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**(54) UPPER PROVIDED WITH SPONGE MEMBER IN HEEL PART**

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TIGE AYANT UN ÉLÉMENT EN ÉPONGE DANS LA PARTIE TALON

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## Description

### TECHNICAL FIELD

**[0001]** The present invention relates to an upper having a sponge member in a heel portion.

### BACKGROUND ART

**[0002]** Shoes having a sponge member in the heel portion in order to improve the fit of the heel portion of the upper are well known in the art.

### CITATION LIST

### PATENT LITERATURE

#### [0003]

First Patent Document: JP2011-041590 A (abstract)  
Second Patent Document: JP2010-022791 A (abstract)

**[0004]** U.S. Patent No. 3,693,270 discloses a structure of an upper for improving a fitting property of a heel portion of the upper of a shoe. Said upper comprises a pad which includes a medial side portion covering a medial side of a calcaneal bone and a lateral side portion covering a lateral side of the calcaneal bone.

### SUMMARY OF INVENTION

**[0005]** There have been no researches in the prior art on the sponge member conducted while sufficiently taking into consideration the change in the shape of the foot. Therefore, in the prior art, the conformity of the upper to the foot (the fitting property) has not been satisfactory.

**[0006]** It is therefore an object of the present invention to provide an upper having a sponge member in a heel portion, with which it is possible to improve the fitting property of the upper.

#### Principle of the Invention

**[0007]** Prior to the description of the configuration of the present invention, the principle of the present invention will be presented through experiments and discussions done by the present inventors.

**[0008]** Referring to FIGS. 1A and 1B, a large number of markers **M** were attached to the foot of the subject in a five-by-five matrix pattern. FIGS. 1C and 1D show images of the markers **M** in a standstill position. Note that the markers **M** are connected with one another by vertical lines and horizontal lines so as to make the images easier to view.

**[0009]** Then, the subject ran as shown in FIGS. 2(a) to 2(e), and images of the markers **M** were captured at different phases, including heel contact **HC** of FIG. 2(a),

foot flat **FF** of FIG. 2(b), mid stance **MS** of FIG. 2(c), heel rise **HR** of FIG. 2(d), and toe off **TO** of FIG. 2(e).

**[0010]** FIGS. 2(f) to 2(j) show images on the back side, and FIGS. 2(k) to 2(o) show images on the lateral side. In these figures, **M1** denotes a marker attached to the medial ankle, whereas **M2** denotes a marker attached to the lateral ankle.

**[0011]** First, looking at FIGS. 2(f) to 2(j) while focusing on the medial side **Med** of the foot, one will notice that the portion below the marker **M1** of the medial ankle is narrowed increasingly toward the bottom throughout the entire motion period, and will notice that the narrowing particularly increases during toe off **TO**. Therefore, it is expected that for the medial side **Med** of the foot, the slippage off the upper will decrease by inserting a thick sponge in a lower portion **Fu**.

**[0012]** On the other hand, looking at FIGS. 2(f) to 2(j) while focusing on the lateral side **Lat** of the foot, one will notice that the portion below the marker **M2** of the lateral ankle is such that an area **Fa** immediately below the lateral ankle is narrowed throughout the entire motion period, and that the narrowing decreases during toe off **TO**. Therefore, it is expected that for the lateral side **Lat** of the foot, the slippage off the upper will decrease by inserting a thick sponge in an upper portion of the foot immediately below the lateral ankle.

**[0013]** Looking at FIGS. 2(k) to 2(o) while focusing on the back side of the foot, one will notice that the portion posterior to the lateral ankle, i.e., the area of the Achilles tendon, is narrowed increasingly toward the top over the period of heel contact **HC** to heel rise **HR**, but the narrowing decreases dramatically at the moment of toe off **TO**. On the other hand, one will notice that the area **Fb** at generally the same level as on the lateral side of the foot is narrowed throughout the entire period. It is assumed that this area **Fb** is behind the calcaneal tuberosity **Cp**. The lower end portion of the Achilles tendon is attached to the calcaneal tuberosity **Cp**, and a portion of the Achilles tendon that is above the calcaneal tuberosity **Cp** is substantially displaced during motion whereas the calcaneal tuberosity **Cp** itself does not substantially change during motion. Therefore, it is expected that for the back side, the slippage off the upper will decrease by inserting a thick sponge in the area of the calcaneal tuberosity **Cp** at generally the same level as on the lateral side **Lat** of the foot.

**[0014]** Then, the present inventors verified the hypothesis by the following method.

**[0015]** First, three different prototypes were provided, which had the same shoe structure with their arrangements of the sponge plate being different from one another. That is, there were provided Type 1 shown in FIGS. 3(a) to 3(c), Type 2 shown in FIGS. 3(d) to 3(f), and Type 3 shown in FIGS. 3(g) to 3(i). These types of shoes are basically of the same structure, only with their arrangements of the sponge plate **Sp** indicated by broken lines being different from one another. Note that reference numeral 1 denotes an upper, and reference numeral 2 a

sole.

**[0016]** Next, while the subject ran, the amount of vertical slippage between the shoe and the foot over the tread period was measured, obtaining a measurement result indicating that Type 2 had a smaller amount of vertical slippage than Type 1 and Type 3. It is believed that this result agrees with the hypothesis, and that the hypothesis is probably right.

**[0017]** As the thickness of the sponge plate **Sp** was varied from 5 mm to 10 mm to 15 mm with Type 2, the amount of slippage was particularly small when a 10 mm or 15 mm sponge plate **Sp** was installed.

**[0018]** An upper **1** of the present invention includes an inner skin **11** placed on a wear's skin side (a side to face a wear's skin), and an outer skin **12** placed on an opposite side from the inner skin **11**, wherein a sponge member **3** is housed between the inner skin **11** and the outer skin **12** in the heel portion **10**;

the sponge member **3** includes a medial side portion **34** covering a medial side of a calcaneal bone **Ca**, and a lateral side portion covering a lateral side of the calcaneal bone **Ca**; and

in a developed view where the sponge member **3** is unfolded into a planar shape (plane figure), a level of a lateral first centroid **O10** of a portion corresponding to the lateral side portion is set to be higher than a level of a medial first centroid **O11** of a portion corresponding to the medial side portion **34**.

**[0019]** In this case, the level of the lateral first centroid **O10** is higher than the level of the medial first centroid **O11**. Therefore, the sponge member **3** is placed in an area where the shape of the foot is hollowed and does not change substantially, i.e., in the lower portion directly below the medial ankle of the foot and in an area immediately below the lateral ankle of the foot, and the fit will therefore improve.

**[0020]** In the present invention, a sponge member refers to a member of a foamed synthetic resin or a foamed rubber that easily deforms under a load of an external force and that generally restores its original shape upon removal of the external force. A sponge member may be a member that is cut off or cut out from a sponge plate of a predetermined thickness, or may be obtained by subjecting such a member to secondary molding in a mold. Moreover, a sponge member may be a member individually foamed and molded in a mold.

**[0021]** Note that in the present invention, the centroid means the center of a shape.

## BRIEF DESCRIPTION OF DRAWINGS

**[0022]**

FIGS. **1A** and **1B** are a slant back side view and a slant lateral side view, respectively, showing a foot with markers attached thereto, and FIGS. **1C** and **1D** are a back side view and a lateral side view, respectively, showing captured positions of the mark-

ers in a standstill position.

FIG. **2** shows a test method and a test result, wherein **(a)** to **(e)** are schematic side views showing the running form from heel contact to toe off, **(f)** to **(j)** are images capturing the markers from the back side from heel contact to toe off, and **(k)** to **(o)** are images capturing the markers from the lateral side over the same period.

FIG. **3** shows arrangements of the sponge plate in test samples, wherein **(a)**, **(b)** and **(c)** are a medial side view, a back side view and a lateral side view, respectively, of the heel portion of a shoe of Type 1, **(d)**, **(e)** and **(f)** are a medial side view, a back side view and a lateral side view, respectively, of the heel portion of a shoe of Type 2, and **(g)**, **(h)** and **(i)** are a medial side view, a back side view and a lateral side view, respectively, of the heel portion of a shoe of Type 3.

FIG. **4** is a conceptual lateral cross-sectional view of an upper according to Embodiment 1 of the present invention.

FIGS. **5A** to **5D** relate to Embodiment 1, wherein FIG. **5A** is a plan view of a sponge member, FIG. **5B** is a cross-sectional view thereof, FIG. **5C** is a medial side view showing the relationship between the sponge member and the foot, and FIG. **5D** is a lateral side view showing the same.

FIGS. **6A** to **6D** relate to Embodiment 2, wherein FIG. **6A** is a plan view of a sponge member, FIG. **6B** is a cross-sectional view thereof, FIG. **6C** is a medial side view showing the relationship between the sponge member and the foot, and FIG. **6D** is a lateral side view showing the same.

FIGS. **7A** to **7D** relate to Embodiment 3, wherein FIG. **7A** is a plan view of a sponge member, FIG. **7B** is a cross-sectional view thereof, FIG. **7C** is a medial side view showing the relationship between the sponge member and the foot, and FIG. **7D** is a lateral side view showing the same.

FIGS. **8A** to **8D** relate to an example not in accordance with the invention, wherein FIG. **8A** is a plan view of a sponge member, FIG. **8B** is a cross-sectional view thereof, FIG. **8C** is a medial side view showing the relationship between the sponge member and the foot, and FIG. **8D** is a lateral side view showing the same.

## DESCRIPTION OF EMBODIMENTS

**[0023]** Preferably, the medial side portion **34** covers at least a portion of a lower edge **Ce** of the calcaneal bone **Ca** directly below a talus **Ta**, and the lateral side portion **35** covers an area of the calcaneal bone **Ca** directly above a point **O**, wherein the point **O** bisects a distance between a lowermost end point **Ae** of a lateral ankle **A0** and the lower edge **Ce** of the calcaneal bone **Ca**.

**[0024]** In this case, the medial side portion **34** of the sponge member **3** fills the narrowed portion directly be-

low the talus **Ta**. On the other hand, the lateral side portion **35** of the sponge member **3** fills the narrowed portion directly and immediately below the lateral ankle **A0**. Therefore, narrowed portions on the medial side and the lateral side of the heel will be filled, and the upper 1 will better fit the heel.

**[0025]** More preferably, the sponge member **3** includes a thin portion **3a** having a small thickness, and a thick portion **3b** thicker than the thin portion **3a**, and wherein with the sponge member **3** unfolded, a perimeter of the thick portion **3b** is surrounded by the thin portion **3a**.

