

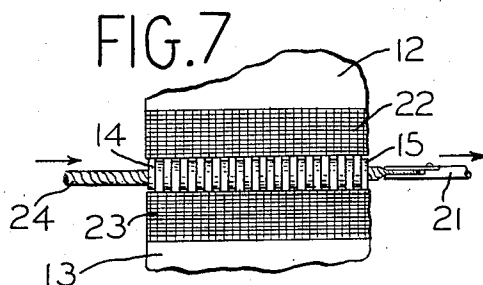
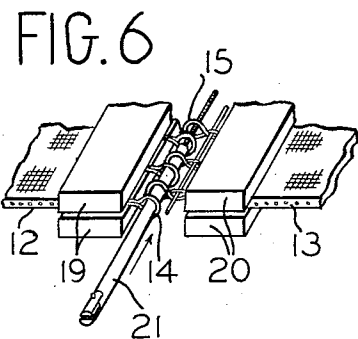
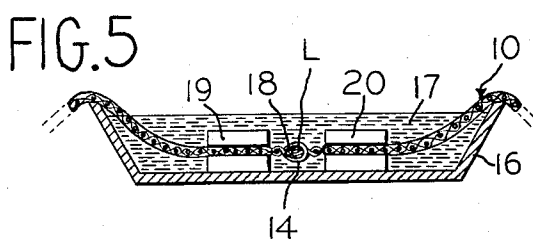
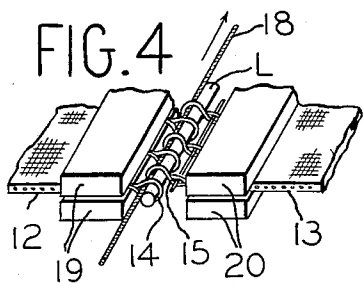
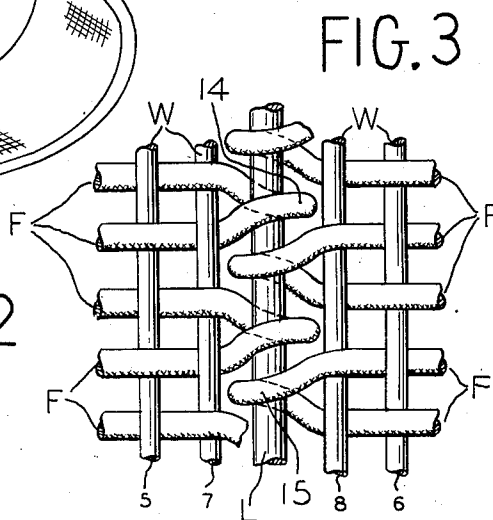
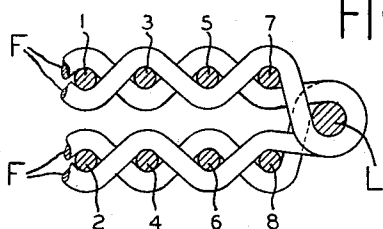
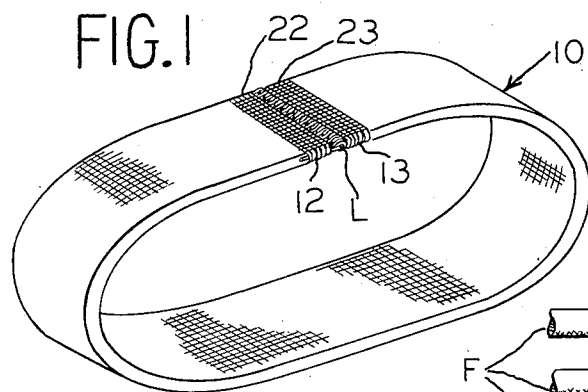
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METHOD OF MAKING PAPER-MAKER'S WET FELT

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METHOD OF MAKING PAPER-MAKER'S WET FELT

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6 Claims. (Cl. 28—72)

This invention relates to the manufacture of paper-maker's wet felts, and has for its primary object to provide a method of producing such felts in open-ended strip form and provided with a separable joint construction composed of a plurality of loops at the ends of the material for connection in interfitting or intermeshed relationship to join together the two ends of the felt to form an endless band at the time of installation in a paper-making machine.

