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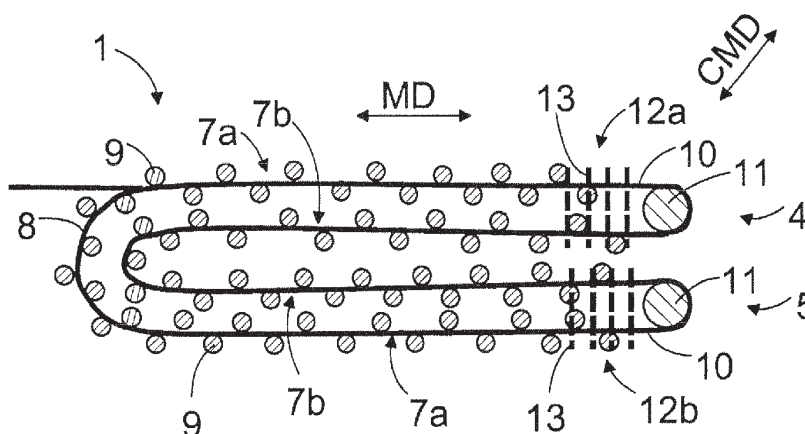
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(54) Title: METHOD FOR MANUFACTURING SEAMED PRESS FELT, PRESS FELT, AND BASE FABRIC



(57) Abstract: The invention relates to a method for manufacturing a seamed press felt, and to a seamed press felt and a base fabric. A base fabric of a laminated structure comprises two or more superimposed fabric layers (7a, 7b). A base fabric woven as an endless weave has connecting ends (4, 5) in which continuous weft yarns (8) form seam loops (10). The connecting ends (4, 5) are further provided with connecting portions (12a, 12b) in which at least two superimposed fabric layers are joined together by means of at least one cross machine direction (CMD) connecting warp (13).

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METHOD FOR MANUFACTURING SEAMED PRESS FELT, PRESS FELT, AND BASE FABRIC

BACKGROUND OF THE INVENTION

[0001] The invention relates to a method for manufacturing a seamed press felt, the method comprising: weaving a laminated base fabric in one weaving machine, the fabric having at least a superimposed first fabric layer and second fabric layer, the fabric layers each having independent yarn systems comprising weft yarns and warp yarns; weaving the base fabric with continuous weft yarns running in the fabric back and forth, at least some of them forming seam loops at connecting ends of the base fabric, the base fabric being arrangeable to form a closed loop by interleaving the seam loops at the connecting ends and by inserting at least one seam yarn through a seam channel formed by the seam loops; and fastening at least one batt fibre layer to at least one surface of the base fabric after the weaving.

[0002] The invention further relates to a press felt, comprising: a base fabric having at least a superimposed first fabric layer and second fabric layer, the fabric layers each having independent yarn systems comprising weft yarns and warp yarns; and in which base fabric the weft yarns running in the fabric are continuous, at least some of them being arranged to form seam loops so that a first connecting end and a second connecting end of the base fabric are provided with a plural number of seam loops; a seam area that includes a seam channel formed by the seam loops, the base fabric being arrangeable to form a closed loop by insertion of at least one seam yarn through the seam channel formed by the seam loops; and at least one batt fibre layer fastened to at least one surface of the base fabric.

[0003] The invention still further relates to a base fabric for a press felt, comprising: at least a first fabric layer and a second fabric layer, the fabric layers each having an independent yarn system comprising weft yarns and warp yarns, the weft yarns running in the base fabric being continuous and at least some of them being arranged to form seam loops so that a first connecting end and a second connecting end of the base fabric are provided with a plural number of seam loops.

[0004] Press felts are used in the press section of a paper machine to absorb therein water from the web to be dried. Depending on the structure of the press section, the press felt may be arranged either on one side of the

web to be dried or on both sides thereof. The press felt is meant to convey the water removed by pressing so that it cannot migrate back into the web. To accomplish the pressing, the paper web is conveyed on the felt into a gap, or nip, between two rolls. The structure of the felt should be such that in the nip, water is easily drawn from the web into the felt. Press felts comprise a base fabric that provides the water space needed in the felt, for example. To make the surface of the felt smooth, batt fibre is attached at least to the base fabric side facing the web. The base fabric is typically woven in a weaving machine, using either flat weaving or endless weaving. Endless weaving may be carried out as round weaving or horseshoe weaving, also known as u-type endless weaving. Further, during the weaving, the ends of the press felt may be provided with seam loops so that by joining the connecting ends together, a press felt in the form of a closed loop is produced. This type of seamed press felt is usually easier and faster to install into a paper machine than a press felt that is manufactured as a closed loop.

[0005] A typical problem associated with some prior art laminated felts provided with seams is that the warp yarns closest to the seam area tend to drift from their position and slide onto the seam loops, for example, or even under them, which complicates the joining of the connecting ends.

BRIEF DESCRIPTION OF THE INVENTION

[0006] It is an object of the invention to provide a novel and improved method for manufacturing a seamed press felt, and a novel and improved press felt and a press felt base fabric.

[0007] The method of the invention is characterized by weaving connecting portions to connecting ends of the base fabric, the connecting ends joining, at the connecting ends only, at least two superimposed fabric layers together into at least one single-base structure.

[0008] The press felt of the invention is characterized in that the connecting ends of the base fabric are provided with connecting portions configured to join together at least two superimposed fabric layers, and that a connecting portion comprises cross machine direction connecting yarns that are separate yarns in relation to the independent yarn systems of the fabric layers and together with the weft yarns they form a weave pattern different from that of the independent yarn systems of the fabric layers.

[0009] The base fabric of the press felt of the invention is characterized in that the connecting ends of the base fabric are provided with connecting portions configured to join together at least two superimposed fabric layers and that a connecting portion comprises cross machine direction connecting yarns that are separate yarns in relation to the independent yarn systems of the fabric layers, and together with the weft yarns they form a weave pattern different from that of the independent yarn systems of the fabric layers.

