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(72) Inventors:
• **PERINELLO, Pierluigi**
I-35030 BAONE (Padova) (IT)
• **AGNOLIN, Riccardo**
I-37124 VERONA (IT)
• **BATTAGLIA, Antonio**
I-55100 MONTE SAN QUIRICO (Lucca) (IT)
• **TACCON, Alessandra**
I-35143 PADOVA (IT)

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(71) Applicant: **Silvateam S.p.A.**
12080 San Michele Mondovì (CN) (IT)

(74) Representative: **Rambelli, Paolo et al**
Jacobacci & Partners S.p.A.
Corso Emilia 8
10152 Torino (IT)

(54) **ECO-SUSTAINABLE SNEAKER**

(57) A sport shoe, made of natural materials, comprising a leather shoe upper (2) and a leather lining (4) fixed to the upper, a midsole (14, 22, 28), comprising a first midsole element (14) and a midsole lining (28), a sole (10), an external annular band (8) of leather that extends between the end of the upper, facing the sole and the sole, optionally in partial overlap with an end section (2a) of the upper, and a sub-band (12), adjacent to the band towards the inside of the shoe, characterized in that the lining (4) of the upper, the lining of the midsole

(28) and the sub-band (12) are fixed to each other adjacent to their ends facing the sole, by means of an annular seam (26); the lining of the midsole (28) is shaped and dimensioned so as to define, following its connection by sewing with the sub-band (12) and with the lining of the upper (4), a recess (24) in which a second midsole element (22) is positioned as a filling. The shoe may be shredded, resulting in a compostable material, and re-used as fertilizer.

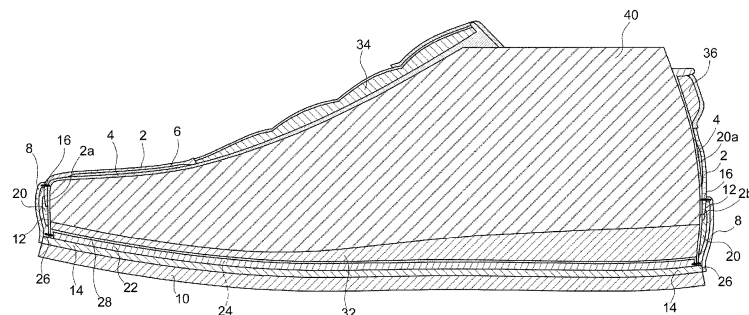


FIG.1

Description

[0001] The present invention relates to a sport shoe, of the type referred to by the term "sneaker," and pertains to an eco-sustainable sport shoe, made with the use of natural materials, such as leather and hide, and having structural features and mechanical strength similar to those of sport shoes nowadays conventionally made with extensive use of plastics materials.

[0002] The eco-sustainable disposal of sport shoes is a highly felt issue today and largely remains unsatisfactorily resolved.

[0003] In fact, modern sport shoes are made using around 20 to 50 component parts, and the increasingly widespread use of synthetic plastics materials with varying chemical properties, as well as the use of plastics materials in combination with natural materials such as leather and hide, makes recycling difficult and economically unsustainable. The way in which such sport shoes are made, wherein the component parts are mostly glued and welded to each other, makes it economically impossible to disassemble the shoes into recyclable and non-recyclable parts; an estimated 350 million sport shoes are thrown away each year, mostly in the non-recyclable waste collection, destined for incineration or disposal in a landfill.

[0004] GB 700520 describes a shoe with a welt, made using a system referred to as the Goodyear process; the term "welt" generally refers to a strip of hide that is stitched to the edge of the insole, also attaching the upper and the lining together.

[0005] From the description and related drawings of GB '520, the person skilled in the art understands that the footwear is made with rather complex workmanship and, more importantly, bases its sturdiness on the following prominent features:

- a compound outer welt 3 formed of a first layer 3a of rubber and a second layer 3b of leather underneath the first, extending from the upper 1 towards the outside of the shoe (Fig. 1). In the variant shown in Fig. 2, the addition of another para rubber welt 8, defined as waterproofing, is provided. The welt 3 at the end of the shoe is covered with a sheet of para rubber 6 glued laterally and then folded over the top of the welt in a complex and dangerous operation because the covering is prone to peeling off;
- the insole 2 must be constructed with a channel, called the "crease," which is the inner edge where the thread 4 attaches to support the holding tension of all the other materials that the thread joins: insole, lining leather, upper leather, and the two welts (or one, depending on the figure being considered). Processing the insole to create the crease is an additional process for preparing to stitch the shoe that makes this workmanship particularly elaborate.

[0006] In view of this document, the invention provides

a shoe structure that does not use a welt and that may be constructed with particularly simple processing with a simple, conventional sewing machine.

[0007] Another object of the present invention is to provide a sport shoe manufactured totally from natural materials, such as leather and hide or natural rubber, which is amenable to being shredded as is, i.e., without disassembly of the parts, to provide a material that may be composted and ultimately used as an organic fertilizer.

[0008] Another object of the invention is to provide a sport shoe having structural features and mechanical properties that do not penalize its durability, under the same conditions of use, compared to shoes made from conventional plastics materials.

[0009] Another object of the invention is to provide a sport shoe having a structure and assembly that allows for a significant reduction in the use of synthetic adhesives, which are thermoplastic or thermosetting in nature.

Summary of the invention

[0010] In view of the objects stated above, the invention pertains to a sport shoe having the features set forth in the claims below, which are an integral and essential part of the present description.

[0011] The invention also pertains to the process of assembling the shoe.

[0012] In particular, the objects of the aforementioned invention have been achieved by a shoe structure that uses the lining of the upper, made of leather material, as the joining element, via a seam, with the sub-band and a midsole lining.

[0013] Thus, it is a feature of the invention that the lining of the upper, the midsole lining and the sub-band are attached to each other, adjacent to their ends facing the sole (bottom end), by an annular seam; between the midsole lining and the midsole a recess is defined, in which an additional midsole element is placed as a filling.

[0014] Further features and advantages of the sport shoe according to the invention will become evident from the following detailed description, made with reference to the appended drawings, provided by way of non-limiting example, wherein:

- Fig. 1 is a cross-sectional view of an embodiment of a sport shoe according to the invention;
- Fig. 2 is an enlarged cross-sectional view of the toe part of the shoe in Fig. 1;
- Fig. 3 is a cross-sectional view of an alternative shoe embodiment according to the invention;
- Fig. 4 is an enlarged cross-sectional view of the toe part of the shoe in Fig. 3;
- Fig. 5 provides a schematic representation of the main component parts of a shoe according to the invention; and
- Fig. 6, in representations a) to n), schematically illustrates the operational steps of assembling a shoe according to the invention.

Detailed description of the invention

[0015] With reference to the drawings, the sport shoe, which is the subject matter of the invention, comprises an upper 2 made of leather and a lining 4, also made of leather, inside the upper and attached thereto by seams. In the toe region of the shoe, a reinforcing layer 6, usually of hide, is preferably and optionally interposed between the upper and the lining of the upper, the function of which is to increase the stiffness of the shoe in the toe region.

[0016] In accordance with the typical aesthetic and also structural feature of a sneaker, the shoe comprises an external annular band 8 with substantially vertical, and not radial, extension surrounding the bottom of the shoe between the sole 10 and the lower end of the lining of the upper 4, and which, in accordance with the invention, is made of leather material. Adjacent to the band 8, towards the inside of the shoe, there is a sub-band 12 that extends parallel to the band 8. The sub-band 12 is made of leather, preferably, suede leather, and is generally glued to the band, as well as being further attached to the band by a seam 26, described hereinafter.

[0017] In the embodiment of Fig. 1 and 2, the band 8 extends, in partial overlap with the end of the upper, denoted with 2a, in the toe region of the shoe and with 2b in the heel region, to cover the peripheral edge of a midsole element 14, typically made of hide.

