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(54) **SHOE MIDSOLE AND ARTICLE OF FOOTWEAR AND MANUFACTURING METHOD THEREFOR**

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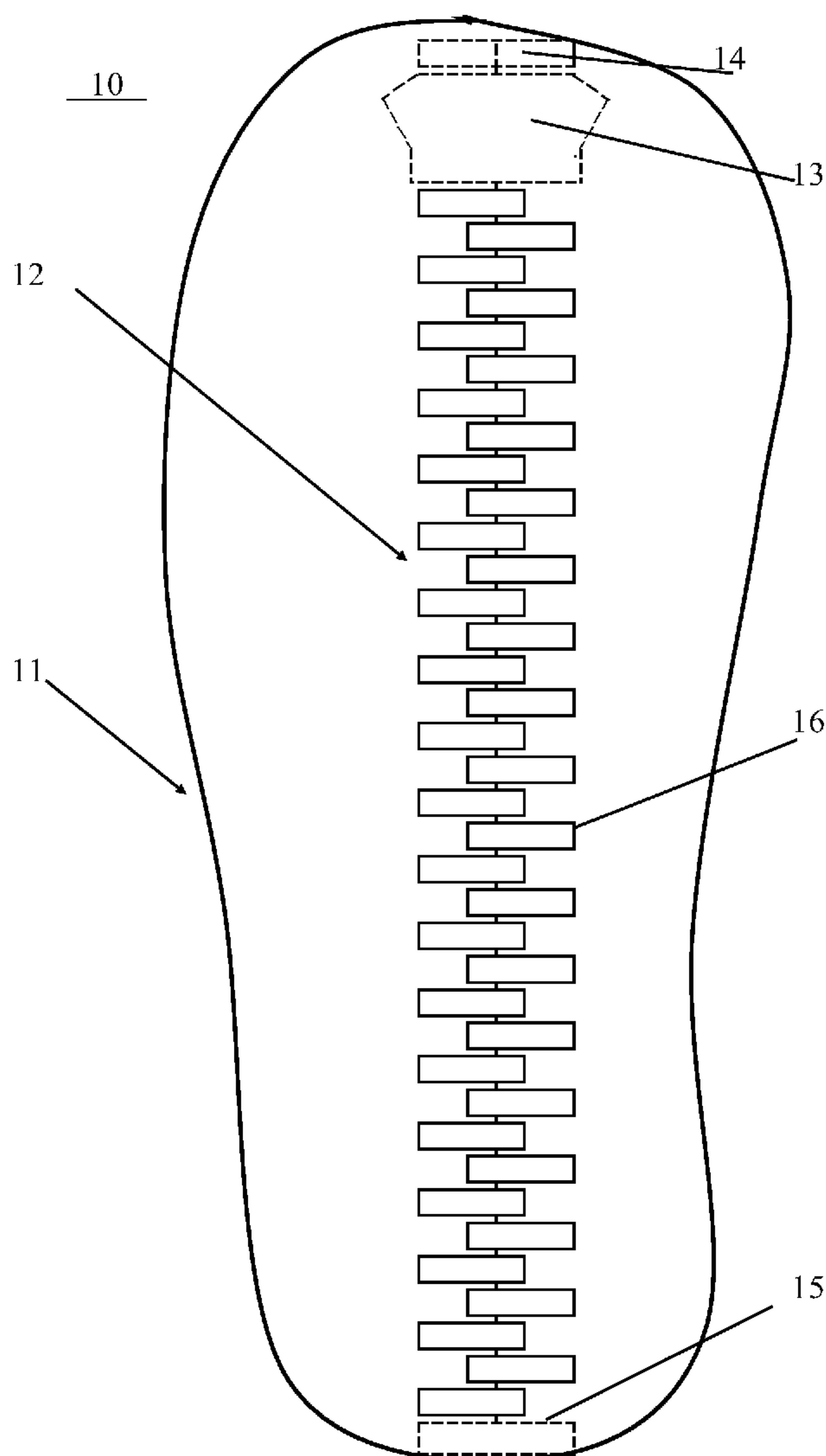
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(57) **ABSTRACT**

Article of footwear comprising a midsole, the midsole comprises an opening and closing component such as zip-pers or Velcro. During the manufacturing process of lasting construction, a shoe last can put into a shoe upper integrated with the midsole through the released opening and closing component of midsole to finish the put-on last step. After the opening and closing component of midsole is sealed, a procedure similar to broad lasting is finished, and a sole laying step and a formation step can be continued.