[0010] The invention is based on the idea of applying an endless weaving technique on a weaving machine to weave a laminated base fabric to the connecting ends of which seam loops are formed by means of weft yarns. Further, during the weaving process the connecting ends are provided with connecting portions joining together at least two superimposed layers of the base fabric. Two or more cross machine direction connecting warps may be woven into the connecting portion, the warps binding with weft yarns of at least two fabric layers. The connecting warps thus run differently than the warps in the individual fabric layers.

[0011] An advantage of the invention is that a single-base portion at a connecting end of the felt renders the seam area stable. This allows for better support to the seam loops and thus they may stay in an upright position better, whereby it is easier to form the seam loop channel. A further advantage is that cross machine direction yarns cannot drift onto the seam loops, because the connecting warps bind the structure. Compared with some known laminated structures, a press felt provided with such connecting ends is easier and faster to seam on the press section. Yet a further advantage is that the connecting warps may improve the attaching of the batt fibre to the seam area.

[0012] An advantage a laminated structure may be considered to have is its relatively large water retention capacity. Other advantages of a laminated structure are its good resistance against compression and its greater flexibility compared with a single-base structure.

[0013] An embodiment of the invention is based on the idea that at the connecting ends of the base fabric the connecting portions join all superimposed fabric layers into a single-base structure.

[0014] An embodiment of the invention is based on the idea that the base fabric contains at least four superimposed fabric layers and that the connecting portion joins two layers together. The connecting portion may join to-

gether two outermost layers, i.e. those facing the web to be dried or, alternatively, it may join together two innermost layers.

[0015] An embodiment of the invention is based on the idea that the base fabric has three superimposed fabric layers, and that the connecting portion joins together two outermost layers.

[0016] An embodiment of the invention is based on the idea that the connecting portion contains not only connecting warps but also warp yarns belonging to the independent yarn systems of the fabric layers to be connected.

[0017] An embodiment of the invention is based on the idea that the connecting portion only contains weft yarns and connecting warps, without any other cross machine direction yarns.

[0018] An embodiment of the invention is based on the idea that the base fabric is woven using horseshoe weaving.

[0019] An embodiment of the invention is based on the idea that the base fabric is woven using endless weaving.

[0020] An embodiment of the invention is based on the idea that the base fabric has at least four independent superimposed fabric layers and that at both connecting ends the fabric layers forming a seam loop between them are joined together, the connecting ends being thus provided with a plural number of superimposed connecting portions.

[0021] An embodiment of the invention is based on the idea that the machine direction length of one connecting portion is 0.5 - 50mm, particularly advantageously 0.5 - 20mm. The number and dimensions of the connecting warps determine the length of the connecting portion.

[0022] An embodiment of the invention is based on the idea that the connecting portion has at least two connecting warps. Depending on the shaft structure used for the connecting warps, the number of connecting warps may be two, four, six, or a number corresponding to a multiple of these.

[0023] An embodiment of the invention is based on the idea that the connecting portion has at least four connecting warps.

[0024] An embodiment of the invention is based on the idea that the connecting warps have a 2-, 4-, 6-, or 8-shaft run.

[0025] An embodiment of the invention is based on the idea that the yarns used as connecting warps are substantially similar to the warp yarns

running in the independent fabric layers. Thus the warps in the connecting portion differ from those in the fabric layers only in the weave pattern.

[0026] An embodiment of the invention is based on the idea that yarns used as connecting warps differ from those of the fabric layers in one of the following characteristics: structure, cross-sectional shape, material, dimension.

[0027] An embodiment of the invention is based on the idea that the yarn density of the connecting warps, i.e. the distance between the connecting warps, is substantially the same as the yarn density of the warp yarns in the independent yarn systems of the fabric layers.

[0028] An embodiment of the invention is based on the idea that the yarn density of the connecting warps differs from that of the warp yarns belonging to the yarn systems of the independent fabric layers. On the connecting portion the yarn density of the connecting warps may be greater than the warp density in the fabric layers.

BRIEF DESCRIPTION OF THE FIGURES

[0029] The invention will be described in greater detail with reference to the accompanying drawings, in which

Figure 1 is a schematic perspective view of a press felt of the invention;

Figure 2 is a schematic cross machine direction view of weaving a base fabric of the invention by horseshoe weaving;

Figure 3 is a schematic cross machine direction view of weaving a second base fabric of the invention by endless weaving;

Figure 4 is a schematic cross machine direction view of a press felt of the invention;

Figure 5 is a schematic cross machine direction view of weaving a third base fabric of the invention by horseshoe weaving;

Figure 6 is a schematic cross machine direction view of a base fabric consisting of two single-layer laminates (1+1), and a connecting end thereof;

Figure 7 is a schematic cross machine direction view of a base fabric consisting of three single-layer laminates (1+1+1), and a connecting end thereof;

Figure 8 is a schematic cross machine direction view of another base fabric consisting of three single-layer laminates (1+1+1), and a connecting end thereof;

Figure 9 is a schematic cross machine direction view of a base fabric consisting of four single-layer laminates (1+1+1+1), and a connecting end thereof;

Figure 10 is a schematic cross machine direction view of weaving a base fabric of the invention having four base layers (1+1+1+1) by horseshoe weaving;

Figure 11 is a schematic cross machine direction view of weaving a three-base (1+1+2) base fabric of the invention by horseshoe weaving;

Figure 12 is a schematic machine direction view of a crosscut made at a connecting portion; and

Figure 13 is a schematic machine direction view of a crosscut made at a second connecting portion.

[0030] For the sake of clarity the invention shown in the Figures has been simplified. Like parts are indicated with like reference numbers.

DETAILED DESCRIPTION OF SOME EMBODIMENTS OF THE INVENTION

[0031] Figure 1 shows a press felt in the form of a closed loop, the felt comprising a laminated, or multi-layered, base fabric 1 and a batt fibre layer 2 attached to at least one surface of the base fabric 1. The batt fibre layer 2 may be attached to the base fabric 1 surface facing the web to be dried, or it may be attached to both surfaces of the base fabric. Further, in the cross machine direction CMD of the paper machine the base fabric 1 shows a seam area 3 that joins together first and second machine cross direction connecting ends 4 and 5 of the base fabric 1. The seam area 3 has a predetermined width L in the machine direction MD of the press felt. The seam area 3 comprises a seam 6 provided with seam loops and a seam yarn. The structure of the seam 6 is illustrated in Figure 4, for example.

