



(12) **EUROPEAN PATENT APPLICATION**  
published in accordance with Art. 153(4) EPC

(43) Date of publication:  
**07.05.2014 Bulletin 2014/19**

(51) Int Cl.:  
**A43B 3/00** (2006.01) **A43D 3/14** (2006.01)  
**A47F 7/08** (2006.01)

(21) Application number: **11767453.1**

(86) International application number:  
**PCT/ES2011/070481**

(22) Date of filing: **01.07.2011**

(87) International publication number:  
**WO 2013/004857 (10.01.2013 Gazette 2013/02)**

(84) Designated Contracting States:  
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR**

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(54) **FOOTWEAR SUPPORTING DEVICE**

(57) A supporting device for maintaining the structural configuration and display of shoe (10), that comprises a shaping element (101) positioned in interior of shoe (10), made from a material that allows flexibility for adjusting to the internal shape of the mold of shoe (10)

obtaining sufficient rigidity to avoid its deformation, and a suspension element (102) that is attached to shaping element (101) to enable suspending shoe (10) for display on another surface for its sale, without said shoe (10) becoming deformed.

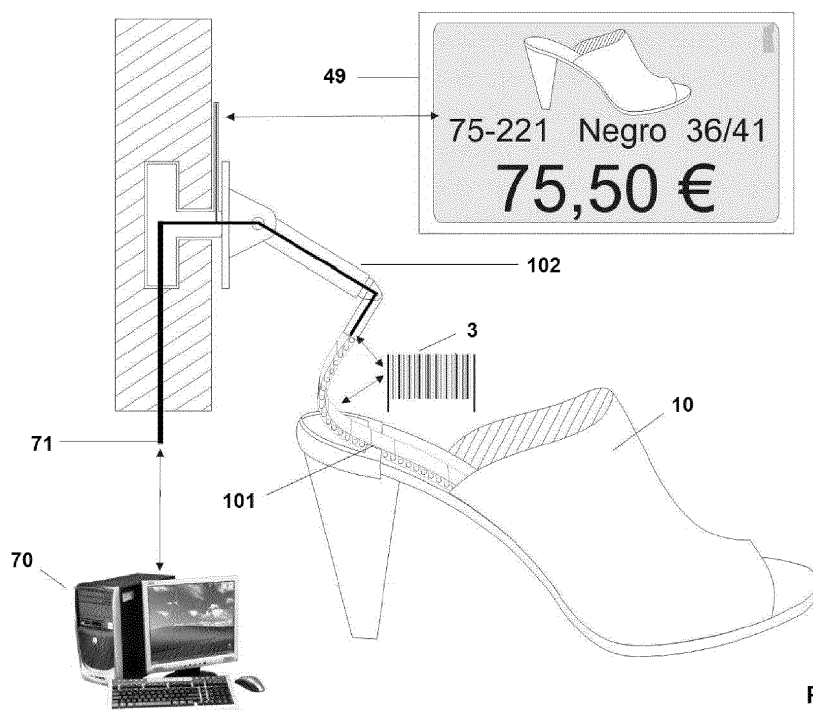


FIG. 8

## Description

### FIELD OF THE INVENTION

**[0001]** The instant invention discloses a sustaining device for the purpose of maintaining the structural configuration of a shoe and suspending it for display while preventing its deformation.

### BACKGROUND

**[0002]** Currently shoes are manufactured in such a way that the end product obtained from the manufacturing process has the three dimensional shapes required by the design of the same. Thus it is common that during manufacturing of the shoe rigid protecting structures are employed in the interior of the shoe, called molds, in such a way that the shoe maintains its configuration throughout the manufacturing process, which includes different processes, materials and machinery.

**[0003]** However, once the manufacturing process of the shoe is complete, the mold or rigid structure that maintained the structure of said shoe is removed before its transportation and sale prior to reaching the end consumer. Consequently, once the mold is removed the shoe begins a process of shrinking and deformation due to the materials employed in its composition (natural and synthetic leather, leather or rubber soles, etc.) reacting and trying to return to their original shape.

**[0004]** To resolve this problem the known state of the art employs stronger rigidity in the material used to shape the shoe. Normally this material is leather, for which a subsequent hardening process is used once the shoe is shaped, in such a way that it maintains said shape. However, the shape is only partially maintained, besides this being an extra procedure that results in higher manufacturing costs. Furthermore, employing these techniques runs the risk of endowing the shoe with excessive rigidity, which would give rise to a feeling of lack of flexibility in the end user, making wearing these shoes very uncomfortable, and which on most occasions would cause various abrasions on the feet.

**[0005]** Also known is the use of three dimensional elements that adjust to the interior shape of the toe of the shoe, these elements habitually being made of paper, and employed together with a longitudinal element, such as a rod, placed as a coiled spring stem between the tridimensional element and the heel of the shoe. The problem presented by this solution is that it is deficient because it is not capable of maintaining the strength and volume that are necessary to retain the shape of the shoe. Furthermore, this solution does not last beyond when the shoes are used by the end user, who ends up throwing it away after wearing the shoes a couple of times.

**[0006]** Also known are diverse structures for maintaining the shape of the shoe, called shoe trees. For example Document ES 222807 discloses a rigid shoe tree that comprises a frontal toe mold and a rear heel joined by a

coiled spring stem element. The problem presented by this type of solution is that the developed structure is complex, which means the cost of the same is high. Besides which, from an aesthetic point of view this solution is not pleasing, and so it is not commonly used during the selling and displaying the shoes for purchase, given that it would not make them very attractive. Moreover, this type of solution cannot be applied in a useful and effective manner to shoes such as sandals, with buckles at the ankle, with additional design elements, such as bows, or other highly deformable elements, etc. Furthermore, these solutions do not enable an attractive display of the shoes for their purchase, nor is it a solution that allows versatility in said display, which must be carried out with shelves on which all of the shoes are placed, thus precluding an optimal use of the display space, with the result that such solutions are expensive and unattractive for sales purposes.

**[0007]** Document EP 1690463 A1, for example, discloses a solution of a shoe tree that comprises a rigid base element to which another rigid frontal element is attached, this being different in accordance with the interior shape of the point of the shoe in which it is going to be employed. This solution likewise presents the problem of being complex and not versatile for shoes such as sandals that comprise deformable elements. Also, it is not an aesthetic solution that may be employed during display for selling the shoes. Consequently said shoes deform when on display for a long period of time. Furthermore, this solution does not lend itself to an attractive display for selling shoes, nor does it allow versatility in said display, which must be done with shelving that limits the optimum use of space, and has a high cost.

**[0008]** Another known solution is disclosed in Document US 2006/0168742 A1, which describes a shoe tree that comprises rigid elements, such as a frontal element for pointed tips, to which two lateral elements are attached that are able to expand laterally by means of some elastic elements such as springs, a rear piece for the heel area, and an element that couples both elements and that can be adjusted lengthwise in accordance with the shoe in which it is going to be placed. Once again the problem presented in solutions of this type is that they are not very versatile when they need to be used in shoes such as sandals, shoes having highly deformable design elements, etc., besides not being aesthetic elements that make the shoe attractive during its display for sale. In like manner as commented in relation to the other solutions, this document does not provide a versatile solution for the display of shoes that, again, must be displayed on shelves or display cases with a flat base on which to rest the shoes.

**[0009]** Other documents that illustrate the prior state of the art include Documents WO 2011055162 A1, US 3750208, US 2777216, US 2169835, EP 2253239 A1 and AR 053744 A1, for example.

**[0010]** Known from Document US 3750208 A is a support for the interior of shoes, such that said shoes remain

without deforming during its transport or storage. The problem this type of solution presents is that it lacks versatility for certain types and shapes of shoes, requiring important modifications to be used in different shoes, which involves very important costs. Furthermore, this type of solution is not aesthetically pleasing for displaying shoes to be sold. Other solutions, such as for example the solution disclosed in Document CA 769981 A, are adaptable to very specific types of shoes, and do not permit versatility in their use, as would be desirable.

**[0011]** Document US 289046 discloses a longitudinally expandable stem element for shoes, said element presenting the problem of lack of versatility when being applied to different models of shoes while maintaining an optimal performance. Also known is Document US 2872692 A, which describes a flexible conforming element with free ends: this type of solution presents the difficulty of not having ends in the heel and toe that retain the correct shape of the shoe, which thus ends up becoming deformed in time. In like manner, Document US 2787013 A discloses a maintaining element for open heel footwear, presenting said solution a lack of versatility to be able to use in other types of shoes.

