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(54) **Elastic fabric**

(57) An elastic fabric, of the type comprising a warp knit fabric with synthetic or natural fiber and elastic fiber yarns, the yarn (1) being formed by an elastic yarn with a (4-1)/(0-3) or (1-4)/(3-0) weave and the yarn (2) is formed by a synthetic or natural fiber with a variable separation zigzag weave for a Ketten or Raschel machine, where the elastic yarn (1) is a multi-yarn of two or more parallel elastic yarns and the non-elastic yarn (2) is

formed by one or more parallel yarns, a structure of successively linked loops of several filaments with a higher resistance to longitudinal traction being formed in a longitudinal direction of the fabric, and a mixed structure of elastic and non-elastic yarns alternated among said structures of loops being formed in a diagonal and transverse direction to provide a greater elasticity in said diagonal and transverse directions.

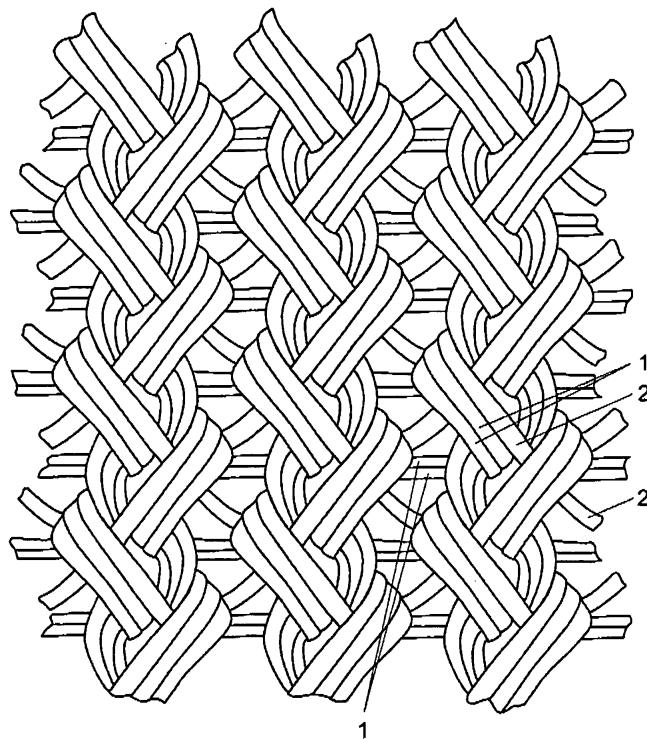


Fig. 3

Description**Object of the Invention**

[0001] The present invention relates to a warp knit elastic fabric with synthetic or natural fiber yarns and elastic elastomeric fiber yarns.

Background of the Invention

[0002] The use of fabrics incorporating mixtures of natural or synthetic fibers with elastomers currently allows manufacturing elastic garments with a great adaptability to the human body, such as underwear garments, sportswear or swimwear and garments that are very comfortable to wear, such as for example high-performance sportswear, or even work clothes or uniforms which must allow a great freedom of movements. These fabrics are preferably made by means of warp knitting.

[0003] Elastic yarn is usually made of elastane, also commercially called "Lycra"® or other trademarks such as creora ®, roica ®, etc, and allows said adaptability to be very high, but also has certain problems during its use, such as that the fabric used in swimwear has a reduced useful life because elastane is attacked by the chlorine of the water in swimming pools.

[0004] For example, Spanish utility model U200602072 is known which describes an elastic fabric for manufacturing underwear garments, sportswear and garments that are very comfortable to wear which allow an improved comfort of use and freedom of movements of the user due to their good three-dimensional adaptability. Said fabric is formed in a loom (preferably a Ketten or Raschel type loom) on two reeds, the elastic yarn with a (4-1)/(0-3) or (1-4)/(3-0) weave with a closed or open mesh being located in one reed, and in the other reed there is a non-elastic synthetic or natural fiber yarn with a zigzag weave. This allows the fabric to have a certain plating in its construction, the non-elastic synthetic or natural fiber providing it with the outer finish and appearance mainly being on one side, whereas the elastic yarn conferring the desired elasticity properties to the fabric is on the other side, intended to not be visible.

[0005] However, this fabric is affected by the action of chlorine in garments intended for swimming, which reduces its useful life. Furthermore, the prolonged use of the garment can mean the appearance of bacteria and bad odors due to its constant contact with the skin and the moisture it can accumulate.

Description of the Invention

[0006] The elastic fabric of this invention has technical particularities allowing its use for manufacturing swimwear, sportswear, garments for industrial uses, medical treatments, and wound recovery garments, in addition to underwear, lingerie and garments that are very comfortable to wear with an improved comfort of

use and freedom of movements of the user.

