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## (54) Adjustable size footwear

(57) Adjustable size footwear (4) is formed by the combination of a vamp (4.1), an insole (2) which fits into the inside of an outsole (3), in that the insole (2) provided with a set of projecting surfaces coupled on the track and the outsole (3) provided with a set of slits forming a strips structure with elastic characteristics allowing the fitting of the insole (2) inside the outsole (3), and ensuring the proper expansion of the variable size sole (1) when subjected to forces exerted by the foot inside the shoe. The variable size sole (1) thus built, the vamp (4.1), and the connection process (4.2) to the vamp (4.1), ensure the natural adjustment of the footwear to different foot morphologies and the natural and dynamic adjustment to the dimensional variations that the foot of the user undergoes during the day and may be applicable to different types of shoe.

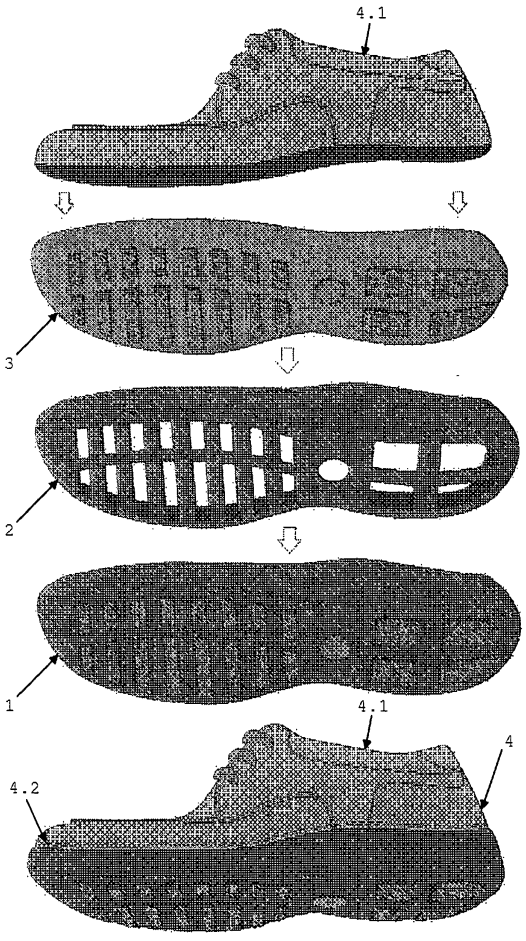


Figure 5

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## Description

### FIELD OF THE INVENTION

**[0001]** The present invention relates to a footwear, sole, and vamp of variable size, able to naturally and dynamically fit the dimensional variations that the user foot undergoes during the day and that can be applied to different types of footwear. Footwear built with this variable size type of sole and vamp will ensure a greater level of comfort to the user, which is transmitted through the continuous adjustment of footwear wedge to foot volume, all the time.

**[0002]** The present invention aims to address a problem commonly identified by people in general, namely wedge discomfort which arises from foot volume variability throughout the day, as a result of dimensional stiffness of sole and vamp size. The solution presented, sole and vamp of variable size, is made from a combination of several different components, an insole and an outsole, which engage pivotably, adjusting to one another and that, based on technical characteristics of the plantar structure, materials of high elastic capacity, and its process of vamp connection, the upper part of footwear, provide the footwear natural sliding and enlargement which naturally adjusts to the variable volume of the foot.

### BACKGROUND OF THE INVENTION

**[0003]** Since the dawn of human history that man produces clothing to cover the body. In this clothing, feet have always had its importance and specificity in such way that it was created the "footwear" concept which means "to dress feet". First footwear had as its unique function to protect the feet from the environment. Later on it started to have an aesthetic function. Through the centuries until the twentieth century, footwear also had a symbolic function which, according to ages and cultures, could be a symbol of social status, politics, beauty, etc. In the nineteenth century the design concept was born, though it is only in the twentieth century that it is really developed and implemented. The design concept in its broad sense means "form follows function", i.e., the aesthetic form is inextricably connected to the function of the object. In the case of footwear, its current function is dependent on a number of factors such as the activities carried out by people, the environment, and the physical characteristics of people, among others. So since the twentieth century it started a differentiation in footwear, emerging specific footwear according to occupations and sports, each with formal and functional characteristics in accordance to such professions and sports specificities, or the requirements of simple current use.

**[0004]** Along with the evolution of the design concept arises a new and growing concern, the footwear comfort, a characteristic that previously was almost entirely overlooked, in order to meet up aesthetic and symbolic standards according to ages and cultures. Although this still happens in some areas of footwear, especially in fashion footwear, the concept of comfortable footwear nevertheless has been growing and becoming more relevant, footwear items with relevant comfort features are increasingly emerging in the market.

**[0005]** What is intended with sole and vamp of adjustable size, or "adjustable size footwear" is to create a comfortable footwear to casual walking in general and suitable for a large number of individuals, fitting different types of feet and the dimensional variability that occurs throughout the day.

**[0006]** It is known that the morphology of the feet is variable depending on age, race, gender, specific physical states such as pregnancy or diabetes, and the weather conditions to which individuals are exposed. The same foot exposed to cold or heat has different physical characteristics throughout the day, by the morning feet have a different volume than they have at night. The same individual has different feet, whether minimal or significant differences. Moreover, the walking exercise itself causes changes in the shape of the foot resulting from the forces applied when different parts of the foot interact with the ground, and also because when a person is in the standing position, the foot expands and while in the sitting position, relaxation, the foot twitches.