**[0012]** In light of the above, it would be desirable to have a solution available that permits correctly maintaining the shape of the shoes in such a way that said solution may be applied in a versatile, simple and economic manner to a wide range of shoes, and for which it would also be possible to have an aesthetic design that enables it to be used during the entire useful life of the shoe, including transport of the same, its attractive display for sale, and its use by part of the end consumer.

**[0013]** Thus, the present invention is oriented to provide these functionalities.

## SUMMARY OF THE INVENTION

**[0014]** The present invention refers to a sustaining device for maintaining the structural configuration of shoes, and also its suspension for display, avoiding at all times the deformation of the shoes.

**[0015]** The solution proposed by the invention discloses a rigid device that acts in a shape similar to the mold used during the process of manufacturing and configuring the shoe.

**[0016]** For its part, the suspending device of the invention comprises the following main elements:

- A shaping element, deployed in the interior of the shoe for the purpose maintaining the structural configuration of the same at all times.
- A suspension element that, when joined to the above shaping element, enables the attractive and versatile display of the shoe during the sale of the same, preventing as well its deformation at any time.

**[0017]** In turn, the shaping element may comprise diverse additional elements, depending on the configura-

tion, structure or type of shoe, which correctly maintains all of the fundamental elements of the shoe, regardless of the type of shoe it may be.

**[0018]** The solution proposed by the invention is a simple, versatile and economic solution that may be used during transport of the shoe, its display for sale, and its storage by the end consumer.

**[0019]** The main advantages of the sustaining device of the invention are broken down as follows:

- It is adaptable to any type of shoe (boots, sandals, clogs, etc.)
- It avoids the deformation of the shoe in which it is deployed
- It can be connected to any type of surface, and
- It can transmit and receive data with respect to the surface to which it is connected.

**[0020]** Other features and advantages of the instant invention will emerge in the detailed description that follows in relation to the accompanying figures.

## DESCRIPCION OF THE FIGURES

**[0021]**

Figures 1 a and 2b display views of the main body of the shaping element of the sustaining device for shoes according to the instant invention.

Figures 2a, 2b, 2c, 2d, and 2e display different schematic views of the support element and the rigidizer for the shaping element of the sustaining device for shoes of the instant invention, as well as the adjustments of the same.

Figure 3 displays a flat view of the additional support element for the shaping element of the sustaining device for shoes according to the instant invention, before being molded into its final shape.

Figure 4 displays a schematic view of the device of the main body, support element, rigidizer, additional support element and supplement, comprising a shaping element of the sustaining device for shoes according to the instant invention.

Figures 5a and 5b display a flat and lateral section view, respectively, of the disposition of the frontal rigidizer element deployed on the main body of the shaping element of the sustaining device for shoes according to the instant invention.

Figures 5c and 5d display, in a flat and volume view respectively, the design of the frontal rigidizer element before being shaped into its final shape, of the shaping element of the sustaining device for shoes according to the instant invention.

Figure 5e displays a detail of the frontal rigidizer element deployed on the main body of the shaping element of the sustaining device for shoes according to the instant invention.

Figures 6a and 6b display details of the rear rigidizer

element as well as its positioning in the shoe, for the sustaining device for shoes according to the instant invention.

Figures 7a, 7b, 7c, 7d and 7e display different schematic and detailed views of the suspending element of the sustaining device for shoes according to the instant invention.

Figure 8 displays a schematic view of the overall composition of the sustaining device for shoes and its assorted components according to the instant invention.

Figures 9a, 9b, 9c, 9d, 9e and 9f display details of the suspension element of the sustaining device for footwear according to the instant invention.

Figures 10a, 10b, 10c and 10d display details of the shaping element of the sustaining device for shoes according to an embodiment of the instant invention.

Figures 11a and 11b display details of the preferred embodiments of the shaping element of the sustaining device for shoes according to the instant invention.

## DETAILED DESCRIPTION OF THE INVENTION

**[0022]** The instant invention discloses a supporting device for maintaining the structural configuration and display of a shoe 10, and also for suspending said shoe 10 for display, preventing deformation of shoe 10 at all times.

**[0023]** The supporting device of the invention comprises in turn the following elements:

- A shaping element 101, placed in the interior of shoe 10, for the purpose of maintaining the structural configuration of said shoe 10;
- A suspension element 102 that, coupled to shaping element 101, permits the display of shoe 10 for its sale, preventing as well that it becomes deformed at any time.

**[0024]** Shaping element 101 comprises, as shown in Figures 1 a and 1b, a main body 1 made of a material that allows flexibility when being shaped to have a complete shape with a mid-sole line of the mold of shoe 10, allowing this material, once shaped, to obtain a sufficient rigidity for maintaining the structural configuration of shoe 10 without changes. Said main body 1 is valid for all sizes of shoe 10 in which it is going to be utilized, because it does not reach the tip of shoe 10. Preferably the material of main body 1 is made of thermoformed plastic material starting from a flat strip of this material that is cut to the required length to be inserted from the tip to the heel of each shoe 10. According to a preferred embodiment, main body 1 comprises a plurality of openings 2 with an anchoring function, not as pass holes, such that body 1 may be more translucent, said openings 2 preferably having a circular section. Said openings 2 serve the purpose of being able to anchor main body 1 of shaping element 101 in a rigid manner to other elements that may be nec-

essary for maintaining the structural shape of shoe 10, in accordance with the particular design of each shoe 10.

**[0025]** Preferably the material which comprises main body 1 will be transparent, in such a way that shaping element 101 will be practically invisible, making it especially attractive for displays, shops and display cases. This feature is particularly important for sandal style shoes.

**[0026]** Shaping element 101 is completely versatile and can be adapted to any type of shoe 10, size, midpoint of the sole, left and right foot, the heel of shoe 10, height of the heel, shoes for women, men, children, boots, ankle high boots, sandals, etc.

**[0027]** Main body 1 of shaping element 101 may comprise an information element 3, preferably a bar code that contains information in relation to shoe 10 in which said shaping element 101 is inserted: model, color, number, picture, lot, etc.).

**[0028]** Shaping element 101 may also comprise at least one support element 4, as detailed in Figures 2a, 2b, 2c, 2d and 2e. Support element 4 is an element preferably made of a translucent material, being configured as a single injected piece. Said support element 4 comprises in its internal part some support points, as shown in Figure 2d, acting in extension, as opposed to a standard flange which usually acts in compression. Shaping element 101 may also comprise at least one rigidizer 5, deployed in the interior of each support element 4, such that rigidizer 5 can rotate in the interior of said support element 4, as can be seen in Figures 2b and 2c. In this manner, support element 4 serves to sustain rigidizer 5.

**[0029]** Shaping element 101 may comprise, if necessary, a support element 6, for the purpose of maintaining shoe 10 straight and taut, thus maintaining its correct structural configuration. Additional support element 6 is comprised preferably starting from a flat strip, preferably made of thermoformed plastic material, capable of acquiring the form of a closed loop shape, to the extent it may be necessary, being attached by some buffers 7. As shown in Figure 4, additional support element 6, once shaped and adjusted, is inserted into rigidizer 5, both elements being subsequently inserted through guide 8, in vertical, in support element 4, the assembly of rigidizer 5 and additional support element 6 being subsequently rotated, typically 180°, or the angle degree required to obtain appropriate tension in the zone of shoe 10. Guide 8 may in turn support both sides of the thickness of shaping element 101 or only support one of the sides, thus allowing for lateral displacement of additional support element 6.

**[0030]** Shaping element 101 may likewise be comprised of a supplement 9, which serves as an extension to match the height of the shaft of shoe 10, when necessary for maintaining the shape of certain models of shoes, such as ankle height boots or full height boots. In turn, said shaping element 101 may comprise a frontal reinforcing element 90, for reinforcing the shape of the frontal part of certain models of shoes 10 that may so require it

(see Figures 11a and 11b). The possibility also exists of guide 8 holding down shaping element 101 on one side, while also holding down supplement 9 on the other side, making it possible in this manner to join both elements, shaping element 101 and supplement 9.

