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(71) Applicant: **Arbesko-gruppen Ab**
**701 16 Örebro (SE)**

(72) Inventor: **Geisler, Peter**
**70210 Örebro (SE)**

(74) Representative: **Kransell & Wennborg KB**
**P.O. Box 27834**
**115 93 Stockholm (SE)**

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# (54) Shock absorber for use in a shoe

(57) The present invention relates to a shock absorber for use in a shoe.

The shock absorber comprises an elastic body arranged with a plurality of tubular cavities axially extending into the elastic body from its under side and ending in the body.

Thus, by providing the shock absorber according to embodiments of the present invention, it is possible to advantageously adapt to the moulding material forming the midsole of the shoe in which the shock absorber is arranged in that when injecting the material in the casting mould onto which the upper, insole and shock absorber is placed, the moulding material (typically being polyurethane) will push up into the tubular cavities and thus into the shock absorber. Hence, the moulding material hardening under the shock absorber in prior art manufacturing process will now enter the tubular cavities and thus avoid pushing the shock absorber upwards into the shoe.

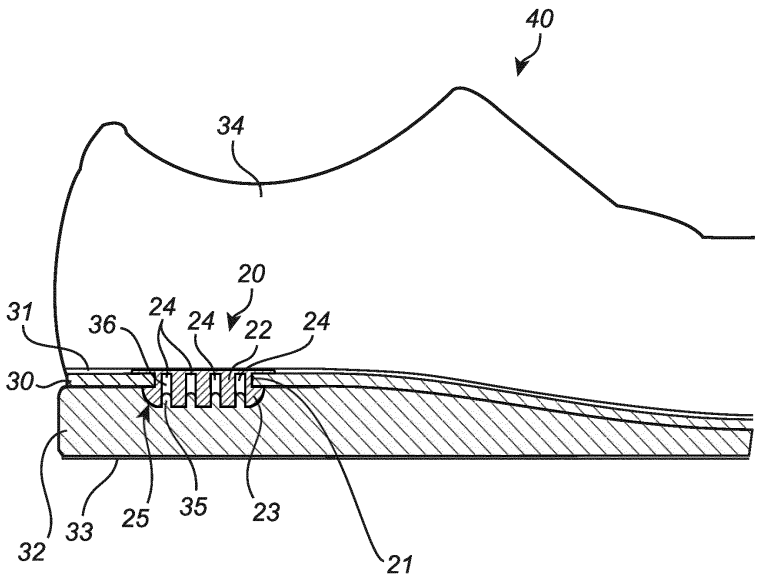


Fig. 5

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## Description

### TECHNICAL FIELD

**[0001]** The invention relates to a shock absorber for use in a shoe.

### BACKGROUND

**[0002]** In order to improve comfort for a wearer of a shoe, it is known in the art to provide a heel section of the shoe with a shock absorber for relieving the pressure on the wearer's feet.

**[0003]** Whether a person is running, walking or even just standing still, a substantive force acts on her feet, in particular on her heels, where a major part of the body weight is balanced. This is even more evident in case the person stands on a hard surface, such as concrete, which is often the case in e.g. industrial environments. This can ultimately lead to back and knee injuries. This problem can be overcome, or at least mitigated, with the previously mentioned shock absorber providing a cushioning element under the wearer's foot.

**[0004]** Further, the elasticity of an individual's heel tissue is not the same at an outer part of the heel as compared to a heel centre part, and a higher pressure occurs at the centre part as compared to the outer part of the heel, also as an effect of bone structure of the foot. Early shock absorbers having a single cushioning element mounted in the heel section of a shoe were not adapted to this varying pressure on the heel of a wearer of a shoe arranged with such a shock absorber.

**[0005]** EP 1 714 571 solves this problem by proposing a sole formed from elastomeric material of a predetermined hardness, where a heel part has a central region formed from relatively softer material, the central region being surrounded by a ring of material whose hardness is intermediate the hardness of the sole and the central region.

**[0006]** A problem with shock absorbers in the art is, regardless of whether the shock absorbers provide a single cushioning element like the earlier shock absorbers or a plurality of cushioning elements as disclosed in EP 1714 571, that when the shock absorbers are mounted in the heel section of a sole structure such as in an insole, and a midsole of the shoe is moulded to the upper and the insole thereby forming a complete shoe, the moulding material, being for example a polymer such as polyurethane, will eventually cool and harden to a desired shape as formed by the casting mould and thus push the shock absorber upwards. This may cause a problem in that an upper portion of the shock absorber will not be flush with an upper side of the insole of the shoe, but slightly protrude from the upper side of the insole, thereby possibly causing discomfort to a wearer of the shoe.

### SUMMARY

**[0007]** An object of the present invention is to solve or at least mitigate this problem in the art and to provide an improved shock absorber.

**[0008]** This object is attained in a first aspect of the present invention by a shock absorber for use in a heel part of a shoe. The shock absorber comprises an elastic body arranged with a plurality of tubular cavities axially extending into the elastic body from its under side and ending in the body.

**[0009]** Thus, by providing the shock absorber according to embodiments of the present invention, it is possible to advantageously adapt to the moulding material forming the midsole of the shoe in which the shock absorber is arranged in that when injecting the material in the casting mould onto which the upper, insole and shock absorber is placed, the moulding material (typically being polyurethane) will push up into the tubular cavities and thus into the shock absorber. Hence, the moulding material hardening under the shock absorber in prior art manufacturing process will now enter the tubular cavities and thus avoid pushing the shock absorber upwards into the shoe.

**[0010]** In an embodiment of the present invention, a shoe comprising the shock absorber is provided where the depth of the tubular cavities extending into the shock absorber advantageously is formed such that the moulding material partly fills the cavities, resulting in an air column being created above the moulding material entering the cavities. This embodiment is further advantageous in that the created air column in the respective tubular cavity has a shock absorbing effect and also has an advantageous deforming effect on the shock absorber.

**[0011]** In an embodiment of the present invention, the shock absorber further comprises an elastic member integrated with the elastic body, which elastic member has a greater elasticity than the elastic body. Thus, by providing a shock absorber comprising two elastic elements; the elastic body and the elastic member, it is advantageously possible to adapt to the varying pressure applied to the heel of a wearer of a shoe arranged with such a shock absorber. Further, since the heel tissue is softer at the centre part of the heel, the elastic member will advantageously bring comfort to the wearer as the softer part of the heel will slightly sink into the shock absorber by compressing the elastic member integrated in the elastic body.

**[0012]** In an embodiment of the present invention, the elastic member is arranged at a centre of the elastic body. Thus, when in use, the elastic member will be compressed to a higher degree than the elastic body due to its greater elasticity. By arranging the elastic member at the centre of the elastic body, the shock absorber according to this embodiment will become bowl-shaped around the heel of the wearer of the shoe in which the shock absorber is arranged and thus advantageously improve the comfort of the wearer.

**[0013]** In a further embodiment, the elastic body has a Shore A value of approximately 20 while the elastic member has a Shore A value of about 10. Thus, the hardness of the elastic body is about twice that of the elastic member. It should be noted that the respective hardness of the elastic body and the elastic member may take on other Shore A values than these two. Generally, the shock absorber of the present invention is positioned between the relatively soft heel of a wearer of a shoe and the hard surface underneath the shoe. Thus, the elastic member is slightly softer than the body tissue surrounding the heel while the elastic body is slightly harder.