[0007] According to the invention, the fabric is characterized in that the elastic yarn is a multi-yarn of two or more parallel elastic yarns and the non-elastic yarn is formed by one or more parallel yarns, a structure of successively linked loops of several filaments with a higher resistance to longitudinal traction being formed in a longitudinal direction of the fabric, and a mixed structure of elastic and non-elastic yarns alternated among said structures of loops being formed in a diagonal and transverse direction. This fabric thus has a greater elasticity in said diagonal and transverse directions.

[0008] In a preferred embodiment, the weave of the fabric allows the resistant strands of six yarns or more to be formed by means of the consecutive loops, configured by all the yarns in parallel and the turn thereof. These weaves also allow the elastane yarns and the non-elastic fiber yarns to change in each loop the exit direction with respect to the entrance direction in the transverse direction. The hybrid mesh of extensible and resistant yarns with an improved tension against stresses is thus formed. This allows the fabric to be suitable for sportswear, in which it must be tightly fitted around the muscles of the athlete, protecting the muscle fibers by means of its uniform pressure, but allowing a complete freedom of movements.

[0009] It has been provided that the non-elastic yarn has a color contrasted with the elastic yarn to create an optical effect on the side on which the non-elastic natural or synthetic fiber yarn is warped. This plating or optical effect depends mainly on the non-elastic yarn, since the elastomer or elastic yarn cannot be easily colored.

[0010] This introduced factor, consisting of using a non-elastic yarn of a certain color which is contrasted with the color of the elastic yarn (for example, black or white), enables both faces of the fabric to be different, and it can easily be detected which face of the fabric (the face mainly containing the elastic yarn) must be in contact with the skin and that the other face is the visible face, achieving that the fabric is adapted to the body and moves together with the skin. Furthermore, on the face on which said non-elastic yarn is visible there are sheens or color change areas. This visual variation of the garment has two main applications. First, the garment is more attractive, common for uses in lingerie, swimwear and underwear. And second, it allows seeing the extension of the fabric, for example during the extension of the muscles of the user's body, whereby it is easy to visually follow in which direction the stresses are exerted on the body and when the risk of a muscle tear injury is near as the color of the elastic yarn appears in excess, which yarn is concealed in the opposite visible face when the fabric is slack.

[0011] This capacity to view muscle tensions together with the aid for muscle protection provided by the resistance of the fabric makes the sportswear made with it be especially suitable for its use in high-performance training.

[0012] It has been provided that the elastic yarn is a chlorine-resistant elastomer, which allows extending the life of the garment, especially suitable for swimwear.

[0013] The non-elastic yarn of the fabric comprises microcapsules of delayed-release substances. These microcapsules contain aromatic, antibacterial, anti-cellulite, deodorant, anti-dust mite, soft silicone and/or paper feel products.

[0014] These microcapsules improve the conditions of use of the fabric in underwear garments, clothes for people with sensitive skin and for cosmetic applications, since they allow its prolonged use without the moisture and the contact with the skin causing bad odors or the appearance of bacteria. Furthermore, as a cosmetic use these garments allow the continuous and prolonged use of anti-cellulite treatments, epidermal relaxation and preservation treatments, in addition to being anti-allergic, adapted to people with sensitive skin.

[0015] The fabric comprises added silver yarns, carbon fiber yarns, copper yarns, stainless steel yarns and/or yarns of other materials incorporated among the yarns of the weft and/or warp. These incorporated yarns allow conferring to the fabric technical characteristics for its use in industrial applications or work clothes, which must provide an added value with respect to traditional fabrics. The fabric thus considerably improves its antibacterial, static electricity conducting and/or thermal properties, according to the desired effect, which unlike other technical fabrics has a better comfort of use and a lower weight.

[0016] These added yarns substitute part of the non-elastic yarns in the weaving mill bar, whereby the original elasticity is not affected.

[0017] The elastomeric yarn, configured in an open or closed loop as has been previously described, can be of any nature such as elastane, rubber, gum, Dow XLA ® or others and mixtures thereof, allowing an elasticity in all the directions, longitudinal, horizontal and transverse oriented from right to left and from left to right. Therefore, a suitable three-dimensional adaptation of the fabric on any shape of the contours of the human body is achieved. The elastic yarn which is used can have a count comprised between 11 and 210 deniers.

[0018] The synthetic or natural yarn in turn allows being able to easily vary the elasticity margins of the garment by means of varying its knit, through the length which is applied in the zigzag of the weave.

[0019] Thus, in a first example, using the (1-2)/(1-0) zigzag or its reverse, (1-0)/(1-2), allows obtaining a fabric which is less dense and with more fall.

[0020] In a second example, it has been provided that the yarn of the second reed has a longer skip, such as (2-3)/(1-0) or its reverse, (1-0)/(2-3), which allows obtaining a fabric which is denser, more opaque and heavier with respect to the previous one.

[0021] In a third example, it has been provided that the non-elastic yarn has a weave with a longer skip, such as (3-4)/(1-0) or its reverse, (1-0)/(3-4), whereby the fabric

is even denser, more opaque and heavier and with different elasticities.

