

March 26, 1957

A. E. CARLSON

2,786,789

GUMMED PAPER

Filed June 8, 1953

2 Sheets-Sheet 1

FIG-1

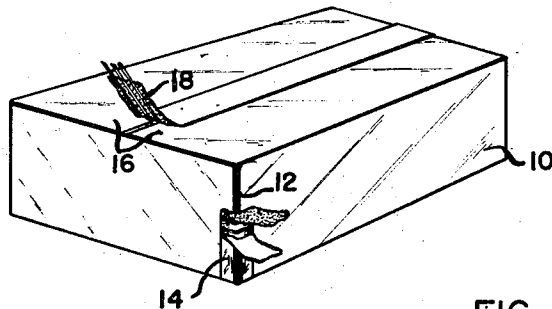


FIG-2

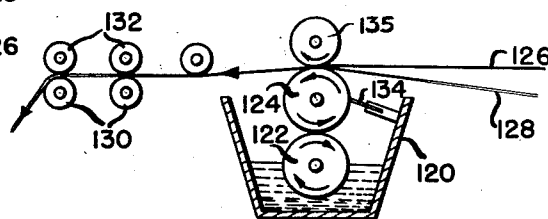
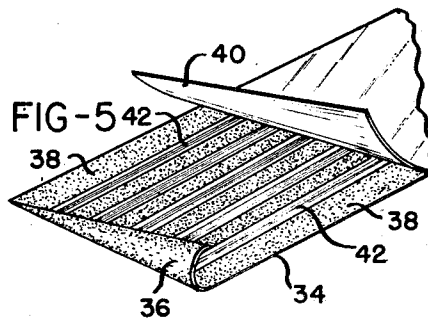
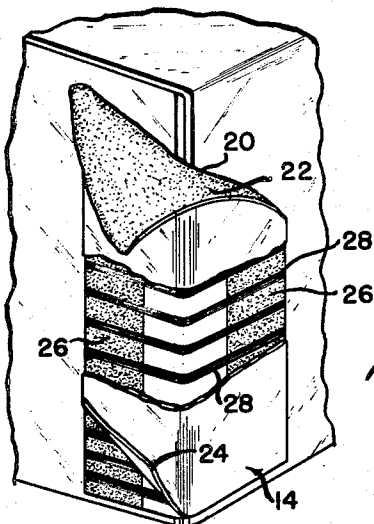


FIG-10

FIG-3

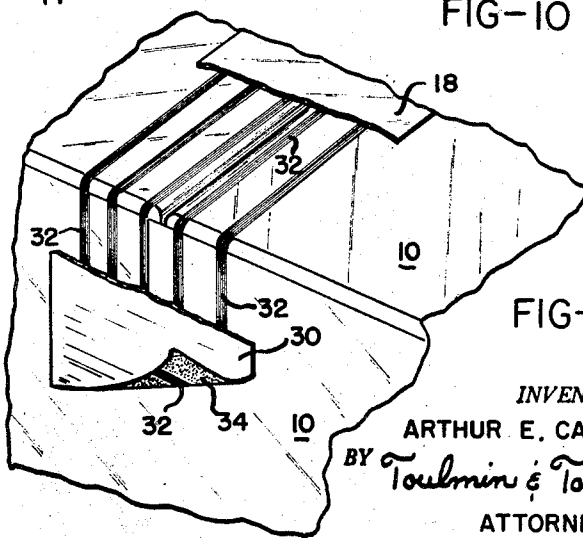
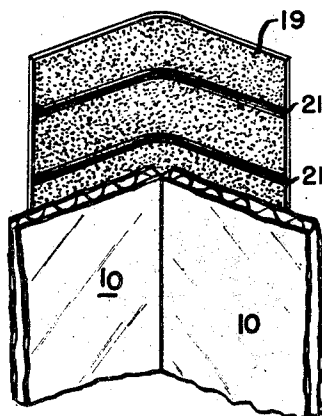


