



(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
06.04.2011 Bulletin 2011/14

(51) Int Cl.:
D04B 35/00 (2006.01) D04B 15/00 (2006.01)

(21) Application number: **09773333.1**

(86) International application number:
PCT/JP2009/061322

(22) Date of filing: **22.06.2009**

(87) International publication number:
WO 2010/001755 (07.01.2010 Gazette 2010/01)

(84) Designated Contracting States:
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 SE SI SK TR
Designated Extension States:
AL BA RS

(72) Inventor: **IWAMOTO Yoshifumi**
Wakayama-shi
Wakayama 641-0003 (JP)

(30) Priority: **03.07.2008 JP 2008174548**

(74) Representative: **Carstens, Dirk Wilhelm**
Wagner & Geyer
Gewürzmühlstraße 5
D-80538 München (DE)

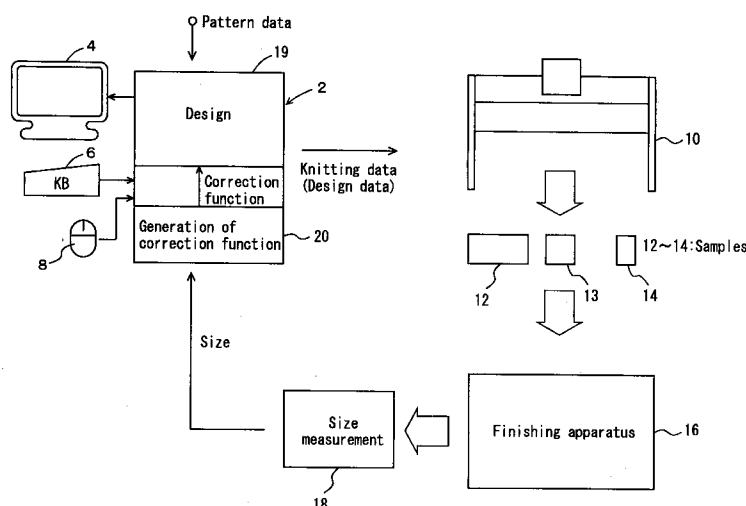
(71) Applicant: **Shima Seiki Manufacturing., Ltd.**
Wakayama-shi
Wakayama 641-0003 (JP)

(54) **METHOD, DESIGN SYSTEM AND DESIGN PROGRAM FOR DETERMINING KNITTED ARTICLE GAUGE**

(57) Disclosed is a method for determining the gauge of a knitted article 40, including the steps of: knitting a plurality of samples (12, 13, 14) that are smaller than the knitted article (40) and have different aspect ratios, by using a flat knitting machine (10); measuring the width and height of each of the samples (12, 13, 14); obtaining a correction function for correcting the size of stitches on the basis of the ratio between the measured width and

height; and determining the number of knitting courses and the number of needles for each of parts of the knitted article 40, from the size of the stitches obtained from each sample (12, 13, 14), the obtained correction function, and target width and height of each of the parts of the knitted article 40. Accordingly, the number of knitting courses for the knitted article (40) can be determined easily and reliably.

FIG. 1



Description

[0001] The present invention relates to the determination of the number of stitches of a knitted article. More specifically, the present invention relates to determining the number of stitches in the width direction, in other words, the number of needles, as well as the number of stitches in the height direction, in other words, the number of knitting courses, to produce a knitted article in approximately the target size.

[0002] The applicant of the present invention has proposed a technique for knitting test pieces that are smaller than an actual knitted article, in other words, texture samples, to determine the gauge of the knitted article (Patent Document 1: JP 2676182). In this specification, the term "gauge" means the number of stitches per width or height of a knitted article, and, "stitches/cm," for example, is used as the unit length thereof. In Patent Document 1, the plurality of texture samples are knitted under different knitting conditions, to select the optimal texture sample. Here, the knitting width is constant. Then, the number of stitches per width or height of the selected sample is measured to determine the gauges of knitted fabrics. The gauges are thus determined and the width and height of the knitted article are specified based on pattern data of the target knitted article, the number of needles is therefore obtained by multiplying the width by the gauge in the width direction. In addition, the number of knitting courses is obtained by multiplying the height by the gauge in the height direction. These processes can reduce the time required for correcting the gauges while producing the actual knitted article.

[0003] However, the inventors have discovered that the technique of Patent Document 1 alone does not always determine optimal gauges. Without the optimal gauges, the knitted article cannot fit into a predetermined size, and consequently, the number of knitting courses needs to be increased or decreased in the knitting data after knitting the actual article. Especially when obtaining a sweater by joining cylindrical knitted fabrics together seamlessly, the sleeves, bodies, and other parts with different aspect ratios are knitted simultaneously. For this reason, the aspect ratios of the texture samples are different from the aspect ratios of these parts. What was discovered by the inventors is that the size of each of the knitted fabrics in the height direction changes depending on the aspect ratio of each knitted fabric, even if the other conditions stay the same. In addition to this, the size of each knitted fabric in the width direction also changes depending on the aspect ratio of each knitted fabric, but the impact of the aspect ratio is small.

