

March 12, 1940.

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2,193,053

MANUFACTURE OF STAY TAPES

Original Filed June 9, 1936

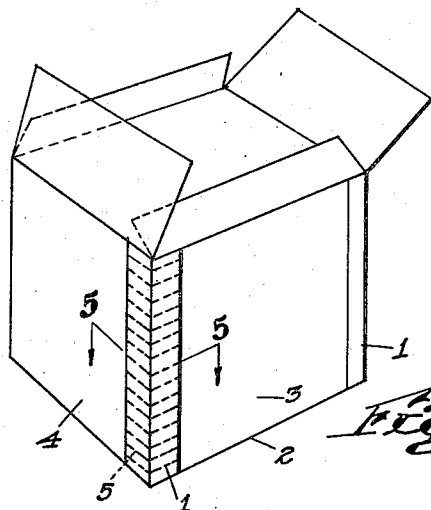


Fig. 1.

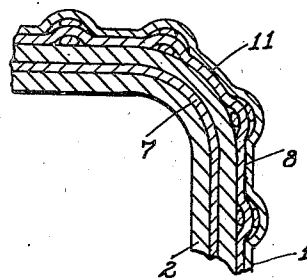


Fig. 5.

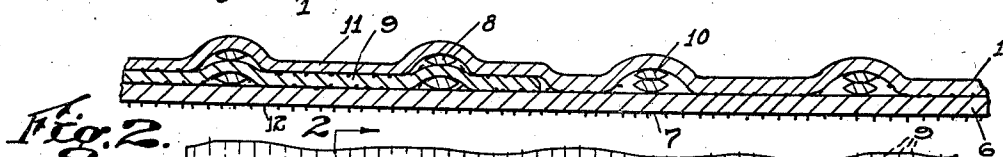


Fig. 2.

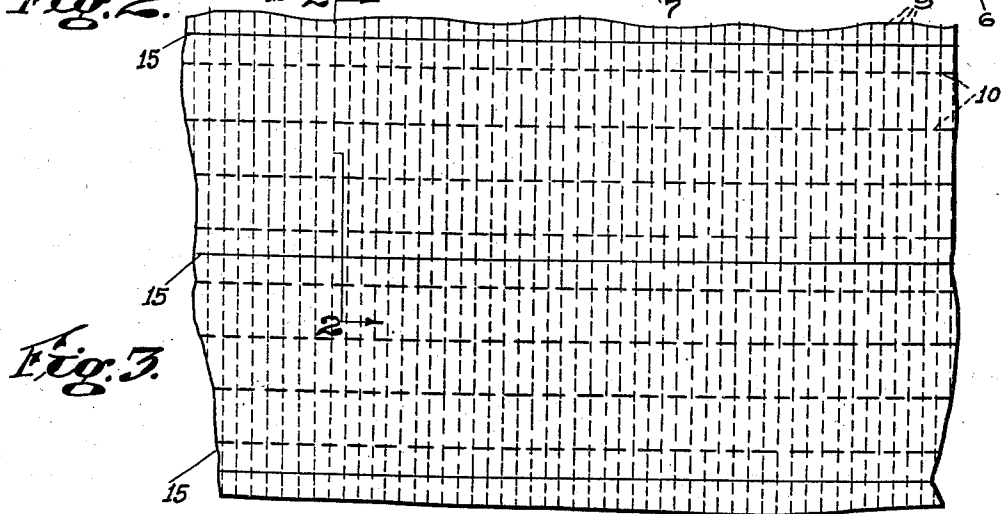


Fig. 3.

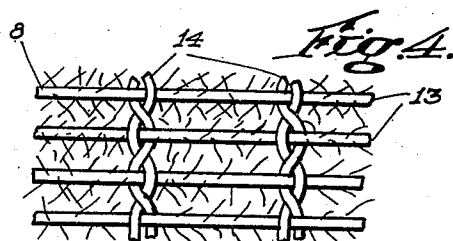


Fig. 4.

