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(54) **SOLE WITH DOUBLE CUSHIONING**

(57) A shoe sole with double shock absorption, made in a single piece and of elastic material, with a bottom side and a top side, first burrs that project from the bottom side towards the top side and hollows of such first burrs, each lateral wall of such first burr is interrupted by a lateral channel that divides said lateral wall into a top section and a bottom one, the hollow comprising a bottom wall

that is parallel to that of the first burr, coinciding with a section of said bottom wall is arranged a wall that slopes towards the lateral wall of the first burr, and coinciding with at least one lateral wall of the first burr a slat projects towards the inside of the hollow, said slat comprising a top face that is part of the top side of the sole and a bottom face towards the inside of the hollow.

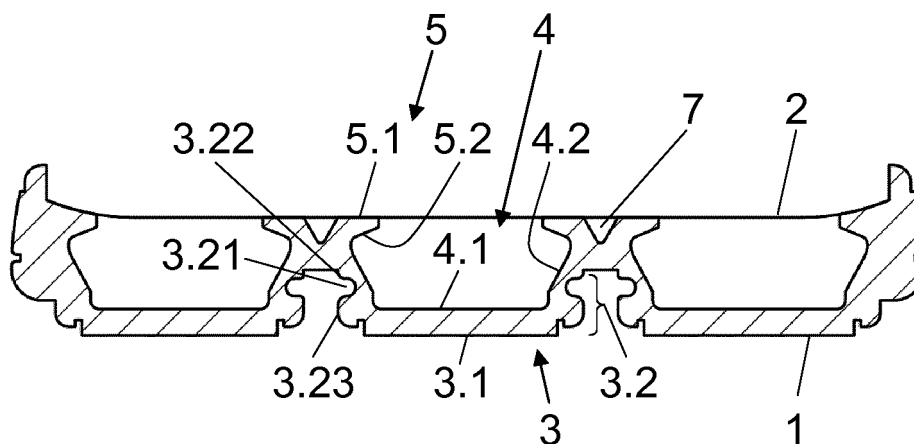


Fig. 1

Description

TECHNICAL FIELD OF THE INVENTION

[0001] This invention falls within the field of the soles with shock absorption for footwear.

[0002] Said invention is a shoe sole with double shock absorption, made in a single piece and of elastic material, with a bottom side and a top side, first burrs that project from the bottom side and hollows for such first burrs, each lateral wall of such first burr is interrupted by a lateral channel that divides said lateral wall into a top section and a bottom one, the hollow comprising a bottom wall that is parallel to that of the first burr, coinciding with a section of said bottom wall is arranged a wall that slopes towards the lateral wall of the first burr, and coinciding with at least one lateral wall of the first burr a slat projects towards the inside of the hollow, said slat comprising a top face that is part of the top side of the sole and a bottom face towards the inside of the hollow.

BACKGROUND OF THE INVENTION

[0003] Amongst the known shock absorption systems there are models of the shock absorber type (called "shock absorber", "air", etc.).

[0004] Under these headings or other similar ones we find shock absorption systems that only specify one or several areas of the sole or the heel that have a channel embossed therein (many times presented in a different colour in order to grab the consumer's attention), but this does not have any effective shock absorbing effect.

[0005] Some of these systems only have in the inside part of the sole, coinciding with the specific outside area mentioned above, a hollow so that it gives in when stepping on it, but this area is so small within the entirety of the sole or heel that the shock absorbing effect is reduced to a small area of the whole, and therefore its effect is very small.

[0006] Others only have on the outside the aforementioned stud, but on the inside of the sole they do not even have the hollow that coincides with the outer stud, resulting in an entirely solid surface.

[0007] Patent WO2009118055 shows studs with a continuous profile that weakens the thickness of material at the bottom of the sole or heel, and therefore the entire column of material of each stud must be compressed in order to provide a shock absorbing effect. This is very similar to Patent WO2010052078, which combines circular and square studs.

[0008] This invention overcomes said disadvantages in the state of the art with a shoe sole with double shock absorption.

DESCRIPTION OF THE INVENTION

[0009] The present invention is established and characterised in the independent claims, while the dependent

claims describe additional characteristics thereof.

