

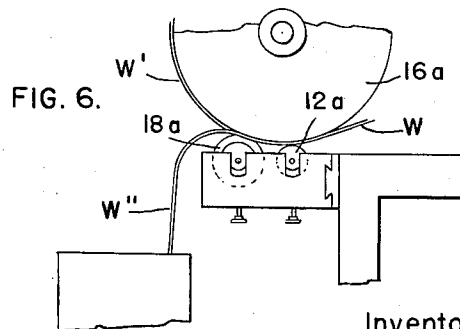
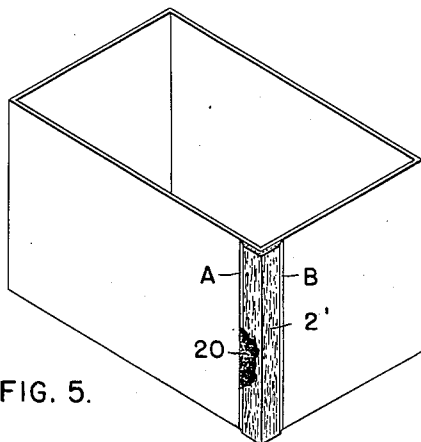
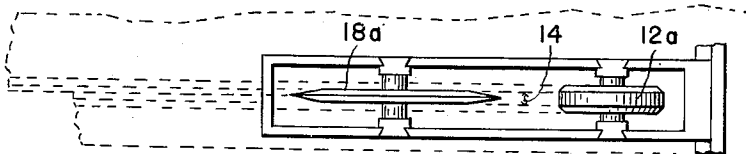
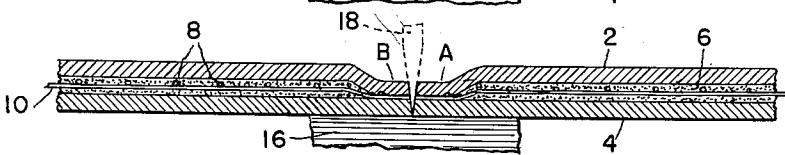
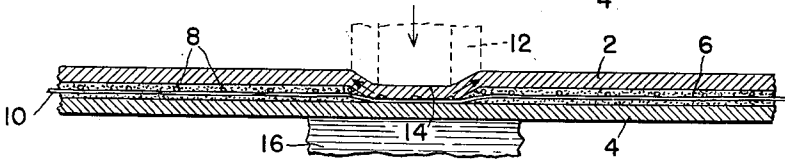
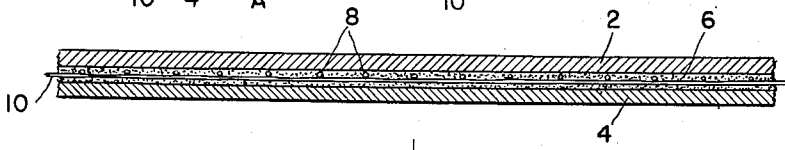
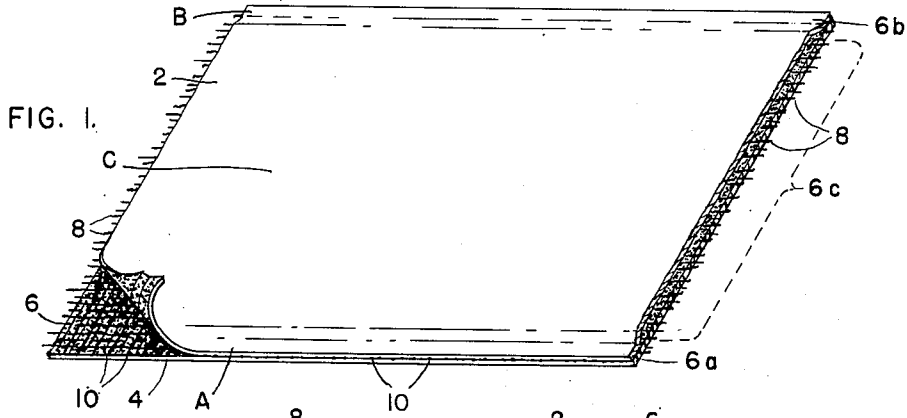
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ADHESIVE LAMINATED PAPER AND BOX STAY TAPE

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ADHESIVE LAMINATED PAPER AND
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4 Claims. (Cl. 154—53.5)

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This invention relates to adhesive laminated paper and to its manufacture, more particularly to wrapping, packaging and building paper, consisting of two sheets of paper adhesively secured together by a waterproof adhesive in which re-

reinforcing fibers are embedded. My invention has for its primary object to provide a laminated paper of novel characteristics which affords certain improvements over similar papers available heretofore.

Fiber-reinforced adhesive-laminated papers now in extensive use are double coated with adhesive, one coating being applied to each sheet before they are combined. When combined, the adhesive layer is in effect composed of several strata. The adhesive contacted by the paper is absorbed by the paper and becomes bonded to it. Between these bonded strata most of the adhesive is in a free state susceptible of plastic flow.

