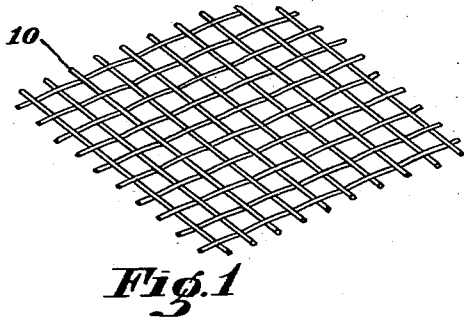
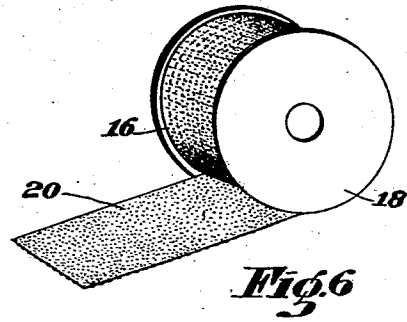
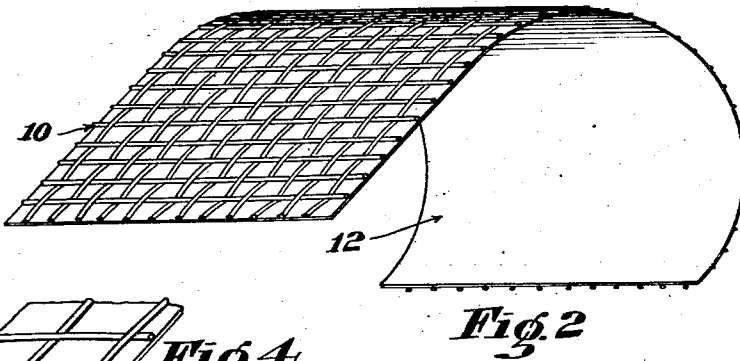
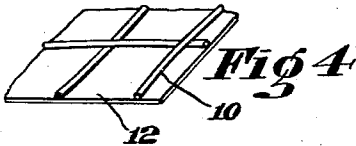
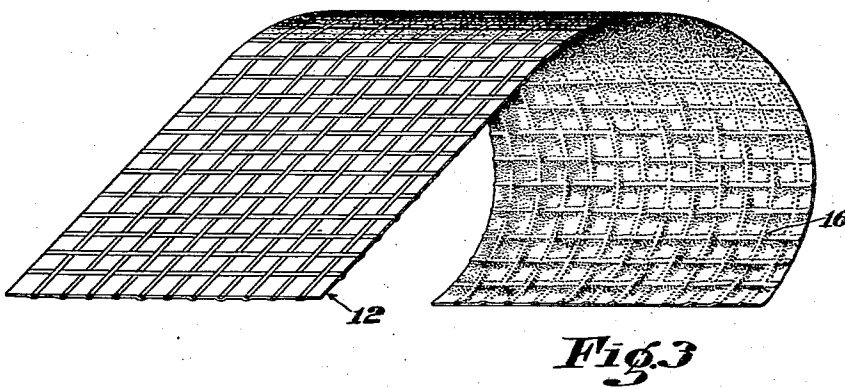
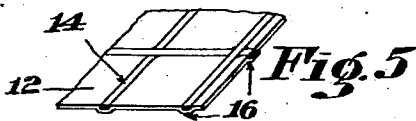


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J. W. BALLARD
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REENFORCED PAPER

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My invention relates to fabric-papers and more particularly to a low cost reenforced paper that may advantageously be used for masking tape, surgeon's tape, sealing tape and the like, and as a backing for pyroxylin or for other coatings or impregnations and purposes requiring a reasonably strong yet flexible, impervious back cloth.