[0010] This invention relates to a shoe sole with double shock absorption for footwear, the aim of which is to provide a sole made in a single piece of elastic material with two areas that are capable of absorbing irregularities in the terrain and the tread, that is, two areas that complement one another in order to achieve a flexing and adaptation of the sole both to the user's tread and the terrain the sole is going over. The technical problem to be solved is configuring a sole made in a single piece so that it has two shock absorption areas.

[0011] The sole of the present invention is made in a single piece from elastic material, that is, it is made in a single piece, typically in rubber, although it could be made in other commonly used materials such as polyurethane or any flexible material, injected or cast, usually by closed molding.

[0012] The sole comprises a bottom side and a top side, some first burrs that project from the bottom face towards the top face and hollows for said first burrs from the top face towards the bottom face. The sole thus exhibits configurations projecting towards the ground upon which the sole will rest, which shall inherently have a certain capacity for collapsing, both by flexing and by compression and buckling, and therefore they potentially have a capacity to absorb stresses coming from the user's tread as well as the irregularities of the terrain.

[0013] As is known, each first burr comprises a bottom wall and side walls starting from the bottom wall towards the top face, such that the bottom walls of the first burrs configure in their entirety a discontinuous contact surface for the sole. Thus, each burr forms a kind of "stud" the bottom surface of which is the one that rests on the floor; the entirety of all the bottom surfaces of all the "studs" of the sole result in the contact surface of the sole. The distribution of the burrs on the sole is not limited to a specific area nor is it compulsory over the entire sole, but rather they can be placed and extended wherever required, for example, they could be arranged only on the tip, or only on the middle part, or only on the heel, and these areas may be combined as desired.

[0014] The sole is characterised in that each lateral wall of the first burr are interrupted by a lateral channel that divides said lateral wall into a top section and a bottom section, the hollow comprising a bottom wall that is parallel to that of the first burr, coinciding with a section of said bottom wall is arranged a wall that slopes towards the lateral wall of the first burr. This configuration provides a first shock absorption due to the combination of the elements as described. The lateral channel located in the lateral wall together with the hollow and the sloping wall thereof allow the burr to work such that it flexes and compresses in a stable and recoverable manner. The configurations, as described, may extend to a part of the perimeter of the burrs or they may cover the entire perimeter thereof, depending on the requirements and the configuration of the burrs. For example, burrs with a square profile may only require the configurations ex-

posed on one side, although they could be arranged on two, three or the four sides.

[0015] Moreover, the sole is characterised in that coinciding with at least one lateral wall from the first burr a slat projects towards the inside of the hollow, said slat comprising a top side forming part of the top side of the sole and a bottom side towards the inside of the hollow. These configurations give rise to what we shall call a second shock absorption, with a kind of "sheets" that flex and collaborate towards the compression of the burrs to provide the sole with double shock absorption. As with the burrs, the slats may be arranged along a section of the hollow or along the entire perimeter, in concordance or not with the channel of the burrs.

[0016] As an option, in order to increase the stability of the sole, the lower section of the lateral wall of each first burr is arranged at a greater distance from the centre of the burr than the top section; thus increasing the contact surface of the sole, which is interesting for applications of floors for terrains with poor adherence, as in places with a lot of rainfall, for example.

[0017] We have seen that an optimal option is for the slanted wall of the hollow to be at the same height as the lateral channel of the first burr, such that they both collaborate in the flexing and compression of the structure, since the channel allows the folding of the wall of the burr and the slanted wall guides said folding such that it is the most vertical and stable possible.

[0018] The slats of a first burr may be connected to one another or not. When connected to one another they form a closed structure that supports more vertical stresses, but make it more difficult to unmold the hollow. When they are not connected to one another their strength by burr is smaller but they allow less demolding. It is clear that the most convenient option shall be chosen depending on the requirements in each case.

[0019] The orientation of the slats affect their shock absorbing behaviour, and they may thus be horizontal, or in order to increase their effect they may be tilted at an angle of less than 180° with respect to the top side, so that they project above the surface of said top side and work as a laminar spring. This option may be convenient to absorb greater stresses, such as in very heavy users, although they will require greater vertical space than when they are horizontal.

[0020] Another option for increasing the load range that a slat can bear consists in arranging a gusset between each slat and their corresponding lateral wall. This also helps in the recovery of the slat after flexing.

[0021] The burrs work and operate independently, however, they are placed continuously in order to form a lattice. In order to maintain the operating independence of each burr, we have seen that the option of arranging a hollow that is open towards the top side on the joined lateral walls of two first contiguous burrs is advantageous.