**[0014]** The shock absorber according to the present invention can be made of e.g. polyurethane plastics such as thermoplastic polyurethane (TPU) or thermoplastic rubbers (TR).

**[0015]** In yet a further embodiment, the elastic member is arranged to be removable from the elastic body. Thus, since the wearer can insert and remove the elastic member from the elastic body, the elasticity of the shock absorber can be even further adapted to the individual wearer in that elastic members having different measures of hardness may be inserted in the elastic body at a choice of the individual wearer.

**[0016]** When comparing elasticity of the up to 2 cm thick fibrofatty body tissue located under the heel bone of a population of individuals, the degree of elasticity may vary up to 50% for two given individuals in the population. By providing a removable elastic member, it is advantageously possible to easily adapt to different elasticity requirements of an individual, and further to easily adapt to varying elasticity properties among a population of individuals, by replacing a given elastic member with another elastic member having a different elasticity.

**[0017]** The object of the invention is further attained in a second aspect by an insole comprising the shock absorber of the first aspect.

**[0018]** The object of the invention is further attained in a third aspect by a shoe comprising the insole of the second aspect.

**[0019]** Further embodiments of the present invention will be described I the following.

**[0020]** It is noted that the invention relates to all possible combinations of features recited in the claims. Further features of, and advantages with, the present invention will become apparent when studying the appended claims and the following description. Those skilled in the art realize that different features of the present invention can be combined to create embodiments other than those described in the following.

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0021]** The invention is now described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 shows a perspective view of a prior art shock absorber to be arranged in a heel section of a shoe;

Figures 2a-d show the prior art shock absorber of Figure 1 in a section taken along line A-A;

Figures 3a and 3b show the prior art shock absorber of Figures 1 and 2 arranged in a heel section of a shoe;

Figure 4a shows a perspective view of a shock absorber according to an embodiment of the present invention;

Figure 4b shows the shock absorber of Figure 4a in a section taken along line B-B;

Figure 5 shows the shock absorber of Figures 4a and 4b arranged in a heel section of a shoe according to an embodiment of the present invention;

Figure 6 shows a perspective view of a shock absorber according to a further embodiment of the present invention;

Figure 7 shows a top view of the shock absorber of Figure 6;

Figure 8 shows a perspective view of the shock absorber of Figures 6 and 7;

Figure 9 shows the shock absorber of Figure 7 in a section taken along line D-D;

Figure 10 shows a shock absorber arranged in a heel section of a shoe according to yet another embodiment of the present invention; and

Figure 11 shows a bottom perspective view of a shock absorber according to a further embodiment of the present invention.

## DETAILED DESCRIPTION

**[0022]** The invention will now be described more fully hereinafter with reference to the accompanying drawings, in which certain embodiments of the invention are shown. This invention may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein; rather, these embodiments are provided by way of example so that this disclosure will be thorough and complete, and will fully convey the scope of the invention to those skilled in the art. Like numbers refer to like elements throughout the description.

**[0023]** Figure 1 shows a perspective view of a prior art shock absorber 10 to be arranged in a heel section of a shoe. As can be seen, the shock absorber comprises a waist portion 11 around which an insole (not shown) will

be tightly arranged in order to create a retaining engagement with the shock absorber 10. Further, the shock absorber 10 comprises a top portion 12 protruding radially from the waist portion 11 and a bottom portion 13 on which the shock absorber rests, which bottom part extends radially from the waist portion. When arranged at the heel section of a shoe, a thin inlay sole (not shown) is possibly placed on the top part 12. Further, the prior art shock absorber 10 comprises a plurality of cavities 14 extending from the top portion 12 through the waist portion 11 and in to the bottom portion 13.

**[0024]** Figures 2a-d show the shock absorber 10 in a section taken along line A-A of Figure 1 in different degrees of deformation. Figure 2a shows a cross section of the shock absorber when no force is applied to the top portion 12. Figure 2b illustrates the elasticity of the shock absorber 10 when a force F is applied to the top portion 12. In use, this force will be embodied by the weight of a wearer of the shoe. Figures 2c and 2d show deformation of the shock absorber 10 as the force F applied by the wearer's heel to the top portion 12 increases. The deformation is further facilitated by the cavities 14. The elasticity of the prior art shock absorber 10 greatly improves the comfort of the wearer of the shoe in which the shock absorber is arranged.

**[0025]** Figure 3a shows a section view along line A-A of the prior art shock absorber 10 of Figure 1 mounted in the heel section of a shoe 40. As can be seen, the shock absorber 10 is inserted into an opening of an insole 30, which is fitted around the waist portion 11 and sandwiched between the top portion 12 and the bottom portion 13 in order to create a retaining engagement with the shock absorber 10. A thin inlay sole 31 is placed on top of the insole 30 and the shock absorber 10. The bottom portion 13 of the shock absorber is enclosed by a midsole 32 of the shoe, which further may be arranged with an outsole 33. Figure 2a shows a desired configuration of the shock absorber where the top portion 12 is flush with the upper side of the insole 30 of the shoe 40.

**[0026]** Figure 3b shows a different, undesired configuration of the prior art shock absorber. When the shock absorber 10 are mounted in the heel section of the insole 30, and the midsole 32 of the shoe is moulded to an upper 34 of the shoe 40 and the insole 30, for instance by means of injection moulding, thereby forming a complete shoe, the moulding material, being for example a polymer such as polyurethane having a cream-like consistency when injected in the mould, will eventually cool and harden to a desired shape as formed by the casting mould (not shown) used during the moulding process and thus push the shock absorber 10 upwards (exaggerated in Figure 3b for illustrational purposes). This cause a problem in that the top portion 12 of the shock absorber 10 no longer is flush with the upper side of the insole 30 of the shoe, but now protrudes from the upper side of the insole 30, thereby causing discomfort to a wearer of the shoe 40.

**[0027]** Figure 4a illustrates a shock absorber 20 according to an embodiment of the present invention in a bottom view. The outer shape of the shock absorber 20 may be identical to that illustrated in Figure 1, thus having a waist portion 21 and a top portion 22 and a bottom portion 23 both protruding radially from the waist portion. However, an elastic body 25 of the shock absorber 20 in Figure 4 is arranged with a plurality of tubular cavities 24 axially extending into the elastic body 25 from an under side of the elastic body and ending in the body. In an embodiment, the tubular cavities 24 extend axially into the elastic body 25 and end in the waist portion 21, thus having a depth in the range of 12-14 mm, and a diameter around 4 mm. In Figure 4a, the elastic body is exemplified to be provided with twelve cavities 24 in its under side.

**[0028]** Figure 4b shows the shock absorber 20 of Figure 4a in a section taken along line B-B. The tubular cavities 24 extend axially (i.e. one of the cavities 24 extends along axis C) into the elastic body 25 from its under side and ends in the waist portion 21.

**[0029]** Figure 5 shows an illustration corresponding to that in Figure 3a, but where a shock absorber 20 according to an embodiment of the present invention has been mounted in the insole 30 of the shoe 40. As can be seen, the shock absorber 20 is inserted into an opening of the insole 30, which is fitted around the waist portion 21 and sandwiched between the top portion 22 and the bottom portion 23 of the elastic body in order to create a retaining engagement with the shock absorber 20. A thin inlay sole 31 is placed on top of the insole 30 and the shock absorber 20. The bottom portion 23 of the shock absorber is enclosed by a midsole 32 of the shoe, which further is arranged with an outsole 33.