[0022] The different combinations give rise to the configuration of the fabric with the yarns arranged in different ways, obtaining different fabrics with regard to weight, elasticity, opacity, size reducing effect, resistance and others.

[0023] The natural or synthetic fiber can be polyamide, polyester, cotton, polypropylene and/or mixtures thereof, among others. For example, if the yarn used is of polyamide, polyester, polypropylene or another one the linear density of the fiber can be between 15 and 200 deniers, said fiber being able to be a monofilament, multifilament or microfiber fiber.

Description of the Drawings

[0024] To complement the description which is being made and with the aim of aiding to better understand the

features of the invention, a set of drawings is attached to the present specification in which the following has been depicted with an illustrative and non-limiting character:

- 25 - Figure 1 shows a graphic depiction of the elastic yarn.
- Figure 2 shows a graphic depiction of the synthetic or natural yarn.
- Figure 3 shows an enlarged image of the fabric resulting from the use of these weaves.
- 30 - Figures 4 to 15 show the different possible combinations of the two yarns, both in an open mesh and in a closed mesh (in the elastic yarn), and in different skips in the synthetic or natural yarn. Each group of figures indicates a different article having a weight, an elasticity, opacity and strength different from the other one.

Preferred Embodiment of the Invention

[0025] As can be observed in the referenced figures, the fabric is formed by a warp knit fabric in Ketten or Raschel machines with at least two reeds, the fabric being formed by a yarn (1) of elastic material, more specifically a chlorine-resistant elastane and a synthetic or natural fiber yarn (2).

[0026] The fabric has the elastic yarn (1) in a knitting machine with a (4-1)/(0-3) weave in the first reed closest to the needles of the machine, as shown in Figure 1. Whereas the natural or synthetic yarn (2) is arranged in the other reed, with its weave in the other reed of (1-2)/(1-0), as shown in Figure 2. The sum of the two reeds results in the elastic fabric.

[0027] Figure 3 shows how the yarns (1 and 2) are woven in a series of consecutive loops in a longitudinal direction, forming resistant strands of six yarns or filaments, from which the transverse yarns (1) are configured by two parallel yarns or filaments, and the diagonal

yarn (2) entering the loop is formed by a single yarn or filament. Whereas transversely it has a filament with a yarn perpendicular to said strands of loops and a filament in each of the respective diagonals to a side exit of the loop, said filaments being formed by the yarns (1 and 2), simultaneously providing the fabric with elasticity and resistance.

[0028] As is depicted in Figures 4 to 15, the elastic yarn can be arranged in a closed or open manner. Figures 4 to 15 show how the natural or synthetic yarn can carry out different movements to achieve different effects in the elasticity and appearance of the fabric obtained since the yarns (1, 2) are criss-crossed in several ways.

[0029] Having sufficiently described the nature of the invention, as well as a preferred embodiment, it is stated for all intents and purposes that the materials, shape, size and arrangement of the described elements can be modified, provided that this does not involve an alteration of the essential features of the invention which are claimed below.

Claims

1. An elastic fabric, of the type comprising a warp knit fabric with synthetic or natural fiber and elastic fiber yarns, the yarn (1) being formed by an elastic yarn with a (4-1)/(0-3) or (1-4)/(3-0) weave and the yarn (2) is formed by a synthetic or natural fiber with a variable separation zigzag weave for a Ketten or Raschel machine, **characterized in that** the elastic yarn (1) is a multi-yarn of two or more parallel elastic yarns and the non-elastic yarn (2) is formed by one or more parallel yarns, a structure of successively linked loops of several filaments with a higher resistance to longitudinal traction being formed in a longitudinal direction of the fabric, and a mixed structure of elastic and non-elastic yarns alternated among said structures of loops being formed in a diagonal and transverse direction to provide a greater elasticity in said diagonal and transverse directions.
2. The fabric according to claim 1, **characterized in that** the yarn (2) has a color that is different and contrasted with the yarn (1) to create an optical effect on the side on which the yarn (2) is warped.
3. The fabric according to claim 1, **characterized in that** the yarn (1) is a chlorine-resistant elastomer.
4. The fabric according to claim 1, **characterized in that** the yarn (2) comprises microcapsules of delayed-release substances.
5. The fabric according to claim 4, **characterized in that** the microcapsules contain aromatic, antibacterial, anti-cellulite, deodorant, anti-dust mite, soft silicone and/or paper feel products.

5 6. The fabric according to claim 1, **characterized in that** it comprises added silver yarns, carbon fiber yarns, copper yarns, stainless steel yarns and/or yarns of other materials incorporated among the yarns (1 and 2) of the weft and/or warp to confer antibacterial, static electricity conducting and/or thermal properties.

10 7. The fabric according to claim 6, **characterized in that** the added yarns substitute part of the yarns (2) in the weaving mill bar.

