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(54) **Fabric manufacture**

(57) A fabric is made from two yarn structures (2, 3) which are formed one on top of the other joined by linking yarns (11) at one edge (4). The resulting folded fabric can be opened out to be of greater width than the individual yarn structures (2, 3). The fabric may be a curtain heading tape with draw cords (16, 17, 18) and rows of

pockets (15). The fabric may be woven with a needle loom having warp feeds (19) providing warp yarns (6, 6a) in two sets (20, 21) one above the other, and linking warp yarns (11) at one side, and a weft feed (26, 27) to feed weft yarns (7, 8) around the warp yarns of the two sets and the linking yarns.

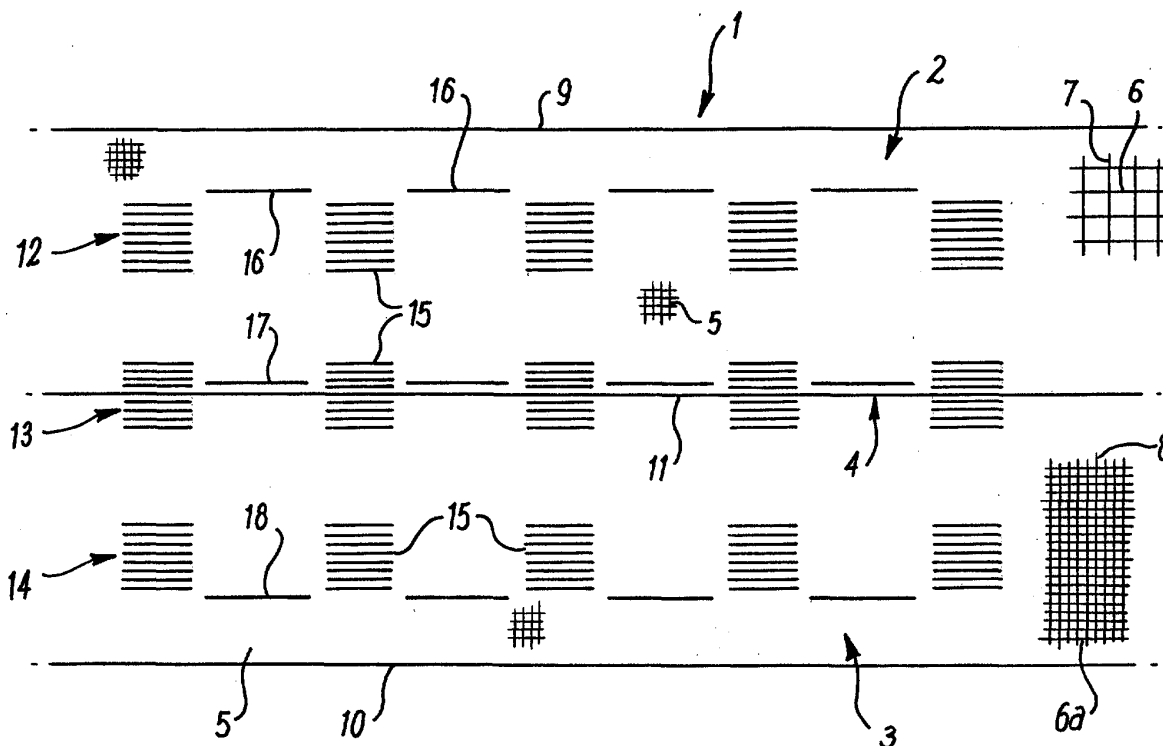


FIG. 1

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Description

[0001] This invention relates to fabric manufacture and is particularly although not exclusively concerned with the manufacture of woven tapes such as curtain heading tapes.

[0002] Conventional curtain heading tapes, which in use are fixed along upper edge regions of curtains, are woven structures incorporating one or more longitudinal draw cords for pleating the tape, and one or more longitudinal rows of pockets to receive suspension hooks.

[0003] There has been a trend towards wider curtain heading tapes and GB-2238800-B describes the manufacture of a tape of 7 to 8cm width with three side-by-side rows of pockets.

[0004] Wider tapes are conventionally manufactured using a broader loom than is the case with narrower tapes, such as single-pocket-row tapes which may be of only 2 to 3cm width. This can however reduce production speed and consequently can increase manufacturing cost in so far as the speed of operation of a loom is conventionally related to the loom type such that speed reduces with increase in maximum operational reed width. Moreover there is the problem that switching production from narrow tapes of say 2-3cm width to wider tapes of say 7-8cm width may necessitate costly acquisition of a larger loom, say a standard 84mm maximum width loom to replace or supplement an existing standard 45mm loom.

