(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 013 315 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
28.06.2000 Bulletin 2000/26

(51) Int Cl.[7]: **A63C 1/02**

(21) Application number: **99403242.3**

(22) Date of filing: **21.12.1999**

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE
Designated Extension States:
AL LT LV MK RO SI

(30) Priority: **22.12.1998 CA 2256932**
19.11.1999 CA 2290209

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(54) Ice skate

(57) An ice skate which includes a skate boot and a ground engaging runner holder supporting the skate boot and fastened thereto. The skate boot has a sole portion with a first aperture in the heel area thereof and two transversely spaced apart apertures in the toe area thereof. The ice skate further includes two front removable connectors extending through the two transversely spaced apart apertures towards the runner holder for connecting the skate boot to the front portion of the runner holder. The ice skate also has a rear removable connector that extends through the first aperture of the sole portion towards the runner holder for connecting the skate boot to the rear portion of the runner holder. The front and rear connectors are accessible only from the inside of the skate boot.

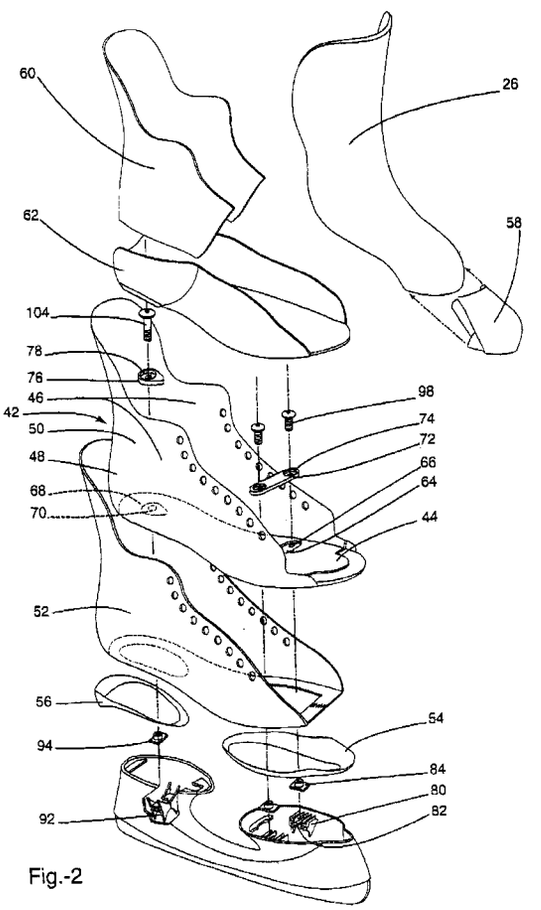

Fig.-2

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Description

Field of the Invention

[0001] The present invention relates to ice skates such as used for playing the game of ice hockey. The invention is more particularly concerned with the connection of the runner holder to the skate boot

Background of the invention

[0002] Traditional ice skates have been manufactured for decades in the same general manner. An insole is made according to well-known methods such as die cutting, molding, etc. The insole may then be formed to better fit to the different cavities of the foot. A last is then used to assemble the different components together. First, the insole is temporarily attached to the last and any excess material may be removed from the edge of the insole to enable a better fit. A boot upper is placed over the last, suitable cement is applied and the bottom margin of the upper is folded over the insole. Tacking the folded portion to the insole also usually makes permanent attachment. The adjustment of the upper to the last, the required stretching of the material before it is attached to the insole and the attachment operations are often difficult to perform and the final result may directly depend upon the worker's skills and experience. Imperfections such as folds, cement stains, or uncovered areas are not uncommon.

[0003] An outsole is then attached to the bottom of the skate boot and the runner holder can then be attached to the outsole of the skate boot, usually with rivets. Rivets are inserted manually, or semi automatically, and here again the quality of the connection is entirely dependent upon the skill of the operator. Imperfectly assembled rivets are frequent, in particular on low and medium price ice skates. It is also very difficult to automate entirely the riveting operations.

[0004] The sole being normally a substantially flat surface without any line-up mark, during the assembling process it may be difficult to locate the runner holder with respect to the skate boot with a very high accuracy, causing for instance misalignments or other similar problems.

[0005] Moreover, considering the forces and stresses encountered by ice skates in use, the rivets are regularly subjected to shear stresses. On most skates, rivets must sustain all forces transmitted from the foot and the skate boot to the runner holder. A certain amount of energy is lost during this transfer since rivets are not particularly efficient in shear and the skate boot may therefore be slightly moveable relative to the runner holder.

[0006] Thus, there is a need to provide a better connection between the skate boot and the runner holder, which eliminates the use of rivets and which allows for a more optimal energy transfer from the skate boot to the runner holder.

Objects and statement of the Invention

[0007] It is an object of the invention to provide an ice skate construction which ensures better force transmission from skate boot to the runner holder.

[0008] It is also an object of the invention to eliminate the use of rivets or other affixing components on the outer side of the skate boot and/or the runner holder

[0009] As embodied and broadly described herein, the invention seeks to provide an ice skate which includes a skate boot and a ground engaging runner holder supporting the skate boot and fastened thereto. The skate boot has a sole portion with a first aperture in the heel area thereof and two transversely spaced apart apertures in the toe area thereof. The ice skate further includes two front removable connectors extending through the two transversely spaced apart apertures towards the runner holder for connecting the skate boot to the front portion of the runner holder. The ice skate also has a rear removable connector that extends through the first aperture of the sole portion towards the runner holder for connecting the skate boot to the rear portion of the runner holder. The front and rear connectors are accessible only from the inside of the skate boot.

[0010] Preferably, the sole portion of the skate boot has a front recess extending between and around the two transversely spaced apart apertures and the ice skate further includes a crossbar closely fitting into the front recess and having two spaced apart apertures, one at each end of the crossbar through which the two front removable connectors extend. By providing this front recess in the sole portion with a crossbar mounted therein, it is possible to increase the rigidity of the construction. Indeed, the sole portion may be made of a light thermoplastic material while the crossbar may be made of a more rigid material.

[0011] Furthermore, with this particular crossbar, it is possible to give to the end user the possibility of choosing between two possible runner holder alignments with respect to the skate boot. To this effect, one of the two spaced apart apertures is closer to the median transverse plane of the crossbar that the other and the crossbar is shaped so as to fit closely into the recess in either of two opposite transverse positions. In a first position, the longitudinal median vertical plane of the runner holder defines a first angular relationship with the longitudinal median vertical plane of the skate boot, and in a second position, the longitudinal median vertical plane of the runner holder defines a second angular relationship with the longitudinal median vertical plane of the skate boot. This construction thus allows the end user to obtain a runner alignment that will be adapted to his foot morphology or his skating style.

