Sept. 30, 1947. J. ROSLUND 2,428,097

DRIER FELT SEAM SECURING STRIP AND SEAM FORMED THEREWITH

Filed Dec. 23, 1941 2 Sheets-Sheet 1

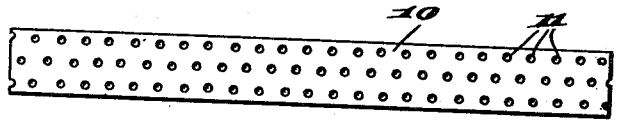


Fig. 1.

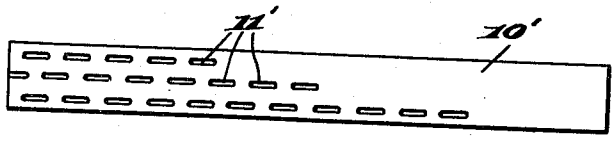


Fig. 2.

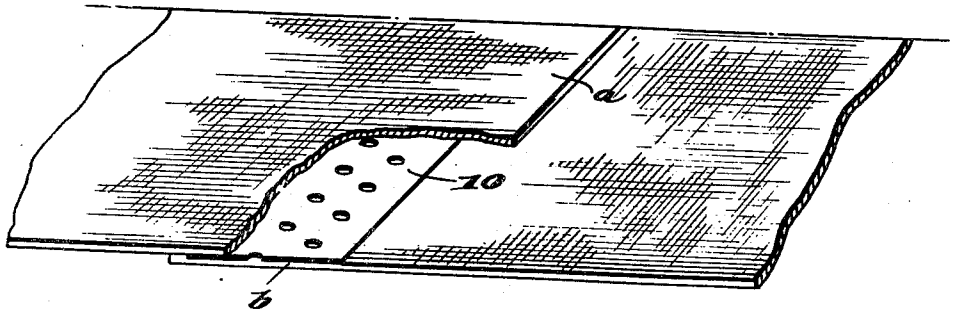


Fig. 3.

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Fig. 4.

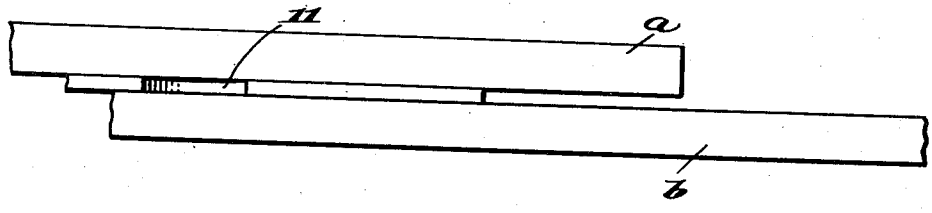


Fig. 5.

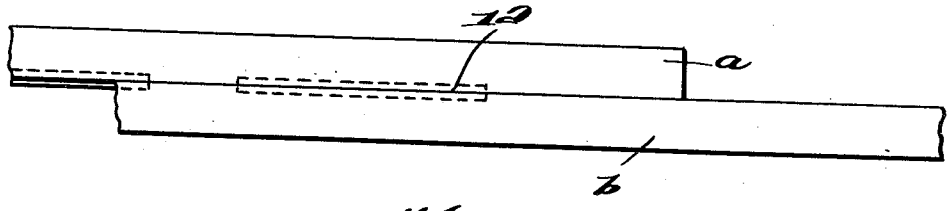


Fig. 6.

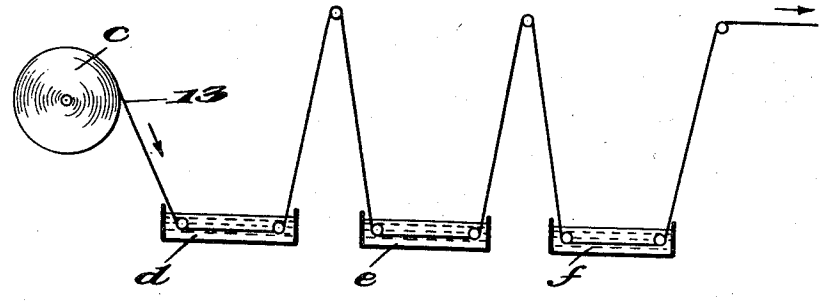
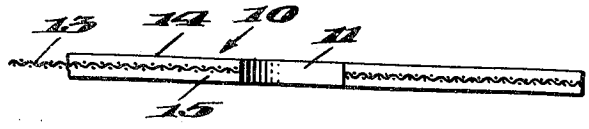


Fig. 7.



