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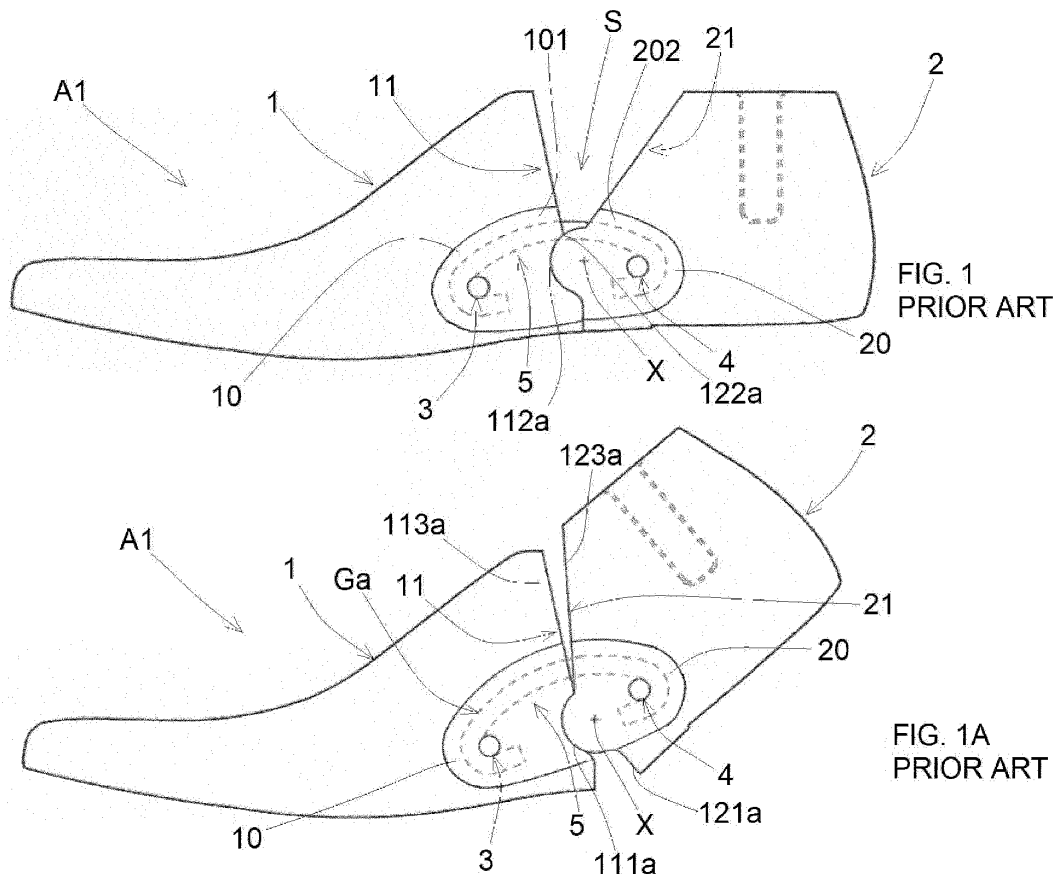
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(54) **ARTICULATED LAST FOR SHOES COMPRISING AN ARTICULATION ASSEMBLY WITH IMPROVED SPRING**

(57) Articulated last (A2, B2) for making a shoe; the articulated last (A2, B2) comprises a front half-body (1), a rear half-body (2), and an articulation assembly (Ga, Gb) that keeps the two half-bodies (1, 2) movably connected

to each other; wherein said articulation assembly (Ga, Gb) comprises a C-shaped spring (6) comprising an inner wire (7) and an outer coating (8) of plastic material that completely covers said metal wire (7).

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Description

[0001] The present patent application for industrial invention relates to an articulated last for shoes comprising an articulation assembly with improved spring.

[0002] It is well known that tools referred to as "lasts" are used in the manufacturing of shoes, which reproduce the shape of the foot that is intended to wear the shoe for each size of shoe to be produced.

[0003] Such lasts accompany the production of the shoes until the final steps of the production process of said shoes.

[0004] Monolithic lasts made of wood or plastic material or composite materials are known, which completely reproduce the shape of the foot. However, such monolithic lasts cannot be used in the case where the shoes have particularly narrow insteps, as such lasts cannot be extracted from the shoe once the shoe is finished.

[0005] Therefore, articulated lasts for shoes have been devised over time. The present patent application relates precisely to such articulated lasts for shoes.

[0006] Articulated lasts for shoes comprise two half-bodies, namely a front half-body and a rear half-body that are movably connected by an articulation assembly comprising a spring that exerts an attractive force between the two half-bodies.

[0007] There are different types of articulated lasts that differ from each other particularly in the type of articulation assembly that connects the two half-bodies and in the way in which it allows the two half-bodies to move relative to each other.

[0008] By way of example, with reference to Figs. 1, 1A, 1B, 1C, 2, 2A and 2B, two conventional articulated lasts (A1, B1) of the prior art are described, namely a first articulated last (A1) and a second articulated last (B1).

[0009] Both articulated lasts (A1, B1) comprise a front half-body (1) and a rear half-body (2) movably mounted between a first extended position, shown in Figs. 1 and 2, and in a second contracted position, shown in Figs. 1A and 2A.

[0010] The front half-body (1) has a rear operating face (11) facing the rear half-body (2) whereas the rear half-body (2) has a front operating face (21) facing the front half-body (1).

[0011] The rear operating face (11) of the front half-body (1) and the front operating face (21) of the rear half-body (2) are shaped so as to cooperate with each other during the movement of the two half-bodies (1, 2) between the first position and the second position.

[0012] The front half-body (1) comprises a seat (10) that ends onto the rear operating face (11) of the front half-body (1), and the rear half-body (2) comprises a seat (20) that ends into the front operating face (21) of the rear half-body (2).

[0013] Each seat (10, 20) is defined laterally by two side walls (101, 202) that are flat and parallel to each other.

[0014] With reference to Figs. 1B and 2B, each one of

said articulated lasts (A1, B1) also comprises an articulation assembly (Ga, Gb) that keeps the two half-bodies (1, 2) movably connected to each other and is arranged in the seat (10) of the front half-body (1) and in the seat (20) of the rear half-body (2).

[0015] The articulation assembly (Ga, Gb) comprises:

- a first element (3) connected to the front half-body (1);
- a second element (4) connected to the rear half-body (2);
- a monolithic spring (5) of phosphate steel having a substantially C-shape and a curved central section (50), a first hook (51) attached to the first element (3), and a second hook (52) attached to the second element (4).

[0016] The two articulated lasts (A1, B1) differ from each other particularly in the articulation assembly (Ga, Gb) and in the operating faces (11, 21) of the two co-operating half-bodies (1, 2).

[0017] The first articulated last (A1) is also technically known as "articulated last with V-hinge."

[0018] With reference to Figs. 1 and 1A, in the first articulated last (A1), the rear operating face (11) of the front half-body (1) and the front operating face (21) of the rear half-body (2) are shaped in such a way as to allow for a relative rotation of the two half-bodies (1, 2) about a pivoting axis (X).

[0019] Specifically, the rear operating face (11) of the front half-body (1) and the front operating face (21) of the rear half-body (2) comprise:

- lower sections (111a, 121a) suitable for engaging one against the other when the first articulated last (A1) is in the first extended position;
- central sections (112a, 122a) especially shaped to generate a rotational coupling between the front half-body (1) and the rear half-body (2);
- upper sections (113a, 123a) that diverge from each other, moving away from the central sections (112a, 122a) when the first articulated last (A1) is in the first extended position.

[0020] The upper sections (113a, 123a) define a space (S) tapering toward the central sections (112a, 122a).