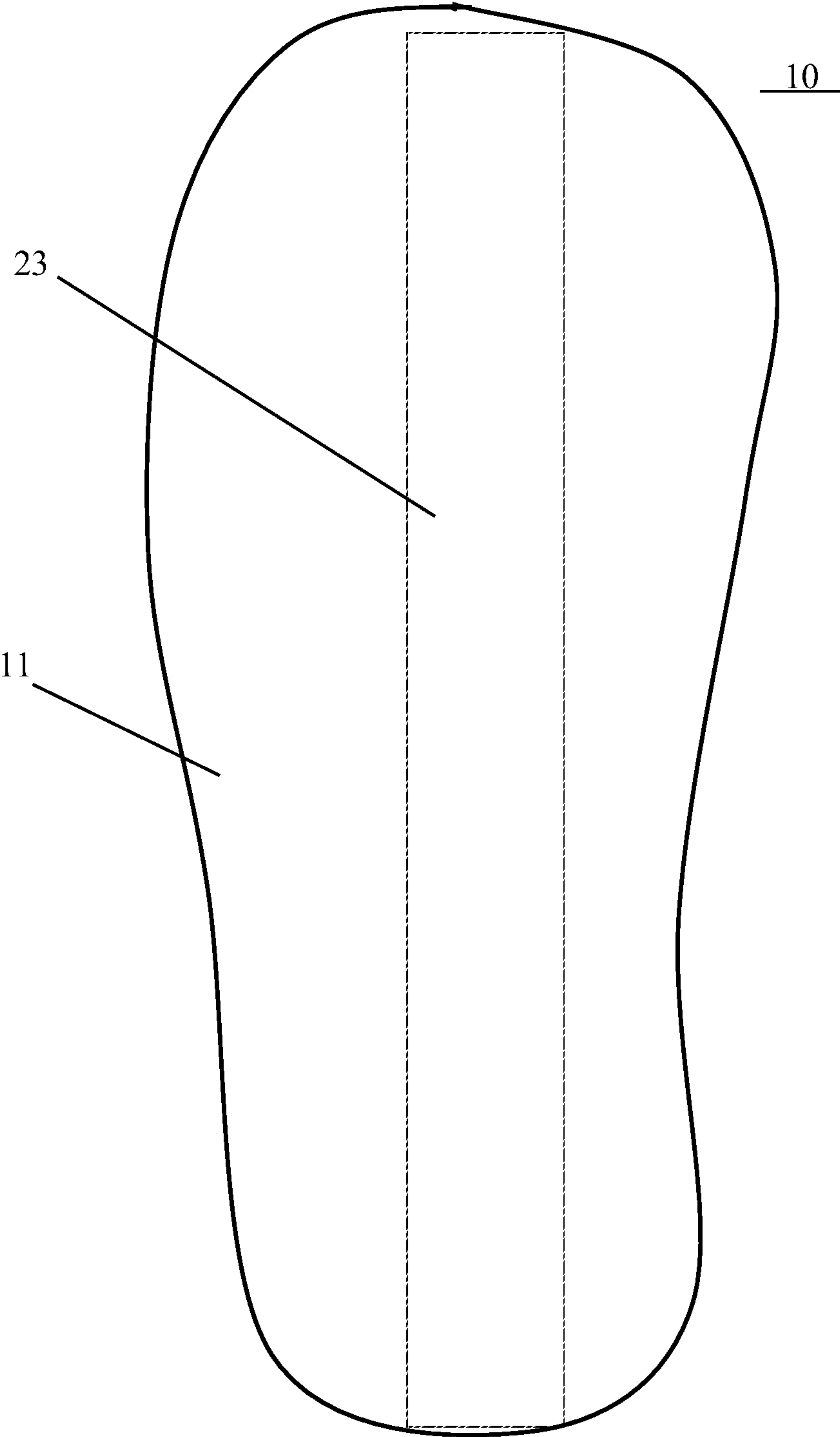
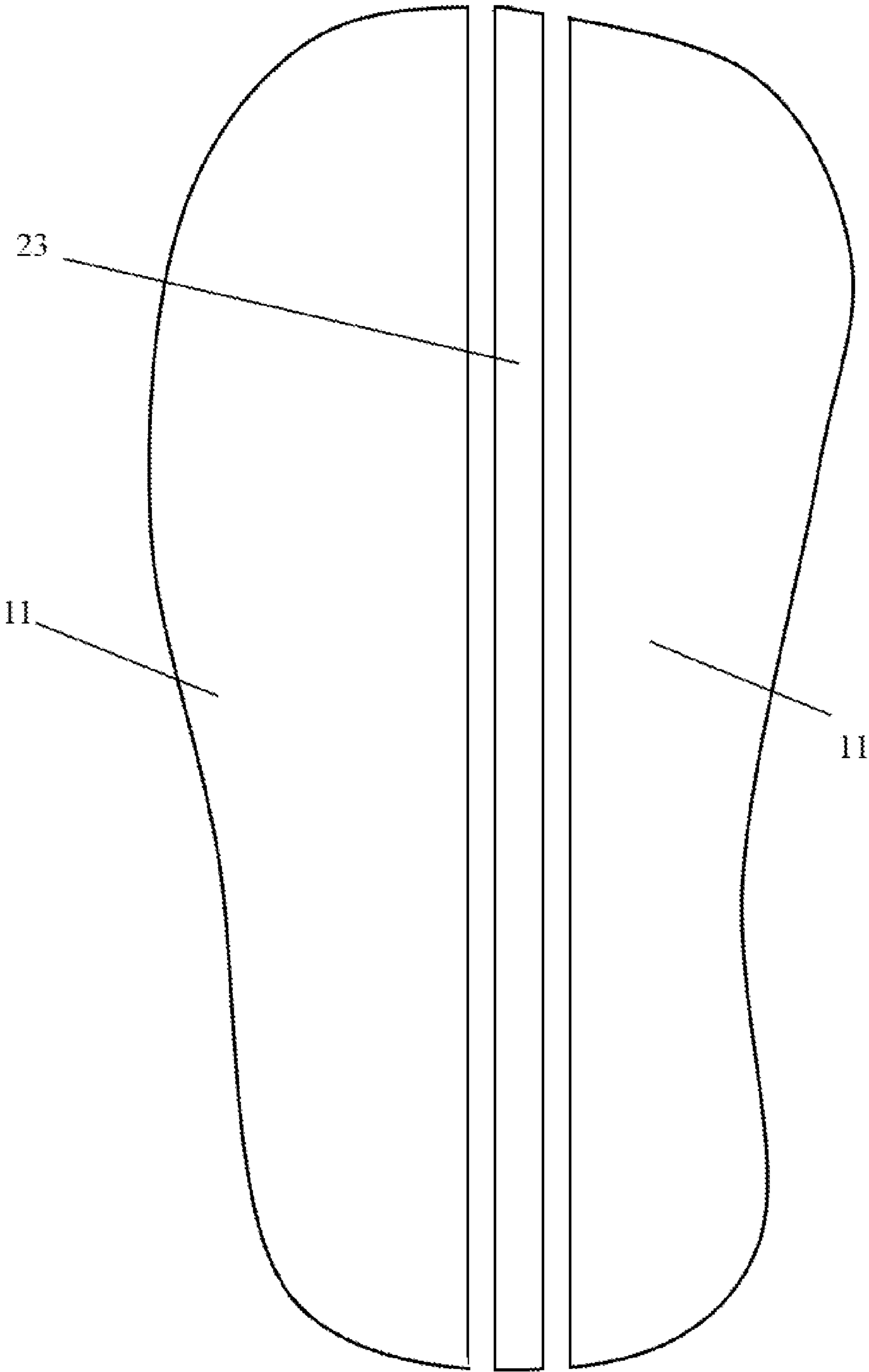


