

Aug. 7, 1923.

1,464,155

P. T. JACKSON
COMPOSITE FABRIC

Filed Oct. 6, 1921

2 Sheets-Sheet 1

Fig. 1

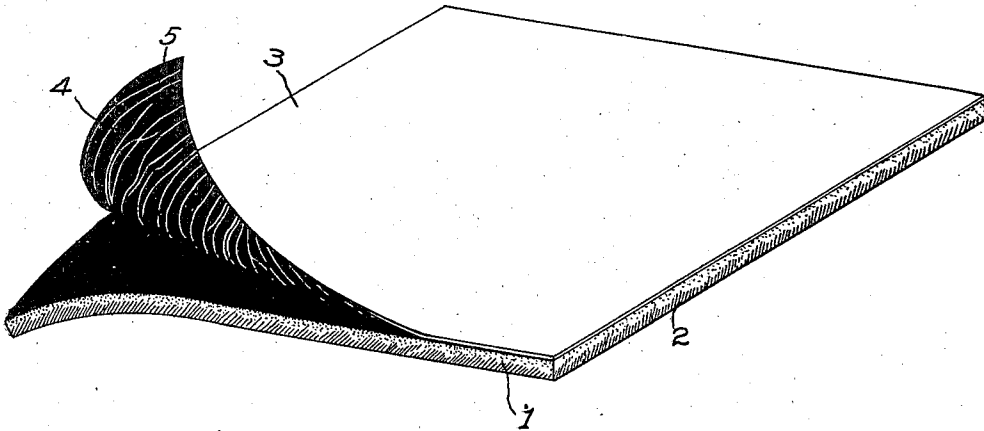


Fig. 2

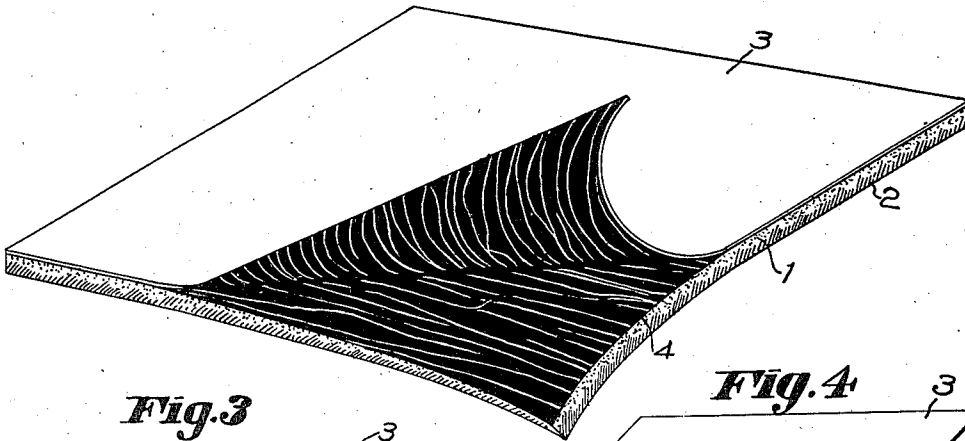


Fig. 3

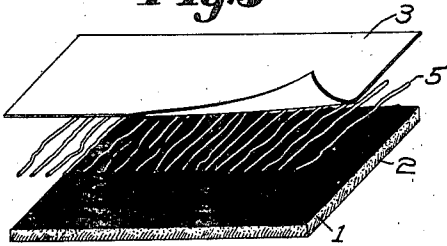
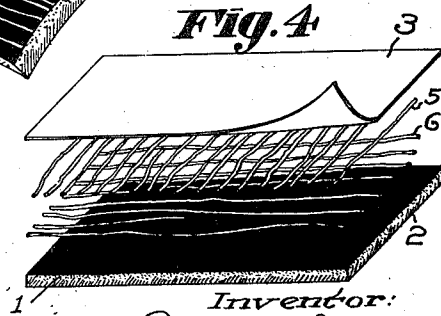


