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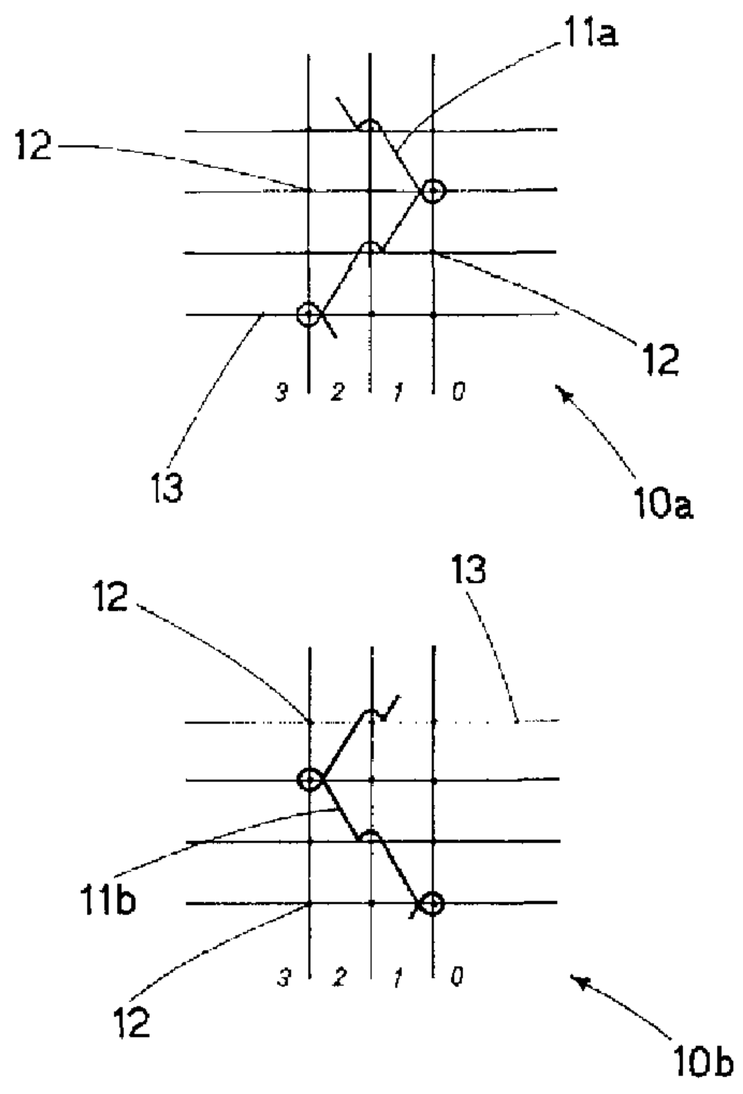
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(54) Titre : METHODE POUR FABRIQUER UN TRICOT ELASTIQUE ET TRICOT OBTENU
(54) Title: METHOD TO MAKE ELASTIC KNITWEAR FABRIC AND RELATIVE FABRIC



(57) Abrégé/Abstract:
Method to make elastic knitwear fabric from an elastic or elastomeric thread (11a) and from at least one non elastic thread (11b), the method using a single-section run-proof knitting machine, or Raschel type machine, having a bar of needles (12) moving in alternation and at least a forward bar and a rear bar of guide needles onto which the relative threads which have to be woven are threaded, the elastic thread (11a) being constituted by an elastic thread known commercially by the name of "Lycra", or material similar or comparable to it, with a count between 22 and 80 Dtex; the non elastic thread (11b) being constituted by a multi-filament nylon thread, or material similar or comparable to it, with a count of between 22 and 78 Dtex, where the ratio between the count expressed in Dtex and the filament count is the same or less than two; the weave of the non elastic thread (11b) having a basic pattern with a recurrence equal to four rows (13) of the machine, in which at least three consecutive rows (13) work on separate needles (12). Elastic knitwear fabric obtained by the method described above, using an elastic thread (12a) identifiable as "Lycra" with a count of 40 Dtex and a mufti-filament non elastic thread (11b) with a count of 44 Dtex and 28 filaments, with a maximum thickness of around 0.54 mm and a minimum thickness of around 0.30 mm according to the type of basic weave used.

ABSTRACT

Method to make elastic knitwear fabric from an elastic or elastomeric thread (11a) and from at least one non elastic thread (11b), the method using a single-section run-proof knitting machine, or Raschel type machine, having a bar of needles (12) moving in alternation and at least a forward bar and a rear bar of guide needles onto which the relative threads which have to be woven are threaded, the elastic thread (11a) being constituted by an elastic thread known commercially by the name of "Lycra", or material similar or comparable to it, with a count between 22 and 80 Dtex; the non elastic thread (11b) being constituted by a multi-filament nylon thread, or material similar or comparable to it, with a count of between 22 and 78 Dtex, where the ratio between the count expressed in Dtex and the filament count is the same or less than two; the weave of the non elastic thread (11b) having a basic pattern with a recurrence equal to four rows (13) of the machine, in which at least three consecutive rows (13) work on separate needles (12).

Elastic knitwear fabric obtained by the method described above, using an elastic thread (11a) identifiable as "Lycra" with a count of 40 Dtex and a multi-filament non elastic thread (11b) with a count of 44 Dtex and 28 filaments, with a maximum thickness of around 0.54 mm and a minimum thickness of around 0.30 mm according to the type of basic weave used.

METHOD TO MAKE ELASTIC KNITWEAR FABRIC AND RELATIVE FABRIC

* * * * *

This invention concerns a method to make elastic fabric for knitted goods, and also the fabric obtained by using the method, as set forth in the respective main claims.