FIG. 1A



**FIG. 1B**

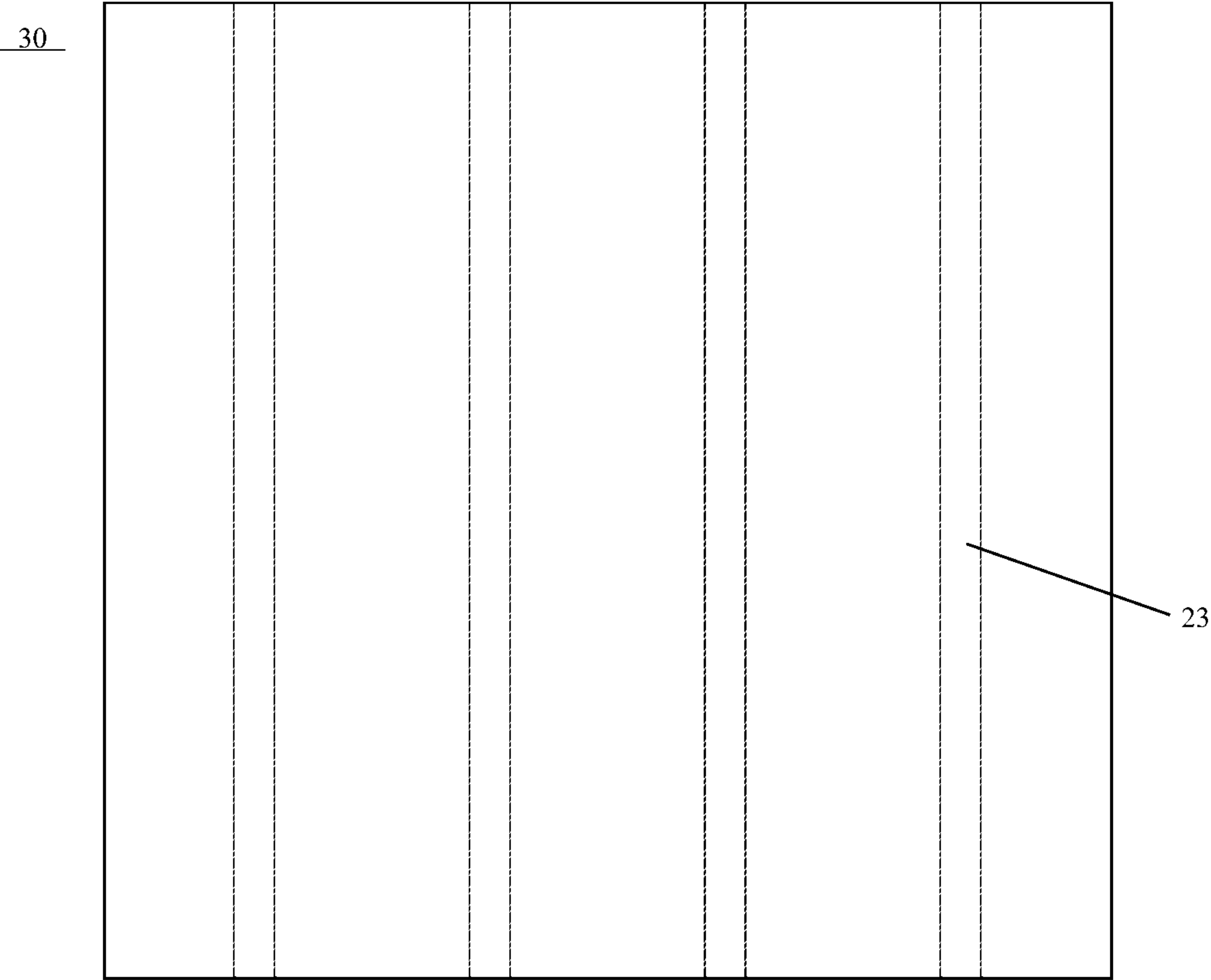
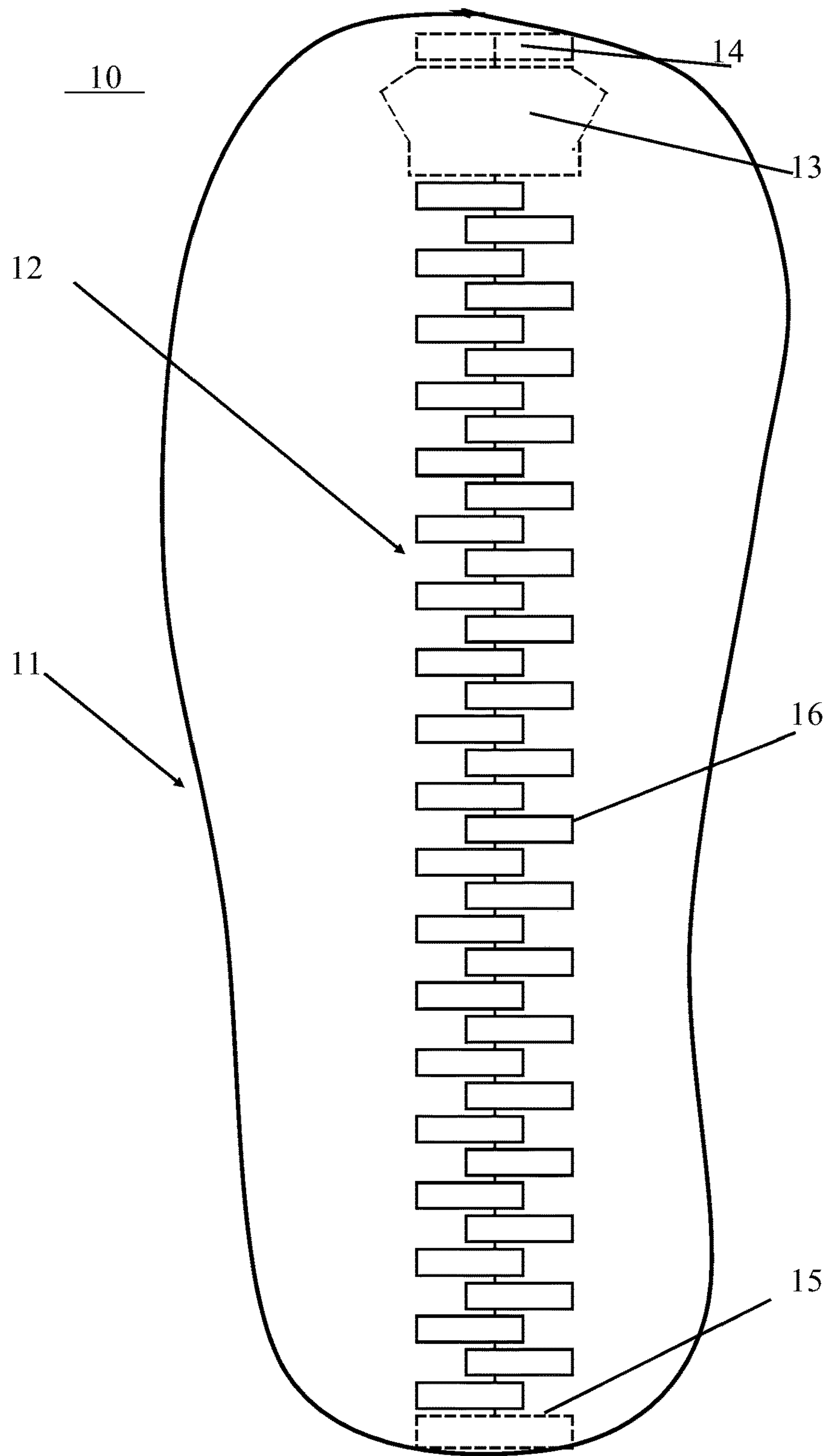


