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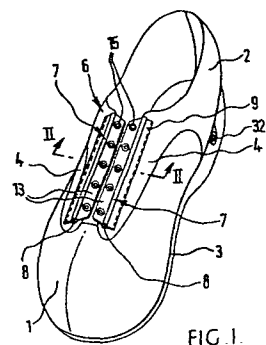
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54 Orthopaedic shoe.

57 The shoe is adaptable to accommodate a wide range of conditions. The upper comprises a forepart (1) of thermosoftening plastics having a lining of resilient expanded thermosoftening plastics of closed cell construction, and a hindpart (2) of leather. The forepart (1) covers the toes and the dorsum and extends to behind the metatarsal heads, and the hindpart (2) covers the heel and supports it against motion in a plane transverse to the longitudinal axis of the shoe and includes wings (4) for closure over the foot. A removable and replaceable connecting means comprises elongate elements (12) which are a friction fit in longitudinally slotted tubes (8) fixed to the wings (4) and which have lateral extensions (13) releasably connected or connectible to each other or connected to each other by resiliently extensible means. An insert, comprising a plug from which extend two stubs (32a) for connection to leg calipers, is inserted in a recess in the upper surface of the sole (3).



"ORTHOPAEDIC SHOE"

This invention relates to orthopaedic shoes.

Orthopaedic shoes are normally made of leather (in this specification the term "leather" includes synthetic leather) and are individually designed to
5 suit the patient. A given shoe is hardly adaptable to accommodate the wide range of deformities which are met with in practice. Shoes in stock sizes and fittings can be adapted to a very limited extent, by stretching the uppers locally. British Patent Specifi-
10 cation 917 477 provides an elastic strip running round the forepart of the shoe, between the upper and the sole.

The fundamental problem to be solved is that of providing an orthopaedic shoe which is sufficiently strong to support the foot, yet which is adaptable to
15 suit an individual patient. My U.S. Patent 4 120 101 is concerned with an orthopaedic shoe in which the upper consists of thermosoftening plastics material having a lining of resilient expanded thermosoftening plastics material of closed cell construction. Extensive
20 research which I have carried out has shown that the main area in which adaptability is required in the majority of patients is the forefoot, whereas the main area in which support is required is the hindfoot.

The present invention provides an orthopaedic shoe
25 comprising an upper secured to a sole, characterised in that the upper comprises a forepart of thermosoftening plastics material having a lining of resilient expanded thermosoftening plastics material of closed cell construction, and a hindpart of leather, the forepart covering the
30 toes and the dorsum of the foot and extending to behind the metatarsal heads, the hindpart covering the heel and supporting it against motion in a plane transverse to the longitudinal axis of the shoe, the hindpart including a pair of wings for closure over the foot.

The shoe thus provides support for the hindfoot, by way of the hindpart, while being adaptable to suit the condition of the forefoot, by forming and/or cutting the forepart. Thus, shoes in accordance with the invention
5 can be supplied as stock items which can subsequently be adapted to suit the patient.

The shoe preferably has a removable insole of resilient expanded thermosoftening plastics material. The insole can thus be removed from the shoe, shaped
10 to the patient's foot, and replaced. A preferred insole comprises a top layer of lower density and a separate bottom layer of higher density.

The plastics material of the forepart is preferably a vinyl polymer, e.g. polyvinylchloride (PVC). The forepart
15 may have a backing of textile material bonded to it, between the forepart and its lining. The expanded plastics material used in the shoe is preferably an expanded cross-linked polyethylene.

It is important for the therapist or orthotist to
20 be in a position to supply the shoe with the type of closure best suited to the patient. Practice has shown that trial and error is the best way of finding a closure which suits a given individual. In order to allow the style of closure (e.g. lacing, buckle and strap, or elasticated
25 gusset) to be changed, a preferred shoe has a pair of elongate hollow members fixed to the respective wings, and connecting means comprising a pair of elongate elements which are a friction fit in the respective hollow members and are removable from them longitudinally, the elongate
30 elements having respective lateral extensions projecting from respective longitudinal slots in the hollow members, the extensions being releasably connected or connectible to each other or being connected to each other by resilient
35 means sufficiently extensible to enable the shoe to be donned and doffed. Thus, one connecting means can readily be removed from the hollow members and replaced by another.

