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(54) **Shock-absorbing sole pad assembly**

(57) A shock-absorbing sole pad assembly (100, 100', 100'') includes a pad body (40, 40', 40''), a plurality of spring coils (50), each of which has first and second ends (51, 52), a plurality of positioning units for positioning respectively the second ends (52) of the spring coils (50) relative to the pad body (40, 40', 40''), and a covering (30) overlying the spring coils (50) so as to de-

fine a volume-variable spring-receiving chamber (43) between the pad body (40, 40', 40'') and the covering (30). The covering (30) is constructed to permit flow of air therethrough such that the spring coils (50) are compressed so as to reduce volume of the chamber (43) when the covering (30) is depressed, after which the spring coils (50) return to their original shape when the covering (30) is relieved from pressure.

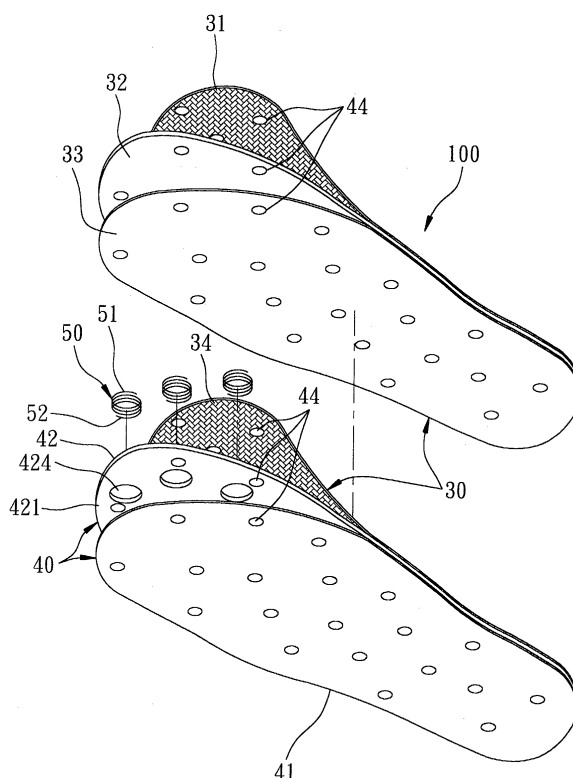


FIG. 2

Description

[0001] The invention relates to a sole pad assembly, more particularly to a shock-absorbing sole pad assembly.

[0002] Referring to Figure 1, a conventional sole pad assembly comprises a pad body 10 and an air permeable lining 20. The pad body 10 has an upper pad surface 11 and a lower pad surface 13 formed with a plurality of hollow protruding posts 12. The air permeable lining 20 has a lower lining surface 21 that covers the upper pad surface 11 of the pad body 10, an upper lining surface 22 opposite to the lower lining surface 21, and a plurality of vent holes 23, each of which extends from the upper lining surface 22 to the lower lining surface 21, and is registered with a respective one of the protruding posts 12.

[0003] In use, the pad body 10 and the air permeable lining 20 are disposed in a midsole 30 of a shoe (not shown). When the wearer's foot (not shown) applies pressure on the sole pad assembly, the protruding posts 12 are deformed, and air is released through the vent holes 23 and flows around the wearer's foot. However, in actual use, since the protruding posts 12 of the pad body 10 are mainly formed by injecting plastic materials, the manufacturing process is rather complicated as air permeability and the locations of the vent holes 23 have to be considered. Furthermore, even though the protruding posts 12 are resilient, the extent of compression is limited by material factors, which in turn, affects air flow.

[0004] Therefore, the main object of the present invention is to provide a shock-absorbing sole pad assembly that is capable of overcoming the aforementioned drawbacks of the prior art.

[0005] According to the present invention, a shock-absorbing sole pad assembly includes a pad body, a plurality of spring coils, a plurality of positioning units, and a covering. Each of the spring coils has first and second ends. The positioning units are provided for positioning respectively the second ends of the spring coils relative to the pad body. The covering overlies the spring coils so as to define a volume-variable spring-receiving chamber between the pad body and the covering. The first end of each of the spring coils is attached to the covering. The covering is constructed to permit flow of air therethrough such that the spring coils are compressed so as to reduce volume of the chamber when the covering is depressed, after which the spring coils return to their original shape when the covering is relieved from pressure.

