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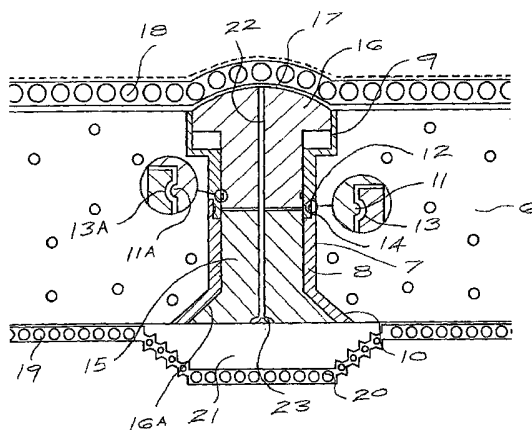
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ance Notes on Codes and Abbreviations" appearing at the begin-
ning of each regular issue of the PCT Gazette.

(54) Title: SHOE SOLES EXHIBITING A THERAPEUTIC EFFECT



(57) Abstract: A shoe sole (2) is provided having an inner surface (3) and an outer surface (4) and a series of passages extending into the sole from the inside surface. The axis of each passage is at generally right angles to the inner surface and each passage receives an element (5, 15, 28, 35) having a generally rounded end (17, 33, 38) movable relative to the inner surface of the shoe sole in the general direction of said axis of the associated passage such that said rounded end of each element exerts cyclically varying pressure on a person's foot with cyclically varying weight exerted on the shoe sole by such person's foot. The passage (37) may have a blind end in which case the elements (35) are resiliently biased towards a position in which the rounded ends (38) project above the inner surface (39) of the shoe sole. Alternatively, the passages (7, 29) extend substantially through the entire sole (6) with only a protective flexible outer sole (19, 20) covering the outer ends of the passages. In the latter case the elements extend through the sole and are arranged such that pressure on the outer surface of the sole urges an element to a position in which the rounded end (17) projects above the inner surface (18) of the shoe sole, in use.

SHOE SOLES EXHIBITING A THERAPEUTIC EFFECT

5 FIELD OF THE INVENTION

This invention relates to shoe soles that exhibit a therapeutic effect to a person wearing shoes embodying such shoe soles. The term therapeutic effect, as used in this specification, is intended to mean that the shoe soles of
10 the invention have a beneficial effect that may be any one or more of diminishing or preventing fatigue; enhancing comfort; or exhibiting some other physiologically beneficial effect. The beneficial effect, or at least part thereof, may be associated with the therapeutic practice known as reflexology.

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BACKGROUND TO THE INVENTION

It is a common occurrence that when running or walking, particularly over long distances, or even when standing for a long period of time, a person's
20 feet will generally become hot, cramped, otherwise fatigued or simply painful.

Relief from this condition is often achieved if the feet are massaged, and also possibly cooled, as may be necessary. Such an activity necessitates that the person sit down; remove the shoes; and allow the feet to be massaged. This
25 is time-consuming; not always practical; and therefore inappropriate in very many circumstances, not least of which is those in which the wearer of the shoes is competing against others in an activity in which time is of the essence.

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OBJECT OF THE INVENTION

It is, accordingly, an object of this invention to provide shoe soles that, at least to some extent, exhibit a therapeutic effect on a person's feet when
5 wearing shoes fitted with such shoe soles.

SUMMARY OF THE INVENTION

In accordance with this invention there is provided a shoe sole having an
10 inner surface and an outer surface and wherein the inner surface has a series of passages extending into the body of the sole with the axis of the passage at generally right angles to the inner surface surrounding the passage and wherein each passage receives an element having a generally rounded end movable relative to the inner surface of the shoe sole in the
15 general direction of said axis of the associated passage such that said rounded end of each element exerts cyclically varying pressure on a person's foot with cyclically varying weight exerted on the shoe sole by such person's foot.

20 Further features of the invention provide for each passage to have either a blind end in which case the elements may be resiliently biased towards a position in which the rounded ends project above the inner surface of the shoe sole, or, for the passages to extend substantially through the entire sole with only a protective flexible outer sole covering the outer ends of the
25 passages in which case the elements extend through the sole and are preferably arranged such that pressure on the outer surface of the sole urges an element to a position in which the rounded end projects above the inner surface of the shoe sole; for the elements to have small air ducts passing therethrough in a generally axial direction with the air duct optionally having a
30 one-way valve such as a flap valve associated therewith; and for the elements to be either rigid generally cylindrical elements that are optionally resiliently compressible in an axial direction, or rigidly flexible capsules

containing a suitably deformable material that preferably has limited compressibility. In the latter case the capsules may have valve means associated therewith so that they can be pressurized internally to a required rigidity, for example, by introducing or removing a pressurized fluid from the capsules. Particularly in the case that the deformable material within the capsules is substantially incompressible, the passages may have an enlarged zone for accommodating expansion of the capsules during application of the force to the rounded end thereof.