Fig. 4



Inventor:
Patrick Tracy Jackson
by Robert S. Harris,
Attorney

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2 Sheets-Sheet 2

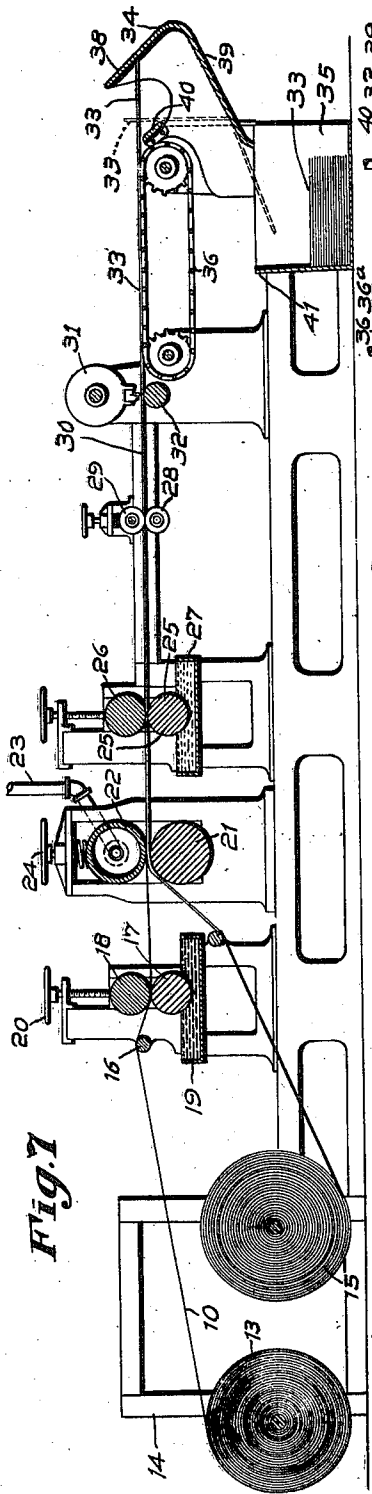


Fig. 1

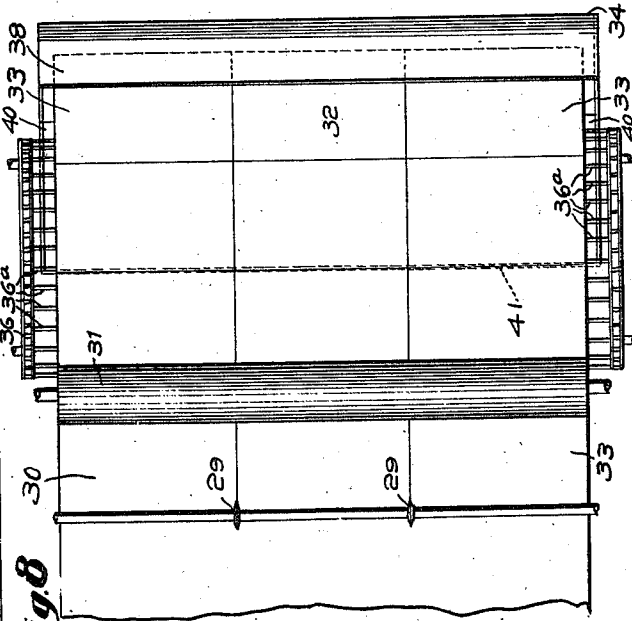


Fig. 8

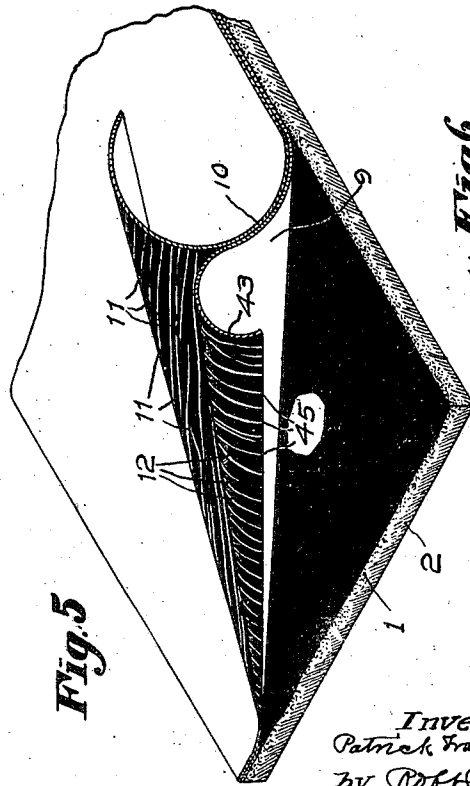


Fig. 5

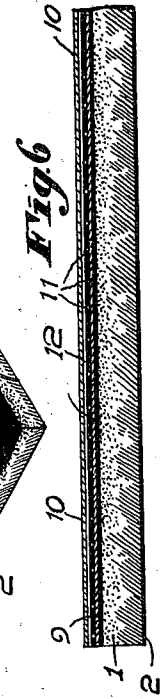


Fig. 6

Inventor:
 Patrick Tracy Jackson
 by Robt. G. Hauke
 Attorney

UNITED STATES PATENT OFFICE.

