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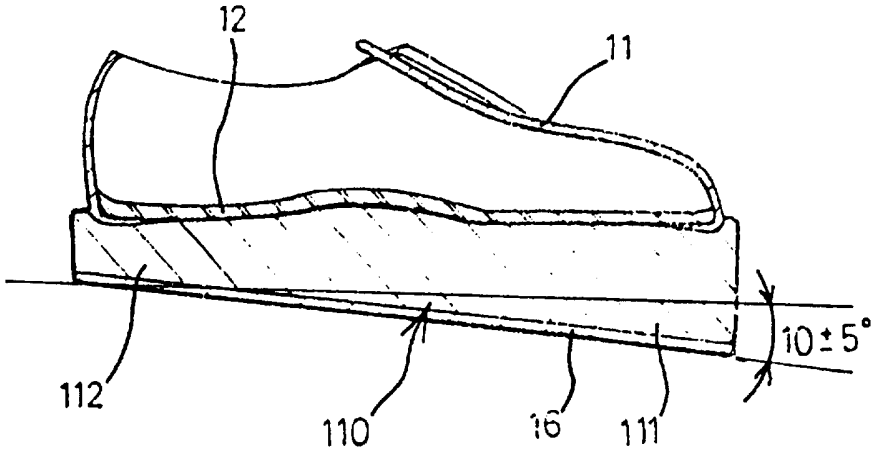
(54) Title: SHOES

(57) Abstract

A shoe having an outer sole structure in which its toe portion has a thickness larger than its heel portion so that an efficient centrifugal contraction of the hamstring muscle and gastrocnemius muscle of the user is carried out during the walking action, thereby achieving a decomposition of unbalanced fat in the pelvic limb. In accordance with the outer sole, the walking actions in the heel strike phase, foot flat phase, mid stance phase and heel off phase are carried out under the condition in which the leg is straight stretched. Accordingly, the centrifugal contraction of the hamstring muscle or gastrocnemius muscle is generated for a lengthened span of time. Since the outer shoe structure provides an efficient generation of the centrifugal contraction, it is possible to obtain an effective fat decomposition of the hamstring muscle and gastrocnemius muscle. As a result, a balanced management for the pelvic limb is achieved.



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SHOES

Technical Field

The present invention relates to shoes, and more particularly to a shoe having an outer sole structure in which its toe portion has a thickness larger than its heel portion so that an efficient centrifugal contraction of the hamstring muscle and gastrocnemius muscle of the user is carried out during the walking action, thereby achieving a decomposition of unbalanced fat in the pelvic limb.

Background Art

Generally, the muscular contraction of a human body mainly includes a centripetal contraction, in which a muscle generates a tension (energy or muscular force resulting from an action of the muscle) while being shortened in length, a centrifugal contraction, in which a muscle generates a tension while being elongated in length, and an isometric contraction, in which a muscle generates a tension without any variation in length. The consumption of energy in a human body or action of the human body result from a muscular contraction which may mainly be a centripetal or isometric contraction.

However, a large tension is generated in a centrifugal contraction, as compared to the centripetal or isometric contraction. A more efficient metabolism is also obtained in the centrifugal contraction. The centrifugal contraction also consumes a large amount of energy as compared to the centripetal contraction. These facts are very interested.

Now, the procedure of a muscular contraction generated in the legs of a human body, namely, the pelvic

limb, in accordance with the above-mentioned principle when the human body walks, will be described in conjunction with FIG. 1. As shown in FIG. 1, the muscle of the pelvic limb mainly includes a quadriceps femoris muscle 1 forwardly disposed above the knee, a hamstring muscle 2 rearwardly disposed above the knee and a gastrocnemius muscle 3 rearwardly disposed beneath the knee. The gastrocnemius muscle 3 is also called "a calf muscle". Typically, fat in the pelvic limb mainly exists in the hamstring muscle 2 and gastrocnemius muscle 3.

The gait cycle of the pelvic limb includes a double stance phase, in which both feet are supported on the ground, and a stance phase, in which one foot is supported on the ground while the other foot is spaced from the ground. The stance phase has a span from the point of time when the heel of the foot comes into contact with the ground to the point of time when the toe of the foot is lifted up from the ground. In the stance phase of one foot, the other foot is in a space phase. In the space phase, the associated foot is spaced from the ground. The muscular contraction is mainly generated in the stance phase of the gait cycle. In the space phase, there is little muscular contraction. This will be described in more detail hereinafter.

The stance phase is divided into a heel strike phase A, in which the heel of the foot is in contact with the ground, a foot flat phase B, in which the flat of the foot is in contact with the ground, a mid stance phase C, in which the center of the weight of the human body moves, a heel off phase D, in which the heel of the foot is lifted up from the ground, and a toe off phase E, in which the toe of the foot kicks off the ground. The whole action of the leg in the stance phase is carried out while

the knee is slightly bent. The muscular contraction in the stance phase is mainly generated in the quadriceps femoris muscle 1. In the heel strike phase A, however, a centrifugal contraction is generated for a short span of time in the hamstring muscle 2 or gastrocnemius muscle 3. This is because the leg is maintained in a straight stretched state in the heel strike phase A. Such a centrifugal contraction, which is generated for a short span of time in the hamstring muscle 2 and gastrocnemius muscle 3, assists in the decomposition of fat contained in the hamstring muscle 2 and gastrocnemius muscle 3, thereby more or less assisting in a balanced management for the pelvic limb.

Referring to FIG. 2, a shoe having a conventional outer sole structure is illustrated. As shown in FIG. 2, the shoe, which is denoted by the reference numeral 10, includes an upper shoe portion 11 adapted to cover the foot of the user, and a sole bonded to or sewed on the lower end of the upper shoe portion 11. The sole includes an inner sole 12 and an outer sole 13. The outer sole 13 is provided with a toe portion 14 and a heel portion 15 having a thickness larger than that of the toe portion 14.

