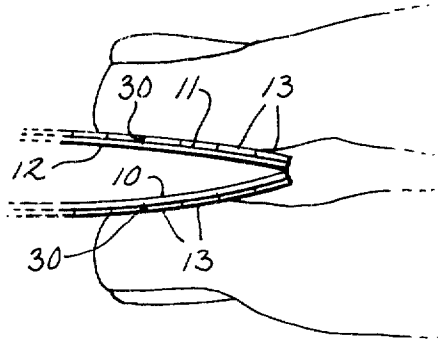


Fig. 10



STORAGE CARD FOR LABELS

This is a continuation of application Ser. No. 237,816 filed Mar. 24, 1972 now abandoned.

BACKGROUND OF THE INVENTION

1. Field

This invention relates generally to the field of storing and dispensing pressure sensitive adhesive articles; more particularly, it relates to the art of card mounting adhesive articles in a manner which will protect them until ready for use and yet admit convenient removal for application of the adhesive article to an object.

2. Description of the Prior Art

Card mounting of pressure sensitive adhesive articles is employed to obviate the inconvenience of roll-form packaging for some articles, particularly in those instances in which individual labels or characters are utilized. The storage card must perform a number of diverse functions in such a combination. Firstly, the card must furnish protection to the pressure sensitive adhesive layer of the article in order to protect it from contamination by dirt, etc., so that the adhesive layer will be in good condition when it is time to apply the article to an object. The card must also supply the function of displaying the adhesive article so that the user may select an appropriate label, or select an appropriate card carrying the desired labels. A third function which the storage card is called upon to provide is that of enabling rapid or convenient dispensing of the labels from the card backing. To this end, the card may be constructed to include a separable, or removable, portion so as to expose part of the label for removal from the card. The card material should be flexible enough to allow the separable portion to be flexed several times while only partially separated from the card so that it can be used to protect labels remaining on the card after some have been dispensed from it. Fourthly, a support or backing card of the type under consideration should have the characteristic of being able to retain its structural integrity if it is to be subjected to manufacturing operations such as printing, embossing and die-cutting, which occur when a sheet of pressure sensitive material is applied to a sheet of the card material and cutting operations are thereafter performed in order to make the individual labels. The card should be able to withstand the stresses involved in such operations without breaking or shattering.

The above and other characteristics needed for a suitable material for an adhesive label storage card are sufficiently dissimilar as to require a material having a balance of diverse properties, at least in those instances in which it is desired to provide a card with maximum utility and convenience of use. Materials which have been employed to attempt to meet these demands include concreted fibrous material such as vulcanized fiber or resin bonded pulp as disclosed in U.S. Pat. No. 2,434,545, cardboard stock, heavy paper, and plastic coated cardboard or paper. Fibrous materials, however, such as paper, cardboard and concreted vulcanized fiber stock exhibit a number of problems which affect their use as a label storage card. The susceptibility of these materials to moisture absorption causes variations in cracking of the card, curl, and uncertain performance of removable portions where used to expose parts of the label. Uneven absorption of release coating can result in variable release properties. The fibrous materials have a rough surface, and the surface roughness is also subject to considerable variation which can result in unpredictability or necessitate surface treatments to modify roughness to a selected level. Because fibrous materials are not homogeneous, they have a tendency to shred or delaminate along a cut line when a label is removed from the storage card, or when separating a removable strip from the balance of the card, which deficiency is also exhibited by plastic coated paper or cardboard storage cards; this can adversely affect performance of the label by causing card particles to cover portions of the adhesive. An important object of this invention is to provide a label storage card of a material which will avoid these difficulties and enable manufacture of a card with consistent performance and a high degree of utility and stability.

