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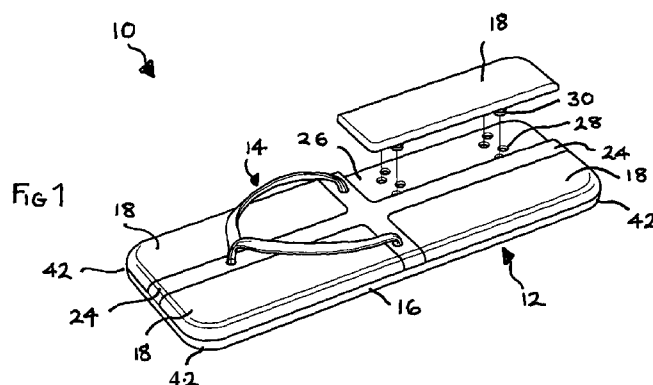
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(54) Title: RECONFIGURABLE MODULAR FOOTWEAR FOOTBED ASSEMBLIES



(57) Abstract: A modular footwear footbed assembly (12) has a base member (16) and a plurality of plug modules (18). The base member (16) is provided with a plurality of first engagement formations (28) by which the plug modules (18) can be releasably secured to the base member so that the footbed is reconfigurable by selectively positioning and securing the plug modules to the base member.



Reconfigurable Modular Footwear Footbed Assemblies

Field of the Invention

The invention relates to reconfigurable modular footwear footbed assemblies and particularly, but not exclusively to flips flops or sandals having a reconfigurable modular footbed assembly.

Background to the Invention

It is known to provide some customisation of footwear by embroidering a person's name on a shoe. The size and location of the motif is usually dictated by the manufacturer. Typically a customer has to order such a shoe especially and then wait some time for delivery. Similarly, customers may also select different coloured panels for a custom made shoe. Again, the shoe has to be especially ordered and there is a wait for delivery.

US2008/0060110 discloses accessorising a shoe that has an upper with pre-existing through-holes by fitting decorative badges to the upper. The badges have a shaft extending from their rear faces that is inserted into a through-hole in the shoe upper and a fastener that secures to the shaft from within the shoe. The badge does not become a part of the shoe and the proximity of the fastener to the upper part of the wearer's foot may make the shoe uncomfortable to wear.

The background discussion (including any potential prior art) is not to be taken as an admission of the common general knowledge.

Summary of the Invention

The invention provides a reconfigurable modular footwear footbed assembly comprising a base member and a plurality of plug modules, said base member being provided with a plurality of first engagement formations by which said plug modules can be releasably secured to said base member to form a footbed that is reconfigurable by selectively positioning and securing said plug modules to said base member.

The invention also includes a kit of parts for assembly into a reconfigurable modular footwear footbed assembly comprising a base member and a plurality of plug

modules, said base member being provided with a plurality of first engagement formations by which said plug modules can be releasably secured to said base member to form a footbed that is reconfigurable by selectively positioning and securing said plug modules to said base member.

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The invention also includes a method of assembling a reconfigurable modular footwear footbed assembly, said method comprising selectively releasably securing a plurality of plug modules to a base member to form a footwear footbed that is reconfigurable by releasing, repositioning and re-securing said plug modules to said

10 base member.

The invention also includes a reconfigurable modular footwear footbed assembly comprising a base member and at least one structural plug module required to stiffen said base member to prevent collapsing of said base member in use, said base member

15 being provided with at least one first engagement portion by which said at least one plug module can be releasably secured to said base member to form said footbed.

The invention also includes a modular footbed assembly for a flip flop or sandal, said footbed assembly comprising at least one pair of plug modules and a central spine

20 module, said plug modules each comprising a segment of the footbed and having a first attachment formation and said central spine module having a longitudinal axis and at least one pair of complementary second attachment formations disposed one on each side of said longitudinal axis to permit a said pair of modules to be connected to said central spine module. Each said pair of second formations may comprise a

25 plurality of openings or projections on each side of said longitudinal axis to permit said plug modules to be connected to said central spine module in a plurality of designated positions to permit foot-bearing faces of different size and/or shaped to be formed.

30 Brief Description of the Drawings

In order that the invention may be well understood, some examples thereof, which are given by way of example only, will now be described with reference to the drawings in which:

Figure 1 is a perspective view of a first example of an article of footwear having a reconfigurable modular footbed assembly;

5 Figure 2 is a plan view of the reconfigurable modular footbed assembly of Figure 1 in a different configuration;

Figure 3 is a perspective view of the footwear of Figure 1 with the reconfigurable modular footbed assembly in the configuration shown in Figure 2;

10 Figure 4 is a plan view of another reconfigurable modular footbed assembly;

Figure 5 is a section on line V-V in Figure 4;

15 Figure 6 is a perspective view of a second example of an article of footwear having a reconfigurable modular footbed assembly;

Figure 7 is a section view on line II-VII in Figure 6;

20 Figure 8 is a perspective view of a third example of an article of footwear having a reconfigurable modular footbed assembly;

Figure 9 is a section view on line IX-1X in Figure 8;

25 Figure 10 is a perspective view of a fourth example of an article of footwear having a reconfigurable modular footbed assembly;

Figure 11 is a section on line XI-XI in Figure 10;

30 Figure 12 is a perspective view of a fifth example of an article of footwear having a reconfigurable modular footbed assembly;

Figure 13 is a perspective view of yet another reconfigurable modular footbed assembly;

Figure 14 is a perspective view of still another reconfigurable modular footwear footbed assembly;

Figure 15 is a section view on line XV-XV in Figure 14;

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Figure 16 is a perspective view of a further reconfigurable modular footbed assembly;

Figure 17 is a perspective view of a seventh article of footwear that has the reconfigurable modular footbed assembly of Figure 16;

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Figure 18 is a section view on line XVIII-XVIII in Figure 17;

Figure 19 is a scrap section view corresponding Figure 18 showing an alternative plug module configuration;

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Figure 20 is a perspective view of an underside of a pair of reconfigurable modular footwear footbed assemblies;

Figure 21 is a scrap section view on line XXI-XXI in Figure 20; and

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Figure 22 is a perspective view on an upper side of the reconfigurable modular footwear footbed assemblies of Figure 20.

Detailed Description of the Illustrated Examples

25 Referring to Figures 1 to 3, an article of footwear in the form of a flip flop 10 (or thong as such footwear is known in some countries) comprises a reconfigurable modular footbed assembly 12 and a strap system 14.

30 The reconfigurable modular footbed assembly 12 comprises a base member 16 and a plurality of plug modules 18 that are releasably securable to the base member. The base member 18 has a first major face (foot-bearing face) 20 that in use is engaged by a wearer's foot and a second major face (ground-engaging face) 22 that in use engages the ground. Although not essential, in this example the base member 16 is generally rectangular in plan view with radiussed corners. The base member is

provided with a two ridges forming a cruciform land 24 that defines four recesses 26 disposed at the corner regions of the base member. Although not essential, in this example the recesses 26 are generally rectangular in plan view. The plug modules 18 are shaped to fit in and at least substantially fill the recesses 26. In the illustrated
5 example there are four recesses 26 and a corresponding number of plug modules 18. It is to be understood that the base member 16 may be provided with a greater or lesser number of recesses 26 and a corresponding number of plug modules 18.

Each recess 26 is provided with a plurality of first engagement formations in the form
10 of stepped, multi-diameter, through-holes 28. Each through-hole 28 comprises a narrower diameter portion that extends from the base of the respective recess 26 towards the second major face 22 and a larger diameter portion that extends from the narrower diameter portion to the second major face. The plug modules 18 are provided with a plurality of second engagement formations in the form of stepped
15 spigots 30 that are engagable in the stepped through-holes 28 to releasably secure the plug modules to the base member 16. The stepped spigots 30 comprise a larger diameter retaining portion at their free ends and a narrower diameter stem connecting the retaining portion to the plug module 18. The narrower diameter portion of the through-holes 28 defines a restriction through which the retaining portion may be
20 snap-fitted into the larger diameter portion of the through holes.

The first and second engagement formations 28, 30 provide a push-fit securing system by which the plug modules 18 are releasably securable to the base member. At least one of the first and second engagement formations 28, 30 is resiliently deformable to
25 permit the snap-fitting of the retaining portions through the narrower diameter portions of the through holes 28. Sufficient resilient deformability may be obtained by selection of suitable materials, for example an elastomer, and suitable dimensioning of the parts 28, 30. To reduce the effort required to push the retaining portions through the restrictions, the retaining portions may be provided with
30 chamfers, tapered or given a dome shaped cross-section.

The plug modules 18 are each provided with two sets of two spigots 30. A leading end set of spigots 30 is provided at a leading end region of each plug module 18 and a trailing end set of spigots 30 is provided at the trailing end region of each plug

module. In this context, leading end means the end closest to the toe end of the footbed assembly 12 and trailing end means the end closest to the heel end of the footbed assembly.

5 Referring to Figure 2, each set of through-holes 28 comprises a first pair 28(1) of through-holes and a second pair 28(2) of through holes. The pairs 28(1), 28(2) of through-holes are disposed on respective imaginary lines extending perpendicular to a longitudinally extending centreline 40 of the footbed assembly. The second pairs 28(2) of through-holes are laterally offset from the first pairs 28(1) of through-holes
10 and are closer to the corner 42 of the base member 16 of the respective recesses 26 in which they are provided. The lateral offset of the second pairs 28(2) of through-holes is such that their through-holes are disposed further from the centreline 40 than the through-holes of the first pairs of through-holes 28(1). The arrangement of the sets of through-holes 28 allows the securing of a plug module 18 in a recess 26 in one of
15 two positions. If the spigots 30 are engaged with the through-holes 28 of the pairs 28(1) the plug modules 18 are secured in a first position that is shown in Figure 1. When in the first position the plug modules 18 substantially fill the recesses 26 to provide a foot-bearing face having a substantially continuous surface. If the spigots 30 are engaged with the through-holes of the second pairs 28(2) the plug modules 18
20 are secured in a second position that is shown in Figures 2 and 3. Due to the lateral offset of the pairs 28(2) of through-holes the plug modules 18 are spaced from the opposing sides of the land 24 to leave a gap 42 and the outer edges 44, 46 of the plug modules 18 overhang the periphery of the base member 16. The result is that the effective area of the foot-bearing face is increased as compared with the configuration
25 shown in Figure 1, but it does not comprise a continuous surface.