[0032] Figure 2 shows one way of weaving a press felt base fabric of the invention. For the sake of clarity the Figure is highly simplified. The laminated base fabric 1 may comprise two or more superimposed fabric layers, each provided with a separate yarn system. The base fabric 1 of the Figure has two independent fabric layers 7, i.e. a first fabric layer 7a and a second fabric layer 7b. In horseshoe weaving there may be four superimposed fabric

layers 7 in the weaving machine. In Figure 2 these layers are in the following order, from top to bottom: 7a, 7b, 7b, 7a. Consequently, it is to be noted that the base fabric 1 may contain a plural number of fabric layers 7, for example three, four, etc. The yarn systems of the fabric layers 7 comprise a plural number of weft yarns 8 running in machine direction MD and a plural number of warp yarns 9 running in cross machine direction CMD, the yarns 8, 9 binding together into a weave known per se, such as a 2-shaft weave. Figure 2 illustrates what is known as a horseshoe weave, which is a special type of endless weaving. The endless weave structure is woven as a double weave, which enables to take better advantage of the weaving machine width. The weft yarn 8 runs in a continuous manner, forming seam loops 10 at the edges of the weave. In the seam loop 10 portion there are no warp yarns 9. The edges may be provided with edging yarns 11 to facilitate the formation of seam loops 10. Connecting ends 4 and 5 provided with seam loops 10 are thereby formed in the base fabric during the weaving. The press felt can thus be seamed into a closed loop form on the press section of the paper machine.

[0033] In accordance with the inventive idea connecting portions 12 are then woven at both connecting ends 4 and 5 of the base fabric 1. The connecting portion 12 is woven at the same time as the rest of the base fabric 1 structure. For the sake of clarity the connecting portion 12 shown in Figures 2 to 5 is heavily simplified. The connecting portion 12 attaches the superimposed first fabric layer 7a and second fabric layer 7b to each other in the area of the connecting ends 4 and 5. At the connecting portions 12a and 12b the base fabric 1 is provided with single-base structures, whereas in other areas the structure is multi-based. The connecting portion 12 may comprise two or more connecting warps 13 in the cross machine direction CMD, and the warps may bind in both fabric layers 7a, 7b with the weft yarns 8 forming seam loops 10. Some prior art two-layer weave capable of attaching the fabric layers 7a and 7b together sufficiently firmly may be used between the connecting warps 13 and the weft yarns 8. The weave between the connecting warps 13 and the weft yarns 8 may consist of four or more shafts, for example. Consequently, the connecting warps 13 in the connecting portion 12a, 12b bind together with both the weft yarns of the first fabric layer 7a and the weft yarns 8 of the second fabric layer 7b, whereas the warp yarns 9 only run in one fabric layer 7. The weave on the connecting warp 13 is thus always different from that on the warp 9 of an individual fabric layer 7.

[0034] The yarn used for the connecting warp 13 may be similar to or different from the warp yarn 9 of the individual fabric layers. With the choice of the connecting warp 13 it is possible to influence permeability in the connecting portion 12 and thereby also in the seam area 3, batt fibre attachment, and seam area thickness. Further, it is possible to select other warp yarns 9 of the seam area 3 so that the seam area 3 will be provided with desired characteristics.

[0035] The number of the connecting warps 13 may be selected according to need. Preferably two to eight connecting warps 13 are used, although particularly preferably there are four or more of them.

[0036] It should be mentioned that in the press felt of the invention the seam area 3 comprises two connecting ends provided with connecting portions and seam loops. In the seam area 3 single-layer structures facing each other are connected together by seam loops 10.

[0037] Figure 3 shows an alternative solution for weaving a base fabric 1 of the invention. Instead of horseshoe weaving, the base fabric 1 may be woven using conventional endless weaving. In the case shown in the Figure there are two superimposed single-layer fabric layers 7a and 7b, both of which have an independent yarn system. The weft yarns 8 run in a continuous manner, forming seam loops 10 at opposite connecting ends 4 and 5. At the same time, connecting portions 12a and 12b are woven to the connecting ends 4 and 5 to attach the fabric layers 7a and 7b together. Similarly as in the horseshoe weaving of Figure 2, the connecting portions 12 may be provided with two or more cross machine direction CMD binding warps 13 running between weft yarns 8 of fabric layers 7 to be attached together. The weaving of the base fabric 1 having been completed, the fabric can be finished and the necessary batt fibre layers may be attached thereto by needling, for example. The press felt may be formed into an endless structure by turning the connecting ends 4, 5 against each other in direction A shown in the Figure, whereby the seam loops 10 intermesh and form a seam loop channel through which the seam yarn 14, or the like, can be inserted, as illustrated in Figure 4. For the sake of clarity Figure 4 does not show any warp yarns 9. Moreover, in Figure 4 the batt fibre layers 2 are attached both to the press felt surface facing the web and to the rear surface of the felt. Lines of dots and dashes illustrate the batt fibre layers 2 in the Figure.

[0038] Figure 5 shows yet another, heavily simplified solution in which horseshoe weaving is used to produce four superimposed fabric layers 7a to 7d that form a base fabric 1 provided with two superimposed sets of seam loops 10a, 10b at both the first and the second connecting ends 4 and 5 of the fabric. Alternatively, the loop sets may be slightly offset in the machine direction MD. Further, during weaving it is possible to form a connecting portion 12a joining together four superimposed fabric layers 7a to 7d simultaneously into a single-base structure at the connecting ends. In other portions of the base fabric 1 the structure comprises four superimposed bases. For the sake of clarity, warp yarns are not shown in Figure 5.

[0039] Figure 5 further shows an alternative solution for joining together individual fabric layers 7. The connecting portions 12b and 12c may join together fabric layers forming seam loops 10 between them at the connecting end. The connecting portion 12b may join together fabric layers 7d and 7c, and the connecting portion 12c the fabric layers 7b and 7a. In this case the connecting end 5 may be provided with two or more superimposed connecting portions 12b, 12c. Yet another alternative is that the connecting portion 12 joins together the fabric layers 7b and 7c at the connecting ends 4 and 5. Connecting end structures of the type shown in Figure 5 may also be produced as a flat weave.