Still further features of the invention provide for the series of passages and associated elements to be arranged in an array of a predetermined pattern over the shoe sole with the pattern optionally being selected to derive benefit from appropriate recognized reflexology pressure points; for the diameter of the elements to be of the order of 3 to 10 mm, preferably 4 to 6 mm; for the rounded ends of the elements to be covered by a flexible and preferably resiliently deformable inner sole; and for the elements, in the case that they extend through the thickness of the sole, to have a headed formation at each end to limit axial movement of the elements and in which case the elements are preferably made in two parts that clip together.

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In one implementation of the invention the shoe soles are made of resiliently deformable and compressible elastomeric material and in that case the passages are preferably formed by a relatively rigid sleeve fitted in moulded or die cut holes in the shoe sole. In such a case, in instances in which the elements pass through the sole, the sleeve is made in two parts that are conveniently injection moulded from a suitable plastics material and wherein the two parts clip together axially.

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In order that the above and other features of the invention may be more fully understood various different embodiments of the invention will now be described with reference to the accompanying drawings.

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BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:-

5 Figure 1 is a partly broken away perspective illustration of a shoe fitted with a sole according to the invention;

Figure 2 is an underneath of view of a pair of shoe soles illustrating one possible arrangement of passages and elements according to the invention;

Figure 3 is a view similar to Figure 2 and showing, simply by way of example, one alternative arrangement of passages and elements;

Figure 4 is an enlarged sectional elevation of one embodiment of passage and element arrangement according to the invention:

20 Figure 5 is a schematic perspective view showing a variation of the
 element described with reference to Figure 4;

Figure 6 is another view similar to Figure 5 and showing a different variation of the element illustrated therein;

Figure 7 is a sectional view similar to Figure 4 but wherein the element assumes the form of a flexible capsule in place of a rigid element; and,

30 Figure 8 is a sectional view similar to Figure 4 and illustrating an embodiment of the invention in which the passage need not extend through the sole.

DETAILED DESCRIPTION WITH REFERENCE TO THE DRAWINGS

Figure 1 of the drawings illustrates, in broad concept, the application of the invention to a sports shoe, generally indicated by numeral (1), in which the shoe has a moulded, rigidly flexible sole (2) having an inner surface (3) and an outer or bottom surface (4).

As provided by this invention the inner surface has a series of elements (5) each of which has a rounded end directed into the interior of the shoe from an associated passage extending into the sole and various embodiments of the detailed construction of which are described below.

Referring more particularly to Figures 2 and 3, the elements (5) may be positioned in an array thereof with the individual elements optionally being arranged to correspond with appropriate and desired reflexology pressure points. Whatever the array, the individual elements are positioned to achieve a massaging effect in a manner that will become apparent from the following. The array of elements for each of the soles for engagement by the two feet of a person need not be the same just as the reflexology pressure points of the two feet are not the same.

The diameter of the elements may vary appreciably but it is generally considered that the diameter will lie in the range of 3 to 10 mm in diameter and more generally from 4 to 6 mm. In one particular application of the invention it is proposed that a diameter of the rounded inner end of the elements be about 5 mm.

Turning now to the more detailed construction of the elements themselves, and with reference to Figure 4 of the drawings, a rigidly elastomeric sole (6) is provided with holes (7) at right angles through the sole and each of the holes receives a relatively rigid sleeve (8) defining the passage referred to above. The sleeve has an enlarged inner end (9) and a flared outer end (10)

and is made in two parts that clip together by engagement of a circumferential rib (11) on a spigot shaped end (12) of one part in a cooperating circumferential recess (13) in a socket formation (14) of the other part. Each sleeve is thus held captive relative to the sole.

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The sleeve receives an axially movable element (15) having an enlarged head (16) cooperating with the enlarged end of the sleeve and having a rounded top surface (17) defining said rounded end of the element. The element has a flared opposite end (16a) that cooperates with the flared end
10 (10) of the sleeve to hold the element captive in the sleeve and limit axial movement thereof relative to the sleeve to the required amount, of the order of a few mm, in order to achieve the desired massaging effect. The element is also made in two parts that clip together by the engagement of a rib (11a) and recess (13a) similar to those described above with reference to the
15 sleeve. With the head (16) raised to its uppermost position, as illustrated in Figure 4, that is to say with the flared end (16a) of the element in engagement with the flared end of the sleeve, the rounded end (17) of the element forms a bump in the surface of a resiliently flexible inner sole (18).

20 The flared end of the sleeve and element are protected by a protective flexible outer sole (19) that has a cup shaped formation (20) opposite the lower end of each sleeve and element so that a cavity (21) is formed that can receive the flared end of the element in the condition in which the head (16) is withdrawn into the enlarged end (9) of the sleeve.