[0006] Other features and advantages of the present invention will become apparent in the following detailed description of the preferred embodiments with reference to the accompanying drawings, of which:

Figure 1 is a sectional view illustrating a midsole of a shoe that incorporates a conventional sole pad

assembly;

Figure 2 is a partly exploded perspective view of the first preferred embodiment of a shock-absorbing sole pad assembly according to the present invention;

Figure 3 is another perspective view of the first preferred embodiment in an assembled state;

Figure 4 is a sectional view illustrating a midsole of a shoe that incorporates the first preferred embodiment;

Figure 5 is a sectional view of the first preferred embodiment in a compressed state;

Figure 6 is a sectional view illustrating the midsole of a shoe incorporating the second preferred embodiment the shock-absorbing sole pad assembly of the present invention; and

Figure 7 is a schematic sectional view of the third preferred embodiment of a shock-absorbing sole pad assembly according to the present invention.

[0007] Before the present invention is described in greater detail, it should be noted that like elements are denoted by the same reference numerals throughout the disclosure.

[0008] Referring to Figures 2 and 3, the first preferred embodiment of a shock-absorbing sole pad assembly 100 according to the present invention is shown to include a pad body 40, a plurality of spring coils 50, a plurality of positioning units, and a covering 30.

[0009] The pad body 40 includes superimposed upper and lower pad layers 42, 41, which are adhered together by means of an adhesive. The lower pad layer 41 is preferably made of a composition containing an ethylene vinyl acetate (EVA) resin and a far infrared material. As the far infrared material is a known material, a detailed description of the same will be dispensed with herein for the sake of brevity. The upper pad layer 42 is made of an air permeable foam material.

[0010] Each of the spring coils 50 is made of a magnetic material, and has first and second ends 51, 52.

[0011] The positioning units, in this embodiment, are formed as openings 424 in the upper pad layer 42 so as to receive and position respectively the second ends 52 of the spring coils 50 relative to the pad body 40. The second ends 52 of the spring coils 50 are adhesively bonded to the lower pad layer 41 of the pad body 40.

[0012] The covering 30, in this embodiment, is formed as a four-layered covering that are adhered to one another by means of an adhesive. The first and fourth layer coverings 31, 34, i.e., the uppermost and lowermost ones, are made of an air permeable woven fabric. The second layer covering 32 is made of an air permeable foam material, and is disposed under the first layer covering 31. The third layer covering 33 is made of a composition containing an ethylene vinyl acetate (EVA) resin and a far infrared material, and is sandwiched between the second and fourth layer coverings 32, 34. The covering 30 overlies the spring coils 50 so as to define a

volume-variable spring-receiving chamber 43 between the pad body 40 and the covering 30. The first end 51 of each of the spring coils 50 is attached to the covering 30. Each of the upper and lower pad layers 42, 41 and the four-layered covering 30 is formed with a plurality of vent holes 44 therethrough, each of which is in fluid communication with the chamber 43. The upper and lower pad layers 42, 41 and the four-layered covering 30 have peripheral parts that are sewn together. The covering 30 is constructed to permit flow of air therethrough such that when the covering 30 is depressed, the spring coils 50 are compressed so as to reduce volume of the chamber 43, after which the spring coils 50 return to their original shape when the covering 30 is relieved from pressure.

[0013] Referring to Figures 4 and 5, the sole pad assembly 100 is shown adapted to be disposed in a mid-sole 60 of a shoe (not shown). When a wearer's foot (not shown) steps into the shoe, the magnetic force produced by the spring coils 50 and the far infrared rays dispersed by the lower pad layer 41 of the pad body 40 and the third layer covering 33 activate human body cells, thereby effecting massaging action on the wearer's foot. Furthermore, when the wearer's foot applies pressure on the sole pad assembly 100, the spring coils 50 are compressed through the covering 30 such that air in the receiving chamber 43 is released through the vent holes 44 in the covering 30 and flows around the wearer's foot so as to provide comfort to the wearer's foot when wearing the shoe. Moreover, shock produced upon ground impact can be absorbed by the spring coils 50, thereby protecting the wearer's foot. When the wearer's foot is lifted from the ground, the spring coils 50 are restored to their normal states since no load is applied on the covering 30, and air can enter the chamber 43 at this time. In addition, since the covering 30 is a four-layered covering, it provides softness, thereby further providing comfort to the wearer's foot when wearing the shoe.