[0021] With reference to Fig. 1A, when the two half-bodies (1, 2) are rotated relative to each other from the extended position to the contracted position, the upper sections (113a, 123a) are moved closer, whereas the lower sections (111a, 121a) are moved away.

[0022] Said central sections (112a, 122a) comprise a concave section (112a) extending along an arc of circumference and a convex section (122a) extending along an arc of circumference.

[0023] The arc of circumference of the convex section (122a) has a radius of curvature equal to the radius of curvature of the concave section (112a) and extends for a

greater angle than the arc of circumference whereon the concave section (112a) extends.

[0024] Referring to Fig. 1B, the first element (3) of the articulation assembly (Ga) of the first articulated last (A1) comprises a pin (3a) mounted transversely in the seat (10) of the front half-body (1) whereon the first hook (51) of the spring (5) is attached.

[0025] The second element (4) of the articulation assembly (Ga) of the first articulated last (A1) comprises a pin (4a) mounted transversely in the seat (20) of the rear half-body (2) whereon the second hook (52) of the spring (5) is attached.

[0026] For reasons that will become apparent in the following description, the reader's attention must be focused on the following two features of the first articulated last (A1) of the prior art:

- a) the seats (10, 20) of the front half-body (1) and of the rear half-body (2) end into the lower sections (111a, 121a), on the central sections (112a, 122a) and on the upper sections (113a, 123a) of the operating faces (11, 21) of the half-bodies (1, 2);
- b) the curvilinear section (50) of the spring (5) develops along a trajectory shaped like an arc of circumference and has a camber (Q) comprised between 28 mm and 32 mm (see Fig. 1C).

[0027] In such a structural configuration, the curvilinear section (50) of the spring (5) of the articulation assembly (Ga) of the first articulated last (A1) protrudes partially into the space (S) defined by the upper sections (113a, 123a) (see Fig. 1).

[0028] Now with reference to Figs. 2 and 2A, the second articulated last (B1) is also technically known as "articulated last with sliding hinge".

[0029] In the second articulated last (B1), the rear operating face (11) of the front half-body (1) and the front operating face (21) of the rear half-body (2) have cam surfaces (11b, 21b) shaped in such a way as to allow for a relative sliding and rotation between the two half-bodies (1, 2).

[0030] Still with reference to Figs. 2B, the first element (3) of the articulated assembly (Gb) of the second articulated last (B1) comprises:

- a lever (30b) having a first end (301b) whereon a slot (35b) is obtained and a second end (302b) whereon a hole (36b) is obtained;
- a first transverse pin (31b) mounted transversely in the seat (10) of the front half-body (1) and threaded into the slot (35b) of the lever (30b);
- a second transverse pin (32b) mounted transversely in the seat (20) of the rear half-body (2) and threaded into the hole (36b) of the lever (30b).

[0031] The second element (4) of the articulated assembly (Gb) of the second articulated last (B1) comprises a pin (4b) mounted transversely in the seat (20) of the rear

half-body (2).

[0032] In such a case, the first hook (51) of the spring (5) is attached to the first end (301b) of the lever (30b) of the first element (3), whereas the second hook (52) is attached to the pin (4b) of the second member (4).

[0033] The present invention is particularly focused on the structure of the spring (5). As mentioned above, the spring (5) is currently made in a monolithic piece of phosphate steel. Such a monolithic structure results in several drawbacks which are particularly due to the method that is to be implemented to obtain the C-shaped spring (5) made of phosphate steel.

[0034] In fact, the following steps are necessary in order to make such a monolithic C-shaped spring (5):

- a) providing a steel strip;
- b) performing a globular annealing step so as to soften the steel strip;
- c) perform a bending step in which the softened steel strip is bent in such a way as to make the C-shaped spring;
- d) performing a step of compression wherein the spring (5) is compressed laterally in such a way that the spring (5) is laterally provided with flat side faces suitable for grazing against the flat walls (101, 202) of the seats (10, 20) without any clearance;
- e) performing a thermal tempering step to reduce the hardness of the spring (5) and increase its toughness;
- f) performing a phosphating step wherein the outer surface of the spring is altered in order to realize phosphate crystals that improve corrosion resistance and favor the adhesion of a subsequent painting operation.

[0035] The applicant has ascertained that the aforementioned annealing, compression and thermal tempering steps cause internal cracks and defects in the molecular structure of the spring (5) that make the spring (5) fragile and thus greatly impair the efficiency and reliability of the monolithic steel spring (5).

[0036] Therefore, malfunctions or failures of said springs (5) are frequent, inevitably necessitating the replacement of the springs.

[0037] US2164054A describes a collapsible last comprising a forepart and a heel section hinged to each other, in which the hinge yieldingly holds said parts in an extended operating position or in a collapsed non-operating position, as the case may be.

[0038] It is precisely from a careful analysis of the problems that affect said monolithic springs (5) that the present invention was devised, by means of which a new spring is obtained, which is more efficient, more reliable and easier to make.

[0039] Otherwise said, the purpose of the present invention is to overcome the drawbacks of the prior art by devising an articulated last comprising an articulation assembly having a new spring that is efficient, reliable

and safe.

[0040] Furthermore, another purpose of the present invention is to devise an articulated last having an articulated assembly with a spring that is simple and quick to make.

[0041] These purposes are achieved in accordance with the invention with the features listed in the attached independent claim 1.

[0042] Advantageous achievements appear from the dependent claims.

[0043] The articulated last for shoes according to the invention is defined by claim 1.

[0044] For the sake of explanatory clarity, the description of the articulated last for shoes according to the invention is continued with reference to the attached drawings, which are for illustrative and non-limiting purposes only, wherein:

Figs. 1 and 1A schematically illustrate a first articulated last according to the prior art in extended position and in contracted position, respectively;
Figs. 2 and 2A schematically illustrate a second articulated last according to the prior art in extended position and in contracted position, respectively;
Fig. 1B illustrates the articulation assembly of the first articulated last according to the prior art in detail;
Fig. 1C illustrates in detail the spring of the first articulated last according to the prior art;
Fig. 2B illustrates in detail the articulation assembly of the second articulated last according to the prior art;
Figs. 3 and 3A schematically illustrate a first articulated last according to the invention in extended position and in contracted position, respectively;
Figs. 4 and 4A schematically illustrate a second articulated last according to the invention in extended position and in contracted position, respectively;
Fig. 5 schematically shows the spring of the first articulated last according to the invention;
Fig. 6 is a cross section of the spring of Fig. 5 sectioned along the V-V plane.

[0045] Hereafter, elements equal or corresponding to those already described are indicated by the same reference numerals, omitting a detailed description.

[0046] With reference to Figs. 3, 3A, 4 and 4A, a first articulated last (A2) and a second articulated last (B2) having essentially the same structural characteristics as the first articulated last (A1) of the prior art and of the second articulated last (B1) of the prior art described above are shown. As shown in Figs. 3, 3A, 4 and 4A, the elements of the articulated lasts (A2, B2) according to the invention that are identical or corresponding to those of the articulated lasts (A1, B1) already described in the prior art (such as the half-bodies (1, 2), the seats (10, 20), the surfaces (11, 21), the articulation assemblies (Ga, Gb)) are shown with the same reference numerals. It is

reiterated that a detailed description of these elements will be omitted for the sake of brevity.

[0047] The articulated lasts (A2; B2) shown in Figs. 3, 3A, 4 and 4A differ from the articulated lasts (A1; B1) of the prior art in the fact that they have a different spring (6) than the monolithic spring (5) of the prior art.