**[0031]** Shaping element 101 can also comprise (see Figures 5a, 5b and 5c) a frontal rigidizer element 20, preferably made of injected plastic material with sufficient rigidity and flexibility to maintain shoe 1 in its original shape, while at the same time said frontal rigidizer element 20 acts as a longitudinal brake with respect to main body 1, being connected to said main body 1 by means of an axel 21 that permits different height adjustments, such that said axel 21 allows frontal rigidizer element 20 to rotate with respect to main body 1, along a longitudinal axis 22, comprising the plane formed by the underside of the body of frontal rigidizer element 20, as according to a pivoting axis (23), perpendicular to the plane formed by the underside of the body of frontal rigidizer element 20 (Figures 5a, 5b). In this way the connection is made as shown in Figure 5e, in which axel 21, that is united to frontal rigidizer element 20, avails of longitudinal grooves that, when inserted in the opening of shaping element 1 and rotating 90° with respect to said element 1, it is secured without any possibility of falling out of said shaping element 1.

**[0032]** Frontal rigidizer element 20, is obtained starting from a piece of vinyl having sufficient density and caliber so that, once cut into any shape (the basic shape does not matter, given that a single standard shape can be used in the large majority of shoes, as shown in Figure 5c), it is inserted in main body 1 through axel 21, positioned in the shape of a folded cone (as shown in Figure 5d) in the interior of shoe 10, and released in the interior of said shoe 10, immediately taking the shape of the interior of shoe. The interior of shoe 10 in turn stops the displacement of main body 1 in a longitudinal manner.

**[0033]** It is also possible to reach a higher level of quality and complexity in the finishing of the configuration of frontal rigidizer element 20, because the same vinyl piece is thermoformed with a tridimensional shape, copied from the original mold in which the model in question was made. The use of one or the other option is the decision of the client, given that neither of the two processes involves highly complicated techniques.

**[0034]** As shown in Figures 6a and 6b, shaping element 101 can also comprise a rear rigidizer element 30, especially useful in models of shoes 10 that do not have support at the heel of the foot (such as clogs). These rear rigidizer elements 30 are comprised starting from a flat piece as shown in Figure 6a, preferably made of a thermoformed plastic material, such that said rear rigidizer elements 30 are attached to main body 1 through one of the openings 2.

**[0035]** The functioning and anchoring of rear rigidizer element 30, preferably injected in transparent plastic material, is such that said element is attached to main body 1 by means of two pairs of lugs that are inserted in each

one of the two faces of main body 1, making horizontal movement of the same impossible with the help of a third support point that exerts pressure on the sole in the rear part of the heel of shoe 10, just as shown in Figures 9a to 9f. Thus the purpose of these rear rigidizer elements 30 is to prevent main body 1 from sliding backwards.

**[0036]** The sustaining device of the invention comprises, besides previously described shaping element 101, having the purpose of maintaining the structural configuration of shoe 10 at all times, a suspension element 102 that enables, when coupled to shaping element 101, the attractive and versatile display of shoe 10 during the sale of the same, preventing said shoe 10 from becoming deformed at any time. Suspension element 102 is joined to shaping element 101 in a rigid manner, suspension element 102 is joined in turn to exterior structure 40 having any rotating shape, said suspension element 102 being able to rotate with respect of exterior structure 40.

**[0037]** The elements that comprise suspension element 102 are shown in Figures 7a to 7e, attached, and are described as follows. More details are shown in Figures 9a to 9f. Suspension element 102 is joined to exterior structure 40 by means of a rigid element 41, embedded in a rigid manner in exterior structure 41. In turn, said rigid element 41 is joined in a rotating manner to connecting element 42 being a type of plaque, preferably of a circular profile, in such a way that connecting element 42 can rotate with respect to rigid element 41 and, thus, with respect to exterior structure 40, in accordance with a rotating axis perpendicular to exterior structure 40, to rigid element 41 and to connecting element 42. The structure of suspension element 102 is completed with at least three joining elements 44, 45 and 46, preferably hollow and with a rectangular profile. Shaping element 101 is, in turn, joined to suspension element 102 through the last of the joining elements, 46. The first joining element 44 is joined to connecting element 42 by means of an articulation 43, in such a way that joining element 44 can rotate on articulation 43 with respect to connecting element 42, in accordance with rotating axis 47, perpendicular to the longitudinal rotating axis of joining element 44 (see Figure 7a). The second joining element 45 is joined to the first joining element 44 in a retractile manner, in such a way that second joining element 45 can be retracted longitudinally on the first joining element 44, or can be extended longitudinally with respect to the same. Finally third joining element 46 is joined to second joining element 45 through an articulation 48, in such a way that third joining element 46 can rotate with respect to second joining element 45, according to rotation axis 60, perpendicular to the longitudinal axis of second joining element 45. In this way, by means of suspension element 102, shoe 10 can be displayed in accordance with the desired orientation and position (in front, profile, right side up or upside down), as may be considered most attractive to the client. In this way, shoe 10 is displayed without the need of using shelves or racks, which, besides being a much more attractive display, optimizes the space ded-

icated to the display.

**[0038]** Exterior structure 40 will comprise some guides or profiles designed in such a way that they can be attached in a rigid manner to rigid element 41 of suspension element 102.

**[0039]** Furthermore, preferably suspension element 102 will comprise a visualizer 49 or a display in which the information contained in information element 3 or bar code, regarding shoe 10 will be shown: model, color, size, image, lot, etc. Thus the information of shoe 10 in information element 3 will be transmitted through a connection 71 both to visualizer 49 and to a computer control system 70 (see Figure 8), that stores all of the information of all of the models of shoes 10 integrated into a multiplicity of storage devices to which it may be connected. This way enables a quick, simple and automatic manner of changing any information that should appear on visualizers 49 by means of a single operation; a task which currently has to be done manually.

**[0040]** There also exists, in accordance with the invention, the possibility of displaying shoe 10 by means of a shaping element 101 as shown in Figures 10a to 10d, that comprises in turn a fastening element 50 in the shape of a clip, as shown in Figures 10b and 10c. Said fastening element 50, comprising in turn a body 52 and a gripping element 51, this fastening element 50 being joined to the heel of shoe 10, on one side by means of body 52, and being joined to shaping element 101 by gripping element 51. With this embodiment shoe 10 can likewise be suspended by means of suspension element 102 which, joined to shaping element 101, will allow the display of shoe 10 for its sale (Figure 10d). According to this embodiment, shaping element 101 also comprises preferably a notch 103 in a determined position, in such a way that shaping element 101 may be easily broken by means of said notch 103, as shown in Figure 10a, being reduced to only one part in the heel of shoe 10.

**[0041]** Although the instant invention has been disclosed entirely in connection with the preferred embodiments, it is clear that those modifications that are within its scope may be introduced, and that the invention should not be considered limited by the previous embodiments, but rather to the content of the following claims.

## Claims

1. A supporting device for maintaining the structural configuration and display of shoe (10), that comprises a shaping element (101) positioned in interior of shoe (10), made from a material that allows flexibility for adjusting to the internal shape of the mold of shoe (10) obtaining sufficient rigidity to avoid its deformation, and a suspension element (102) that is attached to shaping element (101) to enable suspending shoe (10) for display on another surface for its sale, without said shoe (10) becoming deformed.

2. A supporting device according to claim 1 in which shaping element (101) comprises a main body (1) that comprises in turn a plurality of openings (2) to anchor in a rigid manner main body (1) with other elements necessary for maintaining the structural configuration of shoe (10).

3. A supporting device according to claim 2 in which main body (1) is made of thermoformed transparent plastic.

4. A supporting device according to any of the previous claims, in which shaping element (101) comprises at least one support element (4) as a single piece, that comprises in its internal part some support points that act in extension, in which at least one rigidizer (5) is deployed that can rotate in the interior of said support element (4)

5. A supporting device according to claim 4, in which the shaping element (101) comprises at least one additional support element (6) for the purpose of maintaining straight and taut shoe (10), such that at least one additional support element (6) is inserted in rigidizer (5) of support element (4) rotating the assembly of rigidizer (5) and additional support element (6) in support element (4) up to an angle such that the appropriate tension in the zone of shoe (10) is obtained.

6. A sustaining device according to claim 5, in which additional support element (6) is shaped starting from a flat strip made of a thermoformed plastic material, capable of acquiring a closed-loop shape to the extent necessary for shoe (10).

7. A sustaining device according to any of the previous claims, in which shaping element (101) further comprises a supplement (9) in the form of an extension to the height of the shaft of shoe (10).

8. A sustaining device according to any of the previous claims, in which shaping element (101) further comprises a frontal reinforcing element (90) for reinforcing the shape of the front part of certain models of shoes (10).