**[0007]** The universalization of footwear sizes, matching standardized measures which serve as mould to footwear inner volume, is too restrictive, since it assumes that to the length of each foot corresponds a given width and volume. Today there are already some patterns whose sizes relate length with some predetermined widths, still that is far from adequate to provide the right measures of each user.

**[0008]** It is based on these facts and in order to meet the need of having a footwear which can be of flexible dimensions, that the proposed concept of "adjustable size footwear" arises, grounded on innovative technical structure as well as in the use of polymers elastomers materials, it presents the ability to expand naturally, adjusting the dimensional variability of the foot. The footwear to be produced with this type of adjustable sole and vamp, will thus have features that allow it to adapt to the morphology of each foot and to the described above physical changes occurred giving it a constant comfort.

**[0009]** The problematic associated with footwear comfort is therefore an increasing concern in consumer markets, both due to the progressive increase of aging, and to a greater awareness of the importance of foot comfort in the our quality of life and global performances.

**[0010]** The supplier market today also offers solutions addressing comfort, however, in accordance with market studies and with earlier searches in the state of the art, it was not found any solution directed at the concept of comfort-oriented to "adjustable size footwear" or any degree of similarity to the invention here presented. The solutions founded in the state of the art, always point at technical performances regarding the vamp, the upper part of the footwear, by integration of materials and/or

processes that impart greater elasticity, though this should not be interpreted strictly as elasticity, but as "strain", and/or actions in which footwear is treated as a whole involving, in this case, combined actions between the upper part of the footwear, sock, sole, and complex and expensive construction processes.

**[0011]** From the prior art are cited, by way of example, the following prior inventions, more closely related: The document U.S. 2007/0039208 A1, describes an "adaptable shoe with expandable sole", where the solution indicated presents not an adaptable sole and vamp set but a technical intervention on the upper part of the shoe, combined with an assembling system that associates a set of parts that constitute the sole, in that this comprises a first segment, a second segment located adjacent and coplanar to the first, and its size variability is achieved not by the adaptability of sole and vamp set, as in the present invention, but rather through a deformable component connecting the first and the second segment. Also the solution provided for the sole is in no way similar to the present invention.

**[0012]** Mention is also made to DE 3507295 Al, which presents a "sole" which, although also provides a solution of a sole consisting of several layers, in a different way of the solution presented in the present invention, the sole does not expands together with the vamp, so as to adapt to the foot dimensional variability. It is a damping solution where the cylindrical spikes enter in the middle and lower layers, according to the pressure performed by the foot or to the hardness of the surface.

## SUMMARY OF THE INVENTION

**[0013]** The present invention, "adjustable size footwear (4)" refers to a type of footwear composed by a variable size sole (1) combining two components, a insole (2) and an outsole (3) which engage with each other, pivotally to each other, and a vamp (4.1), upper part of footwear, connected together by simple sewing or through other joining process (4.2).

**[0014]** The two components of the variable size sole (1), insole (2) and outsole (3) are made from elastomer polymer material and engaging between them is made in such a way that the variable size sole (1) expands its dimensions by adjusting the shape of the foot at each moment, through the action of sliding between the two components, the insole (2) and outsole (3). This phenomenon is possible due to the dimensional and technical compatibilization of the structure of each of the component soles, insole (2) and outsole (3) forming the variable size sole (1), together with the materials that are produced and with the process of assembling of the shoe, and union of variable size sole (1) with the vamp (4.1).

**[0015]** The adjustable size footwear (4) made in this manner, when put on by the user, the vamp fitting cavity (4.1) may enlarge by action of the foot forces exerted inside the footwear, causing the extension of the variable size sole (1) by sliding between the insole (2) and outsole (3), which means that the whole shoe extends in the metatarsal area, naturally adjusting to the dimension and variation of foot volume in every moment and returning to the original state when the shoe is removed, by action of the memory characteristics of the involved elastomers materials.

## BRIEF DESCRIPTION OF DRAWINGS

**[0016]** The detailed description presented in the following section is made with reference to the drawings attached herewith only by way of reference without limitation, where:

Figure 1 - schematic representation of the variable size sole (1), consisting of the insole (2) and outsole (3);

Figure 2 - schematic representation of the plantar structure of the insole (2) of the corresponding views: lateral (2.1), track (2.2), and section AA;

Figure 3 - schematic representation of the plantar structure of the outsole (3) of the corresponding views: inner (3.1), lateral (3.2), track (3.3) and section AA;

Figure 4 - schematic representation of the plantar structure of the variable size sole (1) of the corresponding views: lateral (1.1), track (1.2), section AA and section BB;

Figure 5 - Schematic representation of the adjustable size footwear (4);

Figure 6 - schematic representation of the view of the adjustable size footwear track in natural position (4.a) and in extension position (4.b);

Figure 7 - schematic representation of the adjustable size footwear (4) of the variable size sole (1) and in natural position (4.a) and in extension position (4.b).

## DETAILED DESCRIPTION OF THE INVENTION

**[0017]** By reference to the accompanying drawings "adjustable size footwear" (4) presented in the present invention is characterized by the following structure and operation: Referring to Figure 1, the variable size sole (1) is constituted by the combination of two components, a insole (2) which engages within an outsole (3). Both, insole (2) and outsole (3) are made of elastomeric polymeric materials with densities and thicknesses such that guarantee the necessary and sufficient elasticity for this purpose.