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UNITED STATES PATENT OFFICE

2,193,053

MANUFACTURE OF STAY TAPES

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Original application June 9, 1936, Serial No. 84,335. Divided and this application May 14, 1937, Serial No. 142,684

1 Claim. (Cl. 154—2)

The present invention relates to the manufacture of stay tapes, especially useful in reenforcing the corners of fibre or cardboard boxes. The invention is particularly directed to a tape which is sufficiently flexible to fit readily around the box corners. This application is a division of Serial No. 84,335, filed June 9, 1936, for Stay tape for boxes now Patent No. 2,096,836, dated October 26, 1937.

In stay tapes used for reenforcing the corners of boxes the greatest strain on the tape is obviously laterally of the tape, as a result of the tendency of the box corner to tear open. One of the features of the present invention resides in the manufacture of a tape which will be reenforced to provide a substantially greater tensile strength laterally of the tape than longitudinally, without, at the same time, materially affecting the flexibility of the tape in either direction, so that the tape may be fitted readily to the box corner.

A stay tape of this character is frequently reenforced by a woven fabric combined with a layer of paper forming the tape, the fabric and paper being usually combined in relatively wide strips which are then cut longitudinally to form individual tapes of the desired width. In using the low grade of fabric customarily considered to be satisfactory, the warp threads of the fabric, which extend longitudinally of the paper web as it is formed are not straight enough or sufficiently widely spaced to permit cutting of the web between adjacent warp threads without cutting into certain of these threads. A further feature of the invention resides in cutting the relatively wide web into narrow stay tapes of suitable widths without cutting across any of the longitudinal threads of the fabric, thus avoiding any fraying at the edge of the tape.

In a reenforced tape, the thickness of the completed tape affects its flexibility and also affects the amount of tape which can be wound into a roll of a predetermined diameter for use in box-making machinery. To avoid these objections, one of the features of the present invention involves the step of forcing the covering sheet, which extends over the reenforcing fabric, into close contact with the paper sheet on the other side of the reenforcing fabric, the latter paper sheet having a smooth outer surface for attachment of the tape to the box. To accomplish this the covering sheet which is stretchable has the portions which engage with the reenforcing material offset from the normal plane of the sheet by passing the combined webs between rollers or

other devices for pressing the covering sheet against the other paper sheet.

Other and further objects and advantages of the invention will appear from the following detailed description taken in connection with the accompanying drawing in which—

Fig. 1 is a perspective view of a box to which the completed stay tape of the invention is applied.

Fig. 2 is a sectional view through a completed stay tape embodying the invention, the thickness of the material being greatly exaggerated.

Fig. 3 is a plan view of a portion of a completed web from which the stay tape is cut.

Fig. 4 is a perspective view of the type of fabric used in the formation of the stay tape.

Fig. 5 is a sectional view through the corner of the box of Fig. 1, showing the tape applied thereto, the thickness of the tape being greatly exaggerated.

Like reference characters refer to like parts in the different figures.

With reference first to Fig. 1, the stay tape 1 made in accordance with the invention is applied to the corner of a box 2 where the front and side walls 3 and 4 of the box come together. The tape forms a reenforcement which prevents the box from tearing at the corner and holds the adjacent sides of the box together. As will be apparent, the tape must reenforce the box especially in the direction of the reenforcing lines 5, which represent the reenforcing fibres extending laterally of the stay tape, as this is the direction in which the box is most liable to tear. The stay tape has adhesive applied to the underside thereof for easy attachment to the box and is relatively narrow since it is necessary only to have the tape extend far enough over the adjacent side walls of the box to assure a secure adhesive connection between the box and the tape.

Referring now to Figs. 2 and 3, the stay tape is made up of a strip of paper 6 of sufficiently heavy stock to present a smooth surface for contact with the box, and to the underside of the paper 6 is applied a suitable dry adhesive 7 of any usual character, by which the stay tape may be applied to the box.