9. A sustaining device according to any of the previous claims, in which shaping element (101) comprises a frontal rigidizer element (20) made of a material with a rigidity and flexibility such that they maintain shoe (10) in its original shape, at the same time that said frontal rigidizer element (20) acts as a longitudinal brake of shaping element (101).

10. A sustaining device according to claim 9, in which frontal rigidizer element (20) is connected to shaping element (101) by means of an axel (21) that permits

different height adjustments of frontal rigidizer element (20), such that said axel (21) allows frontal rigidizer element (20) to rotate with respect of shaping element (101) along a longitudinal axis (22), comprising the plane formed by the underside of the body of frontal rigidizer element (20), as according to a pivoting axis (23), perpendicular to the plane formed by the underside of the body of frontal rigidizer element (20).

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11. A sustaining device according to any of the previous claims, in which shaping element (101) comprises a rear rigidizer element (30) composed starting from flat piece made from a shaped thermoformed plastic material.

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12. A sustaining device according to any of the previous claims, in which suspending element (102) is joined to shaping element (101) in a rigid manner by means of a rigid element (41), said rigid element (41) being united at the same time to a connecting element (42) that can rotate with respect to rigid element (41) and with respect to exterior structure (40), according to a rotating axis perpendicular to exterior structure (40), to rigid element (41) and to connecting element (42).

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13. A sustaining device according to any of the previous claims, in which suspending element (102) comprises a visualizer (49) that visually displays the information contained in an information element (3) in relation to shoe (10), in such a way that information regarding shoe (10) contained in information element (3) is transmitted to visualizer (49) and a computer control system (70).

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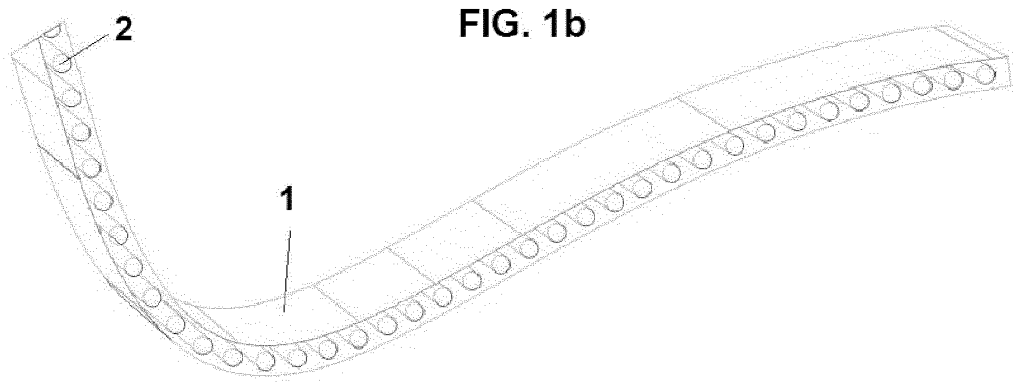
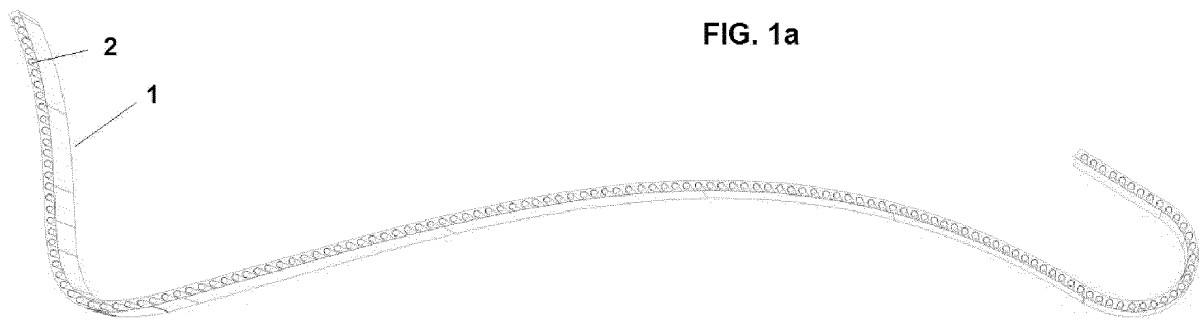
14. A sustaining device according to any of the previous claims, which comprises in turn a fastening element (50) in the shape of a clip, that comprises in turn a body (52) and a gripping element (51), this fastening element (50) being connected to the heel of shoe (10) on the one side, by means of body (52) and being joined to shaping element (101) by means of gripping element (51).

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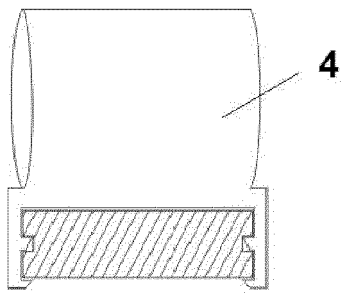


FIG. 2a

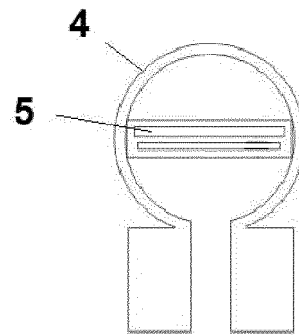


FIG. 2b

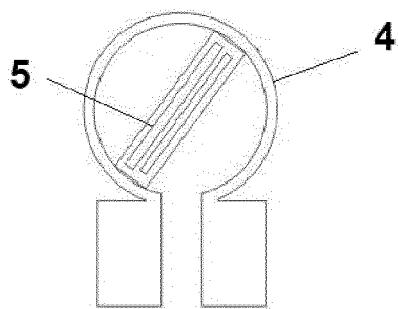


FIG. 2c

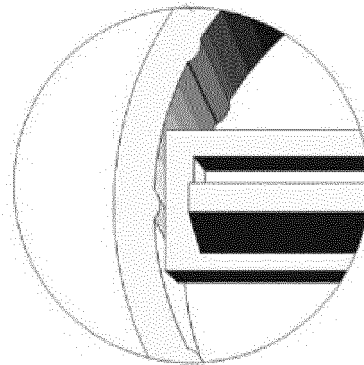


FIG. 2d

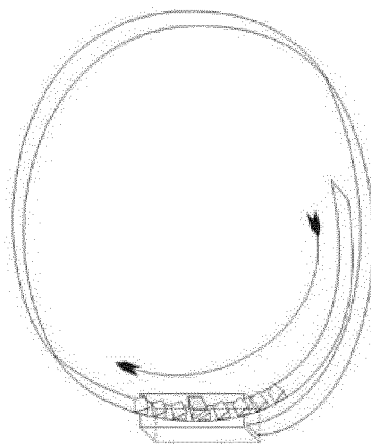
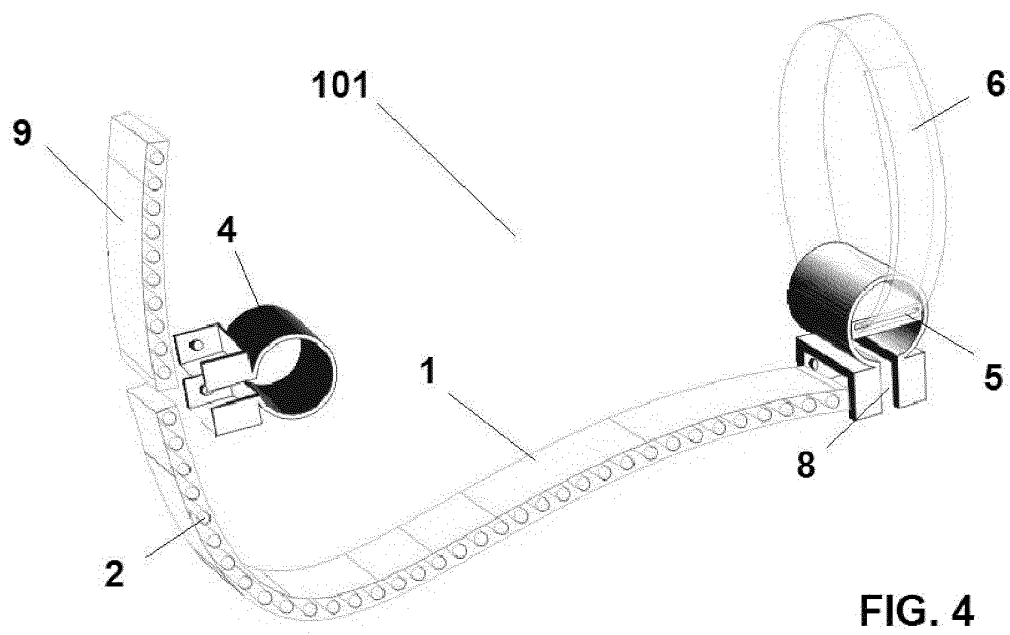
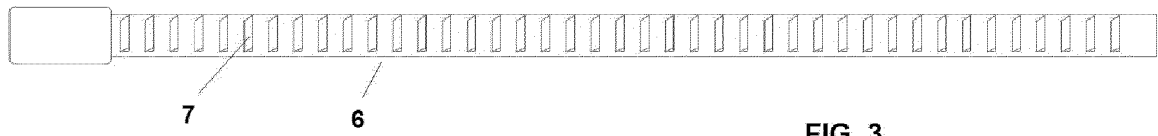