As shown in Figures 1 to 3, the strap system 14 comprises a generally Y-shaped member 54 that is secured to the base member 16 at three locations on the land 24. The Y-shaped member 54 may be secured to the base member 16 by any suitable
30 known technique and may, for example, be secured using an arrangement of stepped diameter formations similar to the through-holes 28 and spigots 30.

As illustrated by Figures 1 to 3, the footbed assembly 12 is reconfigurable by selectively securing the plug modules 18 in one of two positions in the recesses 26.

- This allows the effective area of the foot-bearing face to be varied. Figures 2 and 3 show all four plug modules 18 secured in their second positions in the recesses 26. However, a particular wearer may decide to only have the plug modules 18 at the leading end of the footbed assembly or the plug modules at the trailing end of the footbed assembly in their second positions and have the other two plug modules in their first positions. Similarly, a wearer may decide to have the plug modules 18 on just one side of the footbed assembly in their second positions with the plug modules on the other side in their first positions. Thus a wearer may reconfigure the footbed assembly 12 in one of several configurations according to their desire. One possibility this provides is that the effective area of the foot-bearing face may be increased to take account of growth of a wearer's feet. Another possibility is to make the effective area of the foot-bearing faces of a pair of footbed assemblies 12 with different sizes thus providing customised asymmetric footwear.
- 15 The footbed assembly 12 may be further reconfigurable by providing differences between the plug modules 18. For example, the plug modules 18 may have different colours, carry different forms of ornamentation, have varying surface textures (for example smooth and dimpled or ribbed) and/or different cross-section profiles. Thus by swapping the positions of the diametrically opposed plug modules, the look and/or feel of the footbed assembly can be reconfigured according to the wishes of the wearer. Further choice may be provided by having more than four plug modules 18 with an increased variety of colours, ornamentation, surface configuration or cross-section profile.
- 25 The possible choice of configuration of the footbed assembly 12 shown in Figures 1 to 3 is limited by the different size radiuses of inner corners of the recesses 26 defined by the land 24 and the corners 42 of the base member 16, which only allow the plug modules to be secured to the base member in two of the four recesses (that is the plug modules are 'handed'). By making the radiuses equal or making the corners square, for example, the plug modules 18 can be configured so that they can be secured in each recess 26 to provide more choice for the wearer.
- 30

Figures 4 and 5 show another reconfigurable modular footbed assembly 112. Features of the footbed assembly 112 similar to or the same as features of the footbed

assembly 12 are indicated by the same reference numeral incremented by 100 and may not be described in detail again.

5 The base member 118 has oppositely disposed ribs 116(1), 116(2) projecting from a generally planar central portion. The ribs 116(1), 116(2) extend in a lengthways direction of the base member over at least the majority of its length giving the base member a generally cruciform cross section that can be seen in Figure 5. The ribs 116(1), 116(2) also define a centreline that divides the base member into two side portions, or wings 116(3), 116(4). Although not essential, in the illustrated example 10 the ribs 116(1), 116(2) curve slightly as they approach the toe end 121 of the footbed assembly 112.

As best seen in Figure 5, the base member 116 is provided with first engagement formations in the form of stepped through-holes 128. The through-holes 128 are 15 provided in sets of four. The four through-holes in each set extend in a line transverse to the rib 116(2) with two through-holes on each side of the rib.

The plug modules 118 are bodies having a opposed generally parallel foot-bearing and ground engaging surfaces 118(1), 118(2) surfaces and an inclined side surface 20 118(3). Each plug module 118 bodies define a pocket, or recess 118(4) to receive a portion of a wing 116(3), 116(4) of the base member 116. The plug modules are provided with second engagement formations in the form of two stepped spigots 130 that are disposed within the pockets 116(4). The spigots 130 extend generally perpendicular to the surfaces 118(1), 118(2) and away from the surface 118(2). The 25 through-holes 128 and spigots 130 form a push-fit securing system to releasably secure the plug modules 118 to the base member 116.

In Figure 5 two push-fit modules 118 are shown secured to the base member 116 with both spigots 130 secured in respective ones of the set of through-holes 128. This 30 constitutes a first secured position of the plug modules 118. Alternatively, one or both plug modules may be secured to the base member by having its laterally innermost spigot 130 engaged in the laterally outermost through-hole of the wing 116(3), 116(4) to which it is secured. This constitutes a second secured position of the plug modules 118. When in the second secured position, the laterally outermost

spigot 130 and laterally innermost through-hole 128 are not used. By selecting between the first and second secured positions the wearer can provide a relatively narrower footbed assembly 112 (first secured position) or a relatively wider footbed assembly 112 (second secured position).

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The respective pairs of plug modules 118 at the heel and toe ends of the footbed assembly are also releasably securable to the base member 116 by means of a spigot and through-hole push-fit securing system. In the illustrated example the two through-holes for the heel and toe end plug modules are arranged in-line on lines
10 extending transverse to the lines on which the through-holes for the other plug modules are disposed. In the same way as the other plug modules, the plug modules at the heel and toe ends can be secured to base member by means of both or just one of their spigots. However, instead of changing the width of the footbed assembly 112, this change alters the length. Specifically, the footbed assembly is relatively shorter
15 when in the plug modules are in their first secured positions (both spigots engaging in the through holes) and is relatively longer when the plug modules are in their second secured position (only one spigot engaging a through-hole).

The footbed assembly 112 is thus reconfigurable in a variety of widths and lengths.
20 The footbed assembly 12 may be further reconfigurable by providing differences colour, forms of ornamentation, surface texture (for example smooth and dimpled or ribbed) and/or cross-section profiles of the plug modules.

It is to be understood that it is not essential for the sides 118(3) of the plug modules to
25 be inclined as in the illustrated example. However, having the sides upwardly inclined as shown assists in making features of ornamentation provided on the sides of the plug modules visible.

The footbed assembly 112 comprises several plug modules 118 that can only be fitted
30 to one set of through-holes on the base member 116. This applies to the plug modules 118 at the heel and toe ends of the base member, which are all handed. Also there are two plug modules 118 that have notches 131. These two plug modules are fitted adjacent respective openings 125 that are provided for securing a Y-shaped strap system to the footbed assembly 112 (A third such opening is provided adjacent the toe

- end 121 adjacent the leading end of the rib 116(2)). In order to provide greater choice in reconfiguring the footbed assembly it may be desirable to provide duplicate handed plug modules having different colours, ornamentation, texture and/or cross-section profile. Alternatively, the base member 116 and plug modules 118 may all be made rectangular in plan view with all of the plug modules having the same dimensions so that any one plug module can be located at any available plug module position on the base member. This would entail having spaces between the plug members adjacent the openings 125 provided for the Y-shaped strap system.
- 10 Figures 6 and 7 show an article of footwear in the form of a flip flop 210 comprising a reconfigurable modular footbed assembly 212 and a strap system 214. Features of the flip flop 210 similar to or the same as features of the flip flop 10 are indicated by the same reference numeral incremented by 200 and may not be described in detail again.
- 15 The base member 216 is generally rectangular with radiussed corners and a raised section, or heel support, 224 at the heel end 219 that defines a single recess 226 extending from the heel support to the toe end 221 of the footbed assembly. The strap system 214 comprises a Y-shaped member 254 secured to the recessed portion of the base member.
- 20 The footbed assembly 212 is fitted with eight plug modules 218. The base member 216 is provided with eight first engagement formations in the form of stepped holes 228 and the plug modules 218 are provided with respective second engagement formations in the form of stepped spigots 230 that are engagable in the through holes 228 to releasably secure the plug modules to the base member. Although not essential, as shown in Figure 7, in this example the first engagement formations are blind holes 228, rather than through-holes.
- 25 The plug modules 218 are generally rectangular in plan view with notches 231 provided in opposed ends thereof. The notches 231 allow the plug modules to fit around the ends of the Y-shaped member 254.
- 30 The plug modules 218 may be made in different colours, be provided with different ornamentation or surface textures and/or have different cross-section profiles. The

releasable securing of the plug modules 218 to the base member 216 allows the plug modules 218 to be selectively positioned on the base member 216 so that a wearer can configure and/or reconfigure the footbed assembly 212 as desired.

5 In the illustrated example, the provision of the notches 231 allows each plug module to be positioned at any position in the recess 226 in close proximity so that there is little discontinuity in the foot-bearing surface provided by the footbed assembly. It is not essential that all of the plug modules have notches 231 or that there are notches 231 at opposite ends of the plug modules. The plug modules 218 may be made
10 smaller than shown in Figure 6 so that when they are secured to the base member there is sufficient space between them to allow the Y-shaped member 254 to engage the base member. However, this would produce greater discontinuity in the foot-bearing face, which may be considered undesirable. Further alternatives would be to have a notch 231 at just one end of each plug module 218 or to have just two plug
15 modules provided with notches 231. It is simply necessary to allow the ends of the Y-shaped member 254 to engage the base member 216 without affecting the removability of the plug modules.

