(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 2 319 969 A1**

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
11.05.2011 Bulletin 2011/19

(51) Int Cl.:
D04B 1/22 *(2006.01)*

(21) Application number: **10013786.8**

(22) Date of filing: **19.10.2010**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME

(30) Priority: **20.10.2009 JP 2009241768**

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(54) Knitting method of knitted fabric, and knitted fabric

(57) A knitting method of knitted fabric enabling stitches of front and back knitted fabric parts to be bound while performing bind-off processing without interweaving a knitting yarn of one of the knitted fabric parts with the other knitted fabric part. In a process where the front knitted fabric part held in a front needle bed is knitted using a back yarn feeder located on a side of a back needle bed, and the back knitted fabric part held in the back needle bed is knitted using a front yarn feeder located on a side of the front needle bed, following steps 1 to 3 are performed: [1] a stitch α (β) on a stitch ε (ξ) of the front or back knitted fabric part is newly knitted in a state where the knitting yarns from the front and back yarn feeders are entwined with each other; [2] the stitch α as a bind-off stitch is overlapped with a stitch adjacent to the stitch α, and the stitch P as a bind-off stitch is overlapped with a stitch adjacent to the stitch β; and [3] stitches on the double stitches γ, δ are newly formed.

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Description

TECHNICAL FIELD

[0001] The present invention relates to a knitting method of knitted fabric in which using a flat knitting machine, front and back knitted fabric parts are bound, while subjecting stitches at end portions in a wale direction of the respective knitted fabric parts held in back and front needle beds to bind-off processing, and knitted fabric obtained by the knitting method.

BACKGROUND ART

[0002] When knitted fabric is to be knitted by a flat knitting machine, as a method of preventing stitches in a last course (stitches at an end portion in a wale direction) of the knitted fabric from raveling, bind-off processing can be cited. The bind-off processing is a process of repeating knitting, in which adjacent stitches are overlapped in the last course of the knitted fabric and a stitch of a next course is formed on the overlapped double stitch (a double stitch), from one end side to another end side in a knitting width direction of the knitted fabric.

[0003] When front and back knitted fabric parts are knitted in front and back needle beds, respectively, the front and back knitted fabric parts are also bound while performing the above-described bind-off processing. For example, in Patent Document 1, the front knitted fabric part is knitted in the front needle bed, and at the same time, the back knitted fabric part is knitted in the back needle bed by using a yarn feeder on a back needle bed side with respect to a yarn feeder used for knitting of the front knitted fabric part, and further, when the front and back knitted fabric parts are bound, the needle beds to which knitting yarns are fed from the respective yarn feeders are exchanged. This allows the knitting yarn fed to the back needle bed from the front yarn feeder and the knitting yarn fed to the front needle bed from the back yarn feeder to be entwined, so that the front and back knitted fabric parts are bound while being subjected to the bind-off processing.

[0004]

Patent Document 1: Japanese Patent No. 07-065258

DISCLOSURE OF THE INVENTION

PROBLEMS TO BE SOLVED BY THE INVENTION

[0005] However, in the above-described technique of Patent Document 1, the knitting yarn of one of the knitted fabric parts is interwoven with the other knitted fabric part, and thus, when the knitting yarns forming the front and back knitted fabric parts to be joined are different in appearance (knitting yarns different in shape and color), the interwoven knitting yarn is conspicuous. Particularly, when the knitting yarns used in the front and back knitted fabric parts are different in color, as shown in Fig. 4, bleeding caused by mixing the colors of the knitting yarns occurs in a border of the front and back knitted fabric parts, degrading the outer appearance of the knitted fabric.

[0006] The present invention has been made in light of the above-described situation, and an object of the present invention is to provide a knitting method of knitted fabric enabling stitches of front and back knitted fabric parts to be bound while being subjected to bind-off processing without interweaving a knitting yarn of one of the knitted fabric parts with the other knitted fabric part, and knitted fabric obtained by applying the knitting method.

