

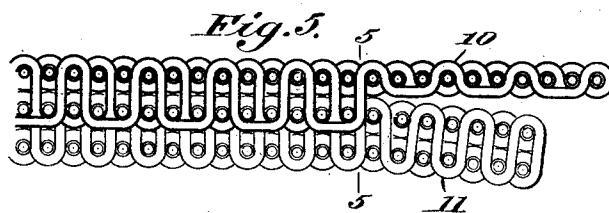
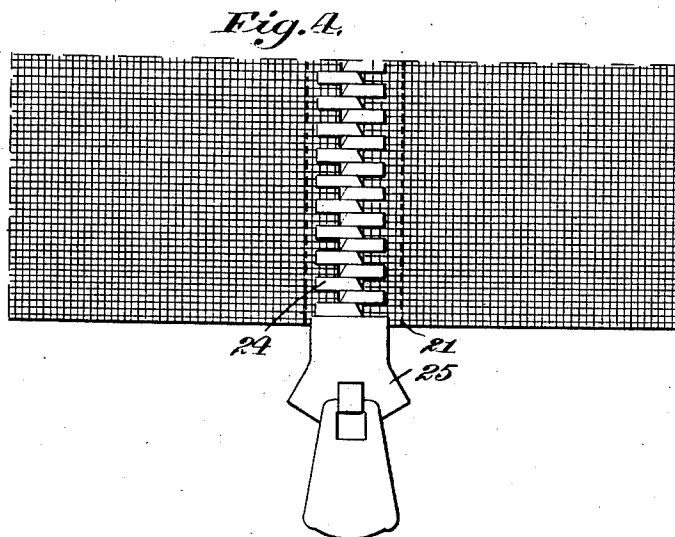
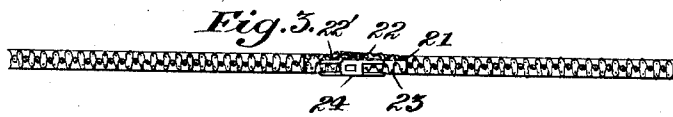
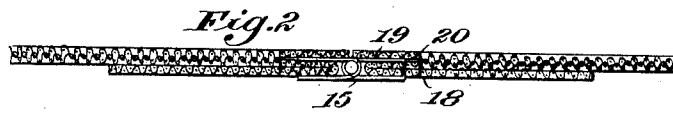
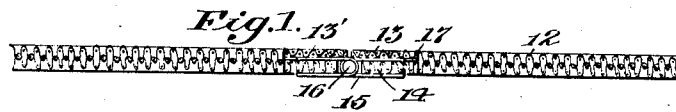
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E. v. ASTEN

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ENDLESS BELT AND SEAM CONSTRUCTION THEREFOR

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ENDLESS BELT AND SEAM CONSTRUCTION
THEREFOR

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6 Claims. (Cl. 24—33)

This invention relates to paper dryer felts, power belts, endless conveyors and like devices in the nature of bands carried by supporting or driving rolls and cylinders adapted to various industrial purposes. For the sake of convenience in manufacture and as an aid to their installation such devices are ordinarily made flat and the ends are then joined or seamed together either before or after installation to form an endless band. To render such type of structure more efficient and to facilitate installation, the present invention involves a novel manner of forming the ends of the band so as to produce a smooth and continuous surface at the joint on at least one side of the band unmarred and uninterrupted by any sort of connecting instrumentality, while at the same time enabling the use of any of various types of fasteners which will insure a strong connection between the two ends. In other words, my invention concerns a particular construction of the ends of the band which will enable them to be joined entirely below one surface thereof and a convenient manner of joining such ends.

In order that the utility and advantages of my invention may be fully appreciated I will describe the same as applied to paper dryer felts, with which type of band it is particularly useful, by reason of the special importance in such structures of having a smooth working surface at the joint between the two ends of the felt.