An orthopaedic shoe is often used with leg calipers, which are connected at the lower end to a pair of lateral caliper stubs in the heel region of the shoe. For example, the stubs may be tubular and receive inwardly directed spurs on the calipers, or they may have pivotable connectors for fixing to the calipers. It is normal practice to adapt an already constructed shoe for this purpose by breaking the upper from the sole, providing caliper stubs in the heel region of the sole, and re-assembling the shoe.

In a preferred embodiment of the present invention, the sole includes a heel portion of moulded plastics material, the upper surface of the heel portion having a recess from which two transverse apertures having a common axis extend to the sides of the heel portion, and an insert comprising a plug of moulded plastics material and two stubs for connection to leg calipers, the stubs extending from the plug in opposite directions along a common axis, the plug and the stubs fitting in the recess and the apertures, respectively, of the heel portion.

If caliper stubs are not required, the insert can readily be removed and replaced by a plain insert consisting of a plug of moulded plastics material fitting in the recess and the apertures of the heel portion.

The invention will be described further, by way of example only, with reference to the accompanying drawings, in which:-

Figure 1 is a perspective view of an orthopaedic shoe;

Figure 2 is an enlarged section on line II-II in Figure 1 through a closure of the shoe;

Figure 3 is a plan view of another closure;

Figure 4 is a section on line IV-IV in Figure 3;

Figure 5 is a plan view of another closure;

Figure 6 is a section on line VI-VI in Figure 5;

Figure 7 is a plan view of the sole of the shoe;

Figure 8 is a fragmentary longitudinal section through the sole; and

Figure 9 is a perspective view of an insert which

fits in the heel portion of the sole.

The orthopaedic shoe illustrated in Figure 1 has an upper consisting of a forepart 1 and a hindpart 2, adhesively secured to a sole 3. The forepart 1 is of
5 PVC bonded to a backing of textile material which is in turn bonded to a lining of low density "Plastazote" (a Trade Mark for an expanded cross-linked polyethylene). The hindpart 2 is of leather and is constructed in the conventional way, including the incorporation of stiffeners,
10 several pieces of leather being stitched together or, in the case of synthetic leather, welded together to provide adequate support for the heel against motion in a plane transverse to the longitudinal axis of the shoe. The hindpart 2 includes a pair of wings 4 for closure over
15 the foot. The forepart 1 is stitched (as shown) and/or bonded (or welded) to the hindpart 2.

The closure 6 seen in Figures 1 and 2 comprises a pair of elongate hollow members 7 in the form of longitudinally-slotted extruded plastics tubes 8 having
20 integral longitudinal flanges 9 stitched (as illustrated), bonded, welded, or otherwise fixed to the wings 4. The closure 6 also comprises connecting means 11 which are removable and replaceable by alternative connecting means 11', 11'' (Figures 3 to 6) described below. The
25 connecting means 11 has a pair of elongate elements 12 which are a friction fit in the tubes 8. The elements 12 are provided with lateral extensions 13 which, in the illustrated example, extend along the entire length of the elements 12 and are integral with them, being
30 extruded in plastics material, for example. Alternatively, the extensions 13 could be of a different material, e.g. canvas, fixed to the elements 12. The extensions 13 project from the longitudinal slots of the tubes 8 and are provided with eyelets 15 for a shoe-lace. The
35 connecting means 11 can be removed by sliding the elements 12 along the tubes 8.

In the closure 6' shown in Figures 3 and 4, the members 7 are the same as in Figures 1 and 2. The connecting means 11' again has elongate elements 12, which are in this case provided with lateral extensions which are integral parts of a resiliently extensible gusset 13' of elasticated fabric.

