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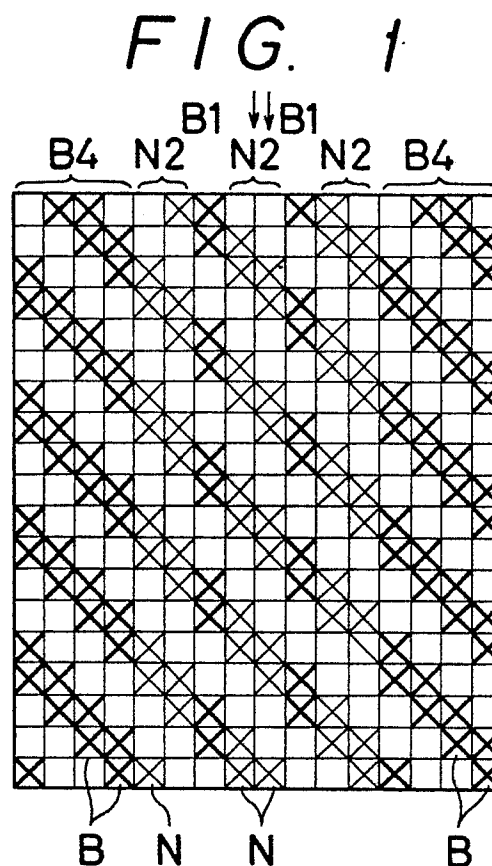
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54 **Webbing for belt.**

57 A webbing for a belt comprising a weave of 2/2 twill in which a warp is arranged at such a high density that a weft is substantially hidden behind the surface of the webbing. The warp comprise at least two kinds of yarns different from each other in the color, and these at least two kinds of yarns are in an alternate warp threading arrangement through two or more rows of yarns adjacent thereto having the same color so that the warp threading arrangement forms a pattern portion which allows a portion having a different color to appear diagonally to the longitudinal direction of the belt.



WEBBING FOR BELT

This invention relates to a webbing for a belt. More particularly, the present invention is concerned with a webbing suitable for a seat belt used for protection of drivers and passengers of automobiles.

With the spreading of users of automobiles in recent years, the demand for seat belts has become diversified. For example, some users of deluxe automobiles etc. are unsatisfied with conventional single-color seat belts and require a seat belt comprising a combination of different colors which exhibits a multi-color effect.

A 2/2 twill weave is widely accepted as a weave for a seat belt of automobiles. Further, in order to maintain the tenacity required of the seat belt, the warp density is so high that the wefts are substantially hidden behind the surface of the seat belt. For this reason, the twill angle of the warps relative to the longitudinal direction is very small, which makes it difficult to confirm the twill lines, so that only turnover lines of the twill and the difference of gloss due to the reflection of light ways are recognized.

Therefore, even if warps having a different color are threaded into a 2/2 twill weave having a very high warp density, only a simple stripe pattern can be formed on the surface of the weave. In other words, it is difficult to form a pattern having noticeable portions having a different color diagonal to the longitudinal direction of the belt. This rendered it impossible to sufficiently comply with the above-described diversification of the needs of users.

An object of the present invention is to provide a webbing for a belt which can develop various patterns comprising portions having a different color noticeably arranged at the diagonal direction of the webbing even in a weave of a 2/2 twill weave having a very high warp density.

Another object of the present invention is to provide a webbing for a seat belt having a weave pattern which can sufficiently comply with the diversification of the tastes of users.

The webbing for a belt of the present invention for attaining the above objects basically comprises a weave of 2/2 twill having such a high warp density that the wefts are substantially hidden behind the surface of the webbing. In the above-described weave of 2/2 twill, the webbing of the present invention is characterized in that said warp comprises at least two kinds of yarns different from each other in the color and said at least two kinds of yarns are in an alternate warp threading arrangement through two or more rows of yarns adjacent thereto having the same color so that said warp threading arrangement forms a pattern portion

which allows a portion having a different color to appear diagonally to the longitudinal direction of the belt.

Particularly, the webbing for use in a seat belt is characterized in that said plurality of yarns having different colors comprise a spin-dyed yarn and a non-spin-dyed yarn each having a multifilament yarn structure and the difference in the fineness and strength between said spin-dyed yarn and said non-spin-dyed yarn is 10% or less.

Other objects of the present invention will be apparent from the following description of the preferred embodiments with reference to the accompanying drawings.

Figs. 1 to 13 are drawings of the weaving of the webbing for a belt according to the present invention; and

Figs. 14 to 18 are plan views of belts each comprising a webbing according to the present invention.

In the webbing for a belt according to the present invention, there is no particular limitation with respect to the plurality of yarns having different colors for use in the warp as far as they comprise a combination of yarns having different colors. For example, the combination may be any of a combination of a spin-dyed yarn with a non-spin-dyed yarn, a combination of a dyed yarn with an undyed yarn, a combination of spin-dyed yarns having different colors, a combination of dyed yarns having different colors, and a combination of a spin-dyed yarn with a dyed yarn. Further, the warp yarn may be in the form of a multifilament yarn or a spun yarn.

However, in the case of a webbing for a seat belt, it is preferred that the above-described at least two kinds of yarns comprise a combination of a spin-dyed yarn with a non-spin-dyed yarn. Further, the yarn is preferably in the form of a multifilament yarn. It is preferred that the dyed yarn be used for applications, e.g., suspending belts for sporting bags, which do not rather require very high tenacity. This is because the dyed yarn is passed through various steps, such as draw twisting, hank reeling, dyeing, and hank winding, and therefore exhibits a greater tendency to cause the lowering in the tenacity than those of the spin-dyed yarn and the non-spin-dyed yarn in a natural form. When the dyed yarn is used for a webbing for a seat belt, it is necessary to increase the number of the yarns in order to compensate for the lowering in the tenacity. However, the use of a large amount of the yarn brings about not only an increase in the cost but also an increase in the thickness of the belt which makes it difficult to smoothly take the

belt in and out of a retractor.