[0018] The top end of the band 8 is attached to the upper 2 by a seam 16a.

[0019] In the embodiment of the Fig. 3 and 4, the lower end of the upper 2, both in the toe region and in the heel region, is folded over itself and the band 8 extends between the fold of the turned up part and the midsole element 14; the turned up end of the upper is fixed to the sub-band 12 by means of a seam 16b. Optionally and preferably, a reinforcing element 20, adapted to increase the shoe's rigidity, is interposed between the sub-band 12 and the lower end, facing the sole, of the lining 4, in the toe region. Similar reinforcing elements 20a and 20b are optionally present in the heel region.

[0020] In the present description, the term "midsole" is to be understood as including a layered structure comprising a first midsole element 14, preferably of hide, and a second superimposed midsole element 22, preferably of hide, and a midsole lining made of leather 28 superimposed on the second midsole element 22, towards the inside of the shoe.

[0021] According to a feature of the invention, the lining 4 of the upper, adjacent to its end facing the sole 10, is attached, via an annular seam 26, to the sub-band 12 and the lining 28, here defined as the midsole lining, adjacent to its lower peripheral edge 30.

[0022] The aforesaid midsole lining 28 is shaped and sized so as to define, following its connection by sewing with the sub-band 12 and with the lining of the upper 4, a recess 24 in which, during shoe assembly, a second midsole element 22, preferably of hide, is positioned as a filling.

[0023] The lining of the midsole 28 is preferably fixed with glue in a limited peripheral annular region to a peripheral region of the aforesaid second midsole element 22, avoiding the presence of glue in the central region of the shoe; similarly, the aforesaid second midsole element 22 is glued to the first midsole element 14 in a limited peripheral annular region, which means that it does not affect the central part of the shoe on which the foot rests.

[0024] 32 denotes a removable insole which may be formed, for example, by a laminate comprising a top layer of hide and a layer of coir.

[0025] Typically, the shoe also comprises padding elements made of natural expanded material, such as natural boiled wool, including a padding element 34 interposed between the lining and the upper in the tongue part of the shoe and a padding element 36 surrounding the collar region of the shoe, between the upper 2 and the lining 4. The sole 10 is typically made from some natural rubber (Para). However, the use of a hide sole is not ruled out.

[0026] In the attached drawings, 40 denotes the rigid shape used in manufacturing to form the shoe.

[0027] A second subject matter of the invention is the process for producing and assembling a shoe having the features previously outlined and defined in the following claims.

[0028] This process is characterized by the operation of connecting, by means of a seam, the lining of the upper 4, the lining of the midsole 28 and the sub-band 12, adjacent to their ends facing the sole, the lining of the midsole being shaped and dimensioned so as to define a recess 24 adapted to receive a second midsole element 22 as filling, and then position said second midsole element in the recess and fasten said second midsole element to the lining of the midsole by gluing it in a peripheral region thereof.

[0029] The operational steps of shoe construction and assembly are schematically illustrated, by way of example, in Fig. 6, steps a) to n), and comprise:

- step a): preparation of the lining 4 of the upper, including the lining of the quarters 4a and the lining of the vamp 4b.
- step b): application of the padding 34 and 36;
- step c): application of the reinforcements 6 and 20 in the toe region and 20a, 20b in the heel region;
- step d): assembly of the parts forming the upper 2 and the sub-band 12, preferably of suede leather;
- step e): stitching the upper with the suede leather sub-band;
- step f): lining of the vamp of the quarters and closure of the upper and lining by means of a seam 26;
- step g): insertion of the last 40 and application of the hide midsole element 22 (filling) with peripheral gluing;
- steps h) and i): application of the first midsole element 14;
- step l): application of the band 8;

- step m): application of the sole 10;
- step n): insertion of the insole 32.

[0030] The construction and structural features of the sport shoe covered by the invention allow the creation of a shoe, formed entirely of natural materials, that has structural features not inferior to conventional sport shoes that make extensive use of plastics materials.

[0031] Preferably, the leather materials used are leathers obtained by tanning with natural tannins, particularly chestnut, quebracho, gall, and tara without the use, in pre-tanning and tanning, of aldehydes, aldehyde donor compounds and/or heavy metal salts and/or any metal.

[0032] A tanning process with plant-extracted tannins, without treatment with aldehydes or metal salts, is described in IT 102021000006233 in the name of Silvateam.

[0033] This process, due to the hygroscopic properties of tannins, also gives the leather the ability to absorb moisture from the foot, creating an especially dry and comfortable environment in the shoe without the formation of unpleasant odors.

[0034] The shoe covered by the invention, in addition to being free of fillers, plastics, or other synthetic polymers, may be made with limited use of thermoplastic or thermosetting adhesives, their use possibly being limited to peripheral regions of limited extension. As a result of these features, the shoe also has improved wicking features, as it is essentially free of components with a barrier function to perspiration.

[0035] As mentioned in the introduction, the sport shoe covered by the invention, for the purpose of its disposal, may be directly shredded into granules or particles, providing a compostable material that may be used as an organic fertilizer.

[0036] Naturally, subject to the principle of invention, the embodiments and details of embodiment may be widely varied from that which is described and illustrated as a non-limiting example, within the claims that follow.

Claims

1. A sport shoe, made of natural materials, comprising:

- a leather shoe upper (2) and a leather lining (4) fixed to the upper,
- a midsole (14, 22, 28), comprising at least a first midsole element (14) and a midsole lining (28),
- a sole (10),
- an external annular band (8) of leather that extends between the end of the upper, facing the sole, and the sole, optionally in partial overlap with an end section (2a) of the upper, and
- a sub-band (12), which extends in parallel and adjacent to the band towards the inside of the shoe,

characterized in that the lining (4) of the upper, the lining of the midsole (28) and the sub-band (12) are fixed to each other adjacent to their ends facing the sole, by means of an annular seam (26).

2. The sport shoe according to claim 1, **characterized in that** the lining of the midsole (28) is shaped and dimensioned so as to define, following its connection by sewing with the sub-band (12) and with the lining of the upper (4), a recess (24) in which a second midsole element (22) is positioned as a filling.
3. The sport shoe according to claim 2, **characterized in that** the midsole comprises said first midsole element (14) made of hide and said second midsole element (22) made of hide, superimposed on each other and said leather midsole lining (28), superimposed on the second midsole element (22), the first midsole element (14) is the bottom element in contact with the sole and extends up to contact with the band (8) and the second midsole element (22) is the top element, positioned in said recess (24).
4. The sport shoe according to claim 2, **characterized in that** the midsole lining (28) is connected by adhesion to the second midsole element (22) in respective peripheral regions adjacent to their side edges.
5. The sport shoe according to any one of claims 1 to 4, **characterized in that** said seam (26) is substantially parallel to the general plane of the midsole.
6. The sport shoe according to any one of claims 1 to 5, **characterized in that** the sub-band (12) is made of suede leather.
7. The sport shoe according to any of the preceding claims, **characterized in that** the end portion of the upper directed towards the sole is fixed by means of a seam (16b) to the sub-band (12) and/or by means of a seam (16a) to the band (8).
8. The sport shoe according to any of the preceding claims **characterized in that** it comprises a removable insole (32) comprising a top layer of hide and a bottom layer of coir.
9. The sport shoe according to any of the preceding claims, **characterized in that** the sole (10) is of natural rubber (Para).
10. The sport shoe according to any of the preceding claims, **characterized in that** it is made of leather or hide materials tanned with vegetable tannins and substantially free from aldehydes or heavy metals.
11. Process for the production of a sport shoe according to any of the preceding claims, **characterized in that**

it comprises the operation of connecting by means of a seam (26) the lining of the upper (4), the lining of the midsole (28) and the sub-band (12), adjacent to their ends facing the sole, the lining of the midsole (28) being shaped and dimensioned so as to define a recess (24) suitable for receiving a second midsole element (22) and fixing said second midsole element (22) to the midsole lining (28) by gluing in respective peripheral regions facing one another.