Although not shown, the base member 216 may be provided with a greater number of
20 holes 228 arranged such that the plug modules 218 can be releasably secured to the base member in the configuration shown in Figure 6 or such that at least some of the plug modules 218 extend beyond the edges of the base member 218. This would allow a wearer to reconfigure the footbed assembly 212 so as to effectively increase the area of the foot-bearing surface.

25 Figures 8 and 9 show an article of footwear in the form of a flip flop 310 comprising a reconfigurable modular footbed assembly 312 and a strap system 314. Features of the flip flop 310 similar to or the same as features of the flip flop 10 are indicated by the same reference numeral incremented by 300 and may not be described in detail again.

30 In this example, the reconfigurable modular footbed assembly 312 comprises a generally planar base member 316 and a plurality of plug modules 318 releasably secured to the base member. The base member 316 is generally rectangular in plan view but has scalloped, or undulating, sides. Although not essential, the plug modules

318 are circular in plan view and the base member 316 is provided with respective circular pads 321 that form seats for the plug modules. The pads 321 are arranged to complement the profiles of the projecting portions of the scalloped sides.

- 5 The push-fit securing system by which the plug modules 318 are releasably secured to the base member 316 differs from the push-fit securing systems of the flip flops 10, 210 in that the first engagement formations are spigots 328 provided on the base member and the second engagement formations are blind holes 330 provided in the plug modules 318. It is to be understood that in the same way as in the flip flops 10,
10 210, the first engagement formations of the flip flop 310 could also be spigots and the second engagement formations could be blind holes or through-holes.

The arrangement of the plug modules 318 is such as to provide a foot-bearing surface that has greater discontinuity than the foot-bearing surfaces of the flip flops 10, 210.

- 15 Some wearers may find this unattractive. However, by giving the plug modules 318 a domed cross-section profile, it is possible to provide a foot-bearing surface that is not uncomfortable and may provide a massage effect when the wearer is walking.

- In the same way as the flip flops 10, 210, the plug modules 318 may be made in
20 different colours or provided with different ornamentation, surface texture or cross-section profile so that by selective repositioning and/or substitution of the plug modules the footbed assembly 312 can be reconfigured as desired.

- Figures 10 and 11 show an article of footwear in the form of a flip flop 410
25 comprising a reconfigurable modular footbed assembly 412 and a strap system 414. Features of the flip flop 410 similar to or the same as features of the flip flop 10 are indicated by the same reference numeral incremented by 400 and may not be described in detail again.

- 30 The reconfigurable modular footbed assembly 412 comprises a base member 416 and a plurality of plug modules 418. The base member 416 is provided with a plurality of recesses 426 in its underside and a plurality of first engagement formations in the form of stepped through-holes 428. The recesses 426 define gaps in the side surface

423 and under-surface of the base member 416 that are filled by the plug modules 418.

5 The plug modules 418 comprise a generally planar base 425, a side member 427 at one end of the base and a second engagement formation in the form of a stepped spigot 430 at the opposite end of the base. The plug modules 418 are configured such than when secured to the base member 416 the side members 427 fill the gaps in the sides 423 of the base member. The spigots 430 of the plug modules are provided with badges 431 on their free ends. The badges 431 may be made in different shapes as
10 shown in Figure 10 or may simply be provided with different ornamentation, colour, texture or cross-section profile. Similarly the side members 427 may be made in different colours or provided with different ornamentation or texture. In the illustrated example the side members 427 are curved to match the curvature of the undulating sides 423 of the base member 416 so that when the plug modules 418 are
15 assembled to the base member a substantially continuous scalloped side is formed. This is not essential and instead, for example, the sides 423 of the base member 416 and side members may be flat.

The plug modules 418 are releasably securable to the base member 418 by means of
20 the push-fit securing system defined by the through-holes 428 and spigots 430. By selective repositioning of the plug modules 418 a wearer can reconfigure the footbed assembly 412. If desired, the side members 427 may be made the same colour as the side 423 of the base member 418 or provided with the same ornamentation or texture as the side 423 so that the changed appearance obtained by reconfiguring the footbed
25 assembly 412 derives from the colour, ornamentation, shape, texture and/or cross-section profile of the badges 431. Alternatively, the badges 431 may have the same colour, ornamentation or texture as the base member 416 so that the changed appearance is the product of differences in the colour, ornamentation, texture and/or cross-section profile of the side members 427.

30

In the illustrated example, the badges 431 project from the plane of the foot-bearing face defined by the base member 418. This is not essential and instead the plug modules 418 may be provided with spigots 430 that fit substantially flush with the plane of the foot-bearing face.

Figure 12 shows an article of footwear in the form of a boot 510 with a reconfigurable modular footbed assembly 512 and an upper 514. Features of the footbed assembly 512 similar to or the same as features of the footbed assembly 12 are indicated by the
5 same reference numeral incremented by 500 and may not be described in detail again.

In the illustrated example the upper 514 provides the article of footwear with a boot form. It is to be understood that the upper 514 may take many forms and may, for example, be configured to provide any desired form of shoe, sandal or the like.

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The reconfigurable footbed assembly 512 comprises a base member 516 and a plurality of plug modules 518 releasably securable to the base member. The base member 516 has a sidewall 523 provided with a plurality of shallow recesses 526. In the illustrated example the base member 516 is shown provided with an arch so as to
15 define a sole portion and a heel portion. However, this is not essential as the arch may be omitted so that the ground engaging face of the base member is substantially planar.

The plug modules 518 may comprise a plate-like member configured to fit in and at
20 least substantially fill the recesses 526. In this example the releasable push-fit securing system by which the plug modules 518 are releasably securable to the base member 516 comprises first engagement portions in the form of apertures 528 extending into the base member 516 from the recesses 526 and second engagement portions in the form of respective projections 530 provided on the inner faces of the plug
25 modules 518. The projections 530 fit in the apertures 528 in the manner of a key and may be provided with axially extending ribs 541 that fit in complementary grooves 543 defined by the apertures. As can be seen from Figure 12, the configuration of the projections 530 and their ribs 541 may take many forms. With reference to the plug module 518 that fits into the heel portion of the base member 516 it can be seen that it
30 is not essential that there is a recess 526 to receive the plug module and that instead of being in the form of a plate-like member, the plug module may comprise a plurality of badges 531 mounted directly on the second engagement formation (projection) 530.

The apertures 528 and/or projections 530 (and ribs 541 if provided) are made resiliently deformable to provide an interference fit that is sufficient to secure the plug modules 518 to the base member 516 such that the plug modules are held in place while the boot 510 is in use but allow a wearer to fit and remove the plug modules by a simple push-fitting operation that does not require tools or significant physical exertion.

The plug modules 518 may be made in different colours or provided with different ornamentation, surface texture or cross-section profile. By repositioning the plug modules 518, or fitting different plug modules to the recesses 524 of the sole portion of the base member 516, the wearer can configure and/or reconfigure the reconfigurable modular footbed assembly 512. It is to be understood that the apertures 528 in the sole portion of the base member 516 are shown having different shapes primarily for the purpose of illustrating that the aperture configuration is not limited to any one shape and that to provide the wearer with greater choice and flexibility of design, it is preferable that the apertures in the sole portion have the same shape so that the plug modules 518 are not limited to use with particular ones of the recesses 526. In this example the plug modules fitted to the sole portion of the base member are not suitable for fitting to the heel portion, which is configured to be fitted with just one plug module. However, it is still possible to provide the wearer with the possibility of reconfiguring the heel portion of the base member by providing a kit of parts comprising a plurality of plug modules configured to be fitted to the heel portion or providing a range of such plug modules at a point of sale.

Figure 13 illustrates a reconfigurable modular footbed assembly 612 comprising a planar base member 616 and a plurality of plug modules 618 releasably securable to the base member. Features of the footbed assembly 612 similar to or the same as features of the footbed assembly 12 are indicated by the same reference numeral incremented by 600 and may not be described in detail again.

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The base member 616 is provided with a plurality of first engagement formations in the form of holes 628 and the plug modules 618 are provided with second engagement formations in the form of projections 630. The holes 628 are arranged in a grid comprising parallel first rows of holes extending in the lengthways direction base

member and parallel second rows extending perpendicular to the first rows. The plug modules 618 are each provided with a plurality of the projections 630 spaced to correspond with the grid spacing of the holes 628. The number of projections 630 provided on a plug module 618 may be dependent on the size of the plug module. For example a plug module 618 may be provided with two or four projections 630 as shown in Figure 13. It may be preferable to provide larger plug modules 618 with sufficient projections 630 to be able to fit every hole 628 disposed beneath the plug module when fitted to the base member 616. However, this is not essential. For example, the plug modules 618 shown with four projections 630 may be provided with just two. In principle there may be just one projection. However, having more than one projection 630 will provide better security and prevent the plug modules 618 from rotating about the axis of the projections.

In the illustrated example the projections 630 are simple circular section pins and the holes 628 are simple circular section holes. It is to be understood that this is not essential and that stepped holes and stepped spigots as illustrated in the previous examples may be used instead. The holes 628 and projections 630 are made resiliently deformable so as to permit a desired interference when the plug modules 618 are fitted to the base member 616.

The plug modules 618 may comprise badges 631 as illustrated and/or comprise members having different colours, ornamentation, surface texture and/or cross-section profile. A wearer can configure the reconfigurable modular footbed assembly 612 by push-fitting plug modules 618 to the base member 616 in any desired configuration. For example, as shown the plug modules 618 may include modules of different thickness with arcuate top surfaces 618(2). By suitable selection of such plug modules 618 it would be possible to build up a foot-bearing face having customised contouring, for example to take account of a foot abnormality of the wearer.

Figures 14 and 15 illustrate a reconfigurable modular footbed assembly 712 comprising a planar base member 716 and a plurality of plug modules 718 releasably securable to the base member. Features of the footbed assembly similar to or the same as features of the footbed assembly 12 are indicated by the same reference numeral incremented by 700 and may not be described in detail again.