**[0018]** Referring to Figure 2, the insole (2) comprises a plantar structure with a lateral contour edge (2.1) and a track (2.2) that assembles a set of volumetric elements

in the form of projecting surfaces (201), (202), (203) coupled to the base, which according to the lateral view (2.1) and section AA are constructed with inverted-I section, in which the geometry of smaller dimension is coupled to the base of the track and the larger geometry corresponds to the ground contact area. The track (2.2) thus formed is characterized by a base structure on which are coupled to the projecting surfaces (201), (202), (203) giving it an appearance of embossed elements and giving to the base a combination of spacing between them.

**[0019]** Still with reference to Figure 2, the track (2.2) is characterized by the following characteristics: at the front part integrates two groups of projecting surfaces (201) of trapezoidal rectangular top geometry with rounded vertices, a projection (202) of circular geometry in the waist area and two sets of projecting surfaces (203) of square and semicircular geometry in the heel area. Both groups of projecting surfaces (201) are longitudinally separated from each other by a curvilinear line space corresponding to front plantar arc curvature of the foot. In each group the projecting surfaces (201) are oriented according to their greater length towards the sole width and are parallel and sequentially arranged to each other in small uniform spacing along the sole length. More elongated dimensions in the group corresponding to the inner side of the sole and shorter dimensions in the group corresponding to the outer contour are presented by the projecting surfaces (201). Similarly, the two sets of projecting surfaces (203) are longitudinally separated from each other by a curvilinear line spacing corresponding to the foot plantar support curvature.

**[0020]** Referring to Figure 3 the outsole (3) consists of a high side contour edge plantar structure (3.2) imparting the sole a high inner housing (3.1). This contour edge (3.2) is characterized by two different thicknesses, being the top contour edge (300) of lesser thickness. In accordance with the view of the track (3.3) and section AA, the base of the outsole (3) consists of a composition of slits (301), (302), (303) with geometry compatible to the projecting surfaces (201), (202), (203) of the insole (2) and from which the engagement between the two soles, inner (2) and outer (3) will occur resulting in the variable size sole (1). Still with reference to the track view (3.3) should be emphasized that in the wider area of plantar structure, the metatarsals area, two slits groups of (301) type transversely arranged to the length of the sole become evident, being more elongated in the insole area and shorter in the outsole area and arranged according with a slightly curved line consistent with the characteristics of the human foot plantar plan. The slits thus designed give the plantar base a strips form structure with the particularity to impart elastic effect. This elasticity is thus achieved through the elastic features strips (304) resulting from the intervals of the slits (301), (302), (303) of the outsole (3).

**[0021]** Referring to Figure 4 should be emphasized that the variable size sole (1) results from combination and fully articulated engage between the insole (2) and outsole (3), wherein elements (201), (202), (203) of the insole (2) pivotally fit the slits (301), (302), (303) of the outsole (3), and when subjected to external stresses may slide between them as elastics, i.e. naturally adjusting to the foot dimensional structure.

**[0022]** Referring to Figure 5, the adjustable size footwear finished (4) is obtained from the connection of the variable size sole (1) to the vamp (4.1) by means of lateral seams (4.2) between the two parts, or other junction system.

**[0023]** Referring to Figure 6, it illustrates the adjustable size footwear (4) in its natural form or initial state (4.a) and in its state of expansion (4.b) when subjected to effort variation produced by foot volume variation.

**[0024]** Referring to Figure 7, the mode of operation of the adjustable size shoe (4) system of expansion is exemplified:

**[0025]** when the adjustable size footwear (4) is subjected to efforts produced by foot volume variation, the elastic strips (304) of outsole (3) elongate causing the stretching (305) which slides over the insole (2) producing the effect of enlargement (306) of the adjustable size footwear (4) as a whole, ensuring the footwear total adjustment to the foot size.

**[0026]** Still with reference to Figure 7, it illustrates in section, the shoe (4.a) in its initial position presenting the vamp (4.1), the insole (2), the outsole (3) and a sock (6). The same Figure 7 also illustrates the adjustable size footwear (4) in a state of extension (4.b), showing the enlargement system in action, i.e., the outsole (3) extends and slides over the insole (2) leading to the enlargement (305); in this way the sole set of variable size (1) carries along the vamp (4.1), since this is sewn only to it and to no other internal component of the footwear, thus yielding the enlargement (306) of the lateral part of the shoe. The insole (2) and the sock (6) are flexible and due to the force exerted by the foot inside the shoe, they are able to fit the shape acquired by the variable size sole (1), thereby creating the dynamic adjustment to the foot according to its volume variability.

## Claims

1. Adjustable size footwear (4) **characterized in that** a variable size sole (1) combining several components, in particular an insole (2) and an outsole (3) made of elastomer polymer material, and a vamp (4.1), said insole (2) fits inside the outsole (3), being formed by a plantar structure with a lateral contour edge (2.1) and plantar track (2.2) with projecting surfaces (201) positioned with the elongated dimension towards the width, arranged sequentially and in parallel with each other according to small uniform spacing towards length, with more elongated dimensions in the inner group and shorter dimensions in the group of external side; projecting surfaces (202) in the region of waist and two groups of projecting sur-

faces (203) in the heel area (203), with all said projecting surfaces coupled to the base and the outsole (3) made by a plantar structure provided with a lateral contour edge in box (3.2), top edge (300) and plantar base (3.3) with silts (301), (302) (303) and strips (304), wherein, the combination of said projecting surfaces and said silts allows insertion and fitting of the insole (2) inside the outsole (3) producing the variable size sole (1) with expansion characteristics when subjected to the action of the foot inside the footwear.

2. Adjustable size footwear (4) according to previous claim **characterized in that** the projecting surfaces (201), (202), (203) being constructed with inverted-I section geometry, wherein the narrow geometry is coupled to the plantar structure and the wider geometry get into contact with the ground.