SUMMARY OF THE INVENTION

My present invention provides label storage and dispenser cards made of non-fibrous homogeneous synthetic plastic material. The plastic material has the characteristic of flexibility sufficient to enable bending of the card and repeated flexing of a removable strip thereof, in combination with the characteristic of rectilinear cracking upon a single flexion, particularly wherein such rectilinear cracking characteristic may be directable with suitable structure. The invention also provides a label storage card structure which incorporates dissimilar surface characteristics on opposed front and rear surfaces and is especially useful for synthetic plastic materials. In another aspect, my present invention provides a class of polystyrene plastic materials having particular utility for a label dispensing and storage card. It has now been found, and is hereinafter disclosed, that synthetic plastic materials can be employed as a label storage card incorporating the characteristics of flexibility, rupturability, resistance to manufacturing stresses, and the ability to be made with opposing surfaces having different degrees of smoothness.

A number of principal or main objects are sought to be attained by the present invention. Firstly, it is desired to employ synthetic plastic materials in a backing card for pressure sensitive adhesive labels in a more efficient manner than has heretofore been accomplished for such a purpose. Secondly, I desire to provide a structure for a label storage backing card which is effective to allow utilization of synthetic plastic materials for the card, particularly plastic materials of a type which can be extruded. It is further desired according to this invention to provide a plastic label storage card which can be fed through processing machinery such as die-cutting, printing and stamping machines used to make the cards, and also through dispensing machines such as those which remove labels from a card and attach them to an object. Lastly, it is desired to discover synthetic plastic materials which can satisfy the divergent conditions that must be met by a fully effective label storage card. A more specific object of this invention is to provide the particular details of structure and composition hereinafter set forth and claimed.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a front view of a label storage card in accordance with this invention;

FIG. 2 is a rear view of the card illustrated in FIG. 1;

FIG. 3 is a sectional view taken along the plane of line 3—3 of FIG. 1;

FIG. 4 is a perspective view illustrating a use of the dispensing card illustrated in FIG. 1;

FIG. 5 is a front view, with portions broken away, similar to the view of FIG. 1;

FIG. 6 is a partial longitudinal sectional view taken along the plane of line 6—6 of FIG. 5;

FIG. 7 is a vertical sectional view, on an enlarged scale, taken along the plane of line 7—7 of FIG. 5;

FIG. 8 is a side view illustrating bending of the dispenser card of this invention;

FIG. 9 is a side view illustrating an initial step in the cracking of a dispenser card of this invention; and

FIG. 10 shows the final step in cracking a card of this invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIGS. 1–4 illustrate one type of label storage and dispensing card in which the present invention may be embodied, it being understood that the invention also may be incorporated in other forms. These figures illustrate a rectangular card **10** carrying on its front face **11** a plurality of pressure sensitive adhesive labels **13** arranged side by side thereacross. The labels **13** as illustrated are the type generally known as "wire markers" and comprise a thin strip-like adhesive article about one and one-half inches long by one-quarter inch wide which is adapted to be wrapped around an electrical wire for identification thereof. As best noted in FIG. **3**, each label **13** comprises a body portion **14** with a layer **15** comprising a coating of pressure sensitive adhesive applied over one of its surfaces. The opposite surface of the body portion may be printed, colored or otherwise decorated, depending upon the intended purpose of the label. The body portion **14**, when made in a film shape, may be a single layer of suitable label material such as plastic film, metal foil or paper, or it may be formed of two or more layers combining similar or dissimilar films or coatings. Pressure sensitive adhesive as used herein refers to normally tacky, non-hardening adhesive which adheres to an object by the application of pressure alone. Suitable compositions are known in the art and will not be described in detail herein except to state that typical formulations include a rubbery polymeric material such as natural rubber, synthetic rubber, latex crepe rubber or rubbery synthetic polymers or copolymers compounded with compatible resinous tackifiers such as terpene resins, ester gum, etc., all dispersed in an appropriate solvent such as an aliphatic or aromatic hydrocarbon. The adhesive layer **15** is strongly bonded to the body **14** of the adhesive article so as not to delaminate therefrom.