The reconfigurable modular footbed assembly 712 is similar to the reconfigurable modular footbed assembly 612. The main difference is that the first engagement formations provided on the base member 716 are projections, or stepped spigots, 728 having a domed or mushroom head and the second engagement formations provided on the plug modules 718 are multi-diameter openings 730 that can receive the spigots 728. The spigots 728 are arranged in a grid comprising parallel first rows of holes extending in the lengthways direction base member and parallel second rows extending perpendicular to the first rows. As illustrated by Figure 15, the openings 730 may be provided at any convenient location on the underside of the plug modules 730. For example, the openings 730 may be located off-centre as shown, provided that where multiple openings are provided the openings are spaced to correspond to the grid spacing of the spigots 728.

Depending on the shape and configuration of the plug modules 718 selected and the way in which they are fitted to the base member 716, a greater or lesser number of spigots 728 will be covered by a plug module. In some examples it may be desirable to make the spigots 728 relatively soft and/or shape their free ends in such a way as to avoid discomfort to a wearer if a significant number of spigots are left uncovered. For example, the spigots may be hemispherical with a flattened free end. The configuration of the spigots may be such that they give a pleasing massage effect to the wearer's foot.

The base member 716 is provided with three openings 725 (only two of which can be seen in Figure 14). The openings 725 are for use in securing a strap system (not shown) comprising a Y-shaped member to the base member 716. The Y-shaped member may be the same as the member 54 illustrated in Figure 3.

The plug modules 718 may comprise badges 731 as illustrated and/or comprise members having different colours, ornamentation, surface texture and/or cross-section profile. A wearer can assemble the configure and/or reconfigure the reconfigurable modular footbed assembly 712 by push-fitting plug modules 718 to the base member 716 in any desired configuration.

Figures 16 to 17 show an article of footwear in the form of a flip flop 810 comprising a reconfigurable modular footbed assembly 812 and a strap system 814. Features of the flip flop 810 similar to or the same as features of the flip flop 10 are indicated by the same reference numeral incremented by 800 and may not be described in detail again.

The base member 816 is a generally planar member provided with a plurality, in this example three, of recesses 824 in the foot-bearing face. Although not essential the recesses 824 are generally rectangular in plan view. The base member is provided with first engagement formations in the form of undercuts 828 (Figure 18) provided at opposite sides 827 of the recesses 824. The undercuts 828 extend along the entire length of two the sides 827.

As illustrated in Figure 16, the plug modules 818 are plate-like members that can bend to form an arch so as to reduce their width to less than the distance between the two sides 827. The plug modules 818 are made from a resiliently deformable material and can be snap-fitted into engagement with the undercuts 828 by inserting one edge 829 of the arched module into one undercut and then allowing the plug module to resile to its normal generally planar state and engage the other undercut. In this way the plug modules 818 are releasably securable to the base member 816 by trapping their edges 829 in the undercuts 828.

It is to be understood that while in the illustrated example the undercuts are configured to receive a complete edge 829 of the plug modules 818 this is not essential. For example the undercut may be configured to receive a tab projecting from an edge 829 in which case the undercut can be located and sized to just receive the tab.

The plug modules 818 may comprise messages 731 as illustrated and/or comprise members having different colours, ornamentation, surface texture and/or cross-section profile. A wearer can assemble the configure the reconfigurable modular footbed assembly 812 by push-fitting plug modules 818 to the base member 816 in any desired configuration and may reconfigure the footbed assembly by removing the

plugs modules and re-arranging the modules or fitting different plugs module to the base member as desired.

Figure 19 shows a modification to the form of the plug module 818, recess 824 and undercut 828. Instead of being substantially rectilinear, the plug module 818 is curved, having a generally elliptical cross-section. The recess 824 and undercuts 828 are curved so as to complement the shape of the plug module.

Figures 20 to 21 illustrate a reconfigurable modular footbed assembly 912 comprising a planar base member 916 and a plurality of plug modules 918 releasably securable to the base member. Features of the footbed assembly similar to or the same as features of the footbed assembly 12 are indicated by the same reference numeral incremented by 900 and may not be described in detail again.

The base member is shown with three stepped through-holes 925 to permit the fixing of a Y-shaped strap (not shown) to form a flip flop. However, other strapping systems can be employed to use the footbed assembly 912 to make a sandal or the like.

The base member 916 is provided with a plurality of first engagement portions in the form of a plurality of through-holes 928 that extend through the base member perpendicular to the plane of the base member. Although not essential, in the illustrated example the through-holes are arranged in a meandering line that extends between the toe and heel ends of the base member. As best seen in Figure 21, the through-holes 928 comprise respective circular recesses in the ground-engaging and foot-bearing faces of the base member and a narrower passage 929 (Figure 21) extending between the two recesses to define a restriction. The plug modules 918 each comprise a member that can be fitted into a through-hole 928 so as to at least substantially fill the through-hole and to that end the plug modules each comprise a narrower central section with circular flanges 927 at each end to fill the circular recesses. Although not essential, the passage 929 and central section of the plug modules are provided with respective flat surface portions 931, 933. The flat surface portions 931, 933 serve to prevent the plug modules from rotating in the through-holes 928 once fitted to the base member 916. The flat surface portions 931, 933 also

serve to orientate the plug modules 918, which, as described below, is desirable for some applications.

The through-holes 928 with their restrictions defined by the passages 929 and the flanges 927 of the plug modules 918 form a push-fit releasable securing system. The flanges 927 and/or portions of the base member that define the passages 929 are made sufficiently resilient to allow a flange to pass through a passage when a plug module 918 is push-fitted into the through-holes during fitting to and removal from the base member 916.

In the illustrated example, the flanges 927 of the plug modules are provided with projecting symbols 935. The symbols 935 project above the respective planes of the foot-bearing and ground-engaging faces of the base member 916. This provides the possibility of leaving imprints of messages, slogans, designs or the like formed by selected combinations of plug modules 918 as the wearer of an article of footwear comprising the footbed assembly 912 walks on, for example, sand. It will be understood that in cases in which a particular design, slogan or message is to be created, the complementary flat surface portions 931, 933 can assist in correctly orientating the symbols 935 and ensuring that the design, slogan or message remains fixed while the article of footwear is in use.

Although the symbols 935 are shown projecting from both major faces of the base member 916, this is not essential and it may be desirable to configure the plug modules 918 so that they can be fitted to the base member 916 with the symbols 935 at the foot-bearing face flush with the surface of the base member. It is to be understood that the plug modules 918 do not have to be provided with symbols as shown. Instead, the plug modules may be made in different colours or provided with different ornamentation, texture or section profiles. It is also to be understood that it is not essential that the through-holes 928 are arranged in a meandering line as shown. Through-holes 928 may be arranged in any desired configuration.

In the illustrated examples, the plug modules are shown providing the possibility of reconfiguring the reconfigurable modular footbed assembly to change the size of a foot-bearing face of the footbed assembly and/or to alter the appearance of the footbed

assembly. The plug modules can be made with different texture and/or cross-section profiles to allow the footbed assembly to be configured to give a desired tactile effect, including the possibility of a massage effect when a wearer is walking in an article of footwear incorporating the footbed assembly. Thus, for example, the plug modules
5 may be made from different materials including relative harder and softer materials. A further possibility is that by selection of the cross-section profile of the plug modules a foot-bearing face having particular contours, for example to counteract the effects of a foot abnormality, can be assembled. Yet another possibility is the provision of footwear with asymmetric footbeds. For example, the footbed
10 assemblies shown in Figures 1 to 7 can be readily configured with footbeds that have different widths and/or lengths.

In the illustrated examples the plug modules are releasably secured to the base member by an interference fit between portions of the base member and plug modules
15 or by resilient snap-fitting. This is not essential. The base member and plug modules may be configured for the plug modules to be secured by other means. For example, a cam locking system or twist lock could be used. Thus, for example, in the case of the reconfigurable footbed assembly shown in Figures 20 to 22 the plug modules could be provided with one or more projections that can engage tracks provided in the
20 through-holes to engage by twist locking. In this case the tracks can be arranged such that they cooperate with the projections to both releasably secure the plug modules to the base member and orientate the plug modules in similar fashion to the flat surface portions 931, 933.

25 It is to be understood that the various reconfigurable modular footwear footbed assemblies shown provided with a Y-shaped strap system to provide a flip flop are not limited to that configuration. In principle, any form of strapping system may be used. For example, straps may extend from opposite sides of the footbed assembly to be fastened by means of buckles or a hook and loop releasable fastener system such as
30 Velcro®. In principle any known type and configuration of strap system as used with footwear may be provided on the reconfigurable footbed assembly.

It is to be understood that the reconfigurable modular footwear footbed assembly can be supplied in made up form, in kits comprising the parts of the footbed assembly or loose at a point of sale whereby a purchaser can select parts as required.

- 5 The various examples of reconfigurable modular footwear footbed assemblies described provide the possibility of considerable freedom for wearers to obtain an article of footwear or footbed assembly that can be customised to provide a desired appearance, shape, size and/or tactile sensation. Additionally, they provide the possibility for parties to supply customised footwear designed to advertise or promote
- 10 a particular product, business and/or event.

- It will be understood that a reconfigurable modular footwear assembly as described may allow for relatively quick and easy repair of damaged or worn portions by the owner of an article of footwear incorporating the footbed assembly or a repairer. In
- 15 principle, the reconfigurable aspect of the modular footbed assembly allows the possibility of on the spot repair.

- In the description above reference has been made to the wearer and actions taken by the wearer. It is to be understood that the initial configuring of the footwear footbed
- 20 assembly and any subsequent reconfiguring does not have to be done by a wearer. For example, the initial configuration and assembly could be undertaken at a shop or factory in response to an order from a client. For more specialist applications, a footbed assembly may be designed and/or assembled by a podiatrist or similarly medically/technically qualified person.