[0004]

Patent Document 1: JP 2676182

[0005] An object of the present invention is to enable determination of the number of knitting courses and the number of needles, in other words, the knitting width, for producing a knitted article in approximately the target size.

[0006] The present invention is a method for converting pattern data of a knitted article into the number of stitches, the method having: a knitting step of knitting a plurality of samples with different aspect ratios; a measuring step of measuring the size of stitches of each sample in at least a height direction; a step of obtaining a relationship between an aspect ratio and the size of the stitches in the height direction of a knitted fabric, on the basis of the aspect ratio and the size of the stitches in the height direction of each sample; and a determination step of determining the number of knitting courses for a target height of each of parts of the knitted article, on the basis of the obtained relationship between the aspect ratio and the size of the stitches in the height direction of the knitted fabric, as well as an aspect ratio and a target height of each part in the pattern data.

[0007] Moreover, the present invention is a system for converting pattern data of a knitted article into the number of stitches, the system having: means for obtaining a relationship between an aspect ratio and the size of stitches in a height direction of a knitted fabric, on the basis of an aspect ratio and the size of stitches in a height direction of each of a plurality of samples with different aspect ratios; means for storing the obtained relationship; and determination means for determining the number of knitting courses for a target height of each of parts of the knitted article, on the basis of the obtained relationship between the aspect ratio and the size of the stitches in the height direction of the knitted fabric, as well as an aspect ratio and a target height of each part in the pattern data.

[0008] The present invention is a program for converting pattern data of a knitted article into the number of stitches, the program causing a computer to function as: means for obtaining a relationship between an aspect ratio and the size of stitches in a height direction of a knitted fabric, on the basis of an aspect ratio and the size of stitches in a height direction of each of a plurality of samples with different aspect ratios; means for storing the obtained relationship; and determination means for determining the number of knitting courses for a target height of each of parts of the knitted article, on the basis of the obtained relationship between the aspect ratio and the size of the stitches in the height direction of the knitted fabric, as well as an aspect ratio and a target height of each part in the pattern data.

[0009] In this specification, the descriptions of the method for determining the number of stitches apply to the design system and the design program, and the descriptions of the design system apply to the method for determining the number of stitches and the design program.

In this specification, the subscript "g" of the symbols represents "gauge," and the subscript "s" represents "size." Since

the size of stitches is inversely proportional to gauge, gauge may be used in place of the size of stitches.

Aspect ratio is a ratio between, for example, the height and width of a knitted fabric.

[0010] As shown in Fig. 2, the size of stitches is dependent upon the ratio between the width and height of a knitted fabric. For this reason, a correction function expressing the size of the stitches can be obtained by knitting a plurality of samples that are different in the ratio mentioned above. Subsequently, the required numbers of knitting courses and needles are defined based on a target height and width for each part of a knitted article, the size of the stitches obtained from the samples, and the correction function. As a result, the impact of the ratio between the width and height of the knitted fabric on the size of the stitches in the height direction can be corrected, and consequently parts in a desired size can be knitted.

[0011] The plurality of samples may be connected to one another by excess yarn. The size of the stitches in the height direction may be obtained by, for example, measuring the number of stitches per predetermined height length or by measuring the total height of a predetermined number of stitches. Since a known method is used as the method for knitting the samples, a design device and the design program may not be involved in creating the knitting data of the samples. The pattern data is used for specifying the shape and size of the designed knitted article, the size being the height and the width.

[0012] Preferably, the determination step of determining the number of knitting courses and the number of needles for each of the parts:

- converts the ratio between the target width and the target height of each part into a ratio Z between the height and width of the stitches, based on the correction function;
- obtains the height of the stitches of each part, on the basis of a square root of a ratio between a product of the width and height of the stitches obtained from any of the plurality of samples, and the ratio Z between the height and width of the stitches;
- obtains the width of the stitches of each part, on the basis of a square root of a product of the size of the stitches in the width direction and the size of the stitches in the height direction obtained from any of the plurality of samples, and the ratio Z between the height and width of the stitches; and
- determines the numbers of needles and knitting courses of each part, on the basis of the width and height of the stitches of each part, as well as the target width and height of each part.

This method assumes that the width of the stitches is inversely proportional to the height of the stitches. Although this assumption is not necessarily realized, this method allowed the inventors to knit the parts that had approximately the target width and height and various shapes. Note that the ratio between the number of needles of each part and the number of knitting courses of each part can be used as a substitute for the ratio between the target width and height of each part.