**[0030]** When the midsole 32 of the shoe is moulded to the upper 34 of the shoe 40 and the insole 30, thereby forming a complete shoe, the moulding material, being for example a polymer such as polyurethane, will eventually cool and harden to a desired shape as formed by the casting mould (not shown) used during the moulding process. With the shock absorber 20 of the present invention being mounted in the heel section of the insole 30, the moulding material will enter the tubular cavities 24 and form a peg 35 in the respective cavity. The moulding material of the midsole 32 will hence advantageously not push the shock absorber 20 upwards into the shoe 40. As can be seen in Figure 5a, the top portion 22 of the shock absorber 10 is flush with the upper side of the insole 30 of the shoe 40.

**[0031]** These pegs 35 could possibly rise upwards during the moulding process to completely fill the cavities 24. However, more preferred is that the pegs 35 only partly fill the cavities 24, such that an air column 36 is created in each cavity 24. The air columns 36 will advantageously have a shock absorbing effect. Further, the air columns 36 will advantageously facilitate deformation of the shock absorber 20 as previously discussed in connection to the prior art shock absorber 10 of Figures 2a-2d.

**[0032]** Figure 6 shows a perspective view of a shock absorber 20 to be arranged in a heel section of a shoe

according to another embodiment of the present invention. In this embodiment of the invention, an elastic member 26 is integrated with the elastic body 25 the shock absorber 20. The elastic body 25 has a first elasticity and the elastic member 26 has a second elasticity, where the elastic member 26 has a greater elasticity than the elastic body 25. Thus, when a force F is applied to the shock absorber 20 of the present invention, as is discussed in connection to the prior art shock absorber 10 shown in Figures 2a-d, the shock absorber 20 of the present invention will be even more compressed at its centre, where the softer elastic member 26 is arranged, thus creating a bowl-shaped structure around the centre of the heel of a wearer of the shoe.

**[0033]** Figure 7 shows a top view of the shock absorber 20 according to an embodiment of the present invention, illustrating that the elastic member 26 is arranged at the centre of the elastic body 25.

**[0034]** Again with reference to Figure 6, it can be seen that the shock absorber 20 according to an embodiment of the present invention comprises a waist part 21 around which a insole (not shown) will be tightly arranged in order to create a retaining engagement with the shock absorber 20. Further, the shock absorber 20 comprises a top portion 22 protruding radially from the waist portion 21 and a bottom portion 23 on which the shock absorber rests, which bottom portion also protrudes radially from the waist portion. When arranged at the heel section of a shoe, an inlay sole (not shown) can be placed on the top portion 22. The top portion 22 acts as a gasket against an upper side of the insole (not shown) in which the shock absorber is arranged.

**[0035]** Figure 8 shows yet another embodiment of the present invention where the elastic member 26 is arranged to be removable from the elastic body 25. The shock absorber according to this embodiment of the invention has in its top portion 22 an opening 27 through which the elastic member 26 is inserted into a space 28 of the waist portion. Thus, since the wearer easily can insert and remove the elastic member 26 from the elastic body 25, the elasticity of the shock absorber can be even further adapted to the individual wearer in that elastic members having different elasticity may be inserted in the elastic body 25 at a choice of the individual wearer.

**[0036]** With further reference to Figure 8, in an embodiment of the present invention the top portion 22 of the elastic body 25 comprises a flange 29 arranged at a circumference of the opening 27 trough which the elastic member 26 is inserted into the space 28 of the waist portion, which flange 29 slightly protrudes radially towards a centre of the elastic body 25. Advantageously, the flange 29 facilitates retention of the elastic member 26 in the space 28 of the elastic body 25.

**[0037]** The elastic member 26 is inserted via the opening 27 into the space 28 in the waist portion of the elastic body 25 and thus rests on top of the tubular cavities 24 axially extending into the elastic body 25 from an under side of the elastic body and ending in the waist portion of the elastic body 25. As previously has been was described, the tubular cavities 24 will facilitate deformation of the chock absorber when acted upon by a compressing force. As can be seen, in this exemplifying embodiment, the number of tubular cavities 24 in the main body is eight, and the cross section of each of the tubular cavities 24 are non-circular; a number of differently shaped cross sections can be envisaged for the tubular cavities 24, such as rectangular, quadratic, circular, oval, etc.

**[0038]** Figures 9a-d shows the shock absorber 20 according to the embodiments of the present invention discussed with reference to Figures 7 and 8 in a section taken along line D-D shown in Figure 7 in different degrees of deformation. Figure 9a shows a cross section of the shock absorber 20 when no force is applied to the top portion 22. Figure 9b illustrates the elasticity of the shock absorber 20 when a force F is applied to the top portion 22. In use, this force will be embodied by the weight of a wearer of the shoe. Figures 9c and 9d show deformation of the shock absorber 20 as the force F applied by the wearer's heel to the top portion 22 steadily increases. The elasticity of the shock absorber 20 of the present invention greatly improves the comfort of the wearer of the shoe in which the shock absorber is arranged. Further, as compared to the prior art shock absorber 10 shown in Figures 1 and 2, due to the elastic member 26 having a greater elasticity than the elastic body 25, the shock absorber 20 of the illustrated embodiment will be more compressed at its centre section where a majority of the force F is applied, thus creating a bowl-like support around the heel of the wearer.

**[0039]** Figure 10 shows an illustration corresponding to that in Figure 5, but where a shock absorber 20 according to a different embodiment of the present invention has been mounted in the insole 30 of the shoe 40. In this particular embodiment, the shock absorber 20 comprises an elastic member 26 extending all the way through the elastic body 25, from the upper side to the under side. Advantageously, this results in an elastic member 26 having a greater volume than that illustrated with reference to Figures 6-9. As can be seen, the shock absorber 20 is inserted into an opening of the insole 30, which is fitted around the waist portion 21 and sandwiched between the top portion 22 and the bottom portion 23 of the elastic body 25 in order to create a retaining engagement with the shock absorber 20. A thin inlay sole 31 is placed on top of the insole 30 and the shock absorber 20. The bottom portion 23 of the shock absorber is enclosed by a midsole 32 of the shoe, which further is arranged with an outsole 33.

**[0040]** As previously has been described, when the midsole 32 of the shoe is moulded to the upper 34 of the shoe 40 and the insole 30, thereby forming a complete shoe, the moulding material will eventually cool and harden to a desired shape as formed by the casting mould (not shown) used during the moulding process. With the shock absorber 20 of the present invention being mounted in the heel section of the insole 30, the moulding ma-

terial will enter the tubular cavities 24 and form a peg 35 in the respective cavity. The moulding material of the midsole 32 will hence advantageously not push the shock absorber 20 upwards into the shoe 40. As can be seen in Figure 5a, the top portion 22 of the shock absorber 10 is flush with the upper side of the insole 30 of the shoe 40.