FIG. 2e



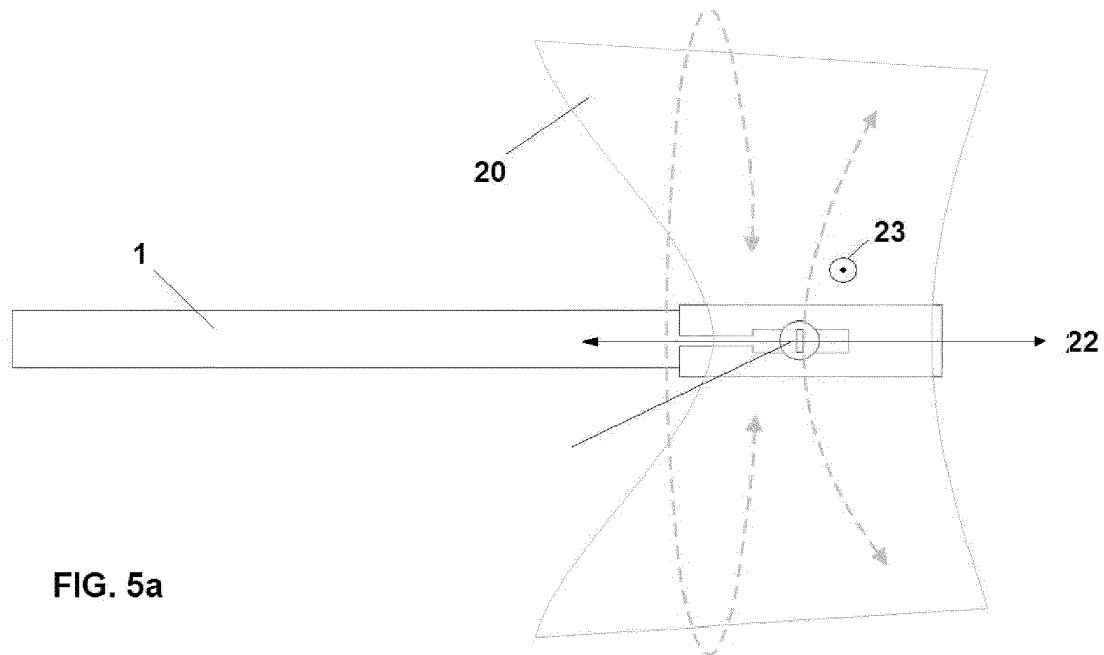


FIG. 5a

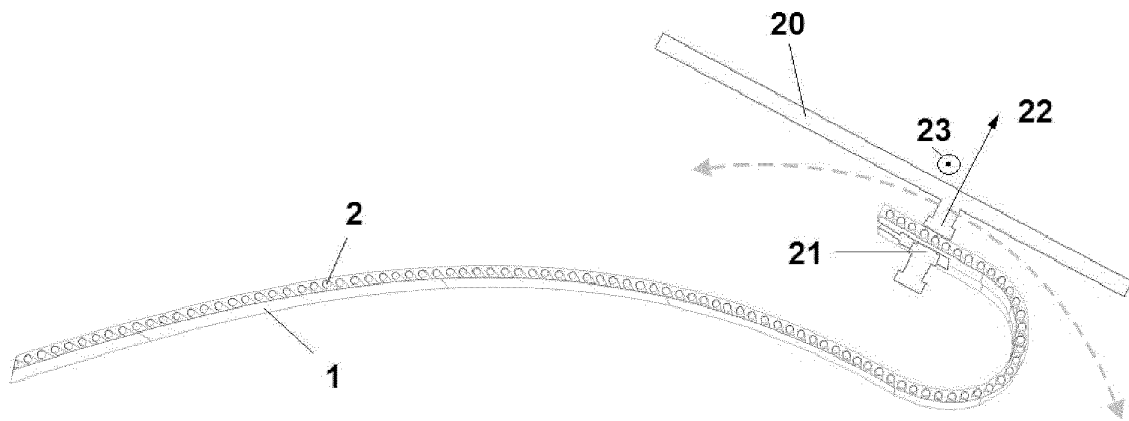


FIG. 5b

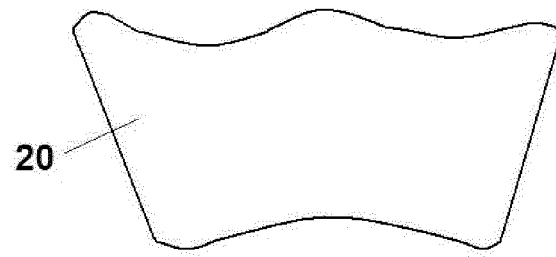


FIG. 5c

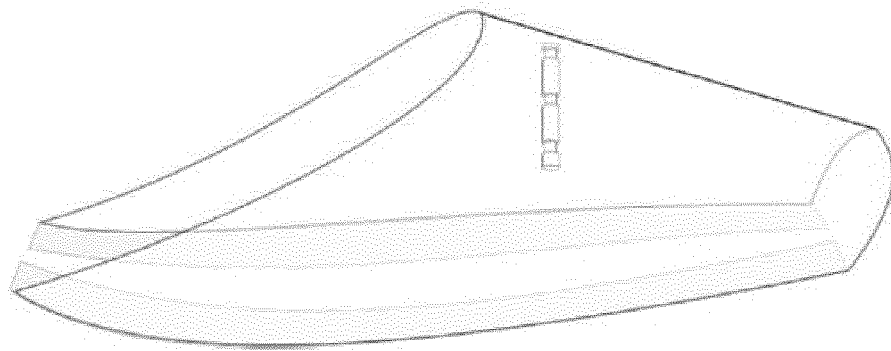


FIG. 5d

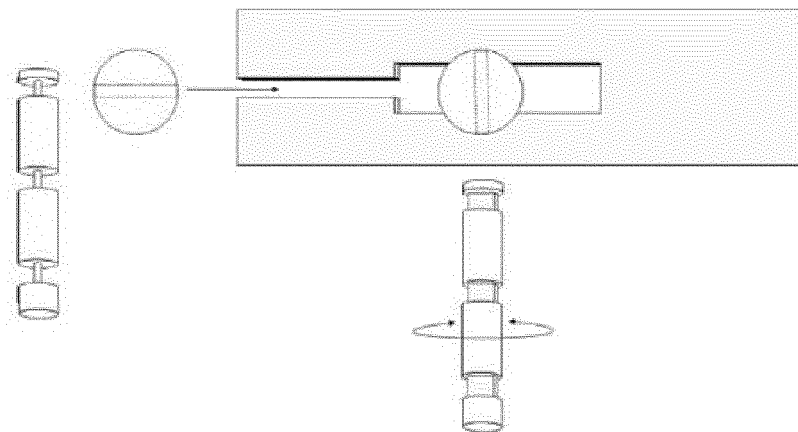


FIG. 5e