[0012] Preferably, the ice skate also comprises an outer cover that encloses at least partially the outer side of the shell and extends underneath. Front and rear gaskets may also be provided between the shell and the

runner holder.

[0013] Other objects and features of the invention will become apparent by reference to the following description and the drawings.

Brief description of the drawings

[0014] A detailed description of the preferred embodiment of the invention is provided herein with reference to the following drawings, wherein:

Figure 1 is a side elevational view, with a portion broken away, of an ice skate constructed in accordance with the invention;

Figure 2 is an exploded perspective view of an ice skate in accordance with the invention and using the runner holder connection of Figure 1;

Figure 3 is a sectional view taken along line 3-3 of Figure 1;

Figure 3a is an exploded view of Figure 3;

Figure 4 is a sectional view taken along line 4-4 of Figure 1;

Figure 4a is an exploded view of Figure 4;

Figure 5 is a perspective view of a shell of the ice skate illustrated in Figure 1;

Figure 6 is a top view of the shell constructed in accordance with the invention wherein the runner holder is illustrated in dotted line and in a first alignment position;

Figure 6a is a top view of the shell illustrated in Figure 6 wherein the runner holder is illustrated in dotted line and in a second alignment position;

Figure 7 is an exploded perspective view of an ice skate constructed in accordance with a first variant; and

Figure 8 is an exploded perspective view of an ice skate constructed in accordance with a second variant.

[0015] In the drawings, preferred embodiments of the invention are illustrated by way of examples. It is to be expressly understood that the description and drawings are only for the purpose of illustration and are an aid for understanding. They are not intended to be a definition of the limits of the invention.

Detailed description of the preferred embodiments

[0016] Figure 1 illustrates an ice skate 10 having a skate boot 12 to which is secured a runner holder 14 (also called blade holder) in accordance with the invention. Skate boot 12 traditionally features a toe portion 16 to enclose the skater's toes, a heel portion 18 to support the heel of the skater, and side walls 20 on each side to laterally support the foot. The upper portion of the skate boot 12 comprises an ankle portion 22, enclosing and supporting the ankle of the skater, and a tendon guard 24 extending upwardly from ankle portion 22 to add support to the ankle and protection to the Achilles tendon of the skater. A tongue 26 covers the entire frontal area of the foot, the frontal area of the ankle and lower front portion of the leg. An opening is defined between each side wall 20 and tongue 26 for Insertion and removal of the foot. Laces 28 and eyelets 30, which extend along the edges of side walls 20 enable one to adjustably attach ice skate 10 to the foot of the wearer.

[0017] The runner holder 14 is formed of an elongated frame 32 having a front pedestal 34 underneath the toe portion 16, a rear pedestal 36 underneath the heel portion 18 and a bridge portion 38 connecting front and rear pedestals 34 and 36. The bridge portion 38 defines an opening 40 in the central area of the runner holder 14.

[0018] As shown in particular in figure 2, skate boot 12 comprises a shell 42 which is advantageously of monocoque construction and made by molding. The mechanical properties may then be improved due to the absence or reduction of junction areas in general such as those with stitching lines or the like. Shell 42 can be made of a single material, for simplicity and economy. The product characteristics may also be adapted to provide different variety of pieces of footwear. For instance, the shell may be provided with different wall thickness in different portions or can also be made of two, three, four, or even more materials.

[0019] Shell 42 is provided with a sole portion 44, upper lateral portions 46 extending at least partially along each side of the foot, a heel portion 48 extending substantially along the wearer's heel and an ankle portion 50 extending at least partially along the ankle portion of a wearer's foot. Upper lateral portions 46 define an opening for insertion of the wearer's foot. An upper connection portion extends downwardly and forwardly from the rear top portion of the lateral walls, to the top lateral walls of the toe portion.

[0020] Preferably, ice skate 10 also comprises an outer cover 52 that encloses at least partially the outer side of the shell and extends underneath. Ice skate 10 also comprises front and rear gaskets 54 and 56 located between skate boot 12 and pedestals 34 and 36 respectively. Front and rear gaskets 54, 56 can be made of a resilient material such as, but not limited to, thermoplastic rubber, thermoplastic olefin, thermoplastic urethane, polypropylene or polyethylene. The toe portion 16 comprises a toe cap 58 for substantially covering a wearer's

toes and providing protection. The tongue 26 is advantageously connected to the toe cap 58. Ice skate 10 may comprise an inner liner 60 encircling at least partially the ankle and a footbed 62 with upper lateral portions extending partially along the wearer's heel and sides foot.

[0021] Referring now to figures 2 to 5, sole portion 44 comprises at the front a transversely extended depression or recess 64 and through the bottom of which there are two spaced apart apertures 66. At the rear of sole portion 44, there is a central aperture 70 in a depression or recess 68. Ice skate 10 further comprises a crossbar 72 shaped to fit closely into front recess 64 and to be inserted therein. Crossbar 72 has two counterbore apertures 74 transversely spaced apart relative to its median vertical plane. A counterbore washer or disk 76 shaped to fit closely into rear recess 68 is inserted therein, this counterbore washer or disk 76 having an aperture 78.

[0022] As illustrated on Figure 3a, distance A between one of the apertures 74 and the median transverse plane of crossbar 72 is slightly smaller than distance B between the other aperture and the median transverse plane of crossbar 72. With this construction, crossbar 72 can be mounted in either of two opposite transverse positions wherein, in a first position, the longitudinal median vertical plane of runner holder 14 defines a first angular relationship with the longitudinal median vertical plane of skate boot 12, and in a second position, the longitudinal median vertical plane of runner holder 14 defines a second angular relationship with the longitudinal median vertical plane of skate boot 12. Figure 6 and 6a illustrate two possible angular relationship between skate boot 12 and runner holder 14 wherein the angular relationship is 0° in Figure 6 while it is identified at C in Figure 6a (C may vary between 0.1 and 1.5°). It is understood that the angular relationship between skate boot 12 and runner holder 14 may for instance vary between -1.5° and 1.5° by using different crossbar constructions.

[0023] As best seen on Figures 3 and 3a, front pedestal 34 has two inwardly, facing integrally formed lugs 80, the top of which being shaped to receive and support sole portion 44 of skate boot 12. Each lug 80 has a lower slotted portion 82 which receives a threaded insert 84 and retains it against rotation. Threaded insert 84 is T-shaped with a rectangular head portion 86 that fits into the slotted portion 82 of one of lugs 80. Insert 84 is also provided with a central cylindrical stem 88 having a threaded aperture 90. Likewise, as best seen on figures 4 and 4a, rear pedestal 36 has a centrally located slotted lug 92 shaped for receiving and holding a threaded rear insert 94, with a threaded aperture 96, the rear insert 94 being the same size and shaped as those previously described and shown at 84. Inserts 84, 94 can be made of a light material such as, but not limited to, aluminum, magnesium, ceramic, carbon-ceramic or aluminum-ceramic.