FIG. 3 illustrates the walking action of the user who wears shoes having the outer sole structure of FIG. 2. In every stance phase, the heel portion 15 of the outer sole 13 of one shoe (in FIG. 3, the right shoe) first comes into contact with the ground in the heel strike phase A. In this heel strike phase A, the right leg of the user is maintained at a straight stretched state. A foot flat phase B follows the heel strike phase A in accordance with a continuous walking action of the user. A mid stance phase C then follows the foot flat phase B. In the mid stance phase C, the center of the weight of the

user moves while the knee of the user is bent. A centrifugal contraction of the hamstring muscle 2 or gastrocnemius muscle 3 is generated for a short span of time in the heel strike phase A in which the knee of the user is straight stretched. In the foot flat phase B, the walking action of the user progresses under the condition in which the knee of the user is maintained at a bent state. This is because the heel portion 15 of the outer sole 13 has a thickness larger than that of the toe portion 14. For this reason, the whole walking action in every stance phase except for the instantaneous heel strike phase A is carried out under the condition in which the knee of the user is slightly bent. Accordingly, the quadriceps femoris muscle 1 contracts mainly in the stance phase. Thus, the conventional shoe has a problem in that the walking action of the user has a gait cycle in which the centrifugal contraction of the hamstring muscle or gastrocnemius muscle is generated for a shorter span of time than that in the case of barefoot walking. Since the conventional shoe can not provide an efficient generation of the centrifugal contraction, it is impossible to obtain an effective fat decomposition of the hamstring muscle and gastrocnemius muscle. As a result, it is difficult to obtain a balanced management for the pelvic limb.

Disclosure of the Invention

Therefore, an object of the invention is to provide a shoe having an outer sole structure in which its toe portion has a thickness larger than its heel portion so that the walking action of the user in every stance phase progresses under the condition in which the knee of the user is maintained at a stretched state, thereby obtaining a more efficient centrifugal contraction of the hamstring

muscle and gastrocnemius muscle during the walking action.

In accordance with one aspect, the present invention provides a shoe comprising: an outer sole having a toe portion and a heel portion, the toe portion having a thickness larger than that of the heel portion in such a manner that the outer sole has an upward slope of about 10° ± 5°,from the heel portion to the toe portion.

Brief Description of the Drawings

Other objects and aspects of the invention will become apparent from the following description of embodiments with reference to the accompanying drawings in which:

FIG. 1 is a schematic view explaining the pelvic limb muscle and gait cycle of human being;

FIG. 2A is a perspective view illustrating a shoe having a conventional outer sole structure;

FIG. 2B is a sectional view of the shoe shown in FIG. 2A;

FIG. 3 is a schematic view explaining a muscular contraction of the pelvic limb of the user who wears shoes having the outer sole structure of FIG. 2;

FIG. 4A is a perspective view illustrating a shoe having an outer sole structure according to a first embodiment of the present invention;

FIG. 4B is a sectional view of the shoe shown in FIG. 4A;

FIG. 5 is a schematic view explaining a muscular contraction of the pelvic limb of the user who wears shoes having the outer sole structure of the first embodiment;

FIG. 6 is a sectional view illustrating a shoe having an outer sole structure according to a second embodiment

of the present invention;

FIG. 7 is a schematic view explaining a muscular contraction of the pelvic limb of the user who wears shoes having the outer sole structure of the second embodiment;

FIG. 8 is a sectional view illustrating a shoe having an outer sole structure according to a third embodiment of the present invention; and

FIG. 9 is a schematic view explaining a muscular contraction of the pelvic limb of the user who wears shoes having the outer sole structure of the second embodiment.

Best Mode for Carrying Out the Invention

Referring to FIGS. 4A and 4B, a shoe having an outer sole structure according to a first embodiment of the present invention is illustrated. In FIG. 4A and 4B, elements respectively corresponding to those in FIG. 1 are denoted by the same reference numerals. As shown in FIGS. 4A and 4B, the shoe, which is denoted by the reference numeral 100, includes an upper shoe portion 11 adapted to cover the foot of the user, and a sole bonded to or sewed on the lower end of the upper shoe portion 11. The sole includes an inner sole 12, an outer sole 110, and a bottom sole 16. The outer sole 110 is provided with a toe portion 111 and a heel portion 112. The toe portion 111 has a thickness larger than that of the heel portion 112. That is, the outer sole 110 has an upward slope of about $10^{\circ} \pm 5^{\circ}$, from its heel portion to its toe portion so that the walking action of the user in the heel strike phase A and foot flat phase B is carried out under the condition in which the knee of the user is maintained at a stretched state, in order to obtain an efficient centrifugal contraction of the hamstring muscle 2 and gastrocnemius muscle 3 while causing any inconvenience in walking.

Preferably, the slope of the outer sole 110 is about 10°. The slope is appropriately determined in accordance with the stature (in particular, the length of the pelvic limb), weight, foot size and stance (determined by the length of the pelvic limb) of the user.

The outer sole 110 of the present invention may be applied to a variety of shoes such as sports shoes, boots, casual shoes and slippers. Preferably, the outer sole 110 is made of a material exhibiting a superior shock absorption in order to prevent an arthritis or lumbago from occurring as an adverse side effect in walking. However, the outer sole may be made of other materials.

The bottom sole 16 is attached to the whole lower surface of the outer sole 110. However, the bottom sole 16 may have an attachment structure different from that of the illustrated case.

Now, a muscular contraction of the pelvic limb generated during the walking action of the user, who wears shoes having the outer sole structure of the first embodiment, will be described in conjunction with FIG. 5.

As shown in FIG. 5, the heel portion 112 of the outer sole 110 of one shoe (in FIG. 5, the right shoe) first comes into contact with the ground in the heel strike phase A of every stance phase. In this heel strike phase A, the right leg of the user is maintained at a straight stretched state. The toe portion 111 of the outer sole 110 comes into contact with the ground just after the heel strike phase A and keeps this contact state. Accordingly, the knee of the user is still maintained at the stretched state in the foot flat phase B and mid stance phase C sequentially following the heel strike phase A. In the mid stance phase C, the center of the weight of the user moves.

In the heel off phase D and toe off phase E, the actions of lifting up the heel of the foot and kicking off the ground by the toe of the foot are carried out under the condition in which the leg is maintained at the stretched state. A space phase follows the above-mentioned stance phase. During the transition from the stance phase to the space phase, the ankle is stretched while the knee is bent as the toe of the foot kicks off the ground. Although the whole walking action in the heel strike phase A, foot flat phase B, mid stance phase C, heel off phase D and toe off phase E is carried out under the condition in which the leg is straight stretched, as mentioned above, there is no damage applied to the ankle, knee and flank joint due to an application of the user's weight.

Referring to FIG. 6, a shoe having an outer sole structure according to a second embodiment of the present invention is illustrated. In FIG. 6, elements respectively corresponding to those in FIG. 1 are denoted by the same reference numerals. As shown in FIG. 6, the shoe, which is denoted by the reference numeral 200, includes an outer sole 210 provided with a toe portion 211, a heel portion 212, and an intermediate arch portion 213 formed between the toe and heel portions 211 and 212. The intermediate arch portion 213 of the outer sole 210 has a thickness larger than those of the toe and heel portions 211 and 212 in such a manner that the toe and heel portions 211 and 212 have opposite inclined bottom surfaces 214 and 215 extending upwardly inclinedly from the intermediate arch portion 213, respectively. The inclined bottom surfaces 214 and 215 have an upper slope of about 10° ± 5°,from the intermediate arch portion 213 so that the walking action of the user in the heel strike

phase A and foot flat phase B is carried out under the condition in which the knee of the user is maintained at a stretched state, in order to obtain an efficient centrifugal contraction of the hamstring muscle 2 and gastrocnemius muscle 3 while causing any inconvenience in walking. The slope is appropriately determined in accordance with the stature (in particular, the length of the pelvic limb), weight, foot size and stance (determined by the length of the pelvic limb) of the user.