**[0026]** In this case, the thick portion **3b** protrudes with respect to the thin portion **3a**, and the triangular narrowed portions on the medial side and the lateral side of the heel will likely be filled by the protruding area.

**[0027]** More preferably, in a developed view where the thick portion **3b** is unfolded into a planar shape, a level of a lateral second centroid **O20** of a portion of the thick portion **3b** corresponding to the lateral side portion is set to be higher than a level of a medial second centroid **O21** of a portion of the thick portion **3b** corresponding to the medial side portion **34**.

**[0028]** The level of the lateral second centroid **O20** of the thick portion **3b** is higher than the medial second centroid **O21** of the thick portion **3b**. Therefore, the thick portion **3b** is placed in an area where the shape of the foot is hollowed or narrowed and does not change substantially, i.e., in the lower portion directly below the medial ankle of the foot and in an area directly (nearly immediately) below the lateral ankle of the foot, and the fitting property will therefore further improve.

**[0029]** Preferably, a lower edge line **3bL** of the thick portion **3b** extends, while being upwardly slanted, from a medial side of the heel portion **10** to a lateral side thereof via a back side thereof.

**[0030]** In this case, the thick portion **3b** will likely fill the gap in the lower portion of the heel portion **10** on the medial side of the heel portion **10**, fill the gap behind the calcaneal tuberosity **Cp** on the back side of the heel portion **10**, and fill the gap in the upper portion of the heel portion **10** on the lateral side of the heel portion **10**.

**[0031]** Preferably, a lower edge line **3L** of the sponge member **3** extends, while being upwardly slanted, from a medial side of the heel portion **10** to a lateral side thereof via a back side thereof.

**[0032]** In this case, the sponge member **3** will likely fill the gap in the lower portion of the heel portion **10** on the medial side of the heel portion **10**, fill the gap behind the calcaneal tuberosity **Cp** of the heel portion **10** on the back side of the heel portion **10**, and fill the gap in the upper portion of the heel portion **10** on the lateral side of the heel portion **10**.

**[0033]** Preferably, the sponge member **3** includes:

a first sponge plate **31** extending along a medial side of a heel coming from a back side of the heel and also extending along a lateral side of the heel coming from the back side of the heel; and

a second sponge plate **32** laid on a foot skin side of the first sponge plate **31**, the second sponge plate **32** having a smaller area than the first sponge plate **31**, wherein:

the second sponge plate **32** is laid on a portion of the first sponge plate **31** while being bonded, glued or welded to the first sponge plate **31**; the thin portion **3a** is formed by a portion of the first sponge plate **31** on which the second sponge plate **32** is not laid; and the thick portion **3b** is formed by a portion where the second sponge plate **32** is laid on the first sponge plate **31**.

**[0034]** In this example, the manufacturing cost will be significantly lower as compared with a case where the sponge member **3** is molded in a mold in a secondary molding process, or the like. Moreover, the sponge member **3** will not have locally dense portions.

**[0035]** Preferably, the second sponge plate **32** is formed by a material having a lower resilience than the first sponge plate **31**.

**[0036]** Since the low-resilience second sponge plate **32** placed on the foot skin side maintains, with a small pressure, the shape in conformity with the surface of the foot, it is possible to achieve a desirable foot conformity. On the other hand, when the shape of the heel substantially changes instantaneously, the high-resilience first sponge plate **31** will likely follow such changes. Therefore, the fitting property of the upper will further improve.

**[0037]** In the present invention, "low resilience" means that the speed at which the original shape is restored upon removal of a load of an external force is low. Therefore, when a load of an external force is applied to both of the sponge plates **31** and **32**, the high-resilience first sponge plate **31** will deform quickly, and the deformation of the low-resilience second sponge plate **32** will lag behind. Upon removal of the load of the external force off both of the sponge plates **31** and **32**, the first sponge plate **31** will quickly restore its original shape, and the restoration of the second sponge plate **32** will lag behind the first sponge plate **31**.

**[0038]** Preferably, the second sponge plate **32** is formed by a material having a lower hardness than the first sponge plate **31**.

**[0039]** In this case, the low-hardness second sponge plate **32** placed on the foot skin side will softly contact the skin surface of the heel. Therefore, the wearer will unlikely feel compressed.

**[0040]** More preferably, the second sponge plate **32** is formed by a material having a lower resilience and a lower hardness than the first sponge plate **31**.

**[0041]** In this case, the fit will further improve, and one will unlikely feel compressed.

**[0042]** In the present invention, the material of the first sponge plate **31** having a high hardness and a high resilience may be, for example, an urethane foam, a sili-

cone foam, or the like, whereas a material having a low hardness and a low resilience may be, for example, an urethane foam, a silicone foam, or the like. Although the material of the high-resilience first sponge plate **31** has a lower resilience than the sponge material used in an ordinary midsole or a sock liner (sock lining), it has a relatively higher resilience than the material of the low-resilience second sponge plate **32**.

**[0043]** The hardness of the first sponge plate **31** is preferably 40 to 90 degrees, more preferably 55 to 90 degrees, particularly preferably 70 to 90 degrees, and most preferably 75 to 85 degrees, in terms of the F hardness.

**[0044]** On the other hand, the hardness of the second sponge plate **32** is preferably 10 to 80 degrees, more preferably 10 to 50 degrees, particularly preferably 10 to 30 degrees, and most preferably 15 to 25 degrees, in terms of the F hardness.

**[0045]** The above F hardness is a value obtained through measurement using the Asker rubber hardness meter F-type (from Kobunshi Keiki Co., Ltd.). Note that the hardness of the first sponge plate **31** and the hardness of the second sponge plate **32** will be substantially zero degree if measured by using a JIS C hardness meter.

**[0046]** Preferably, the sponge member **3** further includes a back portion **30** covering a calcaneal tuberosity **Cp** from directly behind along a virtual line **CL** dividing the sponge member **3** into the medial side portion **34** and the lateral side portion **35**, and the sponge member **3** defines a narrowed portion **36** which is narrowed downwardly along the virtual line **CL** and which does not cover an area above the calcaneal tuberosity **Cp**.

**[0047]** In this case, the gap, which likely occurs between the calcaneal tuberosity **Cp** and an area of the upper behind the calcaneal tuberosity **Cp**, will be filled by the back portion **30**, thereby improving the fitting property. On the other hand, the narrowed portion **36** will accommodate substantial displacement or deformation of the Achilles tendon, and therefore the movement of the Achilles tendon will unlikely be hindered.

**[0048]** The present invention will be understood more clearly from the following description of preferred embodiments taken in conjunction with the accompanying drawings. Note however that the embodiments and the drawings are merely illustrative and should not be taken to define the scope of the present invention. The scope of the present invention shall be defined only by the appended claims. In the accompanying drawings, like reference numerals denote like components throughout the plurality of figures.

## EMBODIMENTS

**[0049]** Embodiments of the present invention will now be described with reference to the drawings.

**[0050]** FIGS. 4 to 5D show Embodiment 1.

**[0051]** As shown in FIG. 4, the upper 1 includes the inner skin **11** placed on the wear's skin side, and the

outer skin **12** placed on the opposite side from the inner skin **11**. The sponge member **3** is housed between the inner skin **11** and the outer skin **12** in the heel portion **10**.

**[0052]** Note that although the sponge member **3** undergoes substantial compressive deformation, or the like, when manufacturing the shoe, FIG. 4 merely shows the conceptual placement of the sponge member **3**. Reference numeral **6** denotes an insole.

**[0053]** The inner skin **11** may be a mesh material, or the like, as well as a woven material or a knit material having desirable stretchability and air-permeability. On the other hand, the outer skin **12** may be a mesh material, or the like, as well as a plate or tape material made of a synthetic leather or a non-foamed synthetic resin having a desirable shape retention.

**[0054]** Note that each of the inner skin **11** and the outer skin **12** may include a single layer or multiple layers. A heel counter or a core well known in the art may be placed.

**[0055]** In the present embodiment, the sponge member **3** includes the first to third sponge plates **31** to **33**. The first sponge plate **31** and the second sponge plate **32** are bonded, glued or welded together, and are partially laid on each other. The second sponge plate **32** and the third sponge plate **33** are bonded, glued or welded together, and are partially laid on each other.

**[0056]** The first sponge plate **31** is formed by a sponge having a high resilience and a high hardness. On the other hand, the second and third sponge plates **32** and **33** are formed by a sponge having a low resilience and a low hardness.

**[0057]** Note that the third sponge plate **33** may be of a material having the same physical properties as that of the second sponge plate **32**.

**[0058]** As shown in FIGS. 5A to 5D, the first sponge plate **31** extends along the medial side of the heel coming from the back side of the heel and also extends along the lateral side of the heel coming from the back side of the heel. As shown in FIG. 4, the second sponge plate **32** is laid on the foot skin side of the first sponge plate **31**, and has a smaller area than the first sponge plate **31** as shown in FIG. 5A. The third sponge plate **33** of FIG. 4 is laid on the foot skin side (the inner skin **11** side) of the second sponge plate **32**, and has an even smaller area than the second sponge plate **32** as shown in FIG. 5A.

**[0059]** The sponge member **3** includes the medial side portion **34** covering the medial side of the calcaneal bone **Ca** as shown in FIG. 5C, and the lateral side portion **35** covering the lateral side of the calcaneal bone **Ca** as shown in FIG. 5D. The medial side portion **34** and the lateral side portion **35** of FIG. 4 are separated from each other by a medial-lateral center line (virtual line) **CL** of the heel portion **10** (FIG. 4).

**[0060]** Thus, as shown in FIG. 5B, the sponge member **3** includes the thin portion **3a** having a small thickness, and the thick portion **3b** thicker than the thin portion **3a**. With the sponge member **3** of FIG. 5A unfolded, the pe-

rimeter of the thick portion **3b** is surrounded by the thin portion **3a**.

[0061] That is, the thin portion **3a** is formed by a portion of the first sponge plate **31** on which no second sponge plate **32** is laid. On the other hand, the thick portion **3b** is formed by a portion where the second sponge plate **32** is laid on the first sponge plate **31**.

[0062] Note that in the case of three layers as shown in FIG. **5B**, the sponge member **3** includes a thickest portion **3c** that is even thicker than the thick portion **3b**. With the sponge member **3** of FIG. **5A** unfolded, the perimeter of the thickest portion **3c** is surrounded by the thick portion **3b**.