3. Adjustable size footwear (4) according to claim 1, **characterized in that** the lateral contour edge in high box (3.2) be constructed with material of two different thicknesses, being the top contouring edge (300) of the thin thickness.

4. Adjustable size footwear (4) according to claim 1, **characterized in that** the plantar base (3.3) be formed at the front by a set of silts (301) of trapezoidal rectangular geometry, arranged sequentially and in parallel to each other along the length of the sole and separate into two groups according to a longitudinal curved line, wherein the elongated slits are positioned on the inner side of sole, and more short slits positioned on the outer side by a slit (302) of circular geometry arranged in the waist area, and by slits (303) of square and semicircular geometry arranged in the heel area, which set form a strips structure (304).

5. Adjustable size footwear (4) according to the claim 4 **characterized in that** the slits (301) have position, direction and spacing equivalent to the projecting surfaces (201), (202), (203) and dimensions corresponding to the smaller T-section dimension of the projecting surfaces, resulting in a strips structure (304) with elastic characteristics, imparting expansion ability to the outsole (3) by action of external forces.

6. Adjustable size footwear (4) according to claim 5 **characterized in that** the strips (304) elongate longitudinally and transversely causing expansion of the width of the sole.

7. Adjustable size footwear (4) according to claim 1 **characterized in that** connection to the vamp is done by sewing to the top edge (300), or another type of joint.

