Dec. 31, 1935. E. C. SMITH 2,026,194

COMPOSITE REENFORCED PAPER FABRIC

Filed June 29, 1934 2 Sheets-Sheet 1

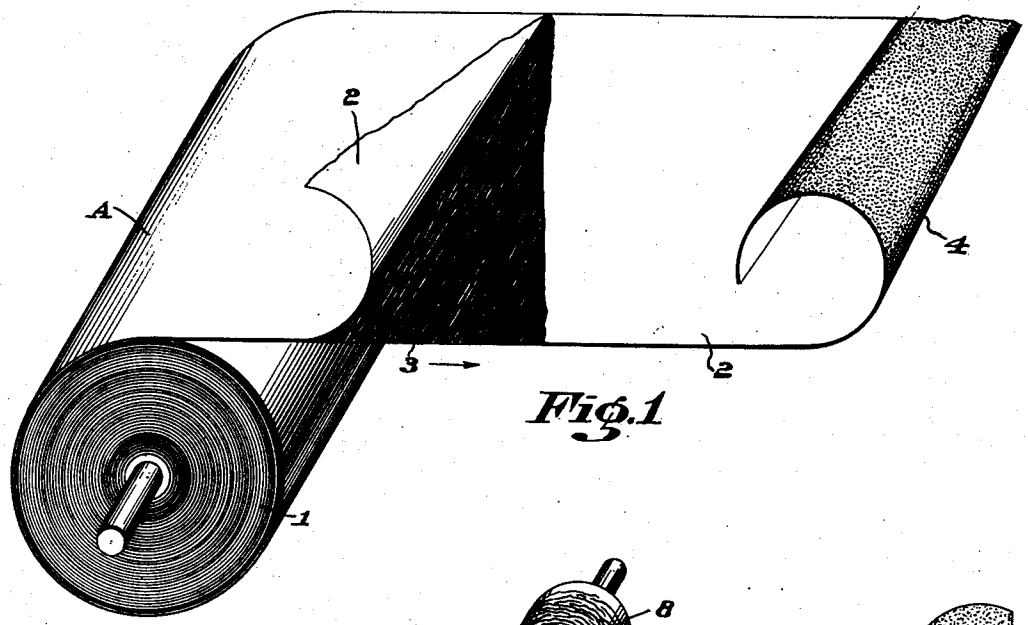


Fig. 1

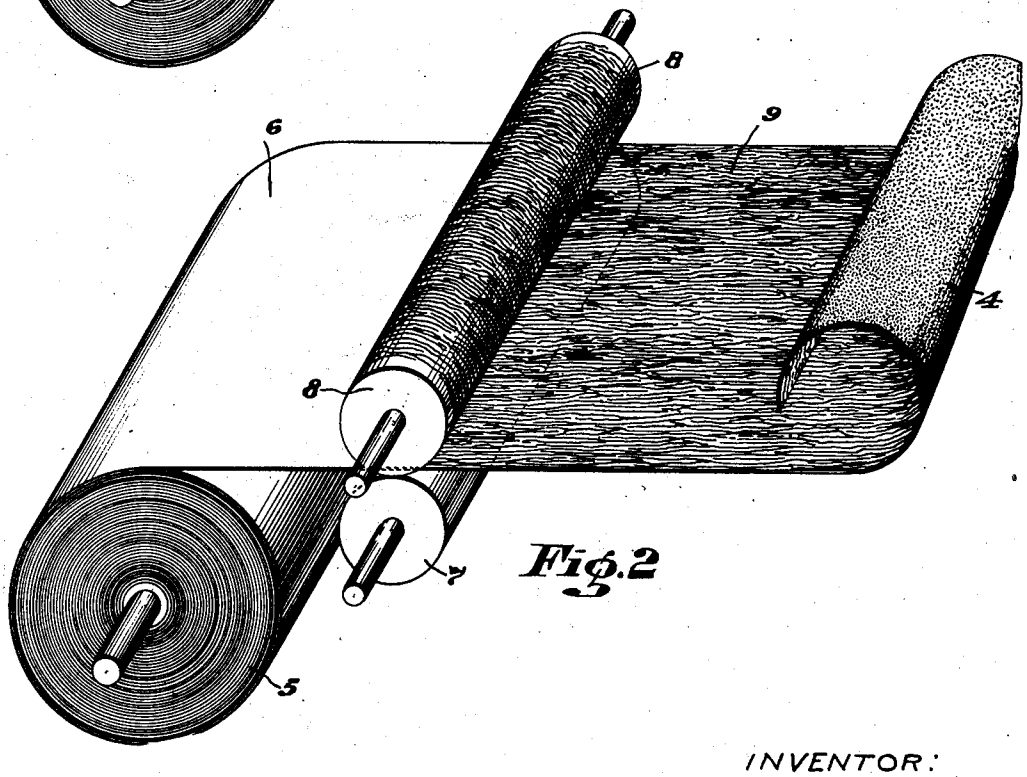


Fig. 2

INVENTOR:
Edward C. Smith
BY Robt. P. Hains
ATTORNEY

Dec. 31, 1935. E. C. SMITH 2,026,194

COMPOSITE REENFORCED PAPER FABRIC

Filed June 29, 1934 2 Sheets-Sheet 2

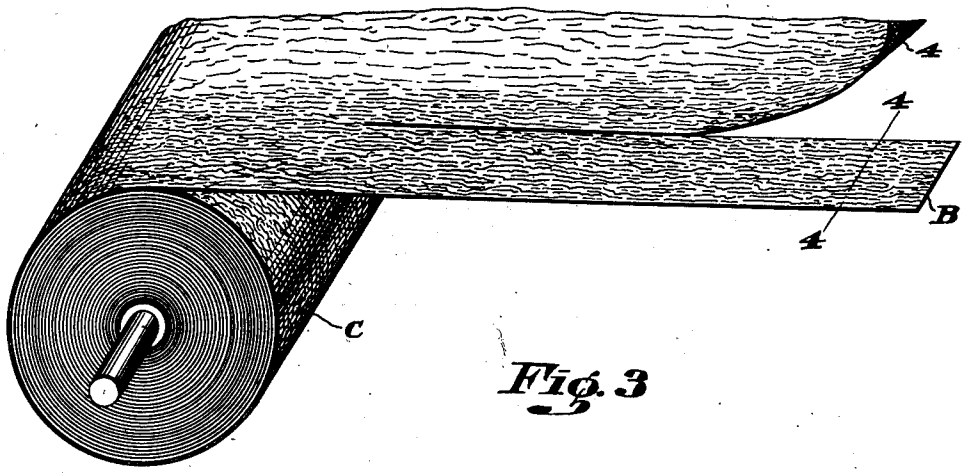


Fig. 3

Fig. 4

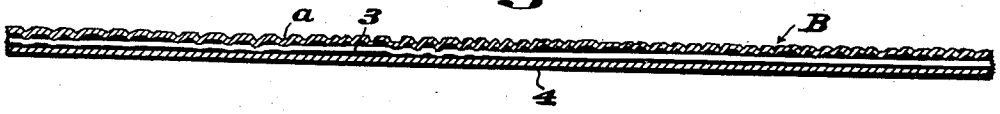


Fig. 6

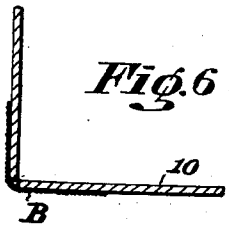
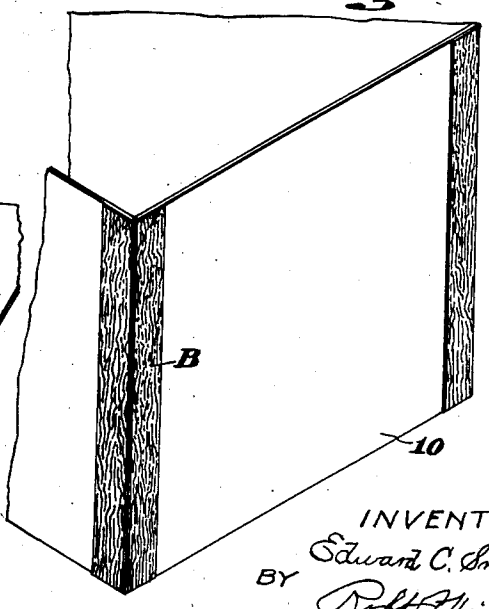


Fig. 7



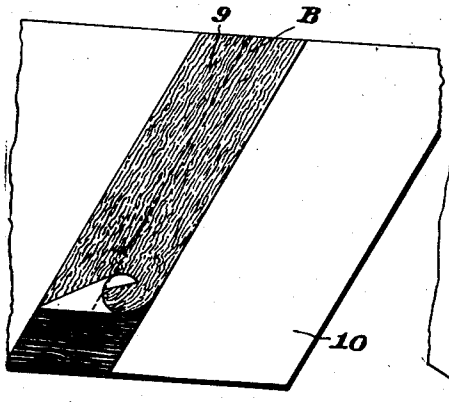


Fig. 5

INVENTOR:
Edward C. Smith
BY Robt. O. Haines
ATTORNEY

Patented Dec. 31, 1935

2,026,194

UNITED STATES PATENT OFFICE

2,026,194

COMPOSITE REENFORCED PAPER FABRIC

Edward C. Smith, Nashua, N. H., assignor to American Reenforced Paper Company, Attleboro, Mass., a corporation of Massachusetts

Application June 29, 1934, Serial No. 732,969

4 Claims. (Cl. 229—49)

This invention relates to composite reenforced paper fabrics and the method of making the same, and is more particularly concerned in the production of such a structure that will be generally useful throughout a wide range of purposes, and especially well adapted for box corner stay strips. The invention will, therefore, be described in connection with box corner stay strips although it is not to be understood that the invention is restricted thereto.