PATRICK TRACY JACKSON, OF CAMBRIDGE, MASSACHUSETTS, ASSIGNOR TO PAPER PRODUCTS MACHINE COMPANY, OF BOSTON, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

COMPOSITE FABRIC.

Application filed October 6, 1921. Serial No. 505,881.

To all whom it may concern:

Be it known that I, PATRICK TRACY JACKSON, a citizen of the United States, residing at Cambridge, county of Middlesex, and State of Massachusetts, have invented an Improvement in Composite Fabrics, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

The invention to be hereinafter described relates to paper fabrics, and more particularly to paper fabrics reinforced by strengthening filaments adhesively secured thereto.

The increasing use of paper containers, boxes, and covers for shipping or transportation purposes has created a demand for a paper material which shall be relatively cheap and yet possess sufficient body or bulk to withstand the rough wear and handling incident to such use, and at the same time shall be strong in resistance to rupture or tearing, and sufficiently stiff and rigid to act as a safe protection to the contained material by resistance to any ordinary crushing or indenting force. Covers, containers, boxes, and shipping cases are frequently subjected to dampness or the effects of moisture, especially in wet weather, and a further demand has grown up for a material of the above-described characteristics which shall be water-resistant or waterproof, also.

One of the objects of the present invention, responsive to the demand above-described, is to provide a composite reinforced paper fabric formed of layers of paper material, secured together by an adhesive, preferably waterproof, and stiffened by a stiffening compound applied thereto, the stiffened composite fabric thus furnishing the desired attributes for the manufacture of cases, containers, or boxes and like covers.

In carrying out the advantages of the invention, the layers of paper material which compose the composite fabric are preferably formed of different thickness, the thicker layer of material being more especially utilized not only to provide the body or bulk for the composite material, but as an absorbent for a stiffening compound, whereby the thicker material, in addition to its bulk characteristics in assisting wear, is ren-

dered inherently stiff and unyielding to ordinary indenting or bending forces to which containers, covers, and packages are subjected during transportation or shipment. It may not always be necessary to provide the paper layer material of different thicknesses, provided one or more layers of the composite fabric are sufficiently absorbent to take up and retain a stiffening compound or material that will harden or stiffen on drying or cooling. In these cases, regardless of whether or not the thicknesses of the paper layers are the same or different, the rigidity and inflexibility given to the composite fabric is largely dependent upon the application of the hardening or stiffening compound; but in most cases it is preferable to use paper layer material of different thicknesses, in which case the thicker material may be made of strawboard, bogus, or other thick absorbent paper which will readily absorb and retain the stiffening compound.

The stiffening compound is preferably of a character that becomes hard and stiff, yet not brittle, after having been applied in the fluid or liquid state, such for instance, as silicate of soda, water-glass, or other material or equivalent compound.

The relatively thin layer of paper material is preferably formed of thin, strong paper which is pliable and yieldingly flexible, such for instance, as manila paper, and yet affords a substantial protective covering to the reinforcing filaments which are placed between the layers of paper.

The reinforcing filaments may be of a character to impart to the composite fabric the desired strength to resist a rupturing or tearing strain, and may be composed of reinforcing elements which may extend longitudinally between the layers of paper and be imbedded in the adhesive by which the two layers of paper are held together. Preferably, however, the reinforcing filaments are formed of unspun fibres which are especially adapted to provide the desired strength to the material without at the same time detracting from its appearance by the forming of unsightly ridges and depressions in the surface of the composite fabric. In some cases it may be desirable to provide the composite fabric with strengthening or reinforcing filaments run-

ning both longitudinally and transversely, and a composite fabric of the character described in the claims having such construction would be within the scope of the present invention.

The adhesive which secures the layers of paper together, and in which the reinforcing filaments are imbedded, may preferably be formed of waterproof substance, such for instance, as asphaltum.

The invention will best be understood from the following further detailed description thereof in connection with the accompanying drawings which show good, practical forms of the invention and one means for manufacturing the same.