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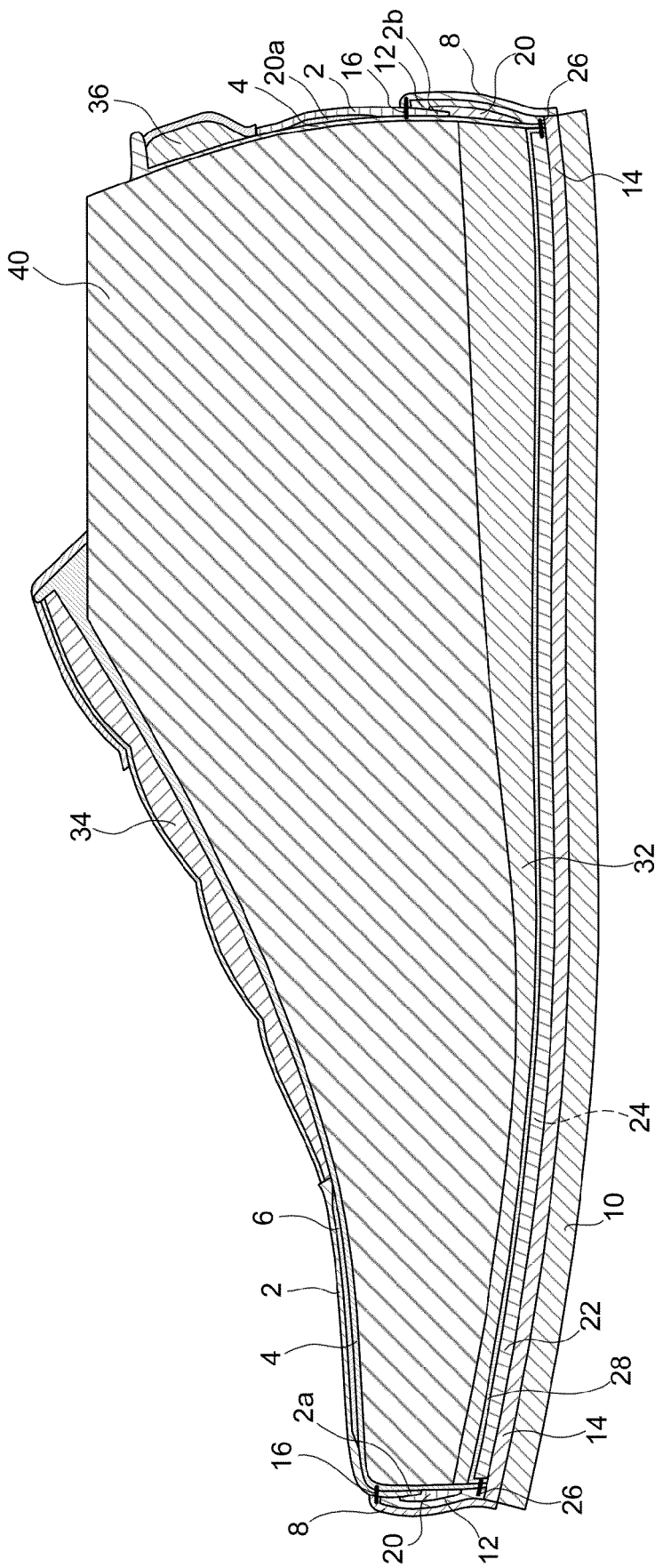