According to the present invention, the felt is woven in a tubular form having a lacing element formed of one of the warp yarns or threads composed of a different material from the other warp yarns or threads and woven in one end at one of the edges of the fabric and of such characteristics that it may be destroyed in situ therein, after the felt is finished, by treatment with an organic solvent agent or a mixture of organic solvents which will not injuriously affect the other yarns or threads which make up the felt structure. Upon completion of the weaving of the tubular felt it is removed from the loom and the felt then subjected to various conventional finishing operations during which treatment and subsequent processing thereof its tubular woven length now becomes known or referred to as the width dimension of the felt.

After the felt is finished, washed and dried, in accordance with usual practice, auxiliary supporting means for the end loops, in the form of a heavy wire or a rod, is run transversely through each loop occupied by the soluble lacing element, following which the soluble lacing element is dissolved out from these end loops thereby forming an open felt having a separable joint construction, were it not for the presence of the auxiliary supporting means which holds together the interfitted end loops at the two terminal ends of the felt. These end loops now are subjected to treatment with a fluid agent adapted to make them wear-resistant. The felt end portions then are given further treatment with a suitable stiffening composition capable of stiffening the body of the felt at each end extremity thereof adjoining and including the loops thereof. The loop supporting rod or wire is removed from the stiffened loops and replaced by a length of stiff paper twine which is shipped with the completed felt and removed at the time of installation of the felt around the rolls of the paper-making machine. After the felt has been fitted around the rolls of the machine, the ends of the felt then are joined together by running a new lacing or cord connector having high strength and durability characteristics through these loops to hold them and the felt together to form an endless band.

The invention will be described with reference to the accompanying drawing in which:

Fig. 1 is a perspective view of a paper-maker's wet felt in the "as woven" tubular condition when it is removed from a loom;

Fig. 2 is a part sectional elevation, on larger scale than Fig. 1, illustrating diagrammatically the formation of the loops at the right edge of the fabric during weaving

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of the felt in tubular form, and further showing the soluble lacing element in the weave passing through such loops;

Fig. 3 is a fragmentary plan view of the rectified sectional elevation shown in Fig. 2, and corresponding to the joint construction of the belt or band of the wet felt structure illustrated in Fig. 1, showing the intermeshed terminal end loops of the felt with the soluble lacing element in the weave passing therethrough and connecting them together;

Fig. 4 is a fragmentary pictorial view illustrating the step of inserting the pilot wire forming the auxiliary supporting means for the end loops, and preparatory to dissolving out the soluble lacing element;

Fig. 5 is a diagrammatic view illustrating one way of dissolving out the soluble lacing element wherein a bath containing a suitable solvent liquid is employed;

Fig. 6 is a fragmentary pictorial view illustrating the step of inserting through the end loops the rod replacement for the soluble lacing element after the latter has been dissolved out, and preparatory to making the end loops wear-resistant and to setting these loops and the adjoining terminal end portions of the felt by a stiffening agent; and

Fig. 7 is a fragmentary plan view diagrammatically illustrating the step of inserting a length of stiff paper twine to replace the rod temporarily used during the manufacturing operation, whereby the felt can be shipped endless for installation on a paper-making machine.

Referring to the drawings, and in particular to Fig. 1, the felt which is generally designated by the reference numeral 10 will be woven in tubular form as a wide band or belt with a warp lacing thread or cord element L of a soluble character woven in one of the fabric selvages which is here shown in Fig. 2 as being at the right edge of the fabric weave. As depicted diagrammatically in Fig. 2, a filling yarn or thread F of the top layer in weaving the latter goes under the lacing element L in passing into the right box (not shown) of the loom, then over the lacing element L on its flight back to the left side into the left box (not shown) of the loom while weaving the top layer; thence back and under the lacing element L into the right box, and then on its return flight over the lacing element L to said left box of the loom. In other words, the first four picks have been inserted in the following order: 1st pick, all face ends 1, 3, 5, 7 and back ends 4, 8 and lacing element L lifted; 2nd pick, all back ends 2, 4, 6, 8 down, and face ends 3, 7 and lacing element L lifted; 3rd pick, all face ends 1, 3, 5, 7 and back ends 2, 6 and lacing element L lifted; 4th pick, all back ends 2, 4, 6, 8 down, and face ends 1, 5 and lacing element L lifted. In this way, the side of the felt at the left edge of the fabric weave is closed without seam and the side at the right edge of the fabric weave is formed with two sets of end loops, those of the top layer alternating with those of the bottom layer on the lacing thread or cord element L, as illustrated in Fig. 3. Thus, the respective ends 12 and 13 of the woven fabric have projecting end loops 14 and 15 which are formed of the filling yarns in the woven fabric. The fabric may be woven with a plain weave having a single warp yarn system of single warp yarns W and a filling yarn system of either single or double filling yarns F. The size of the end loops will fix the diameter of the lacing thread or cord employed.