In the present invention, the term "spin-dyed yarn" is intended to mean a yarn which has been dyed by blending a raw resin with a pigment or a dye prior to the spinning of the raw resin into a yarn, while the term "dyed yarn" is intended to mean a yarn which has been dyed after the spinning of a raw resin into a yarn. There is no particular limitation with respect to the color applied to these spin-dyed yarn and dyed yarn. However, the dyeing in black, light brown, blue or the like is preferable.

When a webbing for a seat belt is manufactured by a combination of the above-described spin-dyed yarn and non-spin-dyed yarn each having a multifilament yarn structure, the difference in the fineness and strength between the spin-dyed yarn and the non-spin-dyed yarn is preferably 10% or less, more preferably 6% or less. Further, it is preferred that the difference in the breaking elongation between the spin-dyed yarn and the non-spin-dyed yarn be preferably 10% or less.

In the webbing for a belt according to the present invention, as described above, the plurality of yarns having different colors are used as the warp, and these are woven into a weave having a 2/2 twill. In the weave having a 2/2 twill, the warp density is so high that the wefts are substantially hidden behind the surface of the webbing. When the plurality of yarns having different colors are subjected to warp threading arrangement in such a high warp density, two or more rows of yarns having the same color and adjacent to each other are arranged alternately with a yarn having a different color. This warp threading arrangement forms a pattern portion which allows a portion having a different color to appear diagonally to the longitudinal direction of the belt. In the present invention, it is a matter of course that a single row of yarn may coexist in these arrangements as far as these arrangements meet the above-described requirement that yarns having the same color be arranged in two or more rows adjacent to each other.

Further, in the present invention, it is more preferable that the above-described warp threading arrangement be conducted so that yarns are regularly arranged bilaterally symmetrically with respect to one yarn arranged in the center. The above-described regular arrangements which are bilaterally symmetrical enable the formation of a pattern having a pattern weaving portion which allows a portion having a different color to clearly appear diagonally to the longitudinal direction of the belt, e.g., one-thread or two-thread yarn bonds pattern, zig-zag pattern, chessboard pattern, and opposing triangular pattern which will be described later.

In the above-described 2/2 twill weave, when

the twill line pattern weaving portions except for the turnover portions of the twill line pattern are regularly arranged in units of three, five, six, seven, or nine yarns in terms of the number of the warps having the same color and adjacent to each other in the order of the warp threading, a twill pattern, such as pointed twill having a twill line angle of about 20°, can be formed in spite of an actual weaving twill line angle of about 7°.

The weave patterns according to the present invention will now be described with reference to the attached drawings. For simplification of the explanation, reference will be made to an example in which a spin-dyed yarn B having a multifilament structure and a non-spin-dyed yarn N having a multifilament structure are used.

Fig. 1 shows the weaving of a 2/2 twill weave having one-thread bonds pattern. As shown in the drawing, the spin-dyed yarn B and the non-spin-dyed yarn N are arranged in the order of the warp threading of the 2/2 twill weave as follows: four rows of the spin-dyed yarn B, two rows of the non-spin-dyed yarn N, a row of the spin-dyed yarn B, two rows of the non-spin-dyed yarn N, a row of the spin-dyed yarn B, two rows of the non-spin-dyed yarn N, and four rows of the spin-dyed yarn B (i.e., B4, N2, B1, N2, B1, N2, B4). With respect to this arrangement, it is apparent from the drawing that a row of B, two rows of N, and four rows of B are regularly arranged in that order on both sides of two central rows of N indicated by a double arrow and bilaterally symmetrically with respect to the two central rows of N. When a webbing is manufactured in the above-described warp threading arrangement so as to have such a high warp density that the wefts are hidden behind the surface of the webbing, a belt comprising this webbing has a distinct one thread bonds pattern as designated by numeral 10 in Fig. 14.

Although, in Fig. 1, the twill lines run in the lower right direction, they may run in the lower left direction as shown in Fig. 2. In this case, the diagonal portion having a different color appears as a diagonal running in the lower right direction as opposed to the one-thread bonds pattern 10 shown in Fig. 14.

Fig. 3 shows the weaving of a two-thread bonds pattern formed by repeating two units of the warp threading arrangement shown in Table 1.

Specifically, the four rows of the spin-dyed yarns arranged at the end portion of Fig. 1 are arranged at the central portion (position indicated by a double arrow), followed by the other arrangements symmetrical bilaterally with respect to this central portion. Further, in this warp arrangement, the two rows of the non-spin-dyed yarns N indicated by a single arrow in each unit arrangement serve as the center of symmetry of the unit ar-

arrangement. When this warp threading arrangement is conducted in such a high warp density that the wefts are hidden behind the surface of the webbing, a distinct two-threads bonds pattern as designated by numeral 11 in Fig. 14 is formed.

Fig. 4 shows the weaving of a 2/2 twill weave which allows a double zig-zag pattern to appear. In this 2/2 twill weave, a row of the non-spin-dyed yarns N indicated by a double arrow is arranged at the central portion, and the following arrangements are made in the order of the warp threading on both the right and left sides thereof symmetrically with respect to the central row of the non-spin-dyed yarns N: a row of the spin-dyed yarn B, two rows of the non-spin dyed yarn N, two rows of the spin-dyed yarn B, a row of the non-spin-dyed yarn N, five rows of the spin-dyed yarn B, a row of the non-spin-dyed yarn N, two rows of the spin-dyed yarn B, two rows of the non-spin-dyed yarn N, and a row of the spin-dyed row B. Further, in the unit arrangements respectively on the right and left sides thereof, the five rows of the spin-dyed yarns B serve as the center of symmetry of each unit arrangement.

That is, the overall warp threading arrangement is as follows: B1, N2, B2, N1, B5, N1, B2, N2, B1, N1, B1, N2, B2, N1, B5, N1, B2, N2, B1. When a belt is manufactured by conducting this warp threading arrangement in such a high warp density that the wefts are hidden behind the surface of the belt, a distinct zig-zag pattern as designated by numeral 12 in Fig. 15 is obtained.