The invention, while using substantially traditional machines, makes it possible to obtain a product of very high quality in terms of modulus, elasticity, reduction in thickness, great permeability, a high level of transpiration and therefore a very low quotient of heat retained, and other qualities too.

The invention also makes it possible to obtain a fabric with high non-run characteristics.

The state of the art of knitted goods, for particular applications and particular products, covers the method of using an elastic thread, or elastomeric thread, interwoven with a non elastic thread in order to obtain a fabric which has characteristics of elasticity, obtaining in any case a good feel quality which does not prejudice the contact effect with the skin of the wearer.

Sometimes at least a third thread may be used in combination with the first two, usually of the non elastic type.

In some cases, the fabric obtained from the knitting machine can be subjected to a process of teaseling followed by a process of shearing in order to improve the feel quality of the fabric.

The knitting machines which make this kind of fabric normally have a movable bar of needles which moves in alternation, and at least two bars of guide needles, that is, needles with a threading eye, defined as forward bar and rear bar, on each of which one of the threads which have to be woven is threaded.

The bars of guide needles are movable in a way which is coordinated with the movement of the bar of needles to define the looping run of the thread around the needles themselves.

In traditional methods, it is preferred to put the elastic thread onto the rear bar, while the non elastic thread is put on the forward bar; however an inversion of this position of the threads is also found in the state of the art.

The state of the art also covers the fact that the non elastic component is woven to the elastic component with a slack length so that, when the fabric is removed from the machine, the elastic component contracts and consequently the slack lengths of the non elastic components are forced and are arranged as well as possible to be teaseled and sheared in such a way as to form a fabric which is characterised by a skin effect.

EP-B-0.452.607 proposes to perform a simple inversion of the threading in the machine between the rear bar and the forward bar, that is the threading of the elastic thread in the forward bar and the threading of the non elastic thread in the rear bar, but this is obvious in itself, as the final effect obtained is specular.

US-A-2996906 describes a method to form a non-run fabric where both the threads, the elastic thread and the non-elastic thread, form the mesh in alternation, and not with every run of the machine.

In this case the method obtains rows of mesh formed by elastic thread alternated with rows of mesh formed by non elastic thread, and therefore it does not provide a fabric wherein the elastic thread and the non elastic thread form the mesh at the same time on the same needle.

US-A-4044575 describes a method to form a fabric which

does not have non-run properties, since only the non elastic thread forms the mesh whereas the elastic thread does not form the mesh, it is inserted as a support or inlay.

Moreover, the Atlas mesh binding is interrupted after three meshes and the total ratio is 6.

EP-A-0119535 simply describes a method to form a fabric which to the technique of forming the mesh adds the insertion of a supplementary elastic thread in the direction of the weft, thus giving extra elasticity in that direction.

All these solutions, even if they are partially satisfactory, have shown characteristics which can still be improved on, at least in terms of elasticity and modulus of the final fabric thus obtained.

The present applicants have also found that it is possible to obtain in the final fabric a reduced thickness even with the same qualities of elasticity and resistence.

In order to improve the quality of a fabric obtained from an elastic component and a non elastic component, using substantially traditional knitting machines and threading methods, and to achieve further advantages, the present applicants have designed, tested and embodied this invention, which uses in a new combination, which could never have been thought of before, basic components and specific weaves which were known to the state of the art.

This invention is set forth and characterised in the respective main claims, while the dependent claims describe variants of the idea of the main embodiment.

The purpose of this invention is to achieve a method to make a knitwear fabric which gives a final fabric of very high quality both manual and mechanical, of elasticity and resistence.

A further purpose of the invention is to obtain a fabric which has a considerably reduced thickness compared with

conventional fabrics normally produced, with the same qualities of elasticity and resistence.

A further purpose of the invention is to obtain a fabric with a high level of permeability and transpiration with a consequent very low quotient of heat retained which gives the fabric the characteristic of "cold" fabrics.

A further purpose of the invention is to obtain a final fabric with high non-run characteristics.

A further purpose of the invention is to obtain an elastic fabric particularly suitable, because of the above mentioned qualities, for underwear, corset articles and sportswear.

The fabric according to the invention is obtained by weaving in the appropriate way a first thread with elastic or elastomeric characteristics with a second thread with non elastic characteristics.

In one embodiment of the invention, the first elastic or elastomeric thread is constituted by a thread known commercially as "Lycra", or similar material, with a count of between 22 and 80 Dtex.

The second thread with non elastic characteristics is constituted by a multi-filament nylon thread, or some comparable material, for example nylon 6, with a count of between 22 and 78 Dtex.

According to a variant, the material which constitutes the filament is nylon 6.6.

According to a further variant, the second thread with non elastic characteristics is made of polyester.

According to the invention, the nylon thread is chosen with a number of filaments such that the ratio between the count expressed in Dtex and filaments is in any case less than 2. This principle defines the minimum number of filaments which must constitute a non elastic thread which can be adapted for the invention, this minimum number being

11 in the case of thread with a count of 22 Dtex.

The method according to the invention uses single section knitting machines of the non-run type, or Raschel machines, substantially conventional with at least two bars of guide needles, one forward and one rear, cooperating with a bar of needles.

The non-run quality of the fabric obtained with the method according to the invention is guaranteed, according to convention, by the fact that during weaving, the elastic thread and the non elastic thread work respectively in opposition.

In this case, the thread with elastic characteristics is threaded on the rear bar of the machine, while the thread with non elastic characteristics is threaded on the forward bar.

All the guide needles of the bars, both forward and rear, are threaded with the relative thread, so that the machine presents a so-called full-bar threading.