[0022] A variation to the exposed first burrs are second burrs that collaborate with the first in the behaviour of the

sole, preferably by placing these second burrs in areas of greater load such as the heel.

[0023] The second burrs thus project from the bottom side towards the top side and hollows of such second burrs project from the top side towards the bottom side, each second burr comprising a bottom wall and lateral walls that start from it towards the top face, such that the lower walls configure as a whole a discontinuous contact surface for the sole, each side wall of the second burr is interrupted by a lateral channel that divides said lateral wall into a top section and a bottom section, the hollow comprising a bottom wall that is parallel to that of the second burr, coinciding with a section of said bottom wall is arranged a wall that is tilted towards the lateral wall of the second burr. These elements of these second burrs are analogous to those of the first burrs, what is different is that instead of slats, above the joined lateral walls of two contiguous second burrs is arranged a vertical partition wall the top side of which is part of the top side of the sole. Due to its construction, the vertical partition works as a vertical column, requires a greater load than if said column were arranged horizontally and fixed on one end, as a cantilever beam, which is how the slats are arranged; this vertical partition thus provides a greater load bearing, as has been mentioned that can happen in the heel area.

[0024] Similarly to the first burrs, in these second burrs the bottom section of the side wall of each second burr is arranged at a greater distance from the centre of the burr than the top section, thus increasing the contact surface on the ground.

[0025] One option so that the vertical partition is not too stiff is that in some section of said partition it has the top side under the top side of the sole, such that the section of the partition is smaller at some point, making it weaker, which can be ideal in order to achieve an intermediate shock absorption between the sheets and a partition with a constant height.

[0026] One special feature of the above is that the section is below the top side of the sole corresponding to the side end of the partition, so that the joint of the partition to the element it is joined to is weakened, making it weaker and improving its independent operation.

[0027] One advantages of the sole is that with a minimum thickness of material we achieve the intended effect of shock absorption, and therefore the sole weighs less and can be cheaper since it requires less material.

[0028] Another advantage is that we achieve great comfort, since the burrs are compressed easily, and thus provide a pleasant floating feeling.

[0029] Another advantage is that when the air in the burrs compresses it moves and provides a refrigerating effect by providing an airflow towards the inside of the shoe.

BRIEF DESCRIPTION OF THE DRAWINGS

[0030] This specification is supplemented with a set of

drawings illustrating the preferred embodiment, which are never intended to limit the invention.

Figure 1 shows a cross section of the sole with the first burrs.

Figure 2 shows a detail in cross section of the first burrs where between each slat and its corresponding lateral wall there is a gusset, and the bottom section of the lateral wall of each first burr lies at a greater distance from the centre of the burr than the top section.

Figure 3 shows a detail in cross section of the second burrs.

Figure 4 shows a perspective view of the side towards the cut of a sole with first burrs in the front area of the sole and with second burrs in the middle and rear areas of the sole.

Figure 5 shows a detail in longitudinal section of the sole of Figure 4.

Figure 6 shows a perspective view of the side towards the floor of the sole of Figure 4.

Figures 7A and 7B show respectively a first burr without compression and when compressed.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT OF THE INVENTION

[0031] An embodiment of the invention with reference to the figures provided is described below.

[0032] Figure 1 shows a cross section of a shoe sole with double shock absorption for footwear, made in a single piece from elastic material, comprising a bottom side (1) and a top side (2), first burrs (3) that project from the bottom side (1) towards the top side (2) and hollows (4) in said first burrs (3) from the top side (2) towards the bottom side (1), each first burr (3) comprising a bottom wall (3.1) and lateral walls (3.2) that start from there towards the top side (2), such that the bottom walls (3.1) of the first burrs (3) configure as a whole a discontinuous contact surface for the sole.

[0033] The sole is characterised, as shown in Figure 1, in that each lateral wall (3.2) of the first burr (3) is interrupted by a lateral channel (3.21) that divides said lateral wall (3.2) into a top section (3.22) and a bottom section (3.23), the hollow (4) comprises a bottom wall (4.1) that is parallel to that of the first burr (3), coinciding with a section of said bottom wall (4.1) is arranged a wall (4.2) that is slanted towards the lateral wall (3.2) of the first burr (3), said wall being approximately at the same height as the lateral channel (3.21) from the first burr (3), and coinciding with at least one lateral wall (3.2) of the first burr (3) a slat (5) projects towards the inside of the

hollow (4), said slat (5) comprising a top side (5.1) that forms part of the top side of the sole (2) and a bottom side (5.2) towards the inside of the hollow (4), and in the joined side walls (3.2) of two contiguous first burrs (3) a hollow (7) is arranged that is open towards the top side (2), which in the embodiment shown coincides with the entire length of the wall (3.2), although it could be located only along a certain section.

