July 3, 1923. 1,460,392

A. F. SCHENKELBERGER

MULTIPLY REENFORCED PAPER

Filed April 6, 1920

Fig. 1.

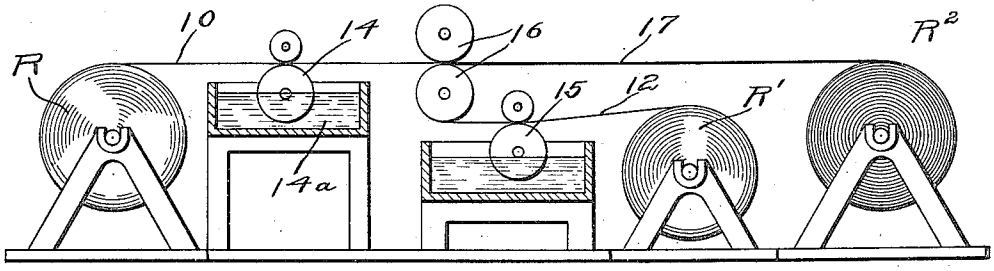


Fig. 2.

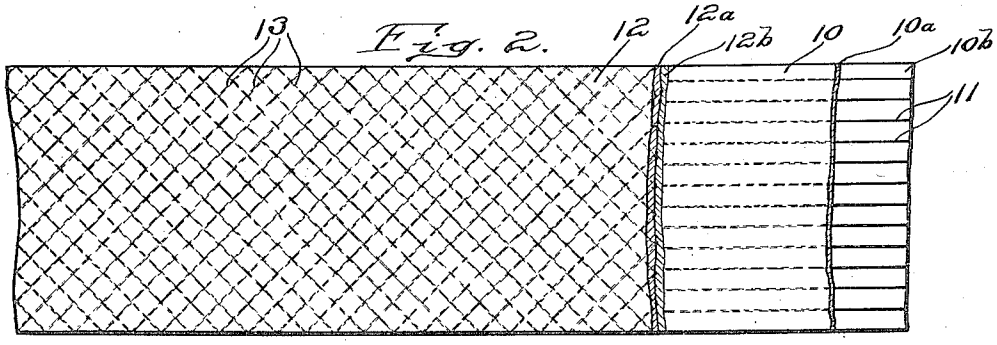
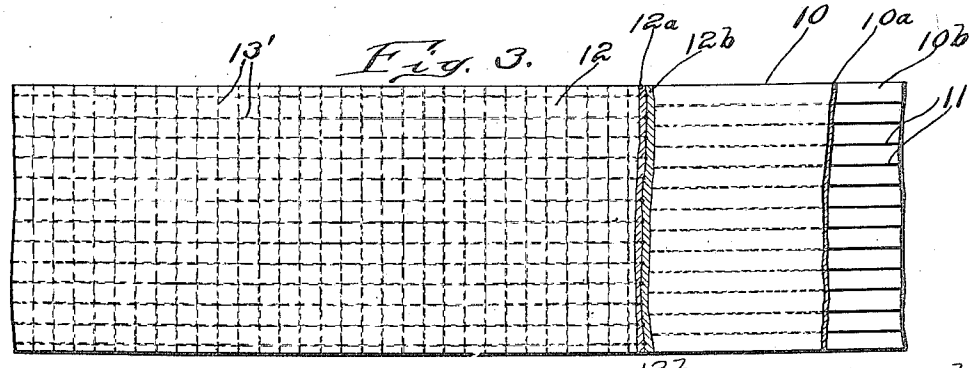


Fig. 3.



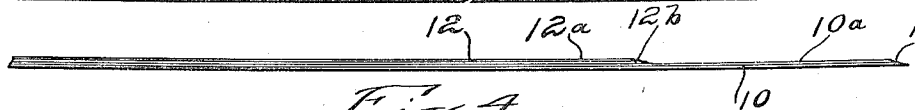


Fig. 4.

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by Clyde L. Rogers
his Atty.

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UNITED STATES PATENT OFFICE.

ALBERT F. SCHENKELBERGER, OF QUINCY, MASSACHUSETTS, ASSIGNOR TO SAFEPACK MILLS, OF BOSTON, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

MULTIPLY REENFORCED PAPER.

Application filed April 6, 1920. Serial No. 371,680.