[0013] It is also preferred that the correction function correct only the size of the stitches in the height direction. In other words, the impact of the ratio between the width and height of the knitted fabric is particularly large on the height of the stitches, and thus corrects only the height of the stitches.

[0014]

Fig. 1 is a block diagram showing how a knitted article is produced in an embodiment;
 Fig. 2 is a diagram showing an example of correction curves of gauges based on the number of needles (knitting width);
 Fig. 3 is a flowchart showing a determination algorithm for the number of stitches according to the embodiment; and
 Fig. 4 is a diagram showing the width and height of each part according to the embodiment.

[0015] The best mode for implementing the present invention is described below.

[0016] Figs. 1 to 4 show an embodiment. In these diagrams, reference numeral 2 represents a design system that has a color monitor 4, input keyboard 6, and a mouse 8, and is connected to the internet by a LAN, which is not shown. The design system 2 is also provided with a disc driver that can be read from a CD-ROM or other storage medium, and comprises an appropriate computer. Reference numeral 10 represents a flat knitting machine having two or four needle beds. Reference numeral 16 represents a finishing apparatus that carries out, for example, cleaning, fulling, or steam processing. A size measuring step 18 measures the width and height, in other words, the width and length, of test samples 12 to 14 knitted using the flat knitting machine 10.

[0017] The measured width and height of each of the plurality of samples are input to a correction function generating unit 20 of the design system 2. The correction function generating unit 20 generates and stores therein correction functions for correcting the size of the stitches, based on a ratio between the width and height of each of the plurality of samples. The functions express combinations of knitting conditions, such as a target loop length per stitch, the type of yarn including the material and thickness of the yarn, and the finished style. Note that, instead of inputting a width Xs and height Ys of each sample into the correction function generating unit, a height direction gauge Yg and width direction

gauge Xg of a knitted fabric of each sample may be input. In other words, whether to use the width or height of each sample or whether to use a gauge indicating the reciprocal of the size of the stitches in order to express the size of the stitches is arbitrary. Furthermore, in the embodiment, correction functions for correcting the height and width of the stitches are generated, but a correction function for correcting only the height may be generated.

[0018] A design unit 19 of the design system 2 designs a knitted article based on the inputs from the keyboard 6, mouse 8 or LAN that is not shown. There are two stages in designing the knitted article. In the first stage, the size of each part is input in the form of the height and width. The sizes input in this stage are specified by unit length in cm or inch, and the data obtained in this stage is called "pattern data." The design unit 19 then converts the pattern data into design data of the knitted article, or converts the design data into knitting data that can be processed immediately by the flat knitting machine 10. In this process, the width and height of each part are converted into the knitting width of each part, in other words, the number of needles to be used in knitting, and into the number of knitting courses of each part, based on the correction functions and the size of the stitches in each sample.

[0019] The design unit 19 also outputs the knitting data on the test samples 12 to 14 to the flat knitting machine 10 and cause the flat knitting machine 10 to knit these samples 12 to 14. The test samples 12 to 14 are different in aspect ratio between the width and height of each knitted fabric. For examples, these test samples are common in the number of knitting courses and different in the number of needles. Each of the test samples 12 to 14 is in the shape of, for example, a rectangle but may be in a different shape. The same type of yarn is used in the test samples 12 to 14 under the same knitting conditions. The target loop length per stitch in the test samples 12 to 14 is also the same, as well as the finishing conditions obtained by the finishing apparatus 16. When the type of yarn, the finished style, and the knitting conditions are changed, the design unit 19 outputs new knitting data on the test samples 12 to 14. Note that the design system 2 and the flat knitting machine 10 may be connected by the LAN, or may be connected manually by using a floppy disk™ or the like.

[0020] Fig. 2 shows correction functions 22 to 24, wherein the horizontal axis represents the ratio between the width Xs and the height Ys of each knitted fabric, and the vertical axis on the left-hand side represents the ratio between the width direction gauge Xg and the height direction gauge Yg, which is also the ratio between the size of stitches in the height direction and the size of stitches in the width direction. The vertical axis on the right-hand side represents relative values of the gauges on the basis of the sample whose ratio between the width and height in the knitted fabric is approximately 1, and shows two types of data, the width direction gauge Xg and the height direction gauge Yg. In the left-side sample with small Xs/Ys in Fig. 2, the number of needles (the number of stitches in the knitting course direction) is 30. The middle samples has 60 needles. The right-side sample has 120 needles. The number of knitting courses for these samples is 80. The data of the samples are shown in Table 1.

[0021] The impact of the ratio between the width and height of each knitted fabric is large on the height direction gauge Yg but small on the width direction gauge Xg. The greater the ratio between the width direction gauge and the height direction gauge, the greater the ratio between the width and height of each knitted fabric. Although the three correction functions 22 to 24 are shown by curves in Fig. 2, these functions may be shown by curves or straight lines. The correction function 22 corrects Xg/Yg based on Xs/Ys, whereas the correction function 23 corrects Yg based on Xs/Ys. These correction functions 22 to 24 may be stored as functions expressing the ratio between the width Xs and height Ys of each knitted fabric as variables, or may be stored in the form of a table having the variables as the heading.