FIG-4

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2 Sheets-Sheet 2

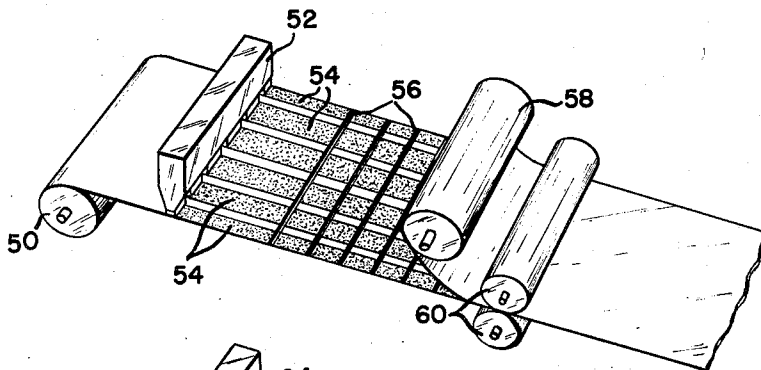


FIG-6

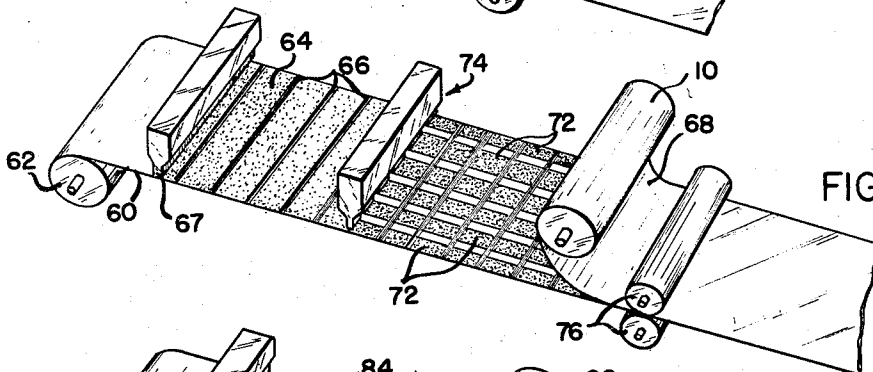


FIG-7

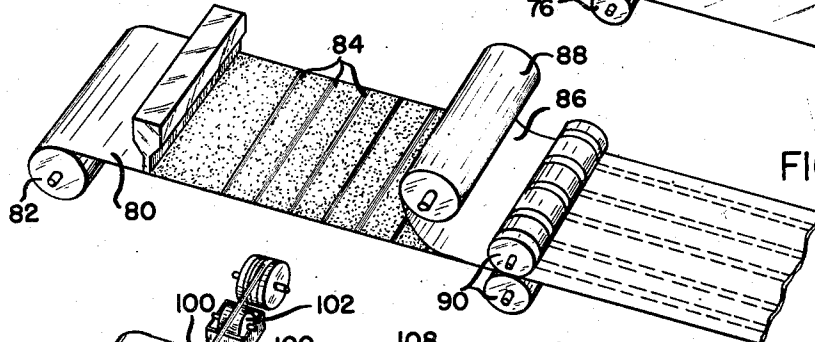


FIG-8

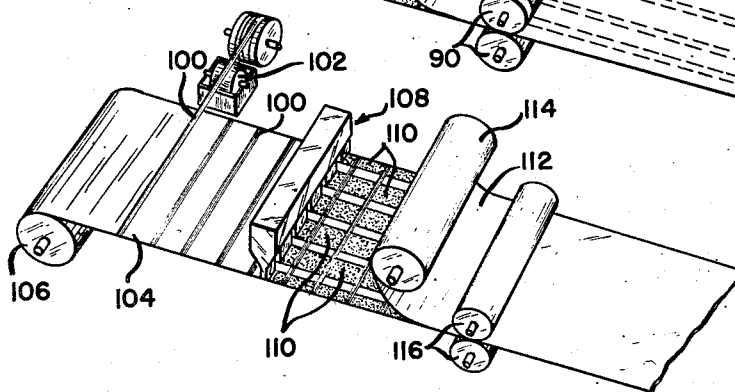


FIG-9

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1

2,786,789

GUMMED PAPER

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Application June 8, 1953, Serial No. 360,051