Fig. 5 shows a view of the weaving of a 2/2 twill weave for forming an opposing triangular pattern. In this 2/2 twill weave, five rows of the non-spin-dyed yarn N indicated by a double arrow are arranged at the central portion, and the following arrangements are made in the order of the warp threading on both the right and left sides thereof so as to attain a symmetrical relationship with respect to the central rows of the non-spin-dyed yarns: a row of the spin-dyed yarn B, two rows of the non-spin-dyed yarn N, two rows of the spin-dyed yarn B, two rows of the non-spin-dyed yarn N, and three rows of the spin-dyed yarn B. That is, the overall warp threading arrangement is as follows: B3, N1, B2, N2, B1, N5, B1, N2, B2, N1, B3.

Fig. 6 shows a drawing of the weaving of a 2/2 twill weave for forming a chessboard pattern. In this 2/2 twill weave, four rows of the non-spin-dyed yarn N indicated by a double arrow are arranged at the central portion, and the following arrangements are made in the order of the warp threading on both the right and left sides thereof so as to attain a symmetrical relationship with respect to the central rows of the non-spin-dyed yarns: two rows of the spin-dyed yarn B, two rows of the non-spin-dyed yarn N, two rows of the spin-dyed yarn B, two rows

of the non-spin-dyed yarn N, two rows of the spin-dyed yarn B, two rows of the non-spin-dyed yarn N, two rows of the spin-dyed yarn N, two rows of the non-spin-dyed yarn N, and two rows of the spin-dyed yarn B. Further, in the unit arrangements respectively on the right and left sides thereof, the two rows of the spin-dyed yarns B serve as the center of symmetry of each unit arrangement.

That is, the overall warp threading arrangement is as follows: B2, N2, B2, N2, B2, N2, B2, N2, B2, N4, B2, N2, B2, N2, B2, N2, B2, N2, B2. When a belt is manufactured by conducting this warp threading arrangement in such a high density that the wefts are hidden behind the surface of the belt, a distinct chessboard pattern as designated by numeral 14 in Fig. 16 is obtained.

In the present invention, it is preferred that the above-described weave patterns each having a diagonal portion of a different color be formed on both end portions of the belt as shown in Figs. 14 to 16. However, these patterns may be formed over the entire width of the belt by repeating the above described unit arrangements. Further, when the weave pattern is arranged over the entire width, the twill lines may be unidirectional. Alternatively, the direction of the twill lines may be changed in the course of the weaving to form a symmetrical pattern.

Figs. 7 to 13 are each a drawing of the weaving for forming a twill pattern, such as pointed twill. In all the cases, the weave is 2/2 twill, and the spin-dyed yarn B and the non-spin-dyed yarn N are regularly arranged in the order of the warp threading in units of three yarns (Fig. 7), five yarns (Figs. 8 and 9), six yarns (Fig. 10), seven yarns (Fig. 11), or nine yarns (Figs. 12 and 13) exclusive of turnover portions of the twill lines. The weaving in the units of a plurality of warps enables the formation of intermittent twill pattern manifesting portions of the spin-dyed yarns B through which a line L can be drawn. That is, the twill line having a gentle slope can be observed along the line L.

More particularly, in Fig. 7, units of three yarns, i.e., a spin-dyed yarn B and two non-spin-dyed yarns N are regularly arranged, and the angle, θ , of the twill line based on the line L relative to the longitudinal direction of the webbing is about 20°.

In Fig. 8, units of five yarns, i.e., a spin-dyed yarn B and four non-spin-dyed yarns are arranged, while in Fig. 9, units of five yarns, i.e., two spin-dyed yarns B and three non-spin-dyed yarns N are arranged. In each case, the angle, θ , of the twill line, based on the line L, relative to the longitudinal direction of the webbing is about 31°.

In Fig. 10, units of six yarns, i.e., two spin-dyed yarns B and four non-spin-dyed yarns N are arranged, and the angle, θ , of the twill line, based on the line L, relative to the longitudinal direction of

the webbing is about 20°.

In Fig. 11, units of seven yarns, i.e., a spin-dyed yarn B and six non-spin-dyed yarns N are arranged, and the angle, θ , of the twill line, based on the line L, relative to the longitudinal direction of the webbing is about 41°.

In Fig. 12, units of nine yarns, i.e., a spin-dyed yarn B and eight non-spin-dyed yarns N are regularly arranged, while in Fig. 13, units of nine yarns, i.e., a spin-dyed yarn B, three non-spin-dyed yarns N, a spin-dyed yarn B, and four non-spin-dyed yarns N in that order are regularly arranged. In each case, the angle, θ , of the twill line, based on the line L, relative to the longitudinal direction of the webbing is about 48°.

The above-described webbing of the present invention can be used not only for seat belts but also for general applications such as fashion tape belts.

Example 1:

A polyester pellet having a high degree of polymerization which was dyed black was melt spun, followed by drawing, thereby preparing a spin-dyed yarn B of 1260 deniers and 108 filaments having a tenacity of 8.68 g/d, a breaking elongation of 12.9%, and a dry heat shrinkage of 8.5%. Separately, an uncolored polyester pellet having a high degree of polymerization was melt spun, followed by drawing, thereby preparing a non-spin-dyed yarn N of 1260 deniers and 108 filaments having a tenacity of 8.93 g/d, a breaking elongation of 13.8%, and a dry heat shrinkage of 9.0%.

321 yarns in total of the spin-dyed yarns B and the non-spin-dyed yarns N were used as the warp. On the other hand, non-spin-dyed polyester filament yarns of 750 deniers and 72 filaments were used as the weft and picked in 22 picks/30 mm, thereby weaving a webbing for a belt comprising a 2/2 twill weave having a width of 50 mm. In weaving this webbing for a belt, the spin-dyed yarn B and the non-spin-dyed yarn N used as the warps were arranged on both side regions in such a manner that in the outer region, they were arranged into a weave as shown in Fig. 3, while in the inner region, they were arranged into a weave as shown in Fig. 1. The webbing thus obtained was then dyed grey with a continuous dyeing machine. Thus, there was obtained a belt having distinct and beautiful two-thread bonds figures and one-thread bonds figures having a black color on a grey ground as shown in Fig. 14.