The weaves used to obtain the fabric according to the invention, starting from the threads as defined above, all have the common characteristic that the non elastic thread always recurs with every four machine rows.

In these four rows which constitute the weave recurrence of the non elastic thread at least three consecutive rows are made to work on three distinct needles.

As the guide needle passes over the relative needle it may define, according to the case, an open mesh or a closed mesh.

In all cases where the method according to the invention is applied, the thickness of the resulting fabric is in any case extremely reduced and variable according to the type of weave used.

According to a variant a third thread is used, for example

cotton, which is bound to the non elastic thread by the interposition of the elastic thread.

The attached figures are given as a non-restrictive example and show some preferred embodiments of the invention as follows:-

Fig.1 shows the basic pattern of a first weave used in the method according to the invention;

Fig.1a partially shows the development of the weave in Fig.1;

Fig.2 shows the basic pattern of a second weave used in the method according to the invention;

Fig.3 shows the basic pattern of a third weave used in the method according to the invention.

The reference number 10a in the attached figures denotes generally a basic length of mesh made by the rear bar of guide needles on which is threaded the elastic thread 11a, while the reference number 10b denotes generally the corresponding section of mesh made by the forward bar of guide needles on which is threaded the non elastic thread 11b.

Each point 12 denotes the position of a needle of the bar with which the relative rear and forward bars of guide needles cooperate, while the spaces between the needles are denoted by the numbers underneath so as to define, according to convention, the run followed by the thread 11a, 11b guided by the guide needles between the needles 12.

The number 13 denotes the lines which represent the various rows of the machine which are progressively covered by the weave made by the threads 11a and 11b.

In all three cases shown, the non elastic thread 11b always works in opposition to the elastic thread 11a, thus guaranteeing the non-run quality of the final fabric.

Moreover, in all the cases shown, the non elastic thread

11b is looped with a recurrence of four rows 13 of the machine.

In the case of Fig. 1, the elastic thread 11a also recurs every four rows 13 of the machine, while in the case of Figs. 2 and 3 the elastic thread 11a recurs every two rows 13 of the machine.

As can be seen from Figs. 1, 2 and 3, inside the four rows 13 of the recurrence, the non elastic thread 11b is looped, for at least three consecutive rows 13, on distinct needles 12.

This type of weave causes the basic patterns shown in Figs. 1 and 2 to be reproduced continuously, moving the non elastic thread 11b sideways from time to time by one needle 12, whereas in Fig. 3 the movement takes place for two consecutive rows on two needles and for the other two rows of the period on one needle.

In the weave shown in Fig.1 it can be seen how the two threads, the elastic 11a and the non elastic 11b, are moved on the respective bars of guide needles in a specular way to each other.

In particular, the elastic thread 11a threaded on the rear bar follows a run denoted by the notation 2-3, (in this pass a closed mesh around the relative needle 12 is achieved), 2-1 (an open mesh is achieved), 1-0 (a closed mesh is achieved) and 1-2 (an open mesh is achieved).

In the same way, for the non elastic thread 11b threaded on the forward bar, the run, specular to the previous one, can be identified by the notation 1-0, 1-2, 2-3, 2-1.

With this type of weave the thread follows a run in which with every successive row 13 the thread passes onto a distinct needle 12, moved sideways and adjacent to the preceeding one.

Fig.1a shows a partial development of the basic pattern of

Fig.1 in which several elastic threads 11a are shown, while only one non elastic thread 11b is shown so as not to overload the drawing.

This type of weave, together with the appropriate choice of the basic component materials, gives a considerable reduction in the thickness so as to obtain a thickness of the finished fabric in the region of 0.34 mm, using an elastic thread 11a made of "Lycra" with a count of 40 Dtex and a non elastic thread 11b made of nylon with a count of 44 Dtex and a number of filaments equal to 28.

According to another embodiment, the non elastic thread 11b is made of polyester.

In the weaves shown in Figs. 2 and 3, the elastic thread 11a is threaded on the rear bar according to a crossing run with a recurrence of two rows 13, identifiable by the notation 1-0, 1-2.

Around the relative needles 12 closed meshes are achieved.

For the non elastic thread 11b threaded on the forward bar, Fig.2 shows a basic pattern of weave which substantially reproduces in a specular way the weave of the non elastic thread 11b shown in Fig.1. In this case too there is a sequential run with a recurrence of four machine rows 13, in which every consecutive row 13 is associated with a distinct needle 12, moved sideways and adjacent to the preceeding one.

In correspondence with the pass 2-3 and the pass 1-0 a closed mesh is achieved, whereas in correspondence with the pass 2-1 and 1-2 an open mesh is achieved.

With this basic weave it is possible to obtain a final fabric with a thickness in the region of 0.43 mm using an elastic thread 11a made of "Lycra" with a count of 40 Dtex and a non elastic nylon thread 11b with a count of 44 Dtex and a number of filaments equal to 28.

The weave in Fig.3 is different from the preceeding ones in that in passing from the first to the second row 13 and from the second to the third row 13 one needle 12 is jumped, whereas in passing from the third to the fourth row 13 and from the fourth to the first row 13 of the following period no needle 12 is jumped, the thread is looped onto the needle 12 immediately adjacent.

With this weave closed meshes are always obtained around the respective needles 12, and thus a final fabric is obtained with a thickness of about 0.54 mm using an elastic thread 11a made of "Lycra" with a count of 40 Dtex and a non elastic thread 11b made of nylon with a count of 44 Dtex and a number of filaments equal to 28.