[0022]

Table 1

The number of knitting courses	The number of stitches (the number of needles)	Xs (cm)	Ys (cm)	Xs/Ys	Width gauge C (stitches/cm)	Height gauge D (stitches/cm)	Xg/Yg Z
80	30	8.4	14.7	0.57	3.57	5.44	0.67
80	60	16.7	14.3	1.17	3.59	5.59	0.64
80	120	33.8	14.1	2.40	3.55	5.67	0.63

[0023] In the data shown in Fig. 2, each of the samples was knitted with wool yarn by a flat knitting method using a flat knitting machine having twelve needles per inch, to obtain a loop length per loop of 6.0 mm. The steam processing and cleaning/drying were carried out as the finishing processing.

[0024] One of the reasons that the data shown in Fig. 2 are obtained is because the quality of the knitted fabrics changes intrinsically according to the knitting widths thereof. In other words, an elongated knitted fabric stretches easily in a vertical direction, while a wide knitted fabric does not easily stretch in the vertical direction. In Patent Document 1 described above, the gauges, in other words, the number of stitches per predetermined length, are obtained based on the heights and widths of the knitted fabrics, and the obtained gauges are applied to the entire knitted fabrics. The optimal

gauges are not always obtained with the parts having different aspect ratios. However, one of the characteristics of the present invention is to obtain the relationship between the aspect ratio of each knitted fabric and the gauges, or the size of the stitches, to establish the optimal gauges that correct the impact of the aspect ratios.

[0025] Fig. 3 shows a gauge correction algorithm. Correction here means to correct the impact of the ratio between the width and height of each knitted fabric during the step of converting the size in the pattern data into the number of knitting courses or the number of needles in each part of each knitted fabric. The design system 2 stores the data, such as the knitting conditions of each knitted fabric, the type of yarn including the thickness and material of the yarn, and the finishing conditions. The design system 2 also stores the correction functions with respect to combinations of these data items.

[0026] When the thickness or material of the yarn, the knitting conditions, and the finishing conditions change, the stored correction functions cannot be applied. Thus, the correction function generating unit 20 outputs, to the design unit 19, information indicating that a new test sample is required, and then the design unit 19 generates the knitting data on the test samples 12 to 14. The knitting conditions, the finishing conditions, and the type of yarn are used in the actual production of a knitted article. The flat knitting machine 10 uses these conditions to knit the three types of test samples 12 to 14 having different aspect ratios. These samples 12 to 14 are subjected to the same finishing as the actual knitted article by using the finishing apparatus 16, to manually measure the width and the height of each test sample. The obtained measurement results are input to the correction function generating unit 20. The width X_s and the height Y_s of each knitted fabric may be input directly or may be input after converting them into the number of stitches, per length, in other words, the gauges. The correction function generating unit 20 generates the correction functions shown in Fig. 2 on the basis of the input data, and stores these correction functions along with the type of yarn, the knitting conditions, and the finishing conditions.

[0027] The width X_s and the height Y_s of each of the parts are obtained based on the pattern data, and the required numbers of knitting courses and needles are determined. The ratio Z is obtained based on the X_s/Y_s from the correction curves shown in Fig. 2. When the impact of the X_s/Y_s becomes inversely proportional to the width gauge X_g and the height gauge Y_g ,

$$X_g \times Y_g \approx C \times D \quad (1)$$

is established. Here, because

$$X_g/Y_g = Z \quad (2)$$

is established, deleting Y_g from Equation (1) accomplishes Equation (3), and deleting X_g from Equation (1) accomplishes Equation (4).

$$X_g^2 \approx Z \times C \times D \quad (3)$$

$$Y_g^2 \approx Z^{-1} \times C \times D \quad (4)$$

As the gauges C and D , for example, those of the sample whose ratio between the width and height of the knitted fabrics is close to that of each of the parts are used. Once the gauges X_g , Y_g are obtained, the number of needles and the number of knitting courses are obtained from the widths and heights of the parts. Furthermore, The width and height of the stitches may be obtained in place of the gauges X_g , Y_g . The actual knitted article is knitted based on the obtained numbers of knitting courses and needles. The program with which the design system 2 executes the processes shown in Fig. 3 is the knit design program of the embodiment, which is supplied to the design system 2 via a storage medium such as a CD-ROM, or via a carrier wave.