One of the objects of my invention is to produce a reenforced paper backing of low cost having a characteristic structure that will insure such an intimate bond between it and a surface coating as will prevent peeling. A further object of my invention is to provide a reenforced paper having its fabric face perfectly suited for the application thereto of a smooth layer of a desired coating material, and in one aspect of my invention, for example where the backing is prepared with an adhesive coating for stripping into tape to be wound into rolls, it is an objective to provide the backing with an uneven paper face so that while the tape remains rolled the adhesive will have only a low percentage of surface bond against the back of a contiguous convolution.

Accordingly one important feature of my reenforced paper comprises an imbedding or implanting of the yarn or threads of an open mesh fabric in relatively cheap soft paper stock to such a degree that at this stage the fabric face presents a flat surface suitable for receiving and retaining a thin coating in a smooth, even layer. I select an open mesh fabric having sufficient strength for reenforcing the paper to the extent desired for its future uses and yet capable of exposing relatively large areas of the paper stock through the fabric so that any coating that is applied to the fabric face will bond principally with the exposed soft paper stock rather than with the fabric.

Another characteristic feature, which is a corollary to the first in the manufacture of reenforced papers wherein the diameter of

the yarn or thread is great relatively to the thickness of the paper, is the imbedding of the fabric to such an extent by pressure that its threads are made to force the paper stock outward on the paper side forming short ridges throughout that side that co-relate in the nature of a grid simulating the mesh count of the fabric used.

To the accomplishment of these objects and such others as may hereinafter appear, as will readily be understood by those skilled in the art, my invention comprises the reenforced paper and process of its manufacture hereinafter described and then particularly claimed.

In the accompanying perspective drawing, Figure 1 shows a fragmentary view illustrative of the open mesh fabric; Figs. 2 and 3 show, respectively, this fabric as initially combined and then as finally combined with the paper; Figs. 4 and 5 are fragmentary portions of Figs. 2 and 3 respectively on a greatly enlarged scale; and Fig. 6 indicates a backing, as shown in Fig. 3, gummed for use as adhesive tape, stripped and wound on a spool.

In the embodiment of my invention as illustrated in the drawing, my invention, in one of its aspects, comprises the manufacture of a backing cloth composed of a suitable paper reenforced with an open mesh fabric in which a special combining process is used, and in another aspect my invention consists in the manufacture of a special form of this backing cloth provided with a gum coating and useful as an adhesive tape or sheet.

The combining of the fabric and paper may be accomplished in more than one way. Fig. 1 illustrates the general nature or kind of open mesh fabric that may be used for reenforcement. In my preferred process of manufacture I feed the fabric against the wire or felt which travels through the vat of wet paper stock in such manner that on emergence from the vat it travels with the felt

having had, in the meantime, a lay of the paper stock of the desired thickness deposited into the mesh of the fabric. By an alternate process of manufacture I use pressure to combine the fabric with a prepared paper. In practising this process I prepare a soft paper felt comprising a soft and fluffy lay of paper that has not been hardened as by the addition of rosin sizing. Softness in the prepared paper is essential to enable a combination thereof with the mesh of the fabric substantially the same as when wet paper stock is deposited therein. Such a soft lay of paper and the fabric are then joined by any suitable compression machinery.

The quality of the paper stock depends upon the purpose for which the backing is to be used; for reinforcing tapes or strong reinforced paper it may be a kraft stock or it may be a combination of cotton, linen, rope or rag stocks, in fact any of the various fibres ordinarily used in making a strong paper; or for impregnation purposes it would be a soft, fluffed, absorbent paper or felt made from the shorter fibres such as bleached sulphite, sulphate, or other cellulose fibres blended with the longer fibres used for the stronger paper. For the best results it is preferable, particularly in the absence of any bond-giving sizing in the paper, to pre-treat the fabric in such manner as to give it an inherent quality of bonding to the paper. This can be done with unconverted starches or the more water resistant of the glues. I find it desirable, in some instances, to increase the bond by further treating the fabric face of the reinforced paper with a stronger, but flexible, glue for example one carrying some glycerine.