[0024] Ice skate 10 also comprises two front removable connectors 98. Connector 98 has a head portion 100 and a threaded portion 102 at its distant end. Connector 98 extends through aperture 74 of crossbar 72 and through aperture 66 of sole portion 44 and engages into threaded insert 84 for thereby connecting skate boot 12 to front pedestal 34 or runner holder 14 at the front thereof. As best seen on figure 3a, counterbore aperture 74 of the crossbar 72 allows head portion 100 of front removable connectors 98 to be substantially sunk into crossbar 74 while front depression or recess 64 is shaped to enclose entirely crossbar 72. Likewise, a rear removable connector 104 with a head portion 106 and a threaded portion 108 at its distant end extends through aperture 78 of counterbore washer or disk 76 and through aperture 70 of sole portion 44 and engages into rear insert 94 for thereby connecting skate boot 12 to rear pedestal 36 or runner holder 14 at the rear thereof. As best seen on figure 4a, aperture 78 of counterbore disk or washer 76 allows head portion 106 of rear connector 104 to be substantially sunk into counterbore disk or washer 76 while rear recess 68 is shaped to enclose entirely counterbore washer 76.

[0025] It is understood that head portions 100 and 106 have means such as a slotted head for engagement with a screwdriver or any other appropriate tool for rotating same relative to a vertical axis either for removing connectors 98 and 104 or for tightening them into a position of engagement. It is also understood that head portions 100 and 106 are only accessible from the inside of skate boot 12 which thus eliminates use of rivets or any other exterior affixing component for connecting the skate boot to the runner holder.

[0026] It is also understood that the ice skate may comprise skate boot to which an outsole may be attached, such outsole comprising front and rear recesses; or a skate boot having an inner sole with front and rear recesses. Naturally, the skate boot, the outsole and/or the inner sole will comprise the appropriate aperture. In this regard, Figure 7 illustrates an ice skate 110 constructed in accordance with a first variant. The ice skate 110 comprises a skate boot 112 having an outsole 114 attached to its bottom. The outsole 114 comprises at the front a transversely extended depression or recess 116 and through the bottom of which there are two spaced apart apertures 118. At the rear of outsole 114, there is a central aperture 122 in a depression or recess 120. Ice skate 110 further comprises a crossbar 124 shaped to fit closely into front recess 116 and to be inserted therein. Crossbar 124 has two counterbore apertures 126 transversely spaced apart relative to its median vertical plane. A counterbore washer or disk 128 shaped to fit closely into rear recess 120 is inserted therein, the washer 128 having an aperture 130. Connectors similar to those described and shown at 98 and 104 and inserts similar to those described and shown at 84 and 94 may thus be used to connect the skate boot 112 to the runner holder 14. Furthermore, crossbar constructions similar to the one described and shown at 72 can be used to

allow different runner alignments.

[0027] Figure 8 illustrates an ice skate 210 constructed in accordance with a second variant. The ice skate 210 comprises a skate boot 212 having an inner sole 214. The inner sole 214 comprises at the front a transversely extended depression or recess 216 and through the bottom of which there are two spaced apart apertures 218. At the rear of inner sole 214, there is a central aperture 222 in a depression or recess 220. Ice skate 210 further comprises a crossbar 224 shaped to fit closely into front recess 216 and to be inserted therein. Crossbar 224 has two counterbore apertures 226 transversely spaced apart relative to its median vertical plane. A counterbore washer or disk 228 shaped to fit closely into rear recess 220 is inserted therein, the washer 228 having an aperture 230. An outsole 232 is attached to the bottom of skate boot 212, the outsole 232 having respective front and rear apertures 234 and 236 at the front and the rear thereof. Connectors similar to those described and shown at 98 and 104 and inserts similar to those described and shown at 84 and 94 may thus be used to connect the skate boot 112 to the runner holder 14. Furthermore, crossbar constructions similar to the one described and shown at 72 can be used to allow different runner alignments.

[0028] The above description of preferred embodiments should not be interpreted in a limiting manner since other variations, modifications and refinements are possible within the spirit and scope of the present invention. The scope of the invention is defined in the appended claims and their equivalents.

Claims

1. An ice skate (10, 110, 210) including a skate boot (12, 112, 212) and a ground engaging runner holder (14) supporting said skate boot and fastened thereto, said ice skate being characterized in that it includes a sole portion (44) which has a first aperture (70, 122, 222) in the heel area thereof and two transversely spaced apart apertures (66, 126, 226) in the toe area thereof; and
said ice skate being further characterized in that it includes two front removable connectors (98) extending through said two transversely spaced apart apertures towards said runner holder for connecting said skate boot to the front portion of said runner holder; and a rear removable connector (104) extending through said first aperture towards said runner holder for connecting said skate boot to the rear portion of said runner holder said front and rear connectors being accessible only from the inside of said skate boot.

2. An ice skate as defined in claim 1, wherein the sole portion of said skate boot has a front recess (64, 116, 216) extending between and around the two transversely spaced apart apertures; said ice skate further including a crossbar (72, 124, 224) closely fitting into said front recess and having two spaced apart apertures (74, 126, 226), one at each end of said crossbar through which said two front removable connectors extend.

3. An ice skate as defined in claim 1 or 2, wherein one of said two spaced apart apertures is closer to the median transverse plane of said crossbar than the other; and said crossbar being shaped so as to fit closely into said front recess in either of two opposite transverse positions wherein, in a first position, the longitudinal median vertical plane of said runner holder defines a first angular relationship with the longitudinal median vertical plane of said skate boot, and in a second position, the longitudinal median vertical plane of said runner holder defines a second angular relationship with the longitudinal median vertical plane of said skate boot.

4. An ice skate as defined in any one of claims 1 to 3, wherein the width of each of said two transversely spaced apart apertures through said sole portion is sufficiently greater than that of said front removable connectors for allowing mounting of said crossbar in either of said two opposite transverse positions.

5. An ice skate as defined in any one of claims 1 to 4, wherein said sole portion has a rear recess (68, 120, 220) extending around said first aperture; said ice skate further including a rear counterbore washer (76, 128, 228) having an aperture (78, 130, 230) and being closely fitted into said rear recess; and said rear removable connector extending through the aperture of said counterbore washer and through the aperture of said rear recess.