The bottom sole 16 is attached to the whole lower surface of the outer sole 210. However, the bottom sole 16 may have an attachment structure different from that of the illustrated case.

Now, a muscular contraction of the pelvic limb generated during the walking action of the user, who wears shoes having the outer sole structure of the second embodiment, will be described in conjunction with FIG. 7.

As shown in FIG. 7, the heel portion 212 of the outer sole 210 of one shoe (in FIG. 7, the right shoe) first comes into contact with the ground in the heel strike phase A of every stance phase. In this heel strike phase A, the right leg of the user is maintained at a straight stretched state. In the foot flat phase B following the heel strike phase A, the rear bottom surface 215 of the outer sole 210 is in contact with the ground. In the subsequent mid stance phase C and heel off phase D, the front bottom surface 214 is in contact with the ground.

In the heel off phase D and toe off phase E, the actions of lifting up the heel of the foot and kicking off the ground by the toe of the foot are carried out under the condition in which the leg is maintained at the stretched state. A space phase follows the above-mentioned stance phase. During the transition from the

stance phase to the space phase, the ankle is stretched while the knee is bent as the toe of the foot kicks off the ground. Although the whole walking action in the heel strike phase A, foot flat phase B, mid stance phase C, heel off phase D and toe off phase E is carried out under the condition in which the leg is straight stretched, as mentioned above, there is no damage applied to the ankle, knee and flank joint due to an application of the user's weight. Accordingly, the outer sole 210 of this embodiment provides the same effect as the outer sole 110 of the first embodiment.

Referring to FIG. 8, a shoe having an outer sole structure according to a third embodiment of the present invention is illustrated. In FIG. 8, elements respectively corresponding to those in FIG. 1 are denoted by the same reference numerals. As shown in FIG. 8, the shoe, which is denoted by the reference numeral 300, includes an outer sole 310 having a toe portion 311 and a heel portion 312. The toe portion 311 of the outer sole 310 has a thickness larger than that of the heel portion 312. The outer sole 310 is also provided with a V-shaped cut-out portion 313 at its toe portion 311. The outer sole 310 has an upward slope of about 10° ± 5°,from its heel portion to its toe portion so that the walking action of the user in the heel strike phase A and foot flat phase B is carried out under the condition in which the knee of the user is maintained at a stretched state, in order to obtain an efficient centrifugal contraction of the hamstring muscle 2 and gastrocnemius muscle 3 while causing any inconvenience in walking. The slope is appropriately determined in accordance with the stature (in particular, the length of the pelvic limb), weight, foot size and stance (determined by the length of the

pelvic limb) of the user.

The bottom sole 16 is attached to the whole lower surface of the outer sole 310. However, the bottom sole 16 may have an attachment structure different from that of the illustrated case.

Now, a muscular contraction of the pelvic limb generated during the walking action of the user, who wears shoes having the structure of the third embodiment, will be described in conjunction with FIG. 9.

As shown in FIG. 9, the heel portion 312 of the outer sole 310 of one shoe (in FIG. 9, the right shoe) first comes into contact with the ground in the heel strike phase A of every stance phase. In this heel strike phase A, the right leg of the user is maintained at a straight stretched state. In the foot flat phase B following the heel strike phase A, the rear bottom surface of the outer sole 310 is in contact with the ground. In the subsequent mid stance phase C and heel off phase D, the front bottom surface is in contact with the ground while the facing inner surfaces of the cut-out portion 313 are in contact with each other.

In the heel off phase D and toe off phase E, the actions of lifting up the heel of the foot and kicking off the ground by the toe of the foot are carried out under the condition in which the leg is maintained at the stretched state. A space phase follows the above-mentioned stance phase. During the transition from the stance phase to the space phase, the ankle is stretched while the knee is bent as the toe of the foot kicks off the ground. Although the whole walking action in the heel strike phase A, foot flat phase B, mid stance phase C, heel off phase D and toe off phase E is carried out under the condition in which the leg is straight stretched, as

mentioned above, there is no damage applied to the ankle, knee and flank joint due to an application of the user's weight. Accordingly, the outer sole 310 of this embodiment provides the same effect as the outer soles 110 and 210 of the first and second embodiments.

Industrial Applicability

As apparent from the above description, the present invention provides a shoe having an outer sole structure in which its toe portion has a thickness larger than its heel portion. By virtue of such an outer sole structure, the leg of the user is maintained at a straight stretched state when the heel portion of the outer sole of the shoe first comes into contact with the ground in the heel strike phase of every stance phase. Since the toe portion of the outer sole has a thickness larger than the heel portion, it comes into contact with the ground just after the heel portion comes into contact with the ground. Accordingly, the walking actions in the foot flat phase and mid stance phase are carried out under the condition in which the leg of the user is maintained at the stretched state. In the subsequent heel off phase and toe off phase, the actions of lifting up the heel of the foot and kicking off the ground by the toe of the foot are carried out under the condition in which the leg is maintained at the stretched state. A space phase follows the above-mentioned stance phase. During the transition from the stance phase to the space phase, the ankle is stretched while the knee is bent as the toe of the foot kicks off the ground. Although the whole walking action in the heel strike phase, foot flat phase, mid stance phase, heel off phase and toe off phase is carried out under the condition in which the leg is straight

stretched, there is no damage applied to the ankle, knee and flank joint due to an application of the user's weight. In accordance with the outer sole structure of the present invention, the span of time, in which the leg is maintained at a straight stretched state during the whole walking action in the stance phase, is lengthened. Accordingly, the centrifugal contraction of the hamstring muscle or gastrocnemius muscle is generated for a lengthened span of time. Since the shoe of the present invention provides an efficient generation of the centrifugal contraction, it is possible to obtain an effective fat decomposition of the hamstring muscle and gastrocnemius muscle. As a result, a balanced management for the pelvic limb is achieved.

Although the preferred embodiments of the invention have been disclosed for illustrative purposes, those skilled in the art will appreciate that various modifications, additions and substitutions are possible, without departing from the scope and spirit of the invention as disclosed in the accompanying claims.