When the paper lay is relatively thin as compared to the thickness (i. e. yarn or thread size) of the fabric, a practice of either process will form, at this stage, a combination of fabric 10 and paper 12 as illustrated by Fig. 2 and in enlargement by Fig. 4.

The next step is to modify the fabric face of the combined fabric and paper in a manner to render it capable of receiving an even, smooth coating consisting of an adhesive or other material. Accordingly I now process the reenforced paper sheet in such a way as to press or bed the yarn or threads of the fabric into the paper the pressure used being in such degree and the engaging surfaces of the pressure tools being of such character that the fabric is sunk into the paper stock, and the yarn or threads may be flattened, to an extent that produces a plane, unbroken surface perfectly suited for the reception and retention of a smooth coating of either liquid or plastic material. Accordingly I calender the combined fabric and paper using pressures dictated by experience and in accord with the characteristics of the sheet effective for leveling the fabric face to a plane sur-

face. When a backing cloth having a relatively thin paper layer, as herein illustrated, is to be formed, I provide calendering rolls that will produce a smooth fabric face by causing the paper to give and envelop the yarn or threads on the paper face as they in turn are forced into the paper stock. The fabric mesh may be crushed or distorted to some extent as indicated by the threads 14 in the enlargement of Fig. 5, but the paper face of the backing will necessarily, by reason of the partial pushing through of the irregularity of the fabric face to the paper face, have formed thereon short ridges that co-relate in the nature of a grid as indicated at 16 in Fig. 3. These ridges on the paper face, or like surface roughening elements, are purposely retained because they have the advantage of lessening the capacity of the paper face to adhere to any gummed surface that may be laid against it.

Having produced a combined paper and fabric backing provided with a smooth fabric face as heretofore described, there may be applied to said plane or leveled surface a glue, adhesive coat, pyroxylin or other covering with certainty that any such application will result in the desired smooth coated face on the finished article.

In Fig. 6 I have shown a tape, wound on a spool 18 and having an adhesive covering 20, made from a thin paper backing cloth, to illustrate the benefit that accrues in unwinding the tape due to the small percentage of contact between the adhesive coated face and the raised grid formation 16 at the paper face. Such an indented back surface, with proper impregnation, will also serve as a non-skid surface for various articles of manufacture.

I call attention to a definite advantage gained by using a relatively thin paper, in addition to the advantages of low cost with sufficient strength for the purpose intended, namely the strength of the bond that is obtained between the paper and its adhesive or other covering. The coating bonds to the paper through the meshes of the fabric reinforcement and because of the thinness of the paper it bonds not only to the surface but to the individual fibres of the paper or underlying mat. The bond is so powerful that it effectually prevents any splitting or peeling of the fabric and/or coating from the paper, such as occurs with back filled and built up fabrics and such as could occur with a thicker paper or mat. The thorough interlaying of an adhesive with the yarn or threads gives greater pliability than has been obtainable heretofore which is a further essential advantage. For pyroxylin coating the same intimate bond is effected with a saving of material.

A use of the backing cloth herein described for some purposes, for example masking tape

and surgeon's plasters, will require proofing not only against water but against such solvents as are used in automobile painting. This may readily be accomplished by a glue sizing followed by a bath of formaldehyde.

The nature and scope of my invention having been indicated and the preferred form of my novel article having been specifically described together with the process of its manufacture, what I claim as new is:—

1. A fabric-paper sheet consisting of a fabric having an open mesh with a paper cover united to one face thereof, the fabric face of the sheet presenting a plane surface and the paper face of the sheet presenting an uneven surface formed by short ridges corresponding in position to the interwoven yarn or threads of the fabric.

2. A reenforced paper sheet consisting of a thin paper cover having an open mesh fabric comprising a yarn or thread size thicker than the paper applied to one face thereof, the stock of the paper being distorted to partly envelop the heavier yarn or threads of the fabric and present a planate surface throughout the combined fabric-paper face of the sheet.