6. An ice skate as defined in any one of claims 1 to 5, wherein said runner holder comprises two transversely spaced apart front aperture anchoring portions adapted to be engaged by said front removable connectors; and a rear aperture anchoring portion adapted to be engaged by said rear removable connector.

7. An ice skate as defined in any one of claims 1 to 6, wherein said runner holder has a front pedestal (34), a rear pedestal (36) and a bridge portion (38) connecting front and rear pedestals; said front pedestal having two transversely spaced apart retaining lugs (80), each of said lugs being shaped for receiving and holding against rotation a threaded insert (84); said rear pedestal having a centrally located retaining lug (92) shaped for receiving and holding against rotation a threaded insert (94); and each distal end of said removable connectors having a threaded portion engaging into said threaded

insert.

8. An ice skate as defined in any one of claims 1 to 7, wherein said sole portion is integrally formed within a shell (42) substantially enclosing at least portions of the bottom and lateral areas of a wearer's foot.

9. An ice skate as defined in any one of claims 1 to 8, wherein said threaded inserts are made of a light material.

10. An ice skate as defined in any one of daims 1 to 9, wherein the two spaced apart apertures of said crossbar are counterbore apertures for allowing each head of said front removable connectors to be substantially sunk therein; and wherein said front recess being shaped so as to enclose said crossbar.

11. An ice skate as defined in any one of claims 1 to 10, wherein said ice skate further comprises front and rear gaskets (54, 56) located between said sole portion and said front and rear pedestals respectively.

12. An ice skate as defined in any one of claims 1 to 11, wherein said front and rear gaskets are made of a resilient material.

13. An ice skate as defined in any one of claims 1 to 12, wherein said ice skate further comprises an outer cover (52) that encloses at least partially the outer side of said shell and extends underneath.