[0048] In fact, while still having a basically C-shape with a curved central section (60), a first hook (61) attached to the first element (3), and a second hook (62) attached to the second element (4), the new spring (6) of the articulated lasts (A2, B2) according to the invention is made of two pieces and comprises:

- an inner metal wire (7);
- and an outer coating (8) of plastic material that completely covers said inner metal wire (7).

[0049] Referring to Fig. 6, the outer coating (8) made of plastic material comprises flat side faces (80) that graze against the flat side walls (101, 201) of the seats (10, 20) of the half-bodies (1, 2).

[0050] The inner metal wire (7) is preferably made of steel and has a circular cross-section with a diameter comprised between 3 mm and 5 mm, preferably 4 mm.

[0051] The outer coating (8) made of plastic material is preferably made of polyethylene or acrylonitrile-butadiene-styrene or polystyrene.

[0052] The outer coating (8) has a thickness comprised between 0.7 mm and 1 mm. It should be noted that the term "thickness" refers to the distance between the outer surface of the inner metal wire (7) and the outer surface of the outer coating (8).

[0053] In the preferred embodiment of the invention, the inner metal wire (7) and the outer coating (8) are co-molded.

[0054] Therefore, the following method is implemented to realize the new spring (6):

- provision of an inner metal wire (7);
- bending of the inner metal wire (7) in such a way that said metal wire extends along an essentially C-shaped trajectory equal to that of the spring (6) to be made;
- disposing the inner metal wire (7) inside a cavity of a mold having the shape of the spring (6) to be made;
- injection of molten plastic material inside the mold cavity in such a way that the plastic material adheres to and covers the inner metal wire (7);
- waiting for the plastic material to set and harden so as to define the outer coating (8) of the spring (6).

[0055] The new spring (6) that comprises the inner metal wire (7) and the outer coating (8) provides several advantages.

[0056] Firstly, the inner metal wire (7) that is the core and the elastic element of the spring (6) is simply bent and does not need to undergo globular annealing, compression, and thermal tempering as in the case of the strips

used to make the springs (5) of the prior art. Since the inner metal wire (7) is not subject to globular annealing, compression and thermal tempering, no cracks or other defects affecting its strength are generated in the internal structure of the inner metal wire (7).

[0057] So, the applicant has found that the new spring (6) comprising the inner metal wire (7) and the outer coating (8) is extremely more reliable and efficient than the monolithic springs (5) of the prior art.

[0058] It is also worth pointing out that since the flat side faces (80) are machined on the outer coating (8) of plastic material, in order to obtain such flat side faces (80) it is only necessary to properly design the cavities of the mold wherein the plastic material is injected, without having to perform any compression step on the spring itself.

[0059] The spring (6) with the inner metal wire (7) and the outer coating (8) is suitable for being used both in the articulation assembly (Ga) of the first articulated last (A2) and in the articulated assembly (Gb) of the second articulated last (B2).

[0060] Referring now to Figs. 3, 3A and 5, the applicant has also devised some technical expedients suitable for solving a problem that is encountered when the spring (6) with the inner metal wire (7) and the outer coating (8) is disposed in the first articulated last (A2).

[0061] In order to understand such an issue, it should be pointed out that in the manufacturing process of the first articulated last (A1; A2), after the assembly of the first articulated last (A1; A2), an operation must be performed to remove the burr in the upper sections (113a, 123a) of the faces (11, 12) in order for the upper sections (113a, 123a) to be completely smooth so that they can be in perfect contact with each other when the first articulated last (A1; A2) is disposed in the contracted position. Such a burr removal operation is performed with milling tools or oxyhydrogen flames.

[0062] Should the first articulated last (A2) and the spring (6) have the same structural configuration and the same dimensions as the first articulated last (A1) of the prior art and of the relative monolithic spring (5), then also the spring (6) with the inner metal wire (7) and the outer coating (8) will have the curved central section (60) protruding into the space (S) defined by the upper sections (113a, 123a) of the surfaces (11, 12) which therefore could be accidentally intercepted by the tool or by the flame during the aforementioned burr removal operation.

[0063] Obviously, being the spring (6) provided with the outer coating (8) made of plastic material, such an accidental event would cause irreparable damage to the outer coating (8), with the consequent need to replace the spring (6) itself.

[0064] In order to resolve such an issue, the applicant has therefore provided that:

- the spring (6) has a lower height than the monolithic spring (5) of the prior art; otherwise said, the curved central section (60) of the spring (6) develops along a trajectory shaped like an arc of circumference with a

- camber (T) comprised between 16mm and 21mm;
- the seats (10, 20) of the half-bodies (1, 2) only end on the lower sections (111a, 121a) of the faces (11, 21) of the half-bodies (1, 2) and on the central sections (112a, 122a) of the faces (11, 21) of the half-bodies (1, 2).

[0065] In view of the above, the spring (6) is completely contained and safely placed inside the seats (10, 20) of the two half-bodies (1, 2) and cannot be intercepted by the tools or flames used during the burr removal operation.

[0066] Numerous variations and modifications of detail may be made to the present embodiment of the invention, within the scope of an expert of the field, but still within the scope of the invention as expressed by the appended claims.

20 Claims

1. Articulated last (A2, B2) for making a shoe; said articulated last (A2, B2) comprising:

- a front half-body (1) and a rear half-body (2) movably mounted between a first extended position and a second contracted position; wherein the front half-body (1) has a rear operating face (11) and the rear half-body (2) has a front operating face (21); said operating faces (11, 12) of the two half-bodies (1, 2) are suitably shaped to cooperate with each other during the movement of the two half-bodies (1, 2) between the first position and the second position; the front half-body (1) comprises a seat (10) that ends in the rear operating face (11) and the rear half-body (2) comprises a seat (20) that ends in the front operating face (21); wherein each seat (10, 20) has two side walls (101, 102) that are flat and parallel to each other; and
- an articulation assembly (Ga, Gb) that keeps the two half-bodies (1, 2) movably connected to each other and is arranged in the seat (10) of the front half-body (1) and in the seat (20) of the rear half-body (2);

wherein the articulation assembly (Ga, Gb) comprises:

- a first element (3) connected to the front half-body (1);
- a second element (4) connected to the rear half-body (2);
- a spring (6) with a basically C-shape having a curved central section (60), a first hook (61) attached to the first element (3) and a second hook (62) attached to the second element (4);

characterized in that said spring (6) comprises:

- an inner metal wire (7); and
 - an outer coating (8) of plastic material that completely covers said metal wire (7); wherein said outer coating (8) of plastic material comprises flat side faces (80) grazing against the flat side walls (101, 201) of the seats (10, 20) of the half-bodies (1, 2).
2. The articulated last (A2, B2) according to claim 1, wherein said outer coating (8) is made of polyethylene or acrylonitrile-butadiene-styrene or polystyrene.
3. The articulated last (A2, B2) according to claim 1 or 2, wherein said inner metal wire (7) is made of steel.
4. The articulated last (A2, B2) according to any one of the preceding claims, wherein the inner metal wire (7) has a circular section with a diameter comprised between 3 mm and 5 mm, preferably 4 mm; wherein said outer coating (8) has a thickness comprised between 0.7 mm and 1 mm.
5. The articulated last (A2, B2) according to any one of the preceding claims, wherein said inner metal wire (7) and said outer coating are co-molded.
6. The articulated last (A2, B2) according to any one of the preceding claims, wherein said curved central section (60) develops along a trajectory like an arc of a circumference and has a camber (T) comprised between 16 mm and 21 mm.
7. The articulated last (A2) according to any one of the preceding claims, wherein the rear operating face (11) of the front half-body (1) and the front operating face (21) of the rear half-body (2) are shaped in such a manner as to allow for a relative rotation of the two half-bodies (1, 2) about a pivoting axis (X);
- wherein the first element (3) of the articulation assembly (Ga) comprises a pin (3a) mounted transversely in the seat (10) of the front half-body (1) whereto said first hook (61) of the spring (6) is attached;
- wherein the second element (4) of the articulation assembly (Ga) comprises a pin (4a) transversely mounted in the seat (20) of the rear half-body (2) whereto said second hook (62) of the spring (6) is attached.
8. The articulated last (A2) according to claim 7, wherein the rear operating face (11) of the front half-body (1) and the front operating face (21) of the rear half-body (2) comprise:

- lower sections (111a, 121a) suitable for being engaged against each other when the articulated last (A2) is in the first extended position;
- central sections (112a, 122a) suitably shaped to generate a rotational coupling between the front half-body (1) and the rear half-body (2);
- upper sections (113a, 123a) that diverge from each other away from the central sections (112a, 122a) when the articulated last (A2) is in the first extended position, defining a space (S) tapering toward the central sections (112a, 122a).