On the upper side of the strip of paper 6 is positioned a woven fabric 8 by which the tape is reenforced in a lateral direction, the weft threads 9, as will be apparent from Fig. 3, being more closely spaced than the warp threads 10. On the upper side of the fabric 8 is a covering strip of paper 11, which is preferably flexible and stretchable in all directions, as for example, the familiar

crepe paper which is formed to provide stretch in every direction, one form of this paper being shown in the Lorenz Patent No. 1,548,783, dated August 4, 1925, and another form being shown in the Kemp Patent No. 2,008,182, dated July 16, 1935. Either of these patents describes a process for producing a paper which is stretchable both longitudinally and laterally of the web. The strips of paper 6 and 11 are securely held together and to the fabric 8 by a flexible adhesive 12 of a type which is preferably soluble in water, as, for example, adhesive containing latex or sago, such as the commercially available "Loto!" which is a colloidal suspension of latex in water and other solvents. As best shown in Fig. 2, the paper 11 is pressed against the paper 6 so that the paper 11 is embossed where the main threads of the fabric are located. Between adjacent threads of the fabric the paper 6 is pressed close enough to the paper 11 to adhere to the loose fibres extending from the weft threads, these fibres being provided by a loose twisting of the weft threads. The two sheets of paper are thus securely held together over substantially the entire surface, thereby avoiding any looseness in either paper sheet. This attachment is possible, by reason of the stretchability of the paper 11, without putting enough strain on the paper 11 to tear it and without distorting the paper 6. The adhesive is used in as small quantities as possible and still have the tape stay together.

In the formation of the stay tape, the paper strips 6 and 11 are positively secured to each other with the fabric 8 therebetween by passing the composite web, from which the tape is subsequently cut, between opposed rollers, one of which has a hard surface and engages the outer side of the sheet 6. The other roll, which engages the outer side of the sheet 11 is relatively soft, preferably of rubber, so that the flexible paper 11 may be pressed inwardly toward the paper 6, thus forming indentations in the paper 11 between the adjacent threads of the fabric 6. Since the paper 11 is stretchable in all directions, it will be clear that portions of the paper can be offset from the normal plane of the paper to a substantial degree without affecting the stretchability thereof and without increasing the stiffness of the tape. The adhesive 12, as shown, is preferably applied to the fabric so that only a small quantity of adhesive is necessary to hold the sheets and fabric together. It will be understood that the fabric need not be entirely impregnated with the adhesive so long as the outside of each of the threads of the fabric is moistened with the adhesive to a sufficient extent to assure the proper adhesion of the several webs of the tape together.

As the tape is to be used on the corners of a box it must have its greatest strength in a lateral direction and the reinforcing fabric 8 is accordingly formed with the warp threads, which extend longitudinally of the tape, placed a substantial distance apart and the weft threads arranged relatively close together. One example of fabric of this character is shown in Fig. 4 which shows a Leno-weave fabric having the weft threads 13 very close together and the warp threads 14 arranged in pairs which are spaced a substantial distance apart, this distance in the preferred embodiment being $\frac{1}{2}$ inch. Each pair of warp threads in the Leno-weave consists of two independent threads 14 which, between adjacent filler threads, cross each other not only in

a plane perpendicular to the fabric, but also in the plane of the fabric, so that, as shown in this figure, the weft threads are tightly held by the warp in a uniformly spaced arrangement, and there is practically no lateral shifting of the warp threads on the weft threads. In order to produce an extremely inexpensive stay tape it is preferable to form the warp threads of relatively light cotton thread and to make the weft threads of jute, which is much less expensive than cotton. The weft threads can accordingly be arranged relatively close together to provide a stay tape which has a great amount of strength laterally without making the tape objectionably expensive. The strength of the tape is obviously controlled by the spacing of the weft threads. The weft threads preferably have a large number of loose fibre ends, a characteristic of jute threads, so that the weft threads are securely held against movement relative to the paper by the adhesive engaging with these fibres. The number and length of the loose fibres is obviously controlled by the amount of twist given to the thread.