Upon completion of weaving of the tubular felt 10, it is removed from the loom and subjected to the usual finishing procedure which includes such steps as fulling, washing, rinsing, stretching and drying, and other finishing operations regularly performed in the manufacture of paper-maker's felts. These operations are well known in this art so that no detailed or further description there-

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of is deemed to be necessary. Mention is made that beginning with the finishing treatment and in all the subsequent processing operations the length dimension of the felt in its "as woven" condition becomes the width designation of the felt.

The character of the material used for this soluble warp lacing thread or cord L may be varied, but is preferably such that it will dissolve in an organic solvent or a mixture of organic solvents. For example, the soluble lacing element L may be a cellulose acetate thread or cord which is soluble in acetone and could be dissolved out of the weave after the felt is finished.

After the felt is finished, washed and dried, it then is necessary to dissolve out the soluble lacing element L therefrom. This may be accomplished in several ways, either by saturating the portion where the end loops 14 and 15 encompass the lacing element L to apply a suitable organic solvent thereto, such as acetone, as by means of a brush, or by immersing this section only in a tank 16, as shown in Fig. 5, containing suitable solvent fluid or mixture of solvents, as indicated at 17. Just before dissolving out the soluble lacing element L, it will be necessary to insert auxiliary supporting means, such as a stiff or heavy pilot wire 18, transversely through all the end loops 14 and 15 through which the soluble lacing element L passes and to clamp the end portions 12 and 13 adjacent the loops, as indicated by the clamps 19 and 20, so as to retain the loops undisturbed in their "as woven" positions during dissolving out of the lacing elements, and also for the wire 18 to prevent separation of the intermeshed end loops 14 and 15 after the lacing L has been dissolved. The end loops 14 and 15 which have now become separated by reason of the soluble lacing L being dissolved out, are retained in interfitted or intermeshing relationship for subsequent treatment by means of a supporting rod 21 which is attached to the wire 18 and thereby drawn through the intermeshed loops 14 and 15 as the wire 18 is drawn out at the opposite side of the felt, as shown in Fig. 6. While the end loops 14 and 15 are thus-held in their interfitted spaced relationship, the loops are treated by application of a suitable fluid agent or other material adapted to toughen and stiffen them permanently and make them wear-resistant. In addition, the loops 14 and 15 and the marginal edge portions of the respective terminal ends 12 and 13 of the felt 10, about four to six inches inwardly thereof, as indicated at 22 and 23 respectively, are given further treatment with a suitable stiffening composition, such as a starch solution, capable of temporarily stiffening the body of the felt adjoining the loops as well as stiffening the loops and maintaining them in properly spaced positions to facilitate the intermeshing of the two sets of end loops 14 and 15 for insertion of the permanent cord connector or lacing element when the felt has been fitted on the paper-making machine. Following the wear-resistant treatment of the loops and the stiffening treatment of the felt ends, just described, a length of stiff paper twine 24 is drawn by the rod 21 through the end loops 14 and 15 as the rod 21 is removed from the opposite side of the felt thereby joining the two ends of the felt together to form an endless belt or band during shipment to the place of installation.

