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(54) Title: AN ELASTICIZED WARP KNITTED MESH FABRIC AND A PROCESS FOR KNITTING AN ELASTICIZED WARP KNITTED MESH FABRIC

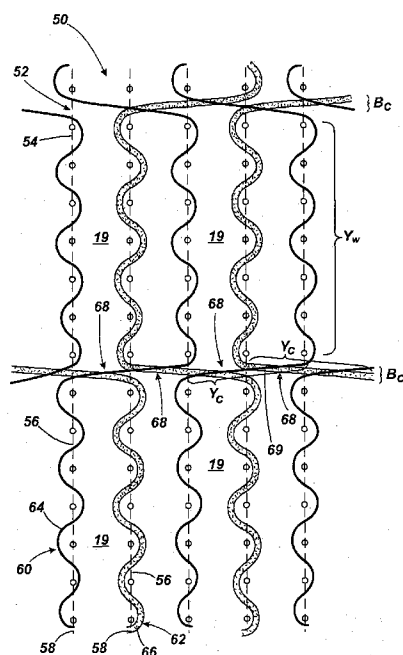


Fig. 2(a)

(57) Abstract: In the field of warp knitted fabrics there is a need for an elasticized warp knitted mesh fabric which allows for greater flexibility in tailoring the modulus of the fabric to particular requirements. An elasticized warp knitted mesh fabric (50; 100) comprises a group (52) of front yarns (54) knitted to form separate wales (56) of pillar stitches (58). The wales (56) are interconnected by at least one group (60, 62) of elastomeric rear yarns (64, 66). The elastomeric rear yarns (64, 66) form coursewise extending connection formations between respective wales (56) which form the only connection between the wales (56) of pillar stitches (58) and which determine the modulus of the fabric (50; 100) in a coursewise direction, the connection formations including at least two of said elastic rear yarns (64, 66) and at least one of which floats across a wale (56). A process for producing an elasticized warp knitted mesh fabric (50; 100) comprises the steps of: (a) threading a front bar of a warp knitting machine with a group (52) of front yarns (54); (b) threading at least one rear bar of the knitting machine with a group (60, 62) of elastomeric rear yarns (64, 66); (c) operating the front bar so as to form separate wales (56) of pillar stitches (58); and (d) operating the or each rear bar to create, by laying in the

corresponding group (60, 62) of elastomeric rear yarns (64, 66), coursewise connection formations which interconnect the wales (56), the coursewise connection formations determining the modulus of the fabric (50; 100) in a coursewise direction and being formed from at least two of said rear yarns (64, 66), at least one of which is floated across a walepath of each elastomeric rear yarn (64, 66) between respective wales (56).



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**AN ELASTICIZED WARP KNITTED MESH FABRIC AND A PROCESS FOR
KNITTING AN ELASTICIZED WARP KNITTED MESH FABRIC**

This invention relates to an elasticized warp knitted mesh fabric and a process for
5 knitting an elasticized warp knitted mesh fabric.

Elasticized warp knitted mesh fabrics have long been used for corsetry, foundation
garments and swimwear. More recently these fabrics have been used in lingerie, and
active sports and leisure wear.

10 A mesh fabric referred to as Powernet is a widely-known, conventional, elasticized warp
knitted fabric.

Figure 1(a) shows the structure of a conventional powernet fabric 10 which includes a
15 ground mesh 12 knitted from first and second non-elastomeric yarns 14, 16. Typically the
non-elastomeric yarns 14, 16 are nylon.

First and second elastomeric yarns 18, 20 are laid into the knitted ground 12. The non-
elastomeric yarns 14, 16 hold captive respective elastomeric yarns 18, 20 via a closed
20 lap 26 to secure the elastomeric yarns 18, 20 within the ground 12 with the yarns 18,20
each extending in a given wale. Adjacent wales produced from yarns 14,16 are
connected to one another on selected spaced courses by stitches 13 formed from yarns
14,16. Adjacent wales are unconnected inbetween these adjacent courses to define
mesh openings 19.

25 Figure 1(b) shows the corresponding lapping movements of front and rear bars 22, 24 of
a warp knitting machine that are required to produce the aforementioned powernet
structure.

30 The modulus or, so called, "power", i.e. the extensibility and recovery of such a powernet
fabric 10 in a given direction, is determined by the extensibility and recovery of the
elastomeric yarns 18, 20 incorporated within the fabric 10

Only a limited number of elastomeric yarns 18, 20 having differing extensibility and
35 recovery characteristics are available. As a result, it is possible only coarsely to modify
the modulus in a given direction of a conventional, powernet fabric 10 since any
modification is limited by the availability of elastomeric yarns 18, 20 having different

extensibility and recovery characteristics. Accordingly it is difficult to tailor precisely the modulus in a given direction of a conventional powernet fabric 10 according to the requirements, for example, of a particular garment.

- 5 Therefore there is a need for an elasticized warp knitted fabric which allows for greater flexibility in tailoring the modulus of the fabric to particular requirements.

According to a first aspect of the invention there is provided an elasticized warp knitted mesh fabric comprising a group of front yarns knitted to form separate wales of pillar
10 stitches, the wales being interconnected by at least one group of elastomeric rear yarns, the elastomeric rear yarns forming coursewise extending connection formations between respective wales which form the only connection between the wales of pillar stitches and which determine the modulus of the fabric in a coursewise direction, the connection formations including at least two of said elastic rear yarns and at least one of which floats
15 across a wale.

Interconnecting the separate wales of pillar stitches with elastomeric rear yarns introduces a coursewise elastomeric component to the structure of the fabric. The path of each elastomeric rear yarn between respective wales determines the number and
20 density of such interconnections. Accordingly, by varying the path taken by the elastomeric rear yarns it is possible to alter the number and density of elastomeric interconnections between the wales, and thereby finely vary the nature of a coursewise elastomeric component. Varying the nature of the coursewise elastomeric component in this manner alters the extensibility and recovery, i.e. the modulus, of the fabric in the
25 coursewise direction.

The range and variation of possible paths for each elastomeric rear yarn between respective wales allows for fine adjustment of the modulus of the fabric in a coursewise direction, and so allows for great flexibility in tailoring the modulus of the fabric according
30 to particular requirements.