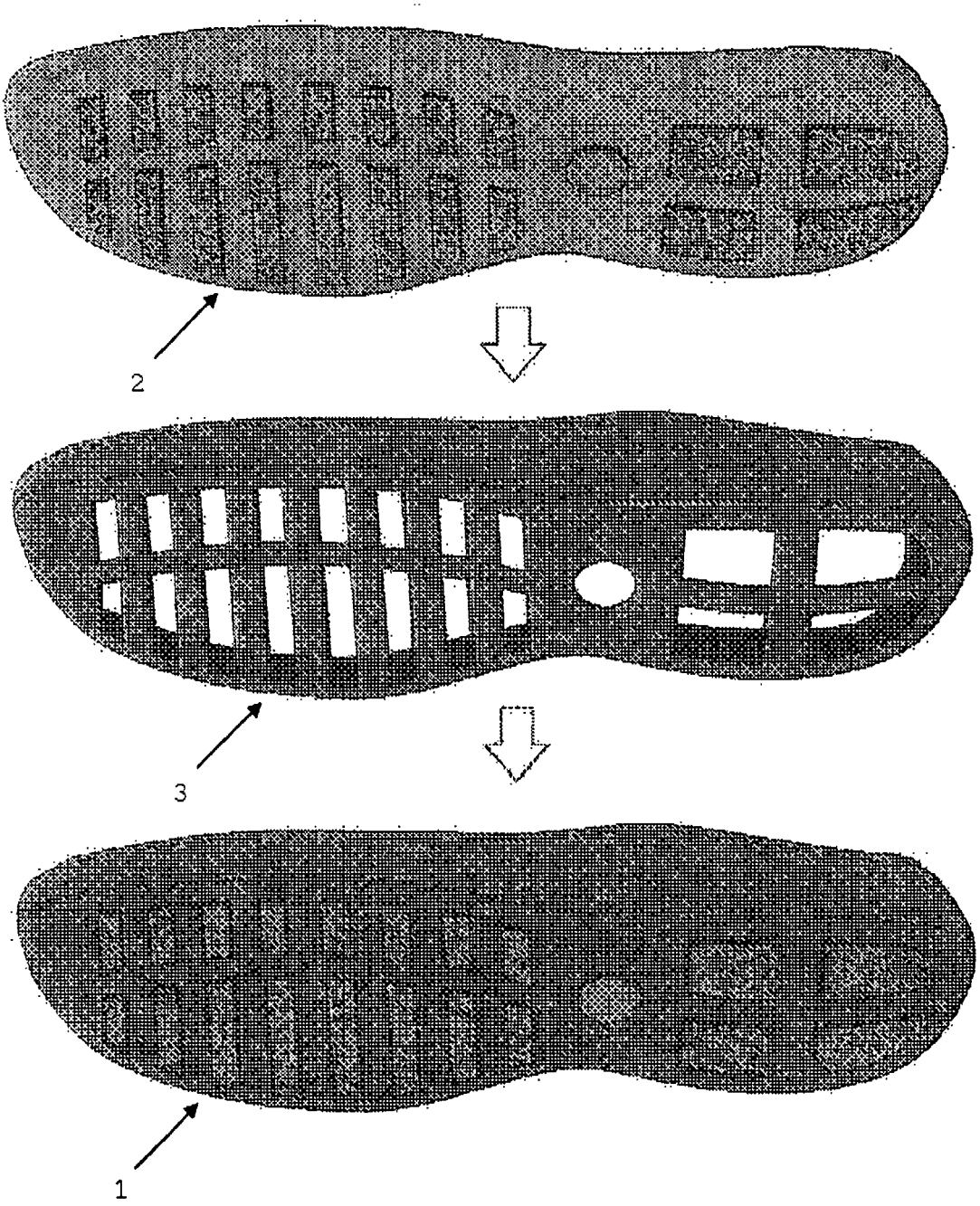


Figure 1

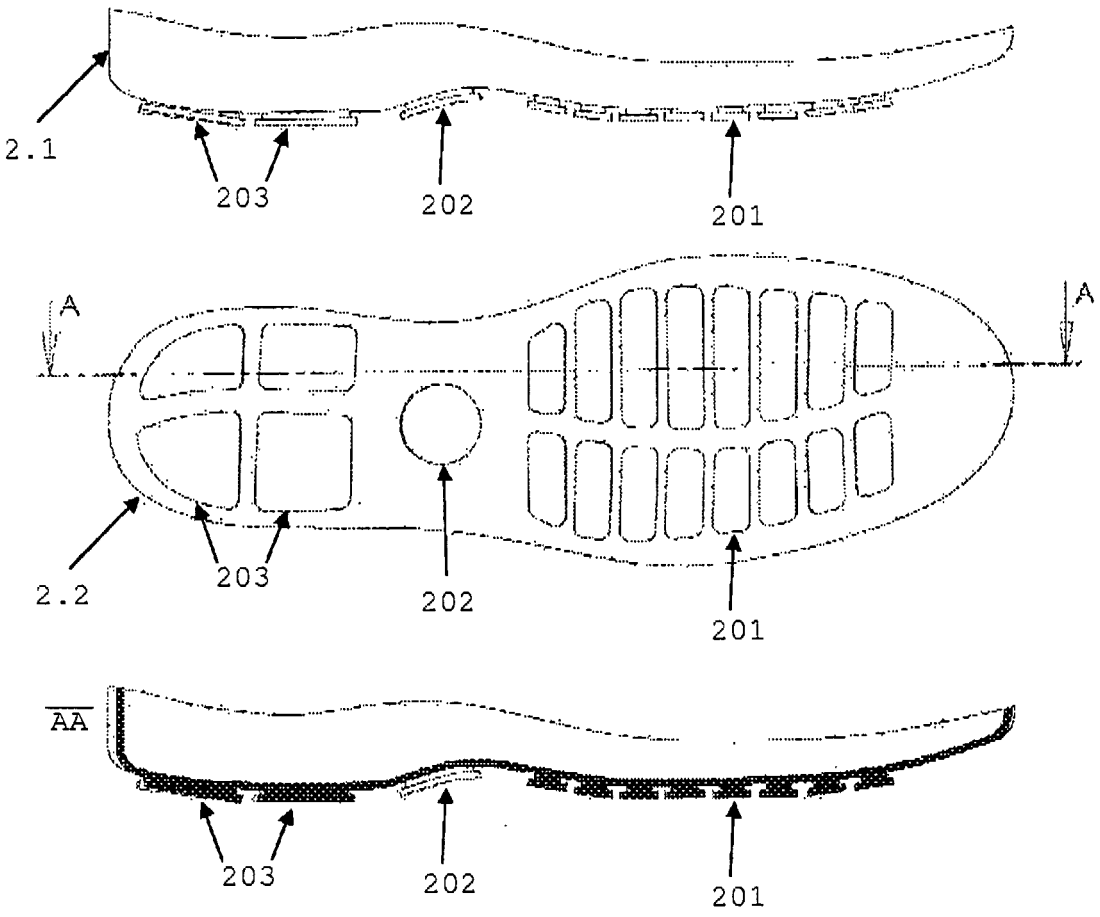


Figure 2

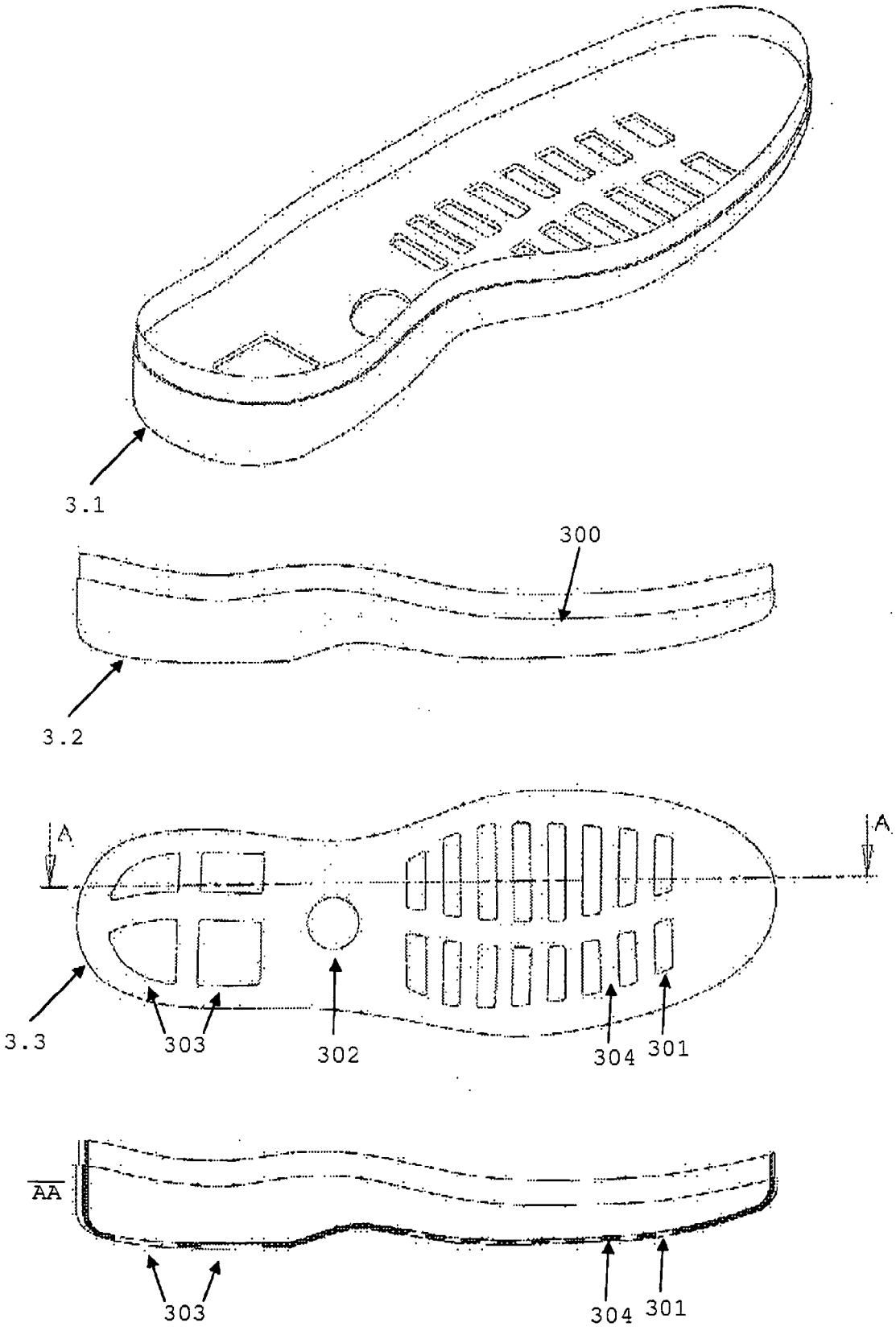


Figure 3