Claims

1. A shoe comprising:

an outer sole having a toe portion and a heel portion, the toe portion having a thickness larger than that of the heel portion in such a manner that the outer sole has an upward slope of about 10° ± 5°,from the heel portion to the toe portion.

2. The shoe in accordance with claim 1, wherein the outer sole further has an intermediate arch portion formed between the toe and heel portions, the intermediate arch portion having a thickness larger than those of the toe and heel portions.

3. The shoe in accordance with claim 1, wherein the outer sole further has a V-shaped cut-out portion at the toe portion.

FIG.1

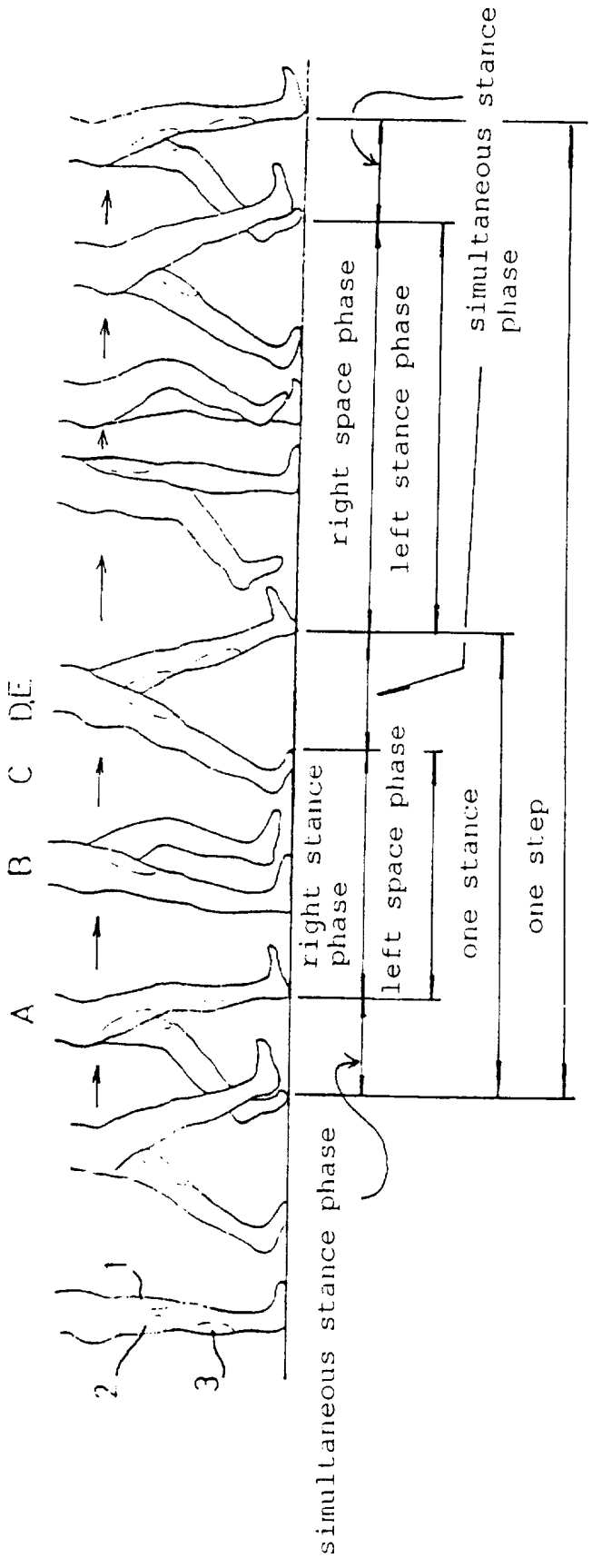
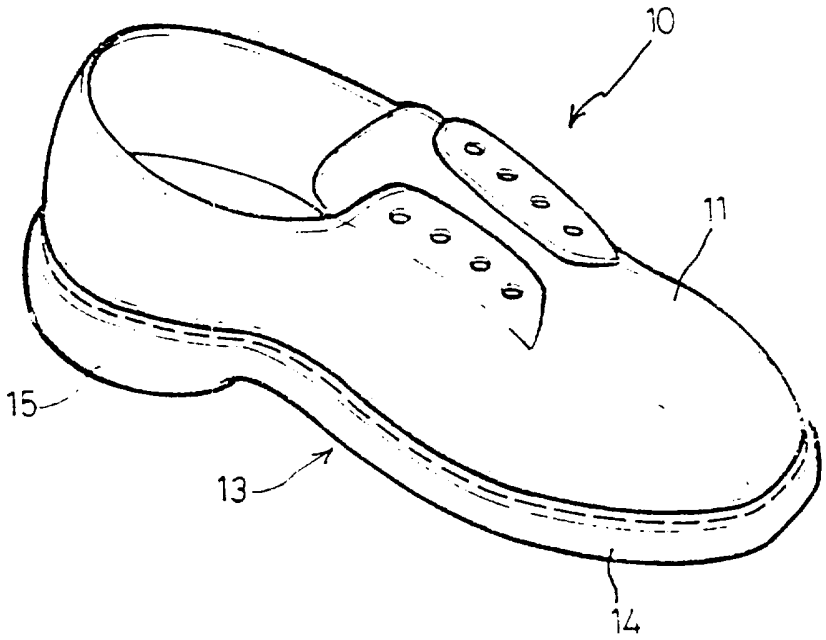

A
B
C
D
E
1
2
3
simultaneous stance phase
right stance phase
left space phase
one stance
one step
right space phase
left stance phase
simultaneous stance phase

FIG.2

(A)



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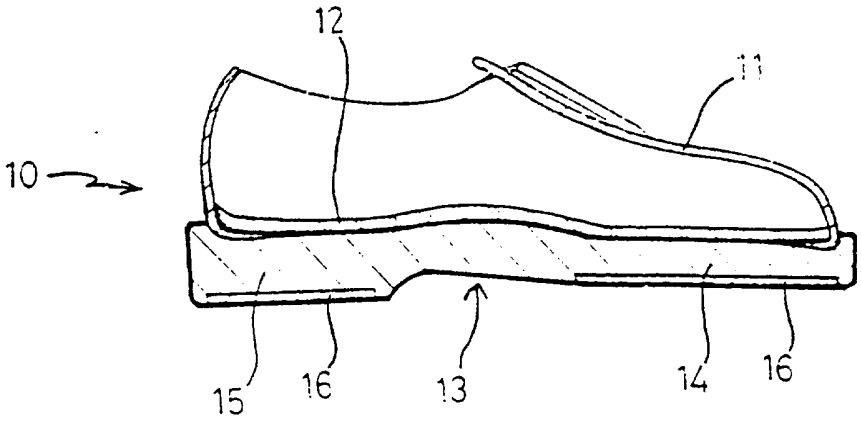