[0014] Referring to Figure 6, the second preferred embodiment of a sole pad assembly 100' according to the present invention is shown to be substantially similar to the first preferred embodiment. However, in this embodiment, the positioning units are formed as protrusions 425 that project upwardly from the upper pad layer 42' of the pad body 40' so that the second ends 52 of the spring coils 50 are sleeved respectively thereon. The effect of the second preferred embodiment on the wearer's foot is substantially similarly to that of the first preferred embodiment. Particularly, human body cells can be activated by the magnetic force produced by the spring coils 50 and the far infrared rays dispersed by the lower pad layer 41' of the pad body 40' and the third layer covering 33 when the shoe that incorporates the sole pad assembly 100' is worn such that massaging action on the wearer's foot can be effected. The air ventilating capability through the vent holes 44 in the sole pad assembly 100' when pressure is applied on the four-

layered covering 30, and the shock absorbing characteristics of the spring coils 50 so as to obtain comfort when wearing the shoe are similarly achieved.

[0015] Referring to Figure 7, the third preferred embodiment of a sole pad assembly 100" according to the present invention is shown to be incorporated in a shoe 80 (shown in phantom lines), and includes a thick sole body 70, a pad body 40", a plurality of spring coils 50, a plurality of positioning units, and a covering 30.

[0016] The sole body 70 is made of an ethylene vinyl acetate (EVA) resin, and has an upward flange 71 that extends upwardly from a periphery of the sole body 70 so as to define a receiving space 72.

[0017] The pad body 40" is made of an air permeable foam material, and is adhesively bonded to the sole body 70.

[0018] Each of the spring coils 50 is made of a magnetic material, and has first and second ends 51, 52.

[0019] The positioning units are formed as openings 424" in the pad body 40" so as to receive and position respectively the second ends 52 of the spring coils 50 relative to the pad body 40". The second ends 52 of the spring coils 50 are adhesively bonded to the sole body 70.

[0020] The covering 30 is substantially similar in construction to that in the first preferred embodiment. The first end 51 of each of the spring coils 50 is attached to the covering 30. The pad body 40" and the covering 30 are received in the receiving space 72 in the sole body 70. The effect of the third preferred embodiment on the wearer's foot is substantially similar to that described in the previous embodiments.

[0021] From the above description of the preferred embodiments of the sole pad assembly 100, 100', 100" of the present invention, it is apparent that the spring coils 50 provide greater extent of compression as compared to that provided by the protruding posts 12 (see Figure 1) in the conventional sole pad assembly so as to effect better shock-absorbency and air permeability. Furthermore, the sole pad assembly 100, 100', 100" provides softness and massaging action so as to enhance comfort to the wearer's foot.

Claims

1. A shock-absorbing sole pad assembly (100, 100', 100") **characterized by:**

a pad body (40, 40', 40");
a plurality of spring coils (50), each of which has a first end (51) and a second end (52);
a plurality of positioning units for positioning respectively said second ends (52) of said spring coils (50) relative to said pad body (40, 40', 40"); and
a covering (30) overlying said spring coils (50) so as to define a volume-variable spring-receiv-