FIG. 1C



**FIG.2A**

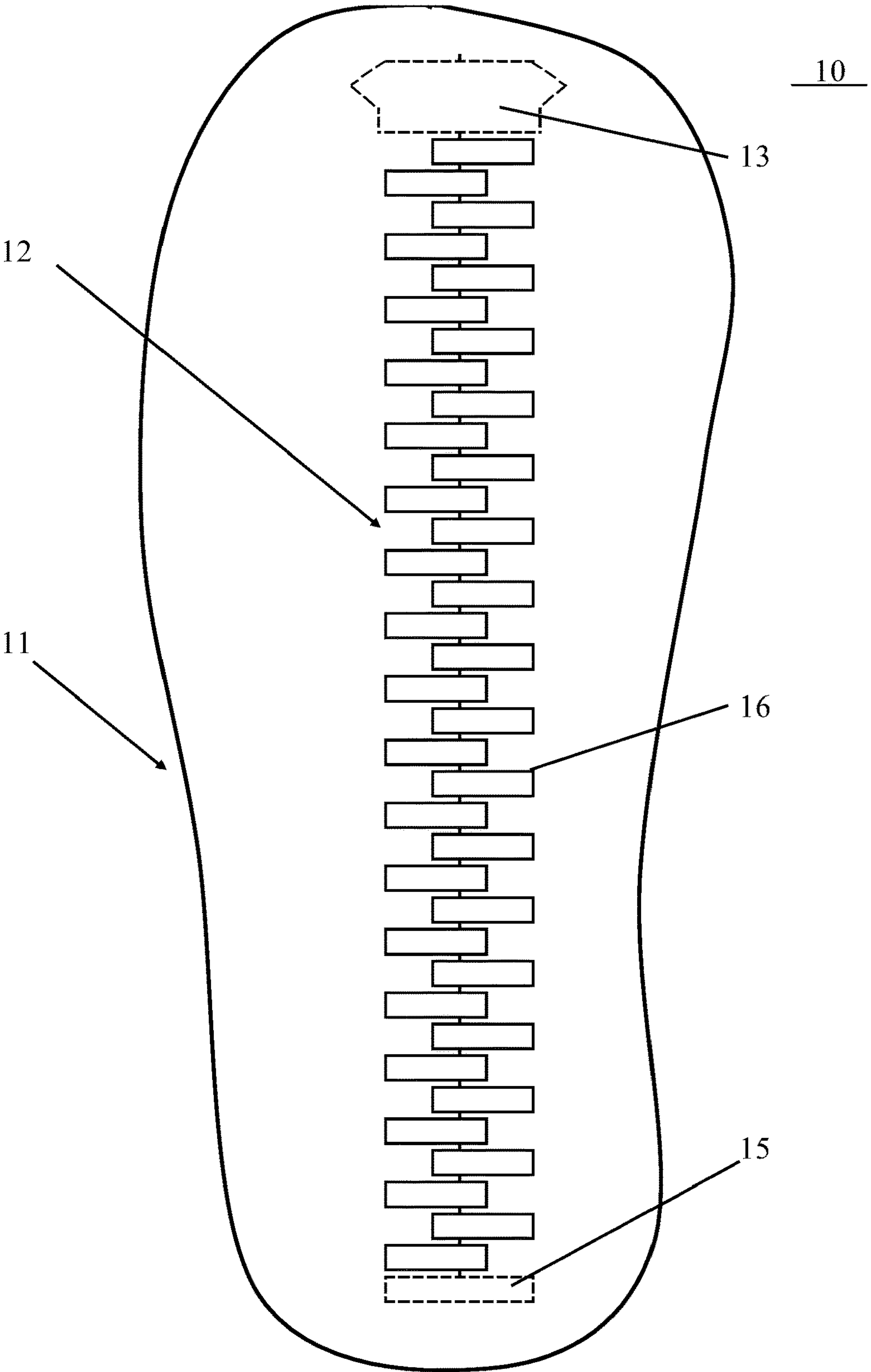


FIG.2B

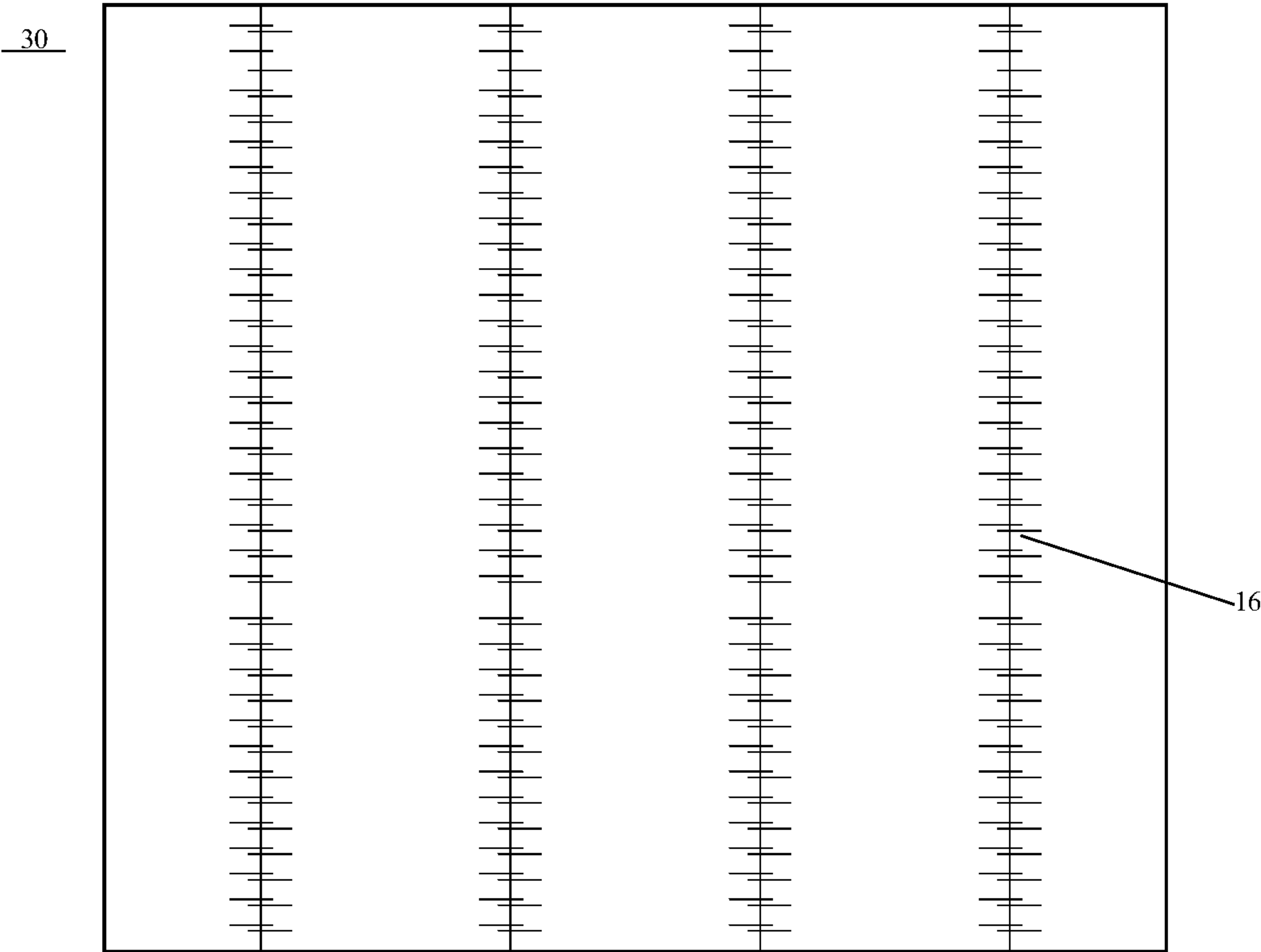


FIG. 2C