[0040] Figure 6 shows a connecting end 4 of a base fabric 1 of the invention. The base fabric 1 comprises two superimposed fabric layers 7a and 7b, which may be single-layer structures and have a 2-shaft weave structure. Further, the connecting end 4 is provided with seam loops 10 formed by weft yarns 8. This kind of structure may have been woven as described above with reference to Figure 2 or 3, for example. The connecting end 4 is provided with a connecting portion 12 woven at the same time with the base fabric 1 and having a machine direction length K that may be from 0.5 to 20mm, for example. The length of the connecting portion 12 can be influenced by selecting a desired number of connecting warps 13. In practice the shaft structure of the weave used for the connecting warp 13 and the number of multiples of connecting yarns 13 selected for each particular connecting portion 12 have an impact on the length of the connecting portion 12. Further, the connecting portion 12 in the base fabric 1 of the Figure comprises only weft yarns 8 and connecting warps 13 that bind together and attach the fabric layers 7a and 7b to

each other. The connecting portion 12 of the base fabric 1 has a single-base structure, whereas in other parts a two-base structure is used.

[0041] Figure 7 shows part of a base fabric of the invention that has three superimposed single-layer fabric layers 7a to 7c. Weft yarns 8 of the outermost layers 7a and 7c form seam loops 10 at the connecting end 4, but the weft yarns 8a of the fabric layer 7b in the middle do not participate in the forming of the seam loops 10. The connecting portion 12 does not have any warp yarns 9 belonging to the independent yarn systems of the fabric layers 7a to 7c but only connecting warps 13 that bind together with the weft yarns 8 forming the seam loops 10.

[0042] Figure 8 shows a base fabric 1 provided with a connecting end 4 in the connecting portion 12 of which connecting warps 13 join together three superimposed fabric layers 7a to 7c into a single-base structure. In this case the connecting portion 12 has not only connecting warps 13 but also warp yarns 9 belonging to the independent yarn system of the fabric layer 7b in the middle. The yarns 8a, 9 in the middle fabric layer 7b may bind together with the connecting warps 13. Alternatively, the yarns 8a, 9 of the fabric layer 7b in the middle do not bind with the connecting warps 13 at all.

[0043] Figure 9 shows part of base fabric 1 comprising four superimposed single-layer fabric layers 7a to 7d with independent yarn systems. The weft yarns 8 in the outermost fabric layers 7a and 7d form seam loops 10 at a connecting end 4, whereas the independent yarn systems of the inner fabric layers 7b and 7c do not reach the connecting portion 12 at all. Consequently, in the connecting portion of the solution shown in the Figure the connecting portion only consists of connecting warps 13 crossing with wefts 8 forming seam loops 10.

[0044] Figure 10 shows an alternative solution for weaving the connecting portion 12 to a base fabric 1 comprising four superimposed single-layer fabric layers 7a to 7d, i.e. having a laminated structure 1+1+1+1. The weft yarns 8a of the inner fabric layers 7b and 7c extend all the way to the connecting portion 12, the connecting warps 13 in the connecting portion 12 being arranged to cross the weft yarns 8a of the independent fabric layers 7b and 7c. In this embodiment the weft yarns 8 forming the seam loops 10 do not bind with the connecting warps 13.

[0045] The embodiment illustrated in Figure 11 relates to the weaving of a base fabric 1 having a laminated structure 1+1+2, i.e. it comprises two

single-layer fabric layers 7a and 7b and one two-layer fabric layer 7c. In this embodiment the weft yarns of the topmost fabric layer 7a and the weft yarns 8 in the lower layer of the two-layer fabric layer 7c form the seam loops 10. In the connecting portion 12 the connecting warps 13 join the single-layer fabric layers 7a and 7b together into a single-base structure. The connecting warps 13 bind with the weft yarns 8 and 8a belonging to the fabric layers 7a and 7b.

[0046] Figure 12 illustrates a base fabric in a cross section that shows the connecting portion 12 from the machine direction MD. The base fabric in question comprises two superimposed single-layer fabric layers 7a and 7b, whose yarn systems include weft yarns 8 and warp yarns 9. The weave may be 2-shaft, for example. In the embodiment of Figure 12 the warp yarns 9 belonging to the independent yarn systems of the fabric layers 7a and 7b extend to the connecting portion 12. Further, the connecting portion 12 is provided with connecting warps 13 crossing between wefts 8 of the fabric layers 7a, 7b according to a weave pattern known per se. As shown in Figure 12, the base fabric 1 in the connecting portion 12 is a single-base structure.

[0047] Figure 13 shows a crosscut of another connecting portion 12 in machine direction MD. The base fabric 1 corresponds otherwise to the embodiment of Figure 12, except that the connecting portion 12 does not contain any warp yarns 9 of the independent yarn systems of the fabric layers 7a and 7b but only connecting warps 13 and weft yarns 8 that bind together.

[0048] The press felt of the invention can be woven using different weaves and yarns. The yarns may be monofilament, twisted monofilament, or multifilament yarns, for example. Further, the yarns may have a circular, oval or substantially rectangular cross-section. The yarns may be made of a synthetic material. A typically used material is plastic, polyamide (PA) being one example that can be mentioned.

[0049] The drawings and the related specification are only meant to illustrate the inventive idea. The details of the invention may vary within the scope of the claims.

CLAIMS

1. A method for manufacturing a seamed press felt, the method comprising:

weaving a laminated base fabric (1) in one weaving machine, the fabric having at least a superimposed first fabric layer (7a) and second fabric layer (7b), the fabric layers each having independent yarn systems comprising weft yarns (8) and warp yarns (9);

weaving the base fabric (1) with continuous weft yarns (8) running in the fabric (1) back and forth, at least some of them forming seam loops (10) at connecting ends (4, 5) of the base fabric, the base fabric (1) being arrangeable to form a closed loop by interleaving the seam loops (10) at the connecting ends (4, 5) and by inserting at least one seam yarn through a seam channel formed by the seam loops (10); and

fastening at least one batt fibre layer (2) to at least one surface of the base fabric (1) after the weaving,

characterized by

weaving connecting portions (12a, 12b, 12c) to connecting ends (4, 5) of the base fabric (1), the connecting portions joining, at the connecting ends only, at least two superimposed fabric layers (7a, 7b, 7c, 7d) together into at least one single-base structure.