In the closure 6'' shown in Figures 5 and 6, the members 7 are the same as in Figures 1 to 4. The connecting means 11'' again has elongate elements 12. In this case the lateral extensions 13'' of the elements 12 do not extend along the entire length of the elements 12. The lateral extension of one of the elements constitutes a strap 14 which passes through a ring 16 fixed to the other lateral extension. A "Velcro" hook tape 17 on one part of the strap 14 engages with a "Velcro" loop tape 18 on another part ("Velcro" is a Trade Mark).

Although the three interchangeable connecting means described above make use of only three types of connection, each type being well known, it is obvious that any other well-known type of connection can be used, for example, buckle and strap; a pair of straps, one with "Velcro" hooks, the other with "Velcro" loops; or a zip fastener.

The sole 3 (Figures 1, 7 and 8) of the shoe is injection moulded from polyurethane. The upper surface of the heel portion has a recess 19 from which two transverse apertures in the form of grooves 22a, 22b of U-shaped cross-section, having a common axis 23, extend to the sides of the heel portion. The heel portion receives an insert 29 (Figure 9) which comprises a plug 31 injection moulded from polyurethane. Two hollow tubes 32a, 32b which extend from the plug 31 in opposite directions are constituted by the ends of a

tube 32 embedded in the plug 31. The tube 32 is provided with transverse wings 28 to prevent movement relative to the plug. The insert 29 is fitted in the heel portion before the sole 3 is secured to the upper.

5 The plug 31 fits in the recess 21, in which it is adhesively secured, and the stubs 32a, 32b fit in the respective grooves 22a, 22b and serve as caliper sockets, the axis 33 of the tube 32 coinciding with the axis 23 of the grooves.

10 The shoe also comprises an insole (not shown) comprising separate upper and lower layers of "Plastazote" of different density, as described in my U.S. Patent 4 120 101.

15 Various modifications may be made within the scope of the invention. For instance, instead of being of circular cross-section (as shown), the tubes 8 of the closure 6 may be of semicircular or D-shaped cross-section with the flat side facing the foot, in use, and being flush with the flanges 9, the elongate elements

20 12 being of corresponding cross-section. Furthermore, in order to locate the elements 12 in the members 7 and to prevent them from slipping out accidentally, the tubes 8 may be provided with internal projections adjacent their ends, e.g. by crimping the tubes.

I CLAIM

1. An orthopaedic shoe comprising an upper secured to a sole (3), characterised in that the upper comprises a forepart (1) of thermosoftening plastics material having a lining of resilient expanded thermosoftening plastics material of closed cell construction, and a hindpart (2) of leather, the forepart (1) covering the toes and the dorsum of the foot and extending to behind the metatarsal heads, the hindpart (2) covering the heel and supporting it against motion in a plane transverse to the longitudinal axis of the shoe, the hindpart including a pair of wings (4) for closure over the foot.
2. A shoe as claimed in claim 1, including a pair of elongate hollow members (8) fixed to the respective wings (4), and connecting means (11) comprising a pair of elongate elements (12) which are a friction fit in the respective hollow members (8) and are removable from them longitudinally, the elongate elements (12) having respective lateral extensions (13) projecting from respective longitudinal slots in the hollow members (8), the extensions (13) being releasably connected or connectible to each other or being connected to each other by resilient means sufficiently extensible to allow the shoe to be donned and doffed.
3. A shoe as claimed in claim 1 or 2, in which the sole (3) includes a heel portion of moulded plastics material, the upper surface of the heel portion having a recess (14) from which two transverse apertures (22_a,_b) having a common axis (23) extend to the sides of the heel portion, and an insert (29) comprising a plug (31) of moulded plastics material and two stubs (32_a, _b) for connection to leg calipers, the stubs (32_a,_b) extending from the plug (31) in opposite directions along a common axis (33), the plug (31) and the stubs (32_a,_b) fitting

in the recess (19) and the apertures (22a,b), respectively, of the heel portion.

4. A shoe as claimed in any of claims 1 to 3, including a removable insole of resilient expanded thermosoftening plastics material.

5. A shoe as claimed in claim 4, in which the insole has a top layer of lower density and a separate bottom layer of higher density.