**[0041]** As further can be deducted from Figure 10, when a wearer of the shoe 40 places her heel on the shock absorber 20, the centre part of her heel will resiliently press the elastic member 26 downwards, and the elastic member 26 will be compressed to a higher degree than the elastic body 25 due to its greater elasticity. Thus, the shock absorber 20 of this particular embodiment of the present invention will advantageously adapt well to the elasticity of the body tissue located under the heel bone of the foot.

**[0042]** Figure 11 illustrates the shock absorber 20 in a bottom perspective view with the tubular cavities arranged in a slightly different manner as compared to the previously illustrated embodiments. In Figure 11, the shock absorber 20 is arranged with nine tubular cavities extending into the elastic body 25 vid the elastic member 26.

**[0043]** Even though the invention has been described with reference to specific exemplifying embodiments thereof, many different alterations, modifications and the like will become apparent for those skilled in the art. The described embodiments are therefore not intended to limit the scope of the invention, as defined by the appended claims. As can be seen in the exemplifying embodiments, the elastic body 25 (and the elastic member 26) have a rectangular footprint, i.e. its perimeter forms a rectangular silhouette, but could alternatively be quadratic, circular, oval, etc. Further, the number of tubular cavities 24 with which the shock absorber 20 of the present invention is arranged may vary from just a few cavities up to the illustrated twelve cavities, or even more.

## Claims

1. Shock absorber (20) for use in a heel part (41) of a shoe (40) comprising:

   an elastic body (25) arranged with a plurality of tubular cavities (24) axially extending into the elastic body from its under side and ending in the body.

2. The shock absorber (20) of claim 1, further comprising:

   an elastic member (26) integrated with the elastic body (25), which elastic member has a greater elasticity than the elastic body.

3. The shock absorber (20) of claim 2, said elastic member (26) being arranged at a centre of the elastic body (25).

4. The shock absorber (20) of any one of claims 2 or 3, said elastic body (25) having a Shore A value of 20; and
   said elastic member (26) having a Shore A value of 10.

5. The shock absorber (20) of claims 2-4, wherein the elastic member (26) is arranged to be removable from the elastic body (25).

6. The shock absorber (20) of any one of claims 2-5, the elastic body (25) comprising:

   a waist portion (21) comprising a space (28) in which the elastic member (26) is arranged;
   a top portion (22) comprising an opening (27) through which the elastic member (26) is inserted into the space (28) of the waist portion (21), which top portion (22) protrudes radially from the waist portion (21); and
   a bottom portion (23) on which the shock absorber (20) rests, which bottom portion (23) protrudes radially from the waist portion (21).

7. The shock absorber (20) of claim 6, the elastic member (25) being arranged such that:

   height of the waist portion (21) is adapted to a thickness of an insole (30) in which the shock absorber (20) is to be arranged; and
   the bottom portion (23) and the top portion (21) being arranged to sandwich the insole (30) enclosing the waist portion (21) in order to have the shock absorber (20) forming a retaining engagement with the insole (30).

8. The shock absorber (20) of claims 6 or 7, said top portion (22) of the elastic body (25) comprising:

   a flange (29) arranged at a circumference of the opening (27) through which the elastic member (26) is inserted into the space (28) of the waist portion (21) for retaining the elastic member (26) in the space (28).

9. The shock absorber (20) of any one of claims 6-8, said cavities (24) being arranged to extend from the under side of the elastic body (25) trough the bottom portion (23) and ending at the waist portion (21) such that the elastic member (26) is located on top of the cavities in the waist portion.

10. The shock absorber (20) of any one of claims 6-9, said bottom portion (23) having a rounded shape on the side on which the shock absorber rests.

**11.** The shock absorber (20) of any one of claims 2-8, said elastic member (26) extending through the elastic body (25), wherein the cavities (24) extend from an under side of the elastic member (26) and partly into the elastic member (26).

**12.** An insole (30) comprising the shock absorber (20) according to any one of claims 1-10.

**13.** A shoe (40) comprising the insole (30) of claim 12, wherein the tubular cavities (24) are arranged to be partly filled with material (35) forming a midsole (32) of the shoe, thereby creating an air column (36) above said material in the respective cavity.

**14.** A shoe (40) comprising the insole (30) of claim 12, wherein the tubular cavities (24) are arranged to be completely filled with material forming a midsole (33) of the shoe.