It is now the usual practice to apply box corner stay strips to box corners to impart strength thereto or to the box as a whole, and such strips have been variously formed. In some instances they have consisted of a strip of woven material pasted or otherwise secured to the sides of a box to extend over the corner thereof. It has likewise been proposed to use paper as a stay strip in either a single or composite layers, but where it is formed of a single layer, its inherent weakness renders it unsatisfactory. And where layers of paper have been tried it is found that the layers separate and become broken when the box is set up by reason of the tension mainly manifested on the exterior paper layer.

One of the objects of the present invention is to provide a composite reenforced paper fabric which, while generally useful for many purposes, lends itself advantageously to the formation of box corner stay strips, and the invention will, therefore, be described in this connection.

In accordance with the present invention the layers of material which constitute the composite fabric are secured together face to face by an adhesive which may be of a waterproof character such as asphaltum, and reenforcing unspun fibres are embedded in the adhesive between the layers of the completed fabric.

When the fabric is to be used as a box corner stay strip the exterior surface of one of the layers of material is supplied with a gum which may extend as a continuous coating or arranged as a pattern with blank or ungummed portions, and in order to dry the gum the fabric, as thus far described, is subjected to a drying heat which may be in the neighborhood of 180° F. The drying heat is liable to so far soften the adhesive between the layers that the layers may separate at certain points due to shrinkage or the like, and when the fabric is bent as in the application to the corners of a box, this separation may become more marked by reason of the tension exerted upon the outer layer which, of course, occupies a more extended arc than does the inner layer.

It is, therefore, one of the objects of the present invention to impart to the outer layer of the composite fabric the capacity for yielding in the direction of the bend, thereby eliminating the surface tension and permitting the layers of material to remain in close union under the action of the adhesive.

The invention and novel features thereof will best be made clear from the following description and accompanying drawings of one method and construction for attaining the objects sought.

In the drawings:—

Fig. 1 represents a roll of two ply fabric reenforced transversely by unspun fibres and secured together by an adhesive such as asphaltum.

Fig. 2 shows one means of imparting to the ungummed layer an embossed condition by indentations impressed into the body of the outer layer;

Fig. 3 shows the manner of slitting the fabric in the formation of a box corner stay strip;

Fig. 4 is an enlarged and much exaggerated sectional view on the line 4—4 of Fig. 3;

Fig. 5 is a perspective view showing the box corner stay strip as having been applied to the box corner, a portion of the upper layer being turned back to show the construction beneath;

Fig. 6 represents a diagrammatic view of a box corner with a stay strip associated therewith; and

Fig. 7 is a perspective view showing a portion of a box, the two corners of which are strengthened by the box corner stay strip

Referring more particularly to Fig. 1 the paper roll 1 commonly referred to as a jumbo roll has wound thereon a composite reenforced fabric A, comprising the upper layer 2 which is turned back to disclose the adhesive and embedded unspun fibres 3 which, in this instance, extend transversely to the lengthwise dimension of the composite fabric, it being supposed, as shown, that the final product is to be cut lengthwise into numerous strips. If, however, the final product, as will be hereinafter described, is to be cut transversely, then the unspun fibres may extend longitudinally.

As the composite fabric A is taken from the jumbo roll 1 the under layer is supplied with a gum, as indicated by the stipple portion 4. The gum is usually applied in a liquid or semi-liquid state and the now gummed reenforced fabric is subjected to a drying temperature to dry and set the gum and when so dried or set the composite fabric may again be rolled up into a second jumbo roll 5. This is possible because the gum has been

duly dried and preferably at approximately a temperature of 180° F.

The composite fabric 6 on the jumbo roll 5 now consists of superposed layers of sheet material, one at least of which shall be paper, and the under layer as above explained with respect to Fig. 1 is provided with a dried gummed surface 4.

In order that the upper or ungummed layer may be given its desired characteristic of expansibility or elimination of surface tension, the composite fabric 6, Fig. 2, has the upper layer thereof embossed or indented. The embossed or indented effect may be imparted to the upper ungummed paper layer by subjecting the composite fabric to the pressure of an embossing element.