4 Claims. (Cl. 154—53.5)

This invention concerns a reinforced material, particularly a reinforced paper tape, to a method of making such an article, and to carton joint assemblies utilizing the tape. This invention is related to the inventions disclosed in my Patent No. 2,610,936, issued September 16, 1952, and in my pending applications Serial Nos. 294,335 now Patent No. 2,722,366 and 340,029, filed June 19, 1952, and March 3, 1953, respectively.

All of my pending applications and the issued patent referred to above deal with the application to a tape of thin reinforcing elements which advantageously take the form of ribbons consisting of a plurality of substantially parallel substantially untwisted filaments. These reinforcing elements greatly increase the strength of the tape, particularly its bursting strength which becomes extremely important in case the carton is dropped or subjected to sudden impact for any other reason.

While I have found that the provision of the reinforcing elements on the tape, as set forth in my previously disclosed invention, is of great merit, I have also found that merely attaching the elements to the tape or the carton by an unyielding adhesive is not sufficient for developing the full strength of the elements. Accordingly, tapes manufactured as disclosed by me in the applications and patent referred to can be improved upon.

In the case of the single ply tapes of my inventions an important objective obtained thereby is economy. An object of the present invention is a laminated tape of improved quality which can still be produced in an economic manner.

This high quality comes about due to the high resilience of the reinforcing elements necessary to this invention relative to the paper of the tape proper, and because of which the elements will break at a much lower stress if they are tightly fixed to the tape or to the carton than if they are free to stretch relative to the carton and the paper of the tape.

In particular, if the reinforcing elements can be made free to stretch somewhat, it not only requires a greater displacement of the members to which they are attached from each other to produce a predetermined stress in the reinforcing elements, but a plurality of the elements arranged in parallel spaced relation will distribute a load among each other, and thus materially increase the resistance to separating movement of the members that are connected by the tape.

In view of this, the present invention deals in particular with a tape having reinforcing elements of the nature referred to, and a method of making the tape characterized in that the elements can stretch over at least a portion of their length, thus adding greatly to the strength of the tape and to the strength of a carton having a corner or the top closed by such a tape.

With the foregoing in mind, it will be evident that the primary object of the present invention is to provide a tape of the nature referred to and a method of making

2

Another object of this invention is the provision of a paper tape having resilient reinforcing elements thereon in which the said elements are free to stretch whereby the tape which, in use, will provide greater strength than it has been possible heretofore to obtain.

Still another object is the provision of a method of making a tape of the nature referred to wherein economy of manufacture can be observed while the end product is characterized by the reinforcing elements having sufficient freedom to stretch in order that a better use of the strength thereof can be realized.

Apart from the strength of a tape of this type, an important characteristic thereof is its ability to stick to a carton. The maximum degree of sticking is accomplished only when the entire area of the tape that is adjacent the carton is coated with an adhesive, usually a water soluble animal glue, especially for the tape that closes the manufacturer's corner of the carton.

If certain coatings of adhesive are applied to the reinforcing elements as well as to the tape they will serve to bind any reinforcing elements on the carton side of the tape tightly thereto and effectively prevent the desired stretch of the elements by which the full strength thereof is realized. It follows that the above-outlined general objectives of this invention may be accomplished by having the reinforcing elements mounted on the tape on the side opposite the carton and, according to my invention, this may be accomplished by providing a laminated tape with the reinforcing elements therebetween and with the carton side of the tape completely covered with adhesive.