FIG.1

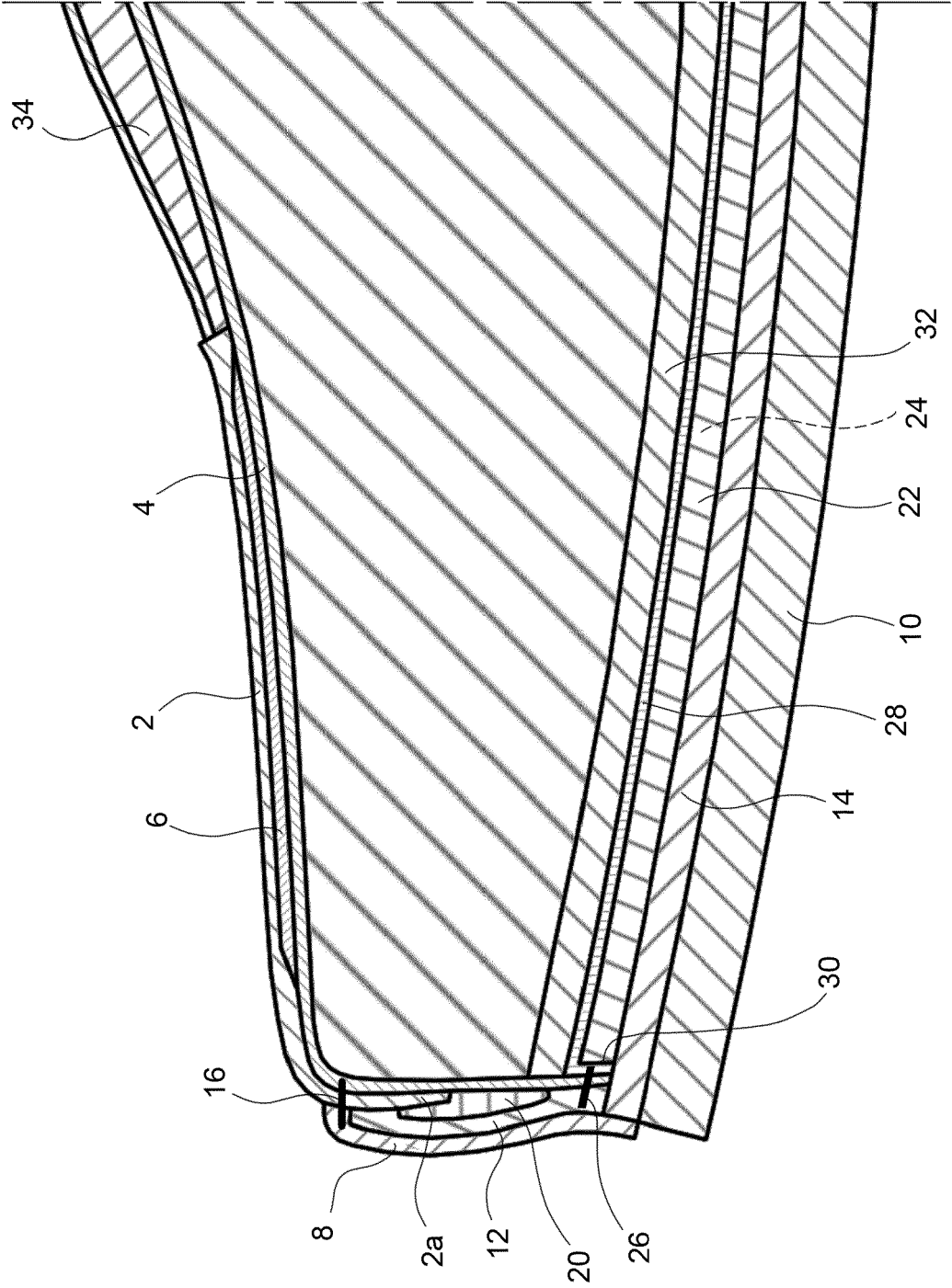


FIG.2

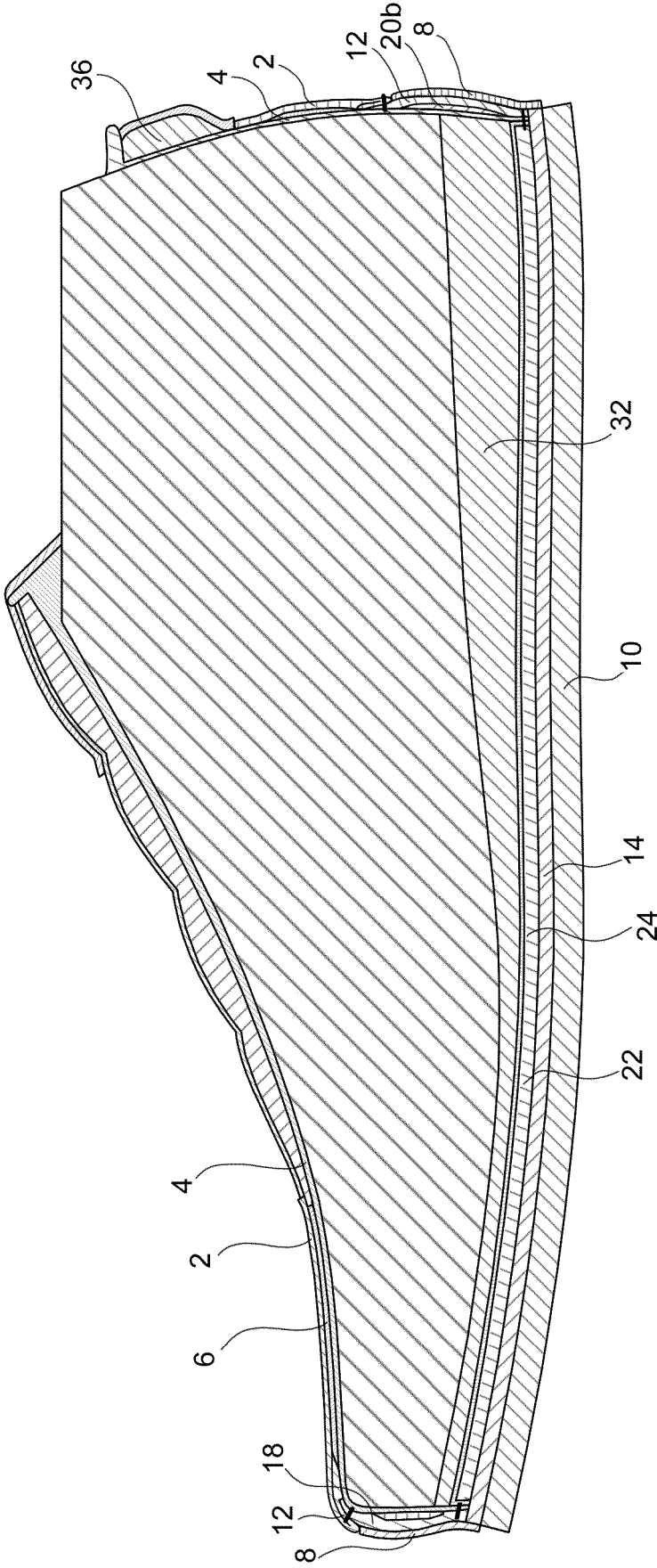


