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G. E. GIBBS

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REINFORCED PAPER

Filed April 3, 1931

Fig. 1

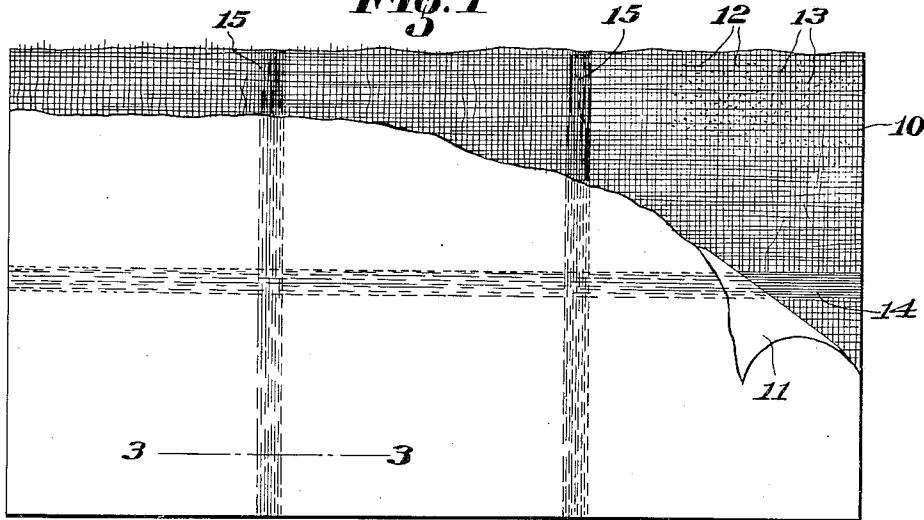


Fig. 2

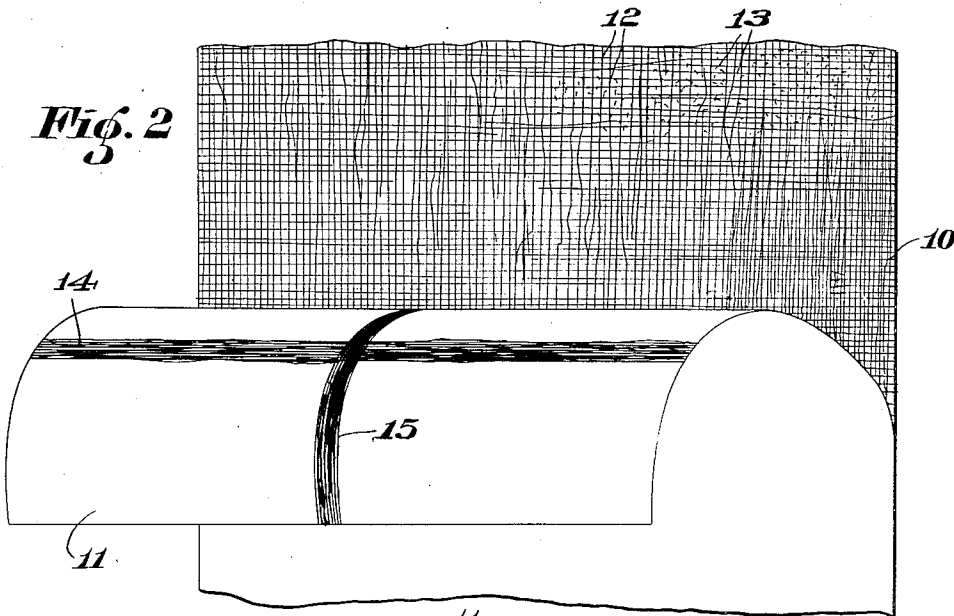


Fig. 3

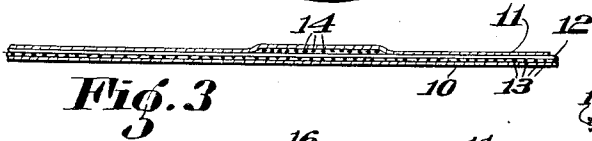


Fig. 4

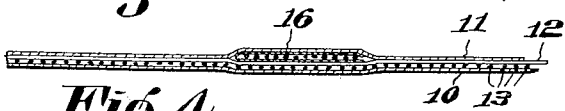
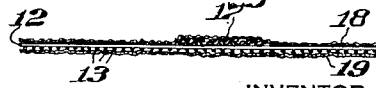


Fig. 5



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REENFORCED PAPER

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This invention relates to reenforced sheet material and more particularly to a multiply reenforced sheet material having means for further strengthening the multiply sheet material at spaced intervals.