Thus, a still further object of my invention is the provision of a laminated paper tape having reinforcing elements between plies of the tape and a method of making the tape wherein the elements have freedom to stretch and, therefore, provide a stronger tape and carton joint.

Another object of this invention is the provision of a method of manufacturing a laminated paper tape having resilient reinforcing elements between the plies thereof such that rapid and efficient production practices are observed while the said elements are so placed in the tape that they have freedom to stretch.

A particular object in connection with the laminated tape is the provision of a method of making the tape and placing the reinforcing elements therebetween such that the two plies of the tape are firmly bonded together without the use of an excessive amount of adhesive and with the said elements having freedom to stretch.

In previous laminated tape structures the reinforcing elements took the form of yarns or cords and required a substantial amount of adhesive filler in the space between the plies, usually an asphalt compound. Such a tape is not only expensive but when asphalt is used it is also sensitive to extremes of temperature, and, accordingly, a still further object of this invention is the provision of a laminated reinforced tape and a method of making the same which avoids the use of uneconomical amounts of expensive materials and which is insensitive to the temperatures that may be encountered in the use of the tape.

In the case of closing the top of a carton, considerable length of reinforcing elements is employed as opposed to the relatively short length of elements employed for the usual carton corner, and it is also within the purview of my invention to construct a single ply tape especially adapted for closing the tops of cartons having reinforcing elements on the carton side of the tape which have freedom to stretch, thus increasing the strength of the tape.

In the case of closing the carton corner, it is an object of this invention to construct a single ply tape having

3

reinforcing elements on the carton side of the tape which are resilient and which are resiliently adhered to the tape, and which are not adhesively bonded to the carton or which are resiliently bonded to the carton, thus allowing the elements to stretch.

It is also an object of this invention to provide for both laterally and longitudinally reinforced tape constructions characterized in freedom of the elements to stretch.

In general, the objectives of this invention are attained by providing a relatively weak, resilient or discontinuous connection between the reinforcing elements and the paper of the tape. Where the exact zone of loading of the tape is known, as in the case of a corner tape, the reinforcing elements can be left unconnected to the paper in that zone and connected to the paper at opposite sides of the zone.

Some latex types of adhesive will also serve to connect the reinforcing elements to the paper while allowing relative movement between the elements and the paper that will permit the necessary stretching of the elements.

Also, the reinforcing elements can be resiliently adhesively mounted on the paper between strips of adhesive on the paper that is to serve for sticking the plies together or for sticking the tape to the carton and this will leave the elements free to stretch.

In still another form, a different degree of adhesion between the reinforcing elements and the paper than between the plies of the laminated tape can be had by pressing the adhesive-coated plies together between the elements during manufacture of the tape, thus causing an imperfect or weak bond to be established between the elements and paper that will allow stretching of the elements.

In a still further form of my invention, with particular reference to a single ply tape, a different degree of adhesion between the reinforcing elements and the carton than between the paper of the tape and the carton can be had by applying pressure to the reinforcing elements during the manufacture of the tape when the elements are in position on the adhesive-coated surface of the tape, thus materially thinning out, even to the point of substantially removing, the adhesive layer over the said elements.

While there is disclosed and described in this application that particular type of tape having a water soluble adhesive on the carton side thereof, it will be understood that all the principles of this invention will obtain accordingly and in connection with a tape which is coated with an adhesive which may be a substance that is not water soluble immediately prior to placing the tape on the carton.