15 8. The fabric according to claim 1, **characterized in that** the synthetic or natural yarn (2) has a (1-2)/(1-0) or (1-0)/(1-2) weave.

20 9. The fabric according to claim 1, **characterized in that** the synthetic or natural yarn (2) has a (2-3)/(1-0) or (1-0)/(2-3) weave.

25 10. The fabric according to claim 1, **characterized in that** the synthetic or natural yarn (2) has a (3-4)/(1-0) or (1-0)/(3-4) weave.

30 11. The fabric according to claim 1. **characterized in that** the elastic yarn (1) is of gum, rubber, Dow XLA ®, PBT and/or mixtures thereof.

35 12. The fabric according to claim 1, **characterized in that** the yarn (2) is of polyamide, polyester, cotton, polypropylene and/or mixtures thereof.

40 13. The fabric according to any of claims 1 and 11, **characterized in that** the yarn (1) has a density comprised between 11 and 210 deniers.

45 14. The fabric according to any of claims 1 and 12, **characterized in that** the yarn (2) has a density comprised between 15 and 200 deniers.

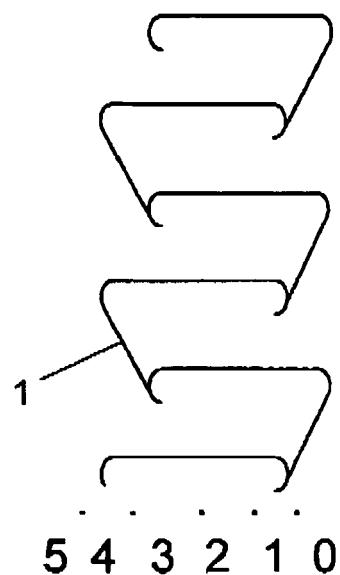


Fig. 1

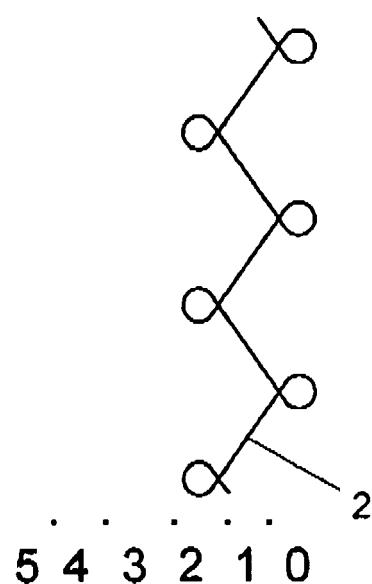


Fig. 2

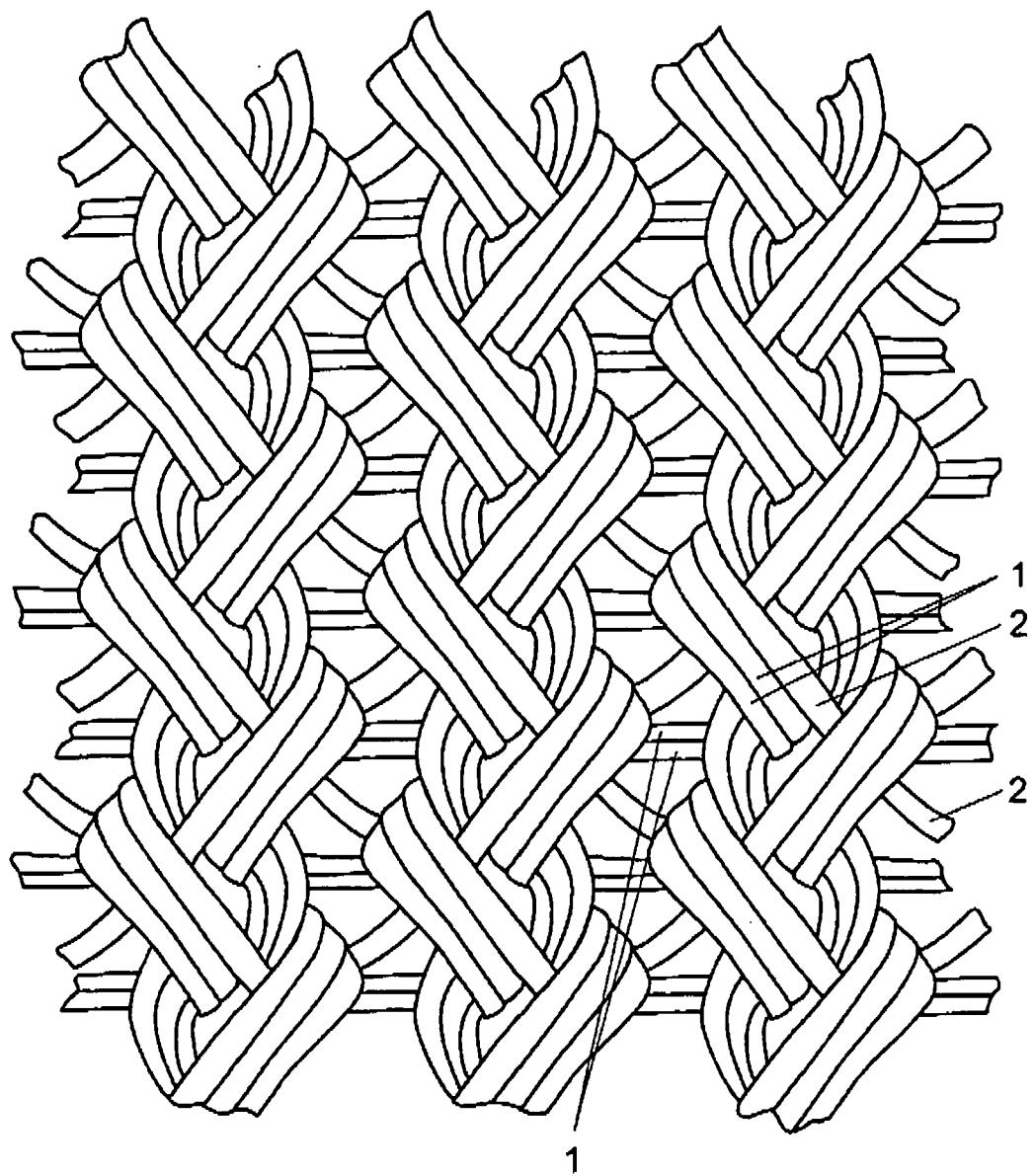


Fig. 3

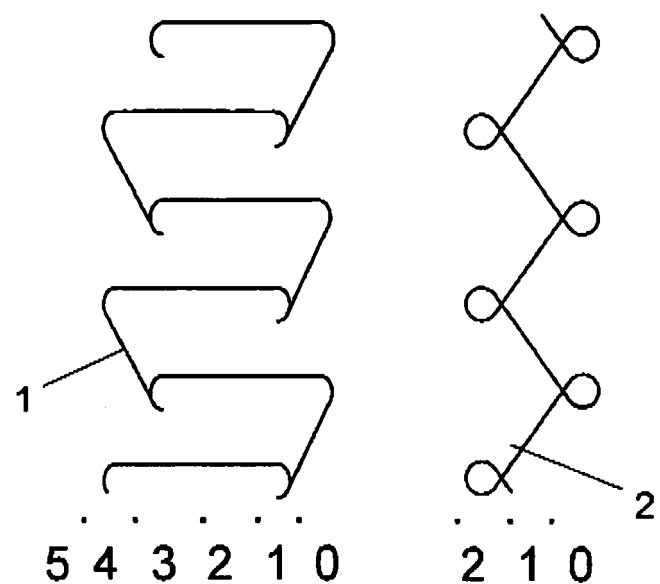