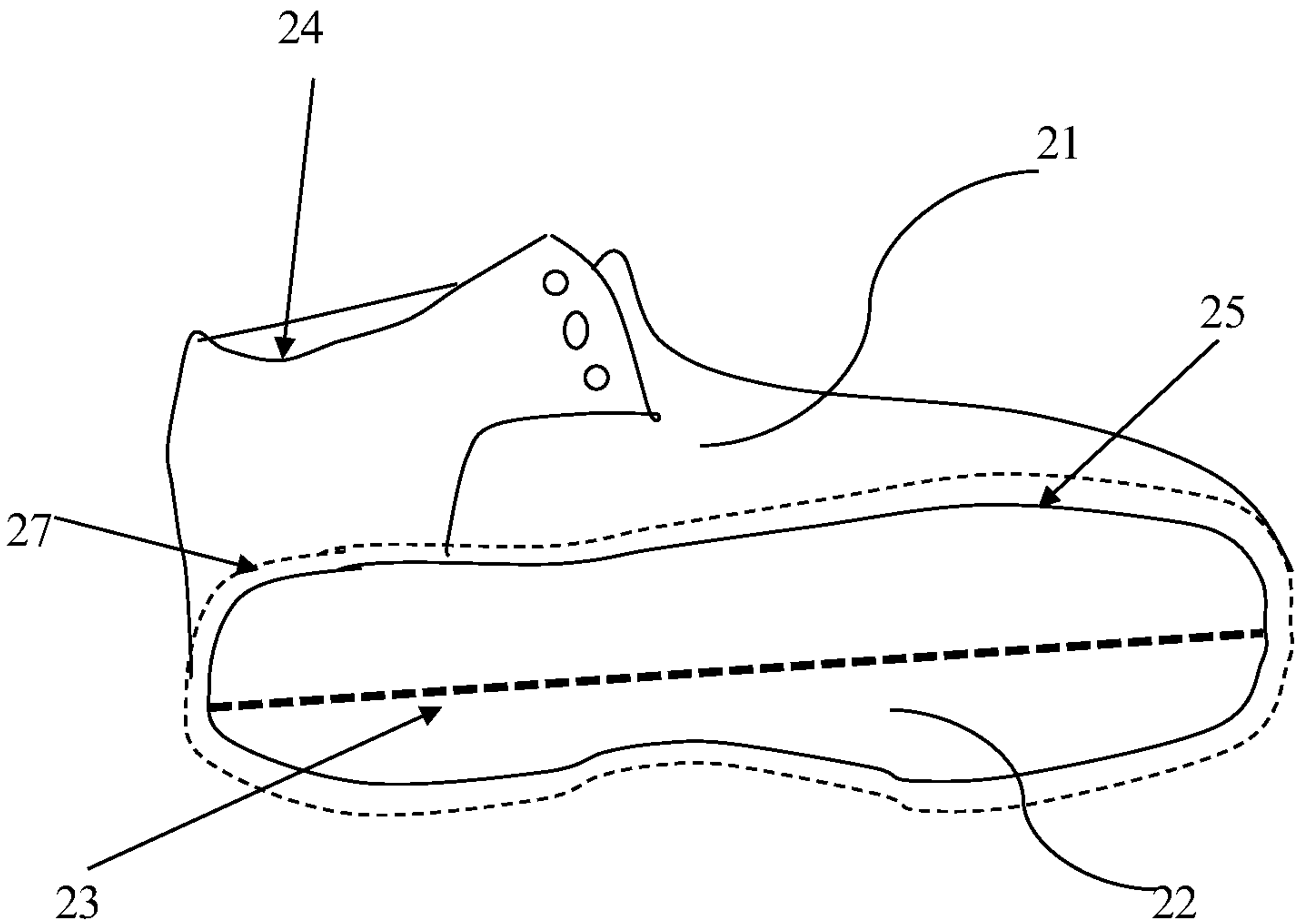
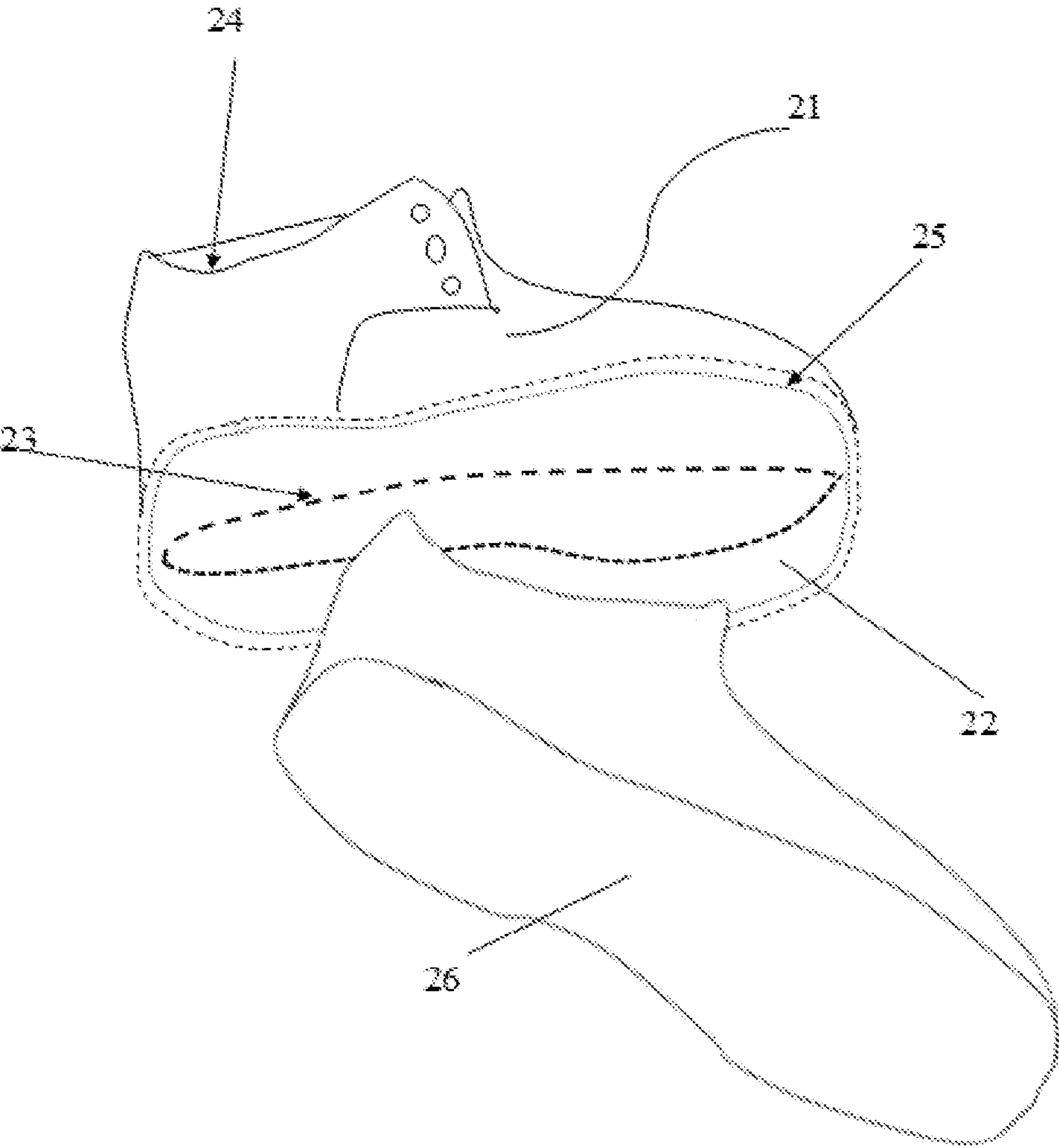
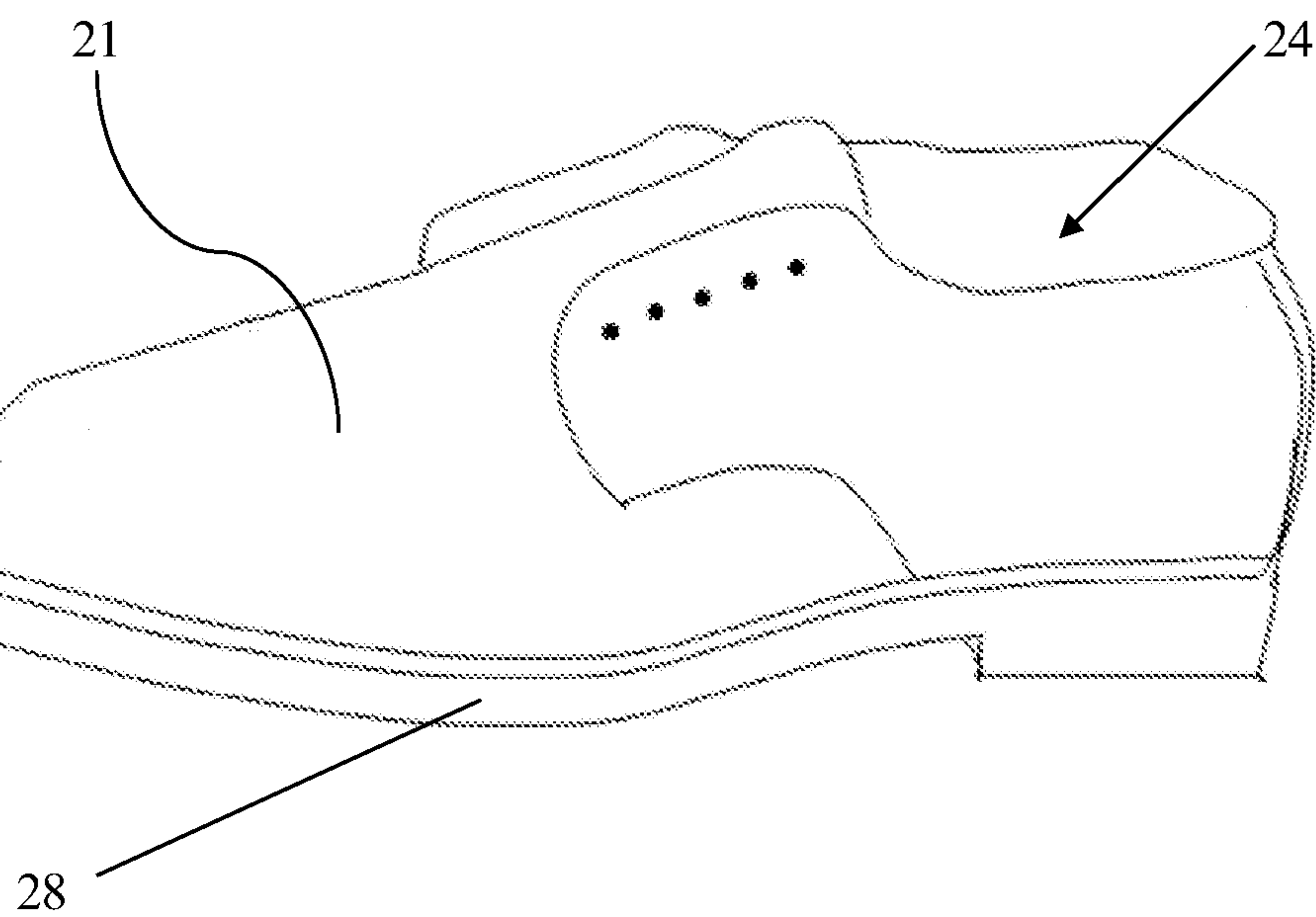