A primary disadvantage in such papers is that when they are cut the free adhesive is left exposed along the marginal cut edges and has a tendency to flow out from between the plies. When the paper is used to wrap articles such as furniture, and especially when exposed to high temperatures, the free adhesive flows out along the marginal edges and adheres to the wrapped article. If the adhesive is asphalt, as commonly used, it stains the wrapped article near the marginal edges of the paper. If the paper is used to cover concrete during the curing process, the adhesive at the marginal edges stains the concrete. As a box stay tape for securing the corners of corrugated boxes, where double adhesive coatings are commonly used, the free adhesive exposed at the edge not only stains the box but also results in edge separation due to scuffing. Oxidation of the free adhesive at the marginal edges results in deterioration of its adhesive qualities so that ply separation first occurs at the edge.

In accordance with my invention, the marginal edges of the laminated paper are substantially devoid of free adhesive and are secured together by adhesive which has become bonded to the paper by absorption therein. The edges of the paper are also secured to the fiber reinforcing by adhesive that has been absorbed by the paper and by the reinforcing fibers. My sheet presents a layer of adhesive of a different thickness throughout the major body portion of the sheet than at and adjacent the marginal cut edges thereof and these two thicknesses are variable substantially independently of each other. Thereby, the sheet may be single or multicoated to build up an ad-

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hesive layer of any thickness desired for particular uses of the paper, and yet the paper may be substantially devoid of free adhesive along the marginal edges.

In its method aspect, my invention provides the desired thickness variations of the adhesive layer and the elimination of free adhesive from the marginal edges preferably by first building up, by single or multi-coatings, a layer of the thickness desired for the body portion of the sheet, and then extruding the free adhesive from an elongated area along which the edge forming cut is to be made. The extrusion is effected by pressing the sheets together and against the fiber reinforcement in the elongated area.

In the drawings:

Fig. 1 is a perspective view of a multiply sheet embodying my invention.

Figs. 2, 3, and 4 are diagrammatic views transversely of the sheet showing the steps in my preferred method of making the sheet.

Fig. 5 shows the sheet in use as a box stay tape, which is one of a wide variety of different uses to which my sheet may be adapted.

Fig. 6 is a side elevation view of apparatus that may be employed in the manufacture of the sheet, and

Fig. 7 is an enlarged detail plan of the pressing and cutting elements of the apparatus, looking upwardly from below Fig. 6.

The multiply sheet shown in Fig. 1 has an upper ply 2 and a lower ply 4 of kraft paper adhered together by asphalt or similar adhesive 6 in which are embedded reinforcing fibers 8 running lengthwise of the sheet, and 10 running transversely thereof. The reinforcing fibers are preferably unspun and unwoven fibers, such as sisal. To insure adequate moisture-proofness and resistance to moisture vapor of a sheet having such embedded reinforcing, it is desirable to provide an asphalt layer 6 of substantial thickness and in practice two coatings of asphalt are employed, one applied to each sheet before they are combined. The layer of adhesive 6 thus formed from the combined coatings is absorbed by and bonded to both sheets of paper in its outermost strata leaving an intermediate strata which is not so absorbed but is in a free state susceptible of plastic flow except for any adhesive absorbed by and bonded to the reinforcing fibers 8 and 10.

The body portion C of the sheet is bounded by marginal edge portions A and B, the sheet being illustrated in Fig. 1 as of indefinite length. In accordance with my invention, the layer of asphalt 6 is not uniform in thickness throughout

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the sheet but is substantially thicker in the body portion C, as shown at 6c, than at and adjacent the marginal edges, as indicated at 6a and 6b. This difference in adhesive thickness is due to the presence of free adhesive throughout the body portion 6c of the adhesive and the substantial absence of free adhesive from the marginal edges 6a and 6b.

In the manufacture of such multiply sheets, the adhesive layer 6 is first built up between the upper and lower plies 2 and 4 to the thickness desired for the body portion of adhesive 6c, so that the asphalt is initially applied in a layer of uniform thickness containing both the bonded and the free adhesive co-extensive with the entire paper area. This is shown diagrammatically in Fig. 2 which is a sectional view taken transversely of the sheet.

Reinforcing fibers 8 extending lengthwise of the sheet, and 10 extending transversely thereof, are applied during fabrication of the sheet by the use of apparatus well known in the art of reinforcing papers.

The free adhesive is then extruded, in part at least, from an elongated area 14, of predetermined width, by the application of pressure, as indicated by the pressure applying element 12, Fig. 3. The upper ply 2 is depressed toward the lower ply 4 throughout the area of pressure application which has the effect of extruding free adhesive from the area 14 as indicated by arrows. During this pressure applying step, the paper is suitably supported at 16 so that the lower ply 4 is preferably not depressed but remains in a single plane. Thereafter, the paper, while still supported at 16, is severed by a knife 18 (Fig. 4), the knife also acting to sever the transverse reinforcing fibers 10 which are left exposed along the cut edge. This operation will produce the marginal edge B, for example, of a wide sheet embodying my invention and leave the cut away portion as waste trim or, if narrow tape widths are being made, this operation will also form the marginal edge A of the next laterally adjacent tape.