[0005] An object of the present invention is to provide a method of manufacturing a fabric whereby increased fabric width can be achieved in an efficient and cost-effective manner.

[0006] According to one aspect of the invention therefore there is provided a method of manufacturing a fabric wherein at least two yarn structures are formed together in superimposed relationship with adjacent edges of adjacent said structures being joined together by one or more linking yarns forming part of said adjacent structures, thereby to produce a fabric folded at said joined edges.

[0007] With this method the fabric can be formed using techniques and equipment appropriate to the reduced widths of the yarn structures, rather than the greater width of the unfolded fabric. The fabric can therefore be manufactured in an efficient and cost-effective manner.

[0008] Most preferably the yarn structures are woven structures having warp and weft yarns. Preferably also, the yarn structures have respective independent weft yarns whereby the interconnection between the structures may be effected by means of one or more linking warp yarns which interlace with weft yarns of the respective yarn structures.

[0009] The method of the invention is preferably performed as a single continuous process resulting in the simultaneous continuous formation and joining together of the respective yarn structures.

[0010] Thus, in the case of woven yarn structures, separate weft yarns are woven simultaneously respectively around two or more spaced superimposed sets of warp yarns and also around one or more common said linking warp yarns disposed between adjacent said sets at one side thereof.

[0011] The yarn structures may be the same or different. That is parameters such as yarn spacing, yarn type and diameter, width, construction (e.g. weave pattern), etc may be the same or different from the respective yarn structures. In one embodiment, adjacent said yarn structures have mirror-image constructions whereby, when unfolded, the resulting fabric has a common construction on each face, or at least on one face thereof, across its entire width. Also, adjacent said yarn structures may have a common width so that, when unfolded, the resulting fabric is double said width.

[0012] The yarn structures may be elongate narrow strip-shaped structures and the resulting fabric may also be narrow, of the nature of a tape. However the invention can also be utilised to manufacture wider fabrics which may be used as square or rectangular pieces or the like.

[0013] Any suitable width of yarn structure may be appropriate. In practice this will depend on the equipment used for manufacture i.e. in the case of a loom it will depend on the reed width. Thus a reed width of up to say 175mm may be used from which a yarn structure of up to say 165mm may be attainable. Thus yarn structure widths of say 25mm, 50mm, 75mm, 100mm up to 165mm may be appropriate.

[0014] There may be more than two-yarn structures which may be formed one above the other with multiple pairs of adjacent said structures being joined alternately at opposite sides in zig-zag fashion.

[0015] After formation of the folded fabric this may be opened out and subjected to treatment to remove any crease at the fold (or folds). Unfolding may be achieved by passing through bars or the like. Treatment to remove creasing may involve heat setting.

[0016] Unfolding or treatment for removal of creasing may be omitted where a pre-folded product is acceptable or desirable e.g. in the manufacture of edging strips for flags.

[0017] Depending on intended end use, the yarn structures may incorporate additional constructions or features. Thus, in the case where the fabric is to be used as curtain heading tape one or more yarn structures may incorporate one or more draw cords and/or one or more rows of pockets.

[0018] The invention is particularly suited to the manufacture of wider curtain heading tape, i.e. tape having multiple pocket rows, e.g. tape having three or more pocket rows, which may have aligned pockets across the tape as described in GB-2238800-B, and having a width of say 7 to 8cm. The pockets may be loose corded, or fully woven as described in this prior patent.

[0019] With such wider curtain heading tape the pocket rows, and any draw cords, may be incorporated within

the confines of the respective yarn structures. However, it is also possible to provide a pocket row and/or a draw cord which coincides with the joining yarn (or yarns).

[0020] In this case, for the draw cord, this may extend at least partially alongside the (or one) linking yarn. Thus, where the (or each) linking yarn is interlaced through weft yarns of the adjacent yarn structures, the draw cord may be interlaced in the same positions through at least the weft yarns of one of the yarn structures.

[0021] For the pocket row, this may straddle the linking yarn (or yarns) such that one part of each pocket (e.g. half the pocket) is in one yarn structure on one side of the linking yarn or yarns and the remaining part of the pocket is aligned therewith in the other yarn structure on the other side of the linking yarn or yarns.

[0022] Alternatively, and especially with greater width tapes (say 20-25cm), pocket rows (and preferably draw cords) may be provided on one only of the yarn structures.

[0023] The invention also provides apparatus for use in performing the above described method comprising a loom having warp yarn feed means for feeding multiple side by side said warp yarns, and weft yarn feed means for feeding together multiple weft yarns transversely around the warp yarns to interlace therewith, wherein the warp yarn feed means is arranged to feed the warp yarns in two or more different superimposed sets, the weft yarn feed means is arranged for feeding different said weft yarns respectively around the different warp sets, thereby to form therewith the different respective yarn structures, the warp feed means being arranged also to feed one or more said linking yarns between adjacent said warp sets at one side thereof, and the respective weft feed means for said adjacent said warp sets being arranged to feed said weft yarns also around the (or each) said linking yarns thereby to effect said joining of the respective yarn structures to produce said folded fabric.

[0024] The loom may be a needle loom whereby the weft feed means comprises movable needles.

[0025] The warp feed means may be arranged to feed warp yarns for only two warp sets. Alternatively the warp feed means may be arranged to feed warp yarns for three or more warps sets, one above the other.

[0026] The apparatus of the invention may also incorporate a mechanism for opening out or unfolding the produced folded fabric. Further, the apparatus may comprise pressing and/or heat setting equipment for treating the opened out or unfolded fabric to remove a fold crease or creases therefrom.

[0027] The invention also provides a fabric when formed by the above described method, or when formed with the above described apparatus, and which may be a curtain heading tape.

[0028] The invention will now be described further by way of example only and with reference to the accompanying drawings in which:-

Figure 1 is a diagrammatic plan view of a curtain heading tape made in accordance with the method of the invention; and

Figure 2 is a diagrammatic perspective view of one form of a needle loom in accordance with the present invention used to make the tape of Figure 1.

[0029] Referring to Figure 1, this shows a curtain heading tape 1 which has a width of 76mm and is of the form of a three pocket pencil pleat curtain tape.

[0030] The tape 1 is formed from two strip-shaped yarn structures 2, 3 which are joined by a seam 4. The yarn structures 2, 3 are essentially identical and of common width whereby the seam 4 runs along the middle line of the tape 1.

[0031] Each yarn structure 2, 3 comprises a base fabric 5 woven from warp and weft yarns which may be formed from any natural or synthetic material or combination thereof such as cotton, polypropylene, etc.

[0032] Each yarn structure base fabric 5 is woven with a needle loom (as described hereinafter) and has single warp yarns 6, 6a with weft yarns 7, 8 inserted as a double pick per shed looped around an edge warp at that edge of the fabric 5 which is at the middle line of the finished tape 1, and locked by an edge knitted construction 9, 10 at that edge of the fabric 5 which is a respective free outer edge of the finished tape 1.

[0033] At the middle line of the tape 1 there is at least one linking warp yarn 11 around which the wefts 7, 8 of both yarn structures 2, 3 are looped. Apart from this linking warp yarn 11 (or yarns), the yarn structures 2, 3 are wholly independent. That is, each has its own weft and warp yarns 6, 6a, 7, 8 which are independent of and do not interlace or otherwise connect with the weft and warp yarns 6, 6a, 7, 8 of the other.

[0034] The yarn structures 2, 3 are provided with additional yarns to form three rows 12, 13, 14 of pockets 15, which pockets 15 are aligned across the tape 1. The pockets 15 are defined by yarns which float freely over the surface of the base fabric 5. They may be wholly warp yarns, woven warp and weft yarns or a combination of both, as described in GB-2238800-B. In between the pockets 15, the warp yarns forming the pockets 15 are woven into the base fabric 5.

[0035] The pocket rows 12-14 are distributed symmetrically across the tape 1 whereby the central row 13 straddles the seam 4 on the middle line of the tape 1. That is, half of each pocket 15 is on one yarn structure 2 on one side of the middle line and the other half of the pocket 15 is on the other yarn structure 3 on the other side. There are no pocket warp yarns along the middle line. Where the pockets 15 have weft yarns these may straddle the middle line or there may be separate weft yarns for the separate pocket halves.

[0036] The tape 1 may have similar pocket constructions on opposite faces whereby the pocket warp yarns form pockets 15 on one face which lie between the pock-

ets 15 formed on the opposite face.

[0037] In addition, the tape 1 includes inserted draw cords 16, 17, 18 which float freely, on both faces of the tape 1, longitudinally between the pockets 15. There are three draw cords. Two cords 16, 18 run along the outermost edges of the two outer pocket rows 12, 14. The other cord 17 runs along the middle line between the halves of the pockets 15 of the middle row 13.

[0038] The cords 16, 17, 18 are woven into the base fabric 5 in the vicinity of the pockets 15. For the central cord 17 this interweaving takes place alongside the linking yarn 11 (or yarns).

[0039] The yarn structures 2, 3 of the tape 1 are formed and joined in the same weaving operation using a loom as illustrated in Figure 2. This drawing omits reference to additional loom features used for construction of the pocket rows 12-14 and insertion of the draw cords 16-18 which would also be effected in the same weaving operation. Reference is made to GB-2238800-B for an explanation of suitable additional loom features.

[0040] The loom is a needle loom having a front reed 19 with a width of say 45mm.

[0041] Warp yarn 6, 6a is fed through the reed 19 in two separate warp sets 20, 21 one above the other. As shown the upper warp set 20 is divided into an upper shed with upper and lower warp yarns 22, 23, and the lower warp set is divided into a lower shed with upper and lower warp yarns 24, 25. The lower yarns 23 of the upper set 20 are level with the upper yarns 24 of the lower set 21.

[0042] At one side (the left side as shown) of the reed 19 there are two movable needle arms 26, 27 terminating in eyes. Two separate weft yarns 7, 8 are fed through these eyes. The arms 26, 27 are mounted one above the other in alignment respectively with the upper and lower sheds of the upper and lower warp yarn sets 20, 21.

[0043] A conventional mechanism is provided to move each needle arm to draw the respective weft yarn through the respective shed from the left side through to the right side. At the right side the weft yarn is picked up by a latch needle to form a loop which is interlocked with a loop of the next weft insertion. Conventional heald and beating up mechanisms and the like are provided.

[0044] With this arrangement two entirely separate yarn structures can be constructed simultaneously, one above the other, each with its own warp and weft yarns.

[0045] The two yarn structures 2, 3 are formed simultaneously since the warp yarns 6, 6a of both sets are fed through the reed 19 at the same time, the two sheds are formed and changed at the same time, and the weft needles 26, 27 are moved through the sheds at the same time.

[0046] Although formed separately the two yarn structures 2, 3 are joined together at one side simultaneously with formation of the structure 2, 3. This is achieved by virtue of one or more peripheral linking warp yarns 11 at the left side which are moved by a respective heald (or

healds) between the upper and lower sheds of both the upper and lower warp sets 20, 21. That is, the (or each) linking yarn 11 is moved between a position level with the upper yarns 22 of the upper set 20 and the lower yarns 25 of the lower set 21 so that both weft yarns 7, 8 are looped around the (or each) linking yarn 11.

[0047] This gives rise to production of the two yarn structures 2, 3 joined together by the seam 4 at the left side, corresponding to the finished tape folded in half along the middle line.

[0048] The folded tape 1 is then passed through an arrangement of bars (not shown) which acts to open out or unfold the tape so that the two yarn structures 2, 3 are coplanar. The opened out tape 1 can then be heated and pressed e.g. by passing through a heated roller nip or in tension around a heated drum or the like, to heat set the tape to remove the centre fold and give a flat configuration.

[0049] The arrangement is such that as produced the upper and lower yarn structures 2, 3 have mirror image constructions whereby when opened out each face of the tape has the same construction throughout for the two yarn structures 2, 3.

[0050] The resulting unfolded tape has a width of 76mm and is closely similar to a tape constructed as a flat 76mm tape on a wider loom, except for the presence of the seam 4 along the middle line which need not detract from appearance or performance.

[0051] Advantageously, with the embodiment described above a 76mm tape can be produced on a standard loom having a maximum reed width of 45mm. This means that the standard loom can be used both for narrow fabrics up to 45mm and for wider fabrics up to say 90mm which gives rise to cost effective use of equipment.

[0052] Also, the speed of operation of a loom is conventionally linked to maximum front reed width whereby the wider the reed width the slower the loom. By way of example, with a standard 4/84 loom (4 weaving heads, 84mm maximum reed width) a 76mm wide fabric produced conventionally as a flat fabric would typically be produced at a maximum speed of 1100 picks per min.

[0053] With a standard 4/45 loom (4 weaving heads, 45mm maximum reed width) which operates at a maximum of 2000 picks per min, it has been found possible to produce the same 76mm fabric as a folded fabric in accordance with the above embodiment at 1600 picks per min.

[0054] It is of course to be understood that the invention is not intended to be restricted to the details of the above embodiment which are described by way of example only.

[0055] Thus, for example, the invention is not restricted to production of two joined yarn structures 2, 3. Three or more yarn structures may be formed simultaneously and joined in zig zag fashion so as to form a tape which when opened out is three or more times the width of each individual yarn structure. By way of example three

yarn structures each of approximately 25mm width can be produced simultaneously one above the other, the bottom two being joined at the left side and the upper two at the right side to give, opened out, a 76mm tape.

[0056] The invention is not restricted to 76mm tapes but is appropriate to other widths. In practice widths for the yarn structures of say 25mm to 165mm, depending on the reed width, are possible, the resulting tape being twice or a multiple of this.

[0057] Also the invention is not restricted to a symmetrical three pocket arrangement. The pockets and draw cords may be on one of the yarn structures only.

[0058] Further, the invention is not restricted to three-pocket curtain heading tape as described. The invention may be applied to any other kind of curtain heading tape or to any other kind of fabric for any suitable purpose.

Claims

1. A method of manufacturing a fabric wherein at least two yarn structures (2, 3) are formed together in superimposed relationship with adjacent edges of adjacent said structures being joined together by one or more linking yarns (11) forming part of said adjacent structures, thereby to produce a fabric (1) folded at said joined edges (4).
2. A method according to claim 1 wherein the yarn structures (2, 3) are woven structures having warp and weft yarns (6, 6a, 7, 8) and wherein the yarn structures have respective independent said weft yarns (7, 8) whereby the interconnection between the structures (2, 3) is effected by means of one or more linking warp yarns (11) which interlace with weft yarns (7, 8) of the respective yarn structures (2, 3).
3. A method according to claim 1 or 2 which is performed as a single continuous process resulting in the simultaneous continuous formation and joining together of the respective yarn structures (2, 3).
4. A method according to claim 2 wherein separate weft yarns (7, 8) are woven simultaneously respectively around two or more spaced superimposed sets (20, 21) of warp yarns and also around one or more common said linking warp yarns (11) disposed between adjacent said sets at one side thereof.
5. A method according to any one of claims 1 to 4 wherein adjacent said yarn structures (2, 3) have mirror-image constructions whereby when unfolded the resulting fabric (1) has a common construction at least on one face thereof across its entire width.
6. A method according to any one of claims 1 to 5 wherein adjacent said yarn structures (2, 3) have a common width.
7. A method according to any one of claims 1 to 6 wherein the fabric (1) is a curtain heading tape and one or more said yarn structures (2, 3) incorporates one or more draw cords (16, 17, 18) and one or more rows of pockets (15).
8. A method according to claim 7 wherein there are three or more pocket rows.
9. A method according to claim 7 or 8 wherein there are multiple pocket rows with pockets (15) aligned across the tape.
10. A method according to any one of claims 7 to 9 wherein a said pocket row coincides with the linking yarn (or yarns) (11).
11. A method according to claim 10 wherein the pocket row straddles the linking yarn (or yarns) (11) so that one part of each pocket (15) is in one yarn structure on one side of the linking yarn or yarns and the remaining part of the pocket is aligned therewith in the other yarn structure on the other side of the linking yarn or yarns.
12. A method according to any one of claims 7 to 9 wherein a said draw cord (17) extends at least partially alongside the (or one) linking yarn (11).
13. A method according to claim 12 wherein the (or each) linking yarn (11) is interlaced through weft yarns (7, 8) of the adjacent yarn structures (2, 3) and the draw cord (17) is interlaced in the same positions through at least the weft yarns of one of the yarn structures.
14. Apparatus for use in performing the method of claim 1 comprising a loom having warp yarn feed means (19) for feeding multiple side by side said warp yarns (6, 6a), and weft yarn feed means (26, 27) for feeding together multiple weft yarns (7, 8) transversely around the warp yarns (6, 6a) to interlace therewith, wherein the warp yarn feed means (19) is arranged to feed the warp yarns in two or more different superimposed sets (20, 21), the weft yarn feed means (26, 27) is arranged for feeding different said weft yarns (7, 8) respectively around the different warp sets (20, 21), thereby to form therewith the different respective yarn structures (2, 3), the warp feed means (19) being arranged also to feed one or more said linking yarns (11) between adjacent said warp sets (20, 21) at one side thereof, and the respective weft feed means (26, 27) for said adjacent said warp sets (20, 21) being arranged to feed said weft yarns (7, 8) also around the (or each) said linking yarns (11) thereby to effect said joining of the

respective yarn structures (2, 3) to produce said folded fabric (1).

15. Apparatus according to claim 14 wherein the loom is a needle loom whereby the weft feed means (26, 27) comprises movable needles. 5
16. Apparatus according to claims 14 or 15 wherein the warp feed means (19) is arranged to feed warp yarns (6, 6a) for only two warp sets (20, 21). 10
17. Apparatus according to claims 14 or 15 wherein the warp feed means (19) is arranged to feed warp yarns for three or more warp sets, one above the other. 15
18. Apparatus according to any one of claims 14 to 17 incorporating a mechanism for unfolding the produced folded fabric. 20
19. Apparatus according to any one of claims 14 to 18 incorporating equipment for treating the unfolded fabric to remove a fold crease or creases therefrom.
20. A fabric when formed by the method of any one of claim 1 to 13. 25
21. A fabric when formed using the apparatus of any one of claims 14 to 19. 30
22. A fabric according to claim 20 or 21 which is a curtain heading tape.

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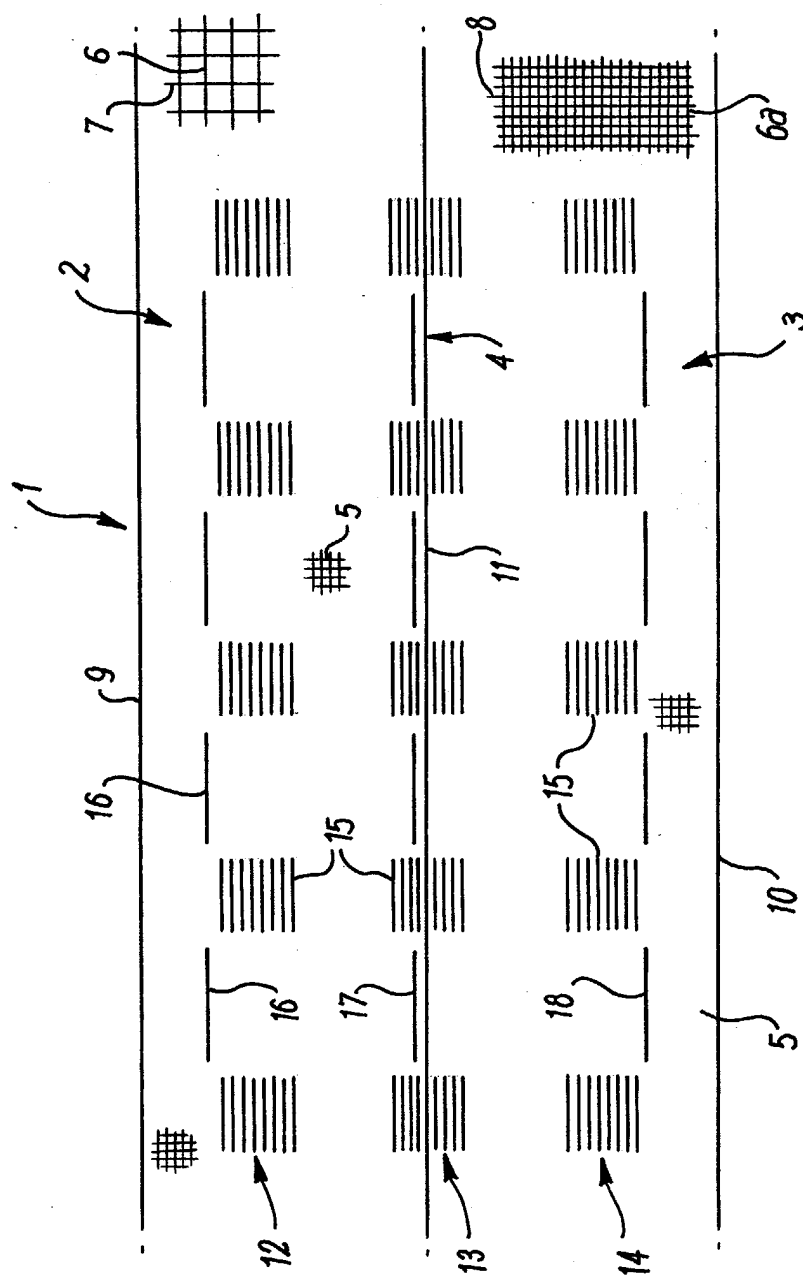


Fig. 1