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DRIER FELT SEAM SECURING STRIP AND SEAM FORMED THEREWITH

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Application December 23, 1941, Serial No. 424,201

6 Claims. (Cl. 154—42)

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This invention relates to improvements in seams for absorbent textile fabrics for technical purposes, and in particular to seams for drier felts for use in paper making machines.

The primary object of the invention is to provide an economical and quickly formed seam for absorbent fabrics which will be enduring.

A further primary object of the invention is to provide a cement seam for drier felts of such character that the porosity and moisture absorbing capacity of the felt at the seam will be maintained to a large degree so that such area as well as other areas of the felt may take up the moisture driven out of the paper. If the felt at the seam is relatively non-absorbent the portion of the paper registering therewith may contain a greater amount of moisture than other parts of the paper with the result that streaks may appear in the paper as defects.

A further essential object of the invention is to provide a cement strip which is of such character and content in relation to the porosity and absorbent characteristics of relatively thick fabrics used for moisture absorbing purposes that a predetermined quantity of cement will be supplied by the strip adequate to produce a strong bond between adjoining portions of the fabric, but not in excessive quantity such as to reduce the absorbent capacities of the fabric to an objectionable degree. By carefully controlling the cement content of the strip according to experimental determination, a reliable seam may be formed through the use of the strip which does not depend in any way upon the judgment of the individual who forms the seam.

It is still another object to form a cemented seam in dried felts and similar absorbent fabrics which will not be objectionably stiff, and which shall have recurrent areas throughout devoid of cementing material. That is to say, the cemented area of the seam will have scattered therethrough recurrent areas wherein the porosity and flexibility of the fabric is the same as it would be were cement not used in forming the seam. This is accomplished by providing recurrent perforations in the cement strip of appreciable size, and of suitable shape and arrangement.

The proposed cement strip need not be composed entirely of cement. In its preferred form the same will incorporate a base, or core, of gauze or other thin open mesh fabric which will permit the free flow of the cement when the strip is softened preparatory to forming a seam therewith.

The invention will be understood by reference

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to the accompanying detailed description and the appended drawings.

In such drawings:

Fig. 1 is a plan view of a cement strip for drier felt seams according to the invention;

Fig. 2 is a corresponding view showing a modification of the cement strip of Fig. 1;

Fig. 3 is a fragmentary perspective view showing the manner in which a lapped seam is formed between the ends of a paper drier felt through the use of a cement strip according to Fig. 1;

Fig. 4 is a diagrammatic view on a greatly enlarged scale corresponding to Fig. 3, and showing the condition of the parts before the cement strip has been softened to effect a bond;

Fig. 5 is a view corresponding to Fig. 4 showing the seam after completion, and indicating particularly the limited penetration of the cement from the strip into the fabric;

Fig. 6 is a more or less diagrammatic view illustrating one way in which cement strips such as in Figs. 1 and 2 may be formed to secure a predetermined suitable cement content; and

Fig. 7 is a greatly enlarged fragmentary view of a portion of a cement strip formed under the process illustrated in Fig. 6.

It has heretofore been proposed to secure the ends of the drier felt in a seam through the use of liquid cement, but because of the thickness and porosity of the felt fabric it has been extremely difficult to apply an adequate quantity of cement to secure a strong bond and avoid applying an excessive quantity of cement such as destroys the porosity of the fabric. Also, because of the same characteristics of the felt it has been difficult to apply the liquid cement uniformly throughout the area to be bonded, and as a result portions of the seam may be undercemented and other portions excessively cemented. These difficulties are entirely eliminated through the use of the present cement strip according to the present invention.

In Fig. 1 is indicated a flat cement strip 10 of flat form and uniform thickness throughout. Such strip as used in drier felts will preferably have a width of 2½ to 3 inches, and experience has shown that this will produce an adequate area of bond to withstand the longitudinal pull on the felt during passage thereof through the drying portion of a paper machine. The length of the strip which runs horizontally in Fig. 1 is unimportant. The strips may be made up in different lengths for drier felts of different widths. As a matter of convenience, however, it is preferred to apply the strips in sections of a stand-

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ardized length of say two feet, such as can be easily handled, and to use the required number of strips end to end to extend across the full width of the particular felt to be seamed. The strips are sufficiently thin so that any excessive length of the strip may be cut off.

As heretofore mentioned the thickness of the strip is an extremely important factor, since it determines the degree of penetration of the cement of the strip into the opposing fabric portions to be joined. The thickness of the strip must be carefully controlled to provide an adequate quantity of cement to be absorbed in the pores of the fabric and leave an adequate quantity of cement at the opposing faces of the fabric sections to secure a strong bond. At the same time the thickness should be no more than necessary to accomplish this, since otherwise the cement is likely to penetrate through to the working surface of the felt, destroying its moisture absorbing capacity completely and tending to cause paper to stick to the felt.