FIG.3

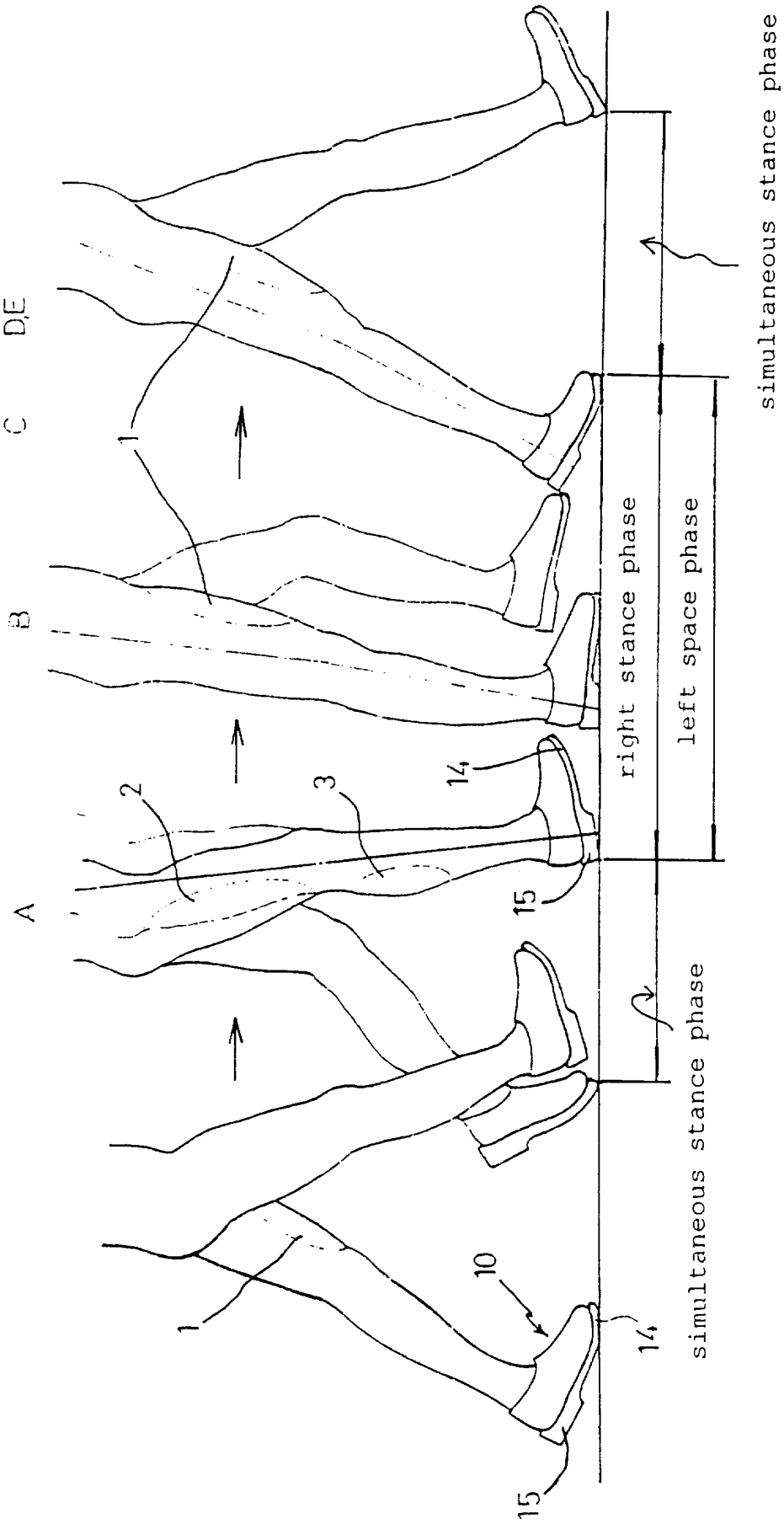
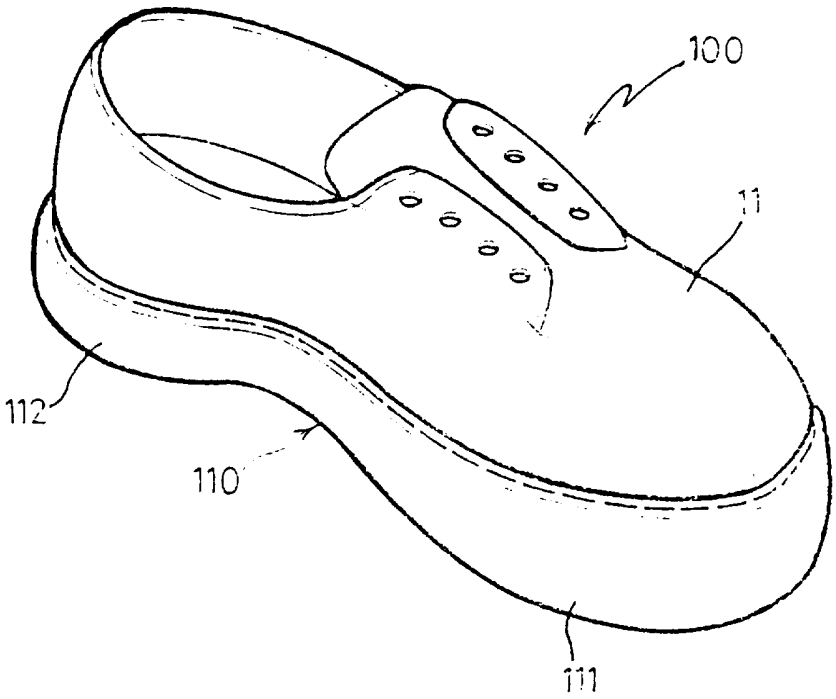

A
B
C
D,E
1
2
3
14
15
10
right stance phase
left space phase
simultaneous stance phase
simultaneous stance phase

FIG.4

(A)



(B)