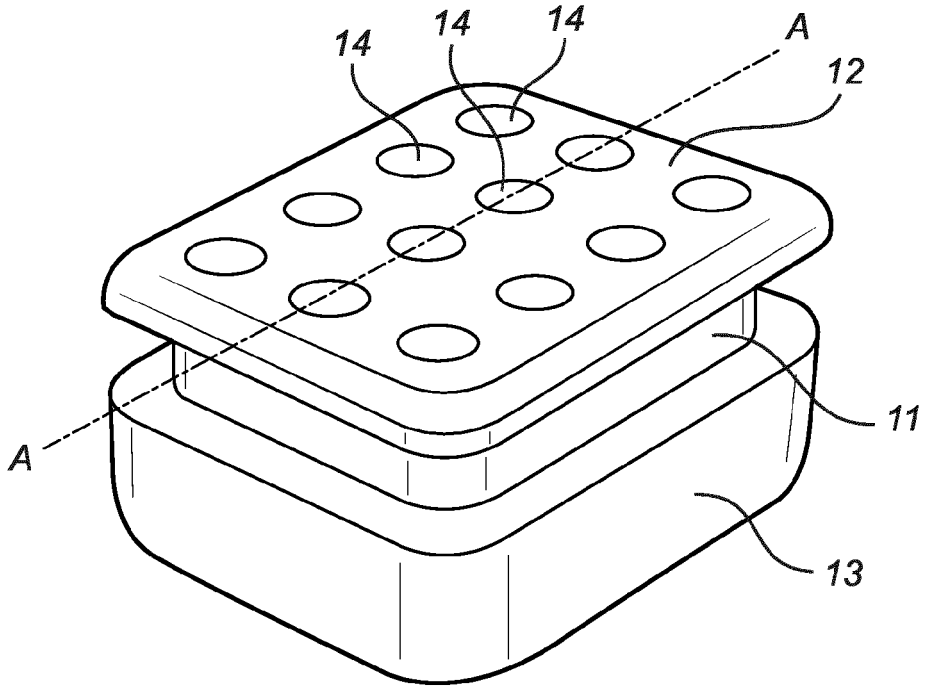


Fig. 1

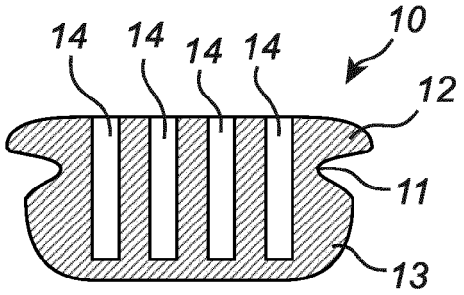


Fig. 2a

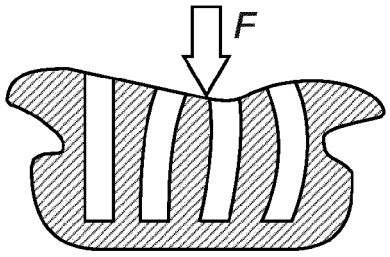


Fig. 2b

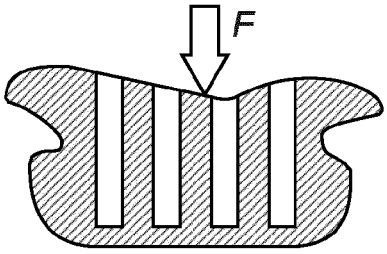


Fig. 2c

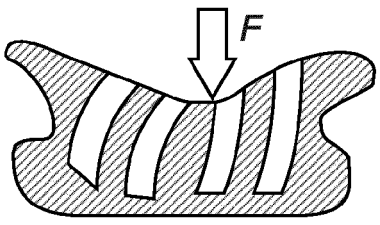


Fig. 2d

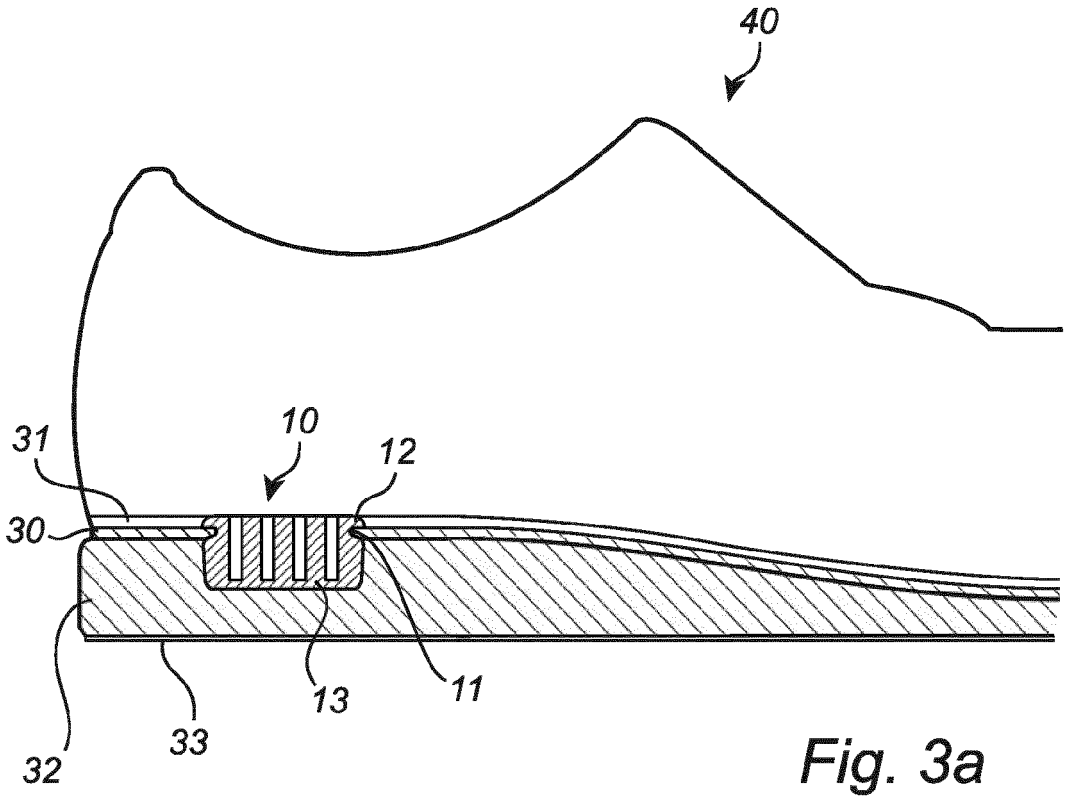


Fig. 3a