MEANS FOR SOLVING THE PROBLEMS

[0007] A knitting method of knitted fabric of the present invention relates to a knitting method of knitted fabric, in which front and back knitted fabric parts are bound while subjecting stitches of the respective knitted fabric parts held in front and back needle beds to bind-off processing, using a flat knitting machine having at least a pair of front and back needle beds and capable of transferring the stitches held in knitting needles of the needle beds to different knitting needles. The method comprises the steps 1 to 3: in a process where the front knitted fabric part held in the front needle bed is knitted using a back yarn feeder located on a side of the back needle bed, and the back knitted fabric part held in the back needle bed is knitted using a front yarn feeder located on a side of the front needle bed,

[1] newly knitting a stitch α on a stitch of the front knitted fabric part using a knitting yarn from the back yarn feeder, and newly knitting a stitch β on a stitch of the back knitted fabric part using a knitting yarn from the front yarn feeder, in a state where the knitting yarn extending from the back yarn feeder to the front knitted fabric part and the knitting yarn extending from the front yarn feeder to the back knitted fabric part are entwined so as to tangle each other;

[2] overlapping the stitch α as a bind-off stitch with a stitch adjacent to the stitch α in the front knitted fabric part , and overlapping the stitch β as a bind-off stitch with a stitch adjacent to the stitch β in the back knitted fabric part; and

[3] newly forming stitches following said double stitches.

[0008] As one aspect of the knitting method of knitted fabric of the present invention, the knitting method preferably comprises: when a direction in which the bind-off stitches are sequentially formed in a longitudinal direction of the needle beds is a bind-off direction, and a direction

toward a portion where the bind-off stitch starts to be formed, which is a reverse direction to the bind-off direction, is a starting point direction,

[A] a step of moving both the yarn feeders in the bind-off direction with one of the front and back yarn feeders preceding, and the other yarn feeder following it to form new stitch rows, on stitch rows each made of one or more stitches including a stitch at an end portion in the starting point direction in each of the front and back knitted fabric parts;
[B] a step of forming a new stitch row including said stitch α, and a new stitch row including said stitch β, on the respective stitch rows formed in the step A, while moving both the yarn feeders in the staring point direction in a state where the relationship of the precedence and follow in the step A is kept;
[C] a step of, in the respective stitch rows formed in the step B, transferring the respective stitch rows to the bind-off direction side, so that said stitches α and β at the end portions in the bind-off direction become bind-off stitches; and
[D] a step of repeating the knitting of the above-described steps A to C.

[0009] A knitted fabric of the present invention relates to a knitted fabric formed by binding a part of an end portion in a wale direction of a front knitted fabric part and a part of an end portion in the wale direction of a back knitted fabric part, using a flat knitting machine having at least a pair of front and back needle beds and capable of transferring stitches held in knitting needles of the needle beds to different knitting needles. The knitted fabric includes: a front base stitch of the front knitted fabric part; a front bind-off stitch formed immediately after the front base stitch, using a knitting yarn forming the front knitted fabric part; a back base stitch of the back knitted fabric part; and a back bind-off stitch formed immediately after the back base stitch, using a knitting yarn forming the back knitted fabric part. The knitted fabric of the present invention comprises, the knitting yarn directly connecting the front base stitch and the front bind-off stitch, and the knitting yarn directly connecting the back base stitch and the back bind-off stitch being entwined so as to tangle each other.

EFFECTS OF THE INVENTION

[0010] According to the knitting method of knitted fabric of the present invention, when the front and back knitted fabric parts are bound, the knitting yarn of one of the knitted fabric parts is not interwoven with the other knitted fabric part. Thus, in the knitted fabric by the method of the present invention, bleeding of stitches, which is found in knitted fabric by the conventional binding method, does not occur.