Fig. 4

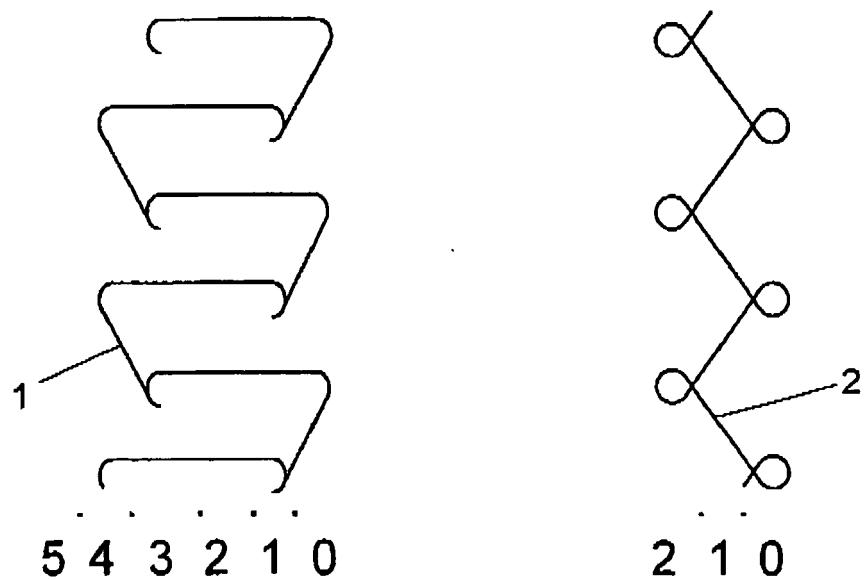


Fig. 5

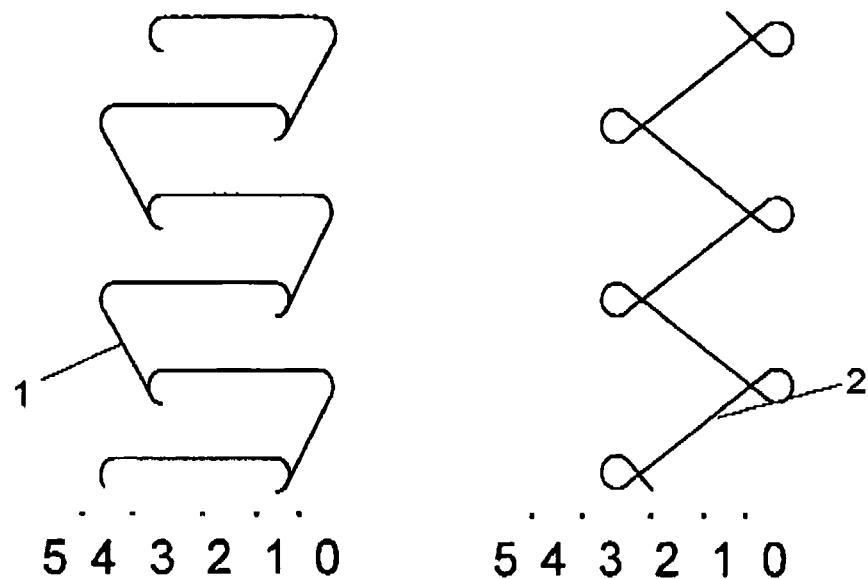


Fig. 6

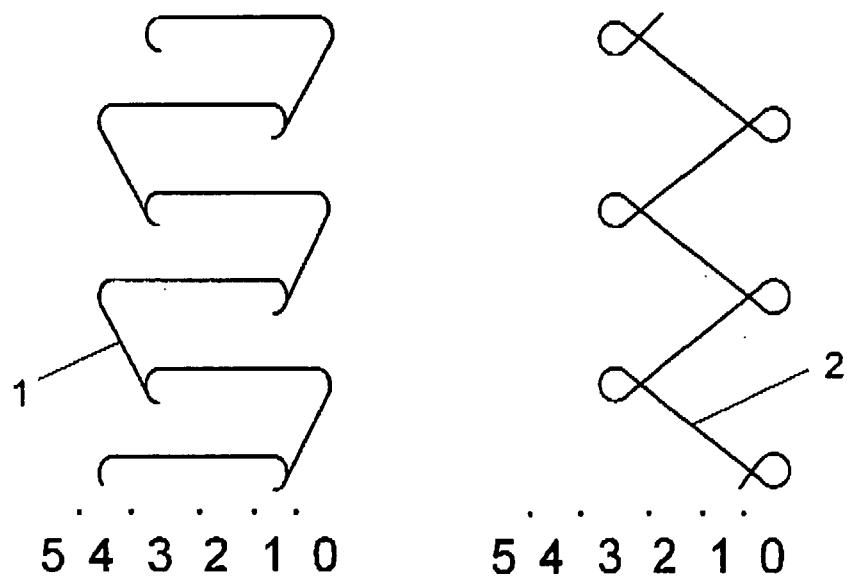


Fig. 7

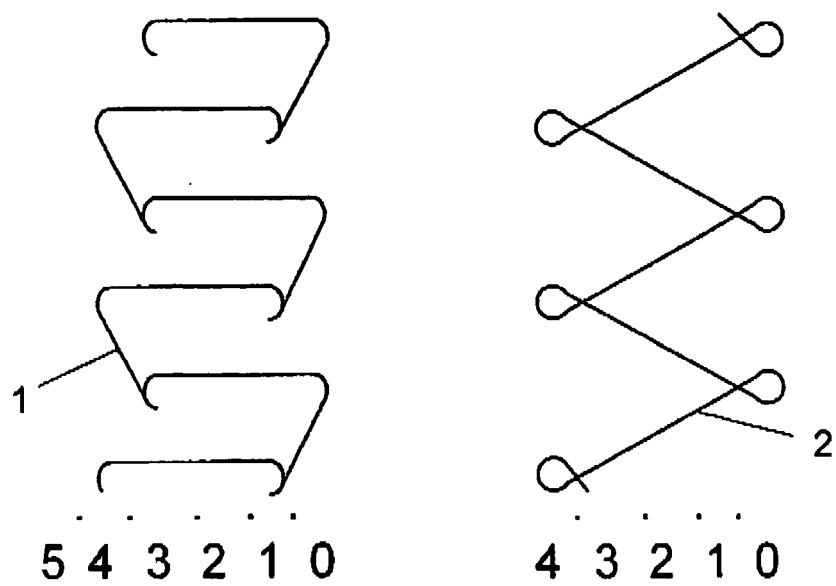


Fig. 8

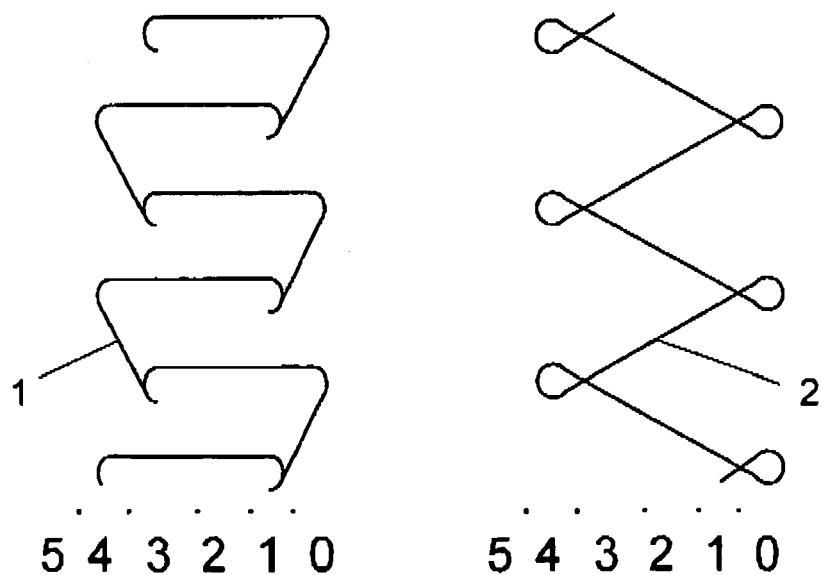


Fig. 9

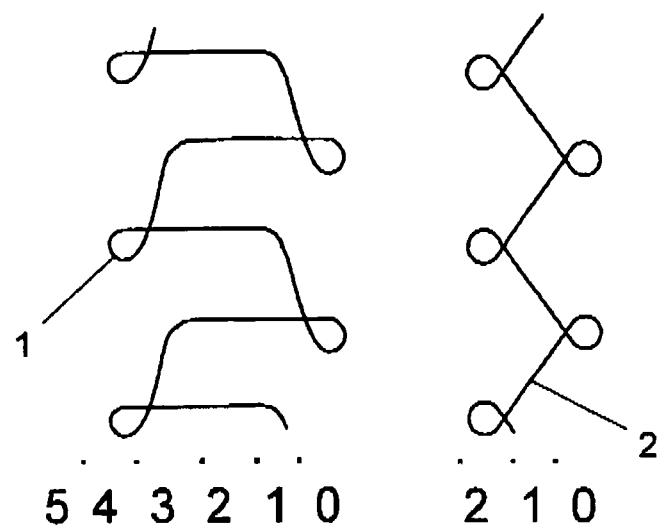


Fig. 10

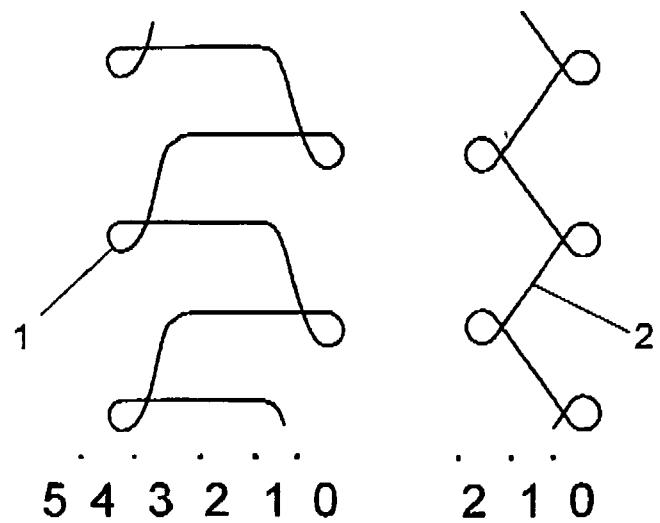


Fig. 11

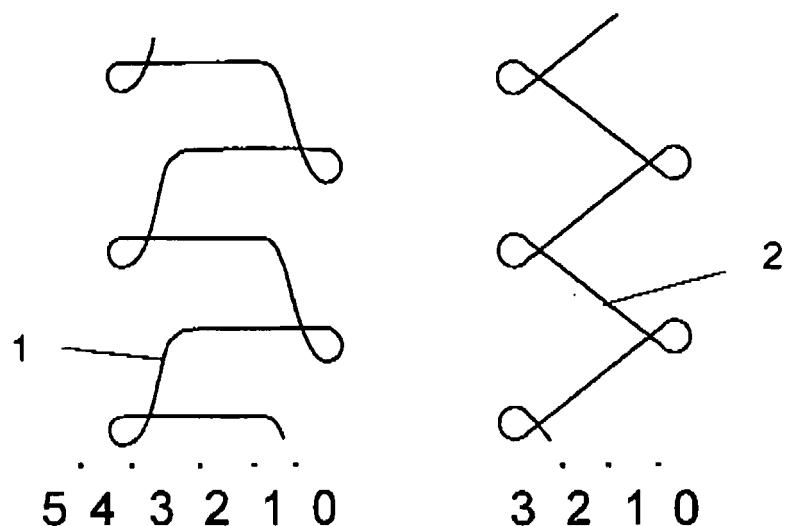