FIG.3

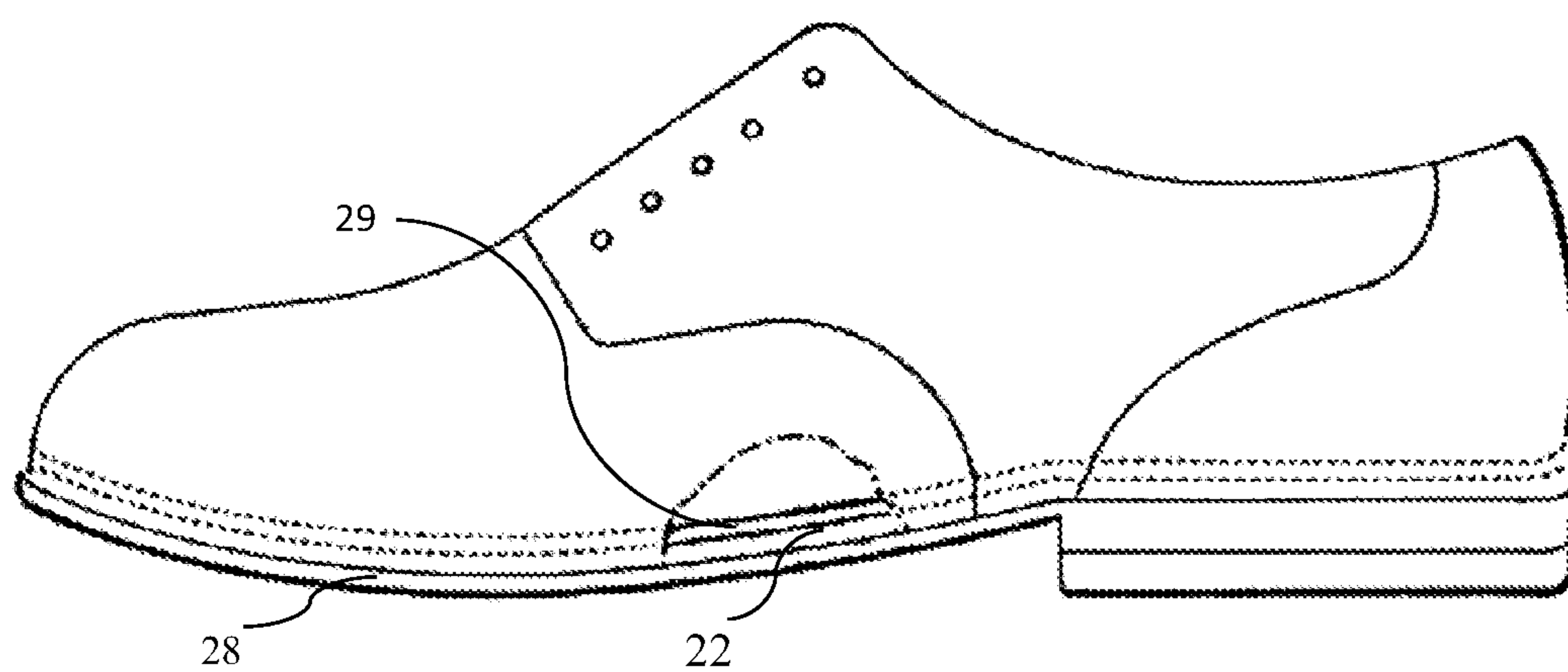


**FIG. 4**

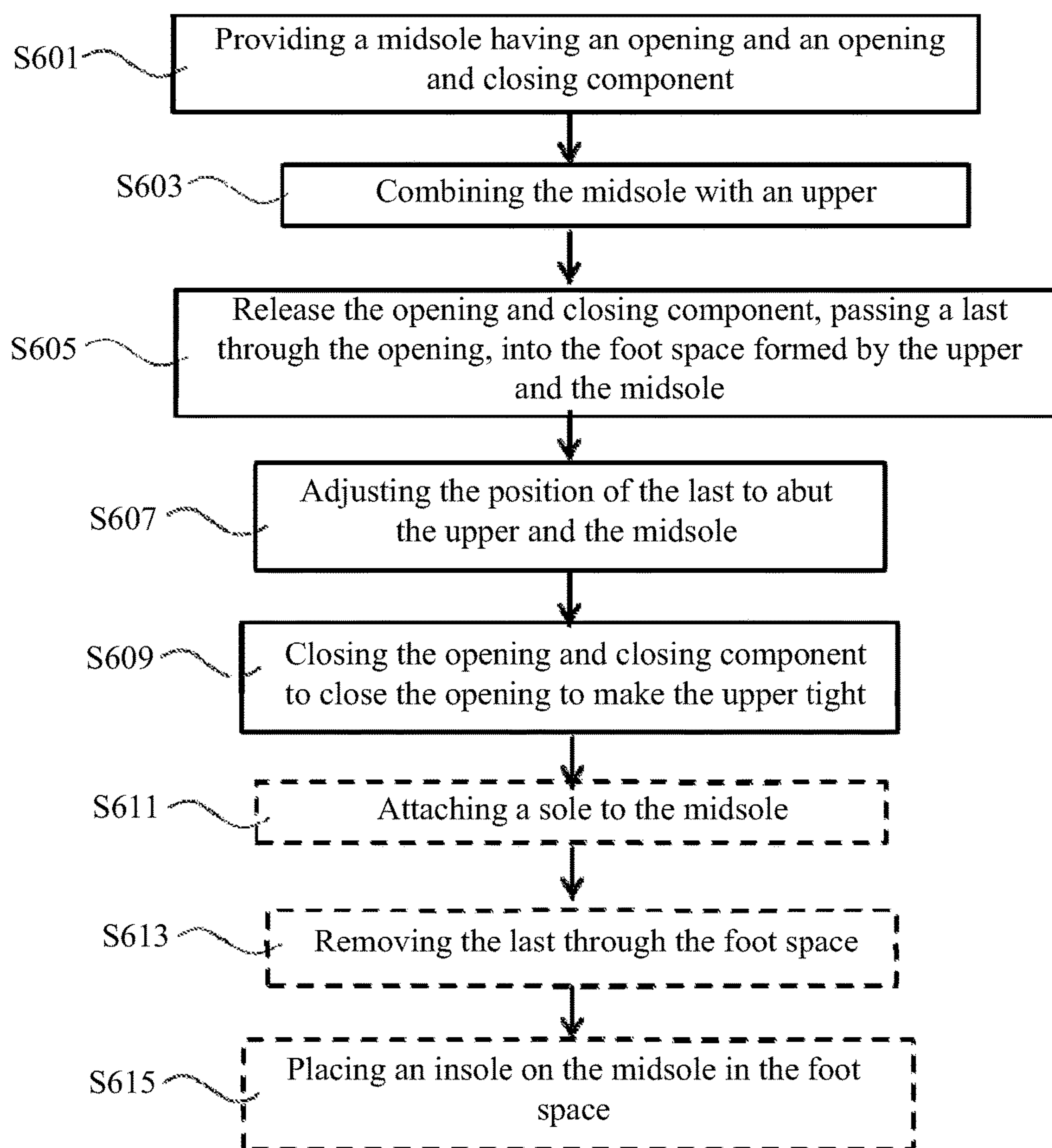




**FIG. 5**



**FIG. 6**

**FIG. 7**



## SHOE MIDSOLE AND ARTICLE OF FOOTWEAR AND MANUFACTURING METHOD THEREFOR

### FIELD OF THE INVENTION

**[0001]** The present invention relates to an article of footwear, and more particularly relates to a shoe midsole and article of footwear and manufacturing Method therefore.