[0011] According to the knitting method of knitted fabric of the present invention including the knitting steps A to C, since the stitch as the bind-off stitch is transferred in the bind-off direction after a length in a wale direction is secured by reciprocating knitting, a portion including the transferred stitch is not pulled in the bind-off direction. Moreover, according to this knitting method, since the knitting yarns are entwined at both the end portions of the reciprocating knitting, the binding of the front and back knitted fabric parts is strong, and gaps between the stitches are hardly found in the bound portion.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012]

Fig. 1 is a knitting process diagram of knitted fabric according to an embodiment.
Fig. 2 is a partially enlarged photograph of the knitted fabric according to the embodiment.
Fig. 3 is a knitting process schematic diagram of knitted fabric according to a modification.
Fig. 4 is a partially enlarged photograph of knitted fabric by a conventional knitting method of knitted fabric.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENET

[0013] Hereinafter, an embodiment of the present invention is described with reference to the drawings. For knitting described in the embodiment, knitting examples using a two-bed flat knitting machine having a pair of front and back needle beds that extend in a transverse direction and are disposed opposite to each other in a cross direction, and a transfer jack bed to transfer stitches held in knitting needles of the needle beds (e.g., refer to Japanese Patent No. 3000461) are described. Even in the case of two-bed flat knitting machine not including the transfer jack bed, providing empty needles for transfer enables the knitting of the present embodiment to be carried out. Obviously, the flat knitting machine to be used may be a four-bed flat knitting machine.

[First Embodiment]

[0014] In first embodiment, as shown in S1 in Fig. 1, an example in which a front knitted fabric part 20F held in a front needle bed (hereinafter, refer to as FB), and a back knitted fabric part 20B held in a back needle bed (hereinafter, refer to as BB) are joined while being subjected to bind-off processing is described. "S + a numeric character" shown in a left column of Fig. 1 denotes a number of a knitting process, and an arrow shown in a right column denotes a movement direction of a yarn feeder. Here, a yarn feeder shown on the upper side in the right column precedes, and a yarn feeder shown on the lower side follows it. Moreover, in Fig. 1, a sign ○ denotes a stitch held in the needle bed, a sign ● denotes a stitch knitted in respective knitting processes, a sign ⊙

denotes a double stitch, a sign ∇ denotes a front yarn feeder, and a sign ▼ denotes a back yarn feeder. Furthermore, in Fig. 1, since bind-off stitch starts to be formed from the left side of a paper face, and the bind-off processing is performed toward the right side, the right direction of the paper face is referred to as a "bind-off direction RS", and the left direction of the paper face is referred to as a "starting point direction LS". The described way to view the figure is similar to that of Fig. 3 described later.

[0015] In S1 of Fig. 1, a state is shown where the front knitted fabric part 20F is knitted using a knitting yarn from the back yarn feeder, the back knitted fabric part 20B is knitted using a knitting yarn from the front yarn feeder, and at a left end portion in a knitting width direction, the knitting yarns from both the yarn feeders are crossed. Both knitting yarns are different not only in yarn feeder as a feeding source, but also in color. In the state of S1, the front and back knitted fabric parts 20F, 20B are joined while being subjected to the bind-off processing as shown below.

[0016] First, in S2, the back yarn feeder precedes and is moved in the bind-off direction RS, so that new stitches are formed on stitches held in knitting needles 1, 2 of FB including a stitch at a left end in the knitting width direction, and the front yarn feeder follows it and is moved in the bind-off direction RS, so that new stitches are formed on stitches held in knitting needles 1, 2 of BB including a stitch at left end in the knitting width direction. At a time point when this knitting of S2 ends, on the side of the starting point direction LS, the knitting yarn of the front knitted fabric part 20F and the knitting yarn of the back knitted fabric part 20B are entwined so as to tangle each other, while on the side of the bind-off direction RS, the knitting yarns extending to the respective knitted fabric parts 20F, 20B from the front and back yarn feeders are crossed between FB-BB. Moreover, at the time point where the knitting of S2 ends, a stitch ε (ξ) held in the knitting needle 2 of FB (BB) is a front base stitch (a back base stitch) in the knitted fabric of the present invention.