CLAIMS

1. Method to make elastic knitwear fabric starting from one of an elastic and an elastomeric thread and at least one non-elastic thread, using one of a single-section, non-run knitting machine and a Raschel type machine, with a bar of needles moving in alternation and at least one forward bar and one rear bar of guide needles on which relative threads to be woven are threaded, the method being characterised in that:

an elastic thread is constituted by an elastic thread selected in the group consisting of "Lycra™" and similar material, with a count of between 22 and 80 Dtex;

a non-elastic thread is constituted by a multi-filament thread made of one of nylon and similar material, with a count of between 22 and 78 Dtex, where a ratio between the count expressed in Dtex and a number of the filaments is equal to at most two; and

the weave of the non-elastic thread has a basic pattern with a recurrence of four machine rows, in which at least three consecutive rows work on distinct needles.

2. The method as in claim 1, in which the non-elastic thread is made of polyester.

3. The method as in any one of claims 1 and 2, in which the elastic thread is "Lycra™" and has a count of 40 Dtex.

4. The method as in any one of claims 1 and 2, in which the non-elastic multi-filament thread has a count of 44 Dtex and a number of filaments equal to 28.

5. The method as in any one of claims 1 and 2, in which the non-elastic multi-filament thread has a count of 44 Dtex and a number of filaments equal to 36.

6. The method as in any one of claims 1 to 5, in which the non-elastic thread is made of type 6 nylon.

7. The method as in any one of claims 1 to 5, in which the non-elastic thread is made of type 6.6 nylon.

8. The method as in any one of claims 1 to 7, in which the weave of the non-elastic thread has a basic pattern in which for every successive row the thread in its run works with a needle moved sideways and immediately adjacent to a preceding needle.

9. The method as in any one of claims 1 to 7, in which the weave of the non elastic thread has a basic pattern in which for every successive row the thread is moved in its run for two consecutive rows on two needles and for the other two rows of a period on one needle.

10. The method as in any one of claims 8 and 9, in which the weave of the non-elastic thread is identifiable with a conventional notation 1-0, i-2, 2-3, 2-1 (Fig.1).

11. The method as in claim 10, in which in passes 1-0 and 2-3 the non-elastic thread achieves a closed mesh around the needle, whereas in the passes 1-2 and 2-1 the non-elastic thread achieves an open mesh around the needle.

12. The method as in any one of claims 8 and 9, in which the weave of the non-elastic thread is identifiable with a conventional notation 2-3, 2-1, 1-0, 1-2 (Fig. 2).

13. The method as in claim 12, in which in passes 2-3 and 1-0 the non-elastic thread achieves a closed mesh around the needle, whereas in the passes 2-1 and 1-2 the non-elastic thread achieves an open mesh around the needle.

14. The method as in any one of claims 8 and 9, in which the basic pattern of weave of the elastic thread is specular with that of the non-elastic thread.

15. The method as in any one of claims 1 to 7, in which the weave of the non elastic thread has a basic pattern in which for every pass from a first to a second row and from the second to a third row the thread in its run moves sideways jumping at least an intermediate needle, whereas in a pass from the third to a fourth row and from the fourth to the first row of a next period the thread moves sideways from one needle to an adjacent one.

16. The method as in claim 15, in which the weave of the non-elastic thread is identifiable with a conventional notation 2-3, 1-0, 2-3, 2-1 (Fig.3).

17. The method as in claim 16, in which in all passes of the basic pattern the thread achieves a closed mesh around the intermediate needle.

18. The method as in any one of claims 12 and 15, in which the basic pattern of weave of the elastic thread has

a recurrence of two rows on two adjacent needles identifiable with a conventional notation 1-0, 1-2.

19. The method as in any one of claims 12 and 15, in which the basic pattern of weave of the elastic thread has a recurrence equal to four rows with a conventional notation 2-3, 2-1, 1-0, 1-2.

20. Elastic fabric for knitwear obtained by means of the method of any one of claims 1 to 19, characterised in that by using an elastic thread identifiable as "Lycra™" with a count of 40 Dtex and a non elastic multi-filament thread with a count of 44 Dtex and 28 filaments, the elastic fabric for knitwear has a maximum thickness in a region of 0.54 mm and a minimum thickness in a region of 0.30 mm according to the type of basic weave used.