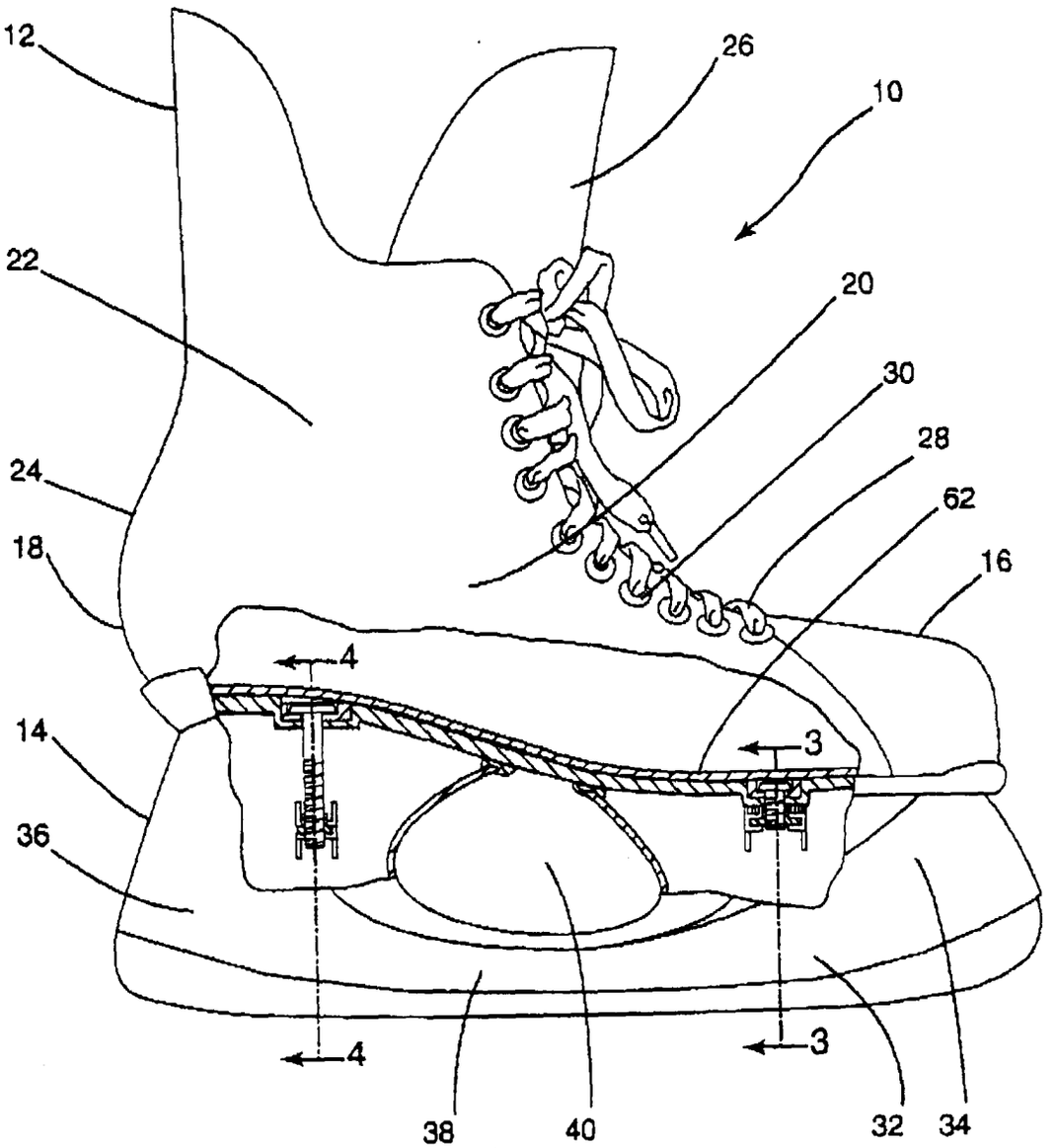

Fig.-1

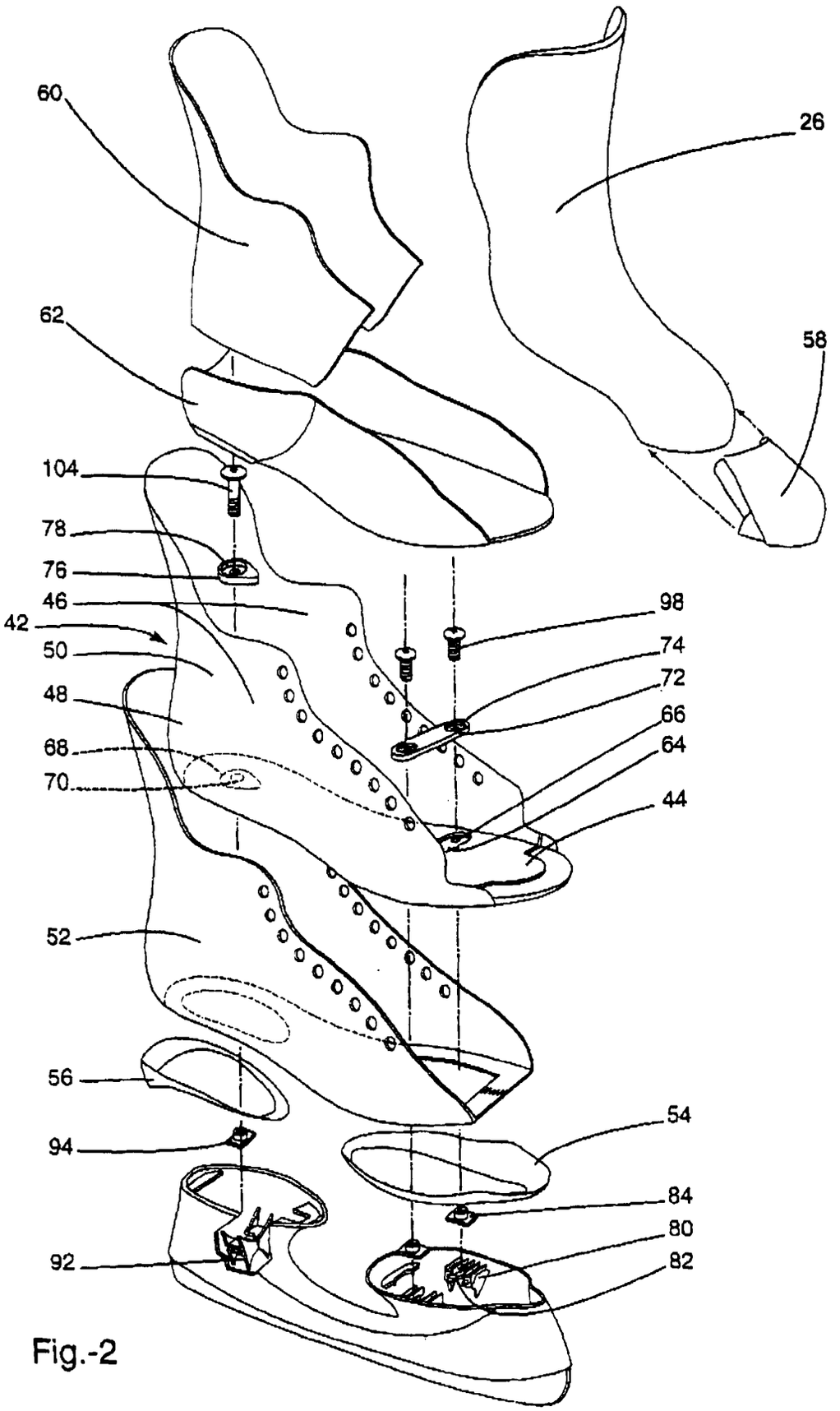
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Fig.-2

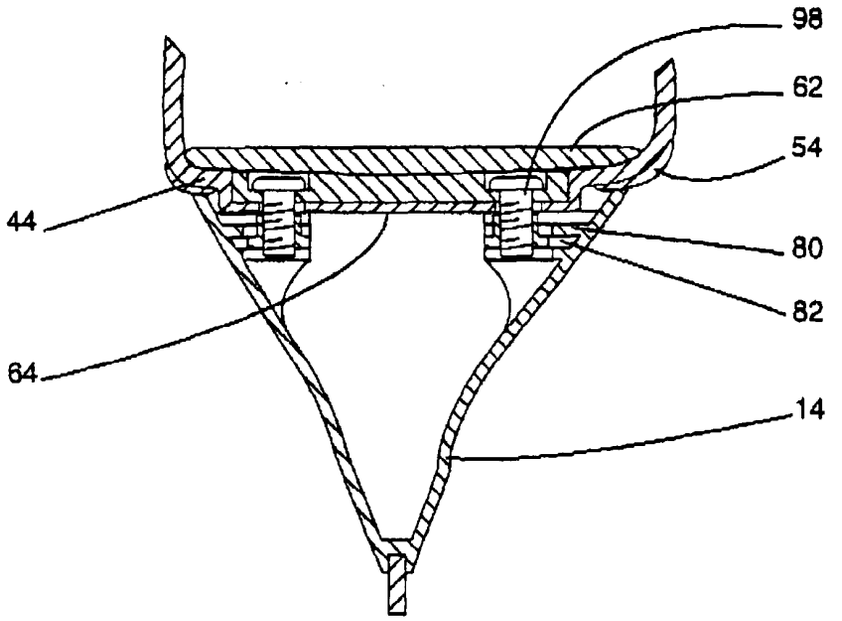