[0017] While each of stitch rows formed in FB and BB in S2 has the two stitches including the stitch at the end portion in the starting point direction LS, it may have one stitch as shown in a modification described later, or may have three or more stitches.

[0018] Next, in S3, with the back yarn feeder preceding and the front yarn feeder following it, the yarn feeders are moved in the starting point direction LS, so that stitches are formed in the knitting needles 2, 1 of FB using the knitting yarn from the back yarn feeder, and stitches are formed in the knitting needles 2, 1 of BB using the knitting yarn from the front yarn feeder. At a time point when this knitting of S3 ends, a state is obtained, in which the knitting yarn directly connecting the front base stitch ε formed in the knitting needle 2 of FB in S2 and a stitch α formed on this stitch ε in a wale direction in S3 is entwined with the knitting yarn directing connecting the back base stitch ξ formed in the knitting needle 2 of BB in S2 and a stitch β formed on this stitch ξ in the wale direction in S3. The entwining of these knitting yarns allows the front and back knitted fabric parts to be bound.

[0019] Furthermore, a stitch row made of the two stitches formed in the knitting needles 2, 1 of BB in S3 is transferred to knitting needles 3, 2 of the same BB by the transfer jack (hereinafter, refer to as TRJ) (S4), and a stitch row made of the two knitting stitches formed in the knitting needles 2, 1 of FB in S3 is transferred to knitting needles 3, 2 of the same FB by the TRJ (S5) . At a time point when these S4, S5 end, in the knitting needle 3 of the FB (BB), a double stitch γ (a double stitch δ) is formed by overlapping the stitch α (the stitch β) held in the needle 2 in S3 and a stitch held in the knitting needle 3 adjacent in the bind-off direction. Since the reciprocating knitting of two courses is performed in S2, S3 to secure a length in the wale direction, unnecessary tension does not act on the knitting yarns when the transfer of the stitches is performed in S4, S5, thereby preventing a portion of the finished knitted fabric from being pulled.

[0020] Next, in S6, with the back yarn feeder preceding and the front yarn feeder following it, they are moved in the bind-off direction RS, so that stitches are formed in the knitting needles 2, 3 of FB, using the knitting yarn from the back yarn feeder and stitches are formed in the knitting needles 2, 3 of BB, using the knitting yarn from the front yarn feeder (S6) . At a time point when this knitting of S6 ends, the crossing of the knitting yarns formed at the end time of S3 is fixed, and the knitting yarns of the front and back knitted fabric parts are entwined each other at the end portion on the side of the starting point direction LS as well, so that the front and back knitted fabric parts 20F, 20B are bound.

[0021] Here, in view of an arrangement state of the stitches in S6, as compared with an arrangement state of the stitches in S2, the stitches of each of the front and back knitted fabric parts are reduced by one in number, and in whole, the arrangement is transferred by one stitch in the bind-off direction RS. Accordingly, in the bind-off processing after S6, the knitting similar to that in S2 to S6 only needs to be repeated.

[0022] According to the above-described knitting process, the front and back knitted fabric parts can be bound without interweaving the knitting yarn of one of the front and back knitted fabric parts with the other knitted fabric part. As a result, as shown in a partially enlarged photograph of the knitted fabric Fig. 2, the colors of the knitting yarns are not mixed at the border of the front and back knitted fabric parts.

[Modification]

[0023] In a modification of the above-described embodiment, some examples in which the front and back knitted fabric parts are bound while being subjected to the bind-off processing without performing the reciprocating knitting shown in S2, S3 of Fig. 1 are described

with reference to a knitting schematic diagram in Fig. 3.