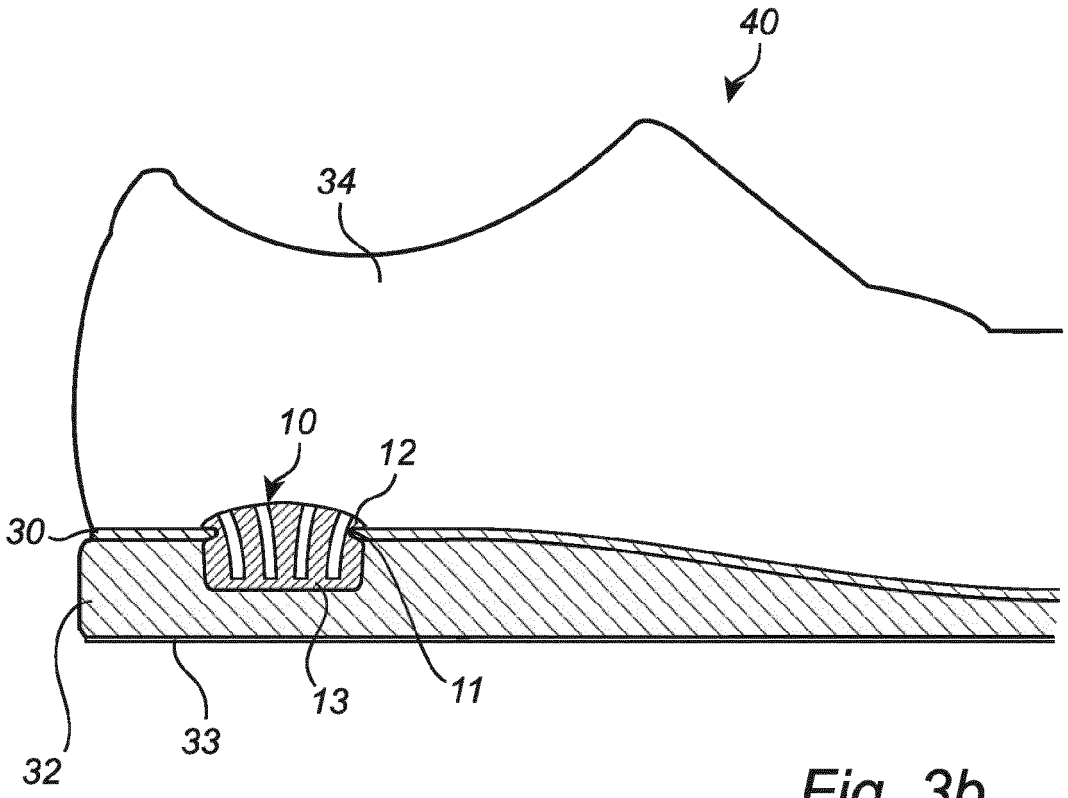


Fig. 3b

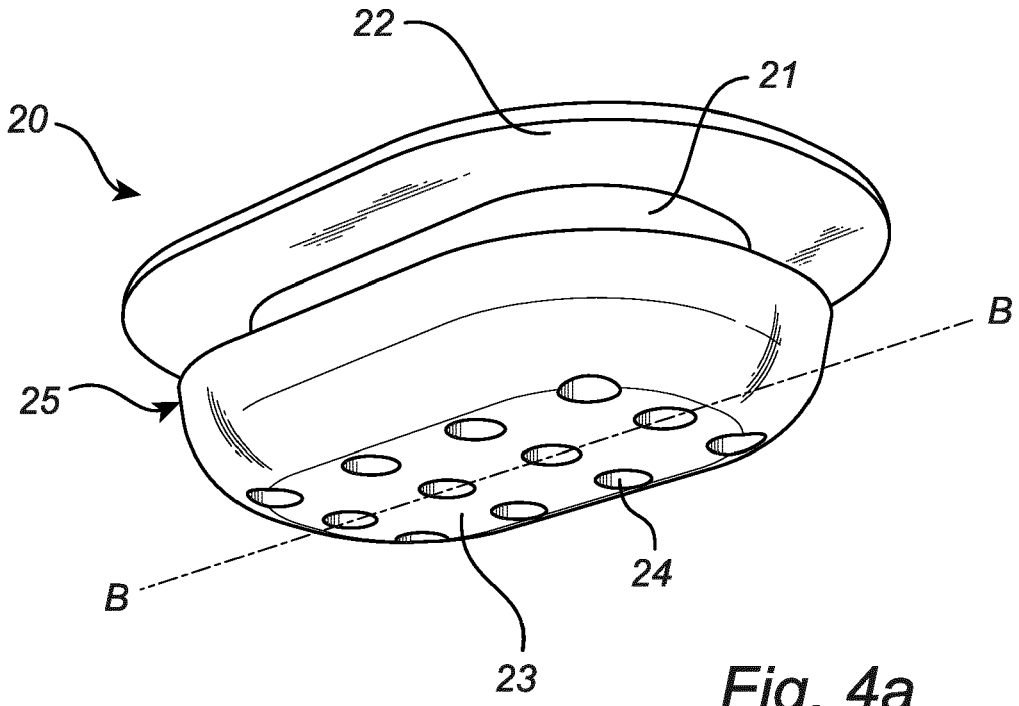


Fig. 4a

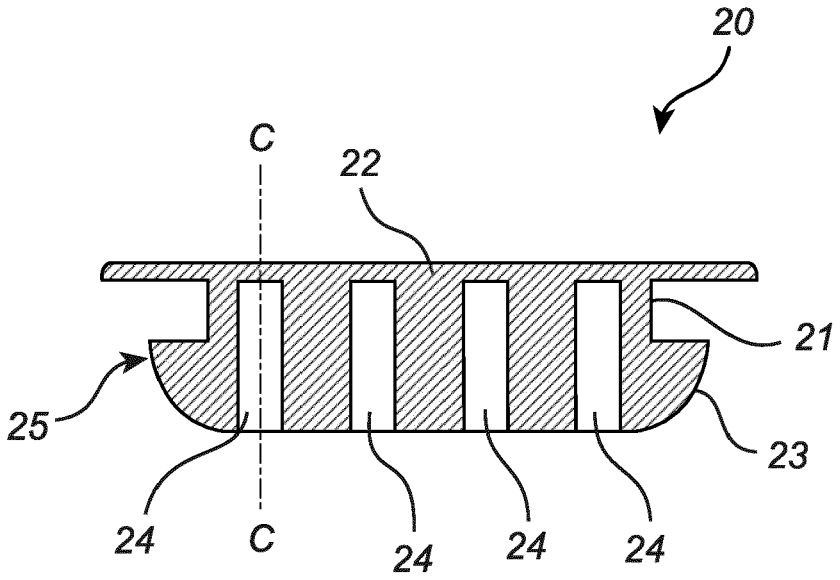


Fig. 4b

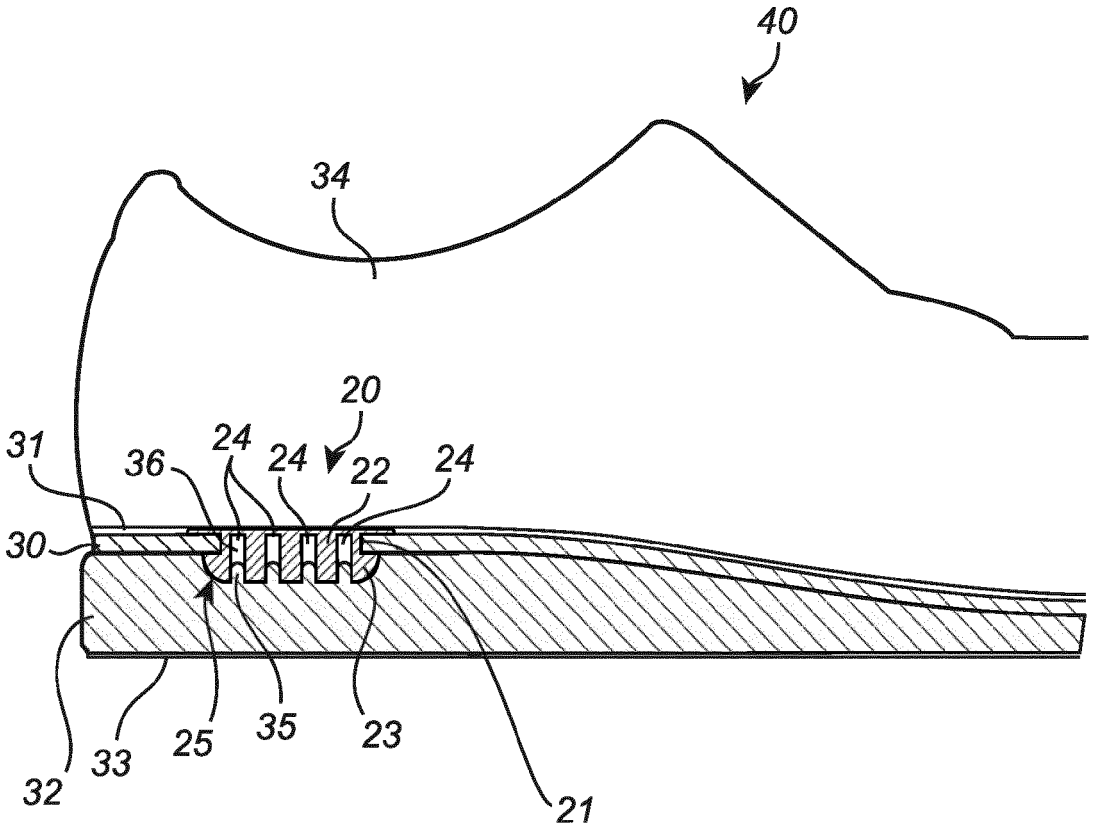


Fig. 5

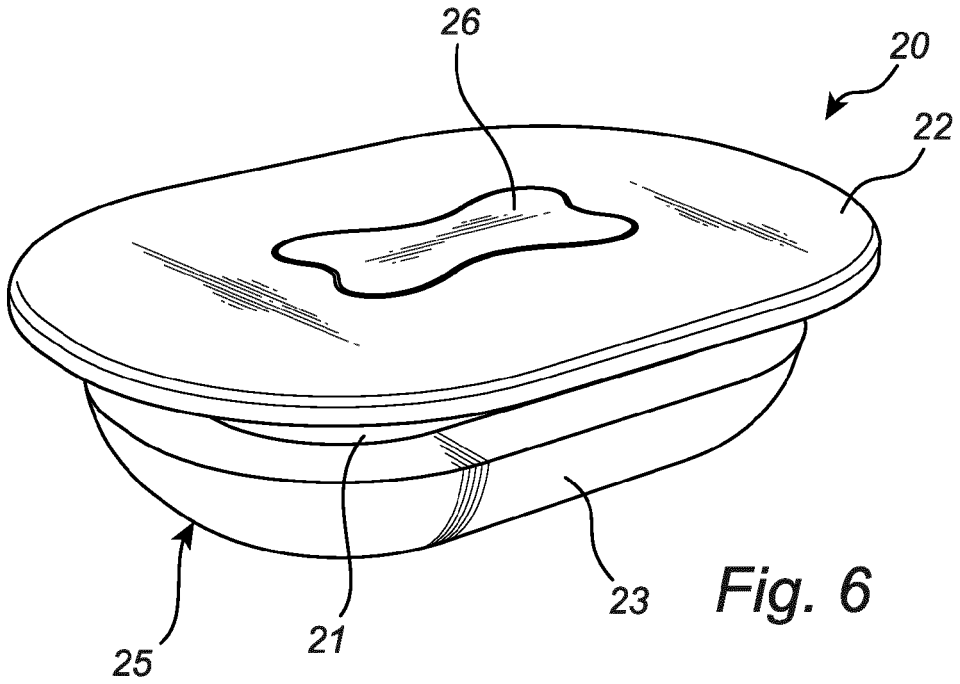


Fig. 6

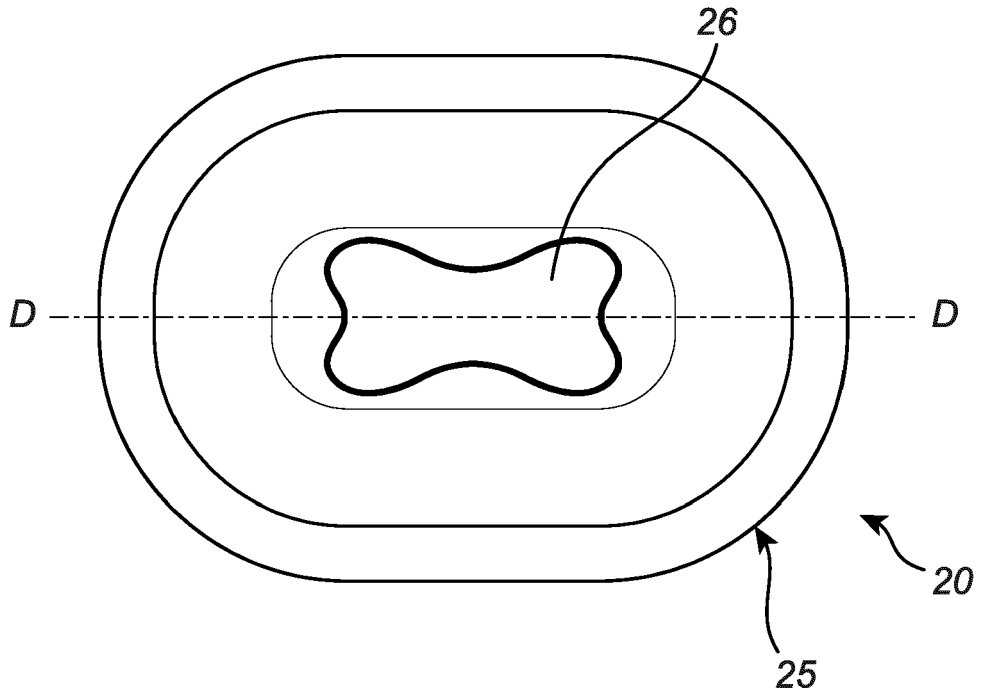


Fig. 7

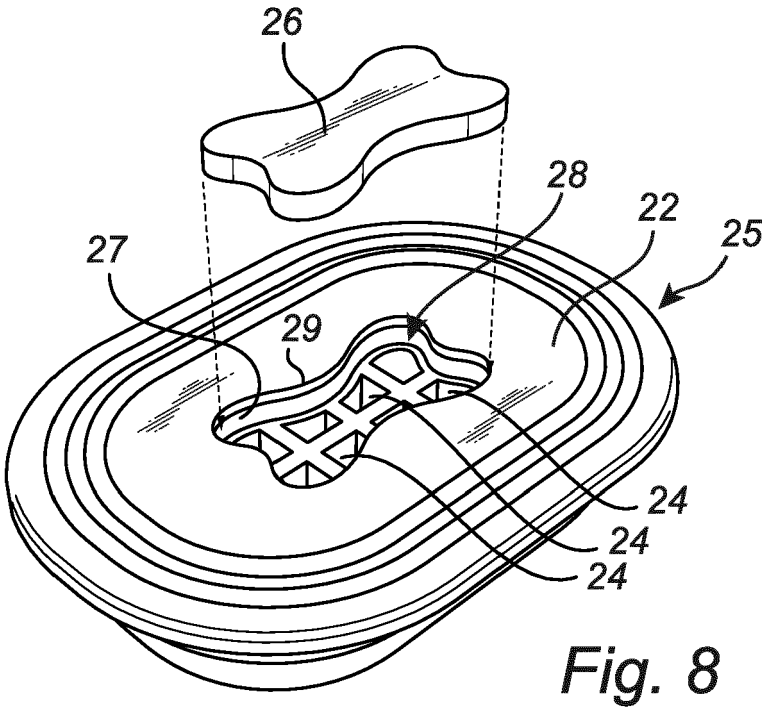