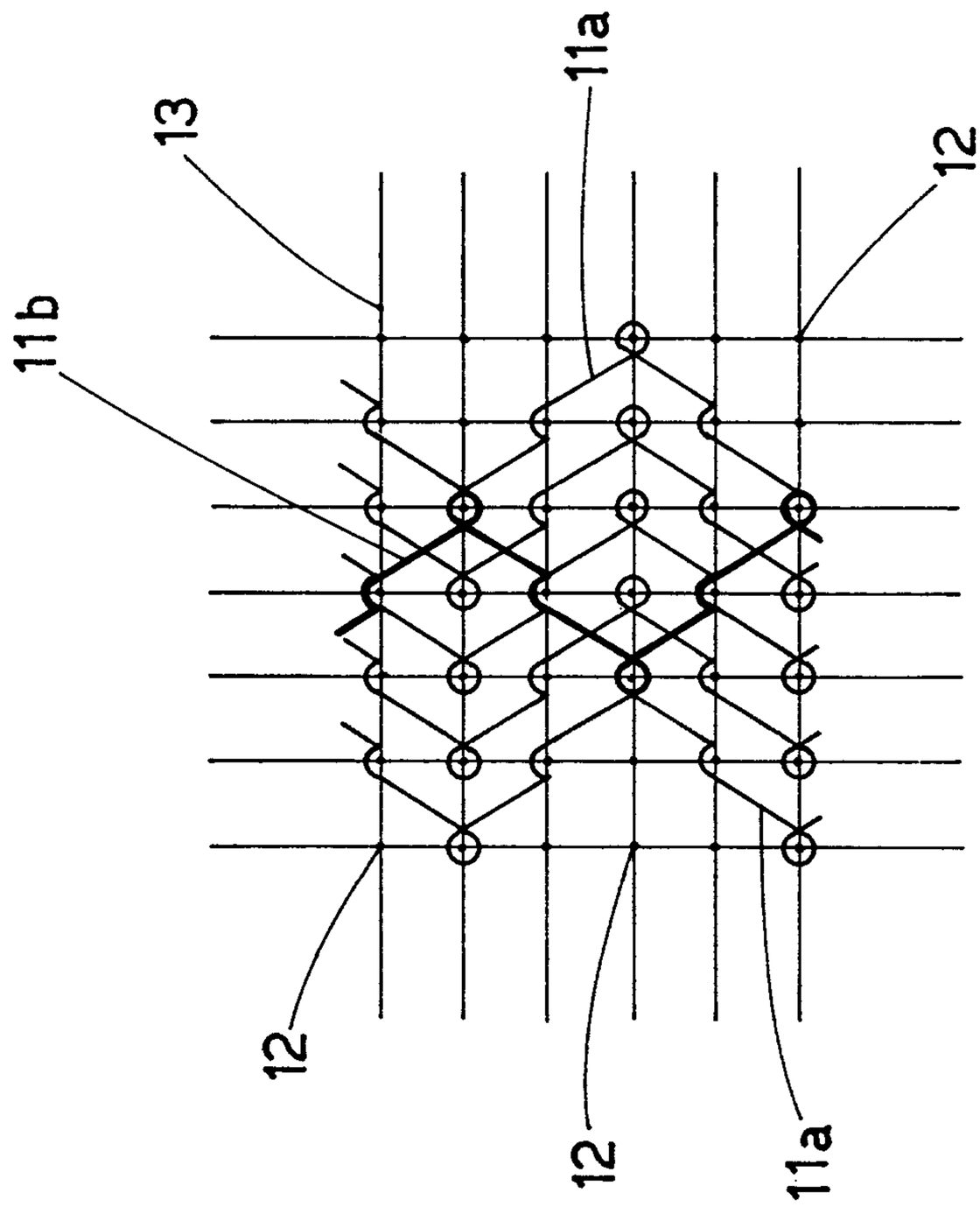
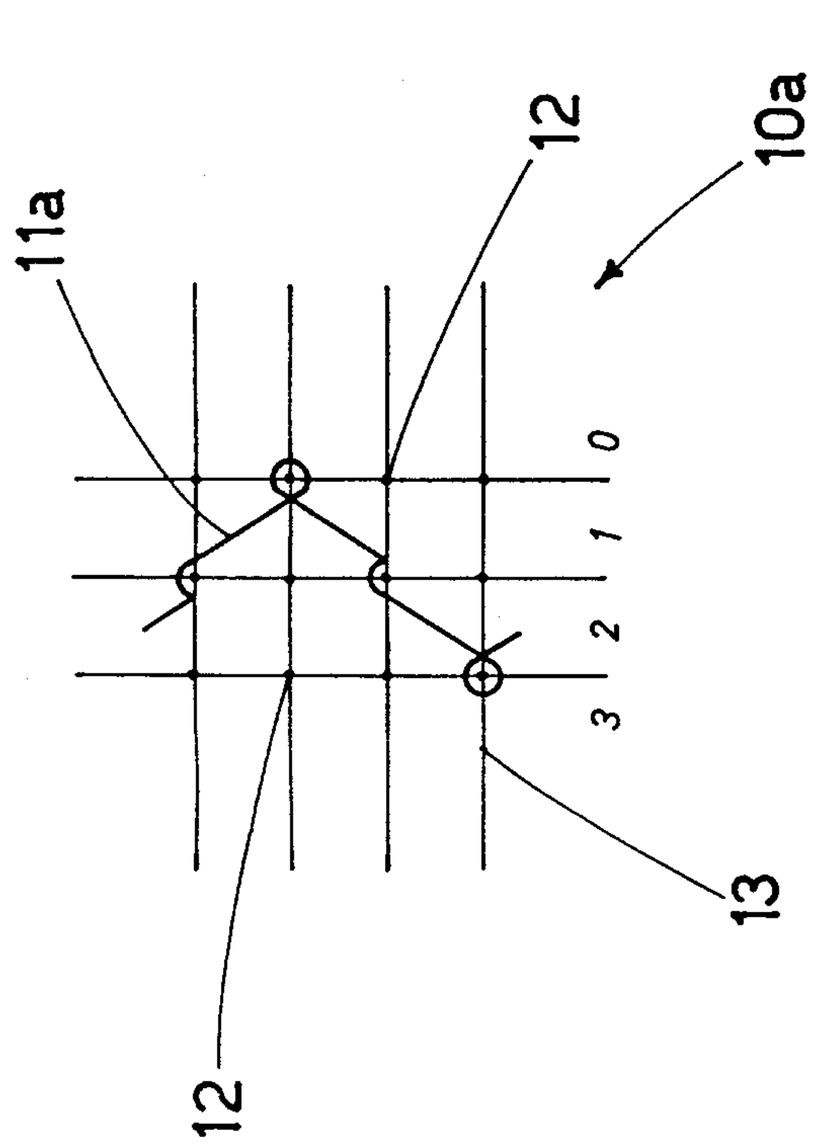