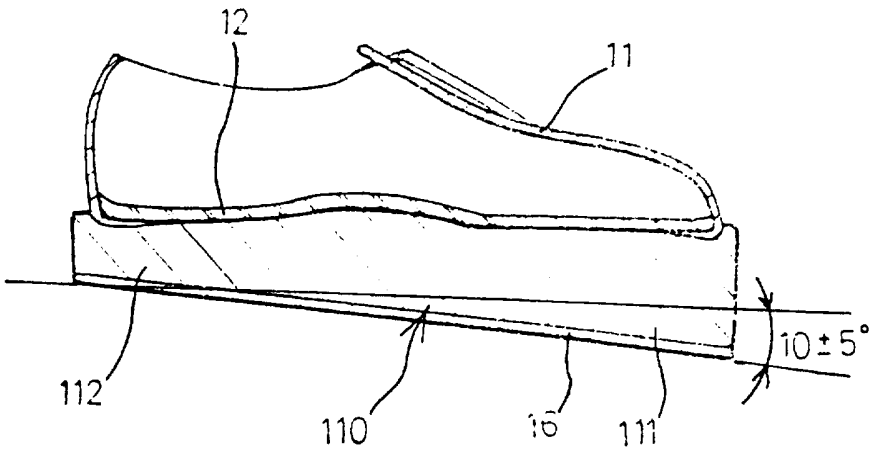


FIG.5

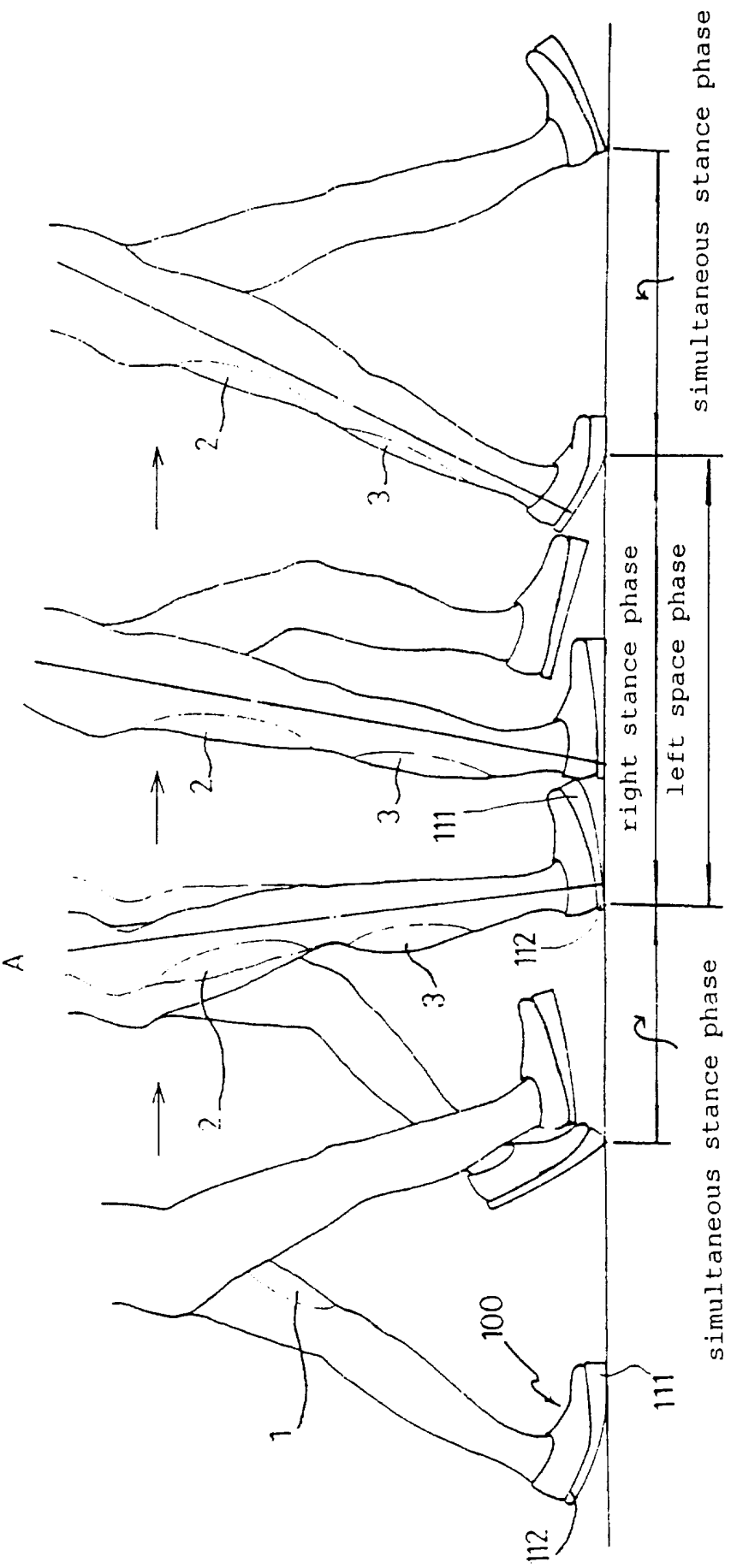

A
B
C
D,E
1
2
3
100
111
112
right stance phase
left space phase
simultaneous stance phase
simultaneous stance phase