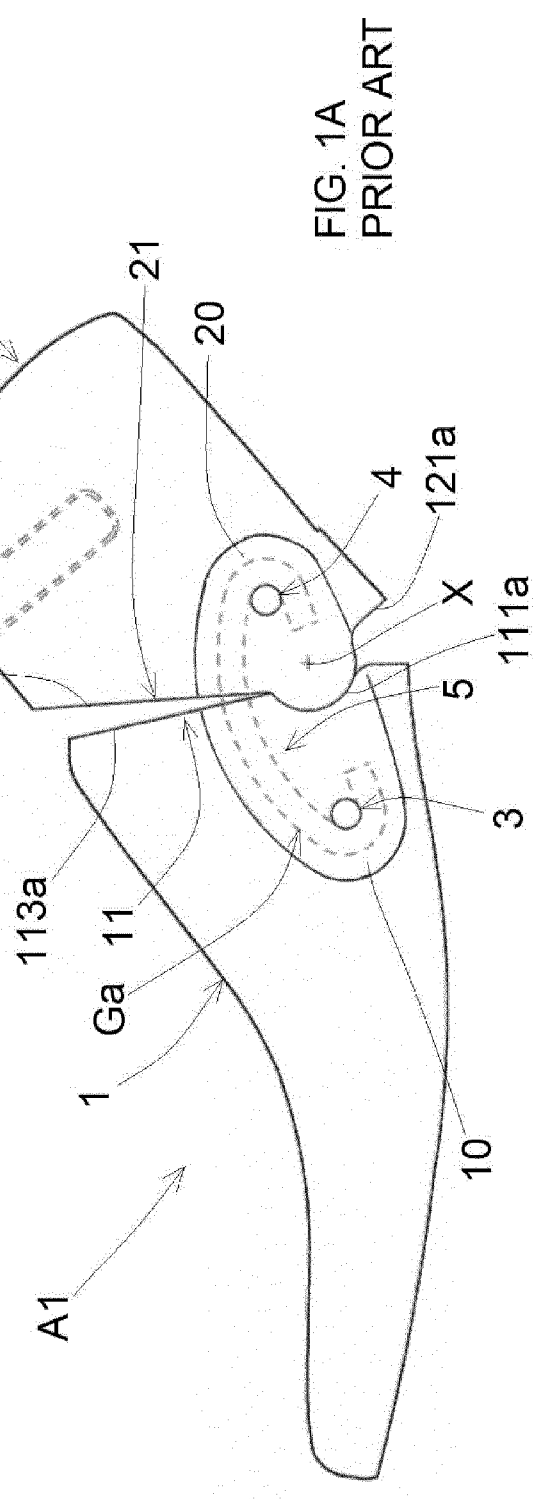
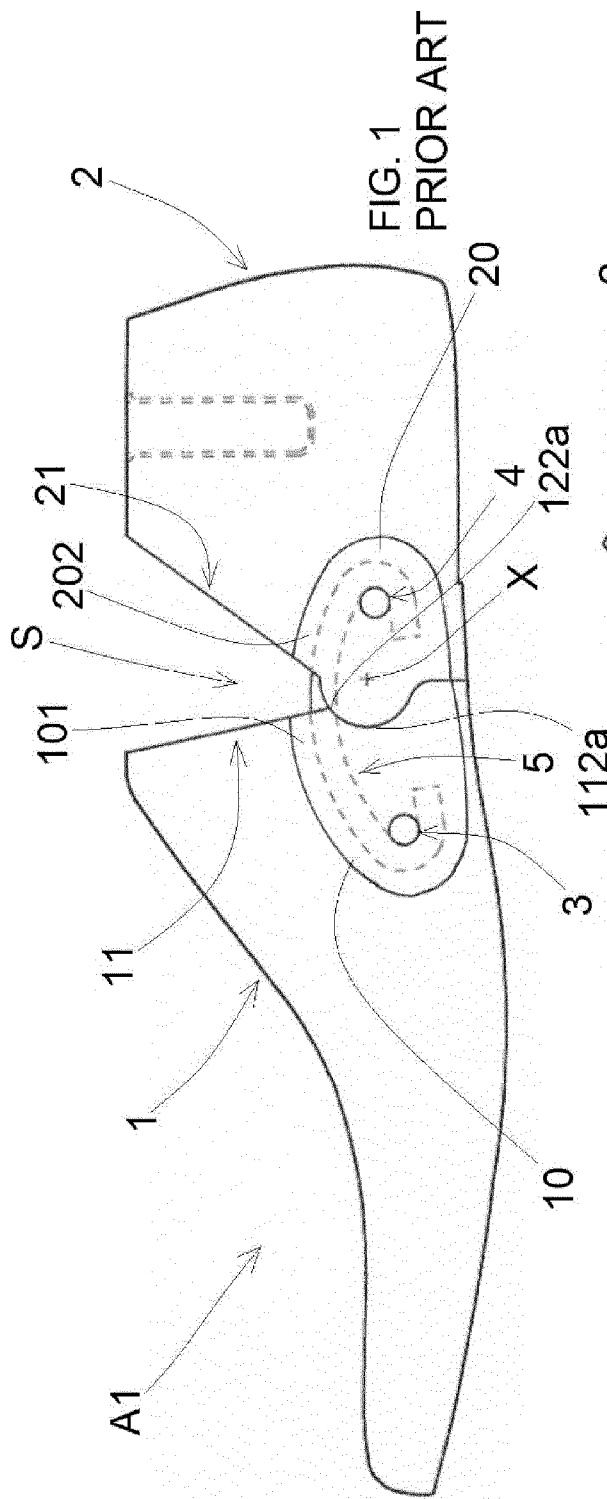
9. The articulated last (A2) according to claim 8 when dependent on claim 6, wherein said seats (10, 20) of the half-bodies (1, 2) exclusively end in the lower sections (111a, 121a) of the faces (11, 21) of the half-bodies (1, 2) and in the central sections (112a, 122a) of the faces (11, 21) of the half-bodies (1, 2).