2. A method according to claim 1, **characterized by** weaving into the connecting portion (12a, 12b, 12c) warp-oriented connecting yarns (13) that are separate from the independent yarn systems of the fabric layers and form, together with the weft yarns, a weave pattern different from that of the independent yarn systems of the fabric layers.

3. A method according to claim 2, **characterized by** weaving two to eight connecting warps into the connecting portion.

4. A method according to claim 1, **characterized by** weaving the connecting portion to a machine direction (MD) length of 0.5 to 20mm.

5. A method according to any one of the preceding claims, **characterized by**

joining all superimposed fabric layers (7a to 7d) together at the connecting portion (12) to provide the connecting portion (12) with a single-base structure.

6. A press felt, comprising:

a base fabric (1) having at least a superimposed first fabric layer (7a) and second fabric layer (7b), the fabric layers each having independent yarn systems comprising weft yarns (8) and warp yarns (9); and in which base fabric (1) the weft yarns (8) running in the fabric are continuous, at least some of them being arranged to form seam loops (10) so that a first connecting end (4) and a second connecting end (5) of the base fabric (1) are provided with a plural number of seam loops;

a seam area (3) that includes a seam channel formed by the seam loops (10), the base fabric (1) being arrangeable to form a closed loop by insertion of at least one seam yarn through the seam channel formed by the seam loops (10); and

at least one batt fibre layer (2) fastened to at least one surface of the base fabric (1),

characterized in that

the connecting ends (4, 5) of the base fabric (1) are provided with connecting portions (12a, 12b, 12c) configured to join together at least two superimposed fabric layers (7a, 7b, 7c, 7d); and that

a connecting portion (12a, 12b, 12c) comprises cross machine direction (CMD) connecting yarns (13) that are separate yarns in relation to the independent yarn systems of the fabric layers and form, together with the weft yarns, a weave pattern different from that of the independent yarn systems of the fabric layers.

7. A press felt according to claim 6, **characterized** in that the connecting portion (12) has two to eight connecting warps (13).

8. A press felt according to claim 6, **characterized** in that the length of the connecting portion (12) in the machine direction (MD) is 0.5 to 20mm.

9. A press felt according to any one of claims 6 to 8, **characterized** in that

at the connecting portion (12) all fabric layers (7a to 7d) of the base fabric (1) are joined together into a single-base structure by means of at least two connecting warps (13).

10. A press felt according to any one of claims 6 to 9, **characterized** in that

the connecting portion (12) has both connecting warps (13) and warp yarns (9) belonging to the independent yarn systems of the fabric layers (7).

11. A press felt according to any one of claims 6 to 9, **characterized** in that

the connecting portion (12) is produced without the warp yarns (9) belonging to the independent yarn systems of the fabric layers (7), the connecting portion (12) thus having only connecting warps (13) and weft yarns (8).

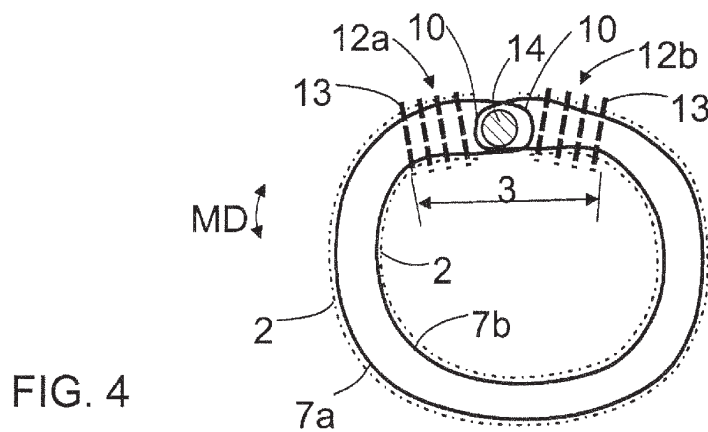
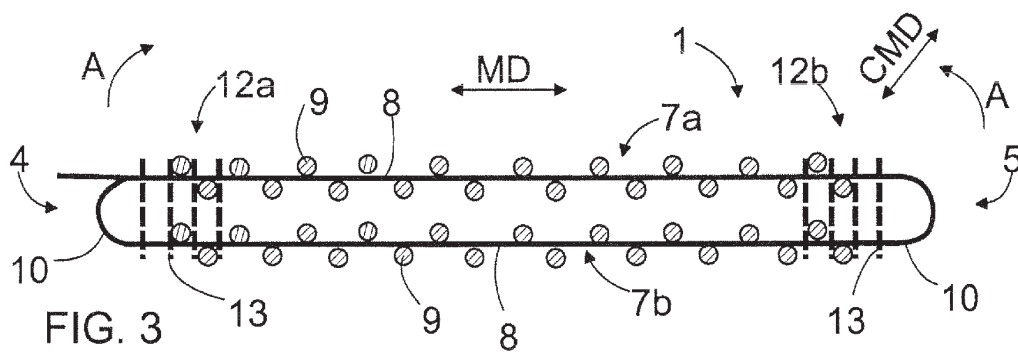
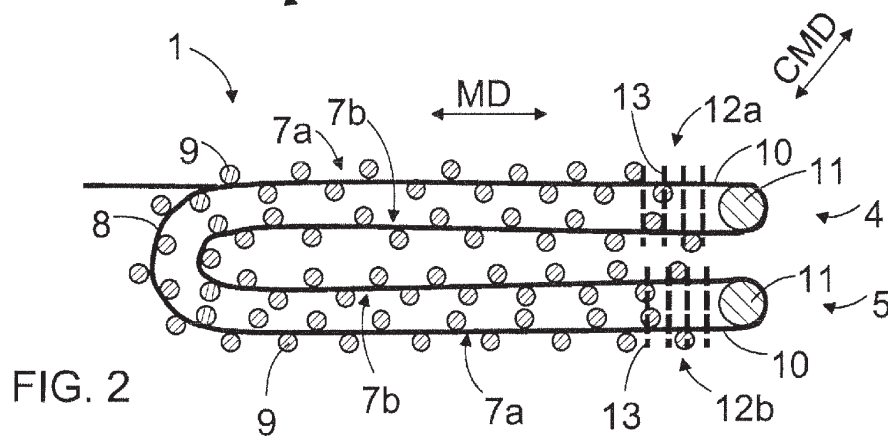
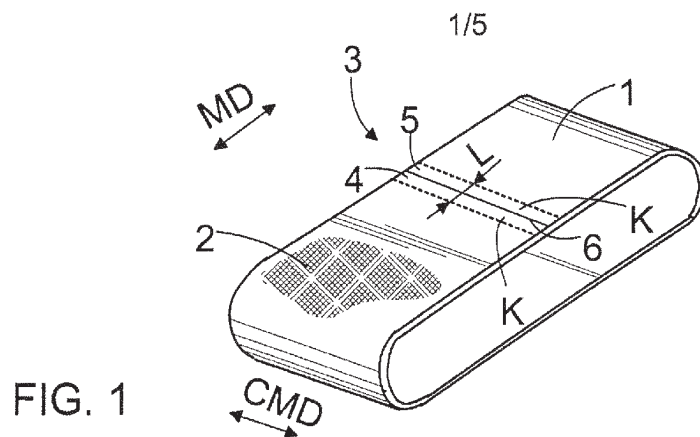
12. A base fabric for a press felt, comprising:

at least a first fabric layer (7a) and a second fabric layer (7b), the fabric layers each having an independent yarn system comprising weft yarns (8) and warp yarns (9), the weft yarns (8) running in the base fabric (1) being continuous and at least some of them being arranged to form seam loops (10) so that a first connecting end (4) and a second connecting end (5) of the base fabric are provided with a plural number of seam loops,

characterized in that

the connecting ends (4, 5) of the base fabric (1) are provided with connecting portions (12a, 12b, 12c) configured to join together at least two superimposed fabric layers (7a, 7b, 7c, 7d) and that

a connecting portion (12a, 12b, 12c) comprises cross machine direction (CMD) connecting yarns (13) that are separate yarns in relation to the independent yarn systems of the fabric layers, and together with the weft yarns they form a weave pattern different from that of the independent yarn systems of the fabric layers.



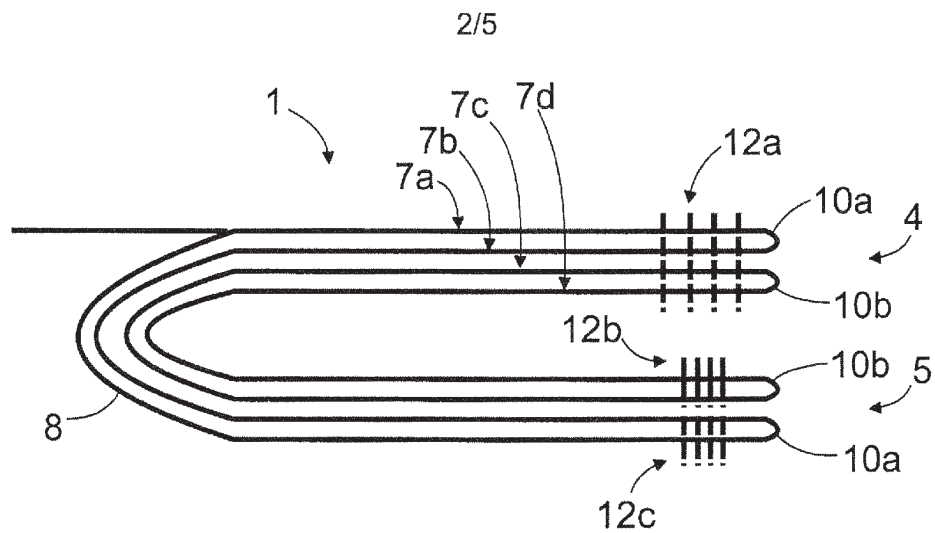


FIG. 5

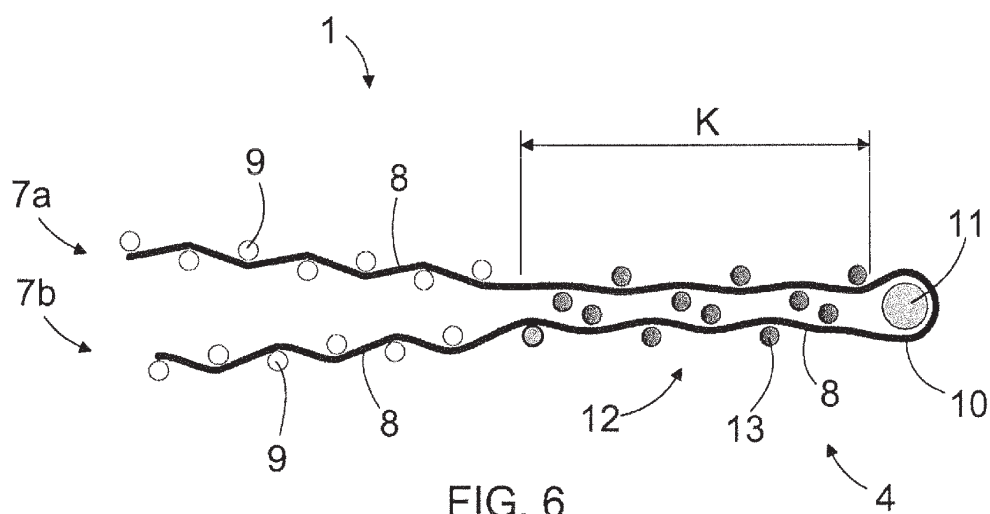
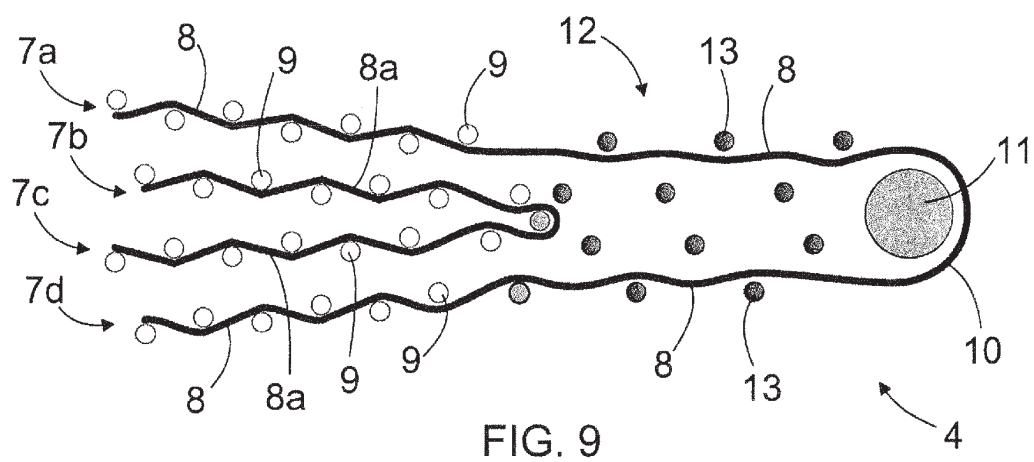
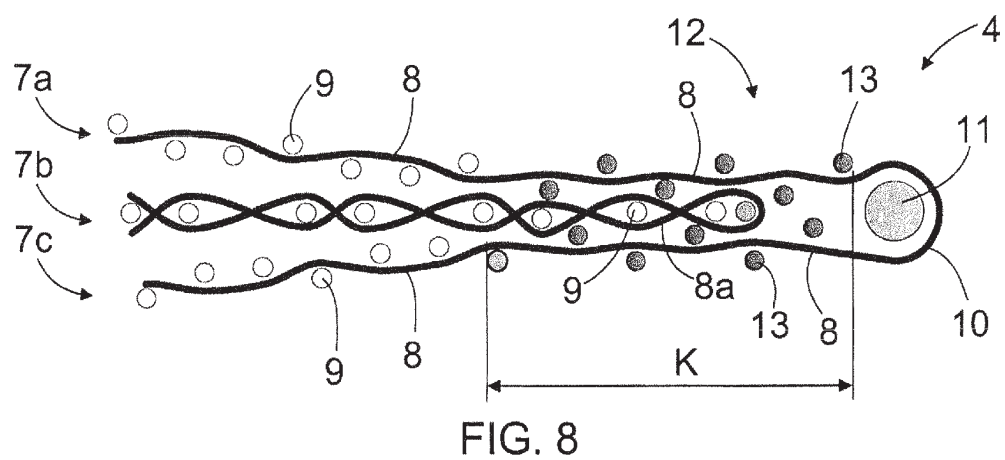
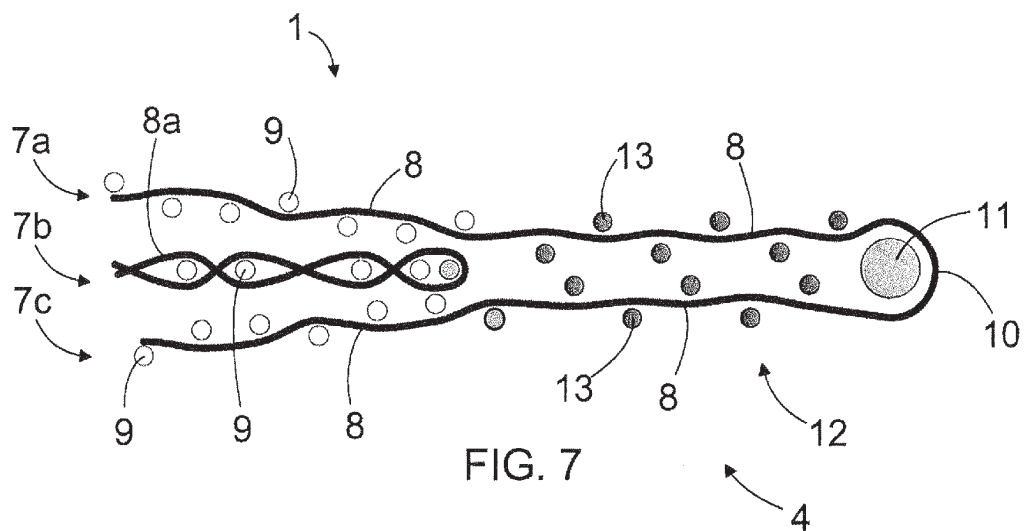