Fig. 8

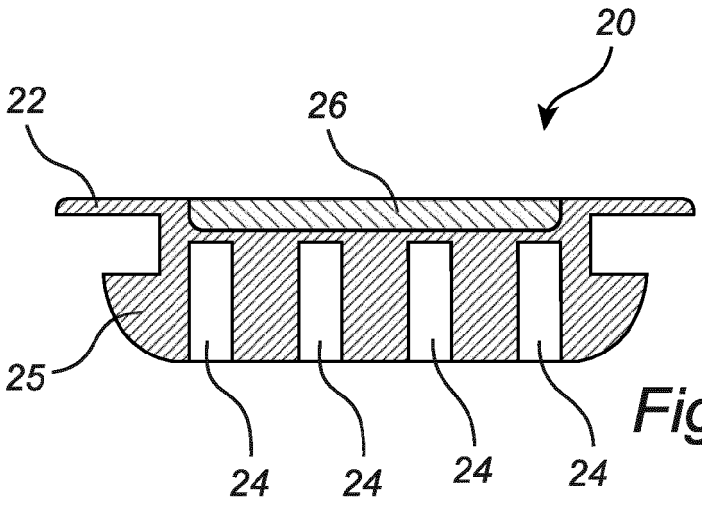


Fig. 9a

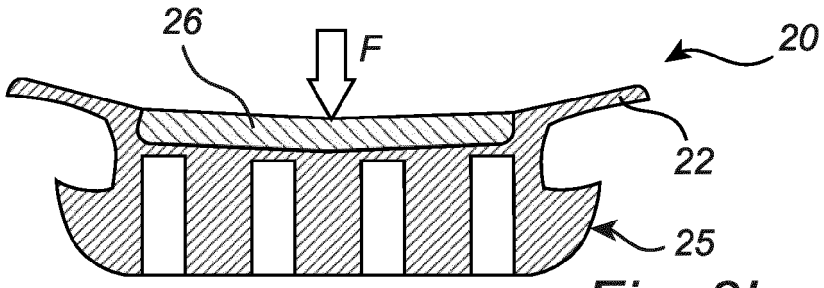


Fig. 9b

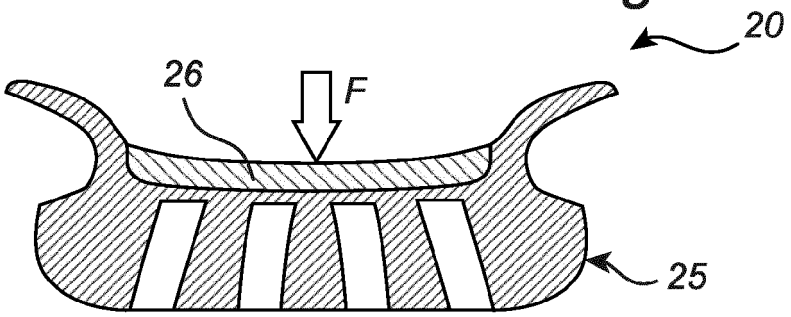


Fig. 9c

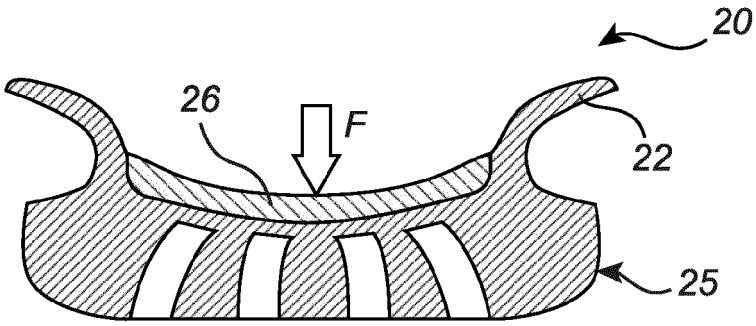


Fig. 9d

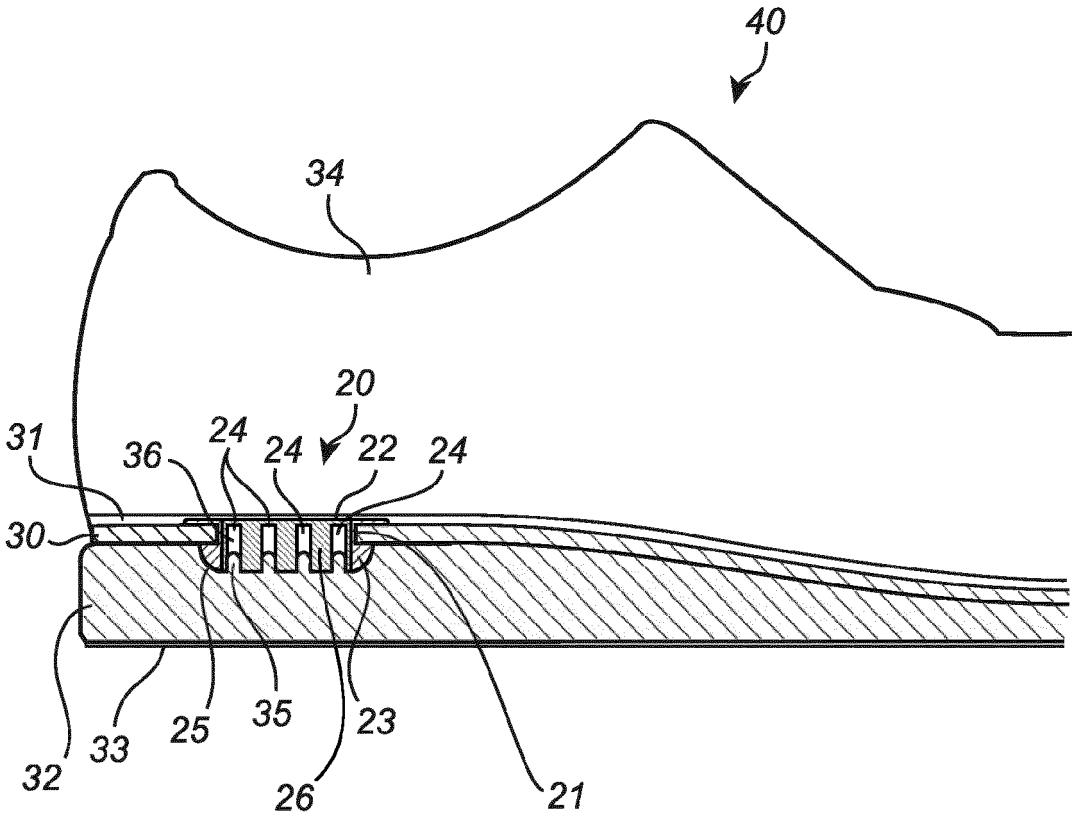
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Fig. 10