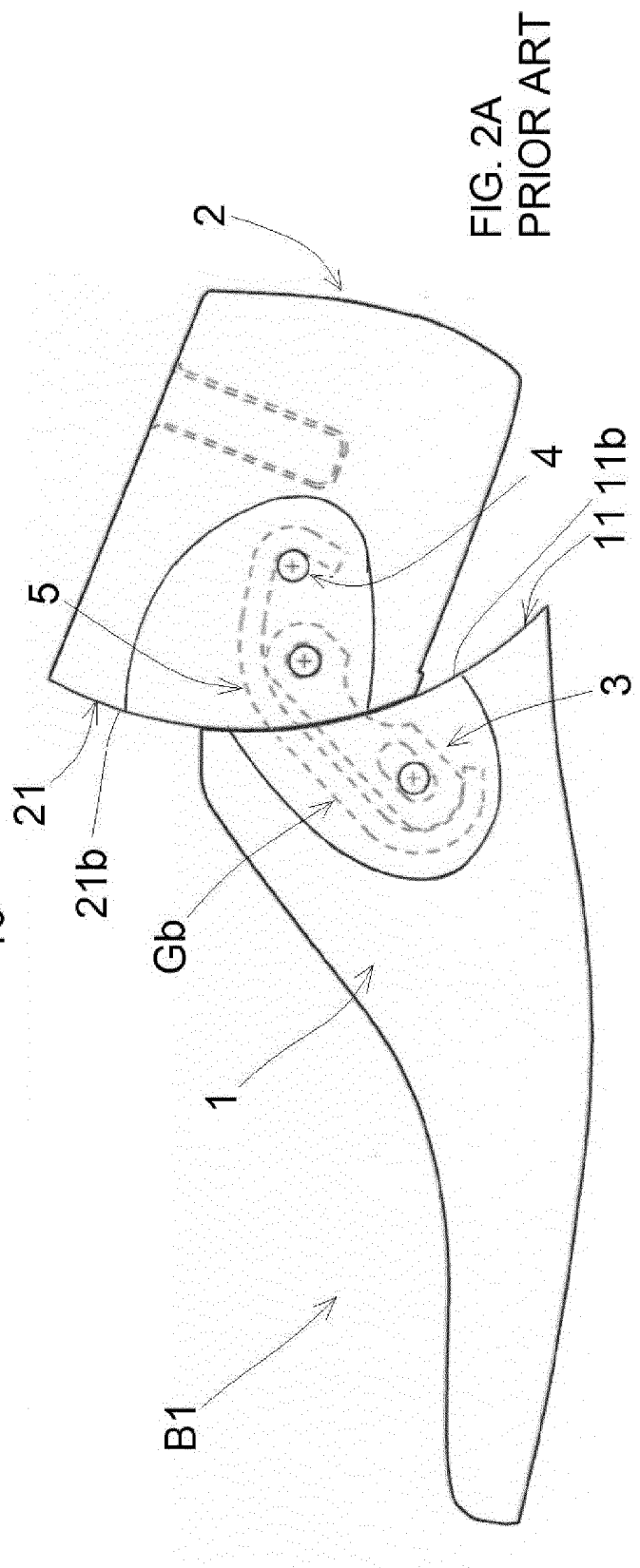
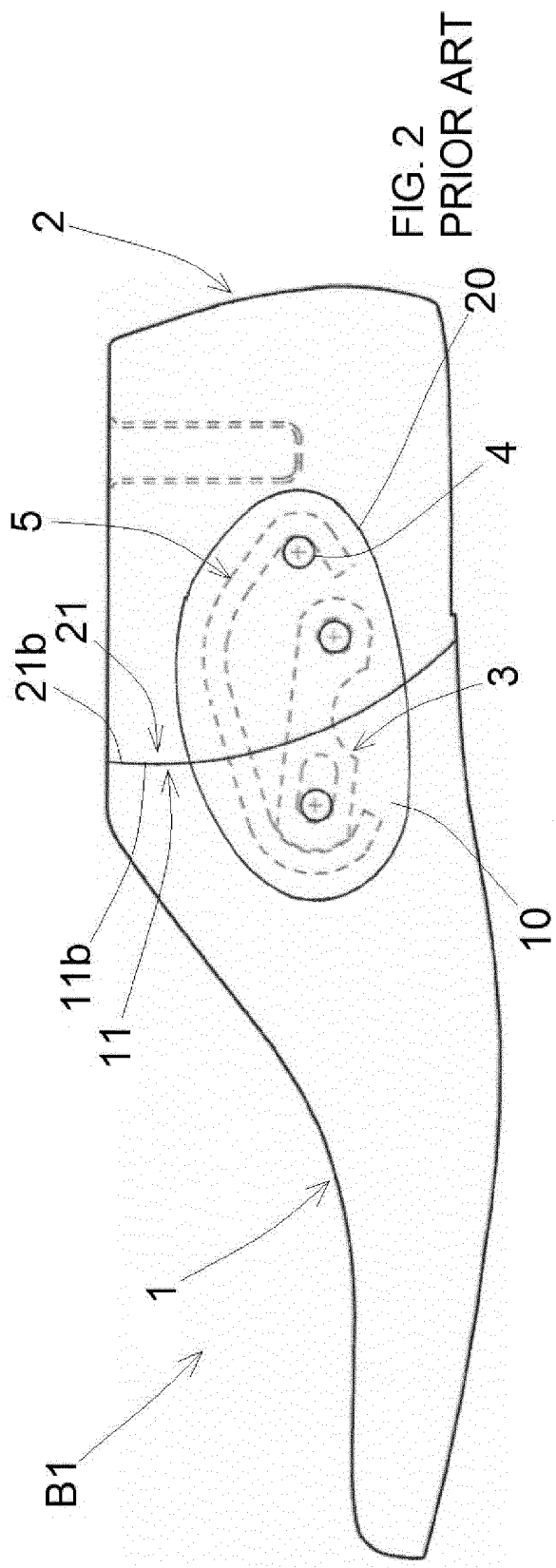
10. The articulated last (B2) according to any one of claims 1 to 5, wherein the rear operating face (11) of the front half-body (1) and the front operating face (21) of the rear half-body (2) have cam surfaces (11b, 21b) shaped in such a manner as to allow for a sliding and a relative rotation between the two half-bodies (1, 2);