[0034] Figure 2 shows a variation wherein the bottom section (3.23) of the lateral wall (3.2) of each first burr (3) is arranged at a greater distance from the centre of the burr (3) than the top section (3.22); moreover, between each slat (5) and its corresponding lateral wall (4.2) there is a gusset (6) that helps the slat (5) to recover after flexing.

[0035] Figures 1 and 2 show horizontal slats (5), which as an option may be slanted at angle of less than 180° with respect to the top side (2).

[0036] Figure 3 shows a cross section of a sole with second burrs (8) that project from the bottom side (1) and hollows (9) of such second burrs (8) from the top side (2) towards the bottom side (1), each second burr (8) comprising a bottom wall (8.1) and lateral walls (8.2) that start from it towards the top side (2), such that the bottom walls (8.1) configure as a whole a discontinuous contact surface for the sole, each lateral wall (8.2) of the second burr (8) is interrupted by a lateral channel (8.21) that divides said lateral wall (8.2) into a top section (8.22) and a bottom section (8.23), the hollow (9) comprises a bottom wall (9.1) that is parallel to that of the second burr (8), coinciding with a section of said bottom wall (9.1) is a wall (9.2) that is slanted towards the lateral wall (8.2) of the second burr (8), on top of the joined lateral walls (8.2) of two contiguous second burrs (8) is arranged a vertical partition (10) the top side (10.1) of which is part of the top side (2) of the sole.

[0037] Similarly to that represented in Figure 2 for the first burrs (3), in the second burrs (8) the bottom section (8.23) of the lateral wall (8.2) of each second burr (8) can be arranged at a greater distance from the centre of the burr (8) than the top section (8.22), not shown in the figures.

[0038] Figures 4 and 6 show different perspective views of a sole that is called mixed because it has in the front first burrs (3) and in the rear it has second burrs (8), both being square. In particular, the slats (5) of each first burr (3) are not connected to one another, although they could be; also, in the second burrs (8) the vertical partition (10) in some sections has the top side (10.1) under the top side (2) of the sole, in this case at each partition (10) joint, although it could also be at the lateral ends thereof. This configuration benefits from the fact that even having only burrs (3, 8) on the front, corresponding to the toe, and rear, corresponding to the heel, there are hollows (4, 9) also in the middle part of the type of the second burrs (9), since the height of said middle part thus allows.

[0039] Figure 5 shows a longitudinal section of the sole of Figures 4 and 6, said section passing through the ver-

tical partitions (10) of the second burrs (8) in the middle part and the rear or heel of the sole.

[0040] Figures 7A and 7B show respectively a first burr (3) without compression and compressed, wherein we can observe the collaboration of the parts of the burr for a simple and directed compression.

Claims

1. A shoe sole with double shock absorption for footwear, made in a single piece from elastic material, comprising a bottom side (1) and a top side (2), first burrs (3) that project from the bottom side (1) towards the top side (2) and hollows (4) of such first burrs (3) from the top side (2) towards the bottom side (1), each first burr (3) comprising a bottom wall (3.1) and lateral walls (3.2) that start there towards the bottom side, such that the bottom walls (3.1) of the first burrs (3) configure as a whole a discontinuous contact surface for the sole, **characterised in that** each lateral wall (3.2) of the first burr (3) is interrupted by a lateral channel (3.21) that divides said lateral wall (3.2) into a top section (3.22) and a bottom section (3.23), the hollow (4) comprising a bottom wall (4.1) that is parallel to that of the first burr (3), coinciding with a section of said bottom wall (4.1) there is arranged a wall (4.2) that is slanted towards the lateral wall (3.2) of the first burr (3), and coinciding with at least one lateral wall (3.2) of the first burr (3) a slat (5) projects towards the inside of the hollow (4), said slat (5) comprising a top side (5.1) that is part of the top side (2) of the sole and a bottom side (5.2) towards the inside of the hollow (4).
2. A sole according to claim 1 wherein the bottom section (3.23) of the lateral wall (3.2) of each first burr (3) is arranged at a greater distance from the centre of the burr (3) than the top section (3.22).
3. A sole according to claims 1 or 2 wherein the slanted wall (4.2) of the hollow (4) is at the same height as the lateral channel (3.21) of the first burr (3).
4. A sole according to claims 1, 2 or 3 wherein the slats (5) of a first burr (3) are connected to one another.
5. A sole according to claims 1, 2 or 3 wherein the slats (5) of a first burr (3) are not connected to one another.
6. A sole according to any of the previous claims wherein the slats (5) are horizontal or tilted at an angle of less than 180° with respect to the top side (2).
7. A sole according to any of the previous claims wherein between each slat (5) and its corresponding lateral wall (4.2) there is arranged a gusset (6) that helps the recovery of the slat (5) after it flexes.