### BACKGROUND OF THE INVENTION

**[0002]** The present invention relates to a midsole and an article of footwear and a method of manufacturing the same, and more particularly to an article of footwear having an opening and closing component in the midsole, and a method of making a shoe using a midsole having an opening and closing component.

**[0003]** In general, the method of shaping the upper in the shoemaking process is mainly divided into two methods: Board Lasting and Slip Lasting. Among them, the Board Lasting method is mainly used for the production of leather shoes and boots, and the Slip Lasting method is mainly used for the production of sports shoes and casual shoes.

**[0004]** In the Slip Lasting making method, the upper and the midsole are mostly integrated by the sewing method, a foot space for the foot to be extended into is formed, and the last is put into the foot space to make the shoes upper shaped. Then, outside the bottom of the foot space, the sole is attached to the midsole to complete the bottom molding.

**[0005]** In the Board Lasting method, the midsole is first fixed on the bottom of the last, the upper is covered with the last, the bottom of the upper and the periphery of the midsole are attached together by climbing, and the upper can be tightly attached and shaped, then stick the sole to the midsole to complete the bottom molding.

**[0006]** The Board Lasting manufacturing method requires a relatively large number of processes, and it is necessary for a shoe-making master with a certain seniority to engage in work such as front climbing, rear climbing, and side climbing, which requires skilled labors, and consumes more labor costs, and the production efficiency is relatively low. However, for some types of shoes, either because the last is difficult to put into the foot space above the upper, or due to the aesthetics of the upper, it is impossible to use the Slip Lasting.

### SUMMARY OF THE INVENTION

**[0007]** The present invention provides a novel midsole structure of a shoe that can realize another simple manufacturing method without the need of a professional machine or multi-year artificial training, that is, the effect of the conventional Board Lasting method can be achieved.

**[0008]** The present invention provides a shoe midsole having an opening and closing component, and the opening and closing component may be a zipper or a Velcro.

**[0009]** The invention provides a shoe midsole having an opening and closing component. When the opening and closing component is fully opened, the midsole of the shoe is divided into two completely separated half midsole.

**[0010]** The invention provides a midsole of a shoe, comprising: a midsole body having an opening; an opening and closing component disposed along the opening edges to open and close the opening.

**[0011]** The invention provides a shoe midsole comprising a midsole body having an opening; an opening and closing component, wherein the opening and closing component is two fabrics having corresponding structures, which are respectively fixed on both sides of the opening.

**[0012]** The invention provides a shoe midsole comprising a midsole body and a zipper. The midsole body has an opening and the zipper is disposed along the opening edges. Wherein, the zipper comprises a slider, a top stop, a bottom stop, and a chain or teeth. Wherein, the slider is flat, so that the thickness of the zipper is approximately equivalent to the thickness of the midsole body.

**[0013]** The invention provides an article of footwear comprising an upper having a three-dimensional shape of a foot; a midsole conforming to the shape of the sole of the foot and having a zipper; wherein the upper is combined with the periphery of the midsole to provide a foot space into which the foot extends. The upper and the midsole can be integrated into one by sewing. The article of footwear further includes a shoe sole that is in close contact with the midsole outside the foot space; wherein the shoe sole may be adhesively attached to the midsole in a bottoming step. The article of footwear further includes an insole stacked over the midsole in the foot space.

**[0014]** The invention provides a method for manufacturing footwear. When a shoe upper and a periphery of midsole having an opening and closing component are combined, it becomes a semi-finished product of footwear; a last can pass through the loosened opening and closing component from the bottom of the semi-finished product into the foot space formed by the upper and the midsole. When the last and the midsole are fitted together, the opening and closing component is closed, and the subsequent shoemaking steps of bottom forming and upper shaping can be performed.

**[0015]** By the present invention, a new Zipper Lasting shoemaking method can be realized, which makes the shoe-making process more efficient and cost-effective.

### BRIEF DESCRIPTION OF THE DRAWINGS

**[0016]** The present invention will be further described below in conjunction with the accompanying drawings and embodiments.

**[0017]** FIGS. 1A, 1B and 1C are schematic views of a midsole of a shoe according to the present invention;

**[0018]** FIGS. 2A, 2B and 2C are embodiments of the present invention;

**[0019]** FIG. 3 is a schematic view of an article of footwear of the present invention;

**[0020]** FIG. 4 is a schematic view of an embodiment of the present invention;

**[0021]** FIG. 5 is a schematic view of another article of footwear of the present invention;

**[0022]** FIG. 6 is a schematic view of another article of footwear of the present invention; and

**[0023]** FIG. 7 is a flow chart of the footwear manufacturing method of the present invention.

### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

**[0024]** The opening and closing component referred to in the present invention refers to a buckle, a zipper, a Velcro (hook-and-loop fastener) or the like, and is a component that binds or fastens an opening together. The so-called opening



can also be really separating opening, comprising two separate objects combined by means of opening and closing component, such as a jacket opening. When the opening and closing component is loosened, an object can pass through the opening; when the opening and closing member is closed, the opening is combined to form a fastening state. Since the zipper is the most well-known among them, some of the following embodiments illustrate the invention with the zipper as the opening and closing component.

**[0025]** Referring to FIG. 1A, the present invention provides a midsole 10 comprising a midsole body 11 and an opening and closing component 23. In general, the opening and closing component 23 is two fabrics having corresponding structures. The midsole 10 may be formed by sewing the midsole body 11 and the opening and closing component 23. FIG. 1B is a schematic view of a semi-finished product of an embodiment of the shoe midsole of the present invention, showing two separate half midsole bodies 11 and the opening and closing component 23 before sewing. Or, as shown in FIG. 1C, another method for manufacturing the midsole of the present invention, a whole bottom material 30 has a plurality of rows of opening and closing components 23 embedded therein, and then cut by using a foot plate model stripper bar or a laser cutting method.

**[0026]** Referring to FIG. 2A and FIG. 2B, the present invention provides a midsole 10 comprising a midsole body 11 and a zipper 12. The midsole body 11 has an opening along which the zipper 12 is disposed to open and close the opening. FIG. 2A shows the zipper 12 is closed and closed the opening. Wherein, the zipper includes a slider 13, a top stop 14, a bottom stop 15, and a chain or teeth 16. In order to make the thickness of the zipper approximately equal to the thickness of the midsole body, the slider 13 may be of a flat thin shape and does not need to have a puller and a tab. As shown in FIG. 2B, the zipper 12 can be a structure without a top stop, and the slider 13 can be further separated from the midsole 10. In addition, the drawings of FIGS. 2A to 2B are for convenience of explaining the structure of the zipper, and do not indicate the relative size relationship and position of the midsole body 11 and the zipper 12. For example, in conjunction with the shoemaking process, when the zipper 12 is fully opened, the midsole can be two completely separated half midsole. In addition, the zipper 12 may be a structure without both top stop and bottom stop. For example, in the midsole material 30 of FIG. 2C, several rows of chain or teeth 16 have been embedded, when a piece of midsole is cut out by using a footboard model stripper bar or a laser cutting method, the zipper on the midsole is the structure with the chain or teeth 16 only. Then use a tool or machine to attach the slider to the midsole, and attach the bottom or top stop to the zipper as needed.