FIG.3

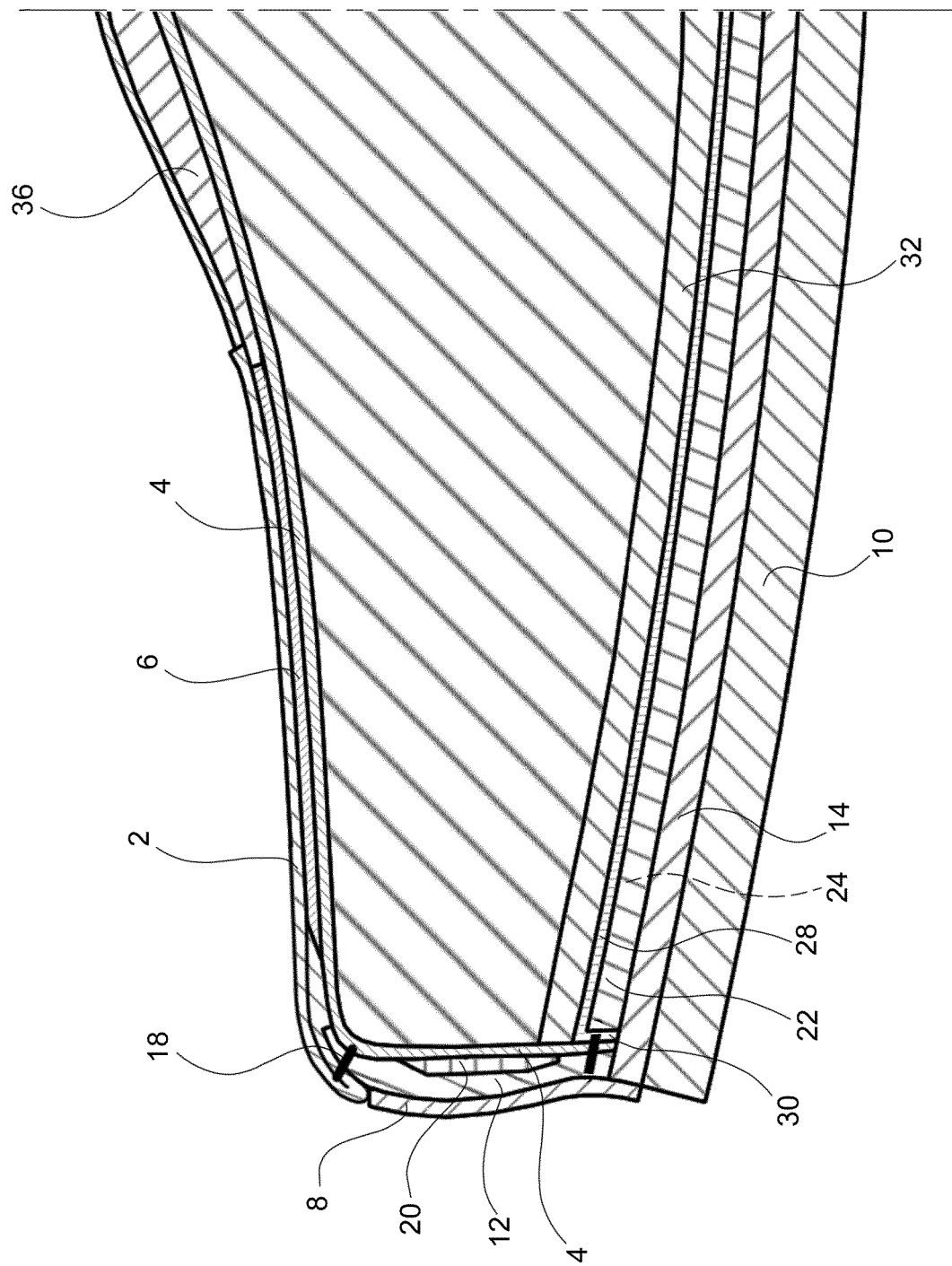
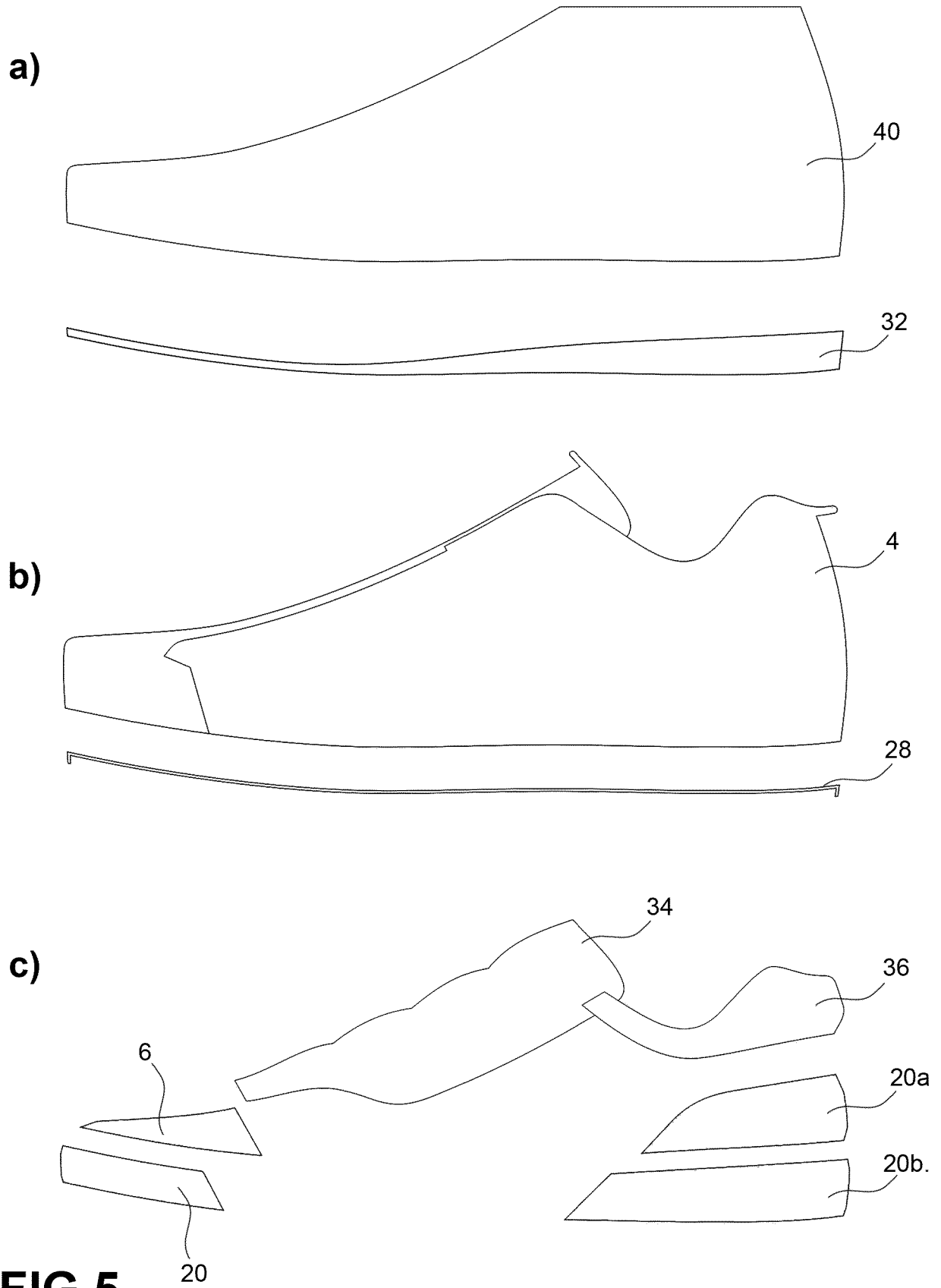