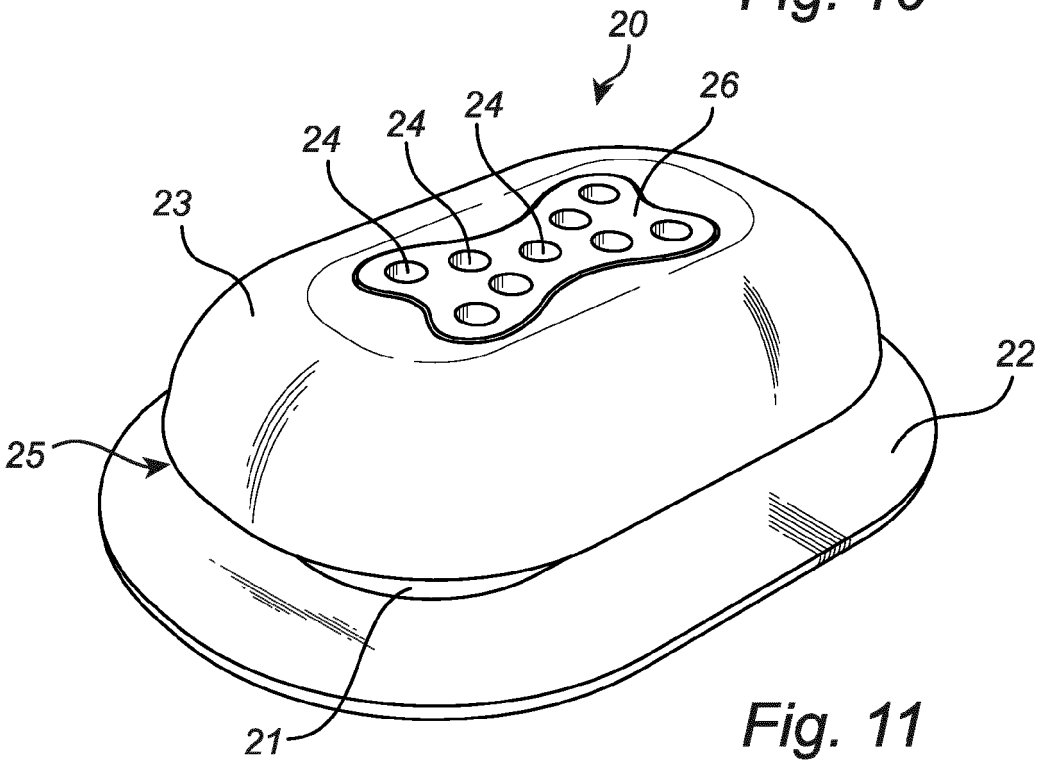
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Fig. 11

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Application Number
EP 14 16 4005

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| The Hague | 13 March 2015 | Claudel, Benoît |

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