Preferably the connection formations are arranged to extend on selected courses which are spaced apart to define mesh openings, the connection formations extending along a given course combining to create an elastomeric band extending along said given
35 course.

Optionally said selected courses are spaced by a number of courses in the range of 3 to 15 courses.

5 Conveniently inbetween said selected courses, the rear elastomeric yarns are laid in along said wales of pillar stitches.

10 Preferably the group of front yarns are or include elastomeric yarns. The provision of elastomeric front yarns allows the fabric to extend in a walewise direction and imbues the fabric with a given modulus in the walewise direction. In addition, the separate wales of pillar stitches formed from elastomeric front yarns helps the fabric to lie flat when unconstrained.

15 Optionally each elastomeric rear yarn is laid within a given wale for a plurality of courses. Such an arrangement reinforces each wale so as to improve the coursewise stability thereof. In addition this arrangement increases the quantity of elastomeric yarn extending in a walewise direction, and so increases the modulus of the fabric in a walewise direction.

20 In a specific embodiment of the invention each elastomeric rear yarn is laid within a given wale for seven courses.

25 In another preferred embodiment of the invention the path of each elastomeric rear yarn extends between three or more adjacent wales in a first direction and in a second direction, the first and second directions being opposite one another.

The foregoing arrangements provide elasticized warp knitted mesh fabrics having an open structure which is desirably lightweight, as well as having desired transparency and breathability characteristics.

30 Preferably the warp knitted mesh fabric includes first and second groups of elastomeric rear yarns. The inclusion of first and second groups of elastomeric rear yarns allows for still further flexibility in adjusting the modulus of the fabric in a coursewise direction.

35 The elastomeric rear yarns in the first and second groups may be laid within alternate wales. Such an arrangement provides a fabric with an open structure having desirable weight, transparency and breathability characteristics.

In another embodiment of the invention the elastomeric rear yarns in the first and second groups may be laid within the same wales. Such a construction helps to further reinforce each wale.

- 5 Optionally the path of the elastomeric rear yarns in the first group is opposed to the path of the elastomeric rear yarns in the second group. Paths of this type help the fabric to lie flat when unconstrained.

10 In a further preferred embodiment of the invention the elastomeric yarns are fused together. Having elastomeric yarns that are fused together helps to further stabilise the structure of the fabric.

According to a second aspect of the invention there is provided a process for producing an elasticized warp knitted mesh fabric comprising the steps of:

- 15 (a) threading a front bar of a warp knitting machine with a group of front yarns;
- (b) threading at least one rear bar of the knitting machine with a group of elastomeric rear yarns;
- (c) operating the front bar so as to form separate wales of pillar stitches; and
- 20 (d) operating the or each rear bar to create, by laying in the corresponding group of elastomeric rear yarns, coursewise connection formations which interconnect the wales, the coursewise connection formations determining the modulus of the fabric in a coursewise direction and being formed from at least two of said rear yarns, at least one of which is floated across a walepath of each elastomeric rear yarn between respective
- 25 wales.

The second aspect of the invention shares the advantages of the corresponding features of the first aspect of the invention.

- 30 Optionally threading the front bar includes threading the front bar for knitting at each needle position.

Preferably threading the or each rear bar includes threading the or each rear bar for knitting at alternate needle positions.

35

Threading the or each rear bar may include threading the or each rear bar for knitting at each needle position.

In another embodiment of the invention threading the front bar includes threading the front bar with elastomeric yarns.

- 5 In a further embodiment of the invention operating the or each rear bar includes lapping each elastomeric rear yarn about the same needle for a plurality of courses.

Preferably operating the or each rear bar includes lapping each elastomeric rear yarn about the same needle for a number of courses within the range of 3 to 15 courses.

10

Optionally operating the or each rear bar includes lapping each elastomeric rear yarn across at least three adjacent needles on selected courses in order to create said connection formations.

- 15 The process may include the step of threading first and second rear bars of the knitting machine with respective groups of elastomeric rear yarns.

In a still further embodiment of the invention the process includes the step of operating the first and second rear bars in opposition to one another.

20

The process may also include the step of fusing the elastomeric yarns together.

There now follows a brief description of preferred embodiments of the invention, by way of non-limiting example, with reference being made to the accompanying drawings in which:

25

Figure 1(a) shows the structure of a conventional powernet fabric;

Figure 1(b) shows the lapping movements for producing the power net fabric shown in Figure 1(a);

30

Figure 2(a) shows a schematic, partial view of the structure of an elasticized warp knitted mesh fabric according to a first embodiment of the invention;

Figure 2(b) shows the lapping movements for producing the elasticized warp knitted mesh fabric shown in Figure 2(a);

35

Figure 2 c shows a schematic partial view of the structure of a warp knitted mesh fabric according to a modification of the fabric shown in Figure 2a; and

Figure 3(a) shows a schematic, partial view of the structure of an elasticized warp knitted mesh fabric according to a second embodiment of the invention.

An elasticized warp knitted mesh fabric according to a first embodiment of the invention is designated generally by the reference numeral 50.

The fabric 50 includes a group 52 of front yarns 54 (shown as dashed lines in Figure 2(a) for clarity) which are knitted to form separate wales 56 of pillar stitches 58. In the embodiment shown the pillar stitches 58 are open lap. In other embodiments different types of pillar stitch, including closed lap, are possible.

Each of the front yarns 54 in the first embodiment is an elastomeric yarn, and more particularly an elastane yarn. Other embodiments of the invention may include a group 52 of front yarns 54 which includes a different type of elastomeric yarn. It is also envisaged that the front yarns may be non-elastomeric yarns, such as for example polyamide or polyester yarns.

In preferred embodiments of the invention the elastomeric front yarns 54 have a yarn count in the range 44 to 156, and in especially preferred embodiments of the invention the elastomeric front yarns 54 have a yarn count of 44 decitex.

The wales 56 of pillar stitches 58 are interconnected by a first group 60 of first elastomeric rear yarns 64, and by a second group 62 of second elastomeric rear yarns 66.