FIG. 4



d)

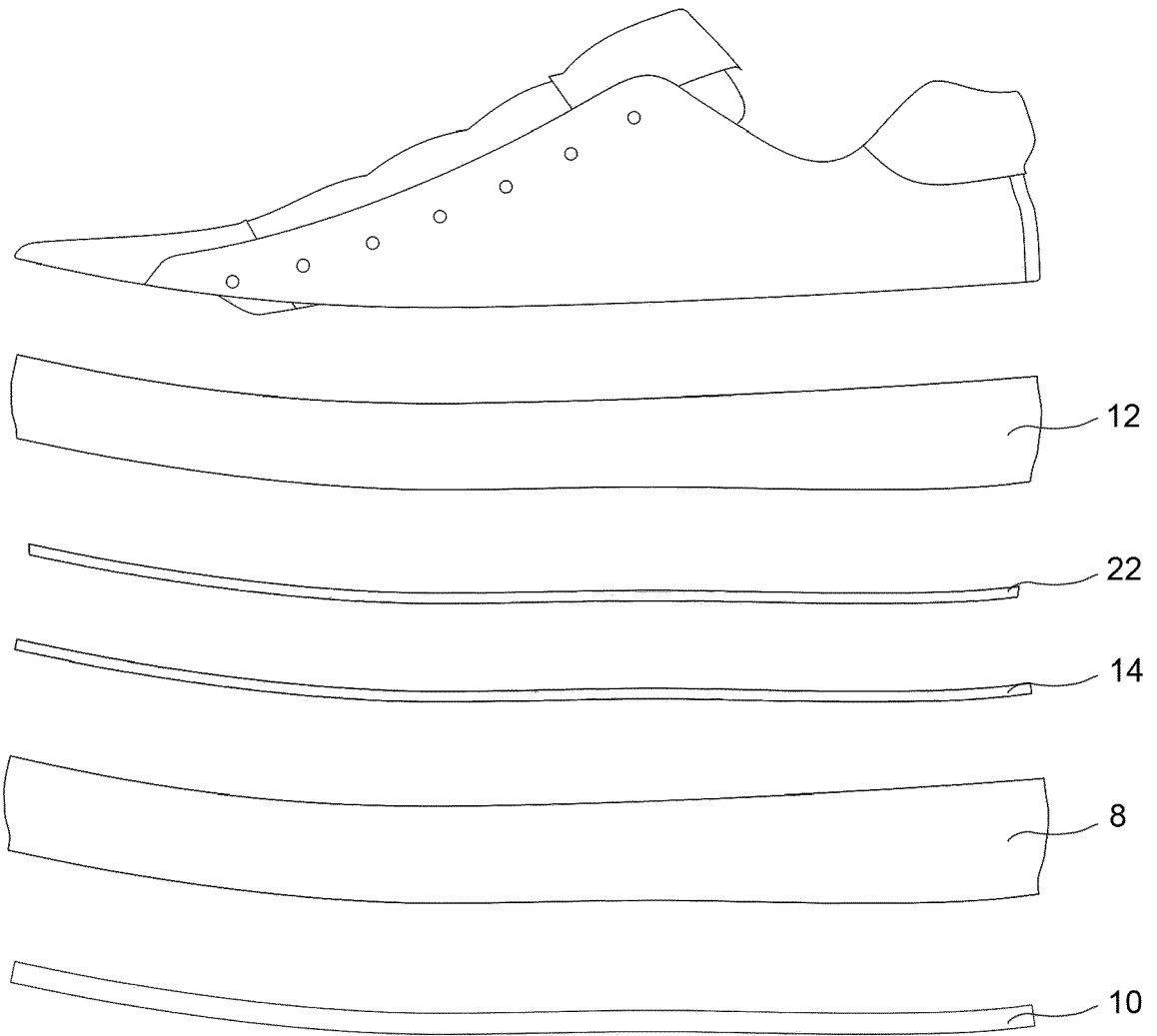


FIG.5

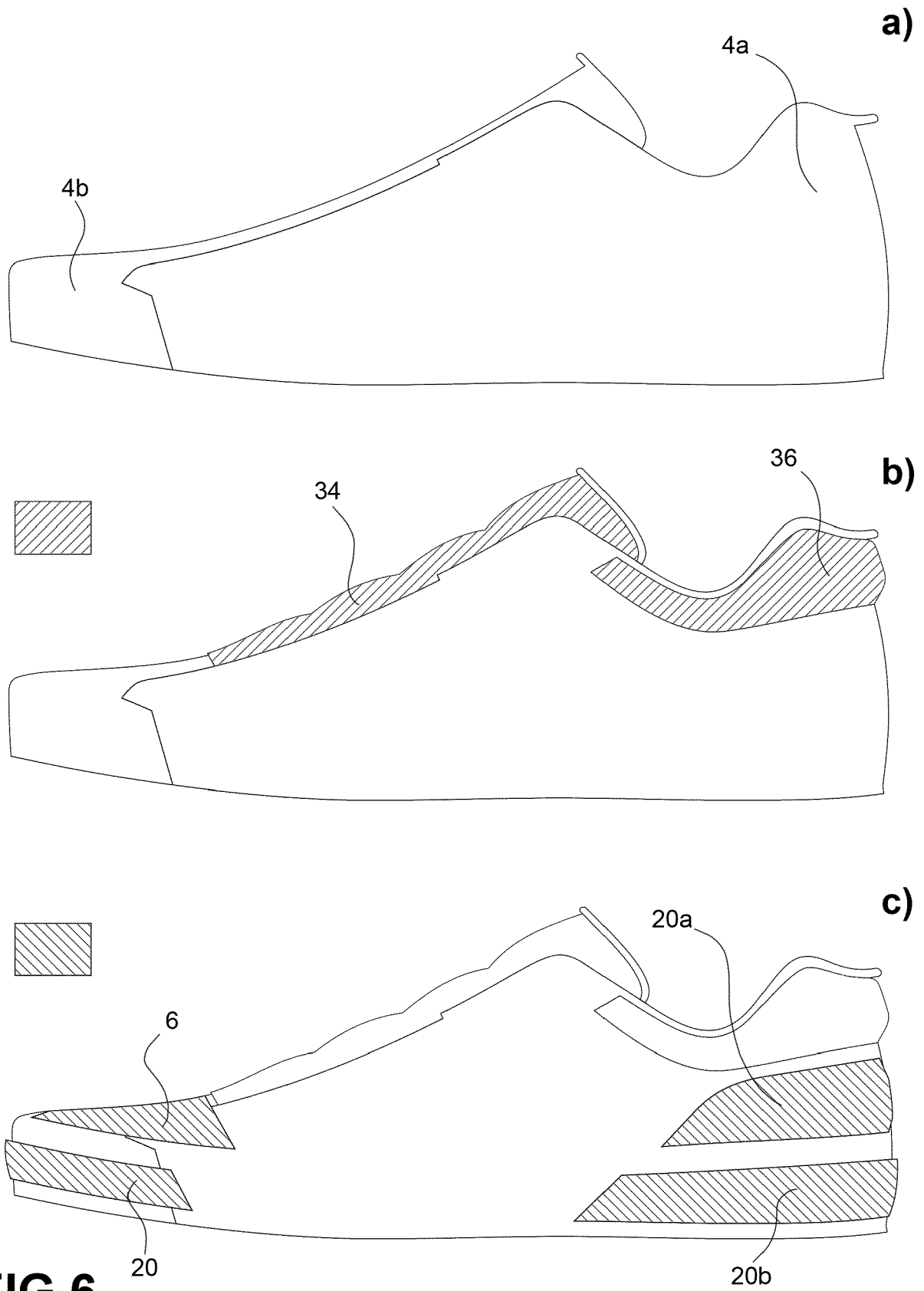


FIG. 6

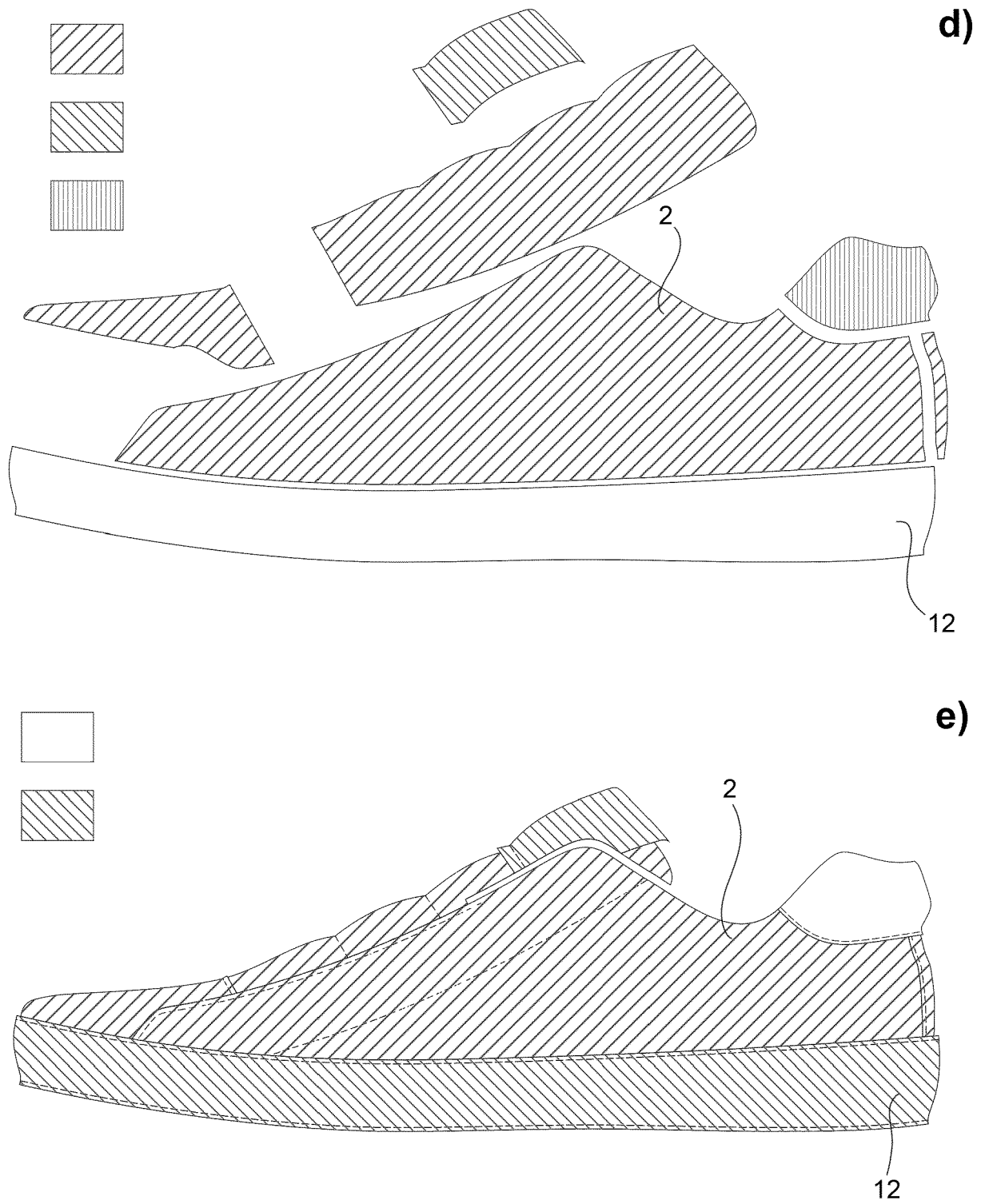
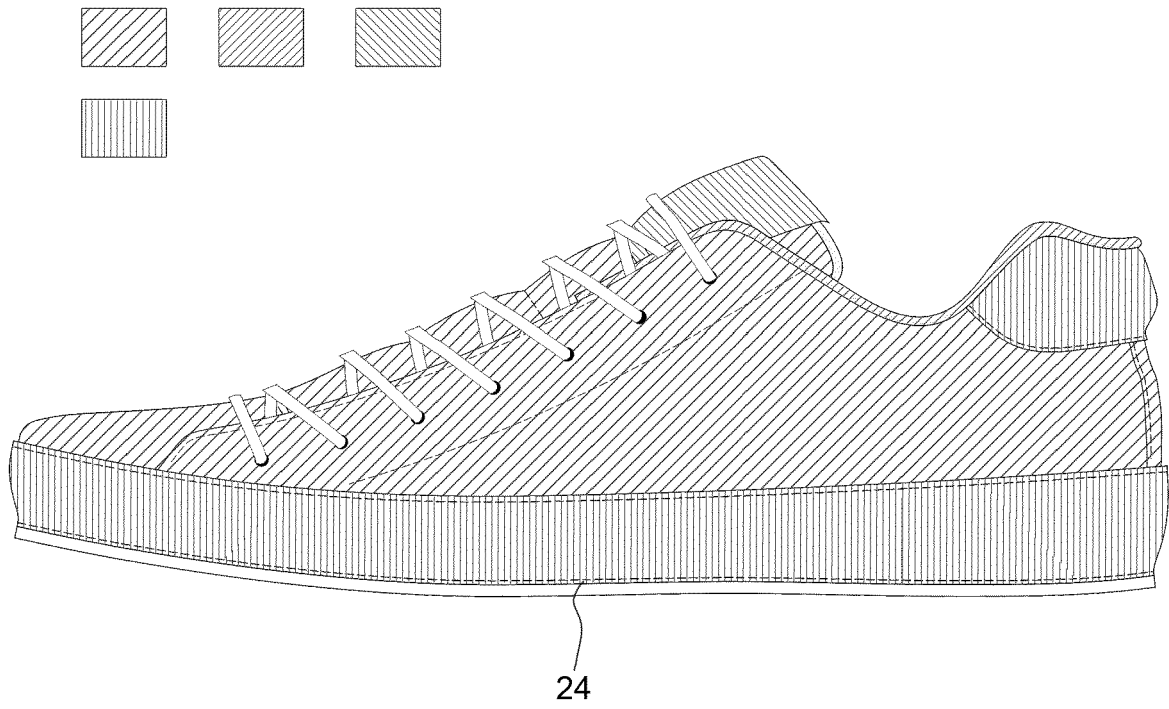