3. A reenforced paper sheet or tape having outer layers composed of an adhesive coating and a paper cover sufficiently thin to effect a non-peelable bond with the coating, and an inner layer composed of an open mesh fabric the yarn or threads of which are relatively thick as compared to the thickness of the paper or the coating and also being imbedded in the paper to such a degree that the coated face of the sheet or tape is smooth while the paper face thereof is roughened by indentation of the open mesh weave.

4. The process of making a reenforced paper backing, in which the reenforce is an open mesh fabric having its constituent yarn or threads relatively heavy as compared to the thickness of the paper cover, which comprises uniting the fabric to one face of the thin paper cover and then pressing the yarn or threads of the fabric and the paper cover until the reenforced face is leveled by bringing the fabric and paper into the same plane, while at the same time permitting the imbedded yarn or threads to distort the thin paper cover and form ridges over its unreenforced face.

5. The process of making a reenforced paper backing according to claim 4 in which the fabric and paper are united during the process of making the paper whereby the wet paper stock is deposited into the mesh of the fabric.

6. The process of making a reenforced paper backing according to claim 4 in which the fabric is pre-treated with a bonding composition before being united to the paper cover.

7. The process of making a reenforced

paper backing according to claim 4 in which the backing thus produced is further treated with a glue sizing followed by a bath of formaldehyde.

8. The process of making a coated reenforced paper which comprises making a reenforced paper backing according to the process defined by claim 4, and then applying an even coating of flexible material to the plane fabric face of the backing and intimately bonding said coating into the paper throughout its areas exposed through the open mesh of the reenforcing fabric.

9. The process of making a fabric-paper adhesive tape which comprises making a reenforced paper backing according to the process defined by claim 4, and then coating the leveled fabric face thereof with a glue, or the like, covering and retaining the fabric in place and bonding with the fibres of the paper through the open mesh thereof.

10. The process of combining a fabric with paper which comprises combining an open mesh fabric with wet paper stock in such manner that the paper stock covers the fabric and is deposited into the mesh thereof, and then applying pressure to the mat thus formed sufficient to level its fabric face, the paper being so thin as related to the diameter of the yarn or threads of the fabric that by forming a plane surface on the fabric face the reverse, or paper, face has to take the form of an indented or roughened surface simulating the pattern of the open mesh of the fabric.

11. The process of preparing reenforced paper which comprises making a particularly soft and fluffy lay of paper unhardened by the addition of sizing, uniting an open mesh woven fabric to said lay of paper by adhesive agents and pressure, and ultimately, by pressure, causing the soft paper to penetrate the mesh of the fabric and said mesh to be imbedded in the paper to an extent that the reenforced face becomes a plane surface and the paper face becomes roughened in a pattern simulating said mesh.

12. The process of preparing an adhesive sheet or tape which comprises making a reenforced paper according to the process defined by claim 11 utilizing a paper so thin that an applied adhesive will bond to a substantial part of the fibres thereof, and then applying a smooth coating of adhesive over the plane face presented by said imbedded reenforcing fabric.

13. The process of making reenforced paper which includes preparing a soft and fluffy lay of paper devoid of hardening as by rosin sizing, combining therewith an open mesh fabric woven from a yarn or thread size which prevents complete embedment of the fabric within the paper, and then calendering the combined fabric-paper sheet.

14. The process of making reenforced

paper which includes feeding a sheet of open mesh fabric with and against the wire or felt travelling in a vat of wet paper stock and depositing a lay of the paper stock on the exposed surface of said fabric while moving through the vat, and then calendering the combined fabric-paper sheet.

15. A combined fabric-paper sheet comprising an open-mesh fabric face-applied and united to a sheet of paper so soft and fluffy as to partly embed the yarn or threads of the fabric.

16. A combined fabric-paper sheet having a layer of open-mesh fabric applied to a layer of paper, said fabric being bound to the fibres of the paper by adhesive carried by its yarn or thread.

In testimony whereof I affix my signature.
JOSEPH W. BALLARD.

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