- ing chamber (43) between said pad body (40, 40', 40'') and said covering (30), said first end (51) of each of said spring coils (50) being attached to said covering (30), said covering (30) being constructed to permit flow of air there-
through such that when said covering (30) is depressed, said spring coils (50) are compressed so as to reduce volume of said chamber (43), after which said spring coils (50) return to their original shape when said covering (30) is relieved from pressure.
2. The shock-absorbing sole pad assembly (100, 100', 100'') as claimed in Claim 1, **characterized in that** said spring coils (50) are made of a magnetic material.
 3. The shock-absorbing sole pad assembly (100, 100') as claimed in Claim 1, **characterized in that** said pad body (40, 40') includes superimposed upper and lower pad layers (42, 41, 42', 41'), which are adhered together.
 4. The shock-absorbing sole pad assembly (100, 100') as claimed in Claim 1, **characterized in that** at least one of said covering (30) and said pad body (40, 40') includes a layer which is made of a composition containing a resin and a far infrared material.
 5. The shock-absorbing sole pad assembly (100, 100') as claimed in Claim 4, further **characterized in that** said resin is an ethylene vinyl acetate resin.
 6. The shock-absorbing sole pad assembly (100, 100') as claimed in Claim 3, further **characterized in that** said upper pad layer (42, 42') is made of an air permeable foam material.
 7. The shock-absorbing sole pad assembly (100, 100', 100'') as claimed in Claim 3, further **characterized in that** said covering (30) is formed as a multi-layered covering.
 8. The shock-absorbing sole pad assembly (100, 100') as claimed in Claim 7, further **characterized in that** each of said upper and lower pad layers (42, 41, 42', 41') and said multi-layered covering is formed with a plurality of vent holes (44) therethrough, each of which is in fluid communication with said chamber (43).
 9. The shock-absorbing sole pad assembly (100, 100') as claimed in Claim 7, further **characterized in that** said upper and lower pad layers (42, 41, 42', 41') and said multi-layered covering have peripheral parts that are sewn together.
 10. The shock-absorbing sole pad assembly (100) as claimed in Claim 3, further **characterized in that** said positioning units are formed as openings (424) in said upper pad layer (42) to receive respectively said second ends (52) of said spring coils (50), said second ends (52) of said spring coils (50) being adhesively bonded to said lower pad layer (41).
 11. The shock-absorbing sole pad assembly (100') as claimed in Claim 3, further **characterized in that** said positioning units are formed as protrusions (425) that project upwardly from said upper pad layer (42) so that said second ends (52) of said spring coils (50) are sleeved respectively thereon.
 12. The shock-absorbing sole pad assembly (100'') as claimed in Claim 1, further **characterized by** a sole body (70) having an upward flange (71) that extends upwardly from a periphery of said sole body (70) so as to define a receiving space (72), said pad body (40'') and said covering (30) being received in said receiving space (72), said pad body (40'') being adhesively bonded to said sole body (70).
 13. The shock-absorbing sole pad assembly (100'') as claimed in Claim 12, **characterized in that** said positioning units are formed as openings (424'') in said pad body (40'') to receive respectively said second ends (52) of said spring coils (50), said second ends (52) of said spring coils (50) being adhesively bonded to said sole body (70).