The first and second elastomeric rear yarns 64, 66 may have a yarn count in the range 44 to 570 decitex. In the first embodiment shown each of the elastomeric rear yarns 64, 66 is an elastane yarn having a yarn count of 78 decitex. In other embodiments of the invention the first elastomeric rear yarns 64 may be of a different type and have a different yarn count to the second elastomeric rear yarns 66.

Each elastomeric rear yarn 64, 66 is laid within a given wale 56 for seven courses, and is then floated in one direction across an adjacent wale to then be laid within the next but one wale for seven courses before being floated back to said given wale. This lapping motion is repeated to produce a desired length of fabric. This produces for each yarn 64, 66 a series of walewise extending yarn portions Yw each of which is separated by a coursewise extending yarn portion Yc.

In the fabric 50 shown, the first elastomeric rear yarns 64 and the second elastomeric rear yarns 66 are laid within alternate wales 56, ie a given wale includes the yarn portions Yw of yarns 64 only and the adjacent wale includes the yarn portions Yw of yarns 66 only. In other embodiments of the invention, the first and second elastomeric rear yarns 64, 66 may be laid within the same wales 56, i.e. in a given wale yarn portions Yw of yarns 64 alternate with yarn portions Yw of yarns 66.

When creating yarn portions Yc, the direction of floating each first elastomeric rear yarn 64 is opposed to the direction of floating of the corresponding second elastomeric rear yarn 66. Other embodiments of the invention may include first and second elastomeric rear yarns 64, 66 which are unopposed to one another, i.e. floated in the same direction when creating yarn portions Yc and so define an unsymmetrical fabric structure. A schematic example of such a fabric is illustrated in Figure 2(c).

With the fabric construction of the invention, wale connection formations 68 are created on selected courses (viz every seventh course in the example of Figure 2a) inbetween each adjacent wale; these connection formations comprise at least two yarn portions Yc which lay side by side.

In the preferred embodiment, each of the elastomeric front yarns 54 and the first and second elastomeric rear yarns 64, 66 are formed of a fusible material and the yarn portions Yc of respective yarns are fused together (shown generally by reference F) where they intersect within a connection formation 68 and thereby secure adjacent wales to one another.

As seen in Figure 2a, a series of connection formations 68 are arranged to extend along each of the selected courses and so in effect create an elastomeric band Bc extending along each of these selected courses (each band Bc in Figure 2a comprising two elastomeric yarns).

Wales 56 of pillar stitches are only connected together by the connection formations 68 and so mesh openings 19 are formed in the fabric inbetween the selected courses (ie the walewise extent of a mesh opening is defined by a pair of connection formations 68 on adjacent selected courses and the coursewise extent of the mesh opening is defined between adjacent wales 56).

In the first fabric 50 adjacent bands Bc are spaced from one another by seven courses. This particular density of interconnections between the wales 56 gives rise to a corresponding coursewise elastomeric component which in turn determines the modulus of the fabric 50 in the coursewise direction. It will be appreciated that the bands Bc may be spaced closer together or wider apart in the walewise direction and that by vary this spacing it is possible to vary, using the same yarns, the degree of modulus of the fabric in the coursewise direction (viz the closer the spacing the greater the modulus).

For example it is particularly envisaged that the bands Bc may be spaced by a number of courses in the range of 3 to 15 courses.

To produce the first fabric 50 a front bar of a warp knitting machine is threaded with the group 52 of elastomeric front yarns 54 for knitting at each needle position, a first rear bar of the knitting machine is threaded with the first group 60 of first elastomeric rear yarns 64 for laying in at alternate needle positions, and a second rear bar of the knitting machine is threaded with the second group 62 of second elastomeric rear yarns 64 for laying in at alternate needle positions adjacent to the needle positions at which the first rear bar is laying in.

In other embodiments of the invention differing knitting configurations, such as a pair of half-set front bars, i.e. two front bars each of which is threaded for knitting at alternate needle positions, and a single full-set rear bar, i.e. a rear bar which is threaded for knitting at each need position, are also possible.

The front bar is operated so as to form the separate wales 56 of open lap pillar stitches 58.

Meanwhile the first rear bar is operated to lay the first elastomeric yarns 64 into respective wales 56 of pillar stitches 58 by lapping each first elastomeric yarn 64 about a same first needle for seven courses, lapping across three adjacent needles in a first direction, lapping about a same second needle for a further seven courses, and lapping across three adjacent needles in a second direction opposite the first direction; and the second rear bar is operated to lay the second elastomeric yarns 66 into respective wales 56 of pillar stitches 58 by lapping each second elastomeric yarn 66 about a same third needle for seven courses, lapping across three adjacent needles in the second direction, lapping about a same fourth needle for a further seven courses, and lapping across three adjacent needles in the first direction.

The aforementioned lapping movements of the front bar, and each of the first and second rear bars are shown in Figure 2(b).

- 5 Following knitting of the first fabric 50, as set out above, the fabric 50 is heat set to fuse the elastomeric yarns 54, 64, 66 together where they intersect.

In other embodiments of the invention, the elasticized warp knitted fabric may be laminated to another fabric instead of being heat set.

10

An elasticized warp knitted fabric according to a second embodiment of the invention is designated generally by the reference numeral 100. The second fabric 100 shares features with the first fabric 50 and these common features are designated using the same reference numerals.

15

The second fabric 100 includes a group 52 of elastomeric front yarns 54 (shown as dashed lines in Figure 3 for clarity) which are knitted to form separate wales 56 of open lap pillar stitches 58.

- 20 The wales 56 of pillar stitches 58 are interconnected by a first group 60 of first elastomeric rear yarns 64, and by a second group 62 of second elastomeric rear yarns 66.

25 The first and second elastomeric rear yarns 64, 66 are laid within alternate wales (ie in each wale yarn portions Yw of one yarn 64 alternates with yarn portions Yw of one yarn 66), with each elastomeric rear yarn 64, 66 being laid within a given wale 56 for three courses, and extending between four adjacent wales 56 in first and second directions.

30 As with the first fabric 50, the path of each first elastomeric rear yarn 64 is opposed to the path of the corresponding second elastomeric rear yarn 66, and all of the elastomeric yarns 54, 64, 66 are fused together (not shown) where they intersect.