8. A sole according to any of the previous claims wherein in the joined side walls (3.2) of two contiguous first burrs (3) there is arranged a hollow (7) that is open towards the top side (2).
9. A sole according to any of the previous claims with second burrs (8) that project from the bottom side (1) towards the top side (2) and hollows (9) of such second burrs (8) from the top side (2) towards the bottom side (1), each second burr (8) comprising a bottom wall (8.1) and lateral walls (8.2) that start from it towards the bottom side (1), such that the bottom walls (8.1) configure as a whole a discontinuous contact surface for the sole, each lateral wall (8.2) of the second burr (8) is interrupted by a lateral channel (8.21) that divides said lateral wall (8.2) into a top section (8.22) and a bottom section (8.23), the hollow (9) comprises a bottom wall (9.1) that is parallel to that of the second burr (8), coinciding with a section of said bottom wall (9.1) is a wall (9.2) that is slanted towards the lateral wall (8.2) of the second burr (8), on top of the joined lateral walls (8.2) of two contiguous second burrs (8) is arranged a vertical partition (10) the top side (10.1) of which is part of the top side (2) of the sole.
10. A sole according to claim 9 wherein the bottom section (8.22) of the lateral wall (8.2) of each second burr (8) is arranged at a greater distance from the centre of the burr (8) than the top section (8.23).
11. A sole according to claims 9 or 10 wherein the vertical partition (10) in some section has the top side (10.1) below the top side (2) of the sole.
12. A sole according to claim 11 wherein the section that is under the top side (2) of the sole corresponds to the lateral end of the partition (10.1).

Amended claims under Art. 19.1 PCT

1. A shoe sole with double shock absorption for footwear, made in a single piece from elastic material, comprising a bottom side (1) and a top side (2), first burrs (3) that project from the bottom side (1) towards the top side (2) and hollows (4) of such first burrs (3) from the top side (2) towards the bottom side (1), each first burr (3) comprising a bottom wall (3.1) and lateral walls (3.2) that start there towards the bottom side, such that the bottom walls (3.1) of the first burrs (3) configure as a whole a discontinuous contact surface for the sole, each lateral wall (3.2) of the first burr (3) is interrupted by a lateral channel (3.21) that divides said lateral wall (3.2) into a top section (3.22) and a bottom section (3.23), the hollow (4) comprising a bottom wall (4.1) that is parallel to that of the first burr (3), coinciding with a section of said bottom