[0063] As shown in FIGS. **5A**, **5C** and **5D**, the lower edge line **3L** of the sponge member **3** extends, while being upwardly slanted, from the medial side of the heel portion **10** to the lateral side thereof via the back side thereof. Thus, in the developed view of FIG. **5A** where the sponge member **3** is unfolded into a planar shape (plane figure), the level of the centroid of the portion corresponding to the lateral side portion **35**, i.e., the lateral first centroid **O10**, is set to be higher than the level of the centroid of the portion corresponding to the medial side portion **34**, i.e., the medial first centroid **O11**.

[0064] As shown in FIGS. **5A**, **5C** and **5D**, the lower edge and upper edge line **3bL** of the thick portion **3b** extends, while being upwardly slanted, from the medial side of the heel portion **10** to the lateral side thereof via the back side thereof. Thus, in the developed view of FIG. **5A**, the level of the lateral second centroid **O20** of the portion of the thick portion **3b** corresponding to the lateral side portion **35** is set to be higher than the level of the medial second centroid **O21** of the portion of the thick portion **3b** corresponding to the medial side portion **34**.

[0065] The first sponge plate **31** further includes the back portion **30** covering the calcaneal tuberosity **Cp** (FIG. **5C**) from directly behind along the virtual center line **CL** of FIG. **5A**. The first sponge plate **31** has the narrowed portion **36** where the upper edge is narrowed downwardly along the center line **CL**, which is the medial-lateral center. Because of the narrowed portion **36**, the first sponge plate **31** does not cover the area above the calcaneal tuberosity **Cp**, and the first sponge plate **31** will not therefore compress the Achilles tendon during toe off of FIG. **2(o)**. On the other hand, protruding portions **37** and **37** protruding upward on opposite sides of the narrowed portion **36** of FIG. **5A** will improve the fit on the medial side and the lateral side of the heel.

[0066] The first sponge plate **31** of the medial side portion **34** of FIG. **5C** covers at least a portion of the lower edge **Ce** of the calcaneal bone **Ca** directly below the talus **Ta**, and covers the majority of the lower half of the calcaneal bone **Ca** posterior to the medial ankle **A1**. The second sponge plate **32** of the medial side portion **34** covers an area of the calcaneal bone **Ca** below the point **O1** and does not cover an area above the point **O1**, wherein the point **O1** bisects a distance between the low-

ermost end point **Ae** of the medial ankle **A1** and the lower edge **Ce** of the calcaneal bone **Ca**.

[0067] The first and second sponge plates **31** and **32** of the lateral side portion **35** cover both an area of the calcaneal bone **Ca** directly above the point **O** and an area of the calcaneal bone **Ca** directly below the point **O**, wherein the point **O** bisects a distance between the lowermost end point **Ae** of the lateral ankle **A0** and the lower edge **Ce** of the calcaneal bone **Ca**.

[0068] The first sponge plate **31** extends to a point anterior to the lowermost end point **Ae** of the medial ankle **A1** on the medial side of the foot of FIG. **5C**, and extends to a point anterior to the lowermost end point **Ae** of the lateral ankle **A0** on the lateral side of the foot of FIG. **5D**.

[0069] The second sponge plate **32** extends to a point anterior to the posterior end **Ab** of the medial ankle **A1** on the medial side of the foot of FIG. **5C**, and extends to a point anterior to the posterior end **Ab** of the lateral ankle **A0** on the lateral side of the foot of FIG. **5D**.

[0070] The areas of the first sponge plate **31**, the second sponge plate **32** and the third sponge plate **33** on the medial side portion **34** are respectively greater than those on the lateral side portion **35**. Note that for the lowermost end portion of the foot, a roll-up portion is often formed in the upper **1** itself or in the sock liner (sock lining), in which case there is no need to provide the sponge member **3** on the medial side **Med**.

[0071] In the following examples, like elements to those of Embodiment 1 will be denoted by like reference numerals and will not be further described below, and the following description will mainly focus on what is different from Embodiment 1.

[0072] Note that as in Embodiment 2 shown in FIGS. **6A** to **6D**, the area of the third sponge plate **33** on the lateral side of the foot may be greater than that on the medial side of the foot.

[0073] FIGS. **7A** to **7D** show Embodiment 3.

[0074] In the present embodiment, the third sponge plate **33** is absent. In such a case, the thickness of the first and second sponge plates **31** and **32** is preferably made greater than that in Embodiments 1 and 2.

[0075] In various embodiments, the thickness of the sponge plates **31** and **32** is preferably about 5 to 15 mm, and more preferably about 7 to 12 mm.

[0076] As shown in FIG. **7A**, in Embodiment 3, the second sponge plate **32** has a narrowed portion **38** that is narrowed downwardly in the area of the center line **CL**. The narrowed portion **38**, in cooperation with the narrowed portion **36**, will further unlikely causes compression on the Achilles tendon.

[0077] As shown in FIGS. **7A**, **7C** and **7D**, the second sponge plate **32** has a significantly larger area on the medial side portion **34** than on the lateral side portion **35**. The second sponge plate **32** extends to a point anterior to the posterior end **Ab** of the medial ankle **A1** on the medial side portion **34** of FIG. **7C**, and the second sponge plate **32** does not extend to the posterior end **Ab** of the lateral ankle **A0** on the lateral side portion **35** of FIG. **7D**,

with the second sponge plate **32** not covering the anterior half of the calcaneal bone **Ca** while covering the posterior portion of the calcaneal bone **Ca**.

**[0078]** FIGS. **8A** to **8D** show an example not in accordance with the invention.

**[0079]** In this example, the medial side portion **34** and the lateral side portion **35** have shapes that are generally in line symmetry with each other about the center line **CL**.

**[0080]** In the present example, the medial side portion **34** of the first sponge plate **31** covers at least a portion of the lower edge **Ce** of the calcaneal bone **Ca** directly below the talus **Ta**. On the other hand, the lateral side portion **35** of the first sponge plate **31** covers an area of the calcaneal bone **Ca** directly above the point **O**, wherein the point **O** is a bisector between the lower end of the lateral ankle **A0** and the lower edge **Ce** of the calcaneal bone **Ca**.

**[0081]** The second sponge plate **32** of FIG. **8A** includes, at its opposite ends, protruding portions **39** and **39** that coincide with the upper edge line of the first sponge plate **31**. The protruding portions **39** will be helpful in positioning the first sponge plate **31** and the second sponge plate **32** with each other.

**[0082]** The sponge member **3** of the present example having a generally line-symmetric shape may lead to a less desirable fitting property as compared with Embodiments 1 to 3. However, the second sponge plate **32** is partially laid on the first sponge plate **31**, and the sponge member **3** can be expected to fill the gap between the foot and the upper 1 and improve the fit to some degree. Particularly, the foot conformity will improve by setting the hardness and the resilience of the second sponge plate **32** lower than those of the first sponge plate **31**.

**[0083]** On the other hand, this example having a symmetric shape can improve productivity as compared with Embodiments 1 to 3, where it is necessary to provide both a member for the left foot and a member for the right foot, and the left-foot member and the right-foot member cannot be installed incorrectly during the manufacture.

**[0084]** While preferred embodiments have been described above with reference to the drawings, various obvious changes and modifications will readily occur to those skilled in the art upon reading the present specification.

**[0085]** For example, different sponge plates may have the same hardness and the same resilience property.

**[0086]** The sponge member may be divided into two pieces between the medial side and the lateral side, or may be divided into three pieces between the medial side, the back side and the lateral side.

**[0087]** Thus, such changes and modifications are deemed to fall within the scope of the present invention.

**[0088]** The present invention is applicable to a heel portion of an upper.

#### REFERENCE SIGNS LIST

**[0089]**

1: Upper, 10: Heel portion, 11: Inner skin, 12: Outer skin

2: Sole

3: Sponge member, 30: Back portion, 31: First sponge plate, 32: Second sponge plate, 33: Third sponge plate, 34: Medial side portion, 35: Lateral side portion, 36: Narrowed portion, 37: Protruding portion, 38: Narrowed portion, 39: Protruding portion  
3a: Thin portion, 3b: Thick portion, 3c: Thickest portion, 3bL: Lower edge line of thick portion  
3L: Lower edge line of sponge member

6: Insole

A0: Lateral ankle, A1: Medial ankle, Ae: Lowermost end point, Ab: Posterior end

Ca: Calcaneal bone, Ce: Lower edge of calcaneal bone, Cp: Calcaneal tuberosity

CL: Center line

Fa: Area directly below lateral ankle, Fb: Area at same height as on lateral side of foot, Fu: Lower portion

M: Marker, M1: Marker attached to medial ankle, M2: Marker attached to lateral ankle

O, O1: Bisector point

O10: Lateral first centroid, O11: Medial first centroid,

O20: Lateral second centroid

O21: Medial second centroid

Sp: Sponge plate

Ta: Talus

#### Claims

1. A structure of an upper for improving a fitting property of a heel portion (10) of the upper (1) of a shoe, wherein:

the upper (1) includes an inner skin (11) placed on a wear's skin side, and an outer skin (12) placed on an opposite side from the inner skin (11), wherein a sponge member (3) is housed between the inner skin (11) and the outer skin in the heel portion (10); and

the sponge member (3) includes a medial side portion (34) covering a medial side of a calcaneal bone (Ca), and a lateral side portion (35) covering a lateral side of the calcaneal bone (Ca);

**characterised in that,**

in a developed view where the sponge member (3) is unfolded into a planar shape, a level of a lateral first centroid (O10) of a portion corresponding to the lateral side portion (35) is set to be higher than a level of a medial first centroid (O11) of a portion corresponding to the medial side portion (34).

2. The structure according to claim 1, wherein the medial side portion (34) covers at least a portion of a

lower edge (**Ce**) of the calcaneal bone (**Ca**) directly below a talus (**Ta**), and the lateral side portion covers an area of the calcaneal bone (**Ca**) directly above a point (**O**), wherein the point (**O**) bisects a distance between a lowermost end point (**Ae**) of a lateral ankle (**A0**) and the lower edge (**Ce**) of the calcaneal bone (**Ca**).