fig.1a



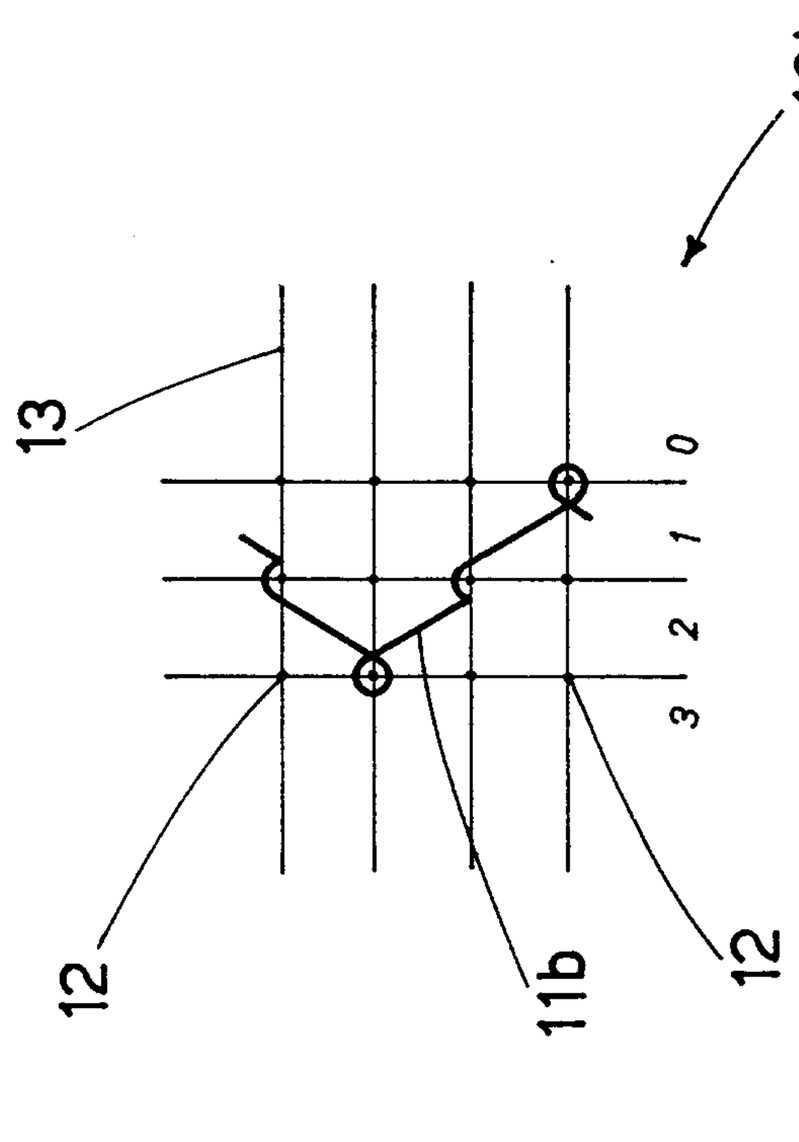
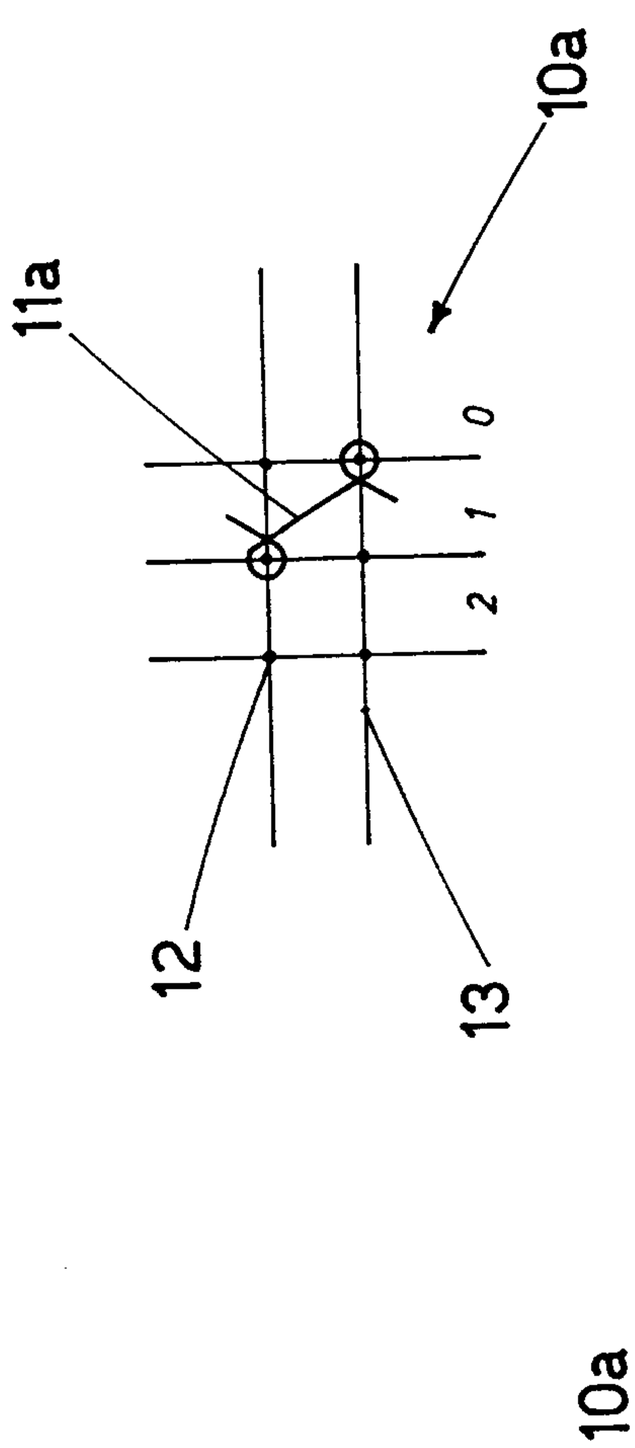