The several objectives and advantages referred to above, as well as still other objectives and advantages of my invention, will become more apparent upon reference to the following specification taken in connection with the accompanying drawings, wherein:

Figure 1 is a perspective view of a carton having the manufacturer's corner and the top thereof closed by tapes according to my invention;

Figure 2 is an enlarged perspective view of the corner with part of the outer ply of the tape removed to show the construction thereof;

Figure 3 is a fragmentary view showing a single ply tape, according to my invention, mounted on the corner of a carton;

Figure 4 is an enlarged perspective view of the top of the carton with a portion of the tape removed to show the reinforcing elements;

Figure 5 is a perspective view showing a laminated tape, according to my invention, for use in closing the top of a carton;

Figure 6 is a diagrammatic perspective view showing one method of making a transversely reinforced laminated tape by strip gluing;

4

Figure 7 shows another method of making a transversely reinforced tape wherein the reinforcing elements are first attached to one ply by an adhesive and the two plies of the tape then being joined by strip gluing;

Figure 8 is a view showing still another method of making the tape wherein the reinforcing elements are introduced between the plies with adhesive and strip pressure is applied to the tape;

Figure 9 is a view showing the application of adhesive coated reinforcing elements to one ply and the subsequent joining together of the plies by strip gluing; and

Figure 10 is a more or less diagrammatic view showing still another manner in which the resilient reinforcing elements can be secured to a ply of paper while simultaneously coating the paper with adhesive and still obtaining a different degree of bond between the elements and the paper than will be had between the paper and the carton.

Referring to the drawings somewhat more in detail, Figure 1 shows a carton 10 having a manufacturer's corner 12 closed by the transversely reinforced laminated tape 14. The top flaps 16 of the carton are held closed by the single ply longitudinally reinforced tape 18.

In Figure 2 the manufacturer's corner is shown somewhat enlarged, and it will be seen that the tape 14 consists of an inner ply 20 coated with adhesive 22 on the carton side thereof, and an outer ply 24 secured to the back of the inner ply by the strips 26 of adhesive.

Resilient reinforcing elements 28 extend transversely of the tape in spaced relation between the plies and are secured thereto by the strips 26 of adhesive, but along the center of the tape which lies around the corner of the carton the reinforcing elements are not rigidly attached to either ply of the tape. The stretch zone thus provided is of benefit in permitting the reinforcing elements to stretch whereby much greater strength is imparted to the corner, particularly under conditions of severe enough impact to tear the paper of the tape. Under these circumstances, even though the paper is torn through, the reinforcing elements will stretch and not break until a still greater load is imposed on the corner. For most impact conditions to which the carton might be subjected, this prevents the corner from opening even when the paper of the tape is torn.

It will also be appreciated that when the paper of the tape tears, and commences tearing at one point, such as at the end thereof, the reinforcing elements that are adjacent the point where the tearing commences will distribute the load among themselves due to their resilience and freedom to stretch, and for this reason I am enabled, according to the present invention, to realize an economy from employing smaller reinforcing elements than could be used according to my previous invention, or according to the reinforced tapes according to the prior art, and still obtain greater ultimate strength of the tape.

It will be noted that there is no loss of glued area between the carton and tape so that the tape will stick tightly to the carton while the two plies of the tape, being glued together under ideal manufacturing conditions, will be secured together so as to develop the full strength of both plies.

In Figure 3 there is shown a single ply 19 forming the tape that is adhesively connected with the side walls of the carton and with the reinforcing elements 21 on the carton side of the tape. The tape in Figure 3 is constructed so that when it is adhesively connected with the carton the reinforcing elements 21 are free to stretch in that they will pull free from the tape and carton under smaller tension than is required to break the elements.

This is accomplished either by having less adhesive between the elements and tape and carton, or by having an adhesive therebetween of a different character than the adhesive which joins the paper of the tape to the carton.

In Figure 4 the top of the carton is illustrated and the tape 18 shown therein consists of a single ply 30 with the

5

resilient reinforcing elements 32 extending lengthwise thereof on the carton side thereof. The single ply 30 has adhesive 34 on the carton side thereof in strips, with the elements 32 located between the strips of adhesive and so connected to the ply 30 as to be free to stretch relative thereto. The connection of the elements 32 to ply 30 can be by a relatively weak adhesive, by a resilient adhesive, or by an imperfect and easily broken adhesive connection, all within the scope of my invention.