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It will be understood that, as a person walks with a shoe fitted with a sole as described above each of the elements will be urged downwards so that the head is positioned within the enlarged end (9) of the sleeve whilst weight is not exerted on the sole. The element is urged to this position by the
30 resiliency of the inner sole (18) and the presence of the foot within the shoe.

Each time weight is exerted on the sole the cup shaped formation will flex upwardly and push the element to its raised position (as illustrated in Figure 4) at the same time pushing on the underneath of the person's foot and, together with all the other elements, carrying out what may be described as a
5 massaging effect on the foot.

The element preferably has an axial ventilation hole (22) extending through it with a one-way valve (23) at the lower end so that a pumping action is created by the reciprocal movement of the element to ventilate the interior
10 shoe and thereby also assist in cooling a foot within the shoe.

Numerous variations may be made to the embodiment of the invention described with reference to Figure 4. Thus, as illustrated in Figure 5, the element could embody a compression spring (24) so that a varying pressure
15 would be exerted on the rounded head as a foot is pressed onto the inner sole whilst walking.

Figure 6 illustrates a further variation in which the effective length of the element is adjustable by means of screw threads (25) interconnecting the two
20 parts (26) and (27) of the element.

Figure 7 illustrates a different embodiment of the invention in which flexible capsules (28) are positioned within passages (29) through the sole (30) in a manner such that in a relaxed position the lower end (31) of each capsule
25 projects beyond the lower surface (32) of the sole (as shown in the left-hand part of Figure 7) but is pushed further inwards to form a rounded end (33) when the lower end (31) is pushed to a substantially flat condition with the lower surface of the sole as shown in the right-hand portion of Figure 7. Also as shown in the right-hand portion of Figure 7, the lower end (31a) of the
30 capsule could be retained by a blind end to the passage and an expansion chamber (29a) formed in the passage could accommodate expansion of the capsule during the application of cyclic force to it.

Figure 8 illustrates a still further embodiment of the invention in which the rigid element (35) is spring loaded by means of a compression spring (36) contained within a sleeve (37) to an upper position in which the rounded end (38) forms a bump in the inner sole (39) and the element is forced
5 downwards against the spring loading when pressure is exerted by the foot on the inner sole.

Numerous other embodiments of the invention are possible within the scope hereof.

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CLAIMS:

1. A shoe sole (2) having an inner surface (3) and an outer surface (4) and wherein the inner surface has a series of passages extending into the
5 body of the sole with the axis of the passage at generally right angles to the inner surface surrounding the passage and wherein each passage receives an element (5, 15, 28, 35) having a generally rounded end (17, 33, 38) movable relative to the inner surface of the shoe sole in the general direction of said axis of the associated passage such that said
10 rounded end of each element exerts cyclically varying pressure on a person's foot with cyclically varying weight exerted on the shoe sole by such person's foot.
2. A shoe sole as claimed in claim 1 in which each passage (37) has a
15 blind end in which case the elements (35) are resiliently biased towards a position in which the rounded ends (38) project above the inner surface (39) of the shoe sole.
3. A shoe sole as claimed in claim 1 in which the passages (7, 29) extend
20 substantially through the entire sole (6) with only a protective flexible outer sole (19, 20) covering the outer ends of the passages in which case the elements extend through the sole and are arranged such that pressure on the outer surface of the sole urges an element to a position in which the rounded end(17) projects above the inner surface (18) of
25 the shoe sole, in use.
4. A shoe sole as claimed in any one of the preceding claims in which the
30 elements have small air ducts (22) passing therethrough in a generally axial direction with the air duct optionally having a one-way valve (23) associated therewith.

5. A shoe sole as claimed in any one of the preceding claims in which the elements are rigid generally cylindrical elements that are optionally resiliently compressible in an axial direction.
- 5 6. A shoe sole as claimed in claim 5 in which the elements have a headed formation (16, 18) at each end to limit axial movement of the elements and the elements are made in two parts (15, 16) that clip together (11, 13).
- 10 7. A shoe sole as claimed in any one of claims 1 to 4 in which the elements are rigidly flexible capsules (28) containing a suitably deformable material that optionally has limited compressibility.
- 15 8. A shoe sole as claimed in any one of the preceding claims in which the shoe soles are made of resiliently deformable and compressible elastomeric material and the passages are formed by a relatively rigid sleeve (7) fitted in moulded or die cut holes in the shoe sole.
- 20 9. A shoe sole as claimed in claim 8 in which the elements pass through the sole and the sleeve is made in two parts that are injection moulded from a suitable plastics material and wherein the two parts clip together axially (13a, 11a).
- 25 10. A shoe sole as claimed in any one of the preceding claims in which the series of passages and associated elements are arranged in an array of a predetermined pattern over the shoe sole with the pattern optionally being selected to derive benefit from appropriate recognized reflexology pressure points.
- 30 11. A shoe sole as claimed in any one of the preceding claims in which the diameter of the elements is of the order of 3 to 10 mm.