- 25
- In this specification reference is made to a foot-bearing face of the footbed assembly. Typically in cases in which the footbed assembly forms a part of a flip flop or sandal the face referred to will actually be engaged by the wearer's foot. However, in when the footbed assembly is incorporated in a boot or shoe as in the example shown in
- 30 Figure 12, the foot-bearing surface may be covered with an insole or the like so that it is not directly engaged by the wearer's foot.

In examples that use a push, or snap-fit, securing system that relies on an element of resilient deformation of portions of one or both of the base member and the plug

modules, sufficient resilience can be obtained by the selection of the materials used and the dimensioning, shape and configuration of the parts. Thus, for example, if the base member and plug modules are both made of a relatively soft material, it may be desirable to provide suitable reinforcing to the first and/or second engagement
5 formations. Alternatively, if relatively hard materials are used it may be desirable to dimension the parts to allow sufficient flexure or form the first or second engagement formations from a different material, for example by co-moulding.

The base member and plug modules may conveniently be formed from plastics
10 materials or elastomers by moulding processes whereby they can be made in a cost efficient manner.

In some examples the base member will lack the strength required to function as footbed, due to the materials from which they are made and/or the shape of the
15 member. In these cases the plug modules function as structural members providing sufficient strength to the footbed assembly for it to be able to function without bending unduly, folding or collapsing. For example, base members illustrated in Figures 10 and 12 may require the presence of the plug modules to prevent it from collapsing towards the ground under the weight of a wearer. Similarly, the base
20 member shown in Figure 16 may tend to fold in the absence of the plug modules due to a lack of stiffness arising from the presence of the recess 824.

In some examples the shape of base member is such that it does not provide a foot-bearing and/or foot-engaging face that has sufficient surface area to function as such.
25 In such cases, for example as illustrated in Figures 1 to 7, the plug modules provide a significant part of the foot-bearing and/or ground engaging face of the footbed assembly. In the examples shown in Figures 1 to 7, the plug modules provide at least 30% and may provide at least 40% or at least 50% of the foot-bearing and/or ground engaging face of the footbed.

30

It is acknowledged that the terms "comprise", "comprises" and "comprising" may, under varying jurisdictions, be attributed with either an exclusive or an inclusive meaning. For the purpose of this specification, and unless otherwise noted, these terms are intended to have an inclusive meaning - i.e. they will be taken to mean an

inclusion of the listed components that the use directly references, but optionally also the inclusion of other non-specified components or elements.

5

Claims

1. A reconfigurable modular footwear footbed assembly comprising a base member and a plurality of plug modules, said base member being provided with a plurality of first engagement formations by which said plug modules can be releasably secured to said base member to form a footbed that is reconfigurable by selectively positioning and securing said plug modules to said base member.
2. A reconfigurable modular footwear footbed assembly as claimed in claim 1, wherein at least a portion of said first engagement formations and/or at least a portion of said plug modules is made resiliently deformable to permit said releasable securing.
3. A reconfigurable modular footwear footbed assembly as claimed in claim 1 or 2, wherein said plug modules have at least one second engagement formation engageable with a said first formation to provide said releasable securing.
4. A reconfigurable modular footwear footbed assembly as claimed in claim 3, wherein said first and second engagement formations are engageable by push-fitting.
5. A reconfigurable modular footwear footbed assembly as claimed in claim 3 or 4, wherein said first engagement formations define a restriction, said second engagement formations comprise a retaining portion having a dimension greater than a dimension of said restriction and said releasable securing is provided by snap-fitting said retaining portions through a said restriction.
6. A reconfigurable modular footwear footbed assembly as claimed in claim 3 or 4, wherein said second engagement formations define a restriction, said first engagement formations comprise a retaining portion having a dimension greater than a dimension of said restriction and said releasable securing is provided by snap-fitting said retaining portions through a said restriction.
7. A reconfigurable modular footwear footbed assembly as claimed in claim 5 or 6, wherein said restriction is defined by a multi-diameter opening and said retaining portion is provided on a multi-diameter spigot.

8. A reconfigurable modular footwear footbed assembly as claimed in any one of claims 3 to 7, wherein said first engagement formations are grouped into sets of first engagement formations to define a plurality of secured positions for respective said plug modules whereby said footbed assembly can be configured with a different
5 length and/or width according to which of said secured positions is selected.

9. A reconfigurable modular footwear footbed assembly as claimed in claim 8, wherein each said plug module comprises a number of second engagement formations corresponding to a number of first engagement formations of a said set of first
10 engagement portions and said plug modules can be secured to said base member in a selected one of said secured positions according to how many of said second engagement formations are brought into engagement with the first engagement formations of said set.

10. A reconfigurable modular footwear footbed assembly as claimed in claim 8, wherein said sets comprise at least one first secured position first engagement formation that defines a first said secured position and at least one second secured position first engagement formation that defines a second said secured position is offset with respect to said at least one first secured position first engagement
15 formation whereby said plug modules can be secured in a selected one of said first and second secured positions by selectively engaging the second engagement formations thereof with said first secured position first engagement portions or said second secured position first engagement formations.
20

11. A reconfigurable modular footwear footbed assembly as claimed in any one of the preceding claims, wherein each plug module comprises a recess for receiving a portion of said base member such that said portion is enclosed by said plug module and said plug module provides a portion of a foot-bearing face and a ground-engaging face of said footbed assembly.
25

12. A reconfigurable footbed assembly as claimed in any one of the preceding claims, wherein said base member defines a spine of said footbed assembly having a longitudinal centreline and pairs of said plug modules are fitted one to each side of said centreline.
30

13. A reconfigurable modular footwear footbed assembly as claimed in any one of claims 1 to 10, wherein said plug modules are at least partially received in recesses provided in said base member to form a part of a foot-bearing face or a ground-engaging face of the footbed assembly.

14. A reconfigurable modular footwear footbed assembly as claimed in claim 13, wherein said recesses comprise through-holes and said plug modules form a part of said ground-engaging face and said foot-bearing face.

15. A reconfigurable modular footwear footbed assembly as claimed in claim 13 or 14, wherein said plug modules project beyond at least one of said foot-bearing face and said ground-facing face of said base member.

16. A reconfigurable modular footwear footbed assembly as claimed in claim 1 or 2, wherein said base member comprises recesses to at least partially receive respective said plug modules, each recess is provided with at least one said first engagement formation comprising an undercut at a side of said recess and said plug modules are resiliently deformable plate-like members that are fitted into a said recess to form a part of a foot-bearing face of the footbed assembly by bending the plate-like member and snap-fitting into the at least one first engagement formation of the recess.

17. A reconfigurable modular footwear footbed assembly as claimed in any one of the preceding claims, wherein said plug modules provide at least 30% of at least one of a ground-engaging face and a foot-bearing face of said footbed assembly.

18. A reconfigurable modular footwear footbed assembly as claimed in any one of claims 1 to 7, wherein said first engagement formations comprise apertures extending inwardly of said base member from a side surface thereof and said plug modules are insertable into said apertures.

19. A reconfigurable modular footwear footbed assembly as claimed in any one of the preceding claims, wherein said base member forms an incomplete footwear

footbed whereby said footbed is completed by securing said plug modules to said base member.

20. A reconfigurable modular footwear footbed assembly as claimed in any one of the preceding claims, wherein at least one said plug module is a structural plug module required to stiffen said base member to prevent collapsing and/or folding of said base member in use.

21. A reconfigurable modular footwear footbed assembly as claimed in claim 20, wherein when releasably secured to said base member said structural plug modules fill voids in said base member.

22. A reconfigurable modular footwear footbed assembly as claimed in any one of the preceding claims, wherein said plug modules comprise at least two plug modules that are different from each other by at least one of:

- a) being a different colour;
- b) having a different texture;
- c) having different ornamentation;
- d) having a different cross-section profile;
- e) having a different size; and
- f) having a different perimeter shape.

22. A kit of parts for assembly into a reconfigurable modular footwear footbed assembly as claimed in any one of the preceding claims.

23. A method of assembling a reconfigurable modular footwear footbed assembly, said method comprising selectively releasably securing a plurality of plug modules to a base member to form a footwear footbed that is reconfigurable by releasing, repositioning and re-securing said plug modules to said base member.

24. A method of assembling a reconfigurable modular footwear footbed assembly as claimed in claim 22, wherein securing said plug modules to said base member at least partially fills spaces in said base member to complete at least one of a ground engaging face and a foot-bearing face of said footwear footbed.

25. A method of assembling a reconfigurable modular footwear footbed assembly as claimed in claim 22 or 23, wherein said base member is provided with a plurality of first engagement formations arranged in respective sets to provide at least a first designated secured position and a second designated secured position for each of a predetermined number of said plug modules whereby said footwear footbed can be provided with different size and/or shape foot-bearing faces and selectively releasably securing said plug modules to said base member comprises securing said predetermined number of plug modules in a selected one of said designated secured positions to form a footwear footbed having a desired size and/or shape.

26. A method of assembling a reconfigurable modular footwear footbed assembly as claimed in claim 23, 24 or 25, wherein said base member is an elongate member defining a centreline of said footbed assembly and releasably securing said plug modules to said base member comprises fitting pairs of said plug modules, one on each side of said centreline.