[0024] First, (A-1) to (A-4) on the left side of a paper face are described. (A-1) shows a state where the front and back knitted fabric parts 20F, 20B are held in the front and back needle beds. From this state, with the back yarn feeder preceding and the front yarn feeder following it, they are moved in the bind-off direction RS, so that the stitch α (the stitch β) on the stitch ε (the stitch ξ) is knitted (refer to (A-2)) . After the yarn feeders are moved in the starting point direction LS, the stitch α (the stitch β) is transferred to the adjacent stitch (refer to (A-3)) to form the double stitch γ (the double stitch δ). Hereinafter, the knitting in (A-2) to (A-4) only needs to be repeated.

[0025] Next, (B-1) to (B-4) on the right side of the paper face are described. (B-1) shows a state where a vertical relationship of the knitting yarns extending from the front and back yarn feeders is reverse to that in the above-described (A-1). From this state, the front and back yarn feeders are moved in the bind-off direction RS (refer to (B-2)), and keeping this relationship of the precedence and follow in (B-2), both the yarn feeders are moved in the starting point direction LS to knit the stitch α (the stitch β) (refer to (B-3)). The stitch α (the stitch β) is transferred in the bind-off direction RS to form the double stitch γ (the double stitch δ) . Hereinafter, the knitting in (B-2) to (B-4) only needs to be repeated.

[0026] In the knitting of this modification as well, the front and back knitted fabric parts can be bound without interweaving the stitches of one of the front and back knitted fabric parts with the other knitted fabric part.

DESCRIPTION OF SYMBOLS

[0027]

1 to 10 knitting needle
FB front needle bed BB back needle bed
RS bind-off direction LS starting point direction
20F front knitted fabric 20B back knitted fabric
α stitch (front bind-off stitch) β stitch (back bind-off stitch)
γ, δ double stitch
ε stitch (front base stitch) ξ stitch (back base stitch)

Claims

1. A knitting method of knitted fabric, in which front and back knitted fabric parts are bound while subjecting stitches of the respective knitted fabric parts held in front and back needle beds to bind-off processing, using a flat knitting machine having at least a pair of front and back needle beds and capable of transferring the stitches held in knitting needles of the needle beds to different knitting needles,
the method comprising the steps of:
in a process where the front knitted fabric part held in the front needle bed is knitted using a back yarn feeder located on a side of the back needle bed, and the back knitted fabric part held in the back needle bed is knitted using a front yarn feeder located on a side of the front needle bed,
newly knitting a stitch α on a stitch of the front knitted fabric part using a knitting yarn from the back yarn feeder, and newly knitting a stitch β on a stitch of the back knitted fabric part using a knitting yarn from the front yarn feeder, in a state where the knitting yarn extending from the back yarn feeder to the front knitted fabric part and the knitting yarn extending from the front yarn feeder to the back knitted fabric part are entwined so as to tangle each other;
overlapping the stitch α as a bind-off stitch with a stitch adjacent to the stitch α in the front knitted fabric part, and overlapping the stitch β as a bind-off stitch with a stitch adjacent to the stitch β in the back knitted fabric part; and
newly forming stitches on said double stitches.

2. The knitting method of knitted fabric according to claim 1, comprising:
when a direction in which the bind-off stitches are sequentially formed in a longitudinal direction of the needle beds is a bind-off direction, and a direction toward a portion where the bind-off stitch starts to be formed, which is a reverse direction to the bind-off direction, is a starting point direction,
a step A of moving both the yarn feeders in the bind-off direction with one of the front and back yarn feeders preceding, and the other yarn feeder following it to form new stitch rows, on stitch rows each made of one or more stitches including a stitch at an end portion in the starting point direction in each of the front and back knitted fabric parts;
a step B of forming a new stitch row including said stitch α, and a new stitch row including said stitch β, on the respective stitch rows formed in the step A, while moving both the yarn feeders in the staring point direction in a state where the relationship of the precedence and follow in the step A is kept;
a step C of, in the respective stitch rows formed in the step B, transferring the respective stitch rows to the bind-off direction side, so that said stitches α, β at the end portions in the bind-off direction become bind-off stitches; and
a step D of repeating the knitting of the above-described steps A to C.