In the formation of stay tapes the fabric is preferably made up in webs of much greater width than the stay tape, and the sheets of paper 6 and 11 of similar width are applied to opposite sides of the full width web. After the sheets of paper 6 and 11 have been applied to the opposite sides of the fabric 8 the composite material is still much wider than the desired width for the stay tapes and the material is accordingly cut longitudinally into the desired widths which are generally from 2 to 3 inches. With the spacing of the adjacent pairs of warp threads $\frac{1}{2}$ inch from each other, it is clear that the stay tapes may be cut from the material along straight parallel lines 15 between adjacent warp threads without any possibility of any of the warp threads being cut during the formation of the tape. Obviously the warp threads form a longitudinal reinforcement for the tape so that the tape may in certain instances be used in sealing box covers as well as in reinforcing the corners.

Although it has been pointed out above that the adhesive used in attaching the paper sheets to the fabric is preferably a water soluble adhesive, it will be apparent that other types of adhesive, such as thermo-plastic adhesives may equally well be used and, in fact, in the production of an extremely inexpensive type of stay tape, where the use of asphalt is not objectionable, it is possible to use asphalt or other similar thermoplastic adhesives.

In the production of these stay tapes at a low cost it is desirable to crepe the paper 11 just prior to the attachment of the several thicknesses of material together, and in the same machine. It is accordingly essential that the adhesive used be of a type which will permit the creping of the paper 11 and the immediate application of the fabric 8 and paper 6 thereto without the necessity for drying the creped paper 11 and subsequently applying a special adhesive thereto. In the use of a thermoplastic adhesive the latter may also form the bond which secured the paper to the creping drum during the creping process and it will be apparent that water soluble adhesives may also be used for the same purpose with the paper immediately thereafter applied to the remainder of the materials making the stay tape without the necessity for drying the crepe paper 11. It will be apparent that the adhesive on the creped paper will aid in securing the crepe

paper to the smooth paper sheet between the threads of the fabric.

The creped or stretchable paper 11 is arranged to cover and protect the woven fabric, and thus prevent any threads of the fabric from being caught and pulled away from the box. The paper 11 also protects the adhesive so that the latter does not appear on the surface of the finished tape and can then, if necessary, be an undesirable color without affecting the salability of the tape. In order that the tape may be readily salable it can be produced in any desired color merely by making the paper 11 the desired color before forming the tape. Since the paper 11 fully covers the tape, contrasting colors on the box and tape may be used to give the package an attractive appearance.

From the foregoing it will be apparent that the present invention provides for a stay tape which is reenforced in a lateral direction by closely arranged fibres located between paper sheets and thereby protected. The sheet of paper provided on its outside with adhesive for attachment to the box corner has a smooth outside surface for positive engagement with the box material over the entire surface of the tape. Moreover, since the paper sheet 11 is stretchable the stay tape can be bent around the corner of the box without the formation of objectionable creases in the paper sheet 6, so that the paper

sheet 6 will adhere to the box over the entire area of the stay tape. Further, the flexibility of the adhesive and of the paper 11 permits the transverse reenforcing fibres of the woven fabric to move slightly relative to the paper 6 so that the paper is allowed to bend around the corner of the box without the formation of any objectionable creases in the paper 6. The creped paper 11 obviously is thicker when creped than when uncreped, and the showing of Fig. 5 indicates an absence of creases at the bend in the stay tape by a relatively thinner paper at this point. It will be understood that the adhesive on the outside of the paper sheet 6 may be omitted and applied to the stay tape at the time that the tape is applied to the box.

I claim,

In the formation of a stay tape, the steps which involve securing together a main paper sheet, a woven fabric and a stretchable paper sheet in superposed relation, with a stretchable adhesive between the sheets, and passing said combined sheets and fabric between a pair of rolls, one having a hard surface and engaging the main paper sheet, and the other having a resilient surface and engaging the stretchable paper sheet to press the stretchable paper sheet around the threads of the fabric and against the main sheet.

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