

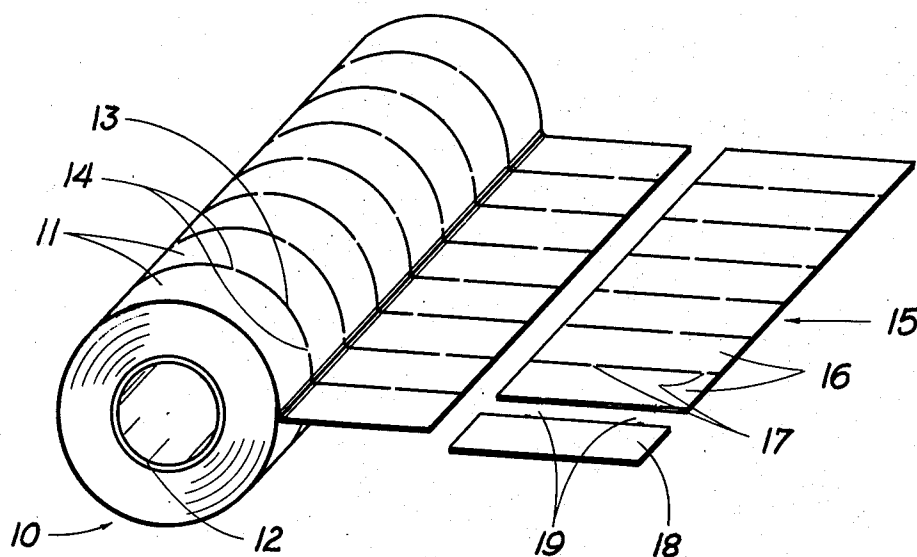
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ROLL OF ADHESIVE TAPE

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ROLL OF ADHESIVE TAPE

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1 Claim. (Cl. 206—56)

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This invention is concerned with normally tacky and pressure-sensitive adhesive tape, particularly as it is used in the reinforcing of leather for shoe uppers and the like. Specifically, the invention concerns such shoe tapes in multiple-strip roll form wherein the contiguous strips are firmly but detachably inter-connected.

Strong, heavy fibrous adhesive tape is customarily applied as a reinforcement to the thin leather of shoe uppers at the back of the area designated for insertion of the lacing eyelets. Normally tacky and pressure-sensitive adhesive tape designed for this purpose has become known as "eyelet stay-tape." In such application, individual tape sections may be cut from a roll and applied to the work as they are cut. A more efficient method is to pre-cut a number of strips to the exact size required. The strips may then be applied in the usual way. Cutting of the strips from a single roll of tape is time-consuming and inaccurate, and in any large-scale operation requires frequent replacing of rolls. Multiple-strip rolls in which each separate strip partially overlaps the backing of the next adjacent strip have been suggested, as providing a relatively large number of identical sections with a single cutting action; but such rolls are difficult to wind, do not unwind smoothly, and are unnecessarily large in diameter. Another suggested system involves placing partly or wholly separated sections of the tape on a liner or slip-sheeting from which individual sections may later be removed as needed. The liner is then discarded, which represents a wasteful and uneconomical practice.

It is therefore an object of the present invention to provide a fibrous adhesive tape product in roll form which avoids the defects and disadvantages of prior art products and methods. A more specific object is to provide a roll of adhesive-coated fibrous sheet material in the form of at least six contiguous tapes or strips of desired width, each individual strip being detachably united with contiguous strips in such a way that the composite sheet is easily and smoothly wound into roll form and unwound therefrom, and such that the sheet material after unwinding may be cut into transverse portions of convenient size, from which portions individual accurately sized pieces or sections of tape may be readily detached as needed.

The invention will be more readily understood by reference to the accompanying drawing, showing in perspective an exemplary roll of the adhesive-coated fibrous sheet material, from the

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unrolled end of which a full-width portion, consisting of eight contiguous and detachably united sections, has been cut, one of such sections being detached therefrom.

Referring to the drawing, the roll 10 is seen to consist of contiguous strips 11 wound upon a single core 12, the strips being separated at slits 13 but at the same time detachably held together by minute connecting areas 14. This relationship is maintained during unwinding of the composite sheet and also when a terminal transverse portion 15 is cut off. This latter portion may then conveniently be handled as a unit, the individual sections 16 thereof being held together by the narrow connecting areas 17. However, when an individual section 18 of the tape is required, it is easily detached from the multiple-strip segment 15 by breaking the narrow connecting areas, as shown at 19.

One specific adhesive tape product which has been found acceptable as an eyelet stay tape for shoes is made in accordance with the following example. A thick, porous creped paper having a multidirectional stretch characteristic, obtained by a double creping operation with the two sets of creping lines at right angles, is selected as the backing. The paper has an apparent thickness of about 17 mils and a base weight of 70 lbs. per 320 sq. yds. It is first coated on the back side with about 30-35 grams per sq. yd. of a low-adhesion backsize composition, applied from solution in a mixture of two parts xylol and one part butyl alcohol. The backsize composition consists of four parts of polyvinyl butyral resin, two parts of hydrogenated castor oil ("castor-wax"), and one part of stearic acid, blended together at an elevated temperature in the presence of 1-2% of a rubber antioxidant, e. g. para-hydroxy-phenyl-morpholine. The mixture forms a substantially continuous coating on the surface of the paper, and also penetrates part way into the web.