In order to facilitate removal of individual labels from the card **10**, a horizontal zone of weakness **16** extends across the card as shown by the dotted line in FIGS. **1** and **4**. The weakened zone **16** is located underneath the labels near one end of each label, and the card **10** is to be rupturable along the zone **16** as shown in FIG. **4** so that a minor strip portion **17** can be separated from the balance of the card **10** to expose an end **13***a* of each label **13**. Such exposed end **13***a* can then be grasped for removal of a label from the card by the user. The card **10** is preferably scored or otherwise weakened in order to form the zone of weakness **16**; thus, a zone **16** can be defined by a continuous score line partially penetrating the card **10**, a line of perforations, a series of separated slits or score lines, a slit or score line combined with a row of tabs, and other constructions which will enable separation of the strip portion **17** or parts thereof. The drawings illustrate a particularly effective means for forming the zone of weakness **16**, comprising the construction illustrated in U.S. Pat. No. 3,038,597. As best shown in FIG. **3**, this includes a score line **20** formed along the front surface **11** of the card **10**, and a pair of spaced score lines **21** and **22** formed along the rear surface **12** of the card **10**. The score lines **21** and **22** are parallel to and spaced on either side of the score line **20**. This construction is particularly effective to enable separation of the strip **17** from the balance of the card **10** in the manner illustrated in FIG. **4**. A second set of similar score lines **20***a*, **21***a* and **22***a* (see again FIG. **3**) can be formed in the card **10** to provide another zone of weakness **16***a* spaced from the weakened zone **16**; this may be utilized when it is desired to have the labels **13** divided in half by a horizontal cut-line (not shown) to provide labels with half the height of those illustrated in FIG. **1**.

The description to this point illustrates prior art features of the card **10**. The present invention is related to the material of which the card **10** is made in one of its aspects, and to other structure thereof in another aspect.

As mentioned previously, the present invention relates to the material from which the card **10** is to be made and is based upon the discovery that synthetic plastic materials can be employed to make a successful label storage card provided they satisfy a number of physical characteristics which have been found to be critical in order to attain useful results. FIG. **8** illustrates the manner in which the card **10** when made according to the material of this invention has sufficient flexibility so that the card can be nearly folded upon itself in a 180° curve without breaking. Referring again to FIG. **4**, the card **10** has sufficient flexibility so that the strip portion **17** can be bent away from the labels **13** without breaking, and, after one or more labels have been removed from the card, the strip **17** can be folded back into its original position in which it underlies the labels remaining on the card. Thus, the material must exhibit back and forth or cyclic flexing in order to be adaptable to this type of use. Conversely, however, it is also desired that the card **10** be rupturable or breakable so that a user may break off a smaller portion when such best suits his purpose. Turning now to FIGS. **9** and **10**, the storage card **10** is shown therein as exhibiting the characteristic of being rectilinearly crackable upon a sharp bend. As will be discussed in detail below, this fracture action best takes place along a shallow score line. The most useful form of rupture is a sharp cracking along a straight line to provide a clean break, and should take place between adjacent labels so as not to damage labels on the front surface of the card. Furthermore, the illustrated rupturing should occur upon a single flexion of the card in a direction away from the labels carried on its front surface. If the card is made of material which must be cracked by using a cyclic motion or back and forth action, requiring bending in a direction in which the labels **13** are along the interior of the bend in addition to bending in the direction shown in FIGS. **9** and **10** wherein the labels **13** are along the exterior of the bend, the labels on the front surface of the card could be damaged by reason of the hinging action which would take place. Hence, the rectilinear cracking action of the card is to take place

along a single flexion or bending of the card in a direction away from the labels i.e., wherein the labels are along the exterior of the bend as shown in the drawings. Thirdly, the plastic material for the card **10** must be tough enough to resist breakage or shattering when undergoing manufacturing operations as occur when a sheet of label material is first adhered to a sheet of the backing material and then the label material is die-cut and otherwise processed to form the individual labels. For example, die-cutting is often performed by cutting the label material with a knife while the label-backing composite is backed up with a steel cylinder. Printing, embossing or stamping operations also may subject the card to relatively high and localized forces. Thus, in summary, the plastic material of the card **10** must be flexible enough to exhibit cyclic bending, brittle enough to have rectilinear crackability, and yet be tough enough to resist stresses imposed during die-cutting, printing and embossing operations.