It is found that by increasing the strength and durability of certain sheet materials they may be satisfactorily used in various fields as a substitute for woven fabrics, and in many cases they are preferable to woven fabric due to the lower cost and the added protection afforded by the property of the sheet material to exclude dirt and moisture.

For example strongly reenforced paper is well adapted for use in the construction of sacks, bags and bale wrappers, and when employed for these purposes gives better protection than burlap or other woven fabrics due to the fact that the paper being devoid of openings or interstices will exclude dirt and moisture, particularly when the paper is waterproof.

Likewise strongly reenforced paper is well adapted for use as a substitute for canvas in constructing tents, tarpaulins and the like, due to the fact that reenforced paper will exclude moisture better than most waterproof canvas, and is much cheaper than canvas.

The difficulty in using reenforced paper, or reenforced waterproof paper for the purposes above mentioned is due to the low strength of paper as compared with woven materials and to its tendency to tear or rupture under strain.

The present invention seeks to overcome this objectionable feature of reenforced paper and contemplates a multiply, reenforced, waterproof paper that is provided with additional reinforcements at spaced predetermined points, such as the portions of the reenforced paper which are likely to be subjected to the greatest wear or strain while in use.

A further feature of the invention resides in reenforced waterproof paper provided with additional reinforcing means provided at spaced intervals and located between the sheets of paper where the additional reinforcement is protected from moisture and exposure by the paper sheets.

The various features of the invention will be further understood from the following description when read in connection with the drawing illustrating good practical forms thereof.

In the drawing:—

Fig. 1 is a plan view of reenforced paper constructed in accordance with the present invention, the upper sheet of paper being partly rolled back.

Fig. 2 is a perspective view of an end portion of the sheet of paper of Fig. 1, the upper sheet being rolled back.

Fig. 3 is a sectional view taken on the line 3—3 of Fig. 1.

Fig. 4 is a sectional view similar to Fig. 3 but shows a modified form of the invention; and

Fig. 5 is a sectional view showing a further modified form of the invention.

In carrying out the present invention the multiply paper is preferably, although not necessarily rendered waterproof. The waterproofing of the paper is readily accomplished by employing a waterproof adhesive to secure the sheets together. In the embodiments of the invention shown in Figs. 1 to 4 inclusive the multiply paper is formed of two sheets of paper 10 and 11, such as kraft, or other tough, durable paper, and these two sheets of paper are secured together preferably with a waterproof adhesive, such as black asphaltum.

Since the strength of the multiply paper is an important feature the sheets of paper 10 and 11 should be strongly reenforced by reinforcing material provided between the two sheets and secured thereto by the waterproofing adhesive, and while various forms of either woven or unwoven materials may be employed to reenforce the sheets of paper, excellent results are secured through the employment of straightened unspun fibers, such as sisal, as the reinforcing elements, and in the construction shown one layer of straightened unspun fibers 12 is secured transversely between the two sheets of paper and a second layer of straightened unspun fibers 13 is secured longitudinally between the two sheets of paper. The advantage of using straight-

ened unspun fibers of relative long staple as the reenforcing elements resides in the fact that these fibers will not elongate or stretch appreciably under tension and as a result

- 5 when paper reenforced with these fibers is placed under tension the fibers will not stretch to subject the material to a rupturing strain but will resist the stretching force which would tear the paper if the fibers yield.
- 10 Each sheet of paper 10 and 11 preferably has a coating of waterproof adhesive applied to its inner face so that one layer of fibers will be secured to the sheet 10 by the adhesive upon its inner face and the other layer of
- 15 fibers will be secured to the sheet 11 by the adhesive applied to the inner face of this sheet and the two sheets of paper will be firmly united by the adhesive in which the fibers 12 and 13 are imbedded. The multiply
- 20 reenforced paper so far described is strong, tough and durable, and is waterproof to a pronounced degree due to the fact that the inner face of each sheet of paper is coated with a waterproof adhesive which prevents
- 25 the moisture that may come in contact with the outer face of either sheet of paper from reaching the reenforcing fibers.

- As above stated the present invention contemplates a reenforced waterproof paper
- 30 such as above described and which is provided at spaced intervals with additional reenforcing means to further strengthen the paper at the points where the greatest wear and strain is likely to occur.