3. Knitted fabric that is knitted using a flat knitting ma-

chine having at least a pair of front and back needle beds, and capable of transferring stitches held in knitting needles of the needle beds to different knitting needles, and is formed by binding a part of an end portion in a wale direction of a front knitted fabric part and a part of an end portion in the wale direction of a back knitted fabric part,
the knitted fabric comprising:

a front base stitch of the front knitted fabric part;
a front bind-off stitch formed immediately after the front base stitch, using a knitting yarn forming the front knitted fabric part;
a back base stitch of the back knitted fabric part; and
a back bind-off stitch formed immediately after the back base stitch, using a knitting yarn forming the back knitted fabric part,
wherein the knitting yarn directly connecting the front base stitch and the front bind-off stitch, and the knitting yarn directly connecting the back base stitch and the back bind-off stitch are entwined so as to tangle each other.

Fig. 1

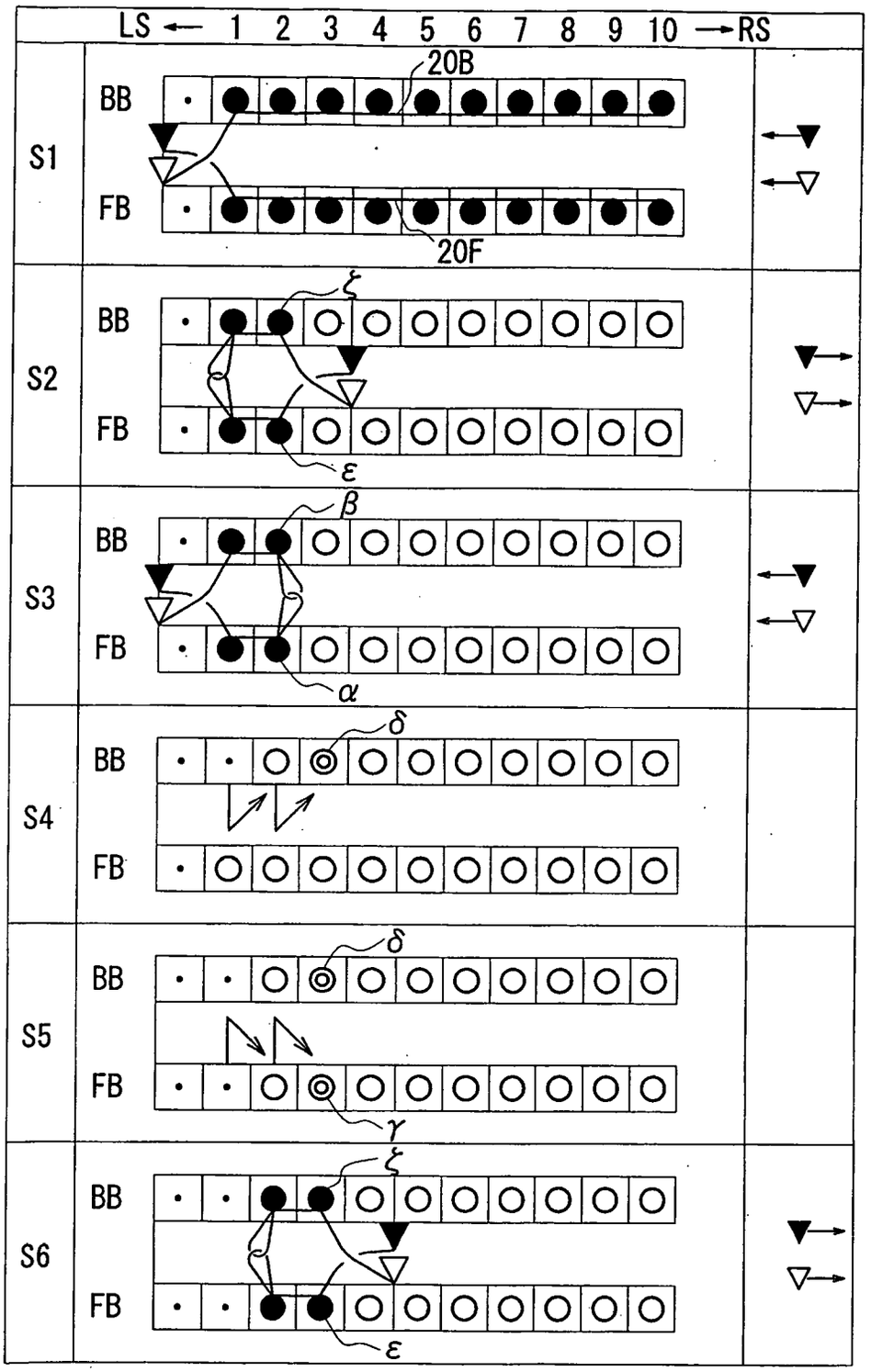


Fig. 2

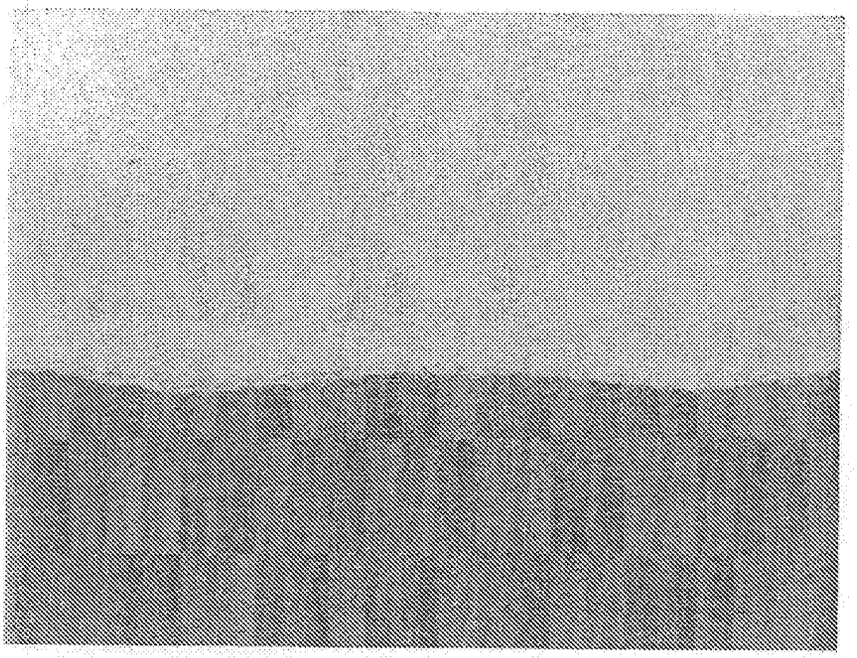


Fig. 3

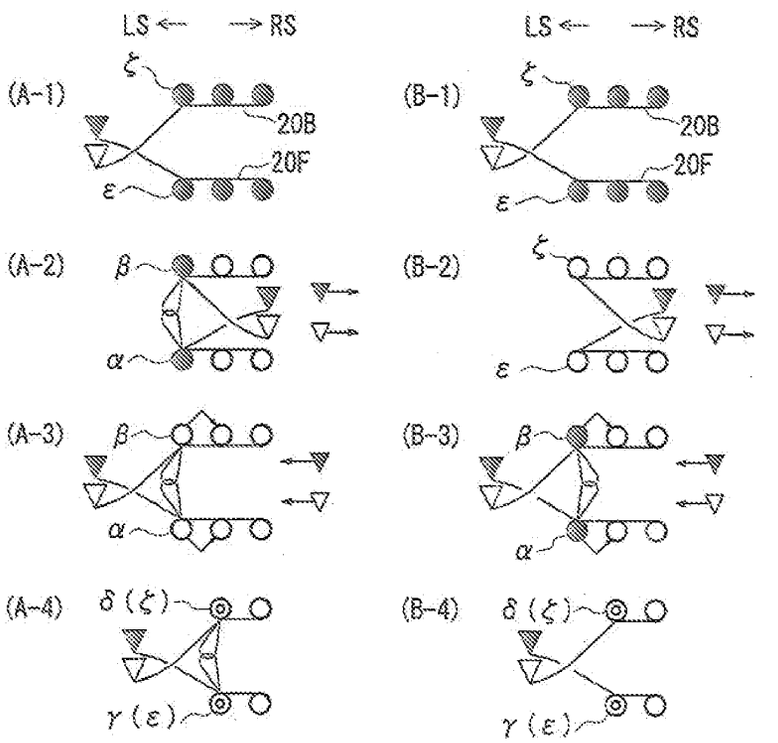
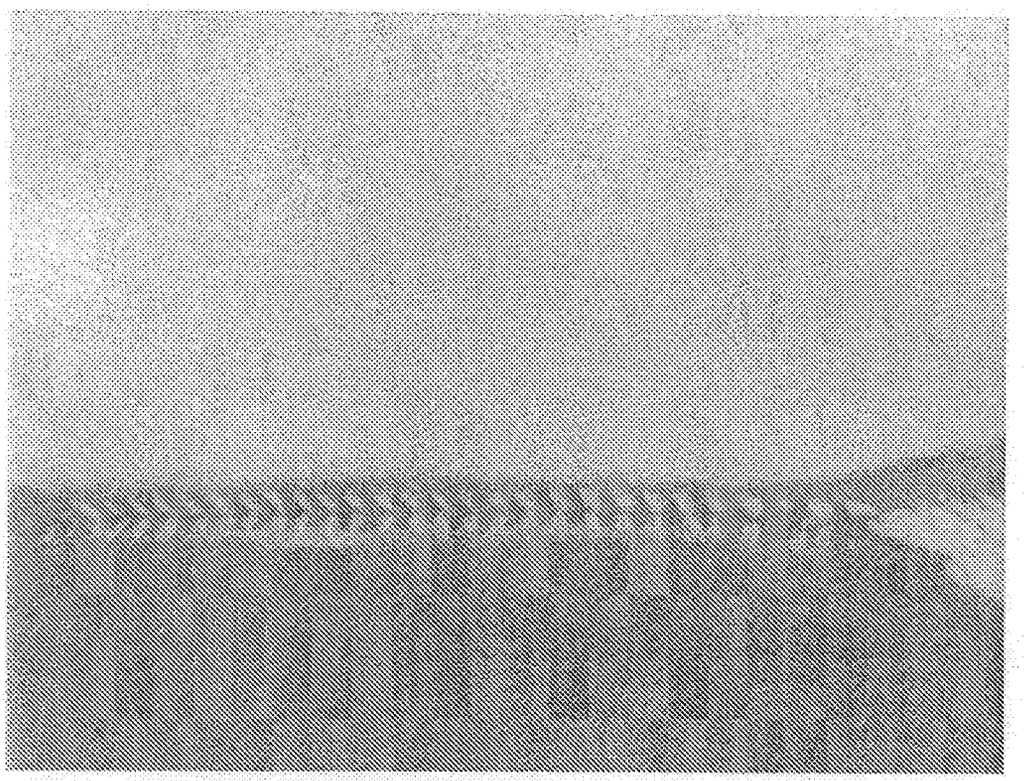


Fig. 4



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EUROPEAN SEARCH REPORT

Application Number
EP 10 01 3786

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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A	* column 1 - column 4; figures 1-11 *	2,3	
A	EP 1 253 228 A1 (SHIMA SEIKI MFG [JP]) 30 October 2002 (2002-10-30) * paragraph [0016] - paragraph [0020]; figures 3-9 *	1-3	

TECHNICAL FIELDS SEARCHED (IPC)

D04B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	25 March 2011	Zirkler, Stefanie

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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