It has been found that non-fibrous, non-laminar, non-cellulosic synthetic plastic material having the following characteristics can be employed for a satisfactory label storage card: (1) material with an Izod impact strength of about 0.5–3.0 foot pounds per inch of notch at 73° F, as measured by ASTM D-256, utilizing a compression molded ⅛ inch thick specimen; (2) a tensile elongation at yield of about 1.0 to 2.5% as determined by ASTM D-638 or D-1708, and (3) a tensile modulus of about 200,000–400,000 psi as determined by ASTM D-638 or D-1708. Polystyrene modified with rubbery materials such as styrene-butadiene copolymer have proved to be especially useful for the card **10** and has physical specifications within the parameters set forth above. Some examples of specific materials of this type which are available commercially are those sold under the tradenames Dow Styron 453A and UCC Bakelite TGDE-6600. A card of the foregoing materials that is 18 mils thick gives excellent results; in general the card **10** may be from about 10 to 25 mils thick for most applications, although thicker or thinner sizes may be used in an appropriate instance.

Another aspect of the invention will now be described with respect particularly to FIGS. **5–7.** One of the difficulties of satisfactorily employing a synthetic plastic material as a label dispenser or storage card as described above is that such materials generally have a very smooth or low friction surface which makes it difficult to print on them and which causes difficulty in feeding the card through mechanical apparatus. To obviate these problems, the card **10** is constructed in such fashion that its front and rear surfaces have different degrees of smoothness, with the front (or label storage) surface being smoother than the rear surface **12.** This provides the advantage of having a very smooth surface underlying the adhesive layer **15** of each laber **13** which is carried on the front surface of the card, which has the effect of improving the adhesion and tack of the layer **15.** The second advantage obtained with this structure is that the rough rear surface **12** provides a surface which can be readily printed so that instructions and other necessary data can be carried thereon, and also provides a rough surface which facilitates feeding the card **10** through processing machinery such as printing, die-cutting and stamping machines used to manufacture the cards and through dispensing machines which remove labels **13** from the front side and wrap them around an object. The differential surface roughness is obtained by extruding the plastic material to be employed for the card **10** through a die into the nip between two rollers, with one roller being very smooth to form the front surface and the other roller having a roughened surface to form the rear surface of the extruded sheet.

FIG. 7 schematically represents the difference between the smooth front surface **11** and the rougher rear surface **12.** The two surface smoothness characteristics which will produce results satisfactory for the practice of the present invention can be quantitatively measured by use of an instrument such as the Profilometer Amplimeter, Type QA, made by Micrometrical Mfg. Co. which measures the average height of surface irregularities and is widely used in the metal finishing art. Suitable results are attained when the front or label-carrying surface has surface irregularities or bumps with an average height in the range of 0 to about 15 RMS (root mean square) microinches, and the rougher rear surface **12** has surface irregularities with an average height of over about 20 RMS microinches. Within this broad range, a preferred range is that in which the smoothness of the label-carrying surface is about 0 to 2.0 RMS microinches and the smoothness of the opposite surface is about 20 to 350 RMS microinches. (Typically, there may also be a visual distinction in the glossiness of the two surfaces finished within these specifications in which the front surface will have a smooth glossy appearance while the rear surface will have a rougher matte finish. Thus, the front surface **11** can have a gloss measurement in the range of 50–55 and the rear surface a gloss measurement in the range of 30–35, both measured on a Gardner 60PG-3 reflectometer at a 60° angle of incidence.)