As is well known to those skilled in the art, dryer felts are large belts or aprons. The purpose of the felt being to lead, support and press a wet paper web as it passes around a series of drying cylinders after formation on a Fourdrinier or other web-forming machinery, it is necessary that the working surface of the felt be capable of absorbing such moisture as remains in the web and at the same time embody a smooth continuous working surface such as will not mar the paper. To this end, it has become common practice to utilize a fabric having a smooth and absorbent working surface comprising canvas or asbestos fibers and to associate integrally therewith a reinforcing under surface adapted to bear the strain imposed on the felt in passing over the supporting rolls of the paper machine and the drying cylinders thereof.

In installing dryer felts, it has heretofore been the practice to pass the felt between the cylinders of a drying machine and then to lap the ends of the felt to secure the same together by stitching. While this practice of joining the ends is simple, it is objectionable in that an uneven surface is presented to the paper web at the seam

of the felt which tends to mar the paper when it is pressed against the drying cylinder by the felt. To overcome this and other difficulties, it has become an accepted practice in some cases to utilize endless felts in which the ends are knit into each other to produce a smooth, continuous surface at the joint. By reason, however, of the construction of the paper making machinery, many of the felt supporting rolls must be removed in order to permit the installation of such a felt, necessitating the expenditure of a great deal of time and consequential loss in production.

Essentially, insofar as its application to dryer felts is concerned, the present invention constitutes an improvement over the type of dryer felt seam construction which obviates many of the difficulties in dryer felts heretofore encountered by stitching on to the under surface of the felt at the ends thereof backings with which are associated suitable connecting means, the arrangement being such that a smooth, continuous working surface is presented at the seam. However, while being satisfactory for most purposes it has been found that with this construction some difficulty has been encountered due to the tendency, after considerable use, of the backings secured to the felt and on which the strain falls, to pull away from the under surface of the felt, by reason of breaking of the securing stitches due to the action of moisture thereon and the strain between the felt and the backings in passing over the supporting rolls.

My improvement comprises essentially a manner of joining the two ends of a dryer felt, themselves, below the working surface thereof by associating the connecting means directly with the under surface of the felt, which, as heretofore pointed out, is formed integrally with the working surface. By such an arrangement, it will be obvious that I overcome the difficulties which sometimes arise in connection with the construction just described.

In carrying out my construction I am further able to present not only a smooth, working surface, but to so associate the connecting means with the under reinforcing surface that there may be, if desirable, substantially no increase in thickness of the felt at the seam, this resulting in the production of a substantially smooth and continuous under surface as well as working surface, which will facilitate the passage of the felt over the supporting rolls of the paper machine.

My invention further contemplates an end construction which will not readily wear out and

which is so formed that the under surface may be readily associated with suitable connecting means to effect a strong joint capable of withstanding relatively high tension and strain and calculated to last for the ordinary life of the felt.

In the accompanying drawing, I have illustrated several practical embodiments of my invention including certain modifications, but it is to be understood that the drawing is illustrative, merely, and diagrammatic and that it is not to be construed as limiting the invention to the particular application or the details of construction therein disclosed but, on the other hand, the invention is capable of a considerable degree of modification and equivalency differing from that herein set forth.

Fig. 1 is a view in vertical section showing the construction of the ends of a dryer felt made according to my invention and further showing the manner in which such ends are joined together to form a seam;

Fig. 2 is a view similar to Fig. 1 showing essentially a modification thereof;

Fig. 3 shows a construction somewhat similar to Fig. 1 differing therefrom, however, in the particular construction of the dryer felt ends and the manner in which the same are associated and further illustrates the application of a different type of connecting means from that shown in Figs. 1 and 2;

Fig. 4 is a view on an enlarged scale of a portion of the under surface of a dryer felt showing particularly the manner in which the type of connecting means shown in Fig. 3 is applied to join the ends of the felt; and

Fig. 5 is a somewhat diagrammatic representation of one type of multiply dryer felt showing particularly the manner in which the ends thereof are constructed according to my invention.