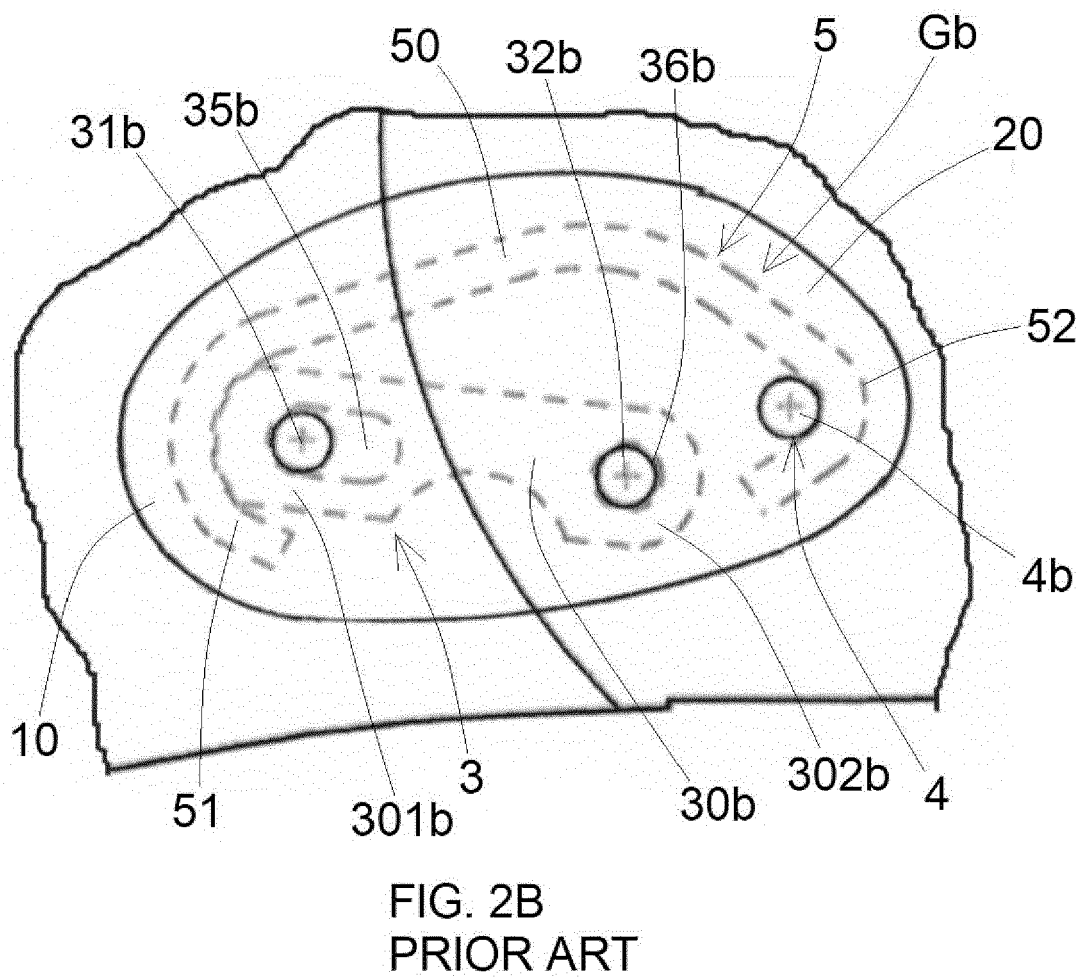
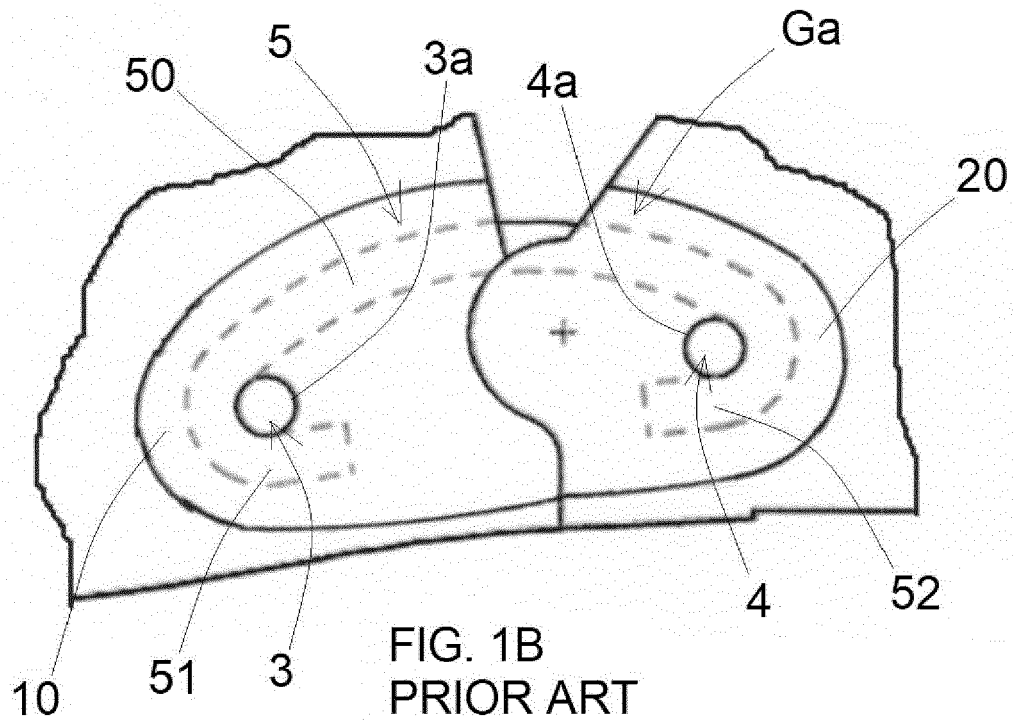
wherein the first element (3) of the articulation assembly (Gb) of the articulated last (B2) comprises:

- a lever (30b) having a first end (301b) whereon a slot (35b) is formed, and a second end (302b) whereon a hole (36b) is formed; wherein the first hook (61) of the spring (6) is engaged with the first end (301b) of the lever (30b);
- a first transverse pin (31b) attached transversely in the seat (10) of the front half-body (1) and inserted into the slot (35b); and
- a second transverse pin (32b) fixed transversely in the seat (20) of the rear half-body (2) and inserted into the hole (36b);

wherein the second element (4) of the articulation assembly (Gb) of the second articulated last (B2) comprises a pin (4b) transversely mounted in the seat (20) of the rear half-body (2); wherein the second hook (62) of the spring (6) is attached to the pin (4b) of the second element (4).