3. The structure according to claim 2, wherein the sponge member (**3**) includes a thin portion (**3a**) having a small thickness, and a thick portion (**3b**) thicker than the thin portion (**3a**), and wherein with the sponge member (**3**) unfolded, a perimeter of the thick portion (**3b**) is surrounded by the thin portion (**3a**).
4. The structure according to claim 3, wherein in a developed view where the thick portion (**3b**) is unfolded into a planar shape, a level of a lateral second centroid (**O20**) of a portion of the thick portion (**3b**) corresponding to the lateral side portion is set to be higher than a level of a medial second centroid (**O21**) of a portion of the thick portion (**3b**) corresponding to the medial side portion (**34**).
5. The structure according to claim 3, wherein a lower edge line (**3bL**) of the thick portion (**3b**) extends, while being upwardly slanted, from a medial side of the heel portion (**10**) to a lateral side of the heel portion (**10**) via a back side of the heel portion (**10**).
6. The structure according to claim 2, wherein a lower edge line (**3L**) of the sponge member (**3**) extends, while being upwardly slanted, from a medial side of the heel portion (**10**) to a lateral side of the heel portion (**10**) via a back side of the heel portion (**10**).
7. The structure according to claim 3, wherein the sponge member (**3**) comprises:
  - a first sponge plate (**31**) extending along a medial side of a heel coming from a back side of the heel and also extending along a lateral side of the heel coming from the back side of the heel; and
  - a second sponge plate (**32**) laid on a foot skin side of the first sponge plate (**31**), the second sponge plate (**32**) having a smaller area than the first sponge plate (**31**), wherein:
    - the second sponge plate (**32**) is laid on a portion of the first sponge plate (**31**) while being bonded, glued or welded to the first sponge plate (**31**);
    - the thin portion (**3a**) is formed by a portion of the first sponge plate (**31**) on which the second sponge plate (**32**) is unlaid; and
    - the thick portion (**3b**) is formed by a portion where the second sponge plate (**32**) is laid

on the first sponge plate (**31**).

8. The structure according to claim 7, wherein the second sponge plate (**32**) is formed by a material having a lower resilience than the first sponge plate (**31**).
9. The structure according to claim 7, wherein the second sponge plate (**32**) is formed by a material having a lower hardness than the first sponge plate (**31**).
10. The structure according to claim 7, wherein the second sponge plate (**32**) is formed by a material having a lower resilience and a lower hardness than the first sponge plate (**31**).
11. The structure according to claim 2, wherein the sponge member (**3**) further comprises a back portion (**30**) covering a calcaneal tuberosity (**Cp**) from directly behind along a virtual line (**CL**) dividing the sponge member (**3**) into the medial side portion (**34**) and the lateral side portion (**35**), and the sponge member (**3**) defines a narrowed portion (**36**) that is narrowed downwardly along the virtual line (**CL**) without covering an area above the calcaneal tuberosity (**Cp**).

#### Patentansprüche

1. Aufbau eines Schafts zur Verbesserung eines Passvermögens eines Fersenabschnitts (10) des Schafts (1) eines Schuhs, wobei:

der Schaft (1) eine Innenhaut (11), die auf einer Trägerhautseite platziert ist, und eine Außenhaut (12) aufweist, die auf einer Gegenseite von der Innenhaut (11) platziert ist, wobei ein Schwammteil (3) zwischen der Innenhaut (11) und der Außenhaut im Fersenabschnitt (10) untergebracht ist; und

das Schwammteil (3) einen medialen Seitenabschnitt (34), der eine mediale Seite eines Calcaneus (Ca) abdeckt, und einen lateralen Seitenabschnitt (35) aufweist, der eine laterale Seite des Calcaneus (Ca) abdeckt;

**dadurch gekennzeichnet, dass**

in einer Abwicklung, in der das Schwammteil (3) in eine ebene Form entfaltet ist, eine Höhe eines lateralen ersten Flächenschwerpunkts (O10) eines Abschnitts, der dem lateralen Seitenabschnitt (35) entspricht, so eingestellt ist, dass sie höher als eine Höhe eines medialen ersten Flächenschwerpunkts (O11) eines Abschnitts ist, der dem medialen Seitenabschnitt (34) entspricht.

2. Aufbau nach Anspruch 1, wobei der mediale Seitenabschnitt (34) mindestens einen Abschnitt einer Un-



terkante (Ce) des Calcaneus (Ca) direkt unterhalb eines Talus (Ta) abdeckt und der laterale Seitenabschnitt eine Fläche des Calcaneus (Ca) direkt oberhalb eines Punkts (O) abdeckt, wobei der Punkt (O) einen Abstand zwischen einem untersten Endpunkt (Ae) eines lateralen Knöchels (A0) und der Unterkante (Ce) des Calcaneus (Ca) halbiert.

3. Aufbau nach Anspruch 2, wobei das Schwammteil (3) einen dünnen Abschnitt (3a) mit einer kleinen Dicke und einen dicken Abschnitt (3b) aufweist, der dicker als der dünne Abschnitt (3a) ist, und wobei bei entfaltetem Schwammteil (3) ein Umfang des dicken Abschnitts (3b) vom dünnen Abschnitt (3a) umgeben ist.

4. Aufbau nach Anspruch 3, wobei in einer Abwicklung, in der der dicke Abschnitt (3b) in eine ebene Form entfaltet ist, eine Höhe eines lateralen zweiten Flächenschwerpunkts (O20) eines Abschnitts des dicken Abschnitts (3b), der dem lateralen Seitenabschnitt entspricht, so eingestellt ist, dass sie höher als eine Höhe eines medialen zweiten Flächenschwerpunkts (O21) eines Abschnitts des dicken Abschnitts (3b) ist, der dem medialen Seitenabschnitt (34) entspricht.

5. Aufbau nach Anspruch 3, wobei sich eine Unterkantenlinie (3bL) des dicken Abschnitts (3b) unter Aufwärtsneigung von einer medialen Seite des Fersenabschnitts (10) zu einer lateralen Seite des Fersenabschnitts (10) über eine Rückseite des Fersenabschnitts (10) erstreckt.

6. Aufbau nach Anspruch 2, wobei sich eine Unterkantenlinie (3L) des Schwammteils (3) unter Aufwärtsneigung von einer medialen Seite des Fersenabschnitts (10) zu einer lateralen Seite des Fersenabschnitts (10) über eine Rückseite des Fersenabschnitts (10) erstreckt.

7. Aufbau nach Anspruch 3, wobei das Schwammteil (3) aufweist:

eine erste Schwammplatte (31), die sich entlang einer medialen Seite einer Ferse ausgehend von einer Rückseite der Ferse erstreckt und sich auch entlang einer lateralen Seite der Ferse ausgehend von der Rückseite der Ferse erstreckt; und

eine zweite Schwammplatte (32), die auf einer Fußhautseite der ersten Schwammplatte (31) aufgelegt ist, wobei die zweite Schwammplatte (32) eine kleinere Fläche als die erste Schwammplatte (31) hat, wobei:

die zweite Schwammplatte (32) auf einem Abschnitt der ersten Schwammplatte (31)

aufliegt, während sie mit der ersten Schwammplatte (31) verbunden, verklebt oder verschweißt ist;

der dünne Abschnitt (3a) durch einen Abschnitt der ersten Schwammplatte (31) gebildet ist, auf dem die zweite Schwammplatte (32) nicht aufliegt; und

der dicke Abschnitt (3b) durch einen Abschnitt gebildet ist, in dem die zweite Schwammplatte (32) auf der ersten Schwammplatte (31) aufliegt.

8. Aufbau nach Anspruch 7, wobei die zweite Schwammplatte (32) durch ein Material mit einer niedrigeren Elastizität als die erste Schwammplatte (31) gebildet ist.

9. Aufbau nach Anspruch 7, wobei die zweite Schwammplatte (32) durch ein Material mit einer niedrigeren Härte als die erste Schwammplatte (31) gebildet ist.

10. Aufbau nach Anspruch 7, wobei die zweite Schwammplatte (32) durch ein Material mit einer niedrigeren Elastizität und einer niedrigeren Härte als die erste Schwammplatte (31) gebildet ist.

11. Aufbau nach Anspruch 2, wobei das Schwammteil (3) ferner einen hinteren Abschnitt (30) aufweist, der einen Tuber calcanei (Cp) von direkt hinter einer gedachten Linie (CL) abdeckt, die das Schwammteil (3) in den medialen Seitenabschnitt (34) und den lateralen Seitenabschnitt (35) aufteilt, und das Schwammteil (3) einen verengten Abschnitt (36) bildet, der entlang der gedachten Linie (CL) nach unten verengt ist, ohne eine Fläche oberhalb des Tuber calcanei (Cp) abzudecken.

## Revendications

1. Structure d'une tige pour améliorer une propriété d'ajustement d'une partie de talon (10) de la tige (1) d'une chaussure, dans laquelle :

la tige (1) inclut une peau intérieure (11) placée sur un côté de peau d'un utilisateur, et une peau extérieure (12) placée sur un côté opposé à la peau intérieure (11), dans laquelle un élément en éponge (3) est logé entre la peau intérieure (11) et la peau extérieure dans la partie de talon (10) ; et

l'élément en éponge (3) inclut une partie de côté médiane (34) recouvrant un côté médian d'un calcanéum (Ca), et une partie de côté latérale (35) recouvrant un côté latéral du calcanéum (Ca) ;

**caractérisée en ce que**, dans une vue déve-

loppée où l'élément en éponge (3) est déplié en une forme plane, un niveau d'un premier centroïde latéral (O10) d'une partie correspondant à la partie de côté latérale (35) est réglé pour être plus haut qu'un niveau d'un premier centroïde médian (O11) d'une partie correspondant à la partie de côté médiane (34).