35 The second fabric 100 includes bands Bc spaced at 3 course intervals. Each band Bc is made up of a series of connection formations 68 as with the first fabric 50, however in the fabric 100 of Figure 3 the connection formations 68 are not the same between each pair of adjacent wales 56.

In this respect, the series of connection formations 68 along a given band Bc includes a series of first connection formations 102 each comprising two length portions Yc of elastomeric rear yarns 64, 66, and a series of second connection formations 104 comprising four lengths Yc of elastomeric rear yarns 64, 66. It will be seen that along a given band Bc, the first and second connection formations alternate

The inclusion of second connection formations 104 including four lengths Yc of elastomeric rear yarns 64, 66 provides the second fabric 100 with a greater density of elastomeric interconnections between the wales 56 than the first fabric 50.

In addition the formations 102, 104 in the second fabric 100 are more closely spaced in a walewise direction than the rear yarn pairs 68 of the first fabric 50. This is because each elastomeric rear yarn 64, 66 in the second fabric 100 is laid in within a given wale 56 for only three courses, rather than seven courses. This increases still further the density of interconnections between the wales 56 of the second fabric 100 compared to that of the first fabric 50.

Accordingly, the fabric 100 of Figure 3 demonstrates that by varying the length Yc of each elastomeric rear yarn 64, 66 (i.e. number of wales over which the yarns 64,66 are lapped on the courses selected for creation of bands Bc) it is possible to alter the density of elastomeric interconnections between the wales 56.viz, for fabric 100the density of elastomeric connections between the wales 56 is increased compared to that in fabric 50.

Increasing the density of elastomeric interconnections between the wales 56 in the second fabric 100 increases the magnitude of the corresponding coursewise elastomeric component, and thereby increases the modulus of the second fabric 100 in the coursewise direction. Accordingly the second fabric 100 has a greater modulus in the coursewise direction than the first fabric 50.

It will be appreciated from the above, that in accordance with the present invention is it possible to vary the coursewise modulus in a warp knitted mesh fabric when using the same yarns by altering the walewise spacing of bands Bc and/or changing the number of wales over which the laid in yarns 64,66 are lapped on the courses having bands Bc.

CLAIMS:

1. An elasticized warp knitted mesh fabric comprising a group of front yarns knitted to form separate wales of pillar stitches, the wales being interconnected by at least one group of elastomeric rear yarns, the elastomeric rear yarns forming coursewise extending connection formations between respective wales which form the only connection between the wales of pillar stitches and which determine the modulus of the fabric in a coursewise direction, the connection formations including at least two of said elastic rear yarns and at least one of which floats across a wale.

2. An elasticized warp knitted mesh fabric according to claim 1 wherein the connection formations are arranged to extend on selected courses which are spaced apart to define mesh openings, the connection formations extending along a given course combining to create an elastomeric band extending along said given course.

3. An elasticized warp knitted mesh fabric according to claim 2 wherein said selected courses are spaced by a number of courses in the range of 3 to 15 courses.

4. An elasticized warp knitted mesh fabric according to claim 2 or 3 wherein inbetween said selected courses, the rear elastomeric yarns are laid in along said wales of pillar stitches.

5. An elasticized warp knitted fabric according to any preceding Claim 1 wherein the group of front yarns are or include elastomeric yarns.

6. An elasticized warp knitted mesh fabric according to any preceding claim wherein for each connection formation the coursewise length of each elastomeric rear yarn extends between three or more adjacent wales in a first direction and in a second direction, the first and second directions being opposite one another.

7. An elasticized warp knitted fabric according to any preceding claim including first and second groups of elastomeric rear yarns.

8. An elasticized warp knitted fabric according to Claim 7 wherein the elastomeric rear yarns in the first and second groups are knitted within alternate wales.

9. An elasticized warp knitted fabric according to Claim 7 wherein the elastomeric rear yarns in the first and second groups are knitted within the same wales.

10. An elasticized warp knitted fabric according to any of Claims 7 to 9 wherein for each connection formation the path of the elastomeric rear yarns in the first group is opposed to the path of the elastomeric rear yarns in the second group.

11. An elasticized warp knitted fabric according to any preceding claims wherein the elastomeric yarns are fused together.

12. A process for producing an elasticized warp knitted mesh fabric comprising the steps of:

(a) threading a front bar of a warp knitting machine with a group of front yarns;

(b) threading at least one rear bar of the knitting machine with a group of elastomeric rear yarns;

(c) operating the front bar so as to form separate wales of pillar stitches; and

(d) operating the or each rear bar to create, by laying in the corresponding group of elastomeric rear yarns, coursewise connection formations which interconnect the wales, the coursewise connection formations determining the modulus of the fabric in a coursewise direction and being formed from at least two of said rear yarns, at least one of which is floated across a walepath of each elastomeric rear yarn between respective wales.

13. A process for producing an elasticized warp knitted mesh fabric according to Claim 12 wherein threading the front bar includes threading the front bar for knitting at each needle position.

14. A process for producing an elasticized warp mesh knitted fabric according to Claim 12 or Claim 13 wherein threading the or each rear bar includes threading the or each rear bar for knitting at alternate needle positions.

15. A process for producing an elasticized warp knitted mesh fabric according to Claim 12 or Claim 13 wherein threading the or each rear bar includes threading the or each rear bar for knitting at each needle position.

16. A process for producing an elasticized warp knitted mesh fabric according to any of Claims 12 to 15 wherein threading the front bar includes threading the front bar with elastomeric yarns.

17. A process for producing an elasticized warp knitted mesh fabric according to any of Claims 12 to 16 wherein operating the or each rear bar includes lapping each elastomeric rear yarn about the same needle for a plurality of courses.

18. A process for producing an elasticized warp knitted mesh fabric according to Claim 17 wherein operating the or each rear bar includes lapping each elastomeric rear yarn about the same needle for a number of courses in the range of 3 to 15 courses.

19. A process for producing an elasticized warp knitted mesh fabric according to any of Claims 12 to 18 wherein operating the or each rear bar includes lapping each elastomeric rear yarn across at least three adjacent needles on selected courses in order to create said connection formations.