A three ply drier felt having asbestos threads in its surface ply, which is one of the standard types of drier felt extensively used in paper mills, has a thickness varying between 2 mm. and 3 mm. For such a felt it has been determined that adequate but not an excessive quantity of cement is obtained by forming the cement strip with a thickness between .5 mm. and 1 mm. It will be found that a strip having a thickness of approximately .75 mm. is extremely satisfactory in connection with felts of the type just referred to and also for felts not including asbestos threads but having the same general characteristics as to thickness.

It is an essential characteristic of the cement strip that the same shall be of substantially less thickness than the thickness of the individual fabric sections to be joined. Regardless of the thickness of the drier felt fabric, it now appears to me that the thickness of the cement strip should not be more than 35% of the thickness of the felt fabric. To provide a sufficient cement content in the strip it also appears that the thickness of the cement strip should not be less than approximately 25% of the thickness of the felt fabric in order that a sufficient cement content may be assured to give the necessary strong bond.

It is of course important to use a cement which is waterproof and heat resistant for a drier felt seam, since the drier felt conducts the paper around heated calendering rolls which drive hot moisture from the paper into the felt fabric. It is preferred to use a cellulose acetate cement because of its ability to satisfy these conditions. The cement strip will of course be hard, and may be softened at the time of formation of the seam through the use of a volatile solvent, or equivalent softening agent which will function at ordinary temperatures.

While the degree of penetration of the cement through the felt may be limited by controlling the thickness of the cement strip, and thus the porosity of the felt for a substantial portion of its thickness adjacent the working surface maintained, it is obvious that the presence of the cement cuts down the total absorptive capacity of the felt at the seam to the extent that it does penetrate the felt fabric. To offset this condition, it is desirable to provide the cement strip with recurrent openings of appreciable size at frequent intervals. The openings may be circular as indicated at 11 in Fig. 1, or may be elongated

as indicated by the slotted openings 11' in the cement strip 10' of Fig. 2. The openings will be uniformly arranged and preferably staggered throughout the entire area of the cement strip. When the cement strip is used in forming a seam in a drier felt the bonded areas of the fabric will have interspersed therethrough areas where the fabric is not bonded and through which the moisture absorbed from the paper at the working surface of the felt can readily penetrate. This not only tends to prevent the felt at the seam areas from running wet, but greatly facilitates the drying of the felt in such area when reconditioning the same after prolonged use in accordance with the usual practice.

In forming a lapped seam in a drier felt the opposite ends *a* and *b* of the felt will be overlapped for a length somewhat greater than the width of the cement strip 10, all as shown in Fig. 3. This is because the cement tends to spread when it is softened, and it is obviously desirable that it should not spread beyond the felt extremities. In practice the lower end *b* of the felt will be placed upon a suitable flat base. A volatile solvent or other softener will then be applied thereto, employing about a quart of solvent for each five feet of width of the felt. The cement strip 10 will then be placed on top of felt end *b* in the position as shown in Fig. 3. The upper felt end *a* will be similarly treated with solvent and then be superposed upon the cement strip 10. A suitable pressure member will then be placed over the laminated structure. The solvent will soften the cement and cause the same to flow, entering the fabric of the felt ends for a distance adjacent the opposing surfaces thereof. Penetration of the cement into the fabric will be facilitated by the pressure through the pressure member, and the opposing surfaces of the felt ends will be forced together. The condition of the seam at the time the felt end *a* is superposed upon the cement strip is shown in Fig. 4, and the condition after the cement has softened and penetrated into the fabric of the felt ends is represented in Fig. 5. As the volatile solvent vaporizes off the cement sets and hardens, and the felt will be ready for use in a very short time after the seam is formed.

Because of the tendency of the cement of the strip to spread when it is softened it is important that the openings formed therein shall be of sufficiently large size as not to be destroyed under spreading of the cement. While the size of the openings as well as their shape may vary considerably, they must have a certain minimum size so that they will provide permanent openings through the cemented seam at relatively close recurrent intervals for the purposes above mentioned. Where circular openings 11 are employed as in the strip of Fig. 1 it is preferred to make them with the diameter of about 10 mm. or larger, making allowance for the fact that their diameter will decrease to some extent, perhaps as much as 25% or more when the cement softens, even though the cement strip is itself comparatively thin. It is obvious that the greater the total area of the openings in relation to the bonded area of the fabric, the greater will be absorptive capacity of the drier felt at the seam. Of course the total area of the openings should be kept within practical limits as otherwise there will be insufficient bonding to make a strong seam which will withstand the longitudinal strain on the drier felt during operation.