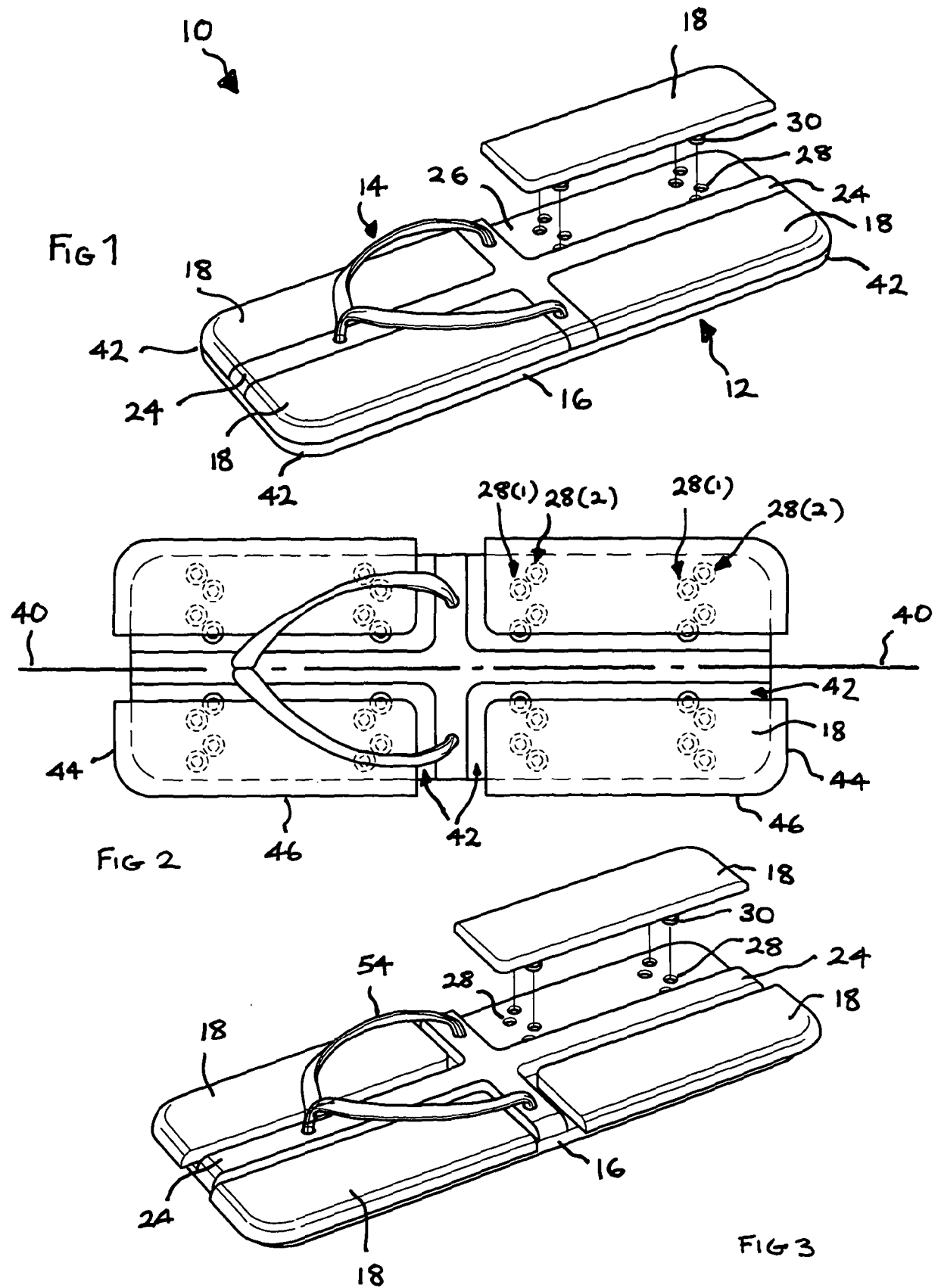
27. A method of assembling a reconfigurable modular footwear footbed assembly as claimed in any one of claims 23 to 26, wherein said plug modules comprise a recess and releasably securing said plug members to said base member comprises enveloping respective portions of said base member in said recesses.

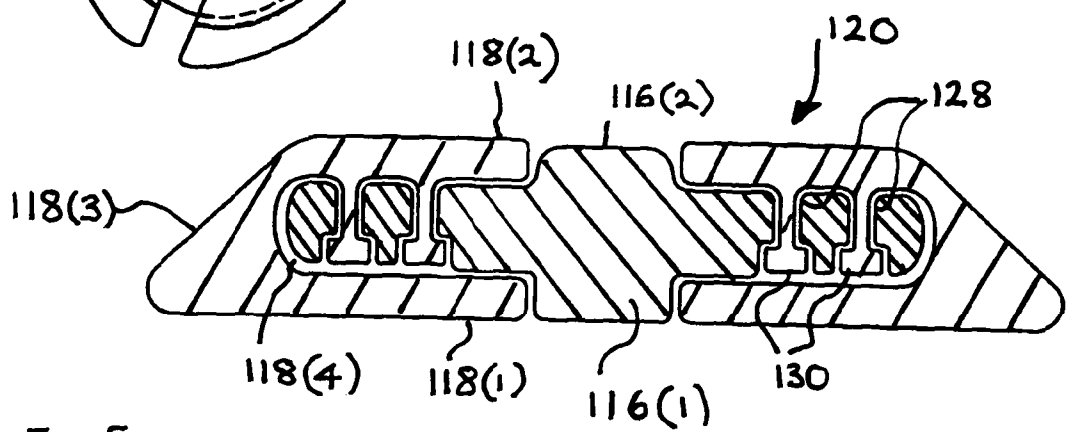
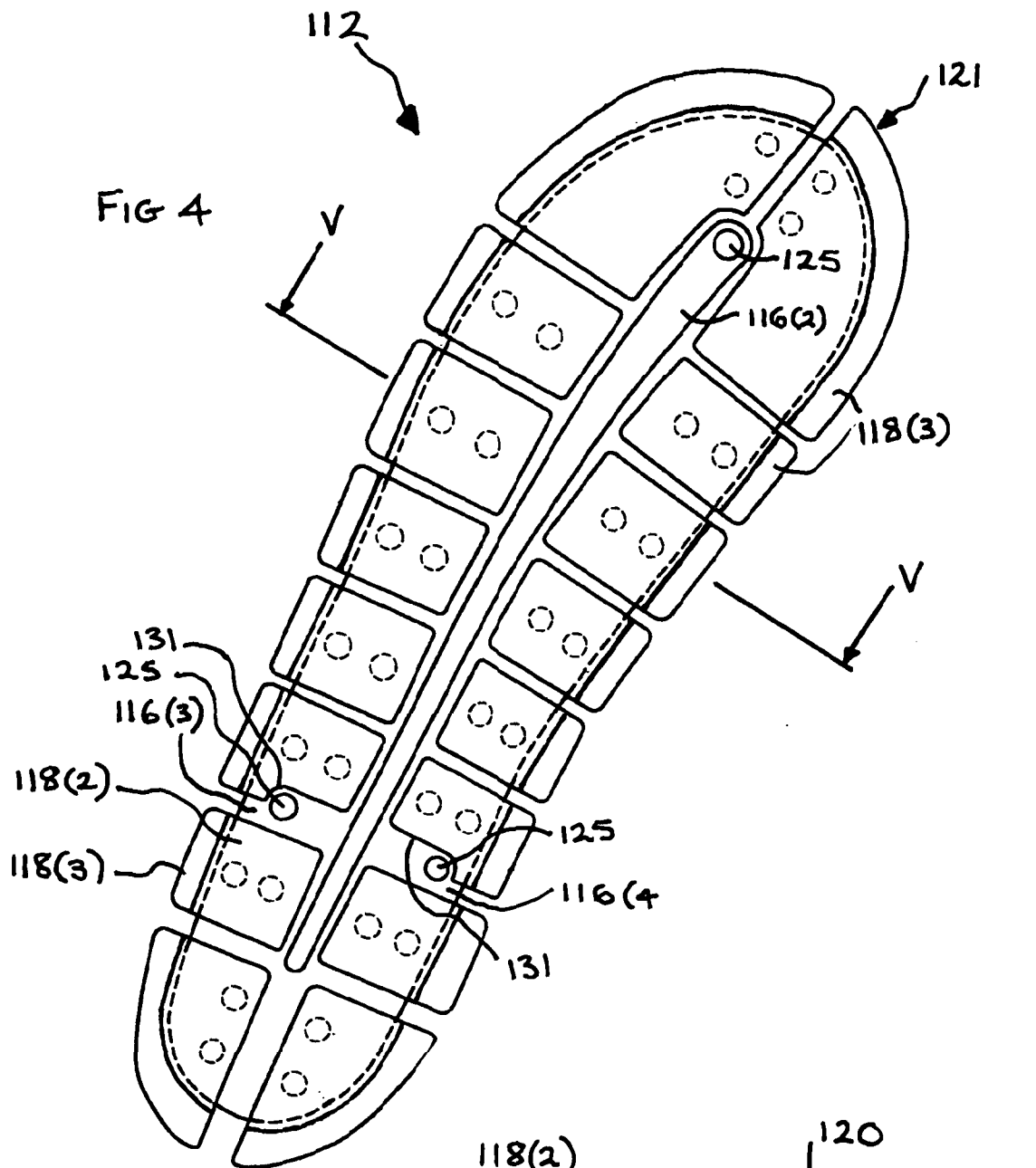
28. A method of assembling a reconfigurable modular footwear footbed assembly as claimed in any one of claims 23 to 27, comprising selecting said plug modules releasably secured to said base member to provide a predetermined non-planar contour for a foot-bearing face of said footbed assembly.