20. A process for producing an elasticized warp knitted mesh fabric according to any of Claims 12 to 18 including the step of threading first and second rear bars of the knitting machine with respective groups of elastomeric rear yarns.

21. A process for producing an elasticized warp knitted mesh fabric according to Claim 20 including the step of operating the first and second rear bars in opposition to one another.

22. A process for producing an elasticized warp knitted mesh fabric according to any of Claims 12 to 21 further including the step of fusing the elastomeric yarns together.

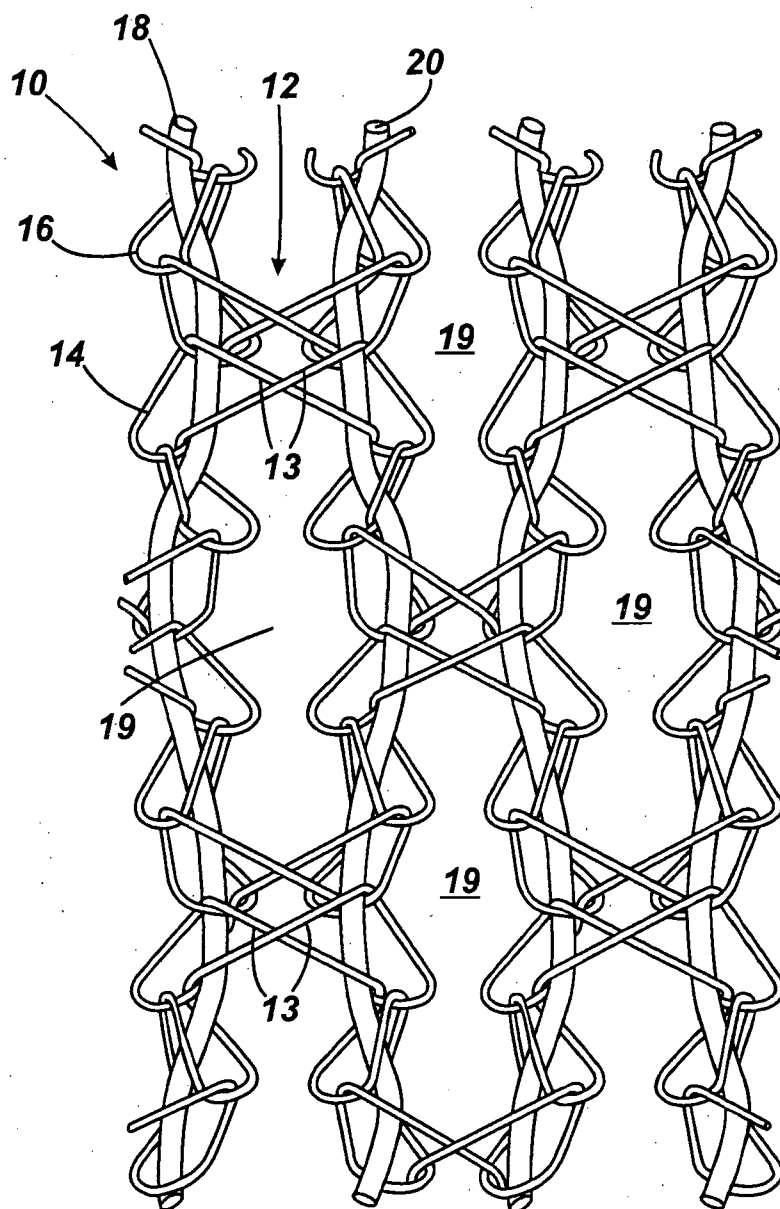
23. A garment comprising an elasticized warp knitted mesh fabric according to any of Claims 1 to 9.

24. A composite fabric comprising an elasticized warp knitted mesh fabric according to any of Claims 1 to 11.

25. An elasticized warp knitted mesh fabric generally as herein described with reference to and/or as illustrated in Figures 2(a) to 3 of the accompanying drawings.

26. A process for producing an elasticized warp knitted mesh fabric generally as herein described with reference to and/or as illustrated in Figures 2(a) to 3 the accompanying drawings.

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*Fig. 1*

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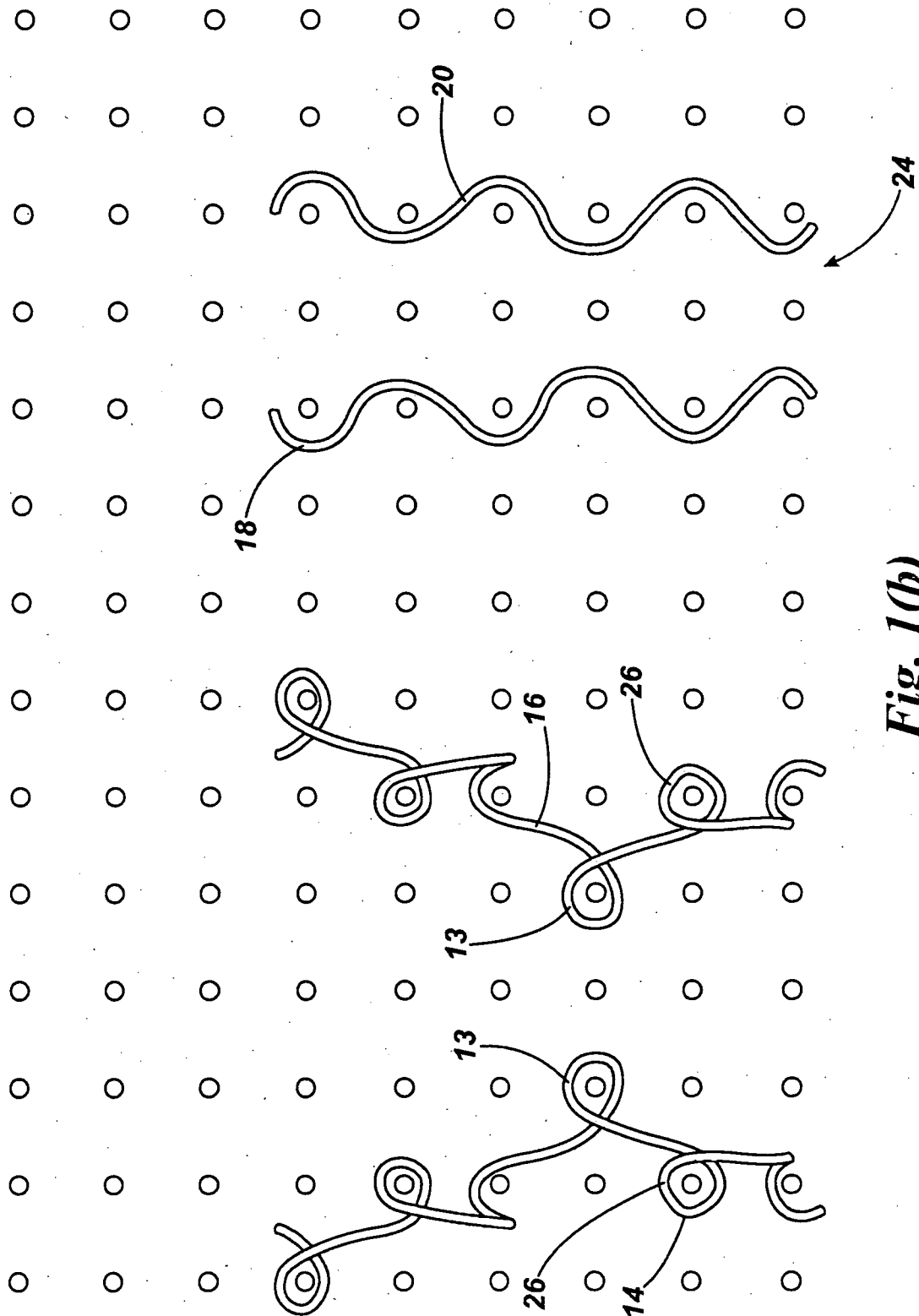