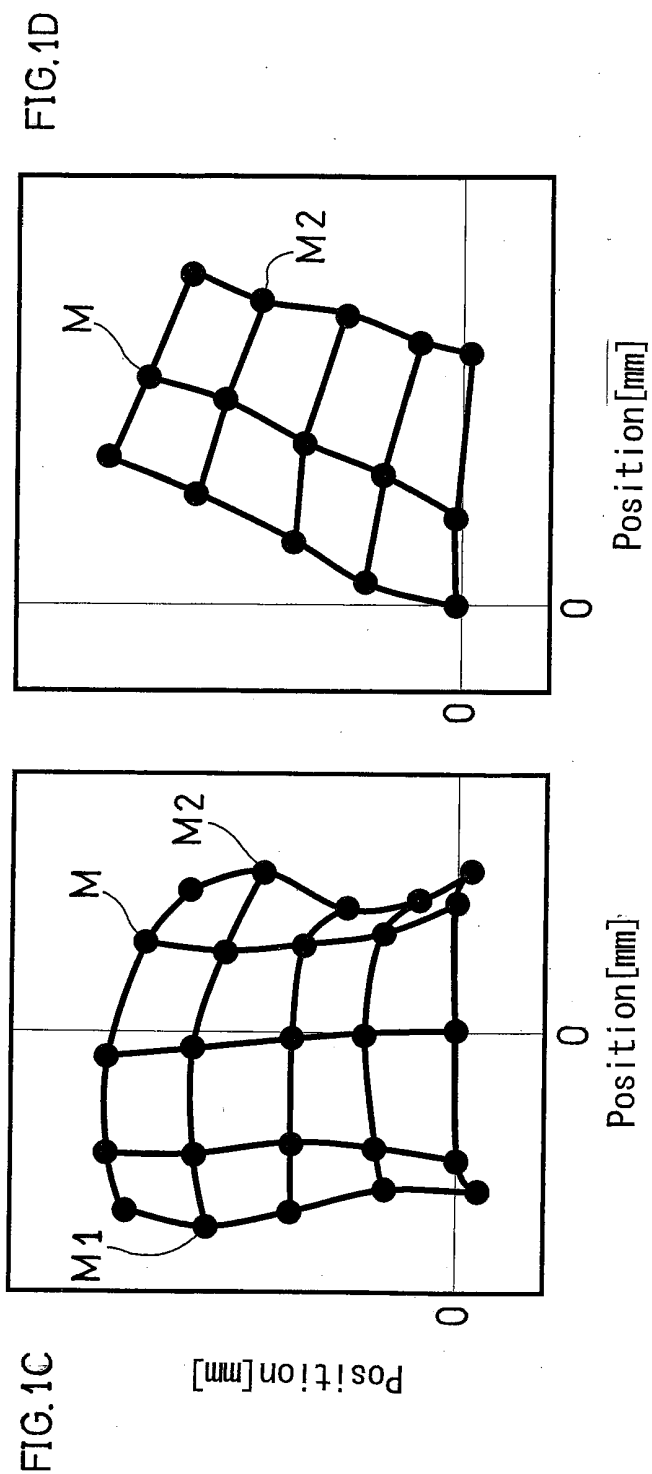
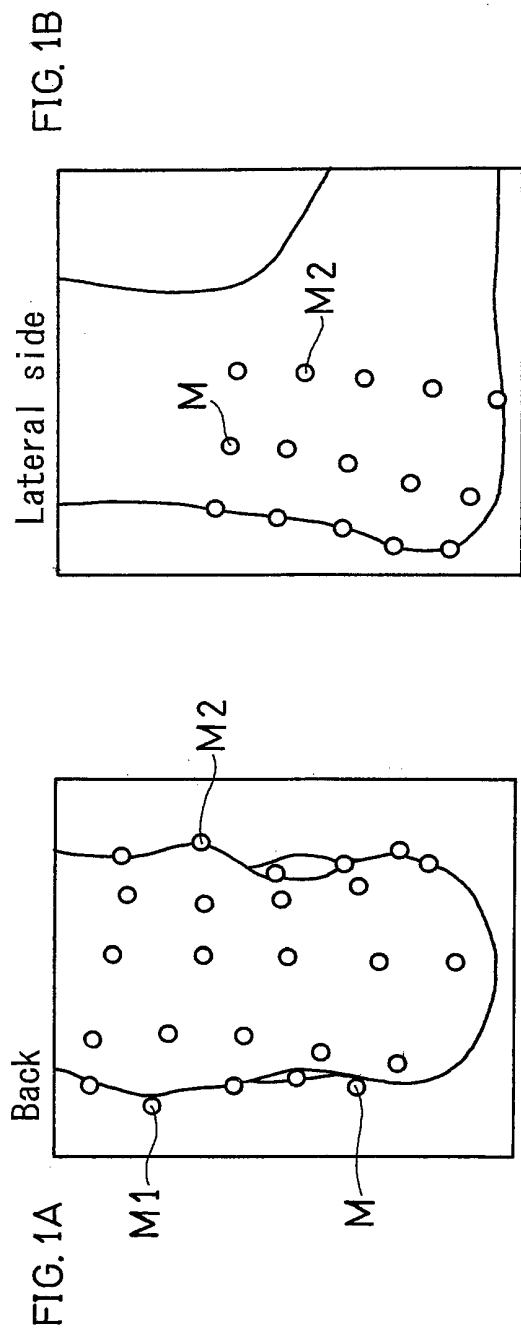
2. Structure selon la revendication 1, dans laquelle la partie de côté médiane (34) recouvre au moins une partie d'un bord inférieur (Ce) du calcanéum (Ca) directement sous un talus (Ta), et la partie de côté latérale recouvre une zone du calcanéum (Ca) directement au-dessus d'un point (O), dans laquelle le point (O) coupe une distance entre un point d'extrémité le plus bas (Ae) d'une cheville latérale (A0) et le bord inférieur (Ce) du calcanéum (Ca).
3. Structure selon la revendication 2, dans laquelle l'élément en éponge (3) inclut une partie mince (3a) ayant une petite épaisseur, et une partie épaisse (3b) plus épaisse que la partie mince (3a), et dans laquelle avec l'élément en éponge (3) déplié, un périmètre de la partie épaisse (3b) est entouré par la partie mince (3a).
4. Structure selon la revendication 3, dans laquelle dans une vue développée où la partie épaisse (3b) est dépliée en une vue plane, un niveau d'un second centroïde latéral (O20) d'une partie de la partie épaisse (3b) correspondant à la partie de côté latérale est réglé pour être plus haut qu'un niveau d'un second centroïde médian (O21) d'une partie de la partie épaisse (3b) correspondant à la partie de côté médiane (34).
5. Structure selon la revendication 3, dans laquelle une ligne de bord inférieur (3bL) de la partie épaisse (3b) s'étend, tout en étant penchée vers le haut, depuis un côté médian de la partie de talon (10) vers un côté latéral de la partie de talon (10) via un côté arrière de la partie de talon (10).
6. Structure selon la revendication 2, dans laquelle une ligne de bord inférieur (3L) de l'élément en éponge (3) s'étend, tout en étant penchée vers le haut, depuis un côté médian de la partie de talon (10) vers un côté latéral de la partie de talon (10) via un côté arrière de la partie de talon (10).
7. Structure selon la revendication 3, dans laquelle l'élément en éponge (3) comprend :

une première plaque en éponge (31) s'étendant le long d'un côté médian d'un talon venant d'un côté arrière du talon et s'étendant également le long d'un côté latéral du talon venant du côté arrière du talon ; et

une seconde plaque en éponge (32) disposée sur un côté de peau de pied de la première plaque en éponge (31), la seconde plaque en éponge (32) ayant une superficie plus petite que la première plaque en éponge (31), dans laquelle :

la seconde plaque en éponge (32) est disposée sur une partie de la première plaque en éponge (31) tout en étant liée, collée ou soudée à la première plaque en éponge (31) ;  
la partie mince (3a) est formée par une partie de la première plaque en éponge (31) sur laquelle la seconde plaque en éponge (32) n'est pas disposée ; et  
la partie épaisse (3b) est formée par une partie où la seconde plaque en éponge (32) est disposée sur la première plaque en éponge (31).

8. Structure selon la revendication 7, dans laquelle la seconde plaque en éponge (32) est formée par un matériau ayant une élasticité inférieure à la première plaque en éponge (31).
9. Structure selon la revendication 7, dans laquelle la seconde plaque en éponge (32) est formée par un matériau ayant une dureté inférieure à la première plaque en éponge (31).
10. Structure selon la revendication 7, dans laquelle la seconde plaque en éponge (32) est formée par un matériau ayant une élasticité inférieure et une dureté inférieure à la première plaque en éponge (31).
11. Structure selon la revendication 2, dans laquelle l'élément en éponge (3) comprend en outre une partie arrière (30) recouvrant une tubérosité calcanéenne (Cp) depuis directement derrière le long d'une ligne virtuelle (CL) divisant l'élément en éponge (3) en la partie de côté médiane (34) et la partie de côté latérale (35), et l'élément en éponge (3) définit une partie rétrécie (36) qui est rétrécie vers le bas le long de la ligne virtuelle (CL) sans recouvrir une zone au-dessus de la tubérosité calcanéenne (Cp).



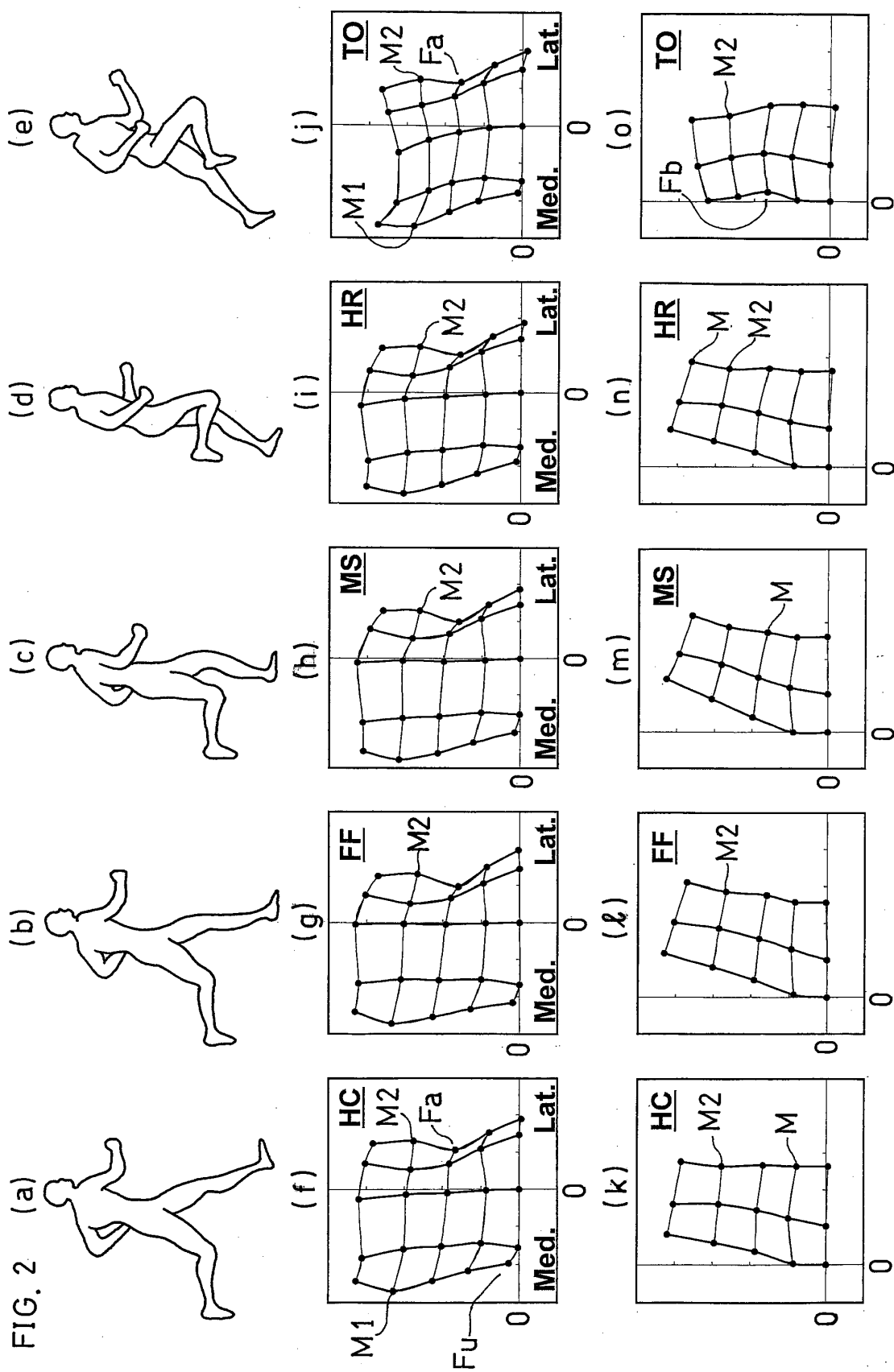
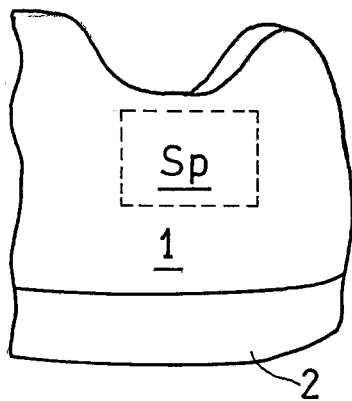