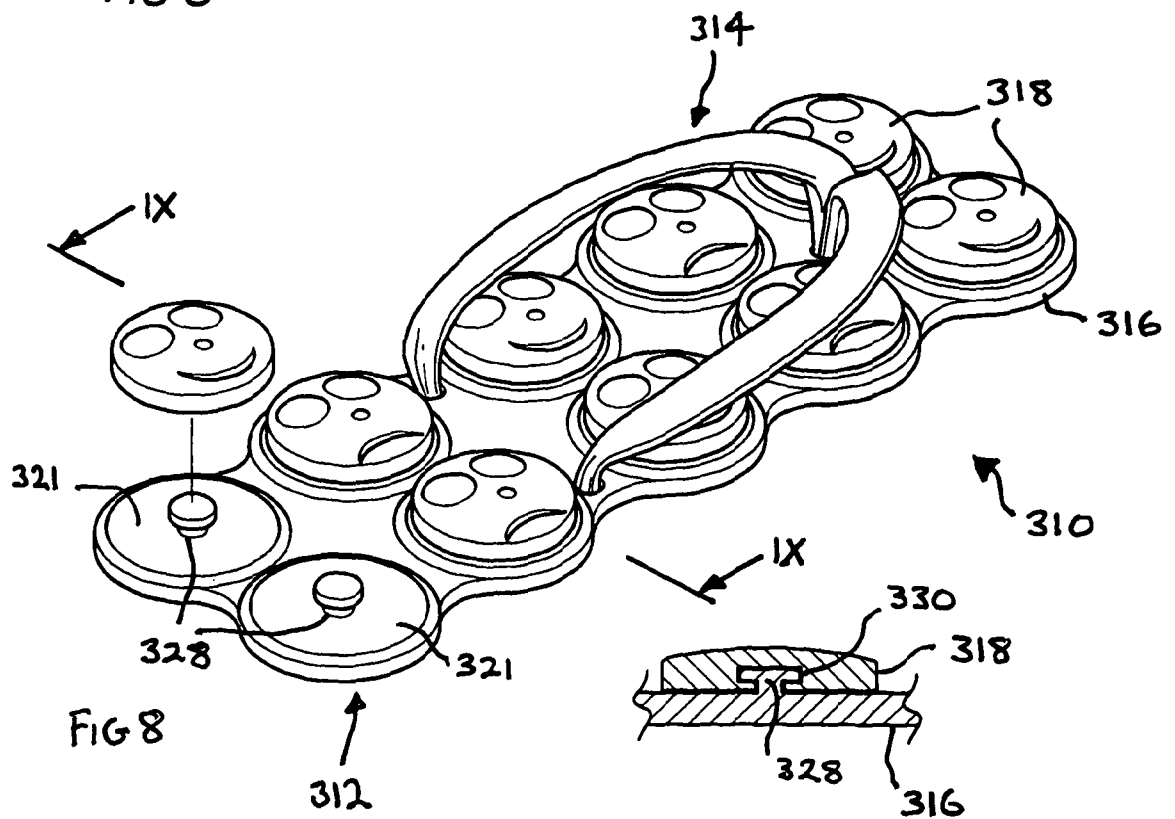
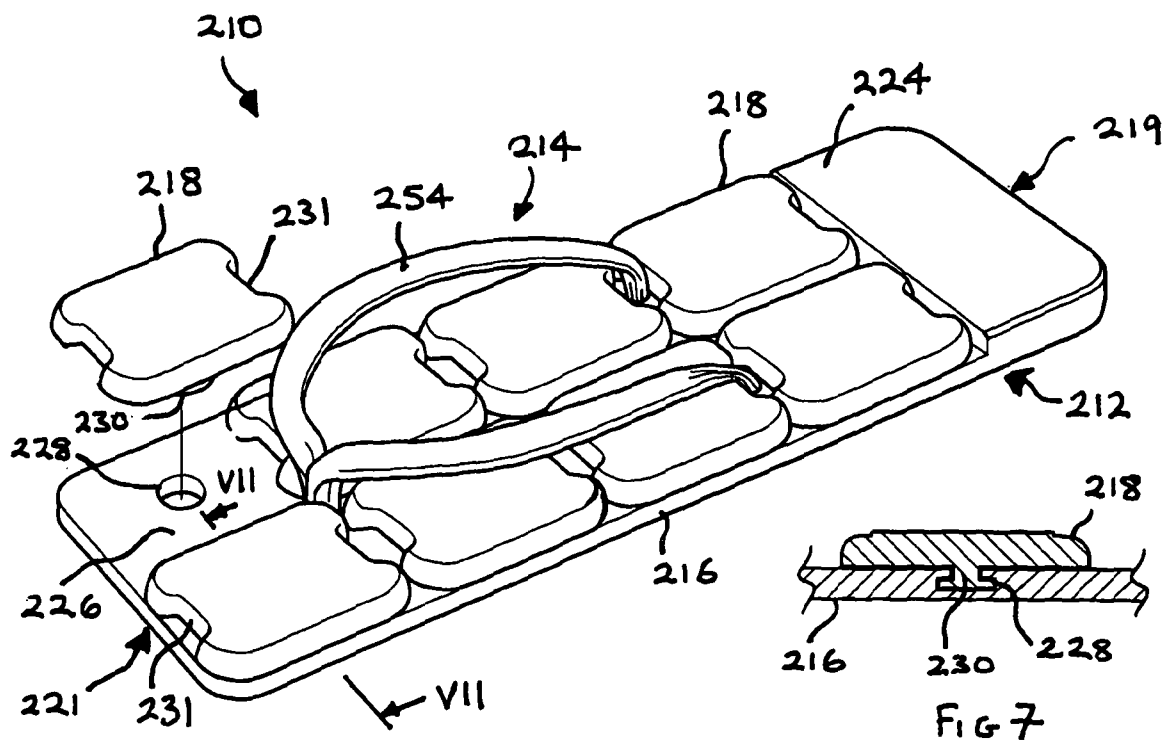
29. A method of assembling a reconfigurable modular footwear footbed assembly as claimed in any one of claims 23 to 28, comprising releasably securing said plug modules to said base member to form a first of a pair of footbed assemblies with a foot-bearing surface having a different size and/or surface contour with a second of said pair of footbed assemblies.

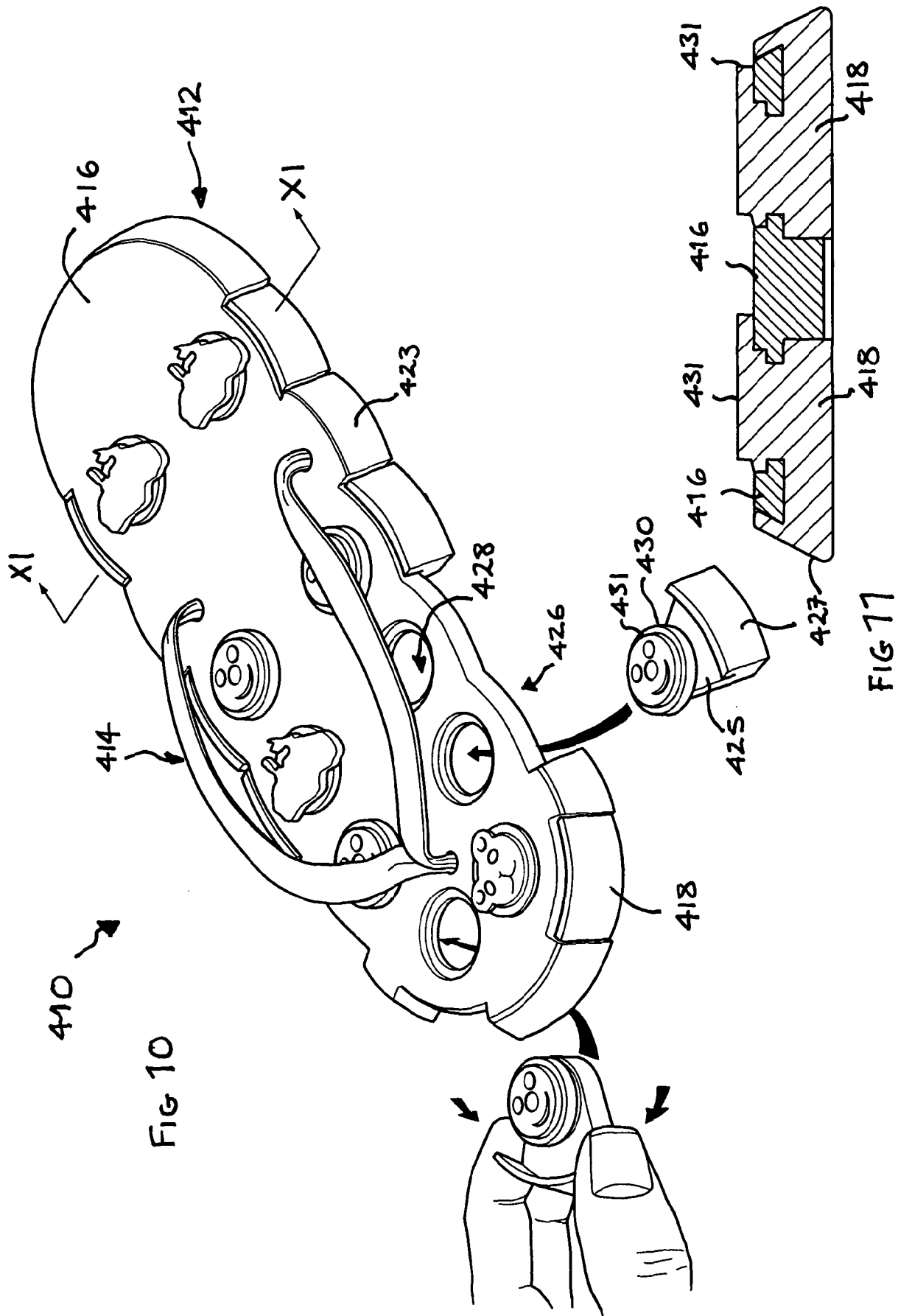
30. A method of assembling a reconfigurable modular footwear footbed assembly as claimed in any one of claims 23 to 29, comprising selecting and securing plug modules to said base member to strengthen said base member to prevent collapsing and/or folding of said base member in use.