- wall (4.1) there is arranged a wall (4.2) that is slanted towards the lateral wall (3.2) of the first burr (3), and coinciding with at least one lateral wall (3.2) of the first burr (3) a slat (5) projects towards the inside of the hollow (4), said slat (5) comprising a top side (5.1) that is part of the top side (2) of the sole and a bottom side (5.2) towards the inside of the hollow (4), **characterised in that** the bottom section (3.23) of the lateral wall (3.2) of each first burr (3) is arranged at a greater distance from the centre of the burr (3) than the top section (3.22).
2. A sole according to claim 1 wherein the slanted wall (4.2) of the hollow (4) is at the same height as the lateral channel (3.21) of the first burr (3).
3. A sole according to claims 1 or 2 wherein the slats (5) of a first burr (3) are connected to one another.
4. A sole according to claims 1 or 2 wherein the slats (5) of a first burr (3) are not connected to one another.
5. A sole according to any of the previous claims wherein the slats (5) are horizontal or tilted at an angle of less than 180° with respect to the top side (2).
6. A sole according to any of the previous claims wherein between each slat (5) and its corresponding lateral wall (4.2) there is arranged a gusset (6) that helps the recovery of the slat (5) after it flexes.
7. A sole according to any of the previous claims wherein in the joined side walls (3.2) of two contiguous first burrs (3) there is arranged a hollow (7) that is open towards the top side (2).
8. A sole according to any of the previous claims with second burrs (8) that project from the bottom side (1) towards the top side (2) and hollows (9) of such second burrs (8) from the top side (2) towards the bottom side (1), each second burr (8) comprising a bottom wall (8.1) and lateral walls (8.2) that start from it towards the bottom side (1), such that the bottom walls (8.1) configure as a whole a discontinuous contact surface for the sole, each lateral wall (8.2) of the second burr (8) is interrupted by a lateral channel (8.21) that divides said lateral wall (8.2) into a top section (8.22) and a bottom section (8.23), the hollow (9) comprises a bottom wall (9.1) that is parallel to that of the second burr (8), coinciding with a section of said bottom wall (9.1) is a wall (9.2) that is slanted towards the lateral wall (8.2) of the second burr (8), on top of the joined lateral walls (8.2) of two contiguous second burrs (8) is arranged a vertical partition (10) the top side (10.1) of which is part of the top side (2) of the sole.
9. A sole according to claim 8 wherein the bottom section (8.22) of the lateral wall (8.2) of each second burr (8) is arranged at a greater distance from the centre of the burr (8) than the top section (8.23).
10. A sole according to claims 8 or 9 wherein the vertical partition (10) in some section has the top side (10.1) below the top side (2) of the sole.
11. A sole according to claim 10 wherein the section that is under the top side (2) of the sole corresponds to the lateral end of the partition (10.1).