[0028] Fig. 4 shows how the height and width of each part are determined. A knitted article 40 shown in Fig. 4 is constituted by a front body 41, rear body that is not shown, and sleeves 44, 45. Reference numeral 42 represents a rib hem and reference numeral 46 a cuff, which are both subjected to rib knitting. The front body 41 has therein a pattern 43 having different colors, which is knitted by the same type of yarn. Knitting width X_1 and height Y_1 of the front body

are defined as shown in Fig. 4, for example. Width X2 and height Y2 of each of the sleeves 44, 45 are defined as shown in Fig. 4. Because the width on the armhole side generally increases in relation to each cuff 46, the knitting width X2 is the intermediate value between the value of the armhole and the value of the cuff 46. In Fig. 4, because the knitted article 40 is knitted tubularly, a plurality of tubular knitted fabrics with different aspect ratios are knitted as the test samples.

[0029] Although Fig. 4 illustrates an example of tubular knitting, the total of four parts of the front body, the rear body, and the right and left sleeves of the knitted article 40 can be knitted integrally. In this case, the test samples are knitted into a flat knitted fabric instead of a tube, many times with different aspect ratios for the knitted fabrics.

[0030] In the present embodiment, the number of knitting courses and the number of needles of a knitted article can be determined by correcting the impact of the aspect ratios of the knitted fabrics on the size of stitches. Therefore, a knitted article in the size in the pattern data can be knitted more easily.

[0031]

2	Design system
4	Monitor
6	Keyboard
8	Mouse
10	Flat knitting machine
12 to 14	Test samples
16	Finishing apparatus
18	Size measuring step
19	Design unit
20	Correction function generating unit
22 to 24	Correction functions
40	Knitted article
41	Front body
42	Rib hem
43	Pattern
44, 45	Sleeves
46	Cuff
Xs1, Xs2	Knitting width
Ys1, Ys2	Knitting height

Claims

1. A method for determining the number of stitches in a knitted article (40) by converting pattern data of the knitted article (40) into the number of stitches, the method being **characterized by** comprising:

a knitting step of knitting a plurality of samples (12, 13, 14) with different aspect ratios;

a measuring step of measuring the size of stitches of each sample (12, 13, 14) in at least a height direction;

a step of obtaining a relationship between an aspect ratio and the size of the stitches in the height direction of a knitted fabric, on the basis of the aspect ratio and the size of the stitches in the height direction of each sample (12, 13, 14); and

a determination step of determining the number of knitting courses for a target height of each of parts of the knitted article (40), on the basis of the obtained relationship between the aspect ratio and the size of the stitches in the height direction of the knitted fabric, as well as an aspect ratio and a target height of each part in the pattern data.

2. The method for determining the number of stitches in a knitted article (40) according to claim 1, **characterized in that** the step of obtaining a relationship obtains a correction function for correcting the size of the stitches in at least the height direction on the basis of the aspect ratio of the knitted fabric, and that the determination step:

- converts a ratio between target width and height of each part into a ratio Z between the height and width of the stitches, based on the correction function;

- obtains the height of the stitches of each part, on the basis of a square root of a ratio between a product of the width and height of the stitches obtained from any of the plurality of samples (12, 13, 14), and the ratio Z between the height and width of the stitches;

- obtains the width of the stitches of each part, on the basis of a square root of a product of the size of the

stitches in the width direction and the size of the stitches in the height direction obtained from any of the plurality of samples (12, 13, 14), and the ratio Z between the height and width of the stitches; and
 • determines the numbers of needles and knitting courses of each part, on the basis of the width and height of the stitches of each part, as well as the target width and height of each part.

3. The method for determining the number of stitches in a knitted article (40) according to claim 2, **characterized in that** the correction function corrects only the size of the stitches in the height direction.

4. A design system (2) for a knitted article (40) for converting pattern data of the knitted article (40) into the number of stitches, the system (2) being **characterized by** comprising:

means for obtaining a relationship between an aspect ratio and the size of stitches in a height direction of a knitted fabric, on the basis of an aspect ratio and the size of stitches in a height direction of each of a plurality of samples (12, 13, 14) with different aspect ratios;
 means for storing the obtained relationship; and
 determination means for determining the number of knitting courses for a target height of each of parts of the knitted article (40), on the basis of the obtained relationship between the aspect ratio and the size of the stitches in the height direction of the knitted fabric, as well as an aspect ratio and a target height of each part in the pattern data.

5. A design program for a knitted article (40) for converting pattern data of the knitted article (40) into the number of stitches, the program being **characterized by** causing a computer to function as:

means for obtaining a relationship between an aspect ratio and the size of stitches in a height direction of a knitted fabric, on the basis of an aspect ratio and the size of stitches in a height direction of each of a plurality of samples (12, 13, 14) with different aspect ratios;
 means for storing the obtained relationship; and
 determination means for determining the number of knitting courses for a target height of each of parts of the knitted article (40), on the basis of the obtained relationship between the aspect ratio and the size of the stitches in the height direction of the knitted fabric, as well as an aspect ratio and a target height of each part in the pattern data.