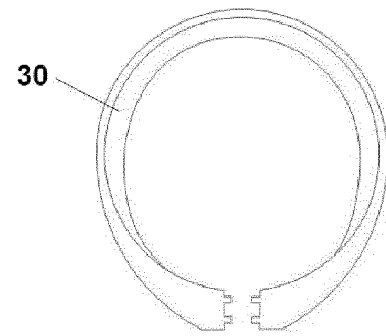


FIG. 6a

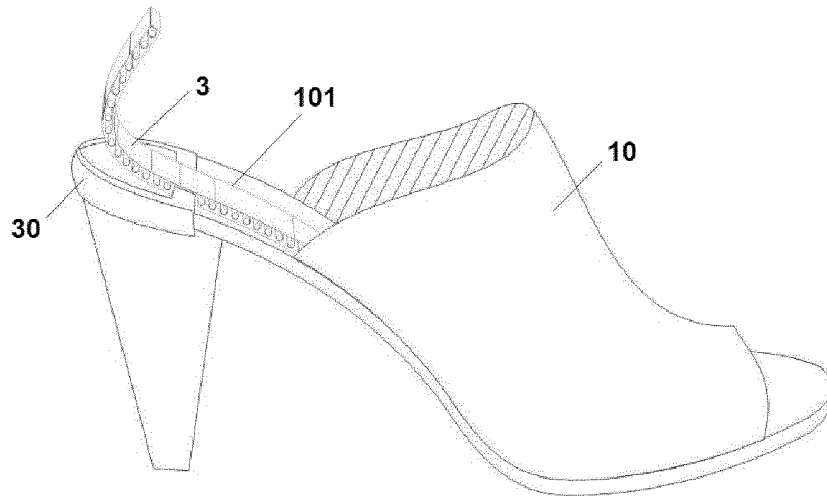


FIG. 6b

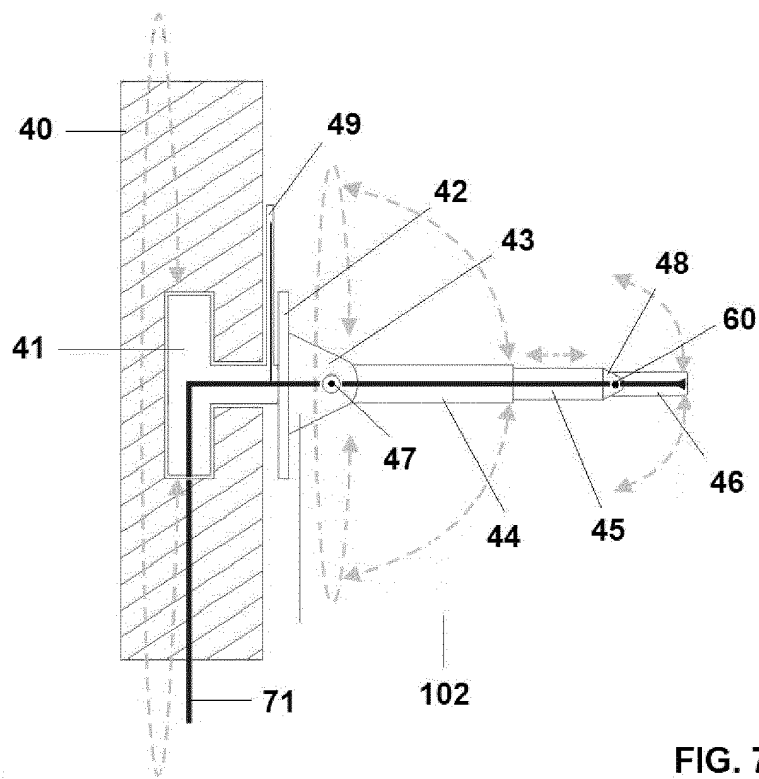
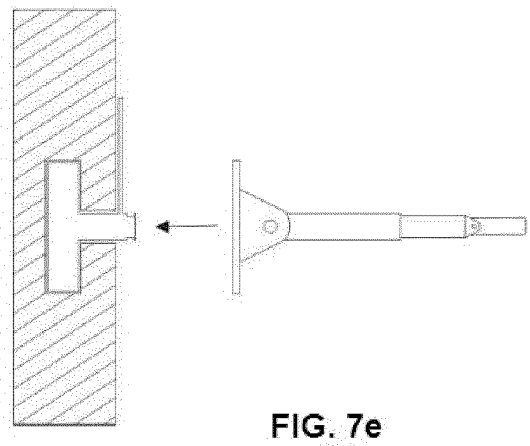
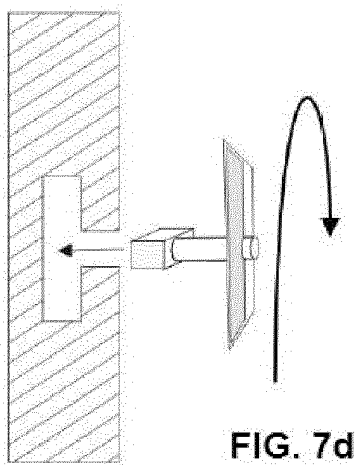
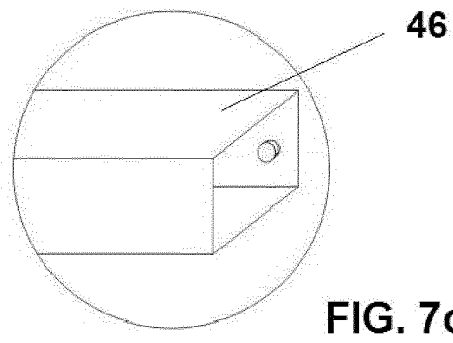
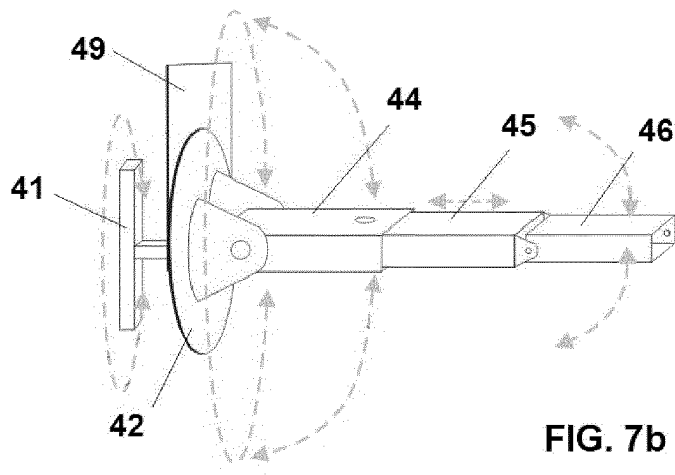