The embossing elements in the illustrated form of the invention comprises the under or smooth presser roll 7 and the upper or embossing roll 8 between which the composite paper fabric is passed, as indicated in Fig. 2, the effect being that the upper layer of fabric is embossed or indented and the pressure of the rolls 7 and 8 will have the effect of reuniting the two layers should they have become separated during the gumming and drying process.

The composite fabric 6 as hereinbefore noted, has the under layer now provided with a dried or set gum 4, while the upper layer of the composite fabric 6 is untreated. As the fabric 6 passes between the two rolls 7 and 8 the upper layer of paper fabric is provided with indentations 9 which may generally be described as an embossed condition.

The embossing designs or indentations are not deep but penetrate about one-half the depth of the top sheet of paper or kraft and are just sufficient to remove surface tension from this sheet. This is indicated in a somewhat exaggerated form in Fig. 4 wherein it will be noted that the top sheet is embossed or indented as at *a* only to such an extent as to not materially disturb the unspun reenforcing filaments 3. The embossed effect does not pass through the entire composite fabric but, as noted, is only sufficiently deep to impart to the top sheet a character of expansibility and relieve tension to the paper layer when the composite sheet is bent around an object. The embossing design may be of any desired character, but as shown in the present instance of the invention, the embossing design 9 extends longitudinally of the upper sheet.

When a box corner is to be strengthened by the stay strip, the box 10 is in a knock-down condition, as indicated in Fig. 5, and the stay strip is adhesively connected to adjacent portions of the box at each side of the bend, with the result that when the box is set up, as indicated in Figs. 6 and 7, the portion of the stay strip next to the box occupies a less distance or arc, if it may be called so, than does the outer or upper layer of paper. This, of course, imparts a strain upon the upper layer but the embossed condition thereof permits the surface tension to be relieved.

The box corner stay strip may be generally identified as B, as indicated in Figs. 5, 6 and 7, and such stay strip is cut from the gummed and embossed composite fabric as it is drawn from the jumbo roll C, as indicated more clearly in Fig. 3, where only one strip is shown as being cut from the finished composite fabric, but it will be understood that the entire width of the composite fabric may be formed into strips similar to that indicated at B, Fig. 3.

From the construction described it will be apparent that the present invention provides a reenforced composite paper fabric wherein the exterior surface of one of the layers is gummed and dried and the superposed layer is embossed or indented to relieve surface tension. Obviously the character of the embossing effect may be varied between wide limits, the purpose being in any case to relieve the top paper layer from undue or disturbing tension when the gummed and embossed fabric is bent around an object to which it is to be attached.

Usually the stay strip will be applied only on the joint or corner where the two ends of the box blank abut or come together, but, as indicated in Fig. 7, the stay strip may also be applied at other corners of the box structure if desired.

In the embossing operation, it is possible that the use of an under embossing roll instead of the plain roll, as shown, might be advantageously employed, but as this is an obvious condition it is not illustrated.

What is claimed is:—

1. As an article of manufacture, a composite reenforced paper fabric, comprising two paper sheets secured together face to face by an adhesive and reenforcing unspun fibres embedded in the adhesive between the sheets, one of the paper sheets having a gummed exterior surface, and the body of the other paper sheet being embossed or indented to render it flexible and relieve tension without rupturing when the composite paper fabric is bent about an object.

2. As an article of manufacture, a composite reenforced paper fabric for box corner stay strips, comprising a layer of sheet material having a gummed surface, another paper strip or sheet embossed or indented to relieve tension therein and prevent rupturing when the composite fabric is bent about the corner of a box, an adhesive for securing the two sheets together face to face, and a series of unspun reenforcing filaments held between the two sheets by the adhesive.

3. As an article of manufacture, a composite reenforced paper fabric for box corner stay strips, comprising a layer of sheet material having a gummed surface, another paper strip or sheet embossed or indented to relieve tension therein and prevent rupturing when the composite fabric is bent about the corner of a box, an adhesive for securing the two sheets together face to face, and a series of unspun reenforcing filaments extending transversely of the composite fabric and held between the sheets by the adhesive.

4. A composite reenforced box corner stay strip, comprising two layers or strips of paper secured together face to face by an adhesive and reenforcing unspun fibres extending transversely of and between the two layers or strips of paper and held in place by the adhesive, one of the paper layers or strips being provided with a gummed surface for securing the stay strip to portions of the box structure, and the other paper layer or strip being embossed or indented to relieve surface tension and prevent rupturing when the stay strip is bent about the corner of a box.

EDWARD C. SMITH.