Fig. 12

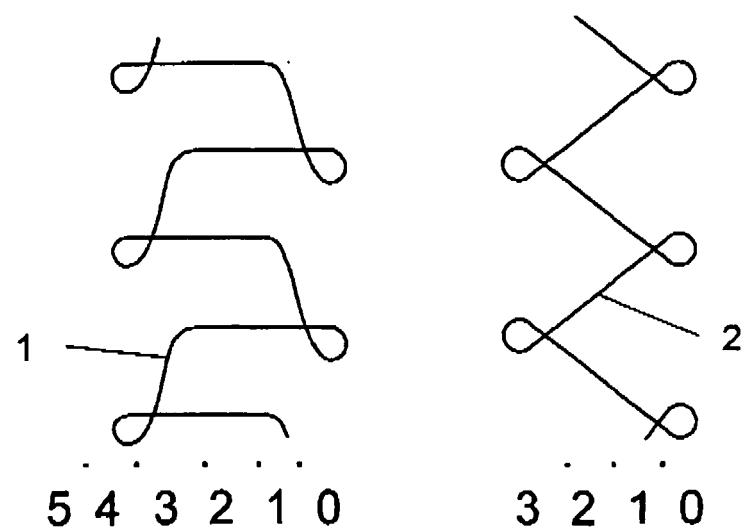


Fig. 13

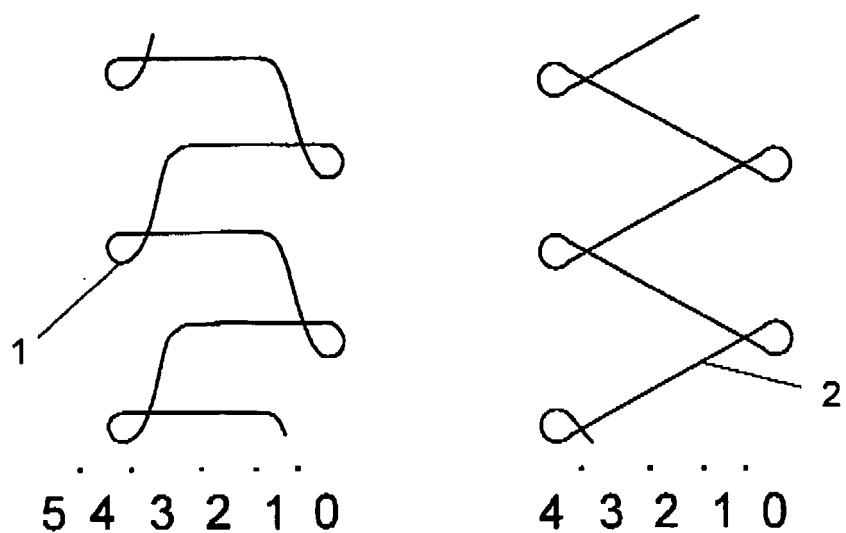


Fig. 14

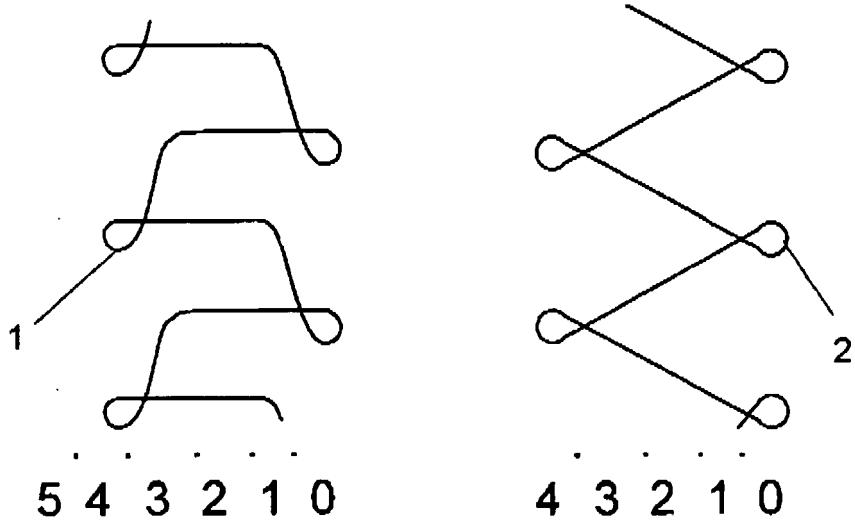


Fig. 15



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| 2 | Place of search Munich | Date of completion of the search 28 September 2009 | Examiner Sterle, Dieter |
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