6. A shoe as claimed in any of claims 1 to 5, in which the plastics material of the forepart (1) is a vinyl polymer.

7. A shoe as claimed in any of claims 1 to 6, including a backing of textile material bonded to the forepart (1), between the forepart and the lining.

8. A shoe as claimed in any of claims 1 to 7, in which the expanded plastics material is an expanded cross-linked polyethylene.

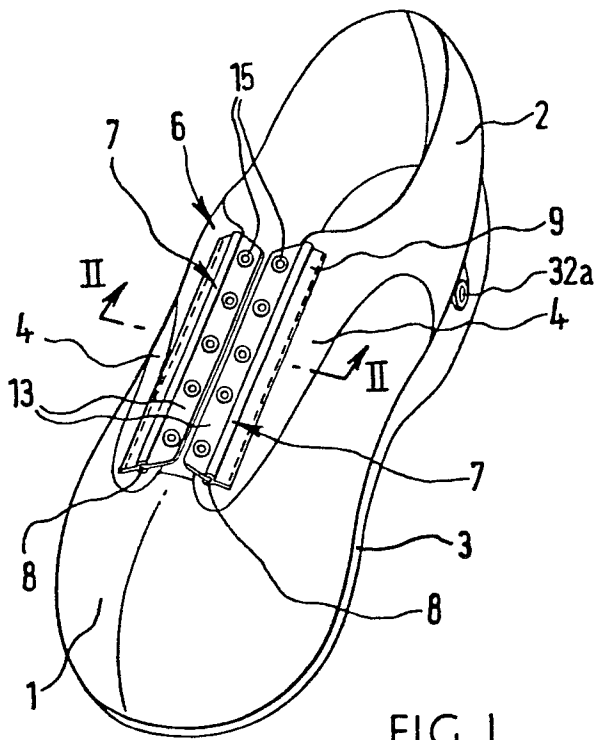


FIG. 1.

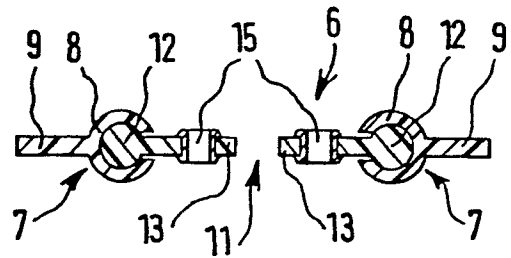


FIG. 2.

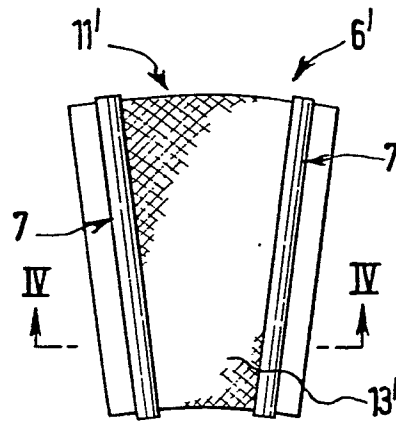


FIG. 3.

FIG. 5.

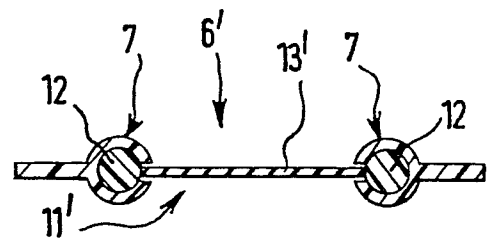
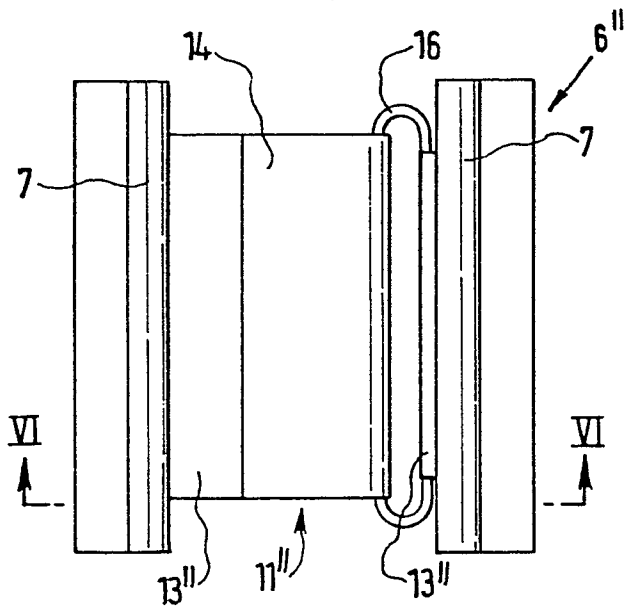


