US 20040154191A1

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2004/0154191 A1**

Park (43) **Pub. Date: Aug. 12, 2004**

(54) **SHOCK ABSORBING SHOE**

(76) Inventor: **Chul-Soo Park**, Seoul (KR)

Correspondence Address:
ROBERT E. BUSHNELL
1522 K STREET NW
SUITE 300
WASHINGTON, DC 20005-1202 (US)

(21) Appl. No.: **10/689,994**

(22) Filed: **Oct. 22, 2003**

(30) **Foreign Application Priority Data**

Feb. 7, 2003 (KR) 2003-7948
Jul. 11, 2003 (KR) 2003-22284
Aug. 2, 2003 (KR) 2003-53584

Publication Classification

(51) **Int. Cl.**[7] **A43B 13/28**; A43B 13/18
(52) **U.S. Cl.** **36/28**; 36/27

(57) **ABSTRACT**

The present invention discloses a shock absorbing shoe. The shock absorbing shoe comprises: an upper member which wraps and protects the instep and ankle; a cushion member which is sutured to the upper member, improves a frictional force between the sole of a foot and the ground, and consists of a forefoot portion and a heel portion each having a recess of a predetermined depth; a buffering unit which is arranged in the respective recesses of the forefoot and heel portions of the cushion member for absorbing shocks while the wearer is walking or running; an air pumping unit which is arranged in the recess of the heel portion to perform an auxiliary buffering action and which supplies air onto the forefoot portion; and a bottom sole which is mounted on the upper part of the cushion member and to which the foot sole of the user is tightly attached. By this, a mutual complementary buffering effect is exhibited by the coil springs and the auxiliary buffering body and so on, thus doubling the shock absorbing effect. Therefore, there is no strain given to the knee or joints of the user, so the convenience of use and marketability can be enhanced.

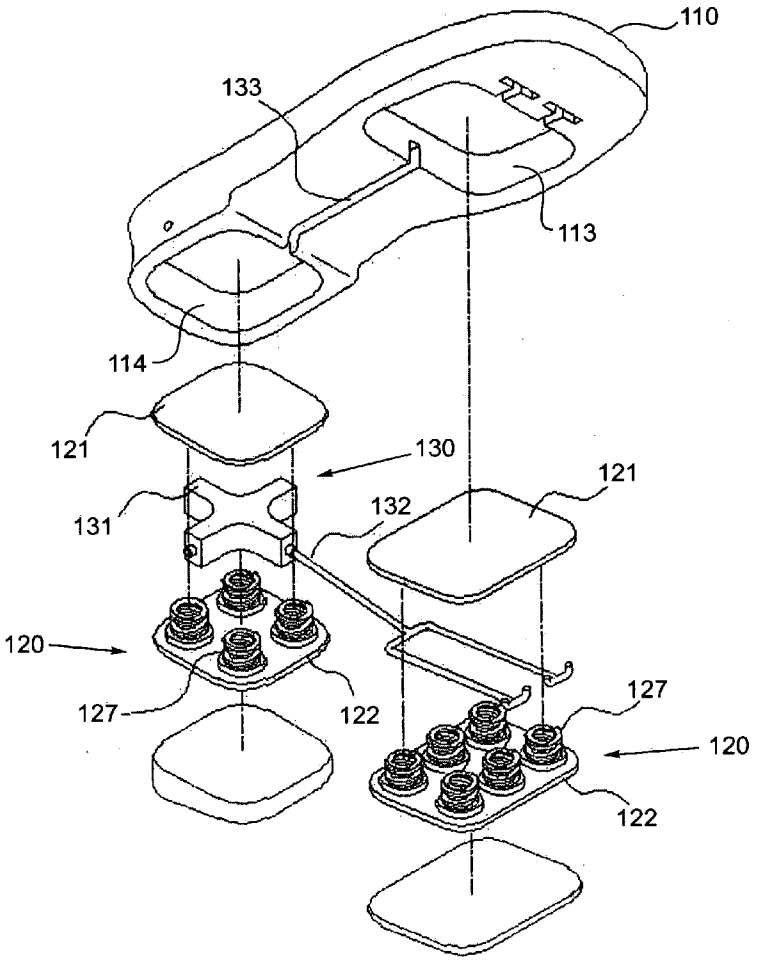


FIG. 1