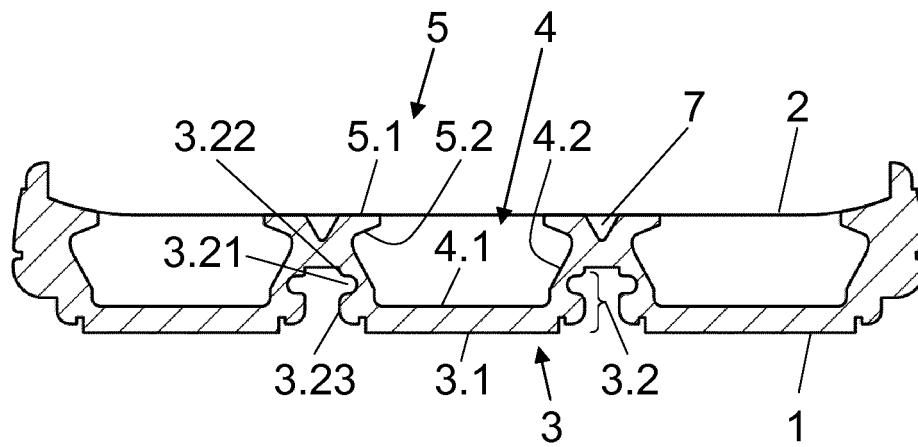


Fig. 1

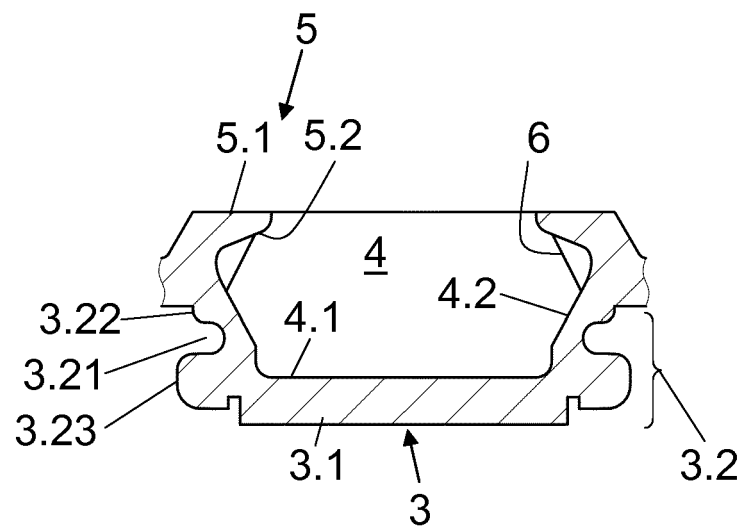


Fig. 2

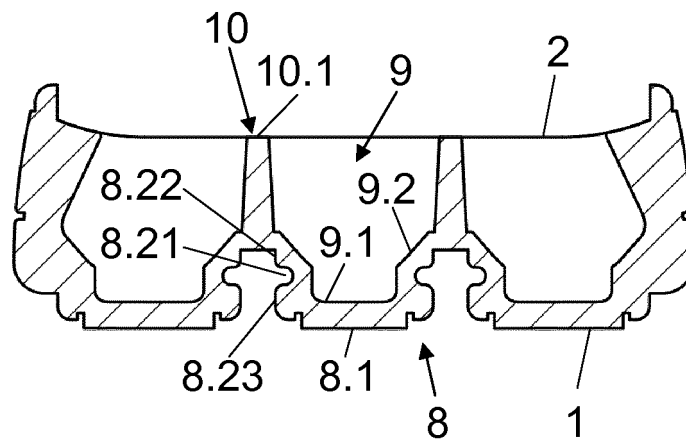


Fig. 3

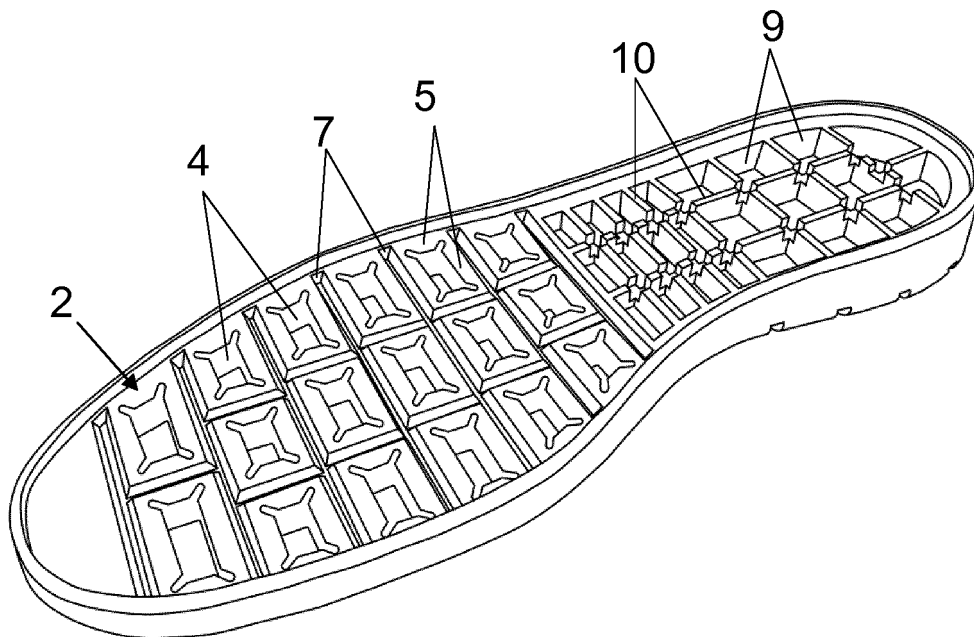


Fig. 4

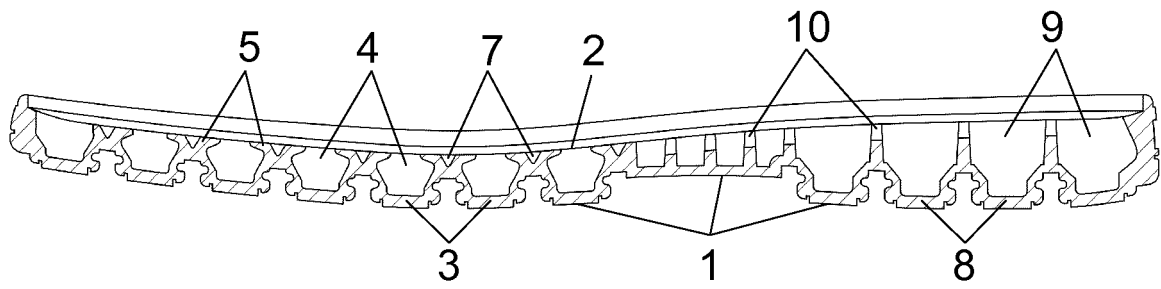


Fig. 5

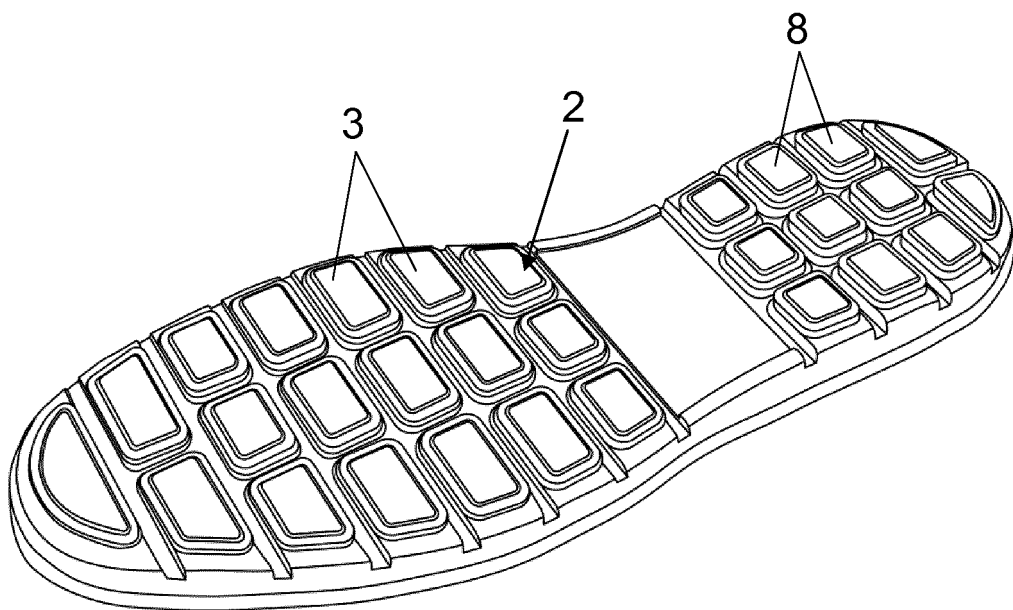


Fig. 6

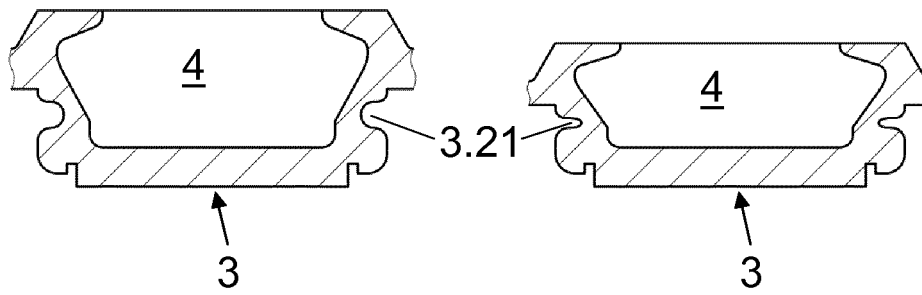


Fig. 7A

Fig. 7B

INTERNATIONAL SEARCH REPORT

International application No.
PCT/ES2013/070722

A. CLASSIFICATION OF SUBJECT MATTER

A43B13/18 (2006.01)

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)

A43B

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 practicable, search terms used)

EPODOC, INVENES, WPI

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	DE 2525615 A1 (DASSLER PUMA SPORTSCHUH) 30/12/1976, pages 5 - 7; figures 2 - 3.	1, 3-4, 6, 8
A		2, 5, 7, 9-12
Y	EP 0875163 A2 (SQUADRONI ONIFARES ELPIDIO CALZATURIFICIO VALLEVERDE S P) 04/11/1998, column 1, lines 3 - 34; column 3, lines 27 - 48; column 4, lines 12 - 32; figures 2, 4, 6.	1, 3-4, 6, 8
A		2, 5, 7, 9-12
A	ES 2316269 A1 (PROMILES DECATHLON SA) 01/04/2009, the whole document.	1
A	(GOMMUS SOCIETA COOPERATIVA PER ET AL.) 01/10/2009, the whole document.	1

☒ 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
18/06/2014

Date of mailing of the international search report
(23/06/2014)

Name and mailing address of the ISA/

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