Suitable apparatus is indicated in Figs. 6 and 7. A web of paper W composed of upper and lower plies adhered together with a layer of asphalt of consistently uniform thickness in which the reinforcement is embedded is introduced around the roller 18a serving as a support during the pressing and cutting operations. The pressure applying element 12 is in the form of a roller 12a mounted in spring pressed bearings which are adjustable to press the roller against the web with desired firmness. Knife 18a is in the form of a rotary cutter also spring pressed against the paper. The pressing roller 12a forms the elongated depressed area 14 as indicated in Fig. 7 and the cutter 18a is aligned with the roller 12a to effect the cut substantially along the mid-line of the depressed area 14. The severed portions of the web W are indicated at W' and W''.

In the manufacture of multiply sheets embodying my invention, the thicknesses desired for the asphalt layer in the area C of the sheet and along the marginal edges A and B are first determined with respect to the particular use for which the sheet is intended. Thus, for wrapping furniture and other large articles where considerable waterproofness is desired, despite the embedded reinforcing fibers, a thicker layer of adhesive is provided in the body portion C than where the sheet is to be used for box stay tapes, for example.

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The pressure applied by the element 12a is then regulated to extrude the desired quantity of free asphalt from the marginal edge portions of the sheet, after which the sheet is severed. The application of pressure has the effect not only of removing a large portion of the asphalt adhesive which would normally be present along the cut edge, but it is also effective to compact the edge around the reinforcing fibers extending transversely of the sheet and which are cut off by the knife element 18a. Thus, despite the substantial thickness of asphalt throughout the body portion of the sheet, very little asphalt is exposed along the cut edge which nevertheless is securely adhered together to minimize delamination of the plies during use. The cut off ends of the fiber reinforcement are embraced by the thin surrounding layer of asphalt so that ingress of moisture by capillary action along the fibers is minimized. Oxidation of the asphalt by exposure to atmosphere along the cut edge is also reduced so that, as the sheet ages during use, the asphalt preserves its integrity and adhesive qualities, thus further contributing to the avoidance of ply separation.

In box stay tapes, the specifications may call for quite different thicknesses of adhesive, as above noted, and they may readily be obtained. Such tape may be provided, as is well known in the art, with gumming or other adhesive on one of the exposed outer surfaces thereby to secure the tape about a box corner. Where one of the outer plies is creped to enhance stretchability about a box corner, the gumming or other adhesive is applied to the exposed tape surface most remote from the creped ply, or directly to the box corner. The tape preferably has reinforcing fibers running only in a transverse direction, since the longitudinal reinforcement is unnecessary, and the outer ply 2' (Fig. 5) is creped in a direction to give the strip transverse stretchability minimizing rupture of the outer ply as the tape is bent around a box corner and adhered thereto by adhesive 20. My invention is particularly well adapted for the provision of multiply sheets intended for use as box stay strips because of the avoidance of delamination despite the narrowness of the strip. If the longitudinal side edges A and B of the tape are formed as above described, it is usually not necessary to form the transverse end edges of the tape in the same way, although in wider sheets used for wrapping that may be desirable.

I claim:

1. As an article of manufacture a multiply sheet composed of superposed layers at least one of which is of paper compressed together and secured by an interposed layer of adhesive having reinforcing fibers embedded therein, the adhesive layer being substantially thinner at and adjacent the lateral edges of the sheet than throughout the remaining body portion thereof, the said lateral edges presenting cut fiber ends and being more highly compressed than the body portion so that the edges are securely bonded against delamination.

2. A box stay tape composed of superposed plies of paper, one of which is creped to enhance its stretchability transversely when bent around a box corner, the layers being compressed together and adhered by an interposed layer of adhesive in which are embedded reinforcing strands extending transversely of the tape and exposing cut ends at the tape edges, the said adhesive layer being substantially thinner at and

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adjacent the lateral edges of the tape than throughout the remaining body portion thereof, and the lateral edges being more highly compressed and compacted around the exposed reinforcing fiber cut ends than the body portion of the tape so that the edges are securely bonded against delamination.

3. As an article of manufacture a multiply sheet comprised of superposed layers, at least one of which is of paper, compressed together and secured by an interposed layer of adhesive having reinforcing strands embedded therein which strands extend transversely of the sheet to expose cut fiber ends at its lateral edges, said layer of adhesive being substantially thinner at and adjacent the said lateral edges than throughout the remaining body portion thereof by virtue of the said edges having been more highly compressed than the remaining body portion of the sheet, so that the edges are securely bonded against bleeding of the adhesive from said remaining body portion, and adhesive on the ex-

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posed surface of one of the outer layers whereby the sheet may be secured to another surface.

4. The box stay tape as described in claim 2 wherein the exposed surface of the paper ply most remote from the creped ply is provided with gumming to secure the tape to one or more surfaces of a box or carton.

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