A seat belt for a passenger car was manufactured from this webbing and then subjected to webbing tests with respect to seat belts of auto-

mobiles prescribed in JIS D 4604. As a result, it was found that the seat belt had a tenacity meeting all the requirements for performance prescribed in JIS. The thickness of the webbing was not different from those of the current webbings. Therefore, it was possible to accommodate the belt within the current retractor. Further, the belt could smoothly be taken in and out of the retractor.

Example 2:

66 yarns of black spin-dyed yarns and 256 yarns of non-spin-dyed yarns of the same kinds as those used in Example 1 were used as the warps, and non-spin dyed polyester filament yarns of 750 deniers and 72 filaments were used as the wefts in 24 picks/30 mm to form a 2/2 twill weave of 3 crests (6 panels). The warps were arranged in units of five yarns, i.e., a black spin-dyed yarn and four non-spin-dyed yarns in the order of the threading, and 11 black spin-dyed yarns were used in a panel. Thus, a webbing was woven. The webbing thus obtained was as shown in Fig. 17, i.e., had a twill pattern like a pointed twill. In this pattern, 11 black color lines per panel were observed. Although the lines were intermittent, the twill lines having an angle of about 31° were clearly observed.

Example 3:

93 yarns of black spin-dyed yarns and 183 yarns of non-spin-dyed yarns of the same kinds as those of Examples 1 and 2 were used as the warps, and the same non-spin dyed polyester filament yarns as those of Example 2 were used as the wefts in 23 picks/30 mm to form a 2/2 twill weave. The warps were arranged in units of three yarns, i.e., a black spin-dyed yarn and two non-spin-dyed yarns in the order of the threading. Thus, a webbing was woven. The webbing thus obtained was as shown in Fig. 18, i.e., had a twill pattern like a pointed twill.

As described above, in the webbing of the present invention, the warp threading arrangement is conducted so that two or more rows of yarns adjacent thereto having the same color are present. This arrangement enables the formation of a pattern in which a portion having a different color distinctly appears diagonally to the longitudinal direction of the belt even in a weave of a 2/2 twill having a very high warp density.

Claims

1. A webbing for a belt comprising a weave of 2/2 twill in which a warp is arranged at such a high density that a weft is substantially hidden behind the surface of said webbing, wherein said warp comprise at least two kinds of yarns different from each other in the color and said at least two kinds of yarns are in an alternate warp threading arrangement through two or more rows of yarns adjacent thereto having the same color so that said warp threading arrangement forms a pattern portion which allows a portion having a different color to appear diagonally to the longitudinal direction of the belt.

2. A webbing for a belt according to claim 1, wherein said warp threading arrangement of said at least two kinds of yarns different from each other in the color are regularly made bilaterally symmetrically with respect to one of said yarns.

3. A webbing for a belt according to claim 1, wherein said at least two kinds of yarns different from each other in the color comprise a spin-dyed yarn and a non-spin-dyed yarn each having a multifilament yarn structure and the difference in the fineness and strength between said spin-dyed yarn and said non-spin-dyed yarn is 10% or less.

4. A webbing for a belt according to claim 3, wherein said spin-dyed yarn and said non-dyed yarn are regularly arranged in any of the units of three, five, six, seven, and nine yarns in twill line pattern weaving portions except for twill line turnover portions.

5. A webbing for a belt according to claim 4, wherein the difference in the breaking elongation between said spin-dyed yarn and said non-spin-dyed yarn is 10% or less.

6. A webbing for a belt according to claim 1, wherein said at least two kinds of yarns different from each other in the color comprise a dyed yarn and a non-dyed yarn each having a multifilament yarn structure.