FIG.6

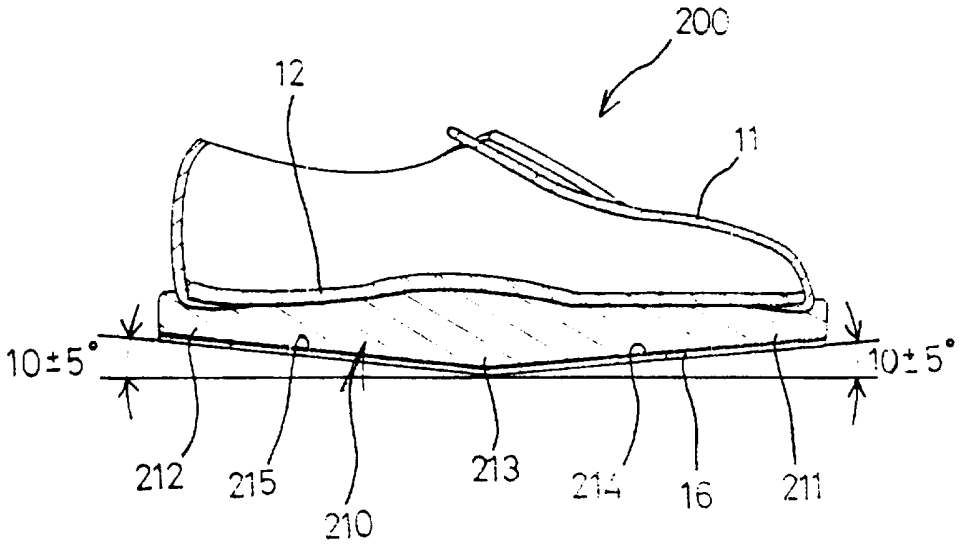


FIG.7

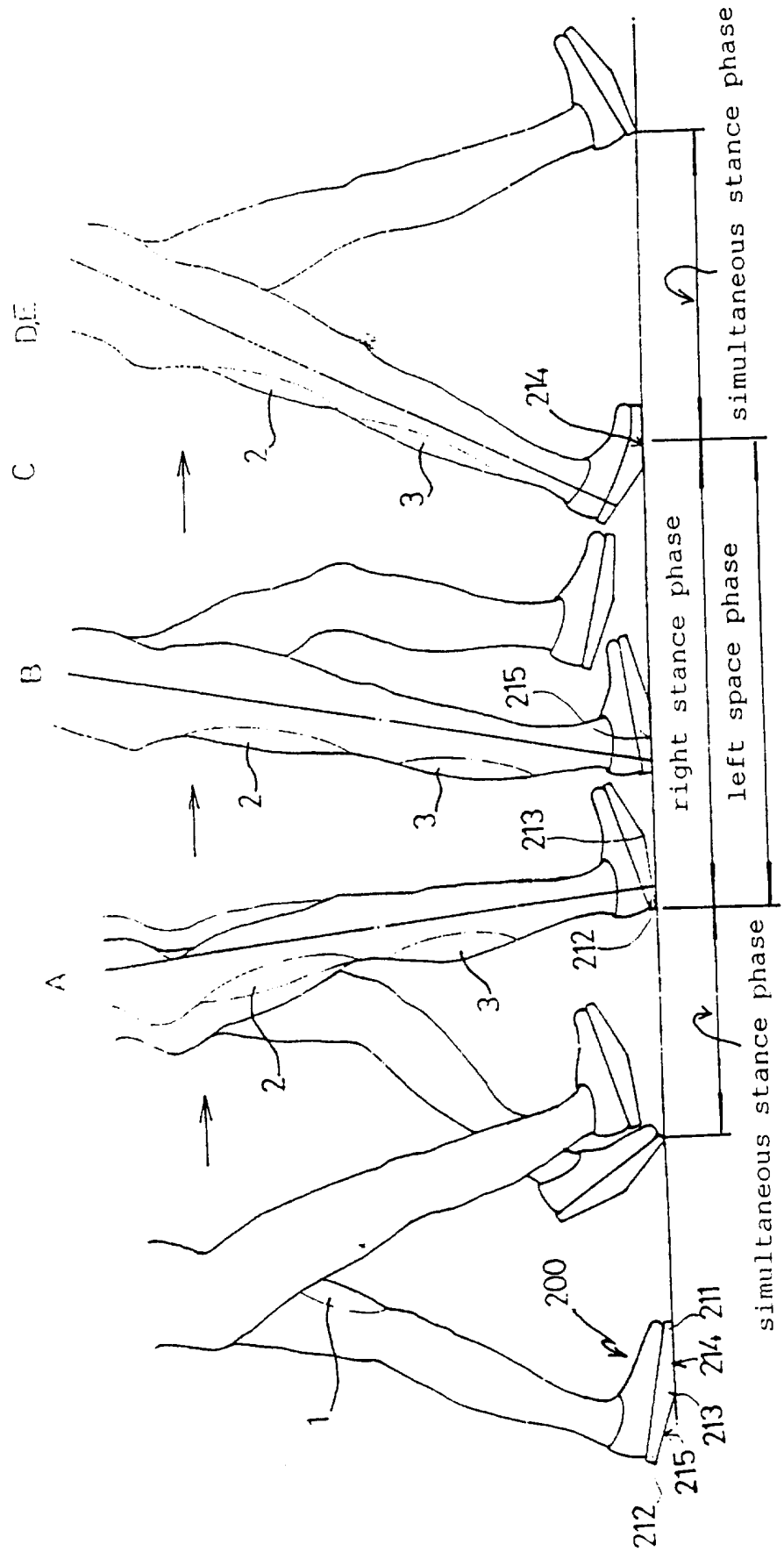
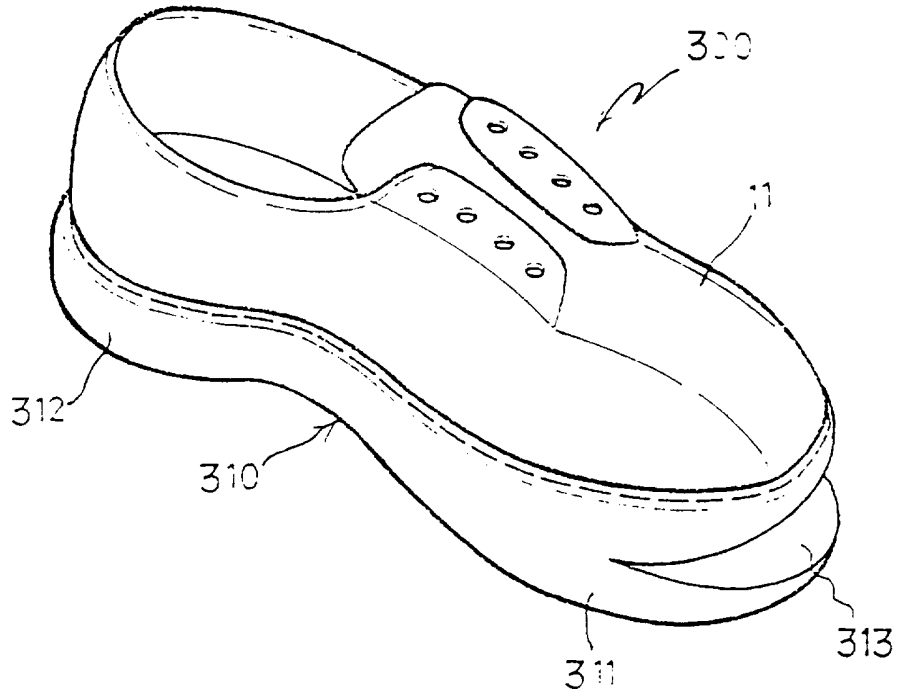

A
B
C
D,E
1
2
3
200
211
212
213
214
215
right stance phase
left space phase
simultaneous stance phase
simultaneous stance phase

FIG. 8

(A)