As heretofore pointed out, the essential object of my invention is to so form the ends of a belt or felt as to enable the same to be readily associated together to produce a smooth upper surface and, if desirable, a smooth under surface, and in accomplishing this result I have adopted an arrangement whereby the under surface is associated with suitable connecting means which will hold the two ends thereof substantially in abutting relation. Referring first to Fig. 5, wherein I have shown somewhat diagrammatically the ends of a fabric felt comprising an upper or working surface 10 in heavy lines and an under surface 11 integrally associated with the upper surface, it being understood that the woven fabric structure disclosed is illustratively, merely, and that my invention is equally applicable to dryer felts or belts of different structure. The essential feature, however, with regard to the end construction is the separation at the ends of the upper surface and the lower surface into two distinct separate parts from, say, the line 5-5 to the end of the felt. With such an arrangement, it will be seen that suitable connecting means such as interdigitating hooks may be readily associated with the under surface 11 without interference with or projection into the upper working surface 10 of the felt. The respective lengths of the separate upper and lower parts will be hereafter discussed in connection with the several disclosures in Figs. 1 to 3. It should, however, here be noted that it may be considered desirable in order to insure a strong and firm foundation to which the connecting means, such as interdigitating hooks, may be connected without danger of pulling out or disrupting the felt, to point out that suitable

measures may be taken to reinforce the under surface of the felt at the end 11 as by effecting a different or closer weave by the introduction of stronger warp threads, or by the introduction of additional reinforcing threads, in the case of woven felts, or in case of felts made of any material, by lapping the ends, or any of various other expedients.

Coming now to the manner in which the ends of the felt are manufactured according to the practice just described, I have in Fig. 1 shown a dryer felt 12, the upper and lower surfaces whereof are transversely split at the ends to form an upper working surface 13 and a lower surface 14. Suitable connecting means, such as interdigitating hooks 15, may be connected to the ends of the under surface 14 and firmly anchored thereto without in any way affecting the upper working surface of the felt at its end 13. It will be further noted that by use of connecting means such as the hooks 15, there is no increase in thickness of the felt in the under surface at the seam with the resulting facility in enabling the seam to pass over the paper machine supporting rolls. In installing a felt having such a construction, the interdigitating hooks in the respective ends of the felt are brought into proper relation and joined by a wire or rod 16.

It will, of course, be apparent to those skilled in the art that the length of the split ends 13 and 14, respectively, of the upper and under surfaces of the felt may be varied at will with relation to each other so that the ends 13 and 13' of the working surface may be brought into as close relation as desired. While in the drawing they have been shown as separated slightly for purposes of clarity it will be understood that they may be of such length with respect to the ends of the lower surface 14 and the connecting means 15 joining the latter that they may be disposed in actual abutment, thereby eliminating the danger of marking even the finest grade of paper web.

To strengthen the felt at the split ends, it may be desirable to include a line of stitching 17 just back of the point of separation.

Referring now to Fig. 2, I have therein shown a construction similar in some respects to Fig. 1, but differing therefrom in the particular construction and formation at the ends thereof to provide a reinforced foundation to which any type of connecting means, such as the interdigitating hooks 15, as shown in Fig. 1, may be secured. One practice, as herein suggested, which may be resorted to is to make the under surface 18 of the felt sufficiently longer than the upper surface 19 so that the same may be doubled back upon itself and secured to the main portion of the felt as by cementing or stitching. Another practice which is illustrated in connection with the doubled end, but which it will be understood may be utilized equally well in connection with the end construction shown in Figs. 1 and 3, is a closer or different weave of the under surface from, say, the line 20 denoting the beginning of the separation between the upper and lower surface to the end, such arrangement being calculated to present a firmer foundation to which the connecting means may be fastened. Thus, it will be noted that the separate portion 18 of the under surface beginning at the point 20 is of different weave from the under surface back of the ends.