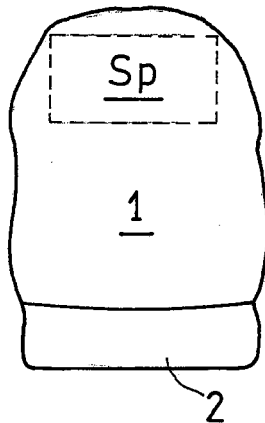
FIG. 3

Type 1

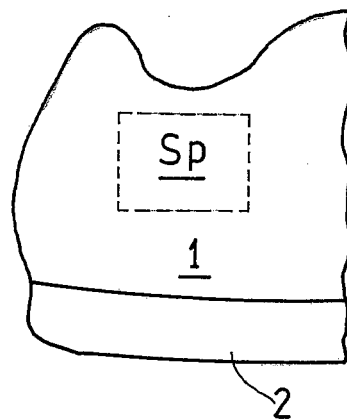
(a) Med.



(b) Back

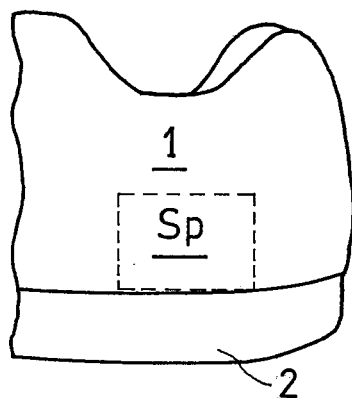


(c) Lat.

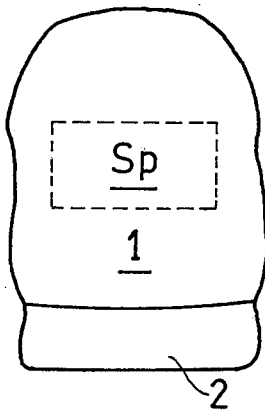


Type 2

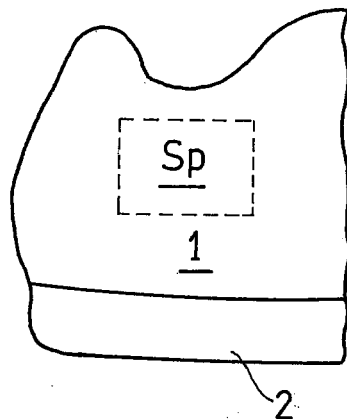
(d) Med.



(e) Back

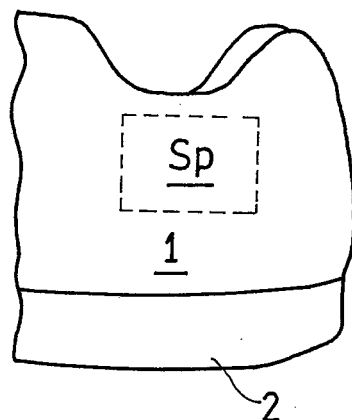


(f) Lat.

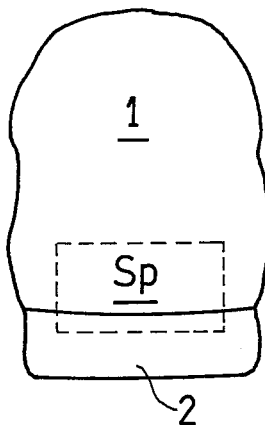


Type 3

(g) Med.



(h) Back



(i) Lat.