FIG. 1

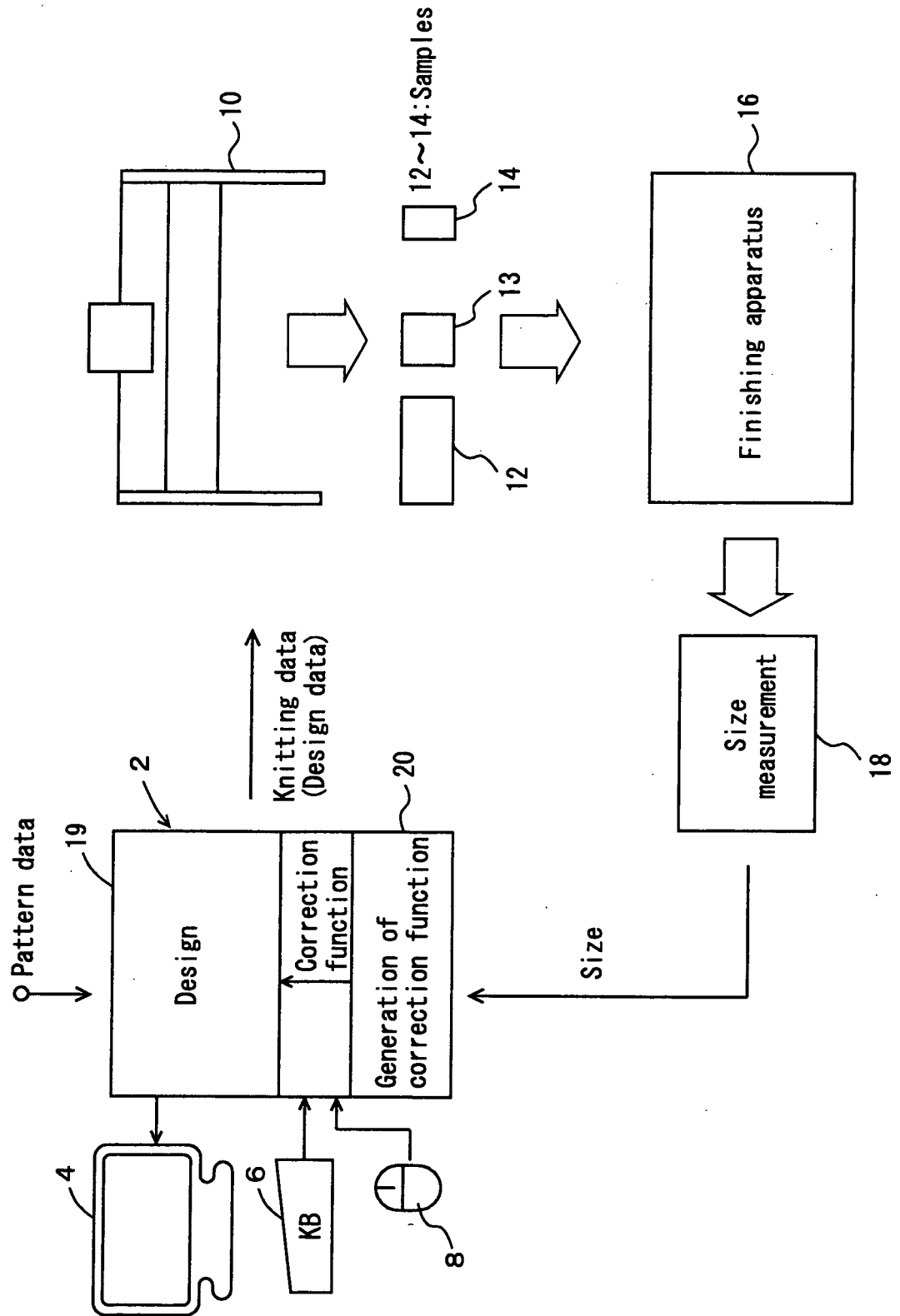