The backing is then coated on the uncoated or face side with a water-insoluble, normally tacky and pressure-sensitive adhesive of the rubber-resin type, e. g. a blend of 100 parts of crude rubber, 50 parts of zinc oxide pigment, 100 parts of wood rosin, and 1-2 parts of an antioxidant, applied from solution in an amount of heptane sufficient to impart a suitable coating viscosity. A total weight of about 225-250 grams per sq. yd. of the dried adhesive is effective in partially impregnating the backing and forming a uniform, adherent surface coating. The sheet as thus prepared may be wound up on itself in roll form

and unwound therefrom without delamination or offsetting of the adhesive.

The coated sheet is next converted to the multiple-strip roll form illustrated in the drawing, by passing the web between a row of notched circular slitter knives and a hardened metal score roll. The knives are radially sawed or notched at equal distances around their circumferences and to an extent such that the web is alternately slit for about $\frac{15}{16}$ inch, then left unslit for about $\frac{3}{4}$ inch or slightly less. After slitting, the tape is wound up on a core to provide a roll of contiguous and partially connected strips of tape, as shown in the drawing.

The above example represents one specific embodiment of the invention. A number of equivalent structures will be apparent to those skilled in the art on consideration of the description and teaching appearing herein, and all such equivalents coming within the scope of the invention and the appended claim are contemplated. Fibrous paper backings may be used which vary considerably from that hereinabove specifically described in weight, caliper, porosity, type of fiber, flexibility and stretchability, and other characteristics, and such backings are believed to be well-known in the shoe-findings art. Equivalent non-woven fibrous webs other than true paper, e. g. short-fibred cotton wadding, may be used. Shellac, cellulosic esters of higher fatty acids, blends of alkyd and urea-formaldehyde resins, and other known low-adhesion backsize compositions may replace the particular composition of the above example, either as a backsize or, in some instances, as a partial impregnant also. The fibrous backing may initially be treated or impregnated for improved strength, water-resistance, or other properties, one suitable exemplary treatment consisting of a blend of rubber (or solubilized reclaimed rubber) and resin applied from dilute solution in a volatile hydrocarbon solvent.

The adhesive may be one of the various rubber-resin type pressure-sensitive tape adhesives, well known in the art, which are water-insoluble and aggressively tacky. One such adhesive is described in connection with the specific description appearing hereinbefore; others have been described in previously issued patents; cf. U. S. Patents Nos. 1,760,820, 2,227,444, 2,236,527, 2,410,078, 2,410,089, 2,438,195. These adhesives have a rubbery base of natural or synthetic rubber which provides cohesion (internal strength) and elasticity (a retractive force when stretched and retraction when released after stretching); and this rubber base is modified by blending with a compatible tackifier resin (such as rosin or ester gum) which serves to increase adhesion (tackiness) and decrease cohesion, with an attendant increase of stretchiness (elongation under low stresses) and decrease of elasticity. Certain synthetic polymers inherently possess an equivalent four-fold balance of properties and can be used as pressure-sensitive tape adhesives, thus being equivalents of the rubber-resin adhesives and hence they may be regarded as being of the rubber-resin type. An example is a 75:25 copolymer of 2-ethyl-butyl-acrylate and ethyl acrylate.

As previously described, the preferred eyelet stay tape roll structure consists of at least six, and preferably about twelve, contiguous but separate strips of heavy fibrous adhesive tape detach-

ably held together by recurring narrow connecting areas of the fibrous backing, such areas representing only about 4% of the total longitudinal edge of the tape and being separated along such edge by about $\frac{7}{8}$ inch. Surprisingly, it has been found that this small connecting area not only provides ample strength to withstand the stresses involved during winding and unwinding of the roll and during removal of the terminal portions 15, but also produces substantially no observable disruption of the edge when the individual sections are detached. On the contrary, strips connected at less than about $\frac{1}{2}$ - $\frac{3}{4}$ inch intervals, e. g. at $\frac{1}{4}$ inch intervals, are found to have an undesirable jagged and irregular edge when detached from the contiguous strip, even though the width of the individual connecting areas is correspondingly reduced. Connections at intervals much greater than about one inch are undesirable in the case of eyelet stay tapes, since the individual tape sections are usually of the order of $\frac{1}{2}$ x $1\frac{3}{4}$ inches and it has been found that at least two connecting points between two contiguous strips are desirable.

Within the limits of about $\frac{1}{2}$ - $1\frac{1}{4}$ inch separation and about 3-8% connection, contiguous strips of fibrous adhesive tape such as the eyelet stay tape herein described are found to be adequately held together under all normal stresses incident to manufacture and handling, and to be readily detachable as desired for application. This result is believed to be partly due to the combination of the low-adhesion backsize, the fibrous backing, and the cohesive, normally tacky and pressure-sensitive adhesive. The low-adhesion backsize permits easy unwinding from the roll of a tape product having desired highly aggressive tackiness toward leather and other surfaces. The fibrous backing resists tearing at the connecting areas during slitting and winding. The tacky adhesive tends to flow together at the contiguous cut edges and aids the connecting areas of the fibrous backing in maintaining the strips in side-by-side relationship.

Having now described various embodiments of our invention for purposes of illustration, but without intent to be limited thereto, what we claim is as follows:

A roll of adhesive tape material comprising a flexible non-woven fibrous backing having a low-adhesion backsize and continuously coated on the face-side with a normally tacky and pressure-sensitive adhesive of the rubber-resin type, wound upon itself in roll form, and formed of at least six continuous lineal tape strips firmly but detachably held together in side-by-side relationship by minute connecting areas thereof which are lineally spaced apart about $\frac{1}{2}$ - $1\frac{1}{4}$ inch, the said adhesive bridging the contiguous cut edges of adjacent strips of said backing to provide additional holding means between said strips.

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