7. A webbing for a belt according to claim 1, wherein said belt is a seat belt.

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FIG. 1

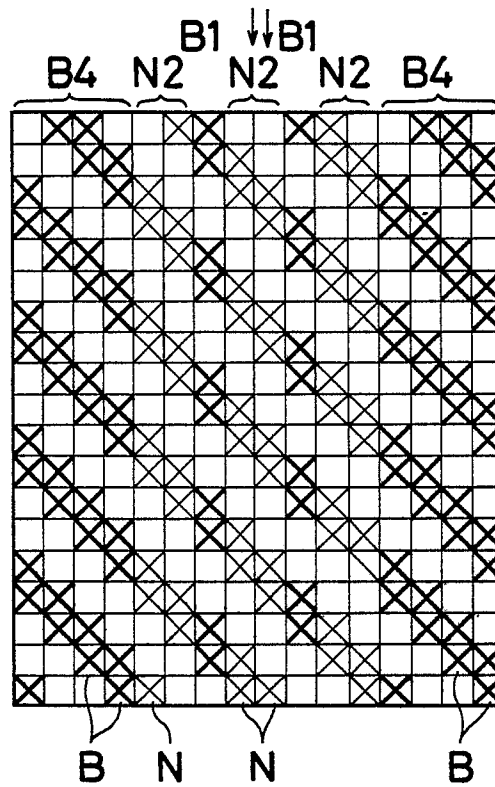


FIG. 2

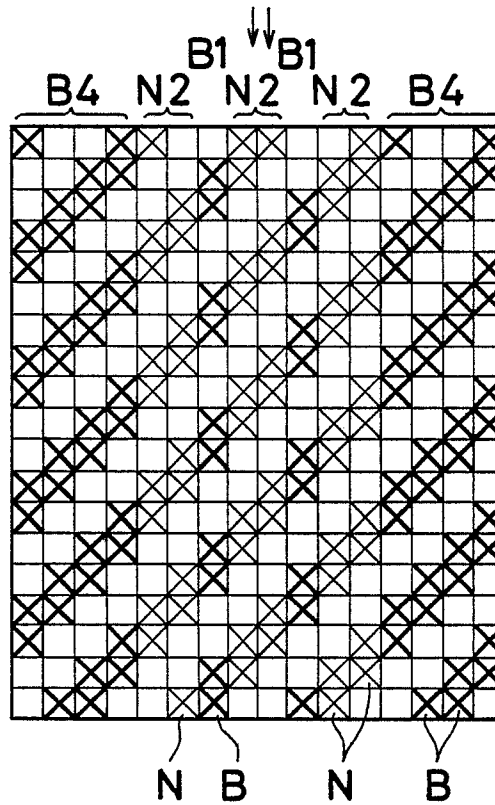


FIG. 3