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Fig.-3

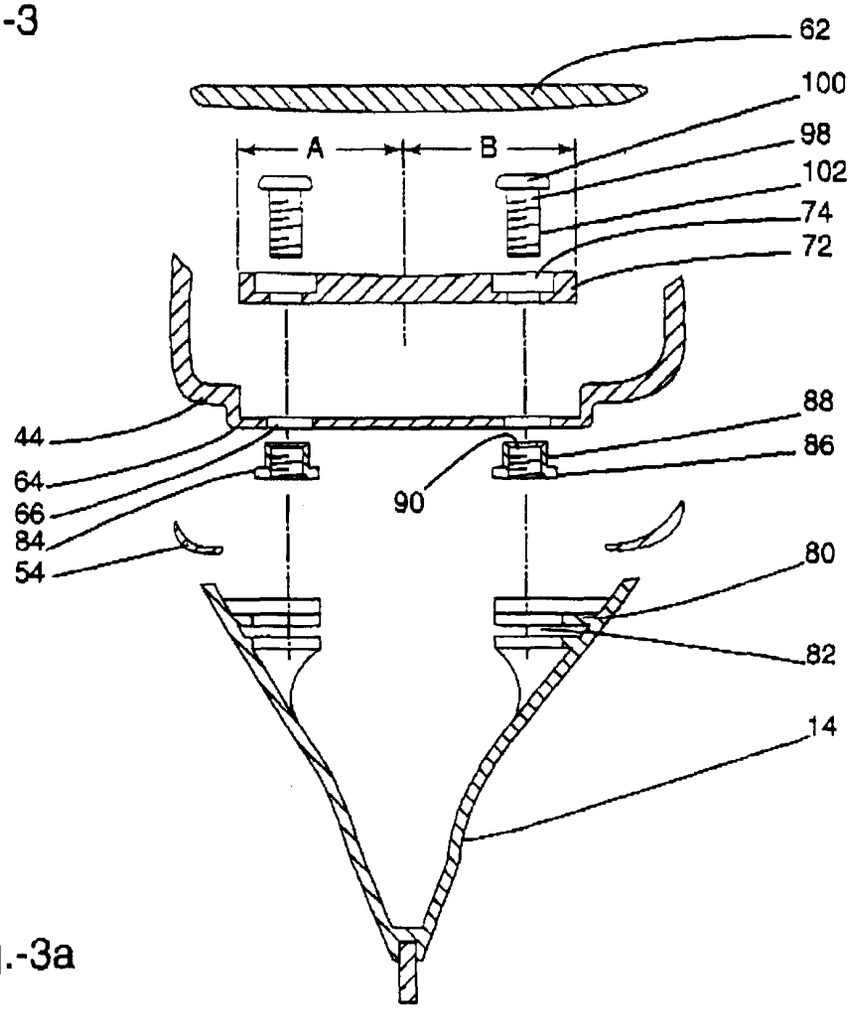
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Fig.-3a