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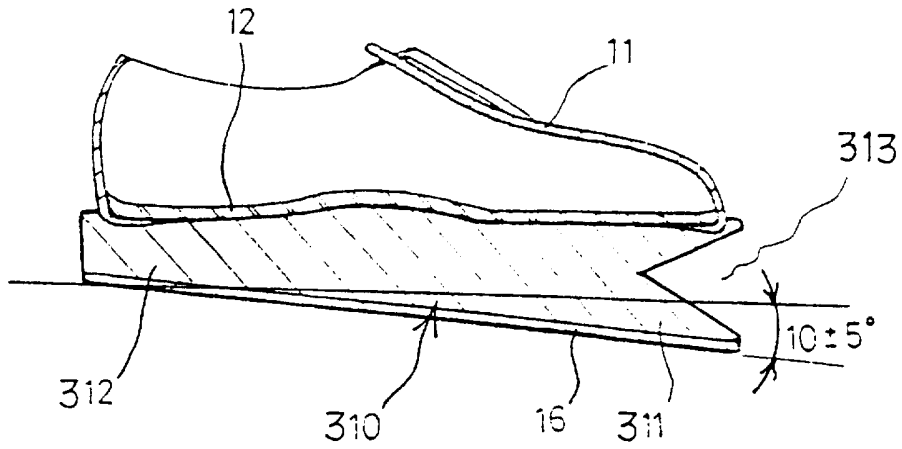
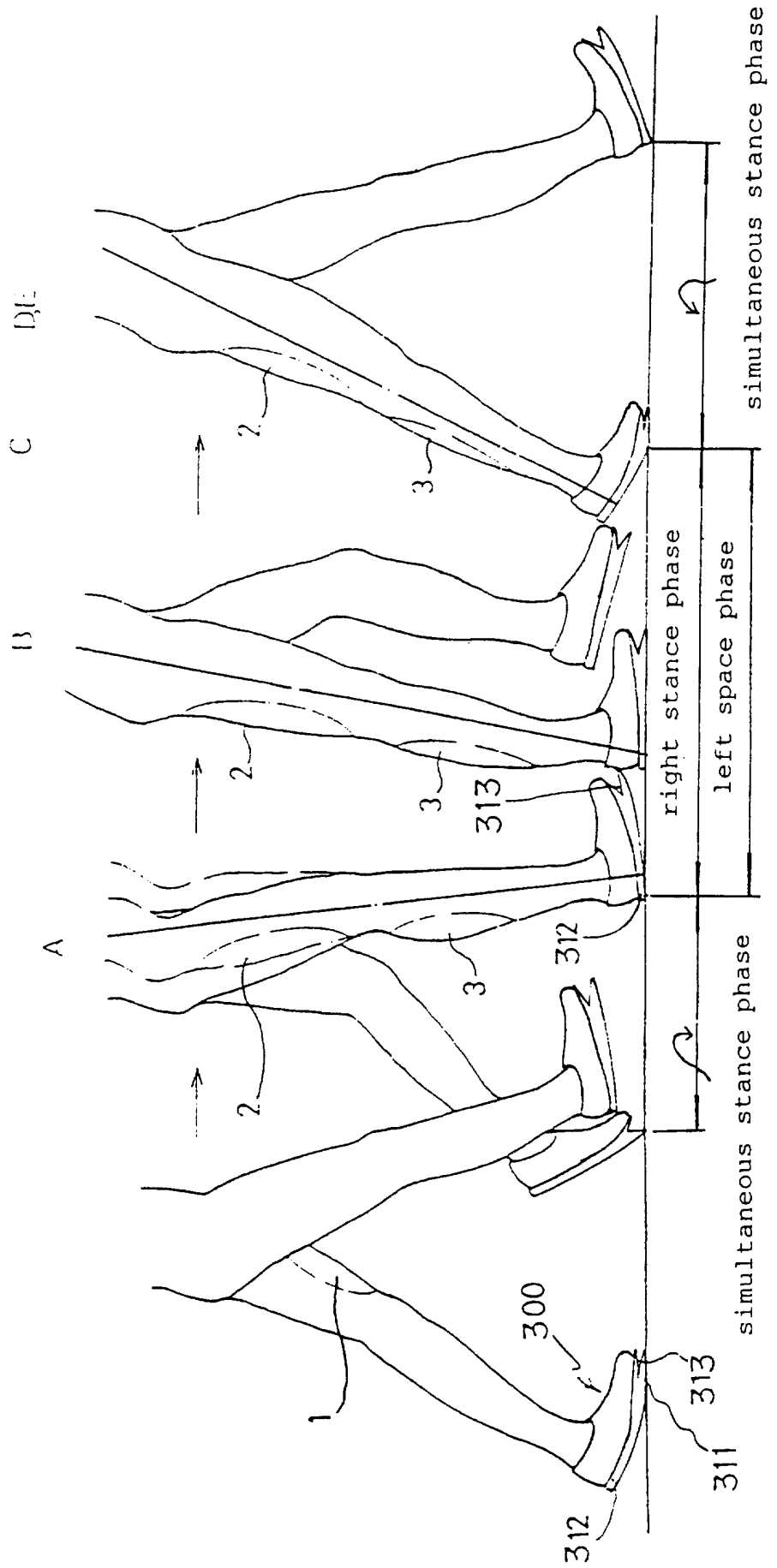


FIG.9


A
B
C
D
E
1
2
3
300
311
312
313
right stance phase
left space phase
simultaneous stance phase
simultaneous stance phase

INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR 97/00079

A. CLASSIFICATION OF SUBJECT MATTER

IPC[6]: A 43 B 13/14, 13/00

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[6]: A 43 B

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 practicable, search terms used)

EPODOC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4 934 073 A (ROBINSON) 19 June 1990 (19.06.90), totality.	1
X	US 3 964 181 A (HOLCOMBE) 22 June 1976 (22.06.76), totality.	1
X	US 4 681 114 A (LODISPOTO) 21 July 1987 (21.07.87), fig.4,5.	2
X	DE 31 15 702 A1 (TAICHER) 15 April 1982 (15.04.82), claims; fig.1,2,7.	2
A	GB 2 288 720 A (MYEONG) 01 November 1995 (01.11.95), fig.4,5,6.	3

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
03 October 1997 (03.10.97)	14 October 1997 (14.10.97)

Name and mailing address of the ISA/ AT	Authorized officer
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Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/KR 97/00079

In Recherchenbericht angeführtes Patentdokument Patent document cited in search report Document de brevet cité dans le rapport de recherche	Datum der Veröffentlichung Publication date Date de publication	Mitglied(er) der Patentfamilie Patent family member(s) Membre(s) de la famille de brevets	Datum der Veröffentlichung Publication date Date de publication
US A 4934073	19-06-90	keine - none - rien	
US A 3964161	22-06-76	keine - none - rien	
US A 4681114	21-07-87	AT E 58046 DE C0 3483582 EP A1 185832 EP TD 185832 EP B1 185832	15-11-90 13-12-90 02-07-86 16-10-86 07-11-90
DE A1 3115702	15-04-82	FR A1 2480576 GB A1 2074009	23-10-81 28-10-81
GB A 2288720		BE AF 1008223 CA AA 2126304 CN A 1118670 DE A1 4421542 FR A1 2719200 FR B1 2719200 GB A0 9413974 GB A1 2288720 IT A0 94U01423 JP A2 7298903	20-02-96 31-10-95 20-03-96 02-11-95 03-11-95 21-06-96 31-08-94 01-11-95 08-07-94 14-11-95