Fig. 1(b)

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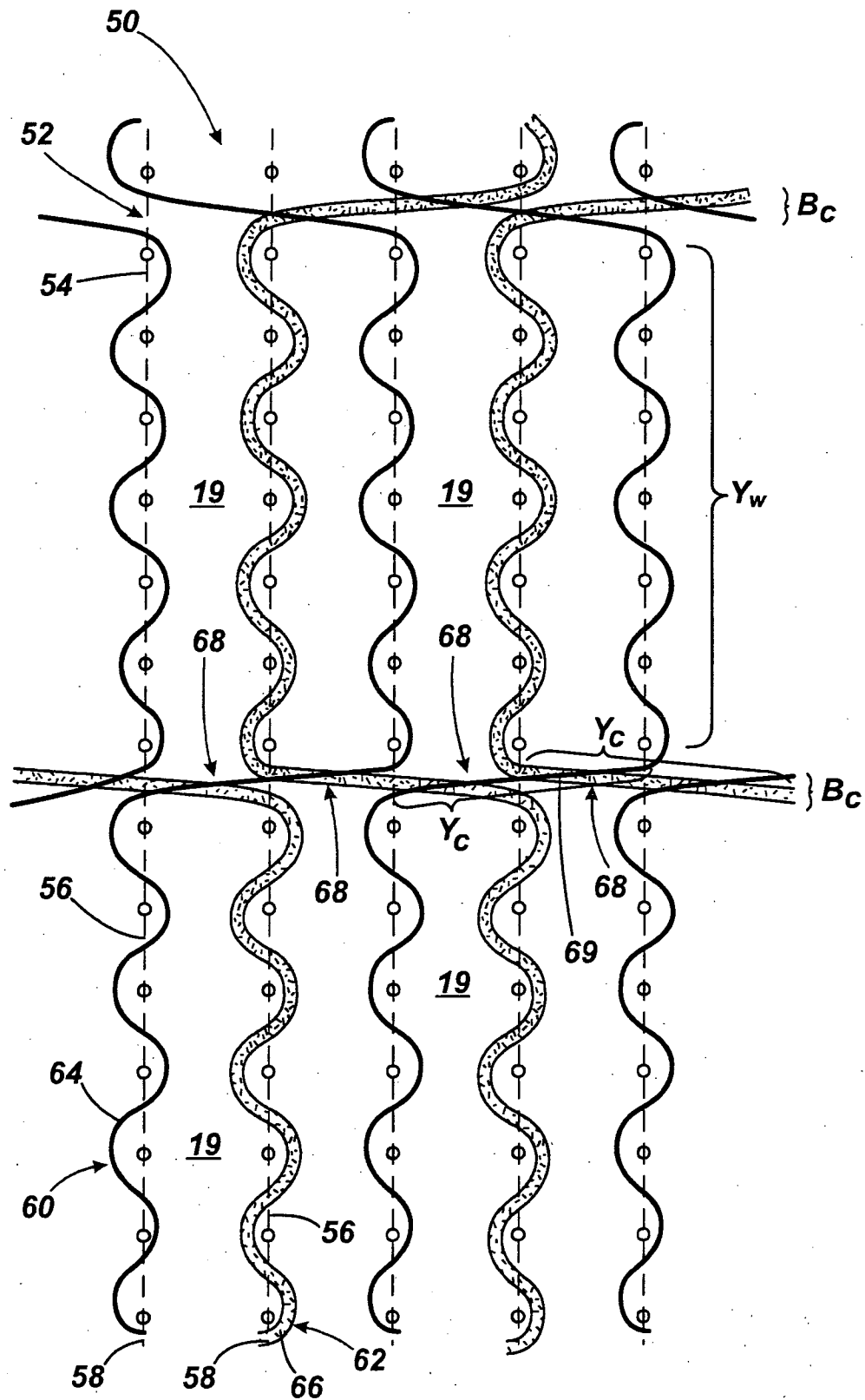
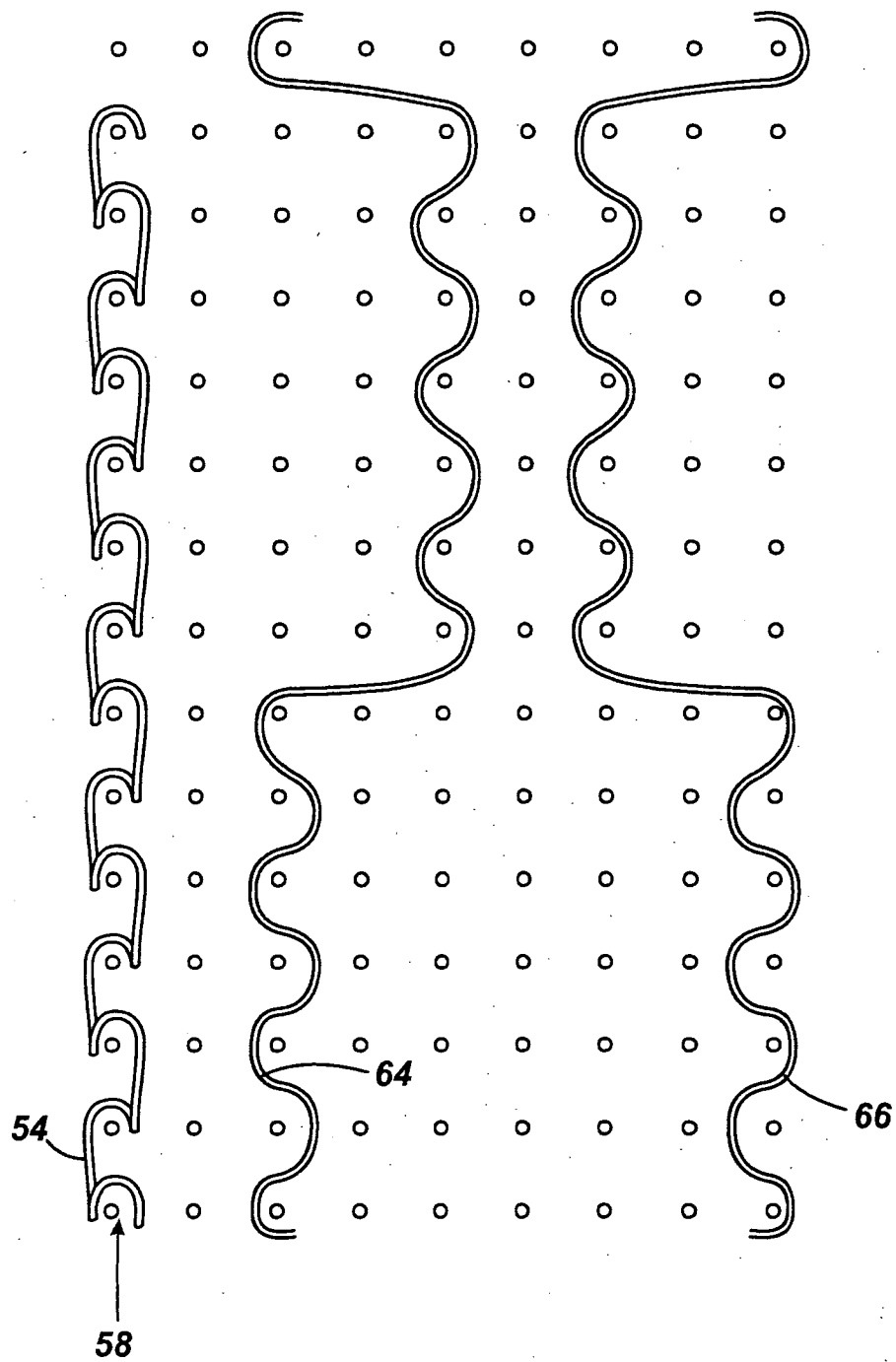