FIG. 6

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4/5

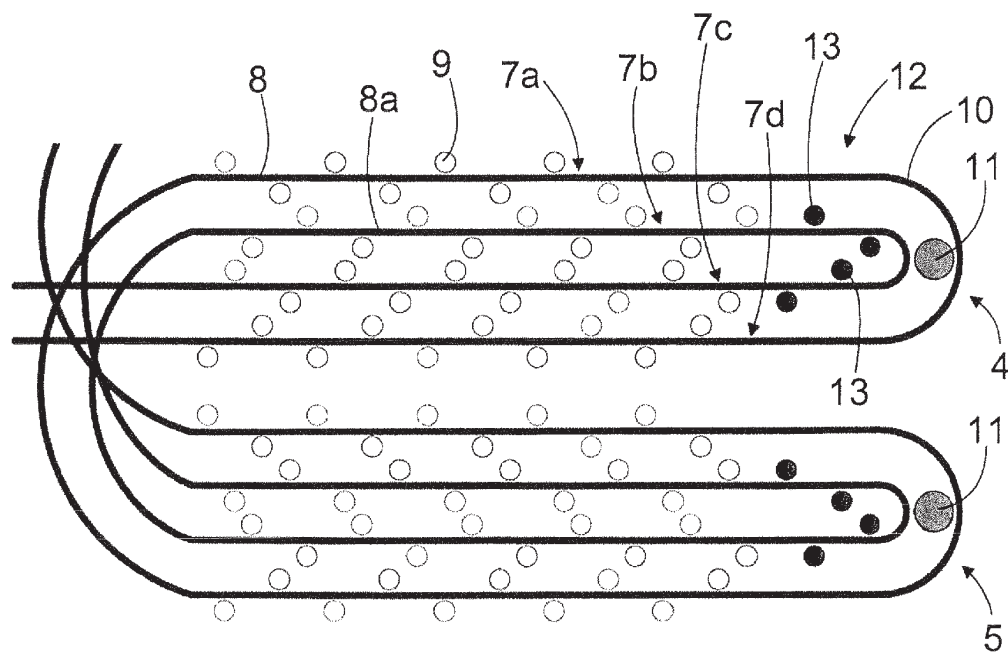


FIG. 10

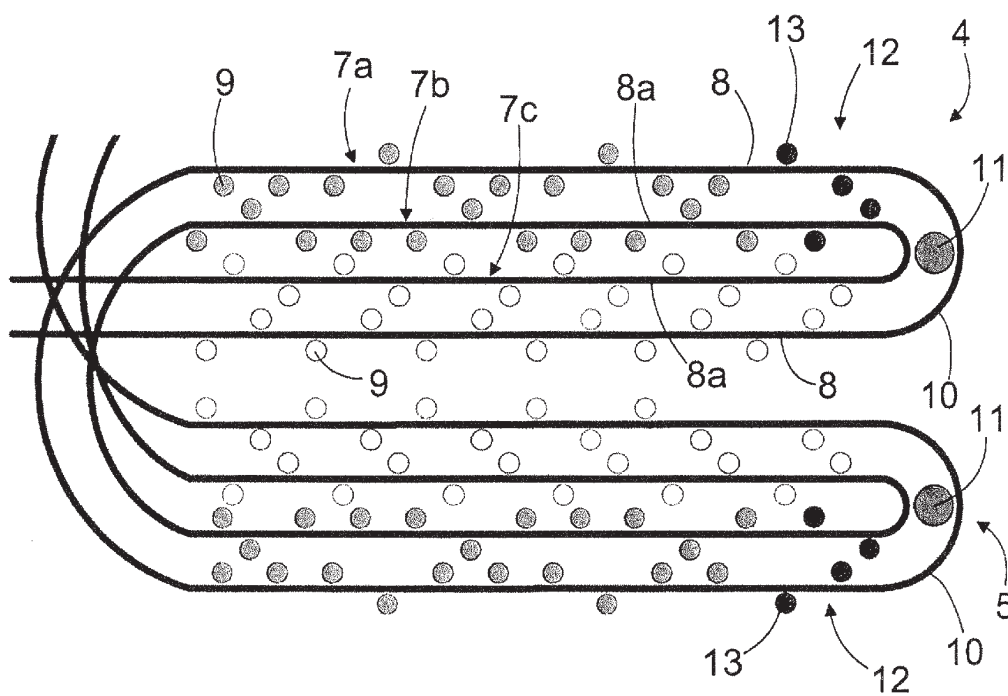


FIG. 11

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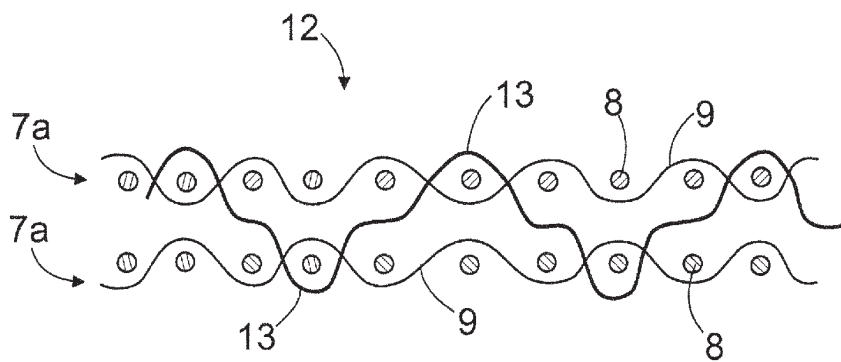


FIG. 12

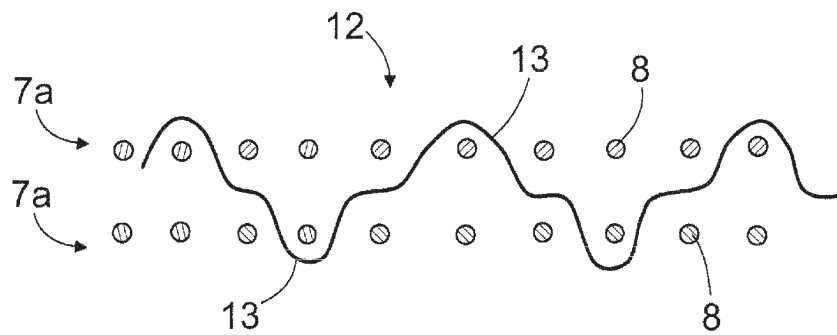


FIG. 13

INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI 2005/050210

A. CLASSIFICATION OF SUBJECT MATTER

IPC: see extra sheet

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: D21F, D03D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-INTERNAL, WPI DATA, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P,X	US 20040216798 A1 (WILLIAM D. ALDRICH), 4 November 2004 (04.11.2004), paragraphs 6,13,27 --	1-12
A	US 20040020622 A1 (KARI HYVONEN ET AL), 5 February 2004 (05.02.2004), paragraphs 1,5,33 --	1-12
A	US 5916421 A (STEVEN S. YOOK), 29 June 1999 (29.06.1999), column 8, line 28 - line 38 -- -----	1-12

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

* Special categories of cited documents:

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"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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"&" document member of the same patent family

Date of the actual completion of the international search

1 February 2006

Date of mailing of the international search report

02-02-2006

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/FI2005/050210

INTERNATIONAL PATENT CLASSIFICATION (IPC) :

D21F 7/10 (2006.01)

D03D 11/00 (2006.01)

D21F 7/12 (2006.01)

INTERNATIONAL SEARCH REPORT

Information on patent family members

26/11/2005

International application No.

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