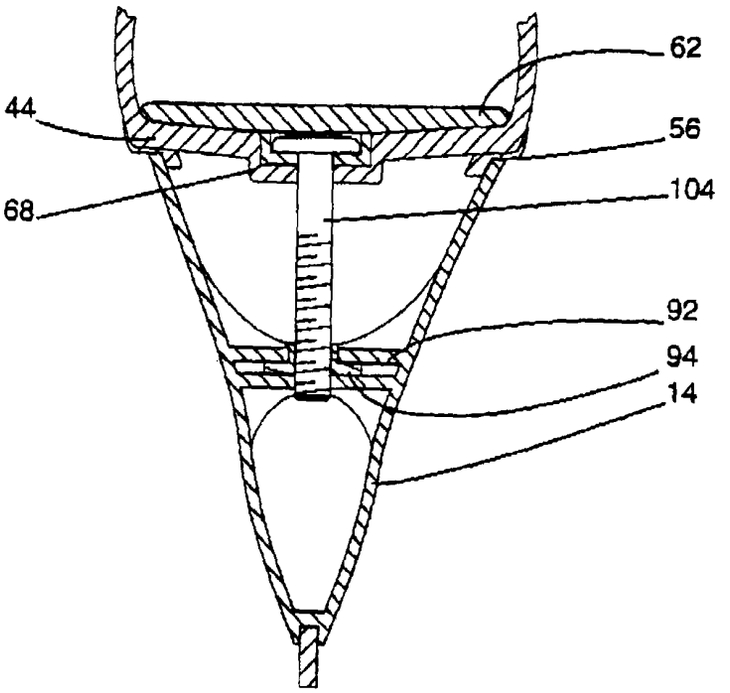

Fig.-4

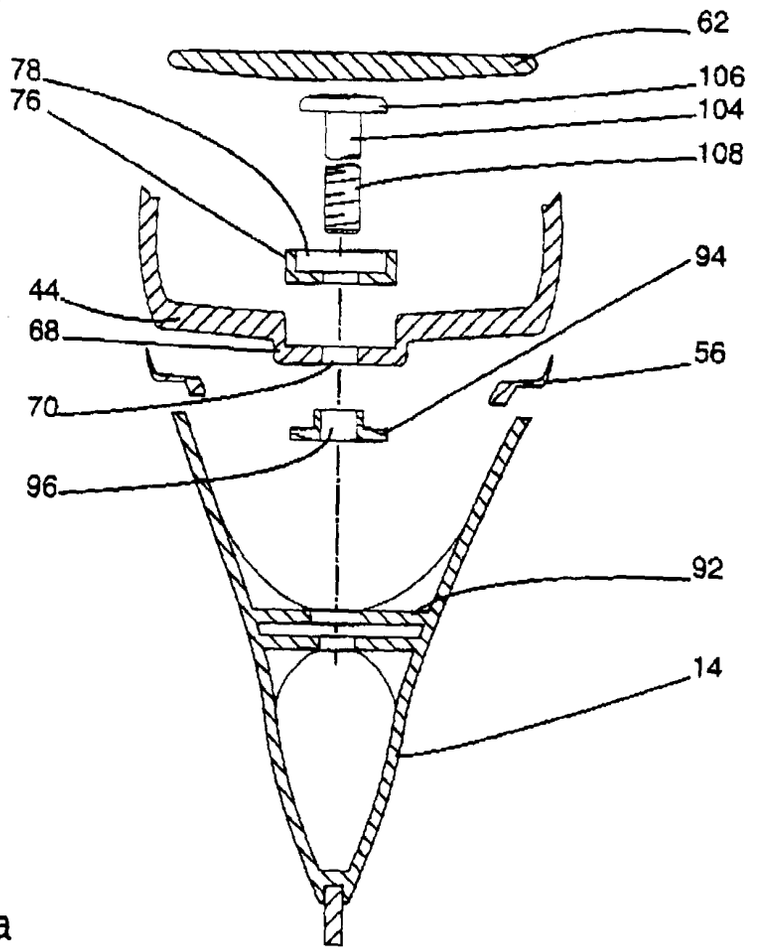

Fig.-4a

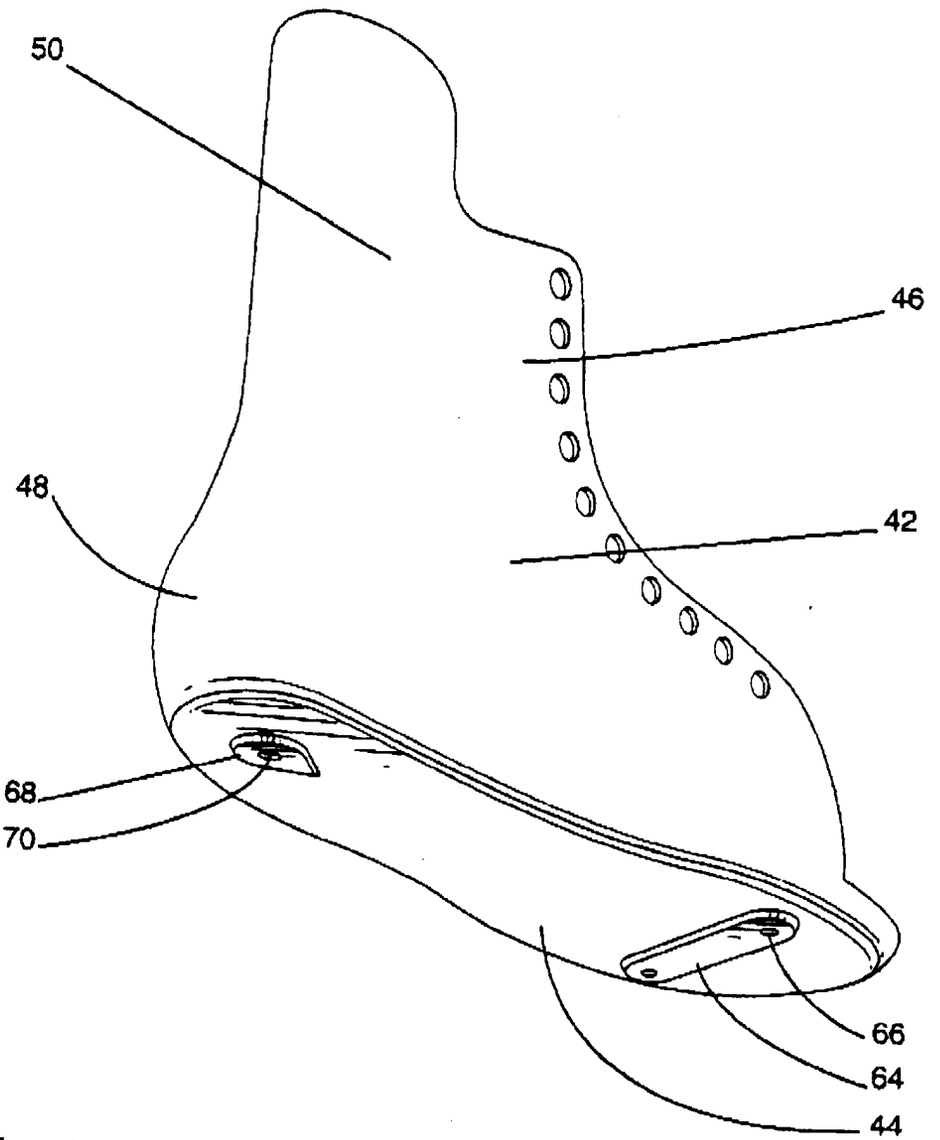

Fig.-5

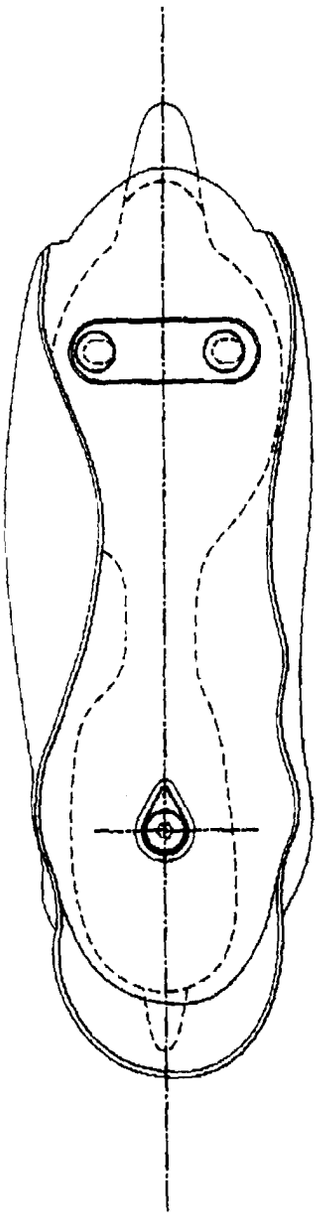

Fig.-6

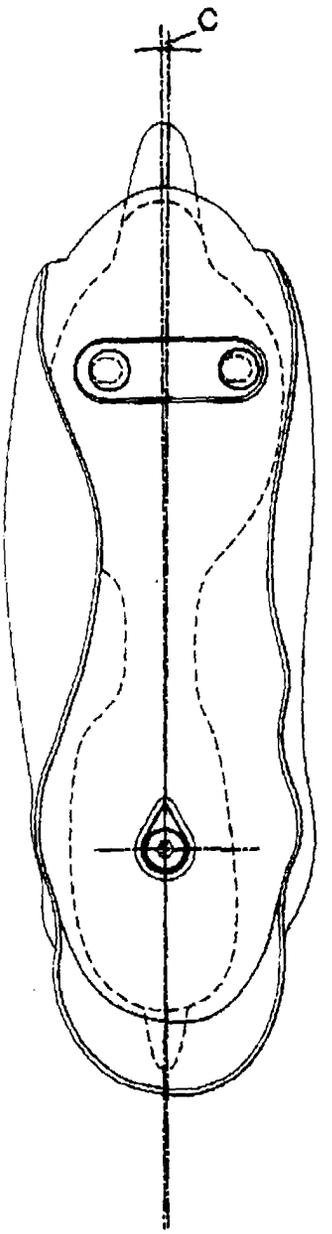

Fig.-6a

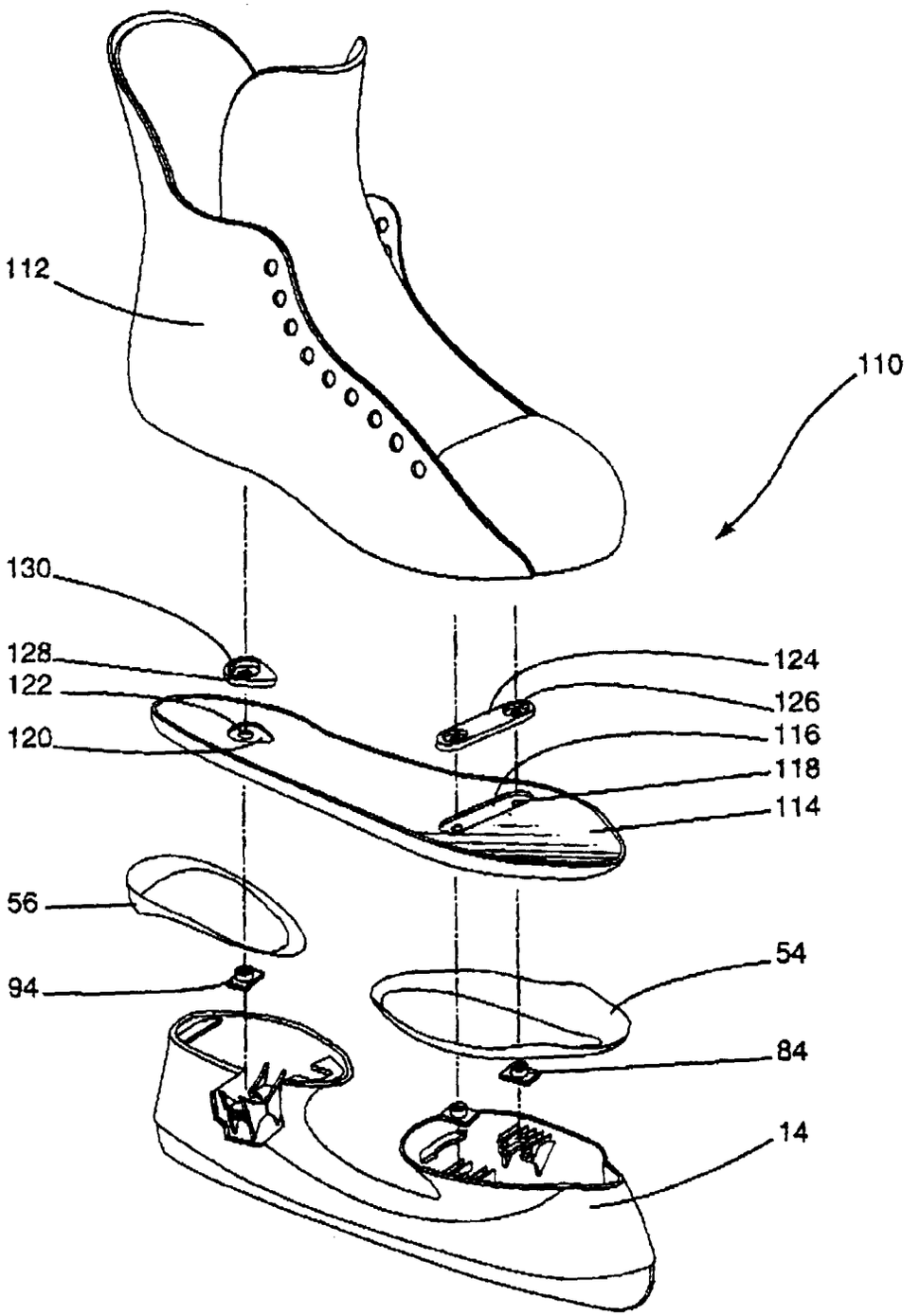

Fig.-7

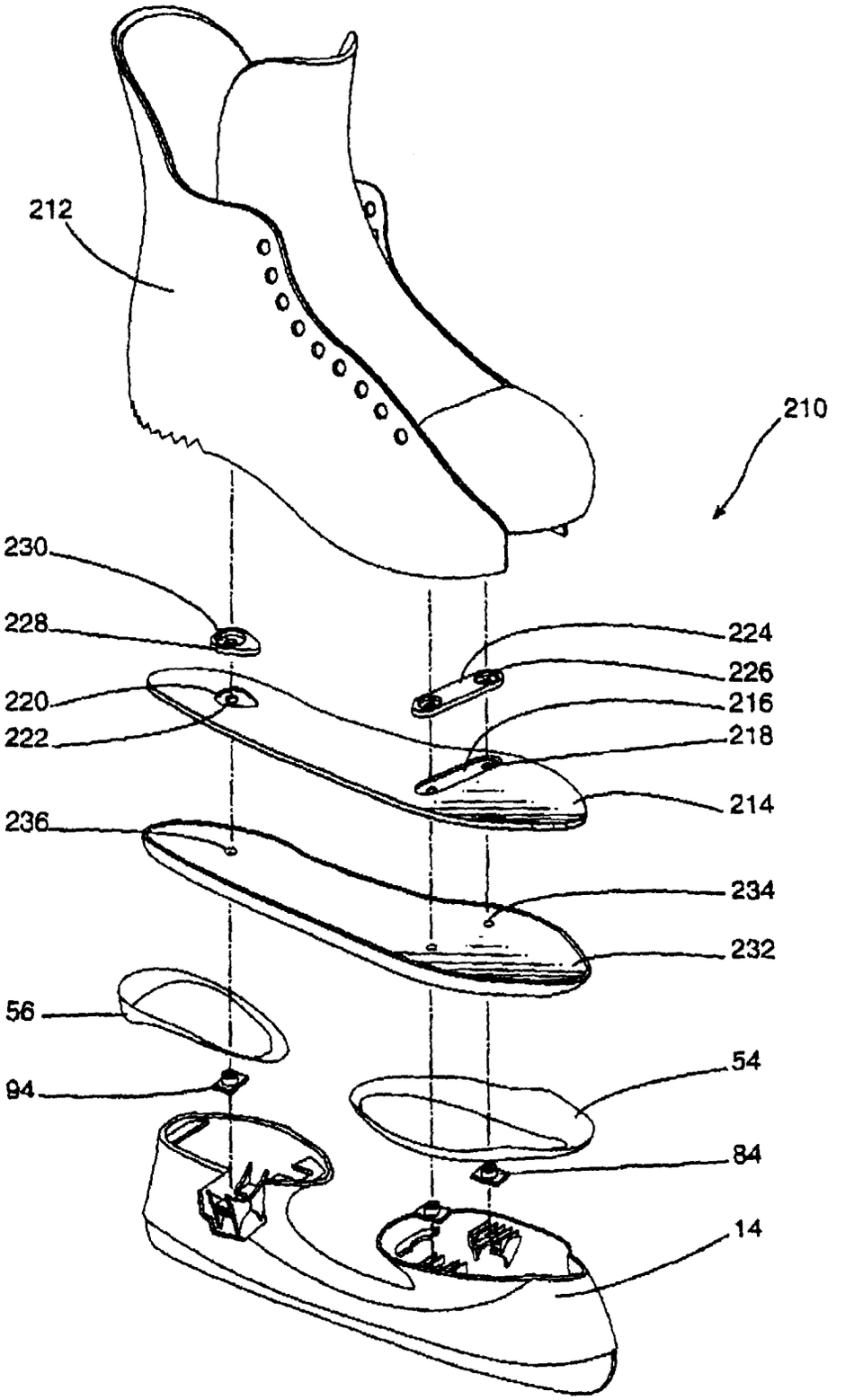
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Fig.-8

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 99 40 3242

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl7)
A	US 5 397 141 A (HOSHIZAKI) 14 March 1995 (1995-03-14) * column 2, line 46 - line 54; figure 2 *	1,2	A63C1/02
A	DE 31 32 993 A (KRIENBÜHL) 29 April 1982 (1982-04-29) * page 6, paragraph 5; figure 2 *	1	

TECHNICAL FIELDS SEARCHED (Int.Cl7)

A63C
A43B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	3 April 2000	Steegman, R

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 99 40 3242

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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03-04-2000

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82