fig.1


10a
11a
12
13
0
1
2

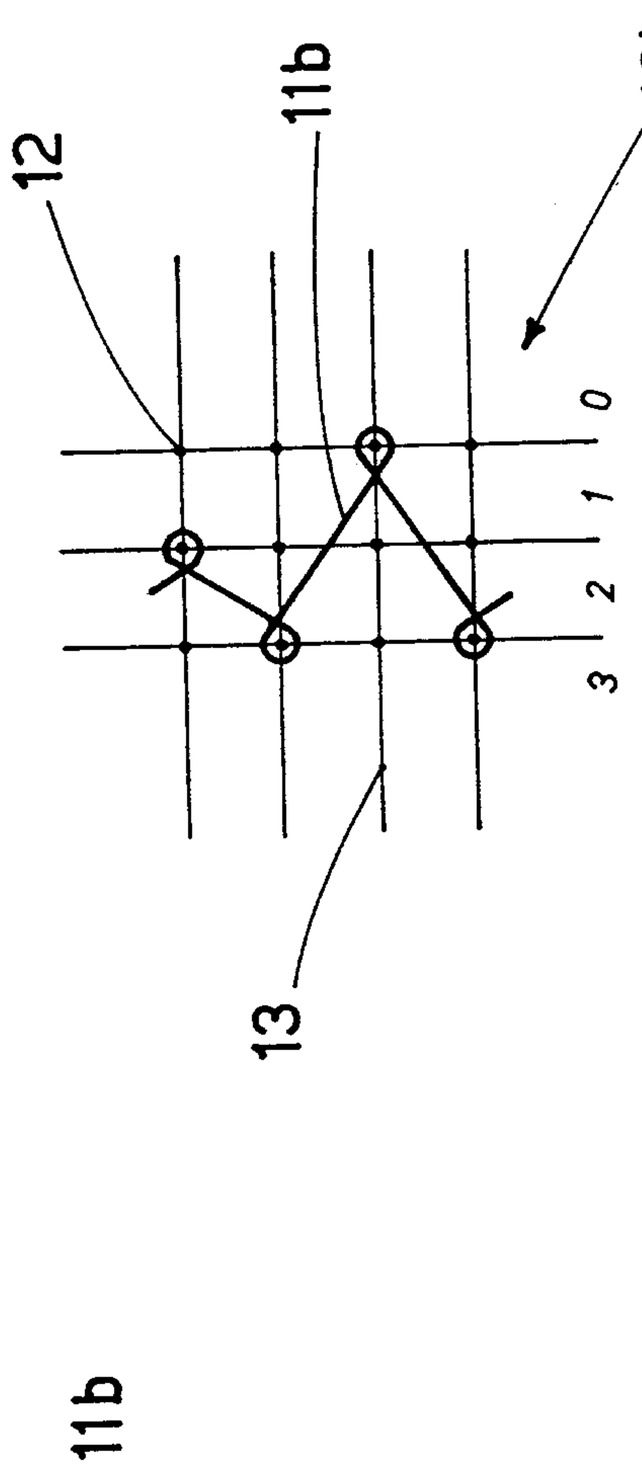
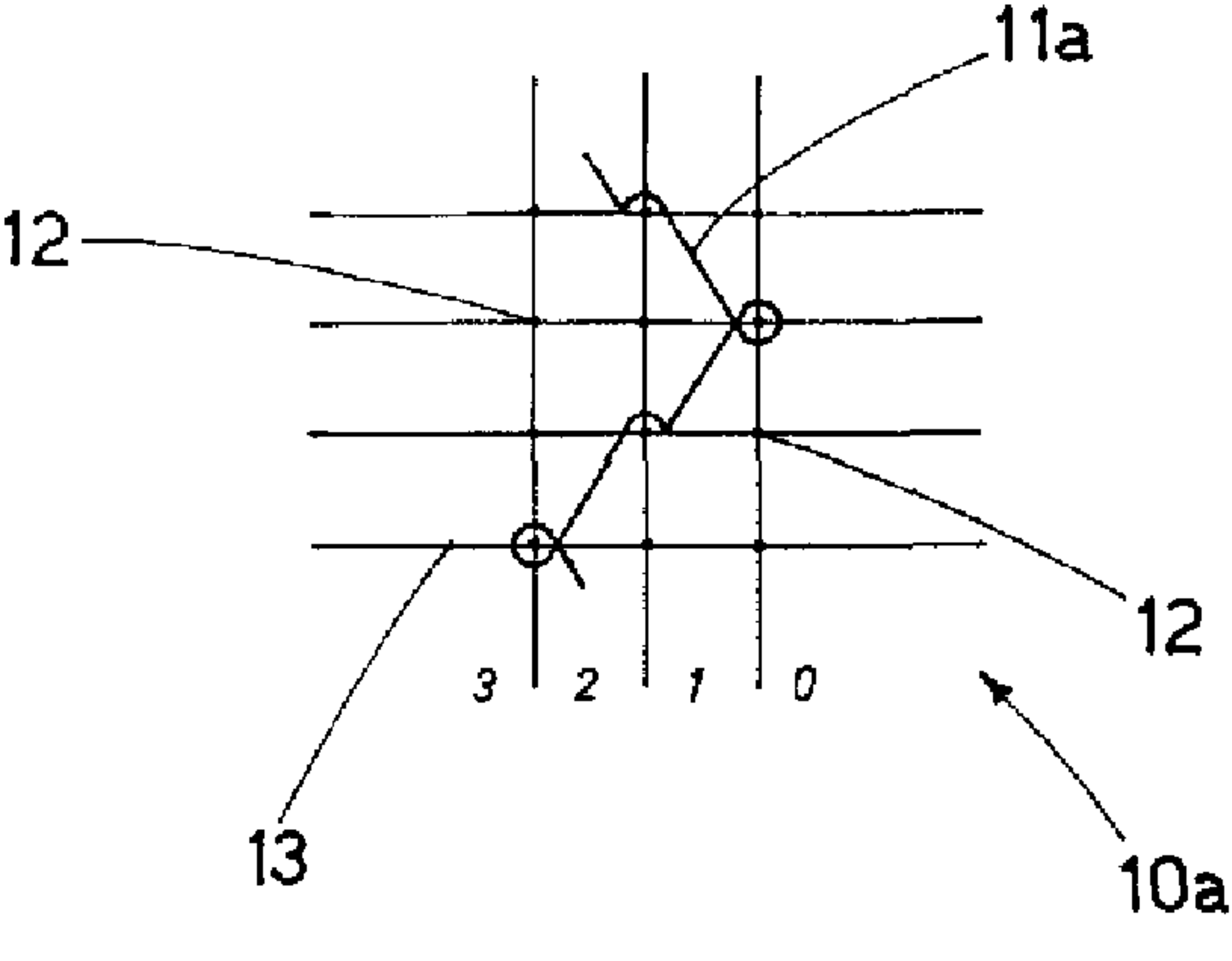