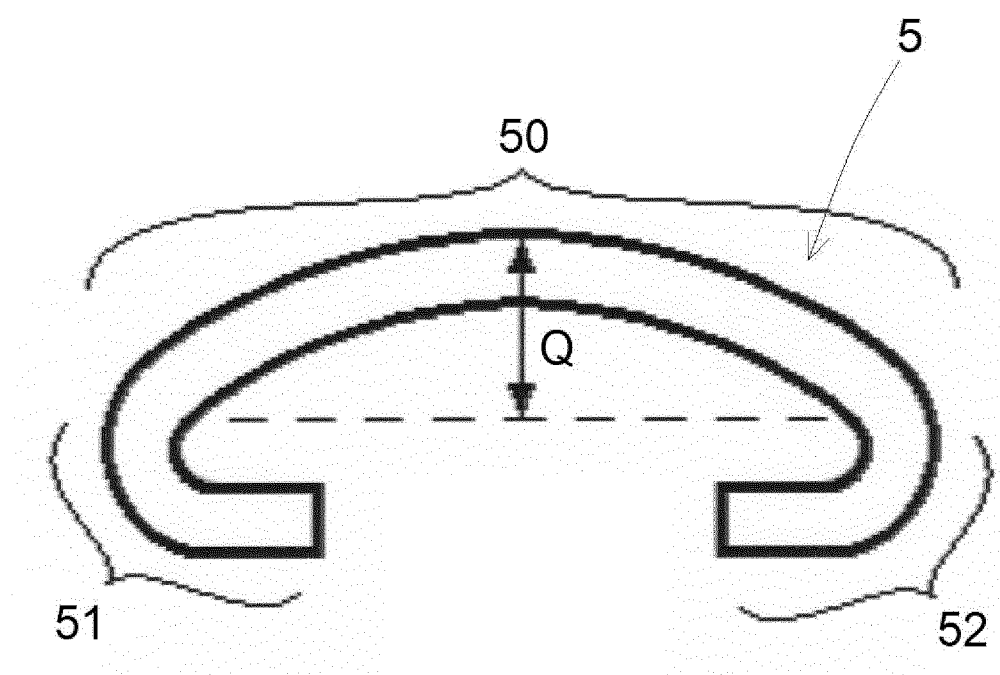
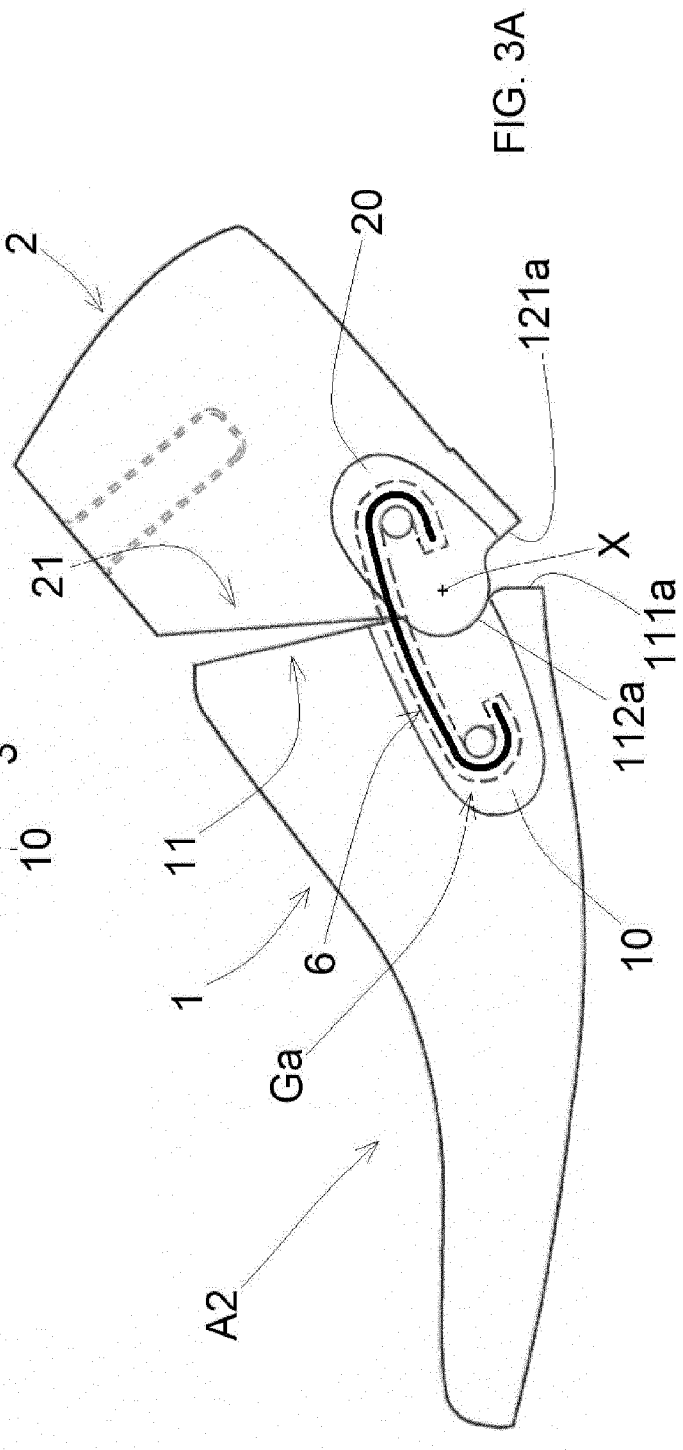
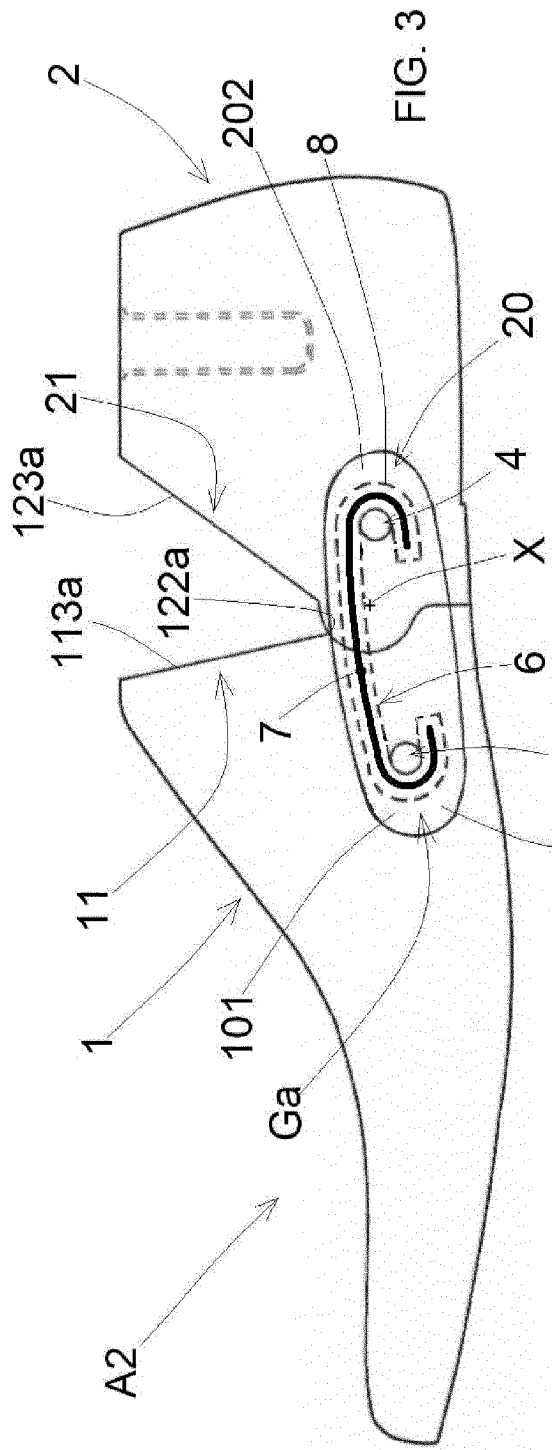
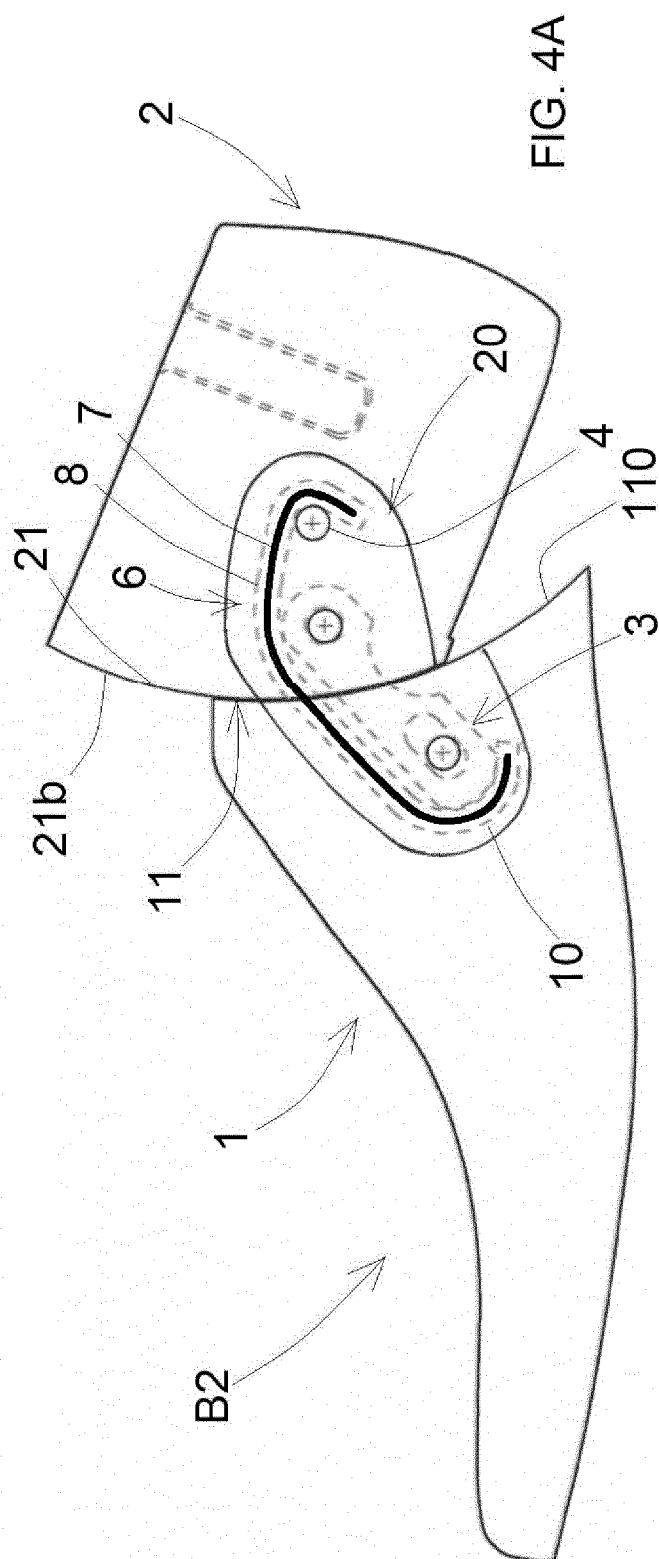
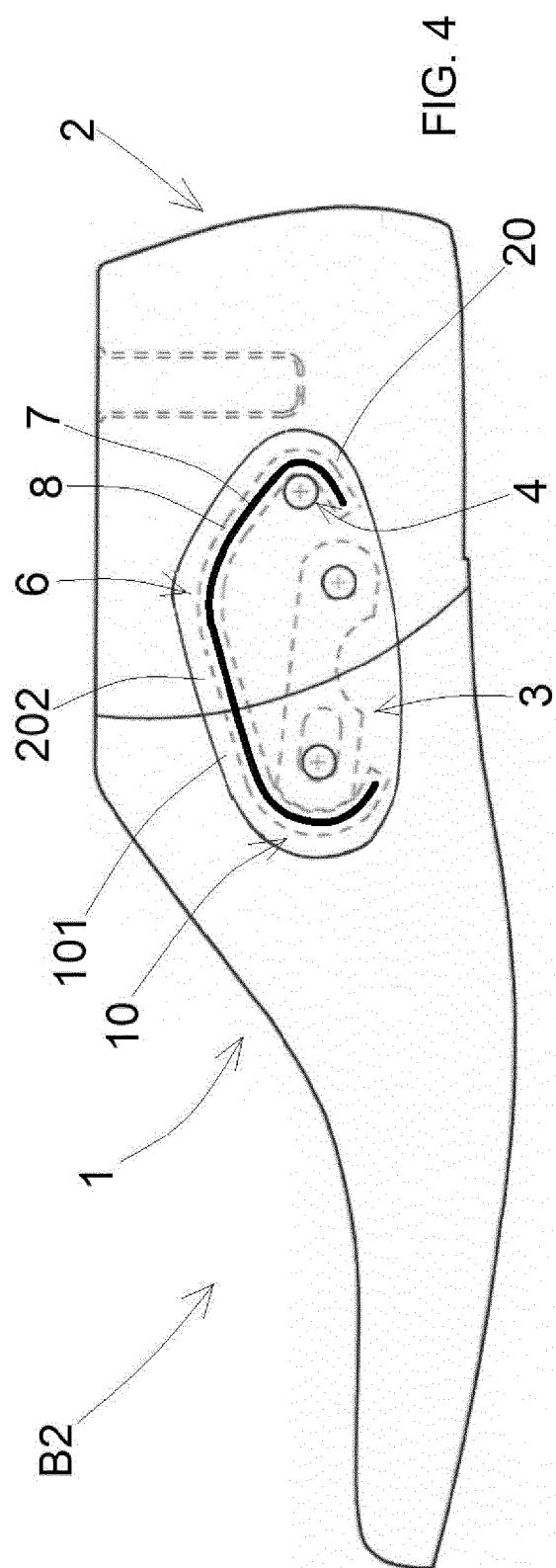
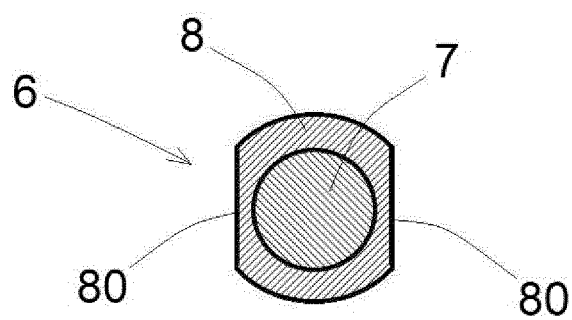
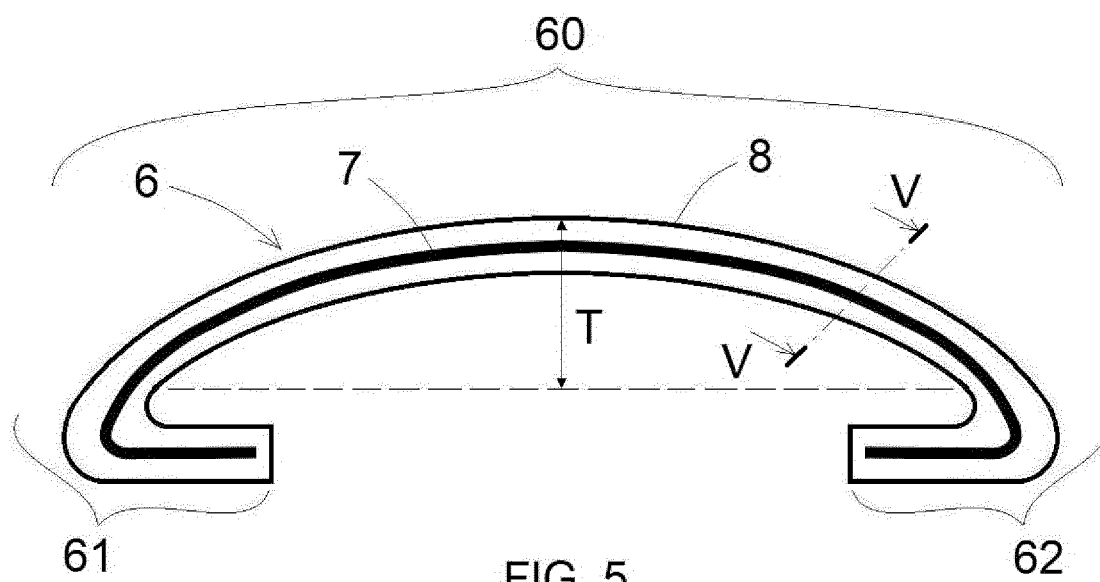


FIG. 1C
PRIOR ART









EUROPEAN SEARCH REPORT

Application Number

EP 24 18 8214

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 2 164 054 A (EMIL DIETZE) 27 June 1939 (1939-06-27) * the whole document *	1-10	INV. A43D3/02
A	CH 299 690 A (BEHRENS AG C [DE]) 30 June 1954 (1954-06-30) * the whole document *	1-10	
A	US 3 284 826 A (MCNEILL WARREN L ET AL) 15 November 1966 (1966-11-15) * the whole document *	1-10	
			TECHNICAL FIELDS SEARCHED (IPC)
			A43D
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
The Hague		16 October 2024	Chirvase, Lucian
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ON EUROPEAN PATENT APPLICATION NO.

EP 24 18 8214

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The members are as contained in the European Patent Office EDP file on
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16-10-2024

10	Patent document cited in search report	Publication date	Patent family member(s)	Publication date
	US 2164054 A	27-06-1939	NONE	
15	CH 299690 A	30-06-1954	NONE	
	US 3284826 A	15-11-1966	GB 1136226 A US 3284826 A	11-12-1968 15-11-1966
20				
25				
30				
35				
40				
45				
50				
55				

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Patent documents cited in the description

- US 2164054 A [0037]