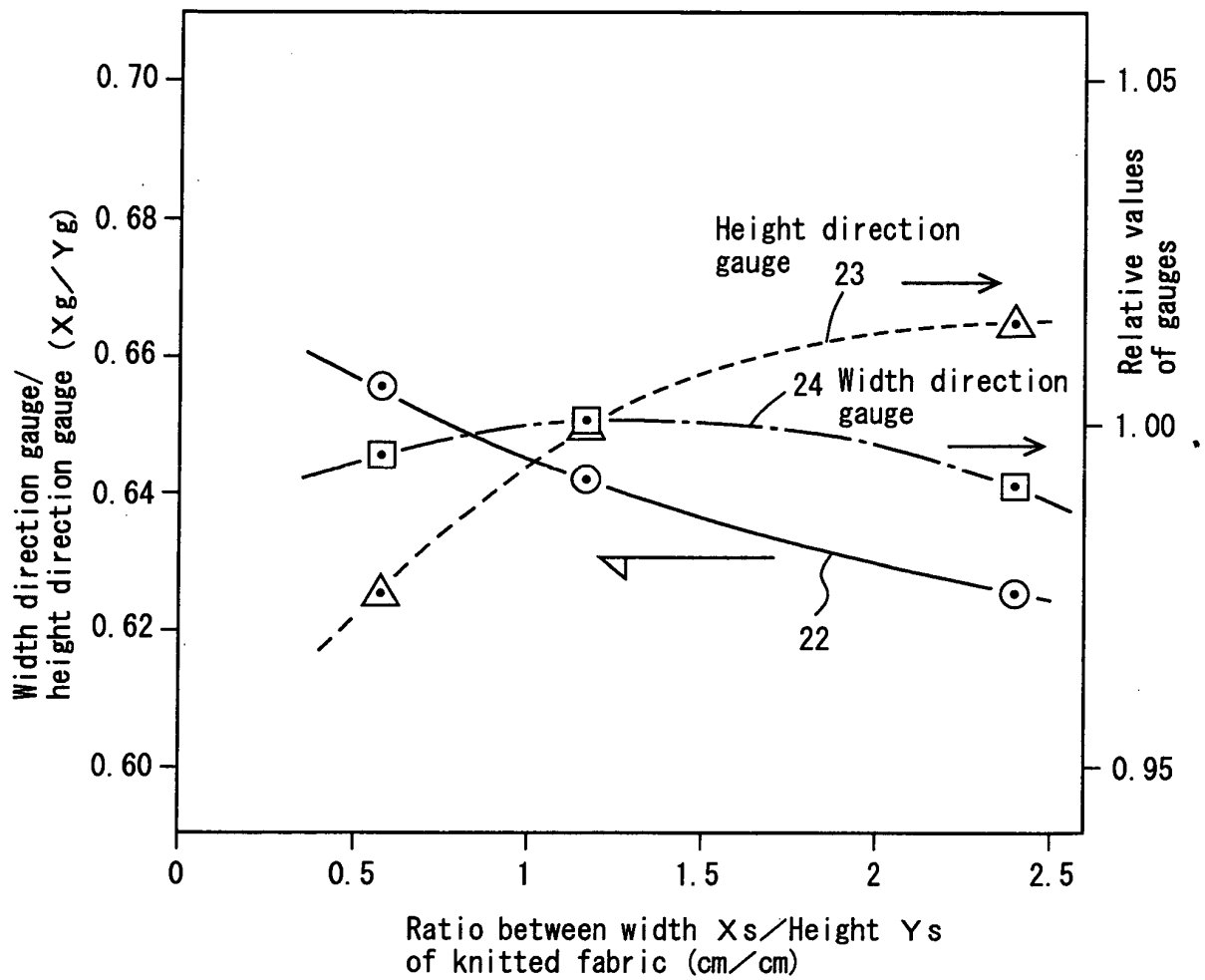