While the cement strip may be composed solely of cement, it is preferred to form the same by the

application of the cement to a strip of gauze 13, or other thin open mesh fabric through which the cement can readily flow as represented in Fig. 7. In such view is shown a fragmentary section of the cement strip of Fig. 1 on a greatly enlarged scale. The fabric has cement portions 14 and 15 on opposite sides thereof, and is cut away together with the cement to form openings 11. While the cement strip can be prevented from undue brittleness such that it readily breaks through the incorporation of a suitable quantity of plasticizer in the cellulose acetate or other adhesive material employed, the presence of the fabric core 13 prevents disintegration of the cement strip even where a plasticizer is not employed.

In forming the cement strip according to Fig. 7 the gauze 13 of the width desired for the cement strip is fed off a roll c through a tank d containing the adhesive material in liquid form, receiving therein a first coating of cement. The fabric strip 13 is thence fed through one or more further tanks e and f to receive an additional coating or coatings of cement. By using this procedure of successively depositing coatings of cement on strip 13 the thickness of the cement strip may be carefully controlled within small limits so that the thickness will be suitable for its intended use in joining absorbent fabrics. The coated strip 13 after leaving the last tank is allowed to dry while in flat condition, and may then be cut into cement strips of suitable length such as illustrated in Figs. 1 and 2. The openings in the strip may be cut through the use of suitable dies.

It will be evident to those skilled in the art that the present invention provides a foolproof way of forming seams between the ends of absorbent fabrics such as drier felts. It is far more reliable in obtaining satisfactory results than when employing liquid cement as heretofore proposed. The use of the solid cement strip suitably proportioned as to area and thickness guarantees satisfactory results, and particularly insures uniformity in the seam throughout its entire area as well as guarding against the presence of excessive quantities of cement which will objectionably impair the porosity of the fabric at the seam.

I claim:

1. A seam forming device for securing together the ends of a thick absorbent fabric drier felt in a cemented strongly bonded lapped seam devoid of cement at the outer fabric surfaces, comprising a strip having a cement-permeable thin open mesh fabric core coated on both sides with a solid water and heat resistant cement subject to softening upon moistening with a suitable solvent and being of appreciable thickness sufficient to penetrate the thickness of the felt ends to a substantial depth.

2. A seam forming device for securing together the ends of a thick absorbent fabric drier felt in a cemented strongly bonded lapped seam devoid of cement at the outer fabric surfaces and having recurrent cement free absorbent areas extending completely through the seam, comprising a strip having a cement-permeable thin open mesh fabric base coated on both sides with a solid water and heat resistant cement subject to softening upon moistening with a suitable solvent and being of appreciable thickness so as to penetrate the ends of the felt to a substantial depth, and recurrent openings of appreciable size disposed at recurrent relatively short intervals throughout the area of the strip and extending through the cement layers and fabric core thereof.

3. A thick absorbent fabric drier felt cemented seam comprising opposite ends of the felt arranged in overlapping relation and bonded together by a transversely extending, solvent treated, water and heat resistant cement strip of a thickness substantially less than the fabric penetrating the felt end portions to a depth of only a part of their thickness outwardly from their opposing surfaces and leaving the felt at the seam at and for a distance inwardly from the outer surfaces of the felt free of cement and capable of absorbing moisture.

4. A drier felt cemented seam according to claim 3 wherein the width of the cement strip is less than the width of overlap of the felt end portions so that the exposed fabric surface areas of the felt bordering the end extremities of the lapped end portions are free of cement despite the tendency of the cement under the softening action of solvent to spread lengthwise along the lapped surfaces of the end portions.

5. A drier felt cemented seam according to claim 3 wherein the cement strip throughout the bonded area of the felt end portions incorporates recurrent permanent openings incapable of being closed under the tendency of the cement to spread under the softening action of solvent and providing recurrent cement free absorbent areas extending entirely through the seam for the passage of moisture.

6. A thick absorbent fabric drier felt cemented seam comprising opposite ends of the felt arranged in overlapping relation and bonded together by a transversely extending, solvent treated, water and heat resistant cement strip of a thickness substantially less than the fabric and between .5 and 1. mm. penetrating the felt end portions to a depth of only a part of their thickness outwardly from their opposing surfaces and leaving the felt at the seam at and for a distance inwardly from the outer surfaces of the felt free of cement and capable of absorbing moisture.

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