**[0027]** Referring to FIG. 3, the present invention provides an article of footwear comprising an upper 21 for fitting a three-dimensional shape of a foot; a midsole 22 conforming to the shape of the sole of the foot and having an opening and closing component 23; wherein the upper is combined with the periphery of the midsole, creating a foot space 24 into which the foot can extend. The opening and closing component 23 can be either a zipper or a hook-and-loop fastener. The upper 21 and the midsole 22 may be integrally formed by sewing, or may be formed by other bonding methods. The sewing method can be divided into three-dimensional sewing and flat sewing. The three-dimensional sewing is as shown in FIG. 3, the bottom edge 25 of the upper will cover

the periphery 27 of the midsole, and then the needle car will fit into the foot space 24 and seam the overlapping of the periphery of the midsole 26 and the bottom edge 27 of the upper. The flat seam, that is, the upper bottom edge 25 and the midsole periphery 27 are attached to the same plane as the midsole 22, and can be placed on the needle table top, sewing the overlapping of the flat upper bottom edge 25 and the midsole periphery 27.

**[0028]** Referring to FIG. 4, a last 26 can be passed from the bottom of the article of footwear through the released opening and closing component 23 into the foot space formed by the upper 21 and the midsole 22. When the last 26 and the midsole 22 are fitted together, the upper 21 will be tightly attached to the last 26 to form a climbing-like effect after the opening and closing component 23 is closed, and then the bottom forming and upper shaping shoemaking steps can be performed. The opening and closing component 23 can be a zipper without a top stop. When the zipper is tightly closed, the slider can also be directly separated from the midsole, so that the midsole is relatively flat.

**[0029]** This invention is helpful even for the current shoe production process that has been adopted in the Slip Lasting process. Whether the lasting is done manually or by machine, since the upper and the midsole are difficult to move after the last is slipped, if the position of the last is deviated, it is necessary to pull the last out and rework. By using the invention, when the zipper is released, the last can be moved to the correct position in the foot space, and the zipper is closed after the positioning is completed, so that the midsole and the upper are tightly pressed against the last and shaped. Therefore, the shoes currently made by either the Slip Lasting manufacturing method or the Board Lasting manufacturing method can change the manufacturing method to the Zipper Lasting method of the present invention.

**[0030]** In another embodiment, the midsole may also have both a zipper and a hook-and-loop fastener. When it is necessary to do further climbing to the upper nearby the toe or heel of shoe, the midsole not only has a zipper in the middle, but also has the structure of hook-and-loop fastener closed to the toe and heel of shoe. The inner surface of the upper close to the toe and the heel has the structure of hook-and-loop fastener corresponding to the midsole. After the last set into the foot space and fit the upper and the midsole, and the zipper is closed, pull the upper close to the toe and the heel to relative hook-and-loop part of the midsole respectively, attach to the opposing surfaces to be fastened, and make the upper look straight and tight.

**[0031]** Referring to FIG. 5, the article of footwear of the present invention further includes a sole 28 that is in close contact with the midsole 22 outside the foot space 24. Wherein, the sole 28 is adhered to the midsole using an adhesive in a bottoming step, and the upper 21 is also fixed at that time. In another embodiment of the present invention, the sole 28 may be integrally with the midsole by sewing, or by sewing and adhering at the same time.

**[0032]** Referring to FIG. 6, the article of footwear of the present invention further includes an insole 29 that is placed over the midsole 22 in the foot space so that the foot does not feel the presence of the zipper. Since the insole 29 is placed in the foot space and is not visible from the side of the shoe, FIG. 6 shows the position of the insole 29 and the midsole 22 in the shoe in broken lines, and indicates a perspective area with a little chain line to indicate insole 29



and midsole **22**. In addition, when the opening and closing component in midsole **22** is a zipper, the zipper can be a flat thin shape. For example, the thickness of the slider, the top stop, the bottom stop, and the chain teeth of the zipper are all equivalent to the thickness of the midsole material, and the slider may be flat or may not have a pull tab and a cap.

**[0033]** Referring to FIG. 6, the flow chart of the footwear manufacturing method of the present invention. As shown in FIG. 6, step **S601**, providing a midsole having an opening and an opening and closing component. The midsole may be formed by sewing a midsole body and the opening and closing component, or cutting from a whole piece of midsole material in which a plurality of rows of opening and closing components have been embedded by using a footboard model stripper bar or a laser cutting method.

**[0034]** Step **S603**, combining the midsole with an upper. Step **S605**, releasing the opening and closing component, passing a last through the opening, into the foot space formed by the upper and the midsole. Step **S607**, adjusting the position of the last to abut the upper and the midsole. Step **S609**, closing the opening and closing component to close the opening to make the upper tight, that is, a step of shaping the upper. Step **S611**, attaching a sole to the midsole. Step **S613**, removing the last through the foot space. Step **S615**, placing an insole on the midsole in the foot space.

**[0035]** The details of the corresponding footwear manufacturing process have been described in the previous embodiments, and are not described herein again.

**[0036]** In summary, the present invention provides a midsole and footwear thereof, and a new method of making shoes, which allows the last to enter between the upper and the midsole in a different manner, thereby reducing labor costs and providing an efficient shoemaking process.

What is claimed is:

1. A midsole of a shoe, comprising:  
at least two lead frames;  
a midsole body having an opening;  
an opening and closing component disposed along the opening edges to open and close the opening.
2. A midsole of a shoe as claimed in claim 1, wherein the opening and closing component is two fabrics having corresponding structures, which are respectively fixed on both sides of the opening.
3. A midsole of a shoe as claimed in claim 1, wherein when the opening and closing component is fully opened, the midsole of the shoe is divided into two completely separated half midsole.
4. A midsole of a shoe as claimed in claim 2, wherein when the opening and closing component is fully opened, the midsole of the shoe is divided into two completely separated half midsole.
5. A midsole of a shoe as claimed in claim 1, wherein the opening and closing component is a hook-and-loop fastener.
6. A midsole of a shoe as claimed in claim 1, wherein the opening and closing component is a zipper.
7. A midsole of a shoe as claimed in claim 6, wherein the zipper comprises a slider, a bottom stop, and a chain tooth.

8. A midsole of a shoe as claimed in claim 7, wherein the slider is flat, and the thickness of the zipper is approximately equivalent to the thickness of the midsole body.

9. An article of footwear comprising:

an upper; and

a midsole comprising;

a midsole body having an opening; and

an opening and closing component disposed along the opening edges to open and close the opening;

wherein the upper is combined with the periphery of the midsole to provide a foot space into which the foot extends.

10. An article of footwear as claimed in claim 9, wherein the upper and the midsole can be integrated into one by sewing.

11. An article of footwear as claimed in claim 9, wherein the opening and closing component is a hook-and-loop fastener.

12. An article of footwear as claimed in claim 9, wherein the opening and closing component is a zipper.

13. An article of footwear as claimed in claim 12, wherein the zipper comprises a slider, a bottom stop, and a chain tooth.

14. An article of footwear as claimed in claim 13, wherein the zipper further comprises a top stop.

15. An article of footwear as claimed in claim 9, further comprising:

a shoe sole, in close contact with the midsole outside the foot space;

an insole, stacked over the midsole in the foot space.

16. A method for manufacturing footwear, comprising:  
providing a midsole having an opening and an opening and closing component;

combining the midsole with an upper;

releasing the opening and closing component, passing a last through the opening, into the foot space formed by the upper and the midsole;

adjusting the position of the last to abut the upper and the midsole;

closing the opening and closing component to close the opening.

17. A method for manufacturing footwear as claimed in claim 16, wherein the opening and closing component is a hook-and-loop fastener.

18. A method for manufacturing footwear as claimed in claim 16, wherein the opening and closing component is a zipper.

19. A method for manufacturing footwear as claimed in claim 17, wherein the inner surface of the upper close to the toe and the heel has the structure of hook-and-loop fastener corresponding to the relative hook-and-loop part of the midsole.

20. A method for manufacturing footwear as claimed in claim 18, wherein, after the zipper is tightened and closed, the slider of the zipper is disengaged from the midsole.

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