FIG.6

f)



g)

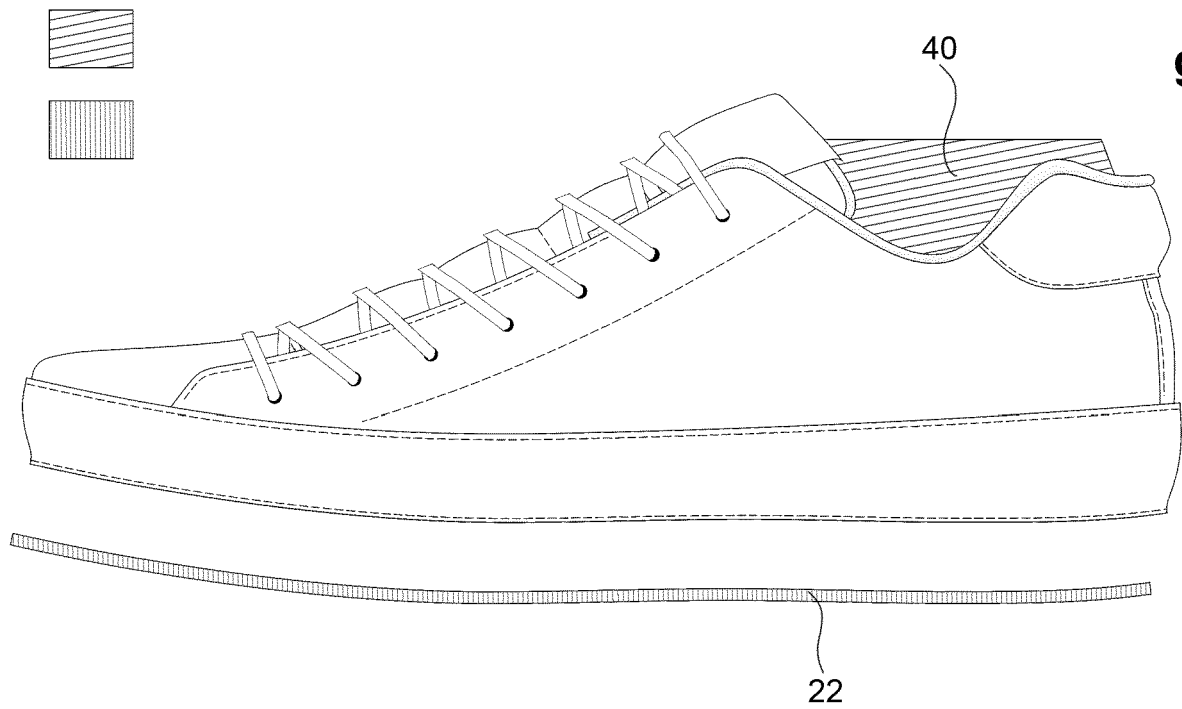
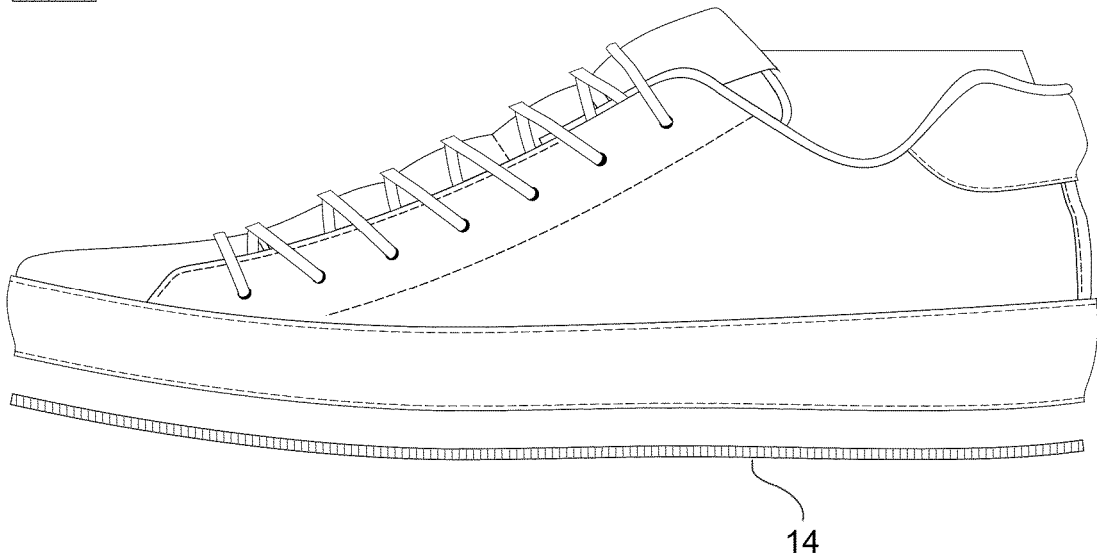


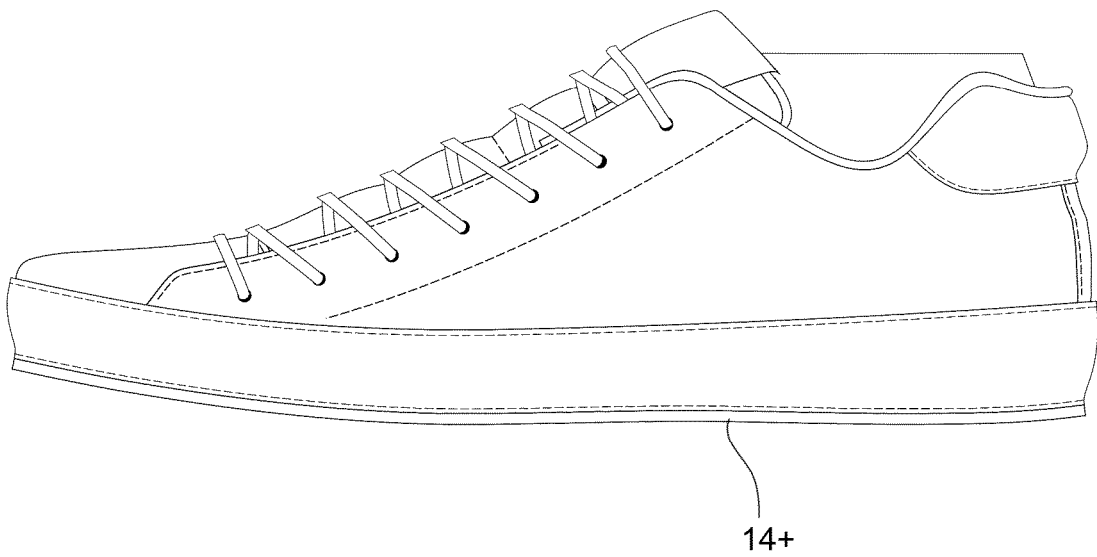
FIG.6



h)



i)



l)