In Fig. 3 I have shown a modification of the construction shown in Fig. 1 wherein the ends

of the upper surface from the line 21 which denotes the separation of the upper working surface and the lower surface of the felt into separate parts 22 and 23, respectively, are made of such relative length that when the connecting means 24 associated with the two ends of the under surface of the felt are brought into position, the upper surface ends 22 and 22', respectively, of the felt are brought into overlapping relation such that no open seam is presented at the joint as is true of the arrangement shown in Figs. 1 and 2. By reason of the fact that the upper surface of the felt is relatively thin and of usually absorbent material which is relatively compressible, it will be apparent that the overlapped ends 22 and 22' will readily be compressed with respect to each other to present a smooth and unbroken surface at the joint. In order to prevent turning back or flapping of the ends 22 and 22', it may be considered desirable to cement the same together and to the undersurfaces. In this connection it may be pointed out with reference to all of the various constructions that it is desirable that the upper relatively soft working surface be treated at the ends with water glass or some other preservative to prevent the same from unraveling or readily wearing out due to other causes.

In Fig. 4 I have shown a view of the under surface of the felt illustrated in section in Fig. 3, illustrating particularly one form of connecting means 24 in association with the undersurface of the felt. Such instrumentality comprises a series of interdigitating fasteners associated with the respective ends of the under surface of the felt and may comprise, as illustrated, the so-called "Zipper hooks", this fastening means being particularly convenient for rapid installation by the utilization of a member 25 which is adapted to bring the alternately disposed hooks into engagement.

While in the drawing and in this description I have illustrated only two types of connecting instrumentalities, it will be understood that any of many fasteners may be equally well utilized to effect a strong joint between the ends of a felt or belt at the under surface thereof.

It will now be seen that I have provided a seam construction for dryer felts in which no part of the seam projects to the upper surface of the felt but, on the other hand, by any of the various embodiments shown and described, a smooth, continuous surface is provided such as will not cause injury to the paper web. All of the embodiments, furthermore, contemplate a strong end construction for the felt and are so arranged that suitable connecting instrumentalities may be readily associated with the under surface of the felt in such a manner as to effect a neat and strong seam and doing so without substantially increasing the thickness of the dryer felt at the seam, with the resulting advantages that the life of the dryer felt is greatly prolonged and the seam will readily pass over supporting rolls and the drying cylinders.

Since my invention is equally applicable to various types of belts as well as to paper dryer felts, whether the same be constructed of fab-

ric or other material, it will be seen that the value of my invention resides in its particular construction rather than in its particular application. Hence, in the appended claims where the term "belt" is used for convenience of terminology, it will be understood that the same is used in a generic sense to include the above-mentioned and other types of structures having common characteristics and adapted to the same general use.

I claim:

1. A multiply woven drier felt for paper machines comprising integrally woven upper and lower plies and having end portions in which the plies are separately woven to provide independent upper and lower end sections, means connecting one pair of end sections in abutting relation to join the ends of the felt, the other pair of end sections being independent of the connecting means and overlying the joint so formed to present a substantially smooth and continuous surface.

2. A multiply woven drier felt for paper machines comprising integrally woven upper and lower plies and having end portions disposed in close abutting relation, the plies of the felt at the ends being separately woven to provide independent upper and lower sections, and means connecting one pair of end sections together to join the ends of the felt, the other pair of sections being independent of the connecting means and overlying the joint so formed to present a continuous smooth surface.

3. A multiply woven drier felt for paper machines comprising integrally woven upper and lower plies and having end portions disposed in close abutting relation, the plies of the felt at the ends being separately woven and providing independent upper and lower end sections the combined thickness of which is substantially the same as the thickness of the main portion of the felt, and means connecting one pair of end sections together to join the ends of the felt and lying within the plane of the felt so as to avoid increase in thickness of the felt at the joint, the second pair of end sections being independent of the connecting means and overlying the joint in free abutting relation to present a continuous smooth surface.

4. A belt having its ends transversely separated into independent upper and lower sections disposed in abutting relation, one pair of abutting ends being reinforced and joined by connecting means independent of the other pair of sections.

5. A belt having its ends transversely separated into independent upper and lower sections disposed in abutting relation, one pair of abutting sections being reinforced by lapping the ends of said sections back upon themselves and joined by connecting means independent of the other pair of sections.

6. A woven belt having end portions integral and of uniform thickness therewith woven as independent upper and lower sections and disposed in abutting relation, one pair of abutting sections being connected to join the ends of the belt, the other pair of sections being lapped one over the other to present a closed seam opposite the joint.

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