12. A shoe sole as claimed in claim 11 in which the diameter of the elements is of the order of 4 to 6 mm.

13. A shoe sole as claimed in any one of the preceding claims in which the
5 rounded ends of the elements are covered by a flexible, resiliently deformable inner sole.

14. A shoe (1) fitted with a sole as claimed in any one of claims 1 to 13.

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Fig 1

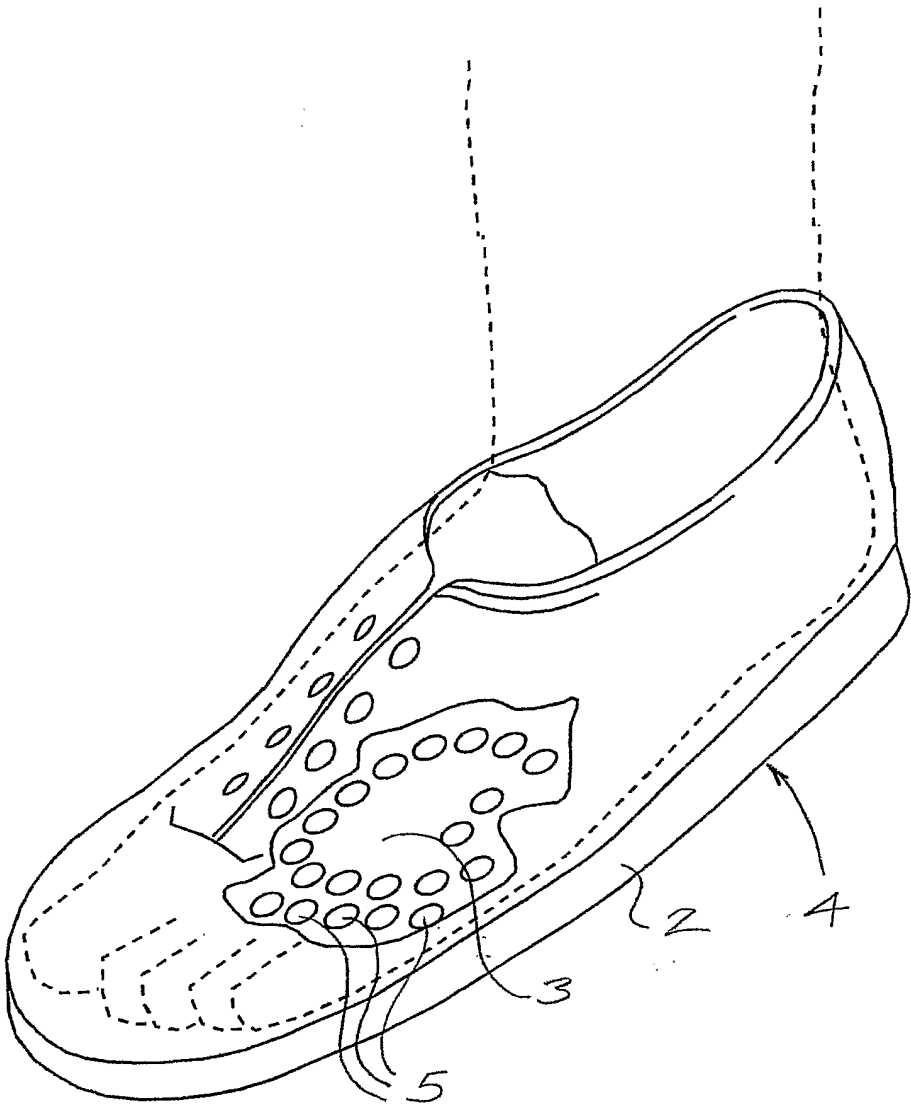
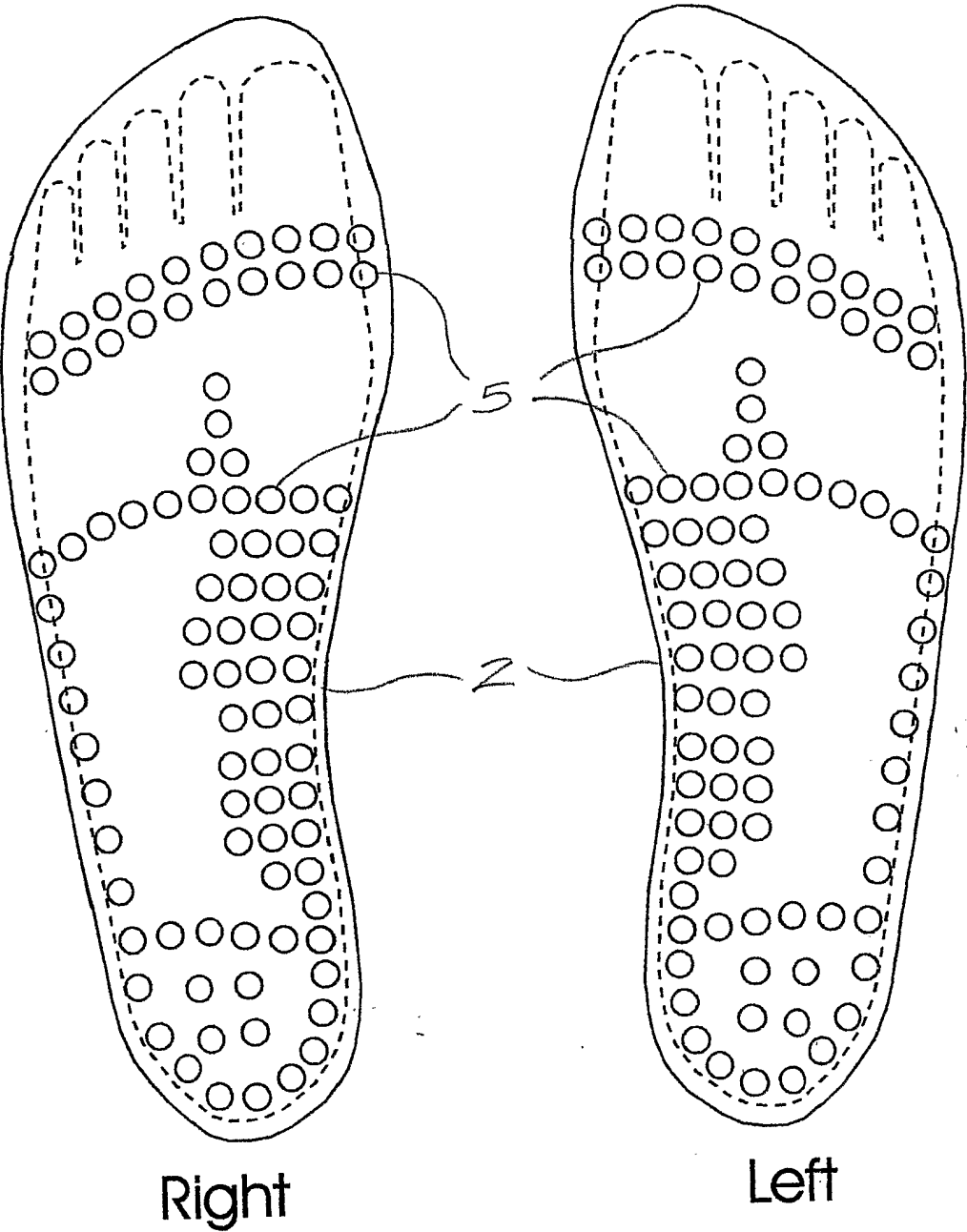
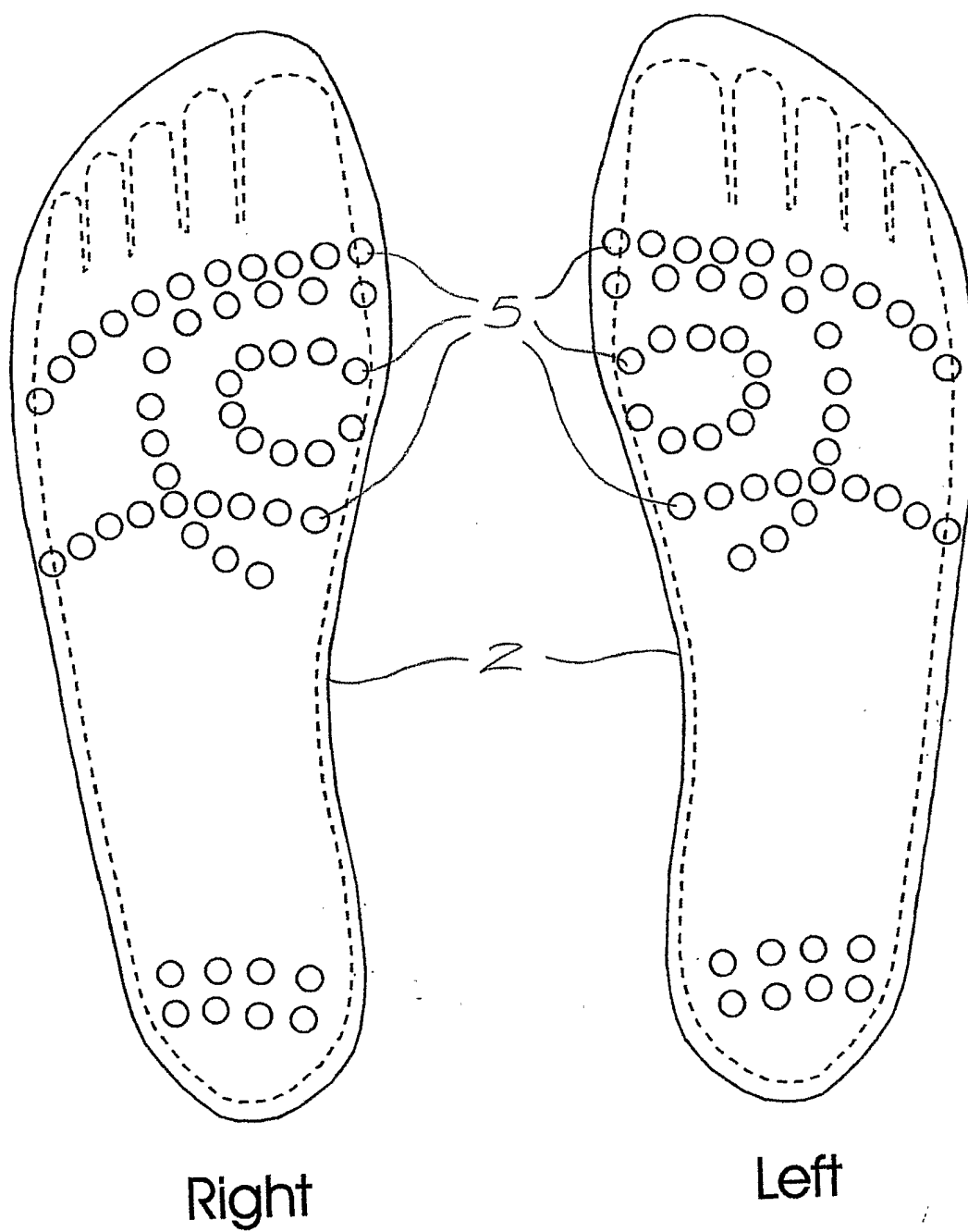