To illustrate the enhancement in adhesion and tack achieved with a label storage card having a smooth label-carrying surface, adhesive tape was laminated on two different storage cards: Card A comprising a card **10** of this invention made of a modified polystyrene with a label-carrying surface having a smoothness of about 1.5 ± 0.5 RMS microinches, and Card B comprising a prior art card made of vulcanized fiber material with a label carrying surface having a smoothness of about 90–130 RMS microinches. After lamination, the samples were stored at room temperature conditions for 14 days. The peel adhesion and tack of the samples were measured according to procedures published by the Pressure Sensitive Tape Council, PSTC-1 being used for peel adhesion and PSTC-5 used for measurement of tack. For both tests, the tape samples were removed from their storage cards and tested against a standard steel surface. Peel adhesion is the force required to remove a tape sample from the steel surface at a specified angle and speed, and tack is the property which causes the tape to adhere to the surface instantly without using external pressure to secure more thorough contact. Both tests produce values which are expressed in terms of ounces (of force) per inch of width (of tape samples). Statistical analysis of data from 50 random samples of each of the two cards showed that the peel adhesion of the adhesive when stored on Card A had a mean value of 44.7 oz./in. while the peel adhesion of the same adhesive when stored on Card B had a mean value of 27.6 oz./in., and the tack of the adhesive when stored on Card A had a mean value of 26.2 oz./in. but the tack of the same adhesive stored on Card B had a mean value of 18.9 oz./in. (Sta-

tistical test of these data for significance showed the difference is significant at the 99% level of confidence.) These results show that tape stored on a card of this invention can exhibit enhanced adhesion and tack when removed from the card and applied to another surface. Apparently, the pressure sensitive adhesive layer developes a surface texture which is acquired from and influenced by the surface upon which it is stored. This beneficial improvement in adhesion and tack is attained with the card of this invention by incorporating a smooth label-carrying surface as a structural feature and using materials which can be made in such construction, particularly in a consistent and reproducible manner.

The labels **13** are to be "releasably joined" to the card **10** along their adhesive layers so that they can be held on the card during storage but removed therefrom without serious delamination or stripping away of the adhesive **15** from a label. The front surface **11** of the card **10** can be coated or impregnated with suitable release materials in order to obtain a releasable joinder of this type, silicone coatings being known for such purpose in the art, as well as diverse other types. The front surface may be suitable pre-treated, chemically or physically, to obtain adherence of a release coating if such is necessary in view of the particular materials involved.

Thus, the front surface of the card under the adhesive layer **15** of the labels is to form a releasable zone to allow removal of labels therefrom without delamination or transfer of the adhesive. However, FIGS. **5** and **7** illustrate a further effective structural feature which may be incorporated in the card **10** comprising an upper edge portion **25** and a lower edge portion **26** which extend across the card. The edge portions **25** and **26** are to comprise zones having a non-release characteristic relative to the adhesive so as to provide frictional edge portions which can be gripped by mechanical elements such as rubber or metal rollers and the like so that the card can be transported through a machine by engagement along its front and rear surfaces. Also, the marginal frictional zones **25** and **26** provide portions which can be printed if informative or instructive data is required on the front of the card. A release coating is too smooth and slippery to allow either of these to be done. The zones **25** and **26** (only one need be used if desired) can be made by several techniques. If the card **10** is release coated to provide a releasable zone under the labels, the coating can be removed along the edges by chemical or mechanical means to form the zones; also the release coating can be overcoated to form the frictional zones. Further, the zones can be made with a roughened texture as employed on the rear surface of the card. The terms "frictional" or "free of release coating" as used in some of the claims are meant to encompass these several constructions for a marginal zone such as **25** or **26.**