FIG. 7a



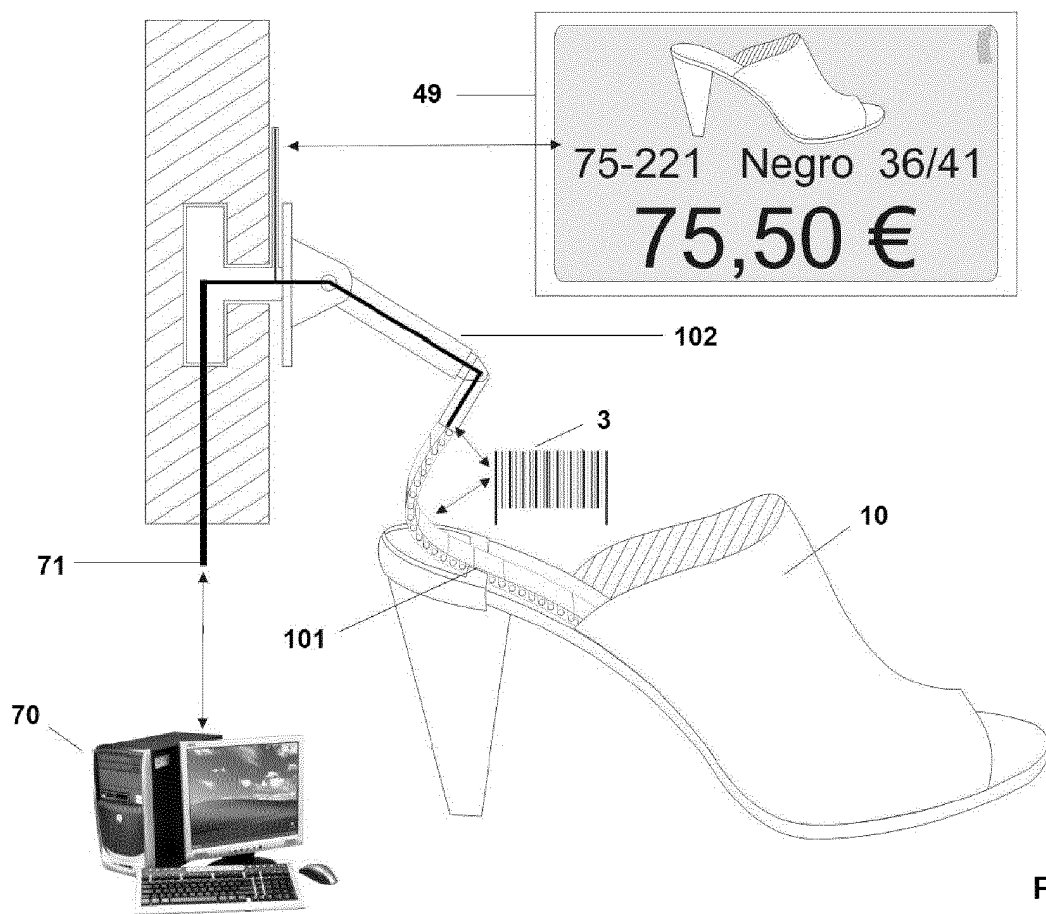


FIG. 8

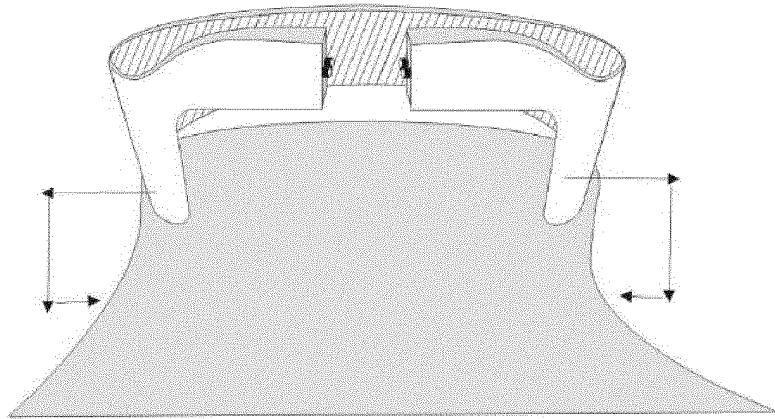


FIG. 9a

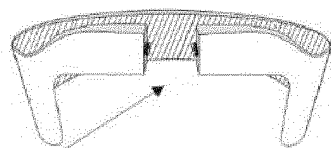
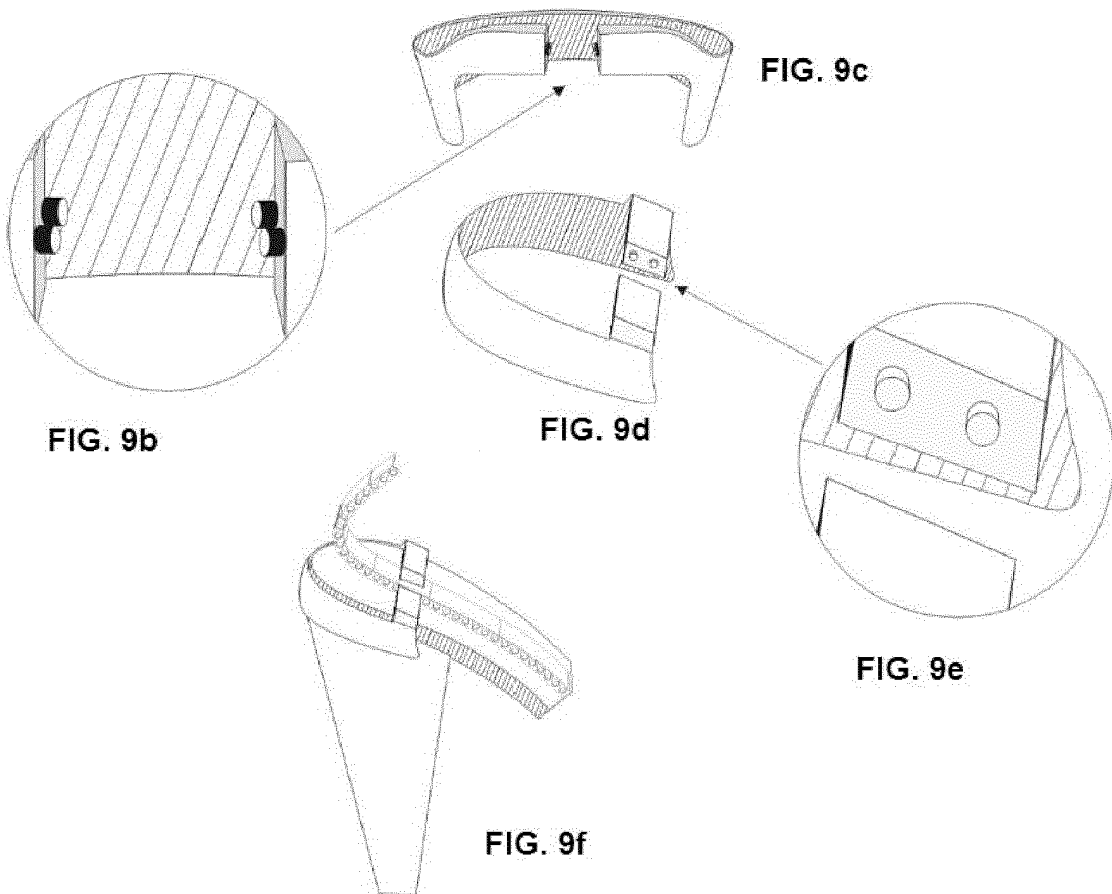