In the drawings:

Figure 1 is a perspective view of a composite, reinforced and stiffened paper fabric embodying the present invention;

Fig. 2 is a modified form, wherein the reinforcing filaments extend both longitudinally and transversely;

Fig. 3 is a perspective detail of a portion of the fabric of Fig. 1, with the paper layers and reinforcing filaments in separated relation;

Fig. 4 is a corresponding view of the paper layer materials and the transverse and longitudinally-extending reinforcing filaments in separated relation;

Fig. 5 is a further modification of a composite, reinforced fabric embodying the present invention;

Fig. 6 is a transverse section through the fabric of Fig. 5;

Fig. 7 is a side elevation and part sectional view of a machine for manufacturing the fabric of the present invention; and

Fig. 8 is a detailed plan view of a portion of the machine shown in Fig. 7.

Having reference more particularly to Figs. 1 and 3 of the accompanying drawings: The composite fabric is composed of a relatively thick layer of paper material 1 which may be formed of strawboard, cardboard, bogus, or other like paper material, and which is sufficiently absorbent to take up and retain a stiffening compound. The thick material 1, as indicated in Figs. 1 and 3 by the lines 2 extending inwardly from one surface of a paper layer, is treated on its exposed surface with a hardening solution or compound which may be silicate of soda, water-glass, or other hardening and stiffening material. The effect of the stiffening compound applied to the absorbent layer of paper 1 is to impart to the composite fabric, hereinafter more fully described, capacity for resisting ordinary bending and deflecting strains, and such stiffening material or compound converts the thick layer of paper into a paper plank or board, especially suitable for making containers, boxes, and other packages for

shipment or transportation purposes. Ordinarily the stiffening compound or material 2 which is applied to the thick paper layer, does not penetrate to the opposite surface, but this will be dependent largely upon the absorbent quality of the thick layer of paper.

Adhesively secured to the stiffened or inner surface of the thick paper layer, as indicated in Fig. 1, is a flexible or pliant thinner layer of paper 3. The two layers of paper in the form of the invention shown in Fig. 1, are secured together by an adhesive 4 indicated in black in Fig. 1, and such material is preferably of a waterproof character, such as asphaltum.

Imbedded in the asphaltum or adhesive between the paper layers 1 and 3, Fig. 1, are the reinforcing filaments 5 which are indicated in Fig. 1 as unspun fibres extending in substantially parallel relation longitudinally of the composite fabric.

The relatively thick layer of absorbent material 1 and the relatively thin layer 3 with the asphaltum and imbedded fibres between, are ordinarily pressed together with sufficient force to permanently unite the layers into a homogeneous fabric.

In Fig. 2, the two layers 1 and 3 of paper material, have imbedded between them the unspun reinforcing fibres laid both in a longitudinal and transverse direction, which are imbedded in the waterproof asphaltum 4, shown in black in Fig. 2. In this form of the invention, as in Fig. 1, the exterior surface of the thick strawboard or the like 1, is impregnated with the stiffening compound.

Fig. 3, which shows the paper layer of Fig. 1 in separated relation, indicates clearly the general parallel relation of the longitudinally-extending filaments which are unspun fibres in the present instance, and shows also that the adhesive or asphaltum by which the layers of paper material are held together, extends over the inner surface of the thick paper layer 1, the opposite surface of which is stiffened by the application of a stiffening compound.

In Fig. 4, the fabric is substantially the same as indicated in Figs. 1 and 3, with the exception that the transversely-extending reinforcing filaments or fibres 6 are held in the adhesive compound between the layers of fabric.

While each of the fabrics shown in Figs. 1 and 2 present the broad features of the present invention wherein a reinforced paper fabric is formed of layers of paper material, adhesively held together face-to-face with the reinforcing filaments imbedded in the adhesive material and the composite fabric stiffened by the application of the stiffening compound, the invention is further exemplified in Figs. 5 and 6, wherein

the thick paper layer 1 is provided with the stiffening compound 2 on one surface the same as in Figs. 1 and 2, and has applied to its other surface a plurality of layers of thin or pliant paper. In the form of the invention shown by Figs. 5 and 6, the two thin layers of paper 9 and 10 are provided with both longitudinally and transversely-extending fibres 11 and 12, and the two layers 9 and 10 are adhesively secured together preferably by asphaltum; and the composite fabric formed by layers 9 and 10 with the reinforcing filaments between, is adhesively secured to the surface of the thick paper 1 by an adhesive compound.

In some aspects of the invention the construction shown by Figs. 5 and 6 presents advantages over the construction shown by Figs. 1 and 2, in that the paper layers 9 and 10 of Figs. 5 and 6 having their contiguous surfaces adhesively held together by asphaltum and the reinforcing filaments between, may be produced independently of the fabric of the present invention, and thereafter applied to the thick paper layer 1.