As best shown in FIG. **5**, after a sheet of adhesive material has been joined to a sheet of material for the card **10**, die-cutting is carried out to cut the sheet into the individual labels along vertical cut lines **30.** During the formation of such vertical cut lines **30,** advantageous results are obtained by setting the mechanism so as to form very shallow score lines **31** in the front surface **11** of the card **10.** The score lines **31** thusly made are very shallow, generally on the order of about 5% of the total thickness of the card **10,** and form rupture-directing zones for controlling the rectilinear cracking of the card **10.** When the card is sharply bent as shown in FIGS. **9** and **10,** the bend is positioned so that its sharpest point will be between adjacent labels, and the shallow score line **31** on the front of the card **10** will insure that a sharp straight break is achieved between labels.

There has thus been described a new label storage card made from a non-fibrous, non-laminar and non-cellulosic synthetic plastic material having specified characteristics. The material as described exhibits a balance of the properties of toughness that is sufficient to resits shattering during die-cutting and other manufacturing operations, flexibility to a degree that enables cyclic manipulation of the card or portions thereof, together with brittleness to allow rectilinear crackability so a user may rupture the card in several portions, as well as low elongation so as to aid in achieving a clean break. The card material of the present invention also exhibits the beneficial effect of being resistant to dimensional change when subjected to varied moisture conditions. This is an aid to manufacturing operations and can enhance performance in certain dispensing equipment; in contrast, fibrous cardstock as typically used heretofore is relatively sensitive to changes in humidity and can produce adverse effects in these situations because of absorbed moisture and the variable nature of such absorption. The synthetic plastic storage card of the present invention additionally possesses the characteristic of rectilinear crackability upon a single flexion in a direction opposite from the surface on which the labels are stored; this crackability is directable through the use of scoring structure formed in the card, preferably simultaneously with die-cutting of labels thereon. The new card structure herein discloses another feature of the present invention which enables particularly efficacious utilization of synthetic plastic materials of the foregoing features in a label storage card by providing opposed surfaces with differing degress of smoothness which can be attained through the use of extrusion techniques for manufacture of the card. The above advantages and others described herein are realized through the use of a material which allows the manufacture of label storage cards having constant characteristics instead of being subject to variations as was true with many prior art materials. The foregoing novel features are taught by the disclosure of this invention in sufficient detail to enable those skilled in the art to fully comprehend its various aspects, it being understood that the preceding description is made with reference to particular illustrative embodiments which are intended to exemplify but not limit the present invention; it is expected that those skilled in the art can devise changes to the embodiments as described and devise other embodiments, all of which will remain within the true spirit and scope of this invention.

I claim:

1. In a combination including an adhesive article of the type having a layer of pressure sensitive adhesive and a storage card about **10** to **25** mils thick for supporting the adhesive article,

the improvement wherein:

the storage card is characterized as being made of a homogenous non-fibrous synthetic plastic material having (1) an Izod impact strength of about 0.5 to 3.0 foot pounds per inch of notch, (2) a tensile elongation at yield of about 1.0 to 2.5%, and (3) a

tensile modulus of about 200,000 to 400,000 psi., the adhesive layer of the adhesive article is releasably joined to a first surface of the storage card,

the storage card is rectilinearly crackable upon a single flexion in a direction away from the adhesive article on its first surface and also flexible to permit cyclic bending without cracking and the first surface of said storage card has a smoothness with surface irregularities in the range of 0 to 15 RMS microinches underlying the pressure sensitive adhesive article supported thereon, and a second surface of the card opposite from the first surface has a smoothness with surface irregularities in the range of more than about 20 RMS microinches.

2. The combination of claim 1 wherein:

the first surface has a releasable zone for releasable joinder thereto of the adhesive layer of an adhesive article, and includes at least one frictional marginal zone having a smoothness with surface irregularities in the range of more than about 20 RMS microinches positioned adjacent the releasable zone.

3. The combination of claim 1 wherein:

the storage card includes score means disposed along its first surface for directing rectilinear cracking of the storage card upon a single flexion.

* * * * *