To all whom it may concern:

Be it known that I, ALBERT F. SCHENKELBERGER, a citizen of the United States, and resident of Quincy, county of Norfolk, Commonwealth of Massachusetts, have invented an Improvement in Multiply Reenforced Papers, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts in each of the several views.

This invention relates to multi-ply papers adapted for wrapping, lining, and like uses wherein a plurality of layers of paper are united adhesively by a suitable cementitious binder which may be of asphalt applied hot, or where water-proofing is not required, it may be of glue or like adhesive. Papers of these kind have hitherto been made with reinforcing threads or filaments interwoven between the layers of a duplex paper and extending lengthwise of the paper web at intervals, and such reinforcing filaments have also been applied in criss-cross relation in a duplex paper. So far as I am aware, however, no multi-ply paper has been known wherein there is available the strength and reinforcing qualities both of the lengthwise extending threads of one duplex paper and of the criss-cross threads of another duplex paper united thereto in continuous and unbroken lengths. The principal object of the present invention is to provide a multi-ply reenforced paper composed of four or more layers of paper cementitiously united into a single web with lengthwise extending filaments between two of the layers and with criss-cross filaments extending continuously of the length of, and between others of the paper layers whereby the composite web thus produced is strengthened to a maximum degree in every direction by the filaments as well as by the multiple layers of paper themselves. A further object is to provide an improved method of manufacturing multi-ply reenforced paper in continuous webs of uniform strength throughout. The foregoing and other objects and advantages of the invention will more fully appear from the following detailed description, and the distinctive features of novelty will be thereafter pointed out in the appended claims.

Referring to the drawings:

Fig. 1 is a diametrical longitudinal view with parts in vertical section showing an apparatus for producing the multi-ply paper of the invention.

Fig. 2 is an elevation with portions broken away in section showing one form of multi-ply paper embodying the invention;

Fig. 3 is a similar view showing another form of the invention; and

Fig. 4 is an edge view of a part of the paper web broken away as indicated in Figures 2 and 3.

In carrying out my invention I provide a duplex paper web 10 which may be produced as usual of two paper layers 10^a—10^b cementitiously united by asphaltic cement or other suitable binder and with lengthwise reinforcing threads or filaments interposed between such layers and imbedded in the binder. I provide a second duplex web 12 likewise composed of two layers of adhesively united paper 12^a—12^b, these layers having interposed between them a criss-cross arrangement of reinforcing filaments as indicated at 13. These filaments as shown in Figure 2 extend diagonally of the web in opposite directions, while in Figure 3 and as indicated at 13′ these filaments extend straight crosswise and lengthwise of the paper. The duplex reenforced webs thus produced are cementitiously united together either by the same kind of binder as used for the original duplexing of the paper, or by a different adhesive or cement if desired. As shown in Fig. 1, one duplex web 10 is drawn from a paper roll R through a coating station 14 where it is engaged by a coating roll partly immersed in a tank 14^a containing the adhesive or binder to be applied. The other duplex web 12 is drawn from a roll R′ and may if desired also be led through a coating station 15, though this coating may be dispensed with, and thence the two webs are led between a pair of press rolls 16 and united to form a four ply reenforced web 17 which may be led onto a take-on roll R^2, or otherwise taken care of. In this way a multi-ply reenforced web may be produced continuously and rapidly and with all parts of the web exhibiting the combined strength of all the paper layers and also of all the series of filaments extending

lengthwise of the web and transversely thereof. I consider the form of the invention as shown in Fig. 2 of special value and importance since thereby the strength imparting qualities of the filaments are utilized to the best advantage by reason of the special and relative arrangement of the longitudinal filaments 11 of one duplex paper with the criss cross diagonal filaments 13 of the other duplex paper. I am aware that the invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof, and I therefore desire the present embodiment to be considered in all respects as illustrative and not restrictive, reference being had to the appended claims rather than to the foregoing description to indicate the scope of the invention.

Having described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A multi-ply reenforced paper comprising two sheets cementitiously united with lengthwise filaments imbedded therebetween and two other sheets united thereto with criss-cross filaments diagonal of the length of the web imbedded therebetween.

2. A multi-ply reenforced paper comprising a duplex sheet with lengthwise reinforcing filaments imbedded therein and another duplex sheet united thereto cementitiously and having filaments in criss-cross relation diagonal of the length of the web imbedded therein.

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

ALBERT F. SCHENKELBERGER.