10b
11b
12
13
0
1
2
3

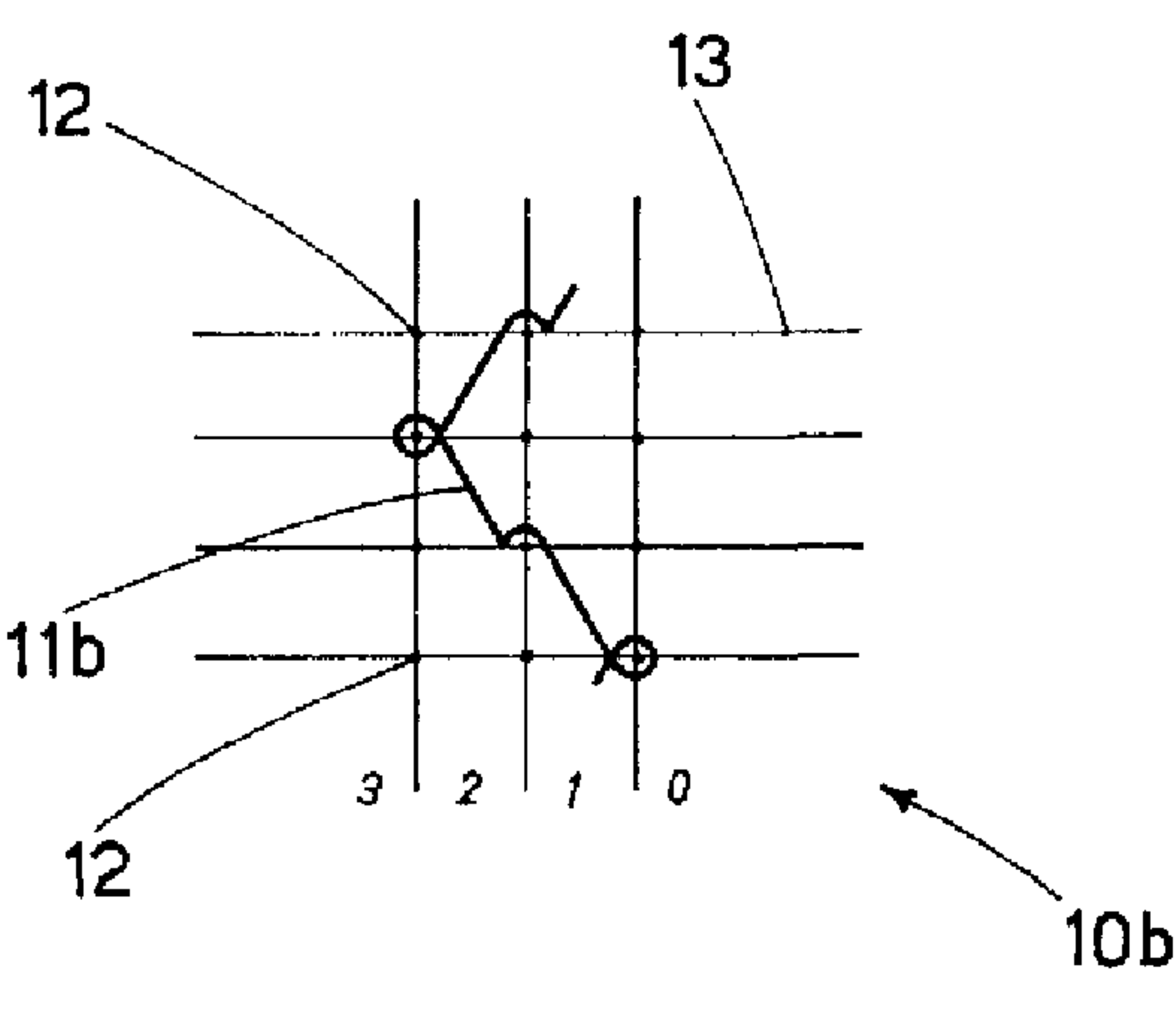
fig. 2

10a
11a
12
13
0
1
2

10b
11b
12
13
0
1
2
3

fig. 3


11a
12
12
3
2
1
0
13
10a


13
12
11b
12
3
2
1
0
10b