It now will be evident that on installation of the felt on the paper-making machine the paper twine connector 24 is withdrawn from the stiffened end loops 14 and 15 which then can be separated and the felt strung around the rolls of the paper-making machine after which joining of the loops at the two ends of the felt can be effected with a new lacing element (not shown) of high strength and durability characteristics, such as a cord of plied nylon yarn, composed of nylon and wool staple, which can be drawn through the stiffened interfitted end loops 14 and 15 to securely hold them and the felt ends together and form an endless band or belt while the felt is being run on the paper-making machine.

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It will be apparent that the tube formed by the four picks as depicted in Fig. 2 will produce the joint shown in the fragmentary view of Fig. 3 so that the two warp yarns or threads W shown at each side of the soluble lacing element L in Fig. 3 also have been designated by reference numerals 5, 7 and 6, 8 to indicate their correspondence to like yarns or threads represented in Fig. 2.

In the foregoing description and in the claims the term "yarn" has been used in a generic sense to include all analogous textile materials such as thread, strands, etc.

It should be understood that the present disclosure is for the purpose of illustration only and that this invention includes all modifications, variations, and equivalents which fall within the scope of the appended claims.

What is claimed is:

1. The method of making a paper-maker's wet felt which comprises weaving a tubular fabric in such a way that the shuttles form loops around a warp end yarn or thread at one edge of the fabric with such warp end yarn or thread acting as a lacing element and being composed of a different material from the other warp yarns or threads in the weave and having such characteristics that it may be dissolved out of the woven felt by a liquid solvent agent which will not injure the other yarns or threads that make up the weave, inserting auxiliary support means through all of said loops occupied by said lacing yarn or thread, treating the portion of said tubular felt incorporating said soluble yarn or thread with a liquid solvent agent so as to dissolve out said soluble yarn or thread whereby the end loops of the filling yarns or threads carried thereby will be retained in interfitted relation about the auxiliary support means, attaching a rod to said auxiliary support means and drawing said rod through all of said intermeshed loops by withdrawal of said support means therefrom at the opposite side of said felt, treating said loops with a suitable agent while they are carried by said rod to make them tough and wear-resistant, and thereafter subjecting said loops including the adjacent marginal end portions of the terminal ends of the felt to treatment with a suitable stiffening composition whereby they will be temporarily stiffened to facilitate interfitted of the loops for joining the same with a permanent lacing element after separation and installation on a paper-making machine.

2. The method as claimed in claim 1 which is further characterized in that the supporting rod for the loops is removed and replaced by running a stiff paper twine through all the loops to retain the stiffened loops in intermeshed relation and the felt endless during shipment preparatory to installation on a paper-making machine.

3. The method as claimed in claim 1 in which the soluble lacing element is composed of cellulose acetate.

4. The method as claimed in claim 1 in which the soluble lacing element is composed of cellulose acetate and the liquid solvent agent is acetone.

5. The method of making a paper-maker's wet felt which comprises weaving a tubular fabric in such a way that the shuttles form loops around a warp yarn or thread at one edge of the fabric with such warp end yarn or thread acting as a lacing element and being composed of a different material from the other warp yarns or threads in the weave and having such characteristics that it may be dissolved out of the woven felt by a solvent agent which will not injure the other yarns or threads that make up the fabric weave, inserting auxiliary support means through all of said loops occupied by said lacing yarn or thread, subjecting the portion of said tubular felt incorporating said soluble yarn or thread to the action of a solvent agent so as to dissolve out said soluble yarn or thread whereby the end loops of the filling yarns or threads carried thereby will be retained in interfitted relation about the auxiliary support means, removing said auxiliary support means from all of said intermeshed loops and simultaneously inserting therethrough a sup-

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porting rod for the loops, treating said loops with a suitable agent while they are carried by said rod to make them tough and wear-resistant, and thereafter subjecting said loops including the adjacent marginal end portions of the terminal ends of the felt to treatment with a suitable stiffening substance whereby they will be temporarily stiffened to facilitate interfitting of the loops for joining the same with a permanent lacing element after separation and installation of the felt on a paper-making machine.

6. The method as claimed in claim 5 which is further characterized in that the supporting rod for the loops is removed following the last-named stiffening treatment and replaced by insertion through all the stiffened inter-

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fitted loops of a length of paper twine effective to connect and retain such stiffened loops in intermeshed relation and the felt endless during shipment preparatory to installation on a paper-making machine.

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