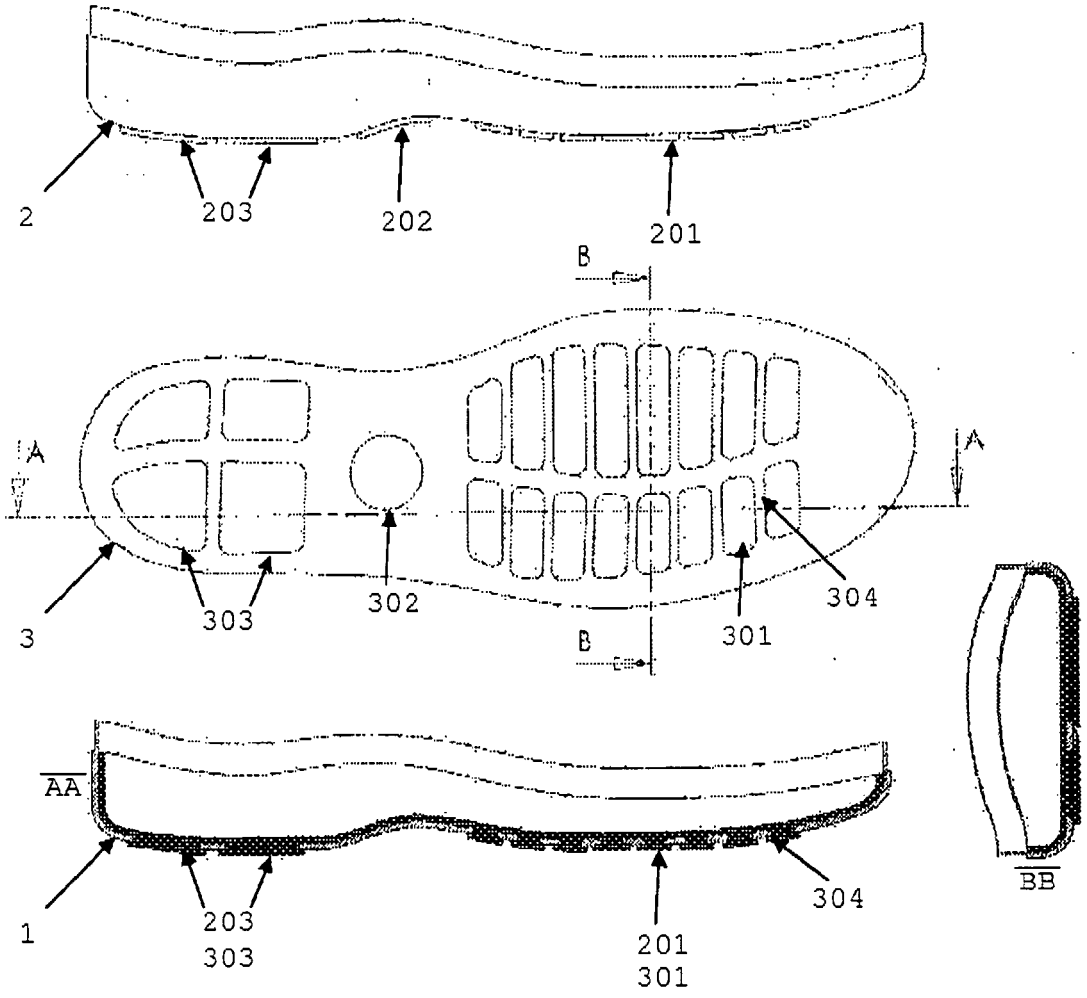


Figure 4

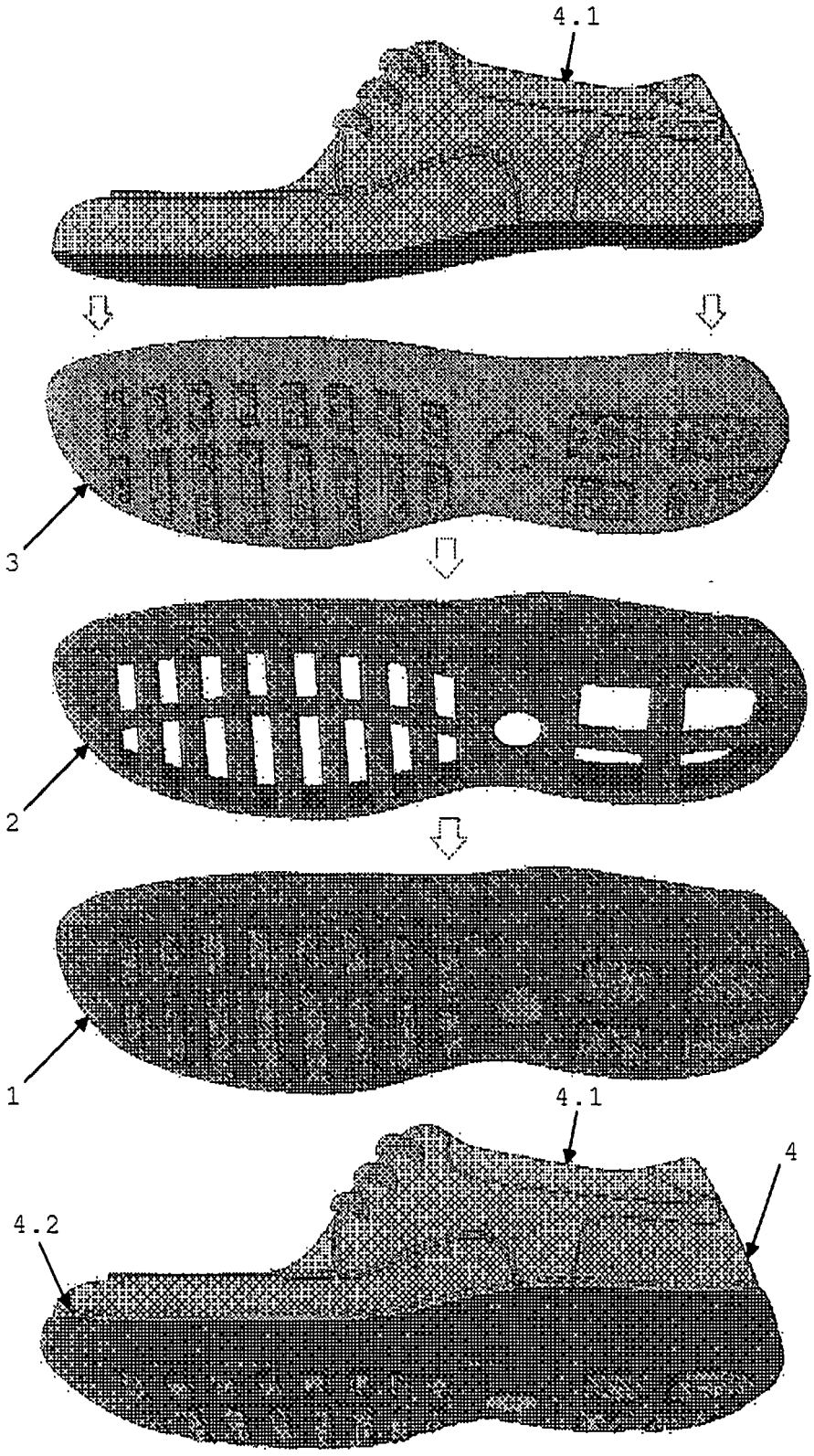


Figure 5

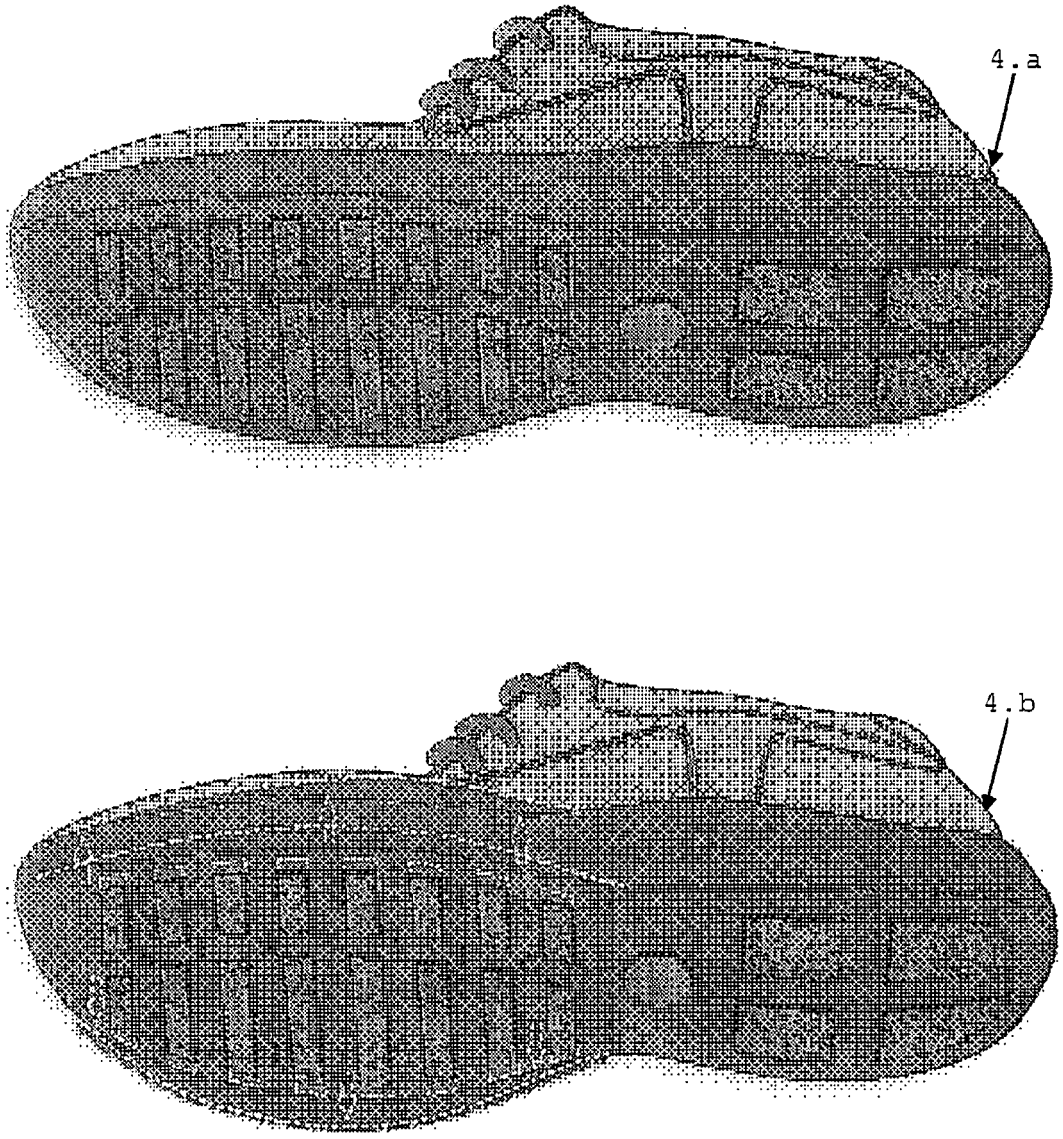


Figure 6