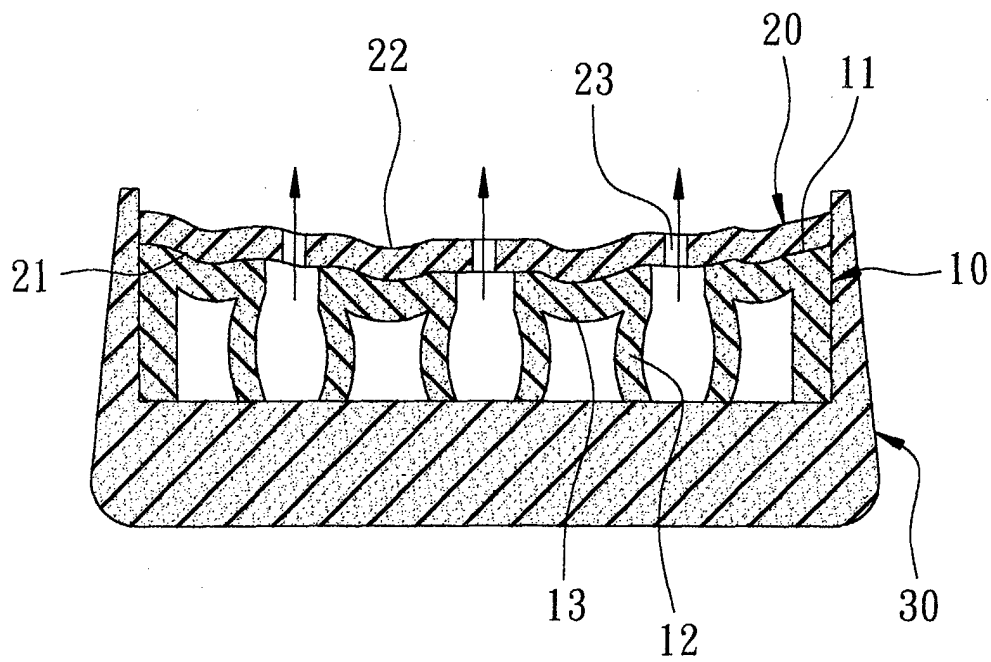


FIG. 1
PRIOR ART

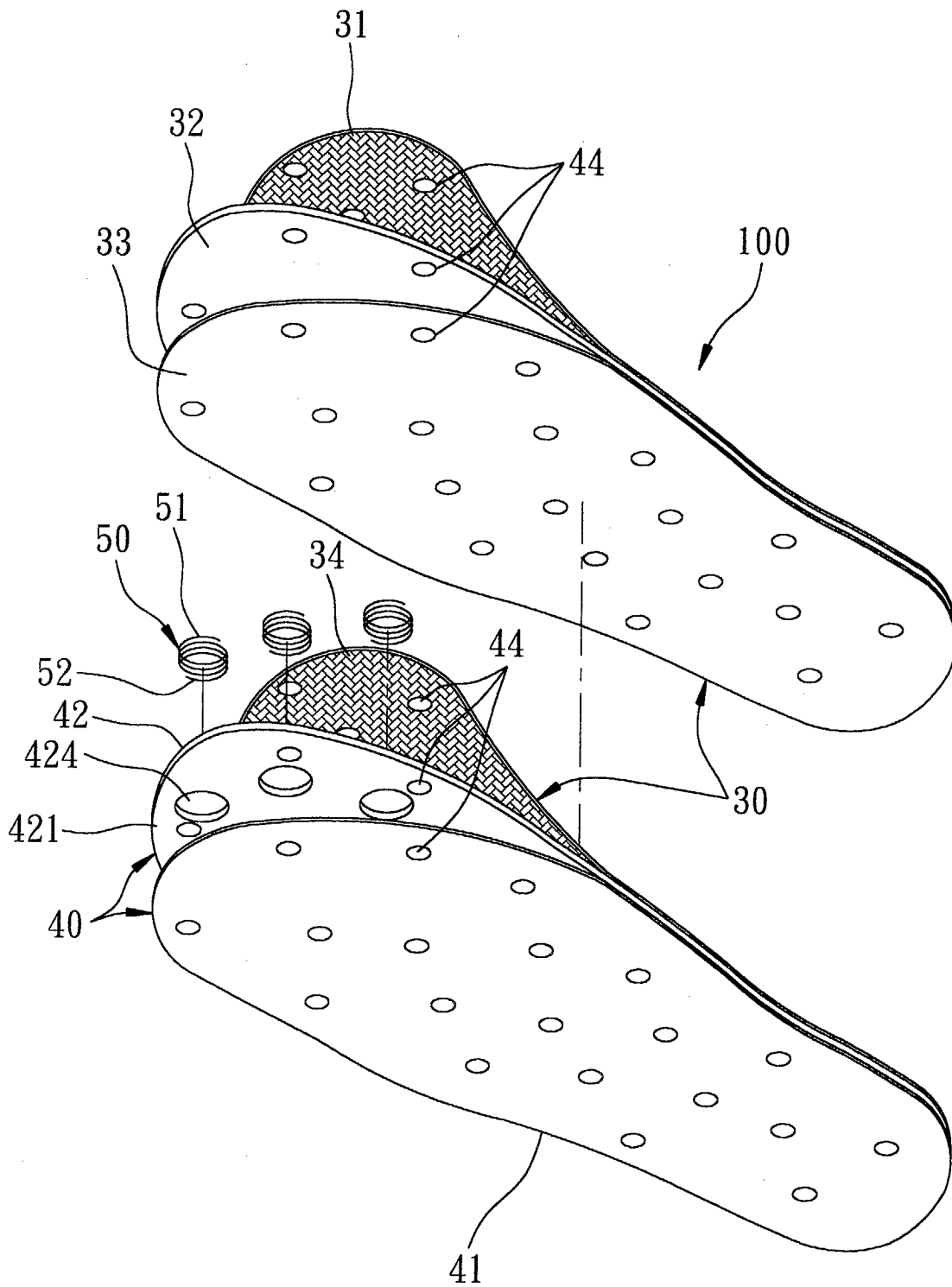


FIG. 2

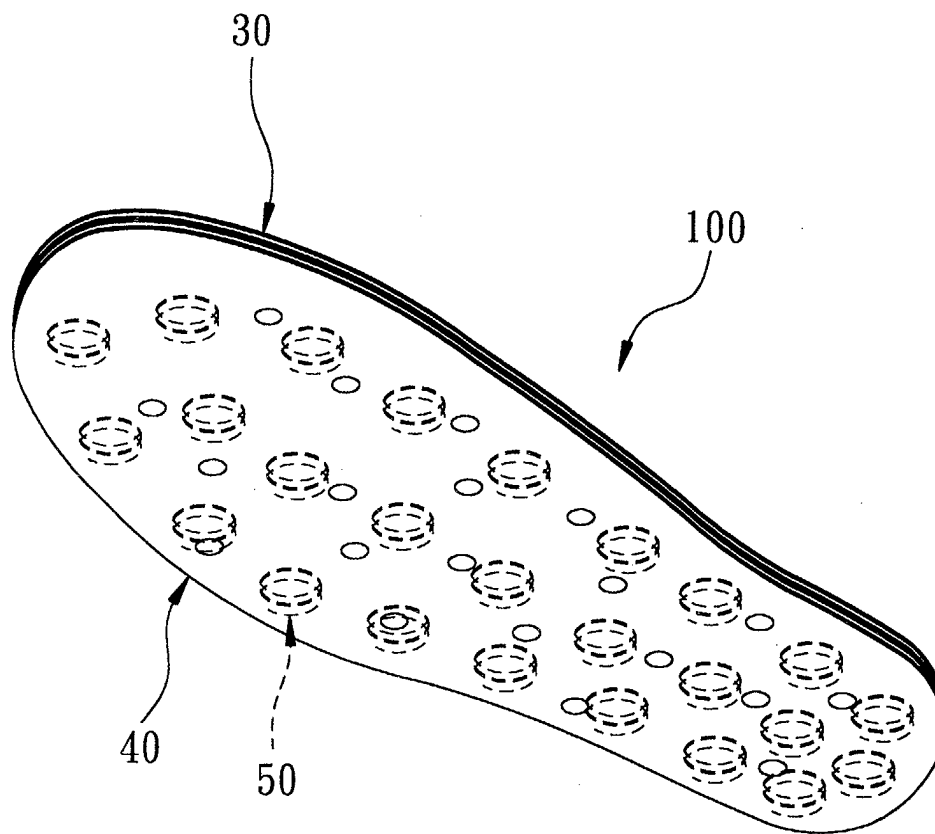


FIG. 3