- 35 The means of the present invention for further strengthening the multiply fabric constitutes reenforcing strips that may be provided either longitudinally or transversely or both longitudinally and trans-
- 40 versely of the multiply paper and these strips are shown in the drawing as extending both longitudinally and transversely of the paper as indicated by 14 and 15. These strips may be formed of various materials, such for ex-
- 45 ample as spun or unspun fibers, woven fabric, woven wire, or other reenforcing elements, and the strips 14 and 15 are shown in Figs. 1, 2, and 3, of the drawing as formed of unspun fibers of long staple such for ex-
- 50 ample as sisal, the fibers being disposed close together to provide the desired strength. In the modified construction of Fig. 4 the reenforcing strip 16 is shown as formed of two sheets of paper having reenforcing fibers ad-
- 55 hesively secured therebetween and extending longitudinally of the strips of paper. In the modification of Fig. 5 the reenforcing strip 17 is shown as formed of a woven material.

- 60 In each of the embodiments of the invention shown the reenforcing strips are provided between the sheets of paper 10 and 11 so that they are protected by these sheets. While it is not essential that the reforcing
- 65 strips be mounted between the sheets of pa-

per 10 and 11, this is desirable in many cases due to the fact that the strips when thus placed are protected from moisture and exposure and from abrasive action by the outer sheets of paper. The reenforcing strips necessarily increase the thickness of the multiply paper somewhat at the places where these strips are provided and the strips are arranged so that they form a raised portion in only one outer sheet of paper as shown in Fig. 3, or both sheets of paper may be displaced outwardly slightly where the strips occur as shown in Fig. 4.

The tendency of the paper employed in forming the multiply reenforced fabric to tear under severe strains may be further reduced by crimping, craping or otherwise distorting the sheets of paper from the flat condition as shown in Fig. 5 in which the outer sheets 18 and 19 are crimped or craped before the reenforcing elements are secured to these sheets of paper, and as a result of this construction the crimped or craped condition of the paper will permit it to stretch under tension without rupturing while the strain is resisted by the reenforcing elements.

It will be seen from the foregoing that the reenforcing bands or strips 14, 15, 16, and 17 may be made as strong as desired and if these bands are so positioned that they will receive the greatest strain and wear to which the reenforced paper is subjected the construction of the present invention may be employed for many purposes where it has been deemed necessary heretofore to employ a heavy woven fabric.

For example the reenforced waterproof paper of the present invention may be employed as a substitute for canvas in constructing sails, tents, tarpaulins, and the like, and if care is taken to secure the grommets or other anchoring means to the reenforced sheet of paper at the points where the additional strengthening strips are provided the paper will be capable of withstanding very severe strains. Likewise if the reenforced paper of the present invention is employed in the construction of sacks, bags, or bale wrappers it will be capable of withstanding severe strains if care is taken to place the reenforcing strips where they will receive the greatest strain and wear to which the paper may be subjected. The reenforced paper of the present invention in addition to the uses just mentioned may also be employed as a blanket or covering for curing concrete and as a covering for various other purposes since its strength will permit its use repeatedly without tearing.

While the multiply reenforced paper of the present invention has been herein shown and described as formed of two sheets of paper 10 and 11, more than two sheets of paper may be employed and adhesively se-

cured together where the increased strength and thickness is desired.

What is claimed is:—

1. As an article of manufacture, a multiply
5 reinforced fabric, comprising two sheets of paper secured together with waterproof adhesive, reinforcing material secured between the sheets of paper by the adhesive, and means for further strengthening the multiply
10 fabric at predetermined points consisting of ribbon-like strips of reinforcing material secured to the reinforced fabric structure at spaced intervals.

2. As an article of manufacture, a multiply,
15 reinforced fabric, comprising two sheets of fibrous material secured together with an adhesive, a layer of reinforcing, unspun fibres secured between said sheets by the adhesive, and means for further strengthening the multiply fabric at spaced predetermined
20 points comprising ribbon-like groups of reinforcing fibres secured to the reinforced fabric structure at spaced intervals.

3. As an article of manufacture, a multiply,
25 reinforced fabric, comprising two sheets of fibrous material secured together with a waterproof adhesive, a layer of straightened, unspun fibres extending longitudinally between said sheets and a second layer of straightened, unspun fibres extending trans-
30 versely between said sheets and secured between the sheets by the adhesive, and means for further strengthening the multiply fabric at spaced predetermined points comprising ribbon-like groups of unspun fibres secured
35 between said sheets at spaced intervals by the adhesive.

4. As an article of manufacture, a multiply,
40 reinforced fabric, comprising two sheets of fibrous material secured together with a waterproof adhesive, a layer of reinforcing, unspun fibres secured between said sheets by the waterproof adhesive, and means for further strengthening the multiply fabric at
45 spaced predetermined points comprising narrow strips of unspun, reinforcing material secured between said sheets at spaced intervals.

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

GEORGE E. GIBBS.

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