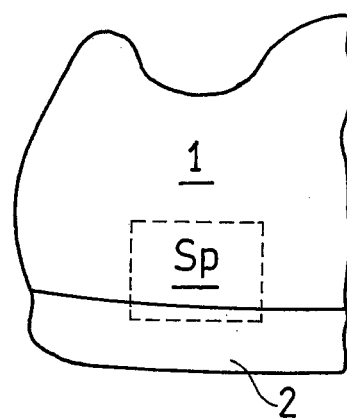


FIG. 4

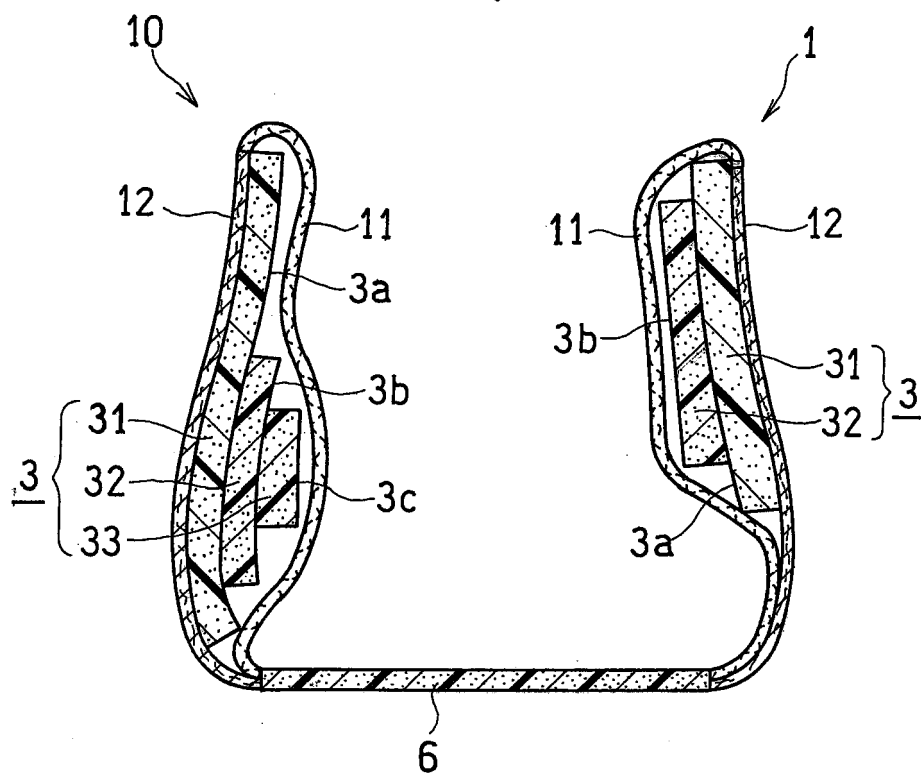


FIG. 5A

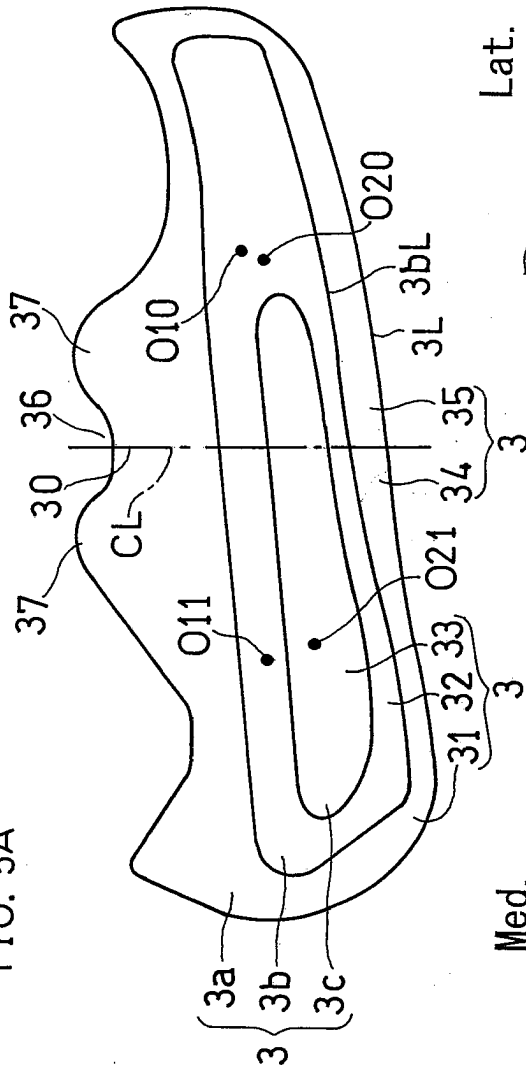


FIG. 5B

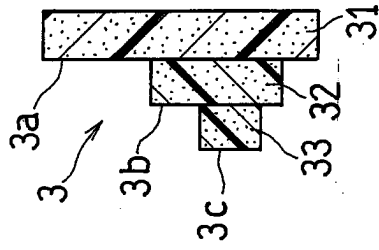


FIG. 5C

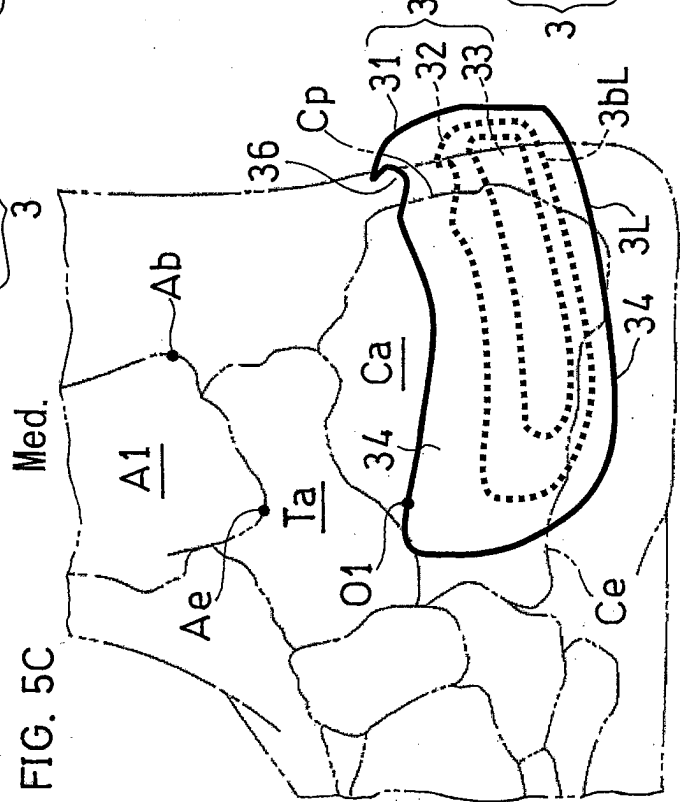
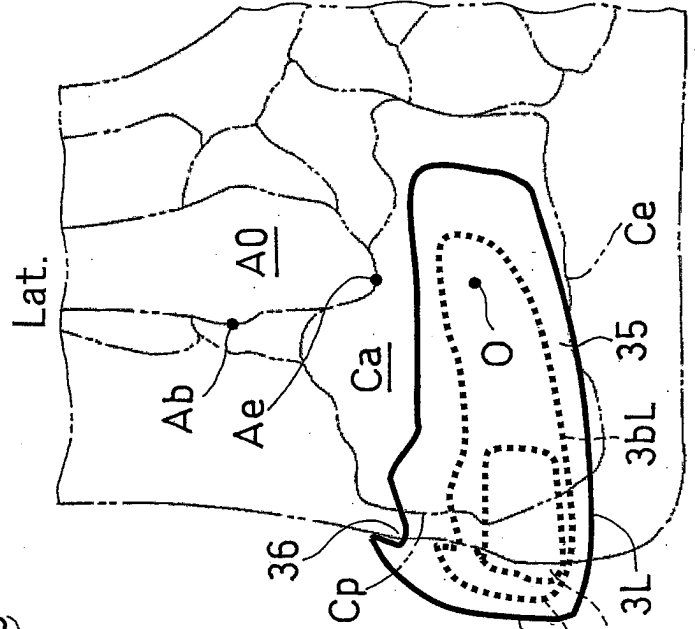


FIG. 5D



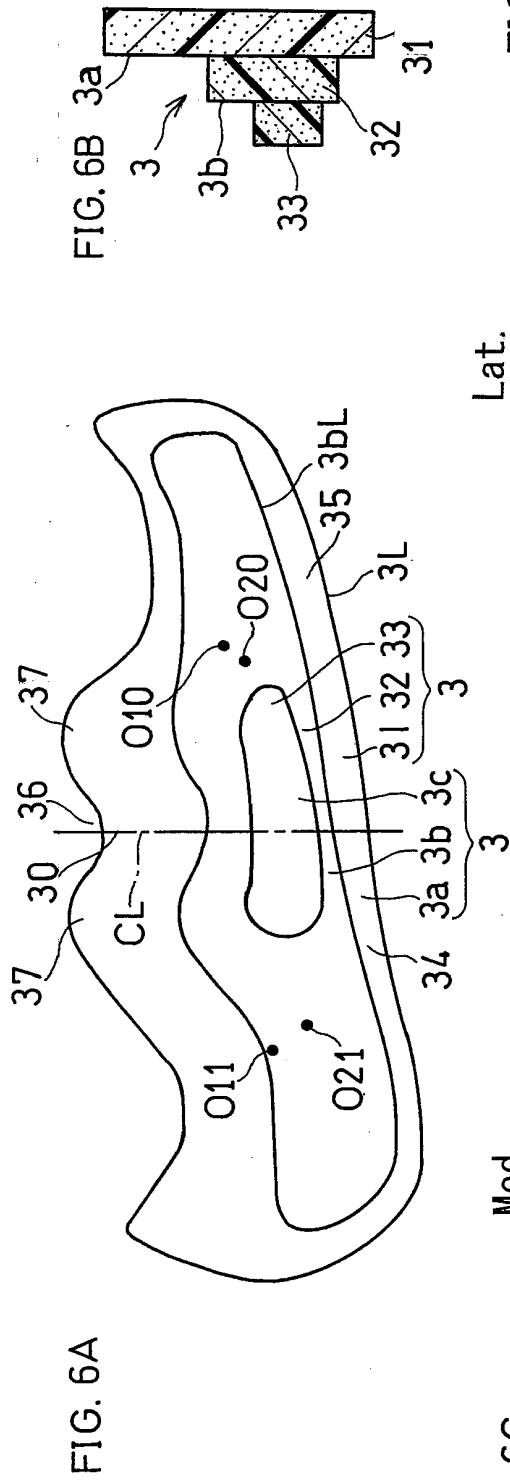
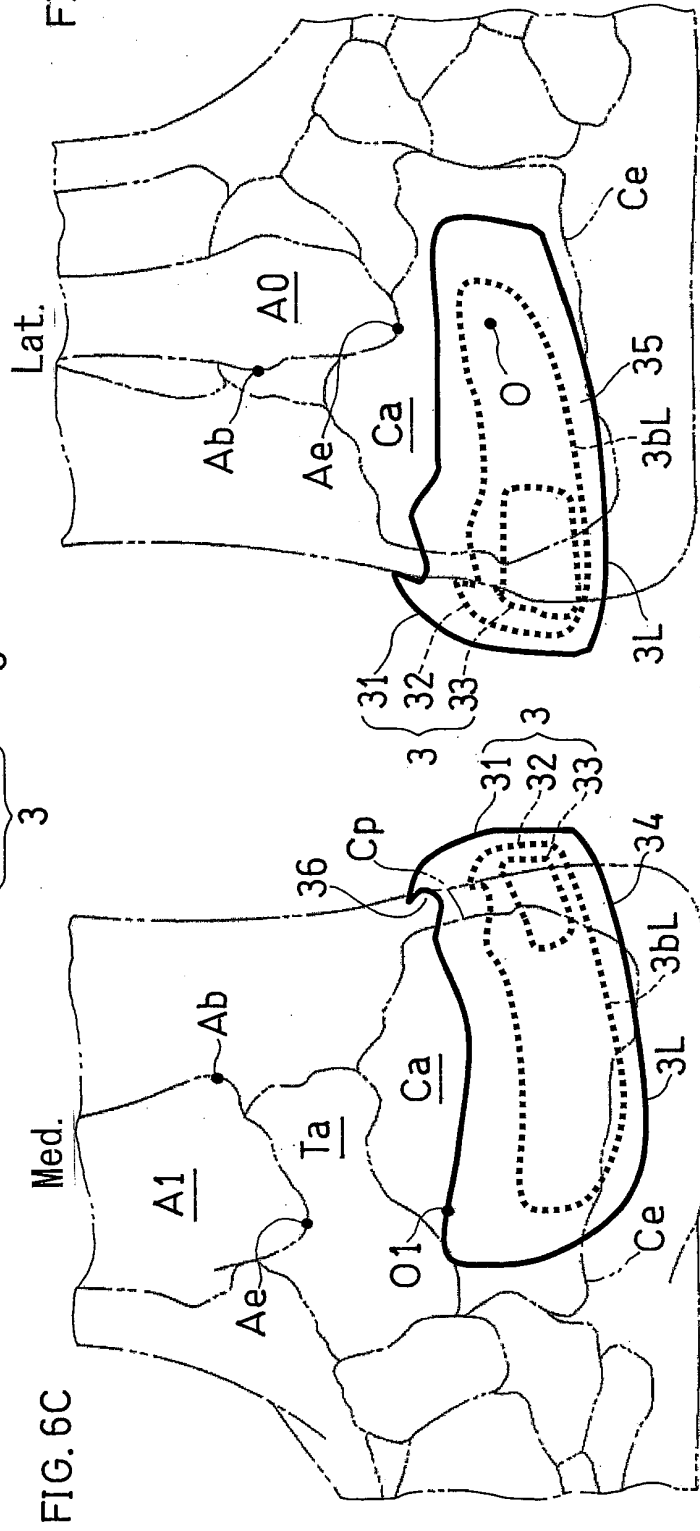
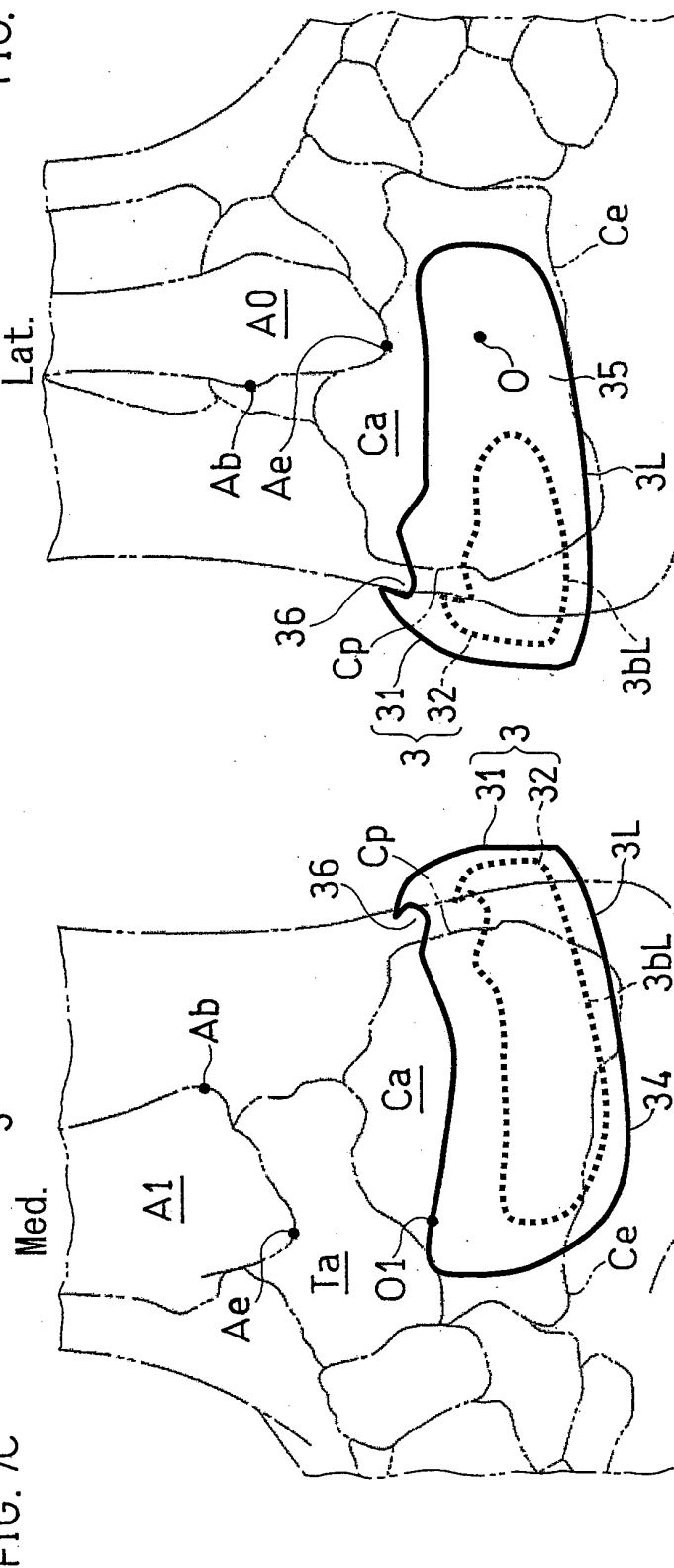
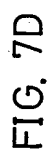
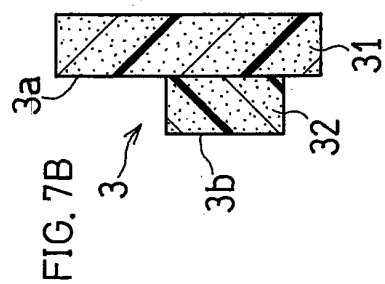
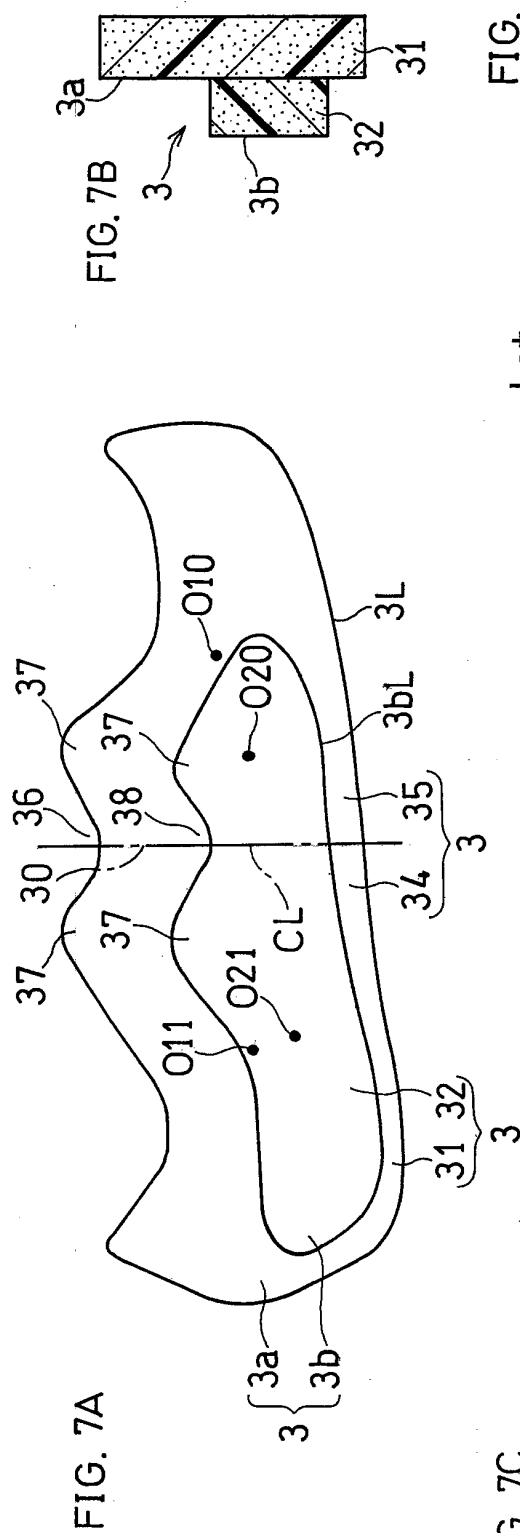