Fig 2



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FG 4

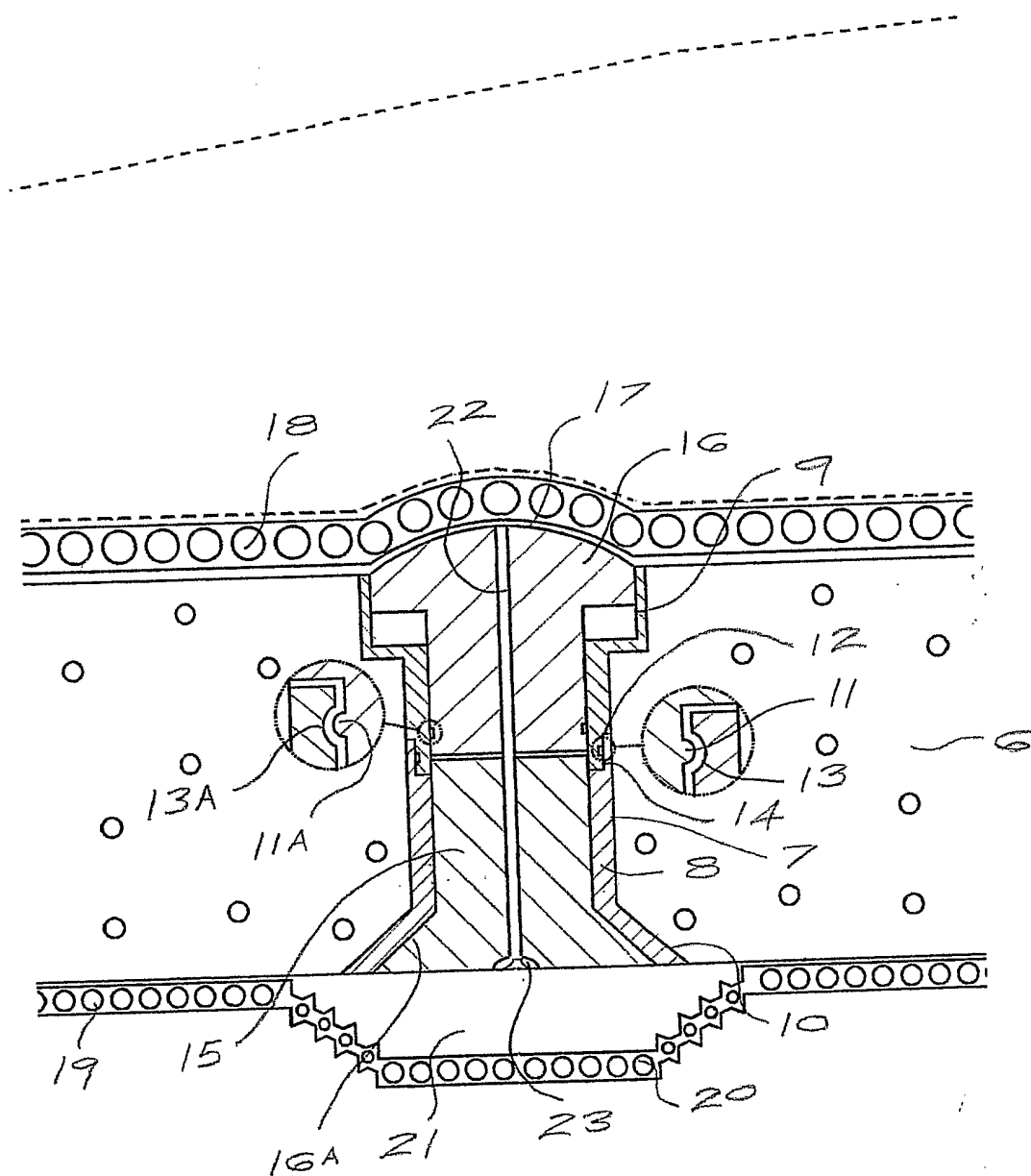


Fig 6

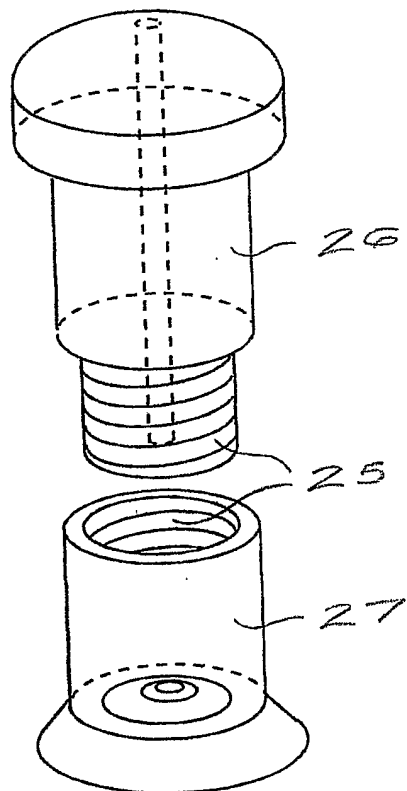


Fig 5

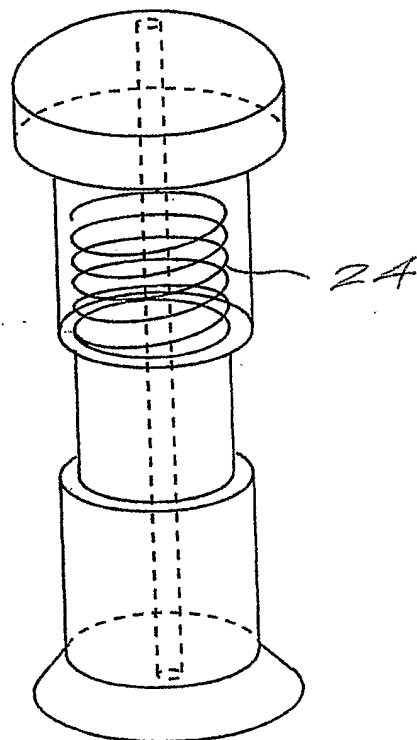


Fig 7

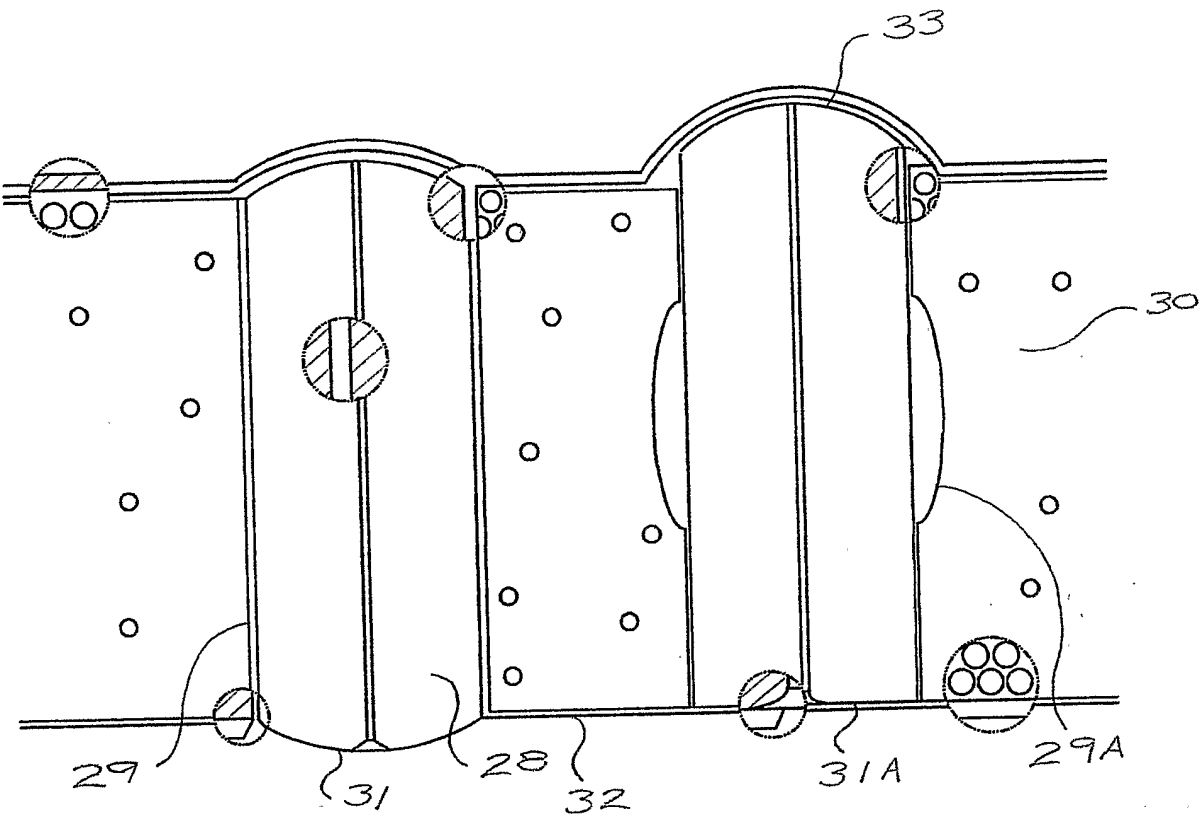
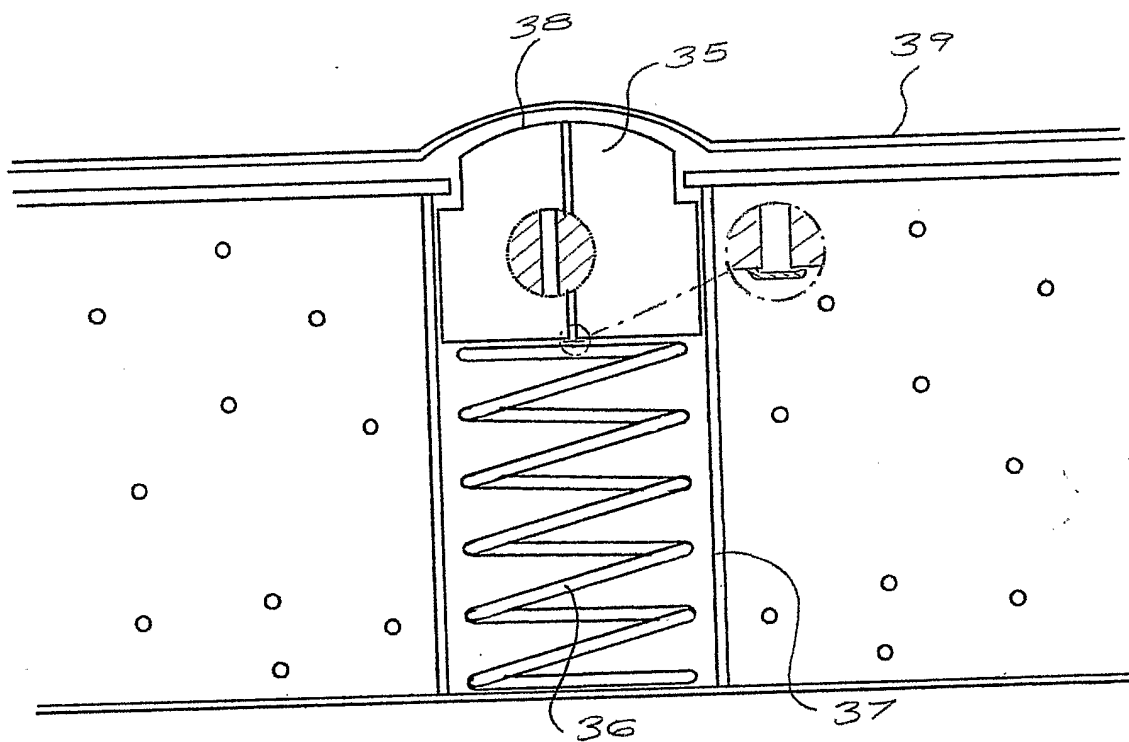


FIG 8



INTERNATIONAL SEARCH REPORT

International Application No

PCT/ZA 02/00125

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 A43B7/00 A43B7/22 A61H39/04

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 A43B A61H

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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X	DE 26 19 410 A (PEDERSEN MARTIN KRESTEN MAJGAA) 25 November 1976 (1976-11-25) the whole document ---	1,2,10, 14
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A	FR 2 779 326 A (DARRAS JEAN CLAUDE) 10 December 1999 (1999-12-10) the whole document --- -/--	1,5,6, 10,11

☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

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INTERNATIONAL SEARCH REPORT

International Application No

PCT/ZA 02/00125

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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