FIG. 4.

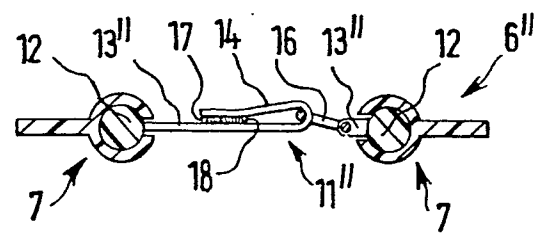


FIG. 6.

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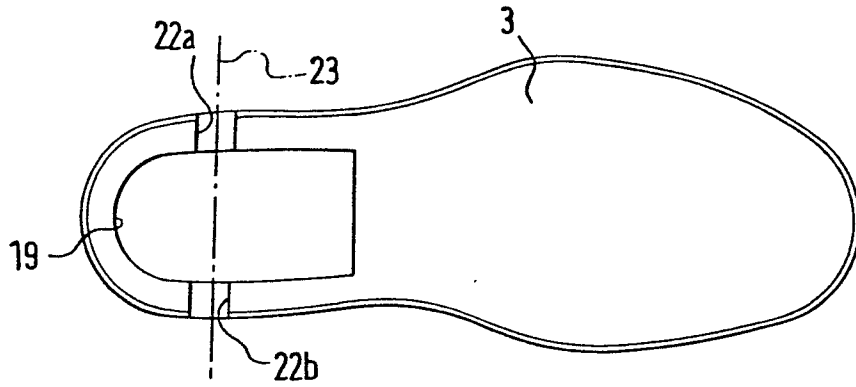


FIG. 7.

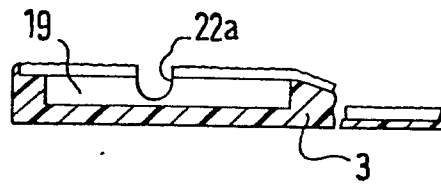


FIG. 8.

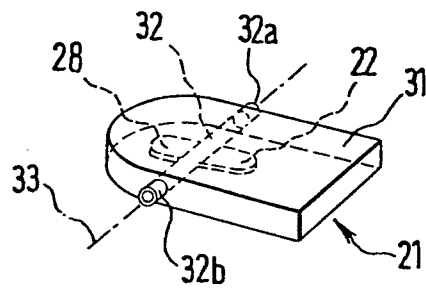


FIG. 9.



DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl. 3)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
A	<u>US - A - 2 607 132</u> (S. WIKLER)	1	A 43 B 23/02 7/00 17/14 A 43 C 11/22
A	<u>US - A - 2 630 635</u> (B. WEILBACHER)		
X, D	<u>US - A - 4 120 101</u> (J. DREW)	4-8	

			TECHNICAL FIELDS SEARCHED (Int.Cl. 3)
			A 43 B
			CATEGORY OF CITED DOCUMENTS
			X: particularly relevant A: technological background O: non-written disclosure P: intermediate document T: theory or principle underlying the invention E: conflicting application D: document cited in the application L: citation for other reasons
			&: member of the same patent family, corresponding document
<input checked="" type="checkbox"/> The present search report has been drawn up for all claims			
Place of search	Date of completion of the search	Examiner	
The Hague	01-09-1980	DECLERCK	