The length of tape 18 permits the glue to be applied thereto in strips and a satisfactory sticking of the tape to the carton will obtain. Also the length of the tape and the reinforcing elements permits the elements to be arranged as illustrated and good results will be had.

The longitudinally reinforced tape can also be laminated as in Figure 5 where a bottom ply 34 having glue 36 over its entire carton side is laminated by strip gluing 38 to a top ply 40, with the reinforcing elements 42 being placed between the glue strips and connected to one of the plies in the manner referred to above. The laminated tape, of course, has greater strength and sticking power if the parts are not otherwise changed than the single ply tape but has the characteristic in common therewith of permitting the reinforcing elements to stretch.

As to the materials to be employed in the manufacture of my tape, I prefer to use kraft paper for the plies of about 30 to 70 pounds per ream while the reinforcing elements are preferably a synthetic resilient material drawn in the form of filaments which may be spun or gathered to form the individual strands of the elements with each strand being on the order of from .002" to .010" thick. Several strands, say 5 to 10, may be laid side by side to form the thin ribbon-like reinforcing elements, or each element may consist of one strand of a large number of substantially untwisted filaments. These elements are preferably untwisted, but some twisting thereof is not deleterious if the elements remain flat and ribbon-like.

The reinforcing elements within the scope of my invention may vary widely, as will be evident from the following examples of such elements:

Twisted or untwisted, organic or inorganic, continuous or non-continuous filaments, thin narrow strips of resilient film having high resistance to edge tear, thin narrow strips of stretchable paper, and all natural and synthetic filaments that are resilient and otherwise compatible with my invention.

Turning now to Figures 6 through 10, I show several but by no means every possible way of making the tape according to my invention. In Figure 6 a roll 50 of paper is fed beneath a glue pot 52 that applies strips 54 of glue thereto. Following the application of the glue strips, the reinforcing elements 56 are applied transversely to the paper in spaced relation, and then the paper from the top roll 58 is applied and the two plies are pressed together by the rolls 60. The completed laminated article is then slit longitudinally along the center of each strip of glue except those at the edges so as to form a plurality of strips of laminated transversely reinforced tape with an unglued center section.

In Figure 7 I show the lower sheet 60 from roll 62 being coated with adhesive 64 at a gluing station 67, with the reinforcing elements 66 then being applied transversely of the sheet. This gluing or adhesive-applying operation provides for a weak or imperfect or resilient bonding of the elements to the paper sheet, and, if desired, the paper can at this point be rolled up and later laminated with the second ply.

In either case, the second ply, in the form of a sheet 68 feeding from roll 10 is applied after the strips of glue 72 are applied at gluing station 74. Rolls 76 press the plies together, and, as before, the laminated sheet is split into a plurality of strips each having an unglued center zone between the plies.

In Figure 8 the sheet 80 from roll 82 is coated with

6

the glue or adhesive that is to join the plies together, the reinforcing elements 84 are then applied and then the top sheet 86 from roll 88 is applied. The plies are then pressed together by the rolls 90 which are slotted so that zones of imperfect bonding are created which are located in the center of the strips that are cut from the laminated sheet.

In Figure 9 I show the elements 100 being wet with adhesive as by the applicator roll 102, and then applied to the bottom sheet 104 feeding from roll 106.

The gluing station 108 then applies the strips 110 of glue and the top sheet 112 feeding from roll 114 is applied and the plies are pressed together by the rolls 116. This method, similar to the one shown in Figure 6, can be carried out as a two-step process with the lower sheet being rolled up after the elements 100 have been applied thereto, and then later laminated with the top ply.