FIG. 6D







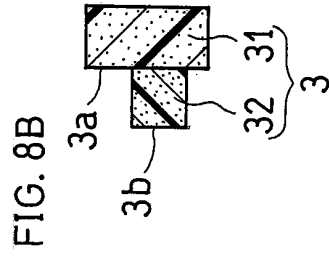
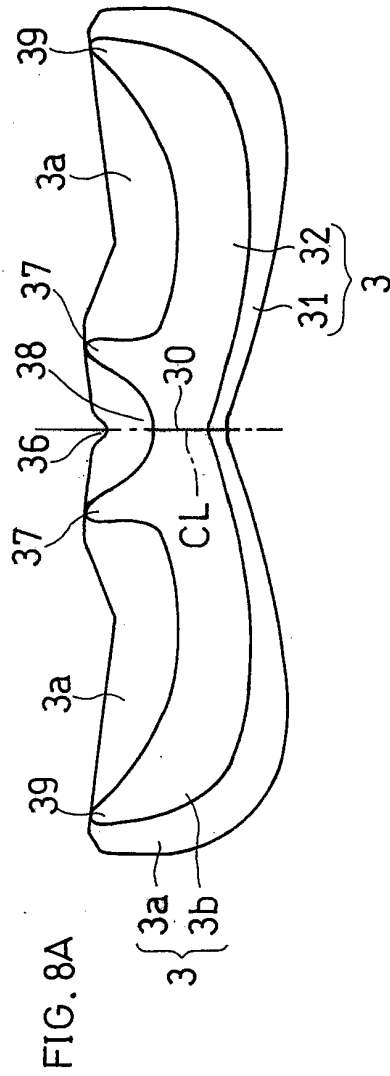


FIG. 8C

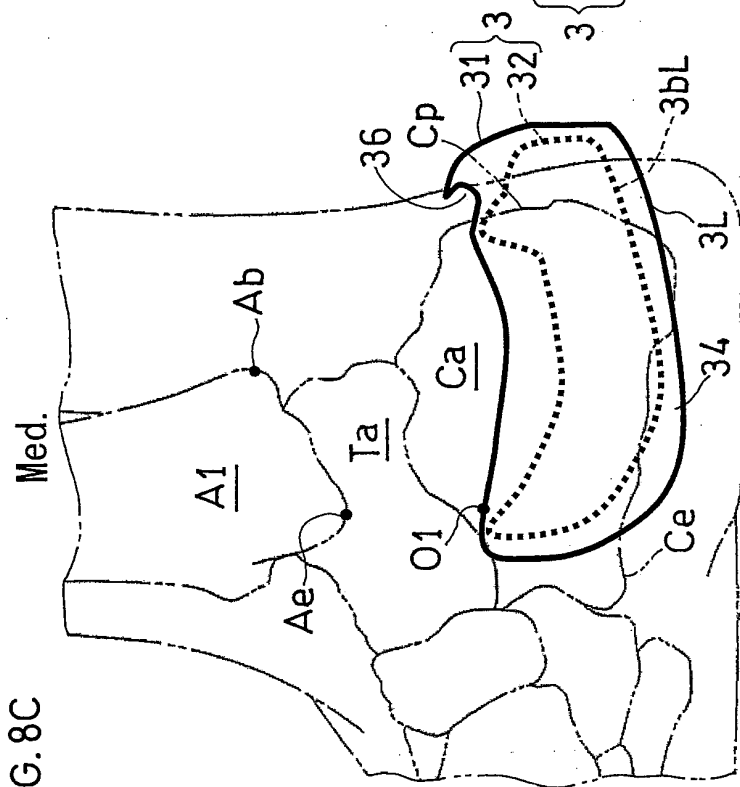
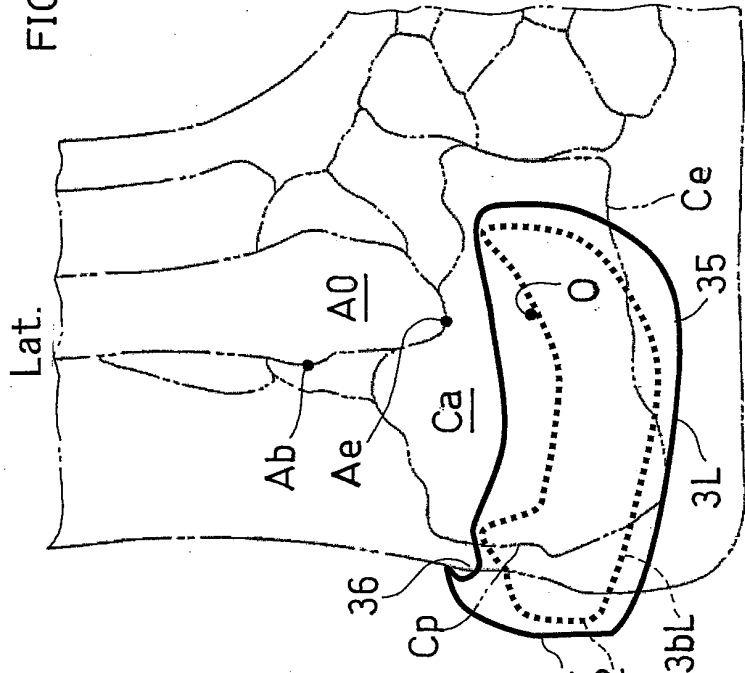


FIG. 8D



**REFERENCES CITED IN THE DESCRIPTION**

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**Patent documents cited in the description**

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