FIG. 2



F I G. 3

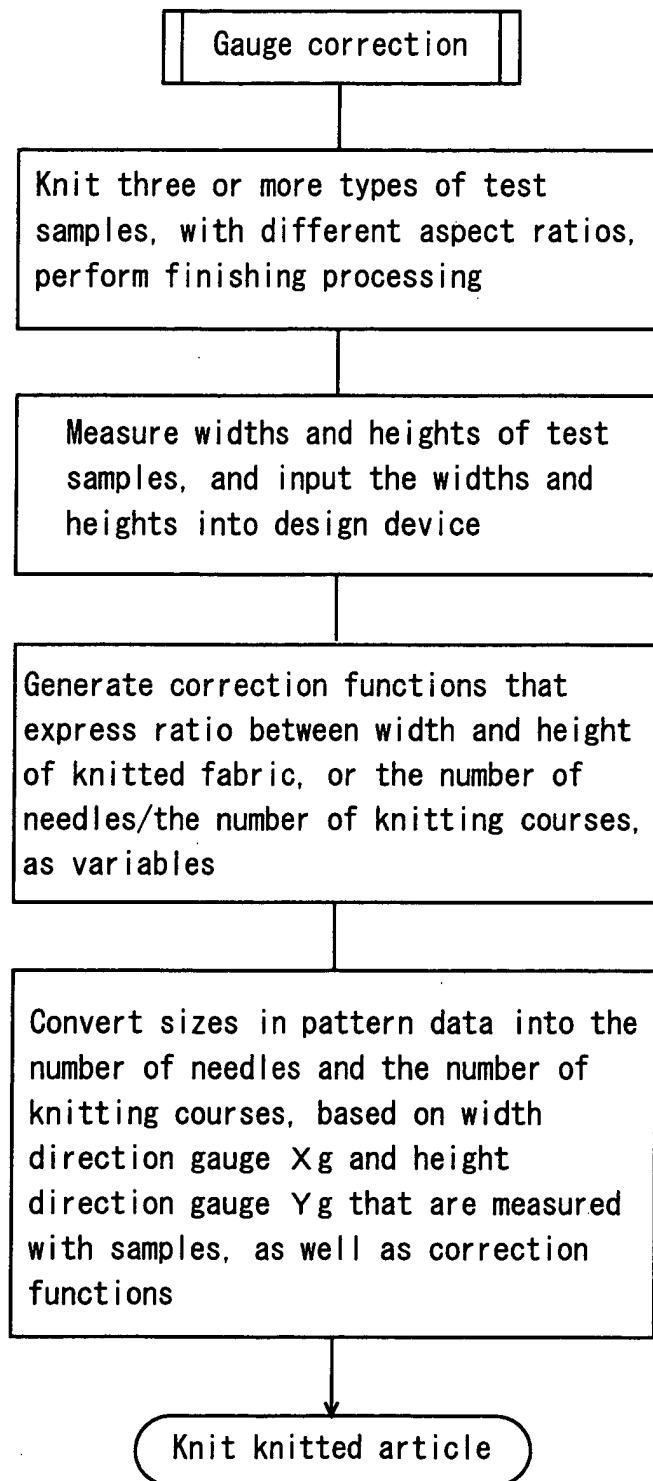
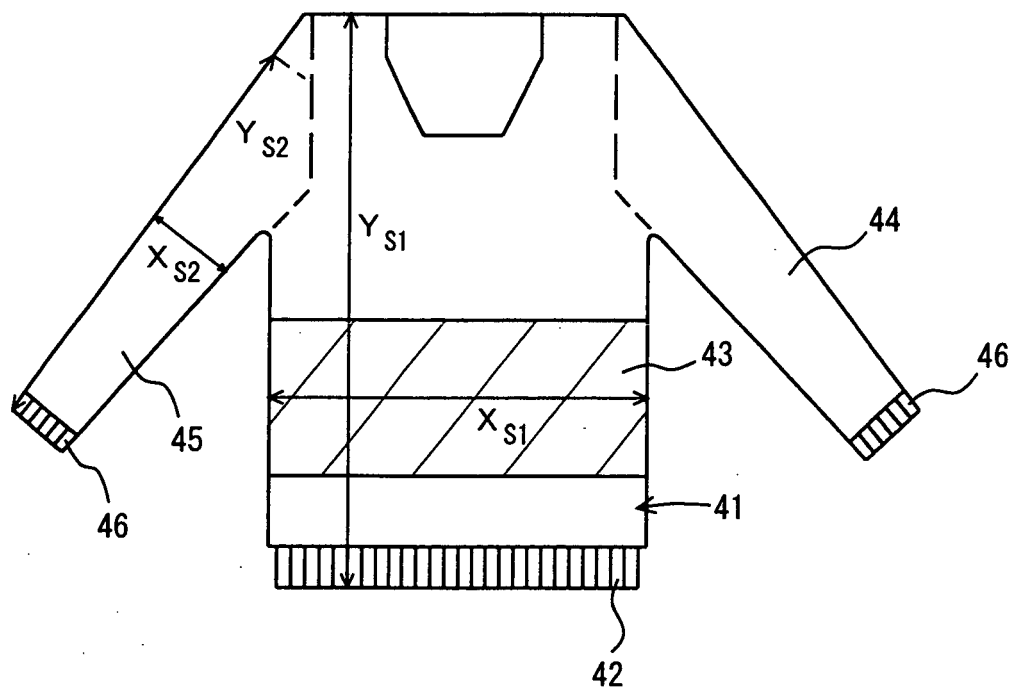


FIG. 4



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2009/061322

A. CLASSIFICATION OF SUBJECT MATTER

D04B35/00(2006.01) i, D04B15/00(2006.01) i

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)

D04B35/00, D04B15/00

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

Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2009

Kokai Jitsuyo Shinan Koho 1971-2009 Toroku Jitsuyo Shinan Koho 1994-2009

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 2676182 B2 (Shima Seiki Mfg., Ltd.), 12 November, 1997 (12.11.97), & DE 69410932 C & AU 7745694 A	1-5
A	JP 2005-15958 A (Shima Seiki Mfg., Ltd.), 20 January, 2005 (20.01.05), & WO 2005/001185 A1	1-5
A	JP 55-30477 A (Sharp Corp., Aisin Seiki Co., Ltd.), 04 March, 1980 (04.03.80), (Family: none)	1-5

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

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"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

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search
01 July, 2009 (01.07.09)Date of mailing of the international search report
14 July, 2009 (14.07.09)Name and mailing address of the ISA/
Japanese Patent Office

Authorized officer

Facsimile No.

Telephone No.

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- JP 2676182 B [0002] [0004]