The composite fabric of Figs. 5 and 6 may be produced commercially by a machine such as shown in Figs. 7 and 8, wherein the composite paper material formed of layers 9 and 10 with the filaments between the layers and held together by asphaltum, may be supplied to the machine from a roll 13 supported by a suitable framework 14; and the thick paper layer 1 may be correspondingly supplied independently to the machine from a separate source of supply. The source of supply for the thick paper material 1 is shown in the present instance as a roll 15 of such material.

From the roll 13 the paper layers 9 and 10 are carried over a guide roll 16 between the rolls 17 and 18, the lower roll 17 of which dips into an asphaltum tank 19. The roll 18 may be adjusted toward and from the roll 17 by an adjusting screw and handwheel 20. As the composite paper strip described passes between the rolls 17 and 18, its under surface is supplied with a coating of asphaltum, preferably hot, and from the rolls 17 and 18 the paper strip passes between the rolls 21 and 22, one of which may be a calendar roll for the purposes of maintaining the asphaltum in a liquid or heated condition. Heat may be supplied to the upper roll 22 through a supply pipe 23 and the roll may be adjusted toward and from the lower roll by the handwheel 24. The thick paper layer 1 passes from the roll 15 in the present instance between the rolls 21 and 22, where the composite paper strips 9 and 10 are adhesively secured to the thicker layer 1 as indicated in Fig. 7. The composite layers 9 and 10 and the thicker layer 1 now held together by the adhesive or asphaltum therebetween, pass to the rolls 25 and 26, the lower roll of

which dips into a tank 27 containing a stiffening compound such, for instance, as silicate of soda, waterglass, and the like, whereby as the composite fabric travels between the rolls, the under surface of the thick paper layer 1 becomes impregnated or saturated with the stiffening compound.

The now impregnated composite fabric may be delivered to any receiving station, where it may be either wound upon a roll or cut up into lengths and piled, layer upon layer.

In the form of the machine indicated in Fig. 7, the completed composite reinforced and stiffened paper fabric is cut into strips by the cutters 28, 29, and thereafter cut into lengths by a cutter 31 cooperating with an under roll 32.

The cut pieces of paper fabric then pass to a conveyor 33 and are delivered over the end thereof, as indicated in Fig. 1, where the advancing end of each cut strip contacts with a turning device 34 which serves to turn the cut pieces with the surface on which the stiffening compound has been deposited, uppermost. The cut pieces thus turned as indicated in dotted lines, Fig. 1, then pass to the receptacle 35.

What is claimed is:

1. As an article of manufacture, a composite reinforced and stiffened paper fabric, comprising layers of paper material adhesively secured together face-to-face, one of said layers of paper material being relatively more absorbent than the others and impregnated with a stiffening compound and reinforcing filaments imbedded in the adhesive between two of the paper layers.

2. As an article of manufacture, a composite reinforced paper fabric, comprising in its construction a thick layer of absorbent paper material impregnated with a stiffening compound, a thinner paper layer secured face to face to the thick paper layer by an adhesive, and reinforcing filaments imbedded in the adhesive between the layers.

3. As an article of manufacture, a composite reinforced and stiffened paper fabric, comprising layers of paper material, one of which is impregnated with a stiffening compound, a waterproof adhesive between the paper layers, and reinforcing filaments imbedded in the waterproof adhesive between two of the paper layers.

4. As an article of manufacture, a composite reinforced and stiffened paper fabric, comprising layers of paper material, one of which is thicker than the others and is impregnated with a stiffening compound, a waterproof adhesive between the paper layers, and reinforcing filaments imbedded in the waterproof adhesive between two of the paper layers.

5. As an article of manufacture, a composite reinforced and stiffened paper fabric,

comprising a layer of thick absorbent paper material, which is stiffened by impregnation with a stiffening compound, a layer of thin paper material, a waterproof adhesive
5 between the paper layers, and reinforcing filaments imbedded in the waterproof material between the two layers.

6. As an article of manufacture, a composite reinforced paper fabric, comprising
10 a layer of relatively thick and absorbent

paper material, a layer of thinner paper material secured to one surface of the thicker paper material by waterproof asphaltum between the two layers, the exposed
15 surface of the thicker paper material being impregnated with a stiffening compound to stiffen the composite paper fabric.

In testimony whereof, I have signed my name to this specification.

PATRICK TRACY JACKSON.