Fig. 2(a)

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*Fig. 2(b)*

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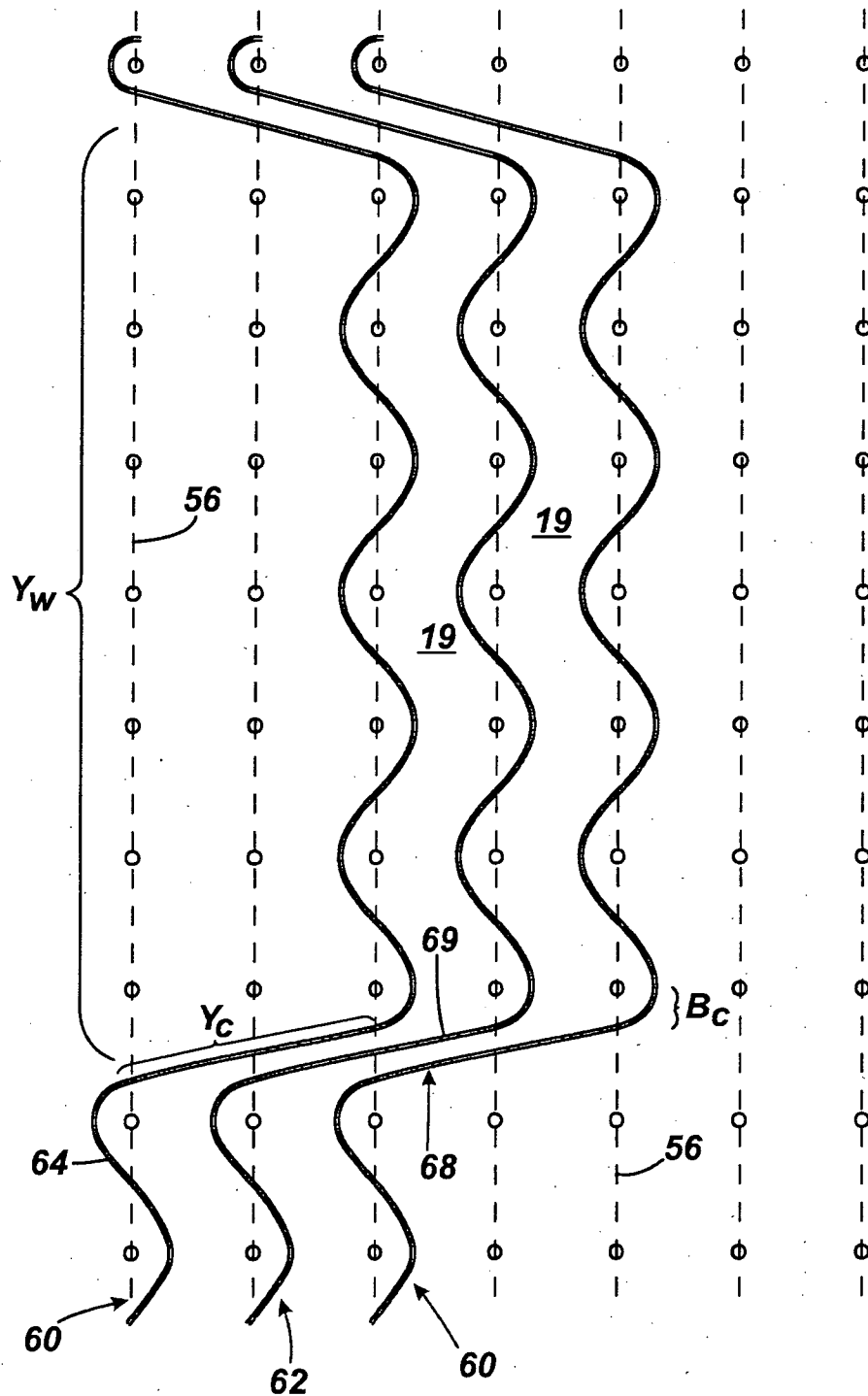