FIG. 9c

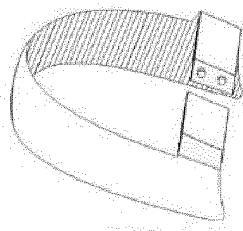


FIG. 9d

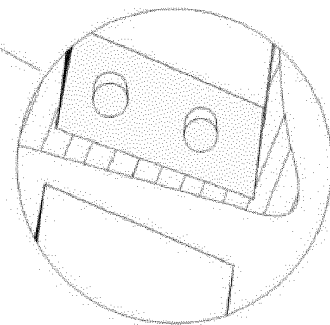


FIG. 9e

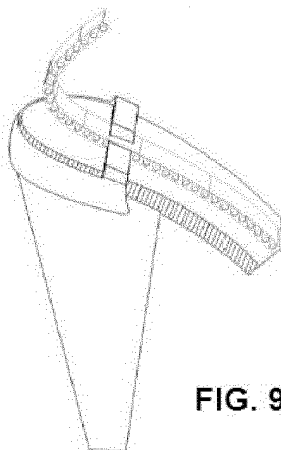


FIG. 9f

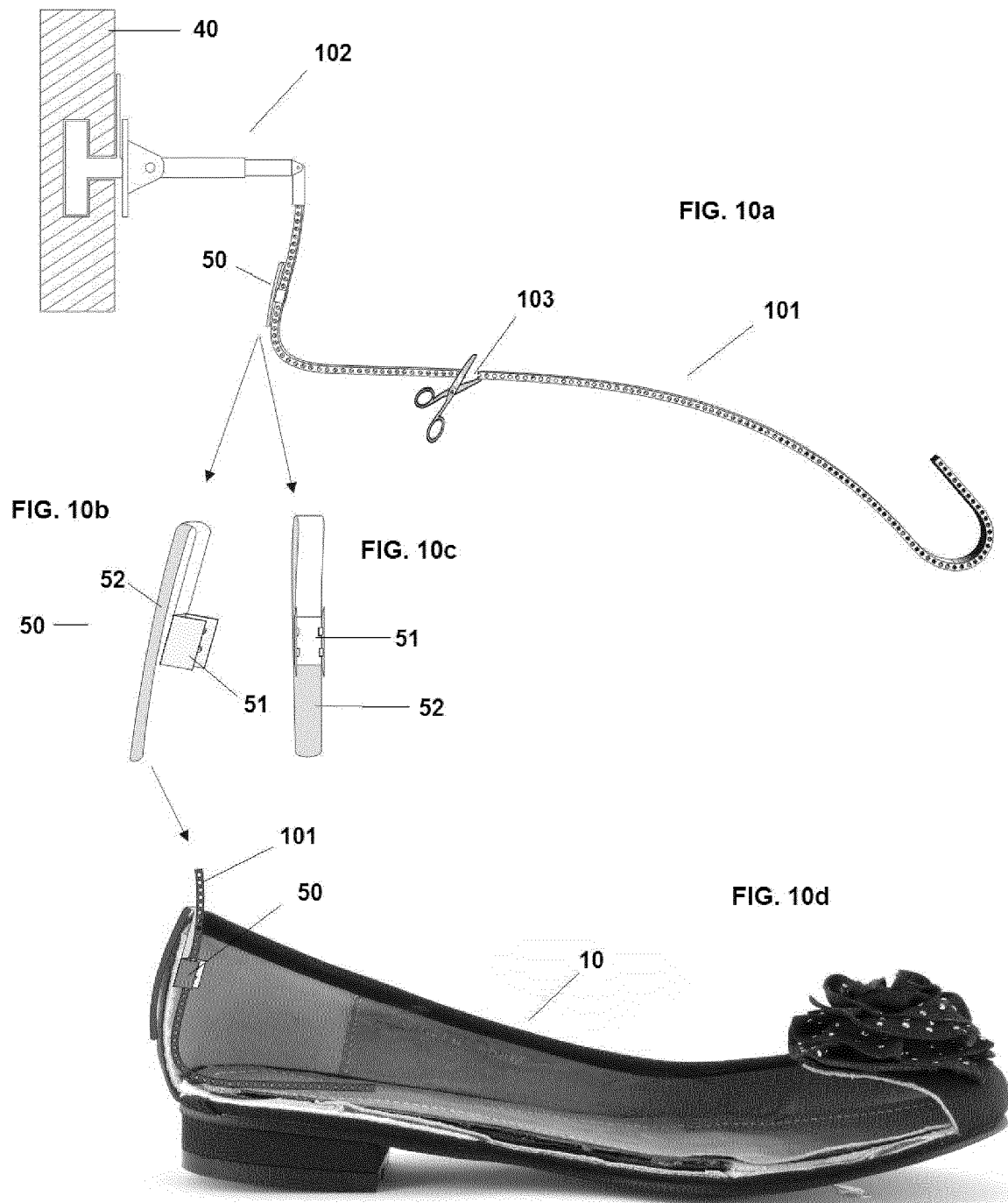


FIG. 11a

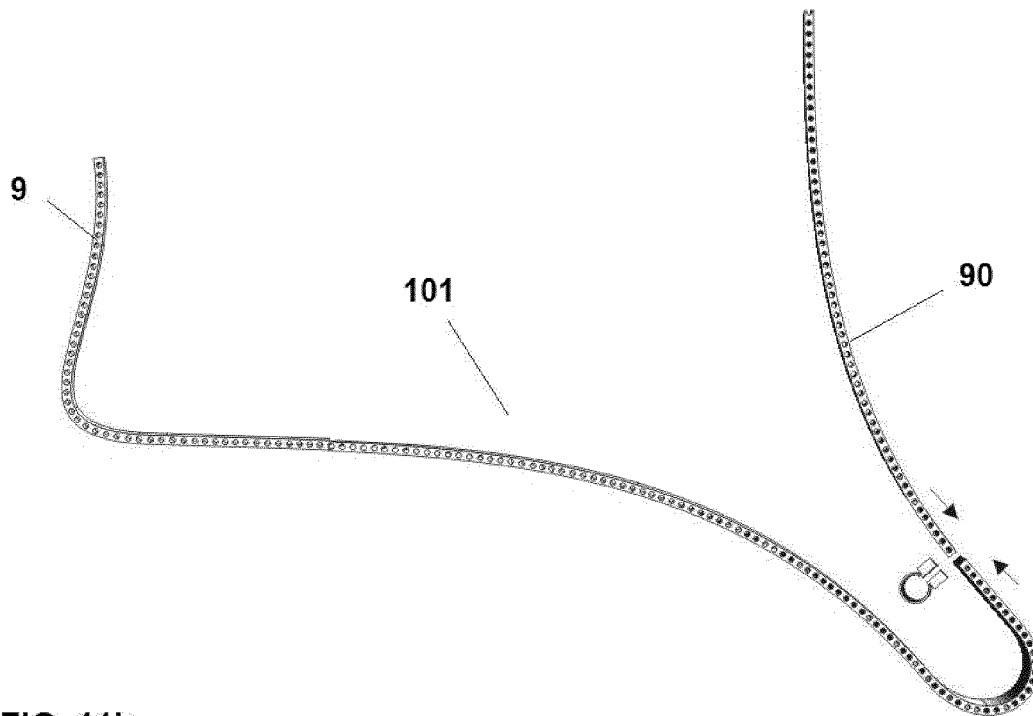
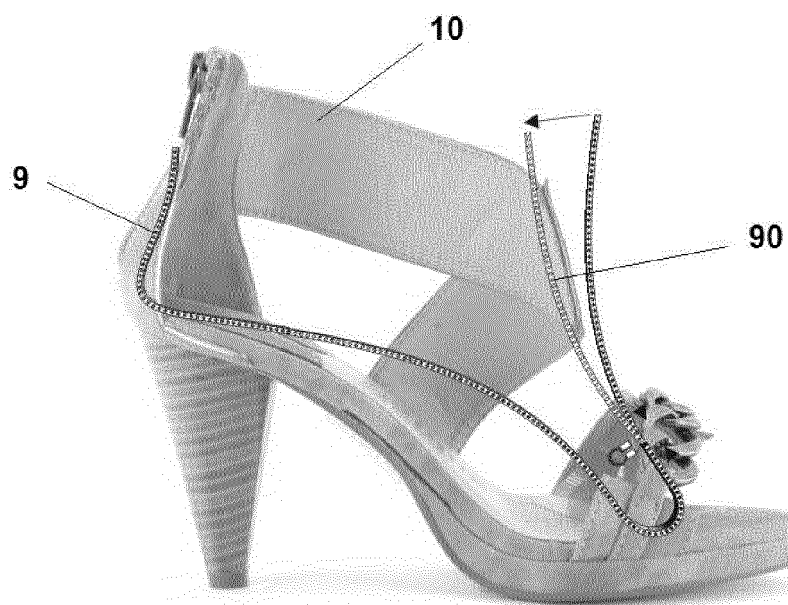


FIG. 11b



## INTERNATIONAL SEARCH REPORT

International application No  
PCT/ES2011/070481

| <b>A. CLASSIFICATION OF SUBJECT MATTER</b><br>INV. A43B3/00 A43D3/14 A47F7/08<br>ADD.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                 |                                                    |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|
| According to International Patent Classification (IPC) or to both national classification and IPC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                 |                                                    |
| <b>B. FIELDS SEARCHED</b><br>Minimum documentation searched (classification system followed by classification symbols)<br>A43B A43D A47F A47L                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                 |                                                    |
| Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                 |                                                    |
| Electronic data base consulted during the international search (name of data base and, where practical, search terms used)<br>EP0-Internal                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                 |                                                    |
| <b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                 |                                                    |
| Category*                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Citation of document, with indication, where appropriate, of the relevant passages                                              | Relevant to claim No.                              |
| X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | US 2007/251894 A1 (KELLEY THOMAS J [US])<br>1 November 2007 (2007-11-01)<br>paragraphs [0018] - [0024]; claims 1,12;<br>figures | 1-14                                               |
| Y                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | FR 1 512 042 A (FELIPE URIOSTE HERMIDA)<br>2 February 1968 (1968-02-02)<br>claims; figures                                      | 1-14                                               |
| Y                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | DE 235 613 C (REINHARDT BRÜNING)<br>20 June 1911 (1911-06-20)<br>claims; figures                                                | 1-14                                               |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | US 2 500 242 A (DENTON CLAUD E)<br>14 March 1950 (1950-03-14)<br>claims; figures                                                | 1-14                                               |
| -----<br>-/-                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                 |                                                    |
| <input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> See patent family annex.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                 |                                                    |
| * Special categories of cited documents :<br>"A" document defining the general state of the art which is not considered to be of particular relevance<br>"E" earlier document but published on or after the international filing date<br>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)<br>"O" document referring to an oral disclosure, use, exhibition or other means<br>"P" document published prior to the international filing date but later than the priority date claimed<br>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention<br>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone<br>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.<br>"&" document member of the same patent family |                                                                                                                                 |                                                    |
| Date of the actual completion of the international search                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                 | Date of mailing of the international search report |
| 13 March 2012                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                 | 21/03/2012                                         |
| Name and mailing address of the ISA/<br>European Patent Office, P.B. 5818 Patentlaan 2<br>NL - 2280 HV Rijswijk<br>Tel: (+31-70) 340-2040,<br>Fax: (+31-70) 340-3016                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                 | Authorized officer<br>Claudel, Benoît              |

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International application No  
PCT/ES2011/070481

| C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT |                                                                                              |                       |
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Form PCT/ISA/210 (continuation of second sheet) (April 2005)

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Information on patent family members

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**REFERENCES CITED IN THE DESCRIPTION**

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