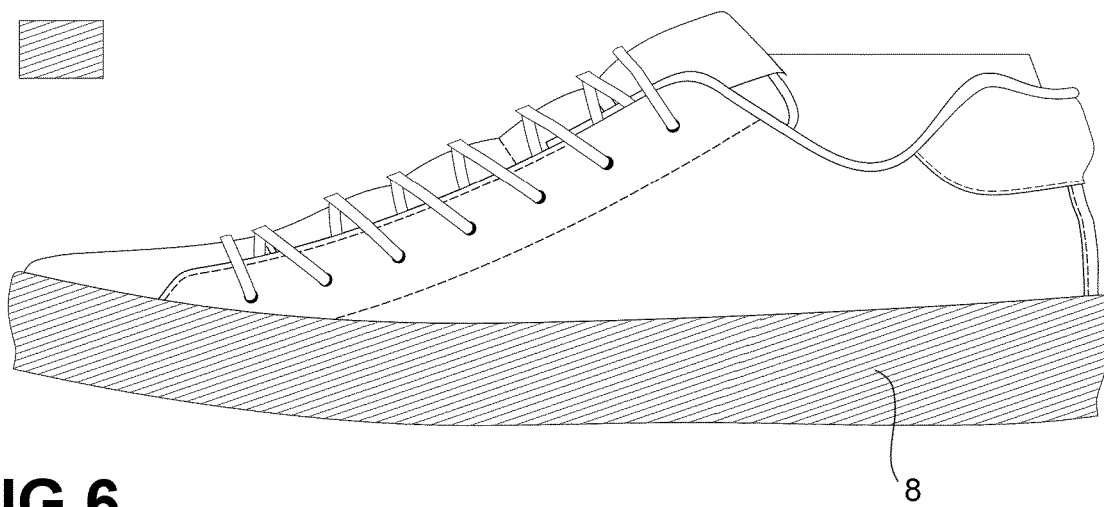
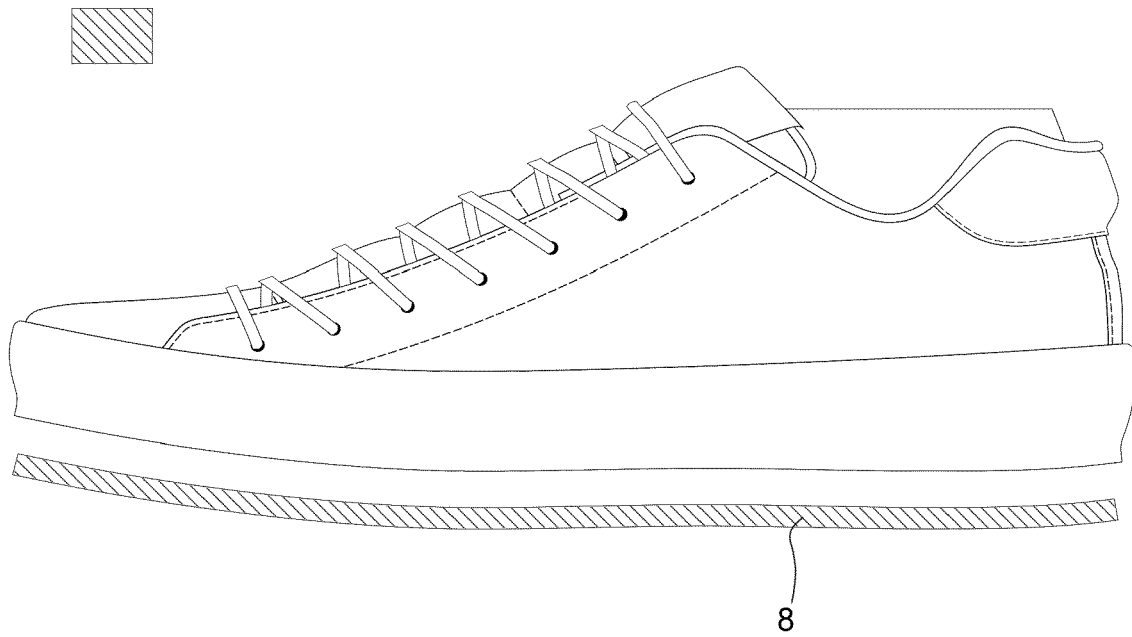


FIG.6

m)



n)

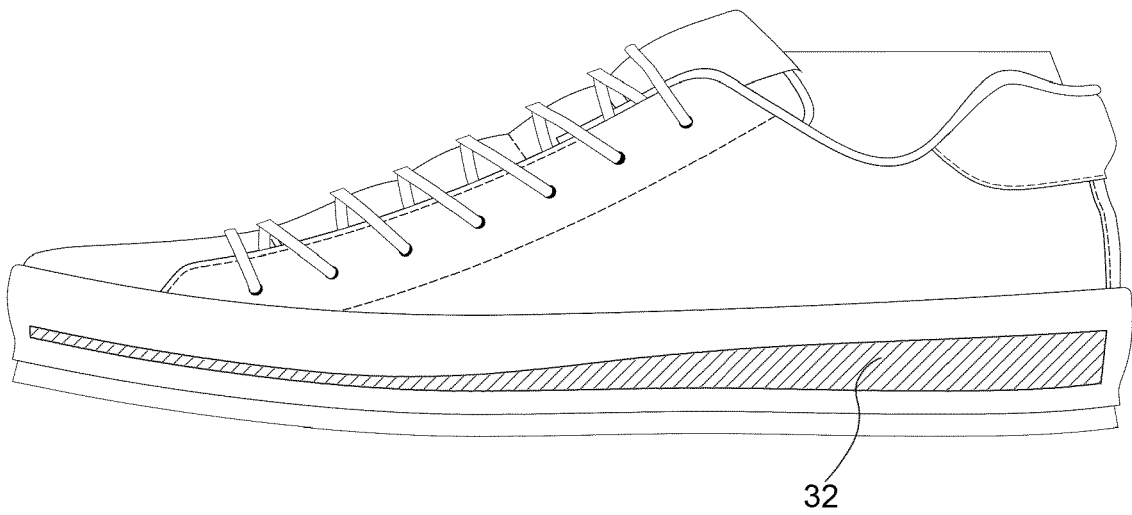


FIG.6



EUROPEAN SEARCH REPORT

Application Number

EP 23 18 0361

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	GB 700 520 A (HAYNES AND CANN LTD; ROWLAND JAMES KITCHIN) 2 December 1953 (1953-12-02) * page 1, line 25 - line 37; figure 2 * * page 1, line 67 - line 77 * * page 2, line 3 - line 30 * -----	1-11	INV. A43B9/06 A43B23/07 A43B13/12 A43B23/02
A	GB 237 496 A (HARRY LYON) 30 July 1925 (1925-07-30) * the whole document * -----	1-11	
A	US 2 995 839 A (CRONIN DENIS W) 15 August 1961 (1961-08-15) * the whole document * -----	1-11	
			TECHNICAL FIELDS SEARCHED (IPC)
			A43B
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
The Hague		10 October 2023	Baysal, Kudret
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ON EUROPEAN PATENT APPLICATION NO.

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5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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10-10-2023

10	Patent document cited in search report	Publication date	Patent family member(s)	Publication date
	GB 700520	A	02-12-1953	NONE

15	GB 237496	A	30-07-1925	NONE

	US 2995839	A	15-08-1961	NONE

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- IT 102021000006233, Silvateam **[0032]**