In Figure 10 I show still another method whereby a paper tape, according to my invention, can be manufactured and wherein a glue in glue pot 120 is picked up by a pickup roll 122 and transferred to a transfer roll 124 over which a ply of paper 126 that is to form the tape is passed together with the resilient reinforcing elements 128. The transfer roll 124 may apply a film of glue across the entire face of paper ply 126, and then the desired degree of bonding of the reinforcing elements thereto, which degree of bonding is less than that which will obtain between the paper ply and the carton to which it is attached, obtained by drawing a tension on the paper ply 126 so that as it passes over the smoothing rolls 130 the major portion of the glue on the reinforcing elements will be pressed therefrom while still leaving the said elements sticking to the paper. The pressure of the smoothing rolls may also be obtained by providing backup rolls as at 132 which will press a substantial amount of glue off the reinforcing elements. Should the reinforcing elements at the time they are brought to the paper be in a form other than ribbon-like, the said elements may also be pressed out to the desired ribbon-like configuration simultaneously with the squeezing of the glue therefrom.

A further possibility involves joining elements adhesively, longitudinally or transversely to web 126 in a previous operation, and in an operation, such as Figure 10, a complete coating of glue (for bonding the reinforced side of the tape to a carton) may be applied to the sheet and elements, but due to pressure from rolls 135 and 132 this coating of glue may be squeezed off of the elements so that when applied to a carton there will be substantially no adhesive bond of the elements to the carton. Blade 134 may be used to apply strips of glue to the tape in areas between the elements if longitudinally applied.

In Figure 10 there is shown a blade 134 bearing on the periphery of transfer roll 124 or otherwise suitably shaped so as to vary the amount of glue deposited on the face of the paper so as to reduce the amount of glue deposit where the elements 128 are to be used.

In any case, the Figure 10 arrangement can be employed for obtaining the connection of the reinforcing elements to the paper so that when the tape is pressed on a carton and the tape is then torn due to loading of the carton, such as by impact thereon, the reinforcing elements will pull loose from the paper and be free to stretch in the manner described above.

It will be apparent that the Figure 10 arrangement, and other mechanisms designed to accomplish the same result, can be employed for preparing one ply of a laminated tape, with the second ply being brought together with the ply carrying the reinforcing elements in a subsequent operation.

In several of the diagrammatically illustrated methods of making a laminated paper product, it has been illustrated that the glue or adhesive, by means of which the plies are joined, is applied to the lower ply, and it will be understood that this adhesive could be applied to either of the plies and the same result would be obtained, and

7

that, broadly, in the case of a laminated product, the adhesive is positioned in the space between the plies.

Since it would be possible to bring the paper tape, reinforcing elements and carton joint together at one time, as, for example, in an automatic joint taping machine, it will be understood that I consider my invention to include the method of making a carton joint as well as the reinforced carton joint, the reinforced tape and the method of making the tape.

It will be understood that this invention is susceptible to modification in order to adapt it to different usages and conditions and, accordingly, it is desired to comprehend such modifications within this invention as may fall within the scope of the appended claims.

I claim:

1. A tape for staying corners of shipping boxes, cartons and the like, comprising a flexible web of paper having on the face which is to be against adjacent box sides, which form a corner, spaced flat ribbons, each composed of a group of resilient stretchable filaments, a relatively weak adhesive applied only to the web under the filaments for releasably securing the filaments of the ribbons to the web, and a relatively rigid substantially non-flowable adhesive covering spaced parallel areas of the face of the web containing said ribbons of filaments for rigidly securing said filaments at said areas to the paper, said strong adhesive extending transversely of

8

the filaments and being adapted to secure the spaced areas of the web to the box sides, the area of the tape between said spaced areas receiving the corner formed by said sides, whereby the portions of the filaments between said spaced areas are relatively free to yield and stretch and to stay the box corner when subjected to stresses arising from handling and shipping.

2. A tape as in claim 1 in which the flat ribbons are composed of a plurality of substantially parallel, substantially untwisted resiliently stretchable filaments.

3. A tape as in claim 1 in which the adhesive on the spaced areas is animal glue.

4. A tape as in claim 1 in which the ribbon securing adhesive is essentially of latex.

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