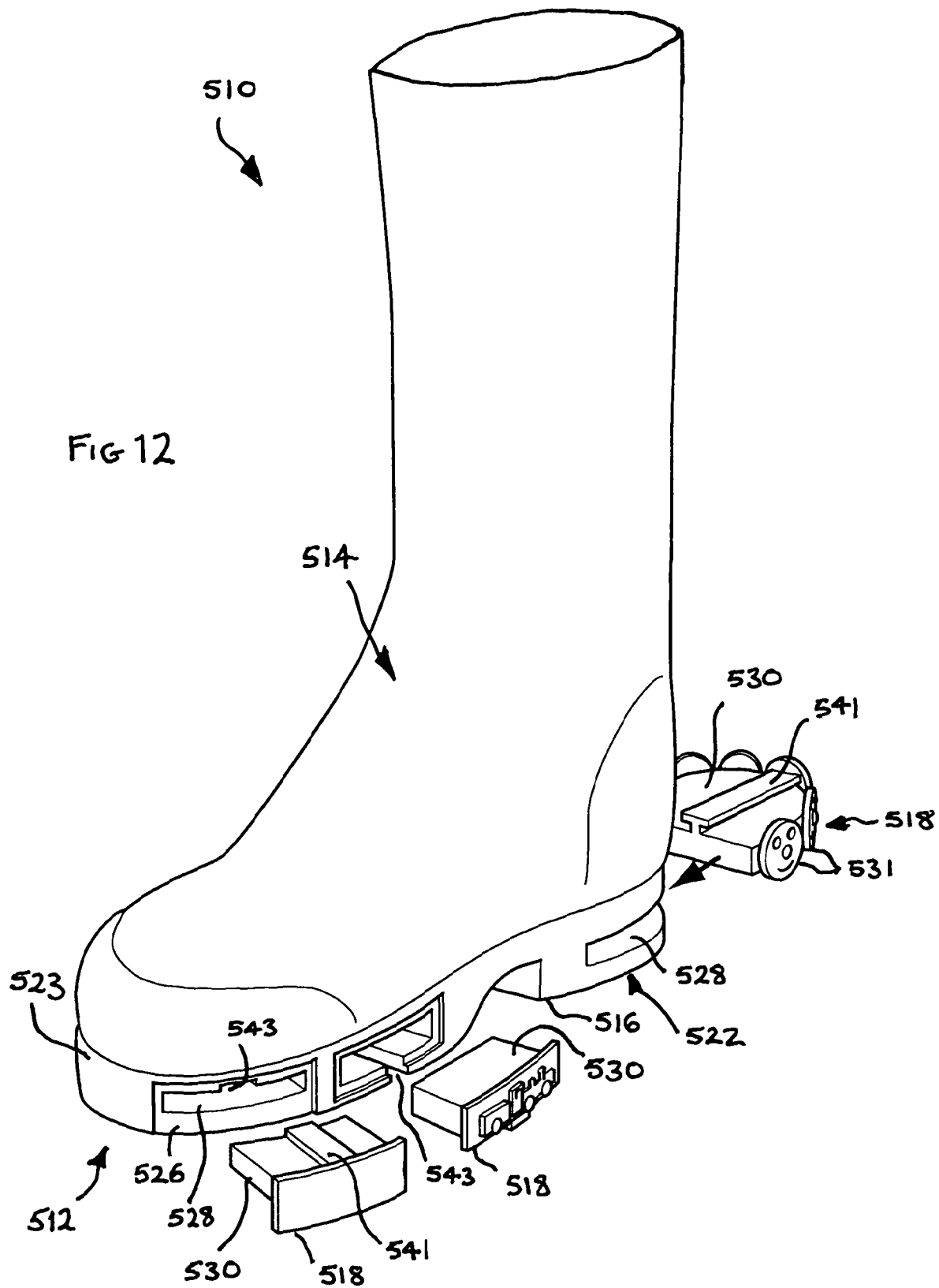
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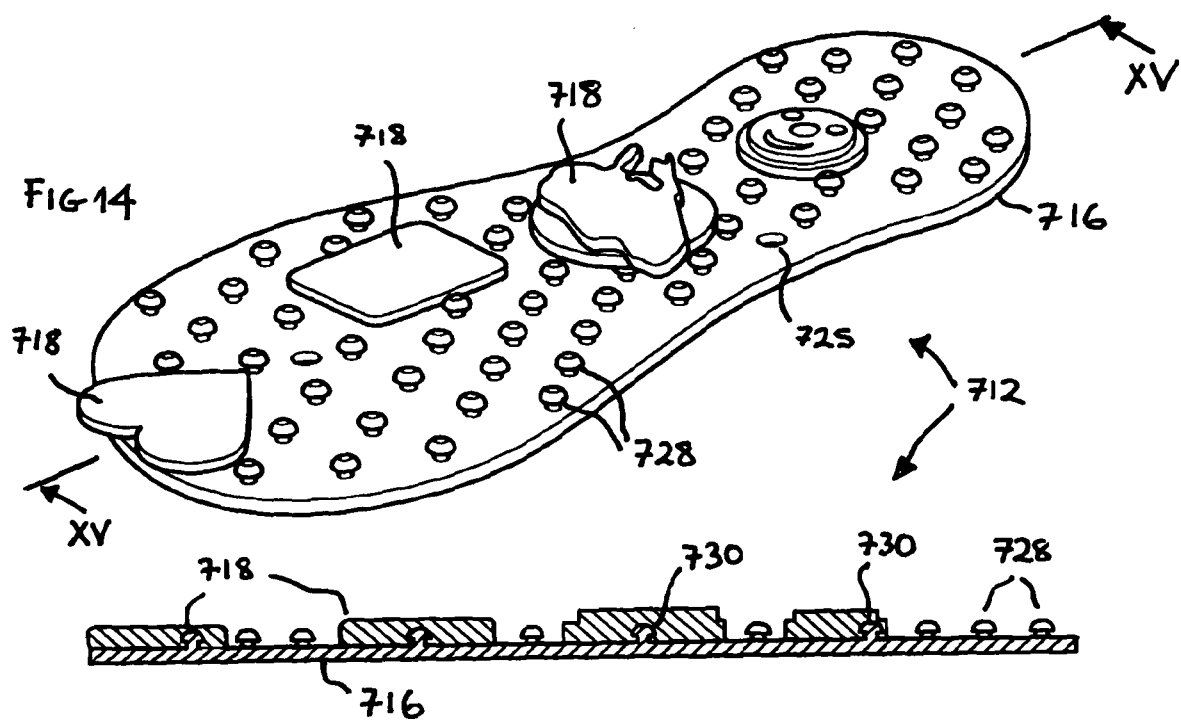
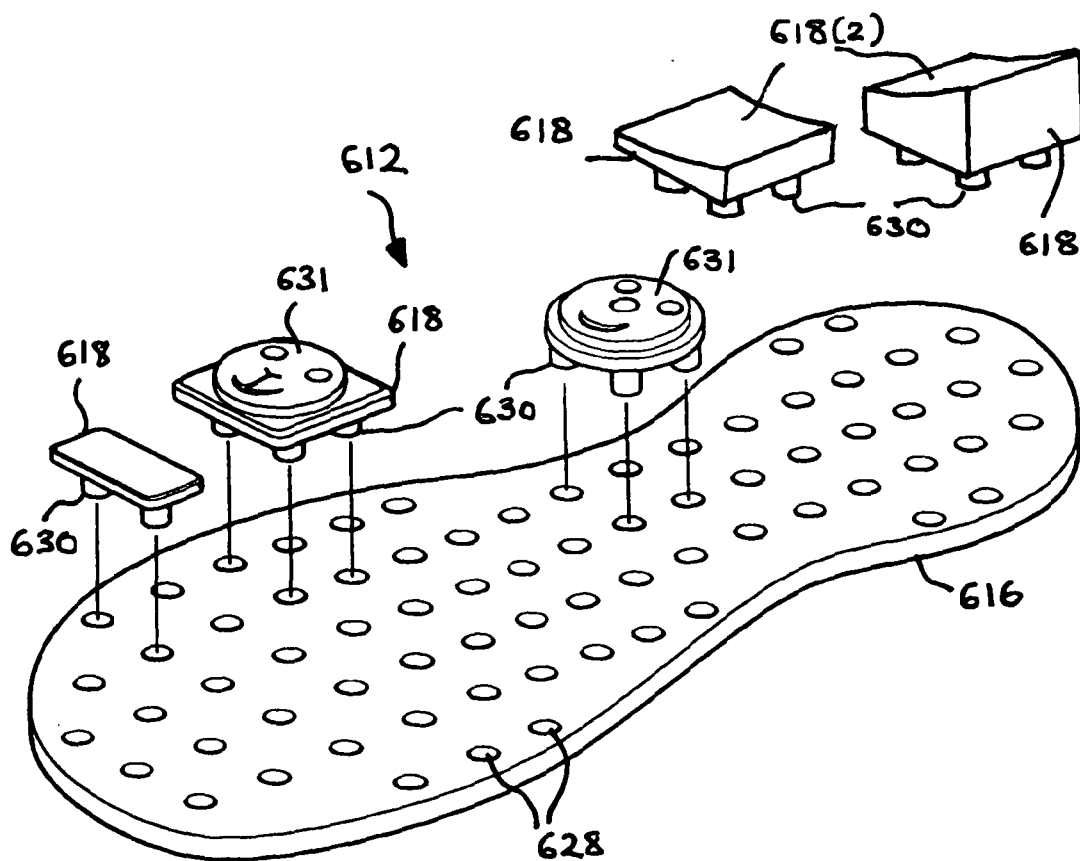


FIG 15