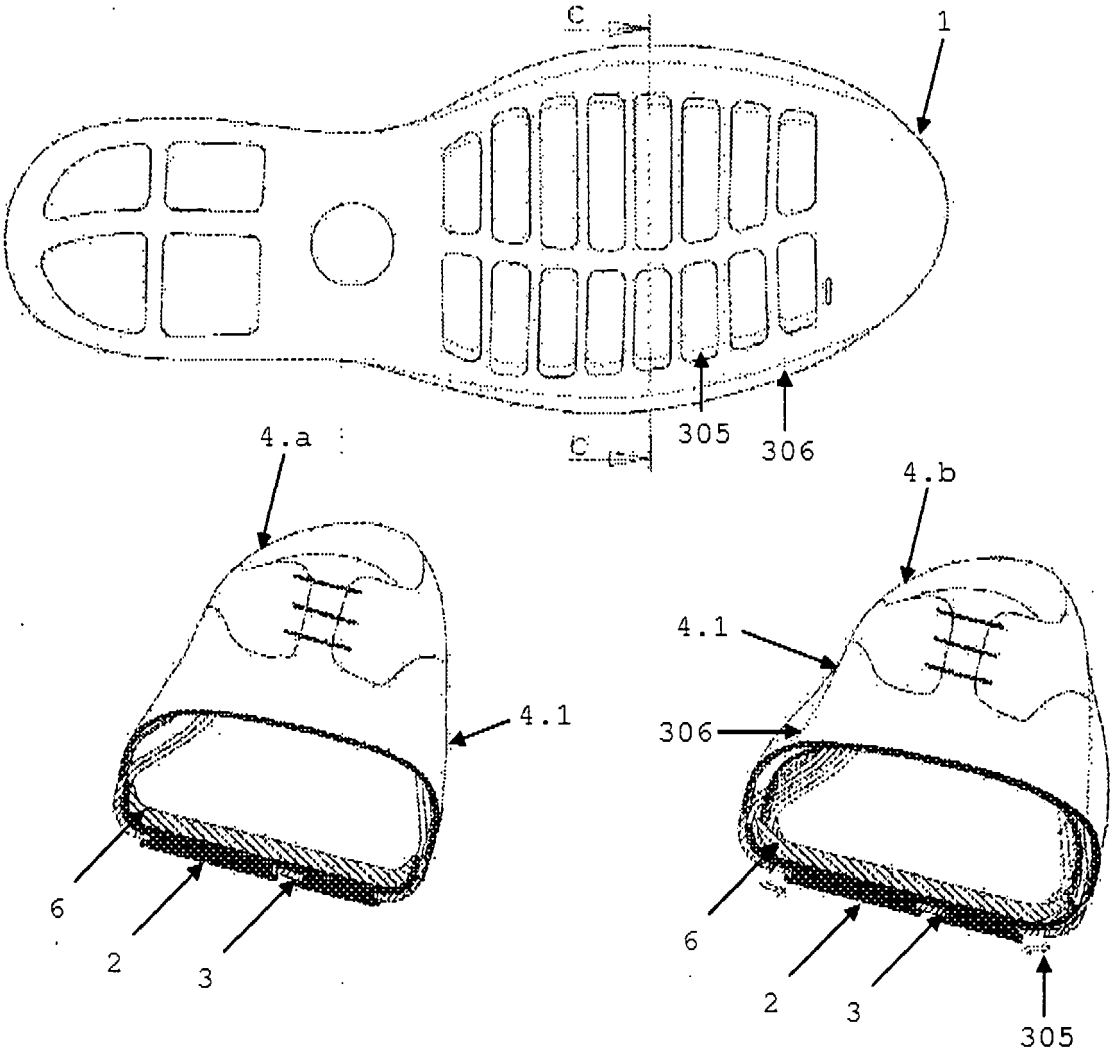


Figure 7

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Application Number
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The present search report has been drawn up for all claims

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
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