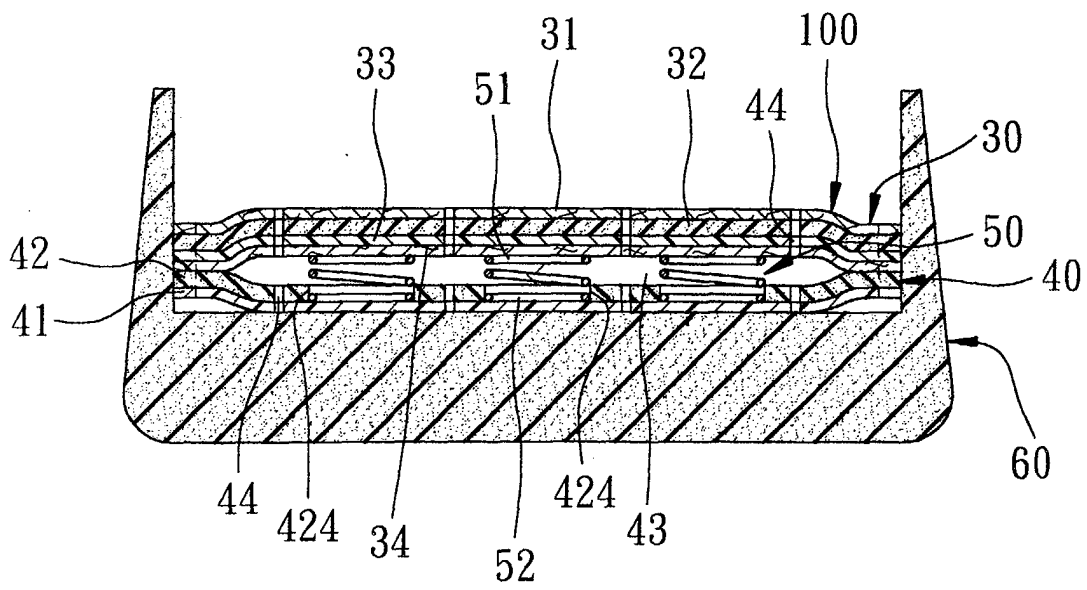


FIG. 4

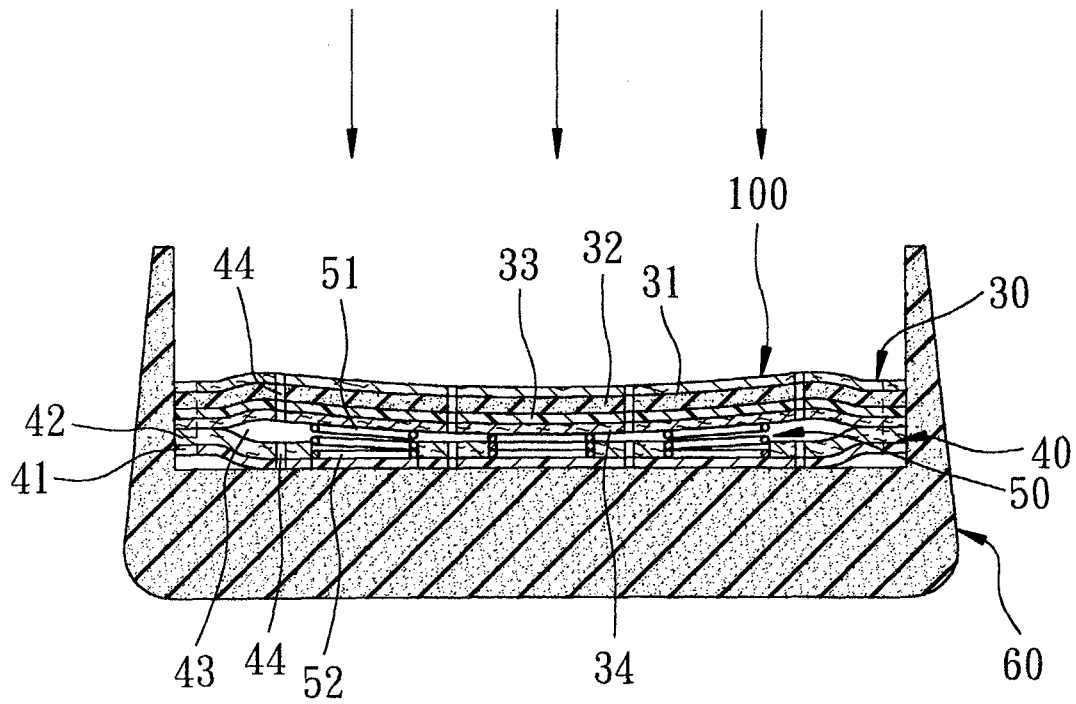


FIG. 5

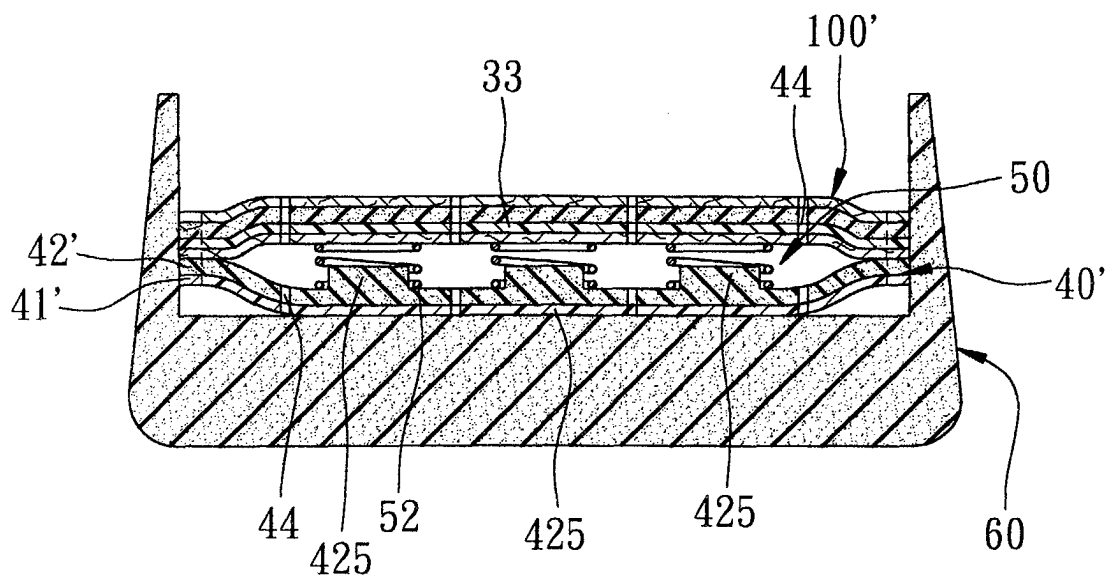
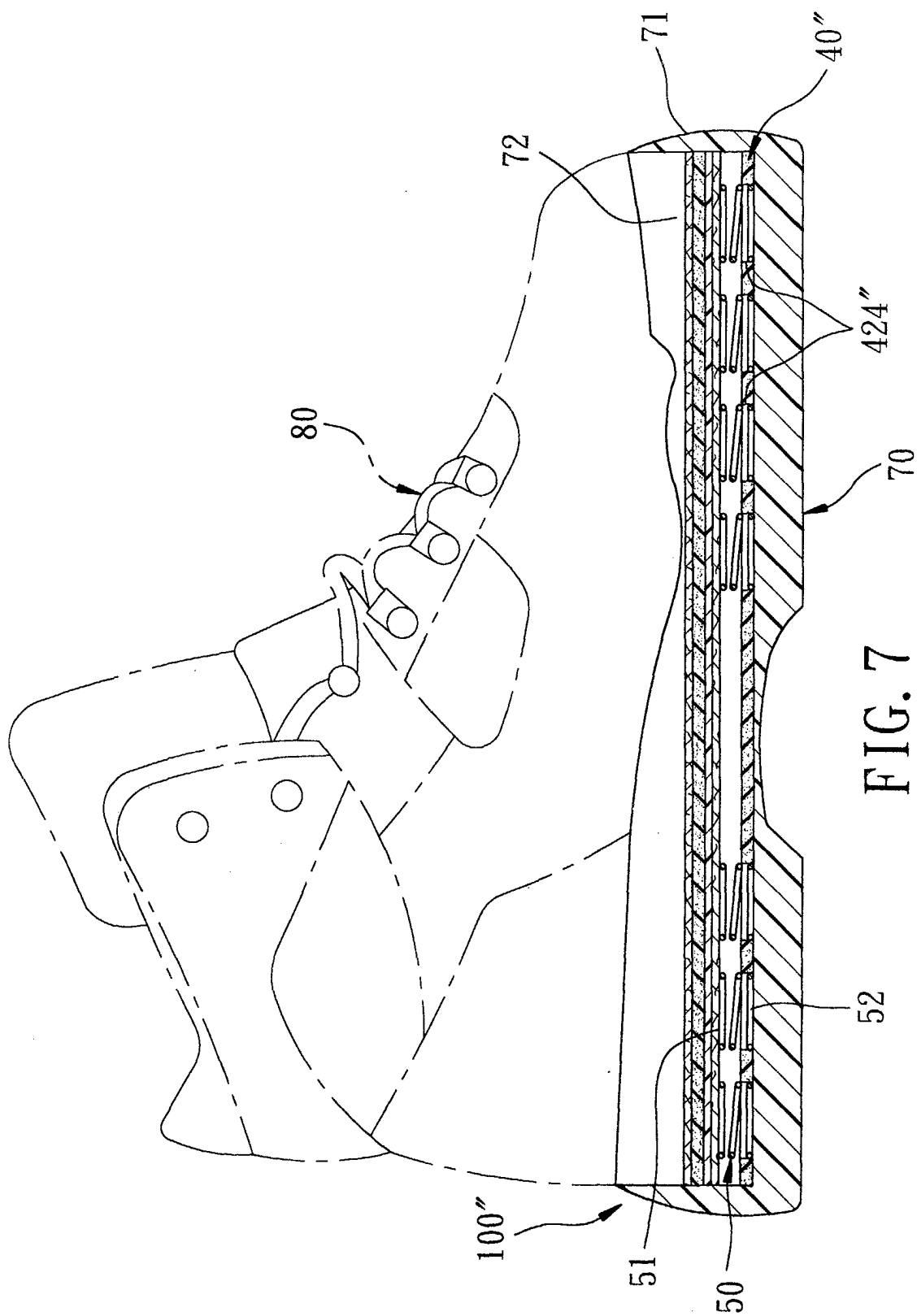


FIG. 6





European Patent
Office

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Application Number
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The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 13 May 2003	Examiner Cianci, S
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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