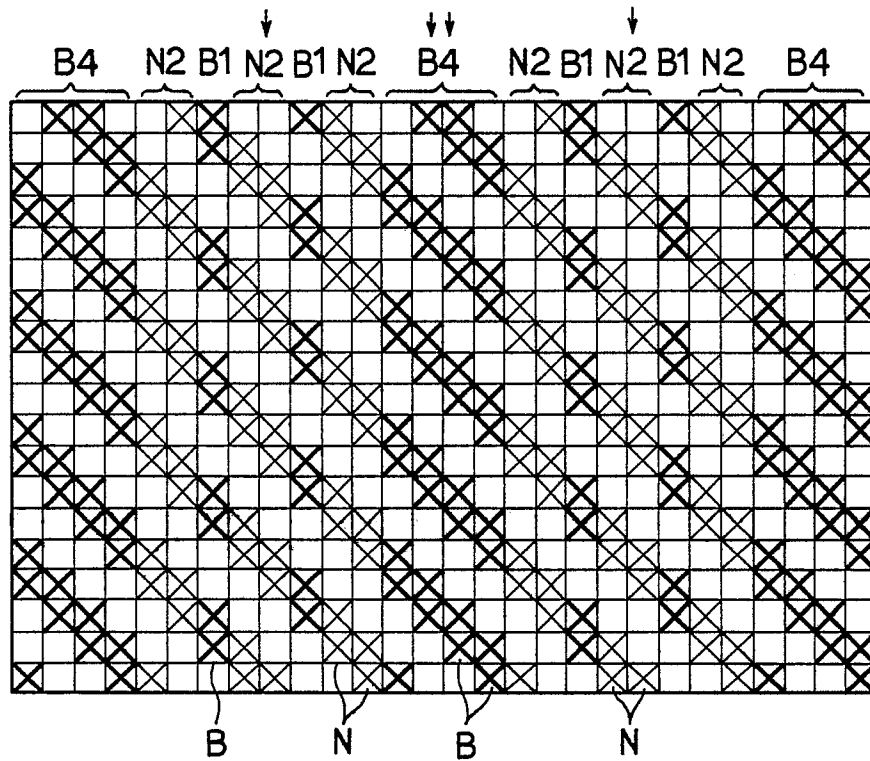


FIG. 4

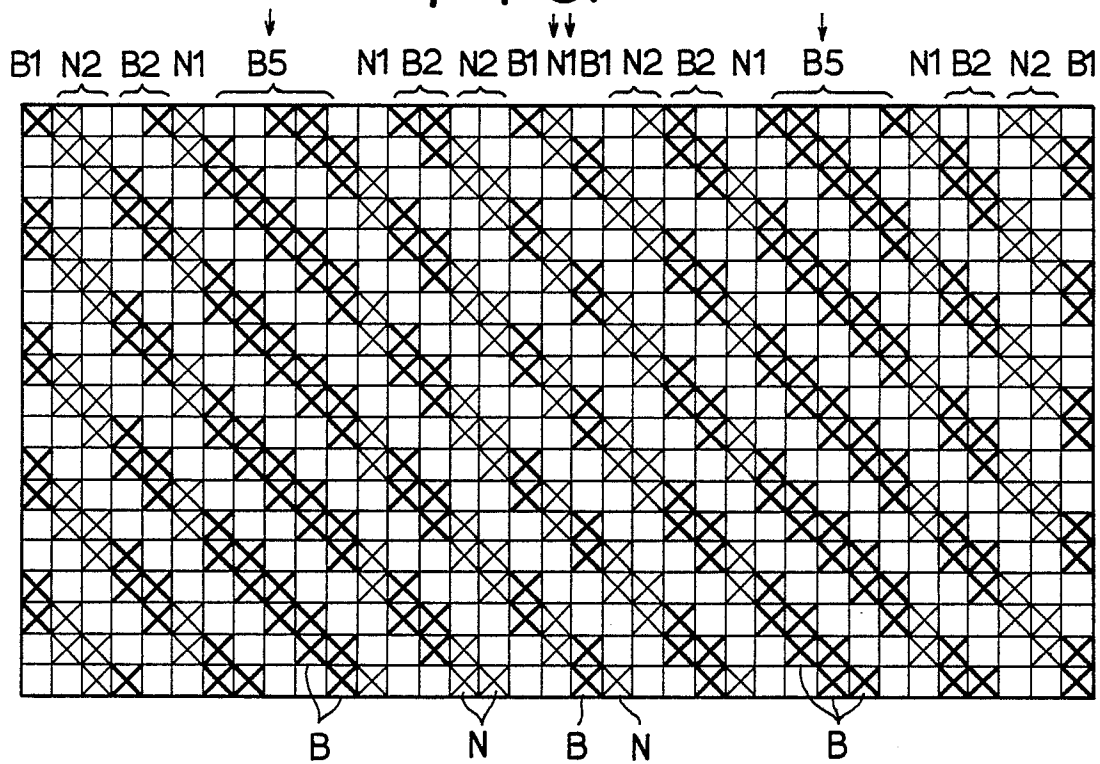


FIG. 5

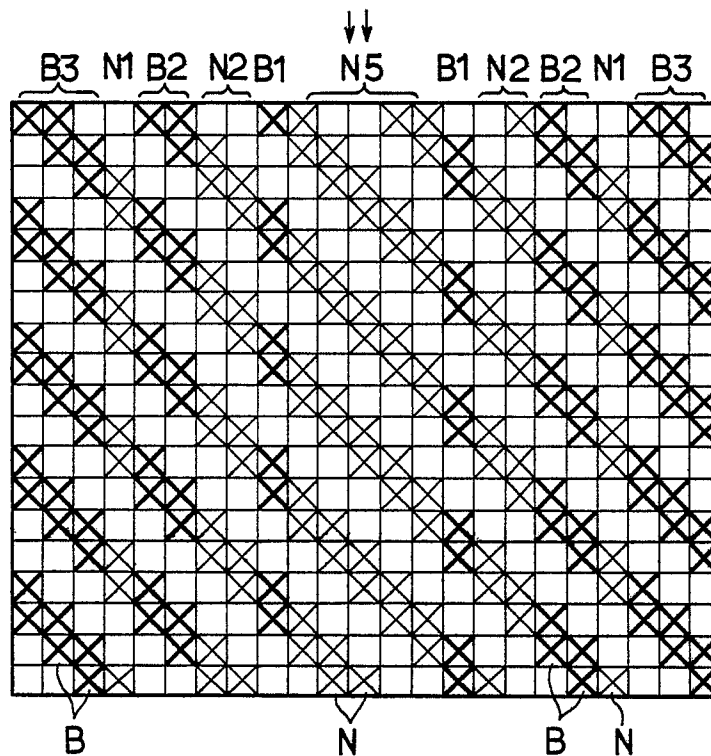


FIG. 6

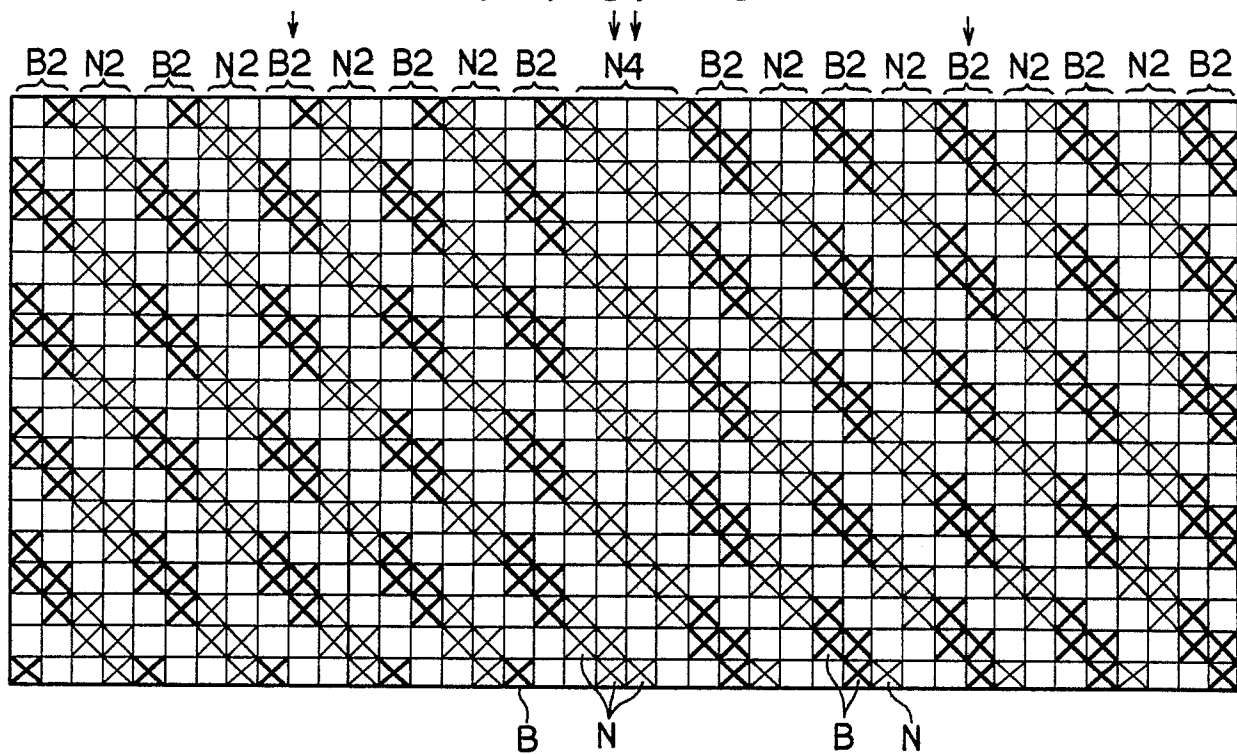


FIG. 7

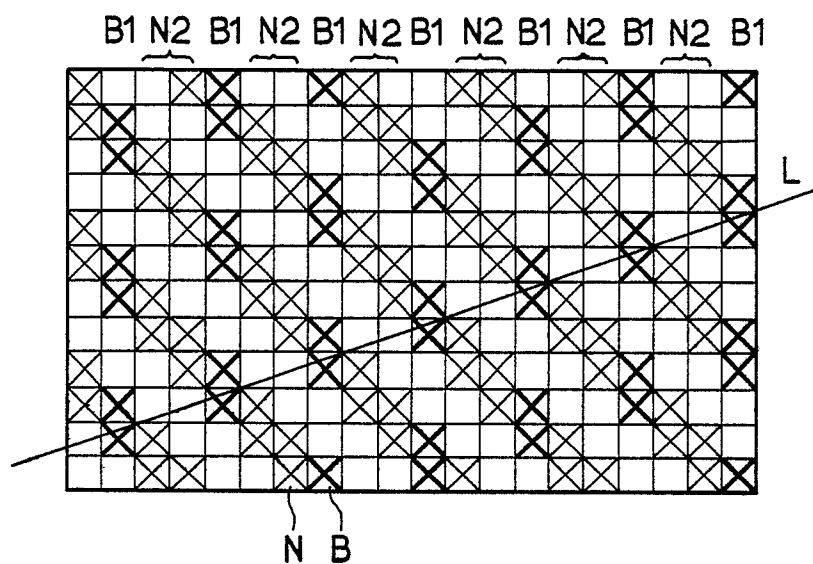


FIG. 8

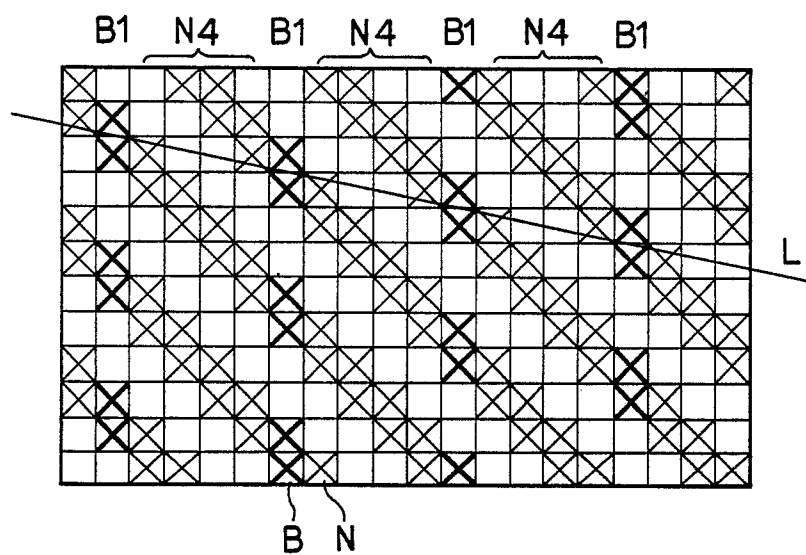


FIG. 9

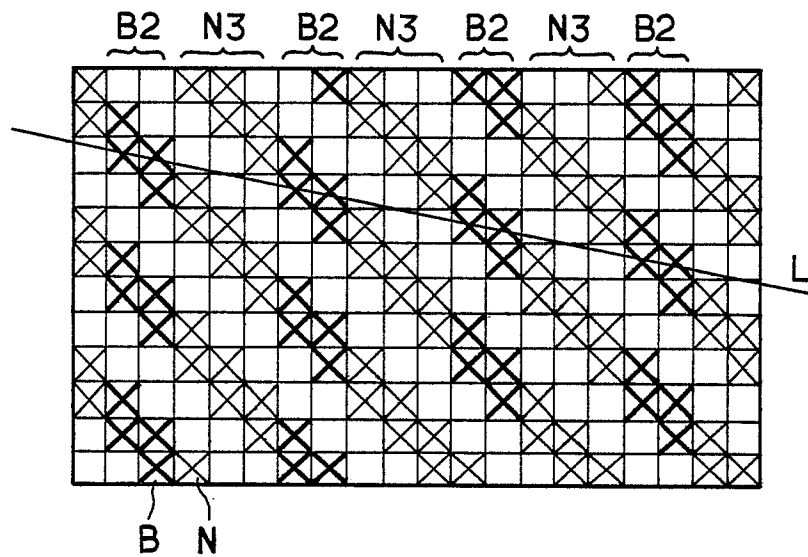


FIG. 10

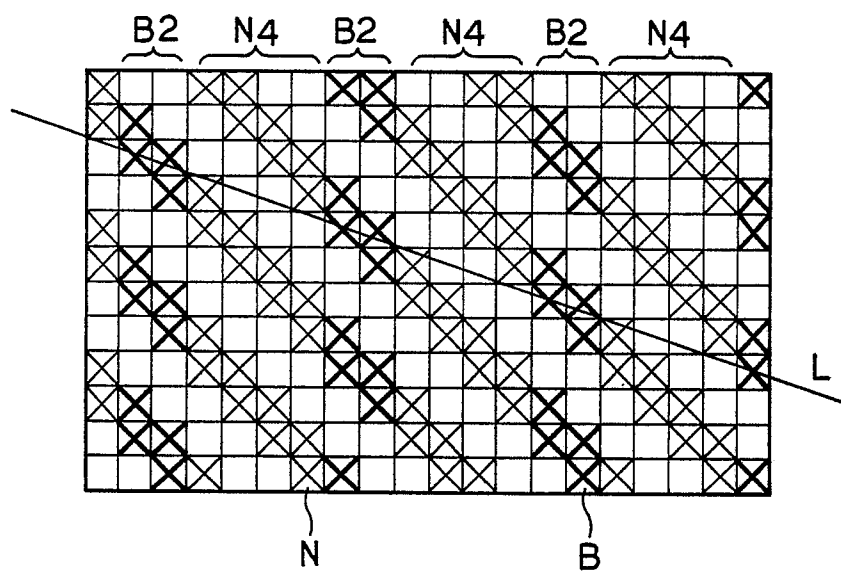


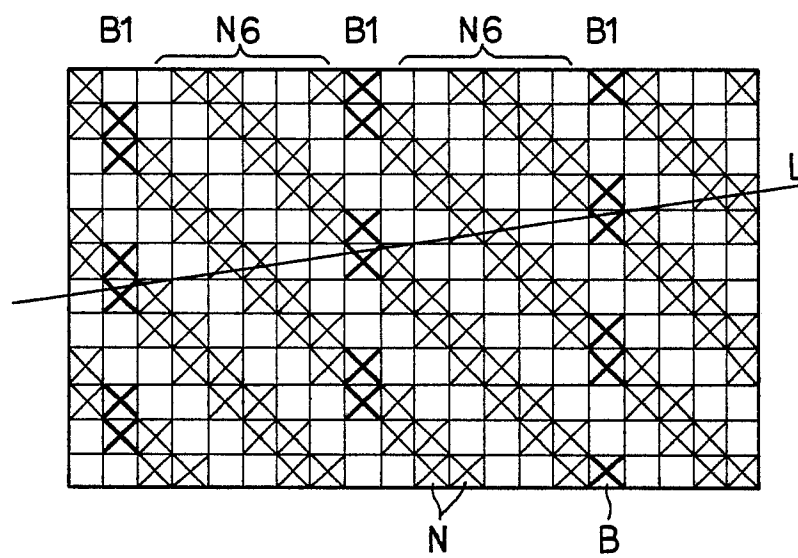
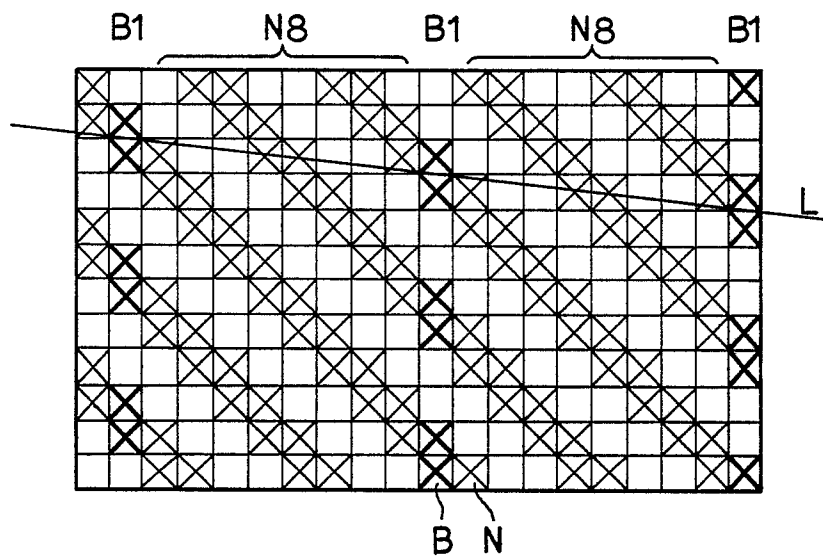
FIG. 11*FIG. 12*

FIG. 13

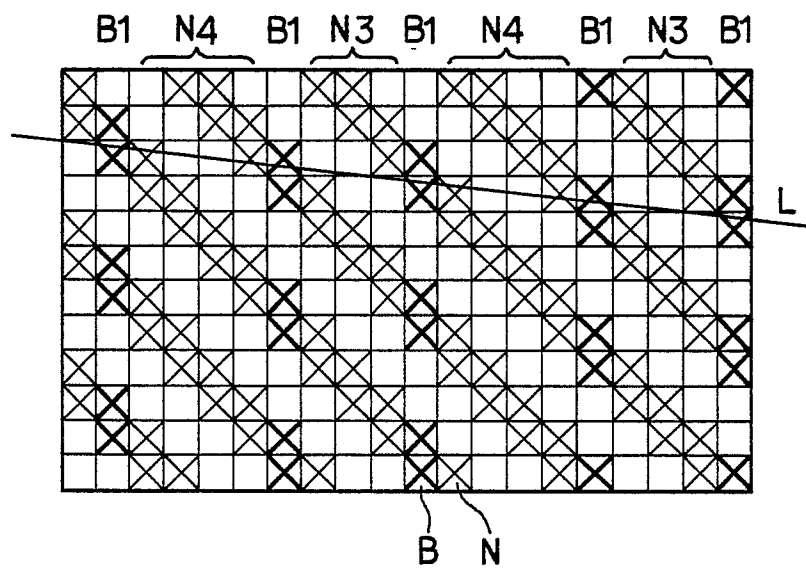
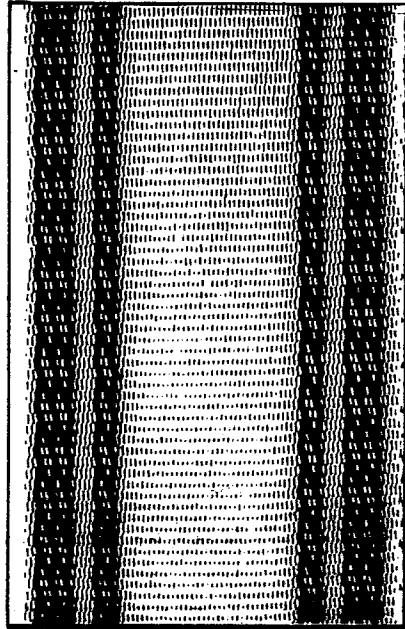
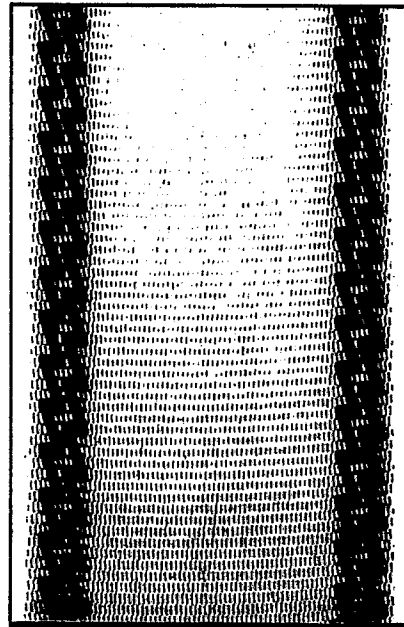


FIG. 14



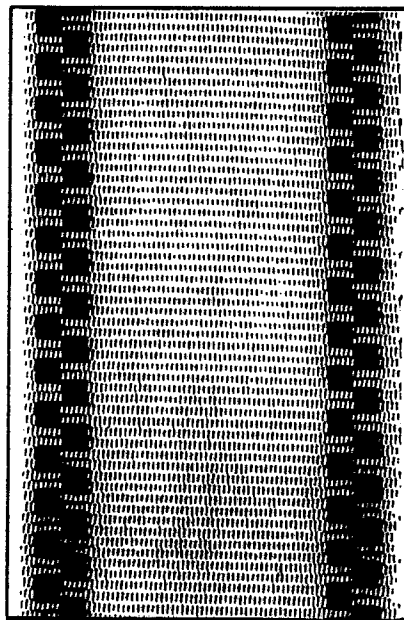
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FIG. 15



12 12

FIG. 16



14 14

FIG. 17

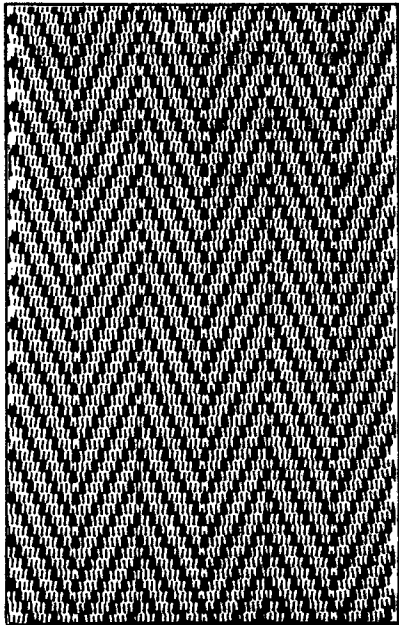


FIG. 18