Fig. 2(c)

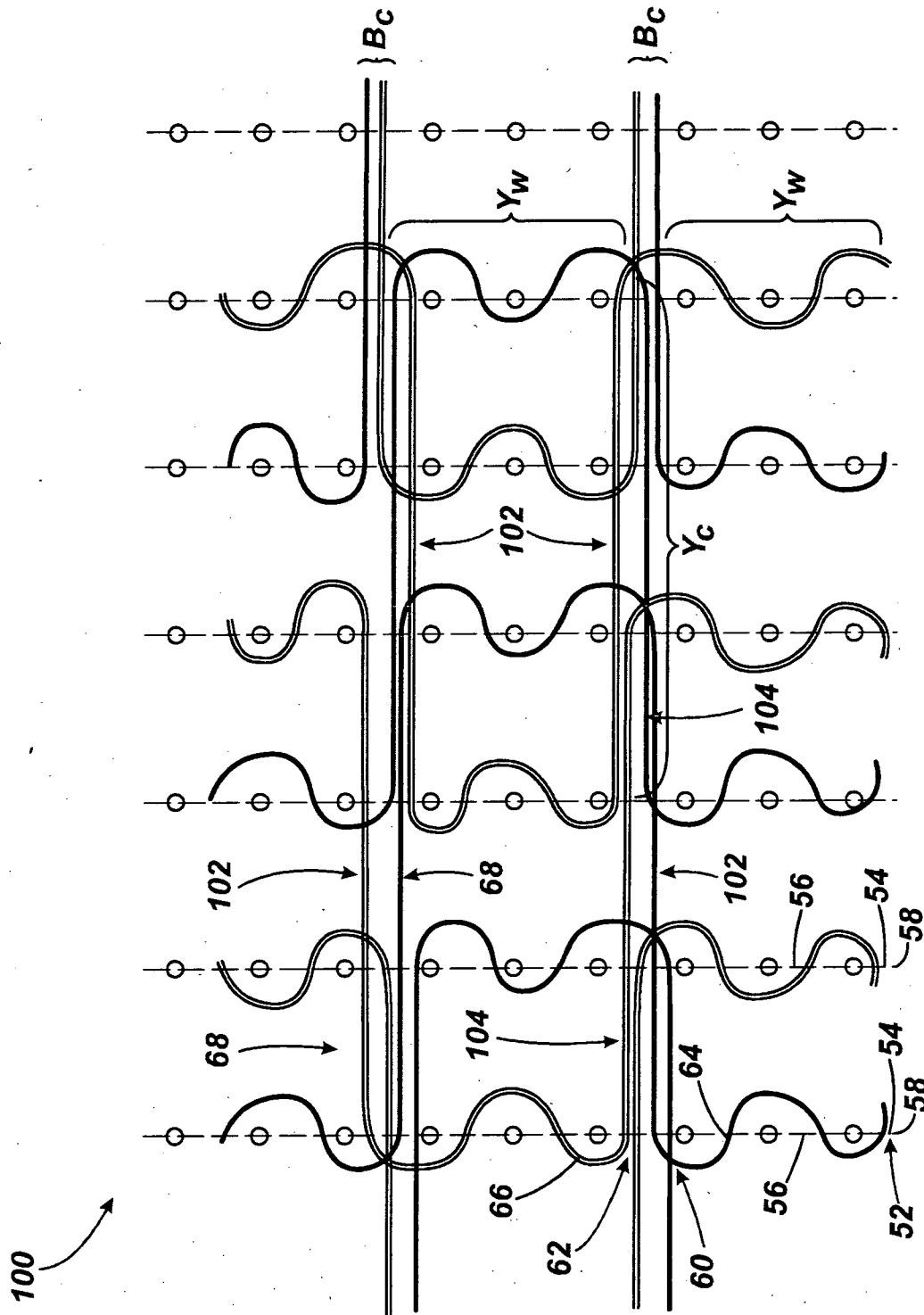


Fig. 3

INTERNATIONAL SEARCH REPORT

International application No
PCT/GB2008/003826

A. CLASSIFICATION OF SUBJECT MATTER

INV. D04B21/12

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)

D04B

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

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

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2005/021852 A (PENN ELASTIC GMBH [DE]; REGENSTEIN MARKUS [DE]; PAGE NIGEL [DE]) 10 March 2005 (2005-03-10) page 2, line 11 - page 4, line 25; claims 1,2,5,8,9; figures 3,5,6 -----	1,7, 9-12, 20-26
A	US 3 389 582 A (ALEXANDER NORMAN J) 25 June 1968 (1968-06-25) column 3, lines 39-60; figures 4,5 -----	1-4,6-9, 12,17-20
A	WO 96/14780 A (MILLIKEN RES CORP [US]) 23 May 1996 (1996-05-23) page 2, line 4 - page 5, line 11; figures 2,6,7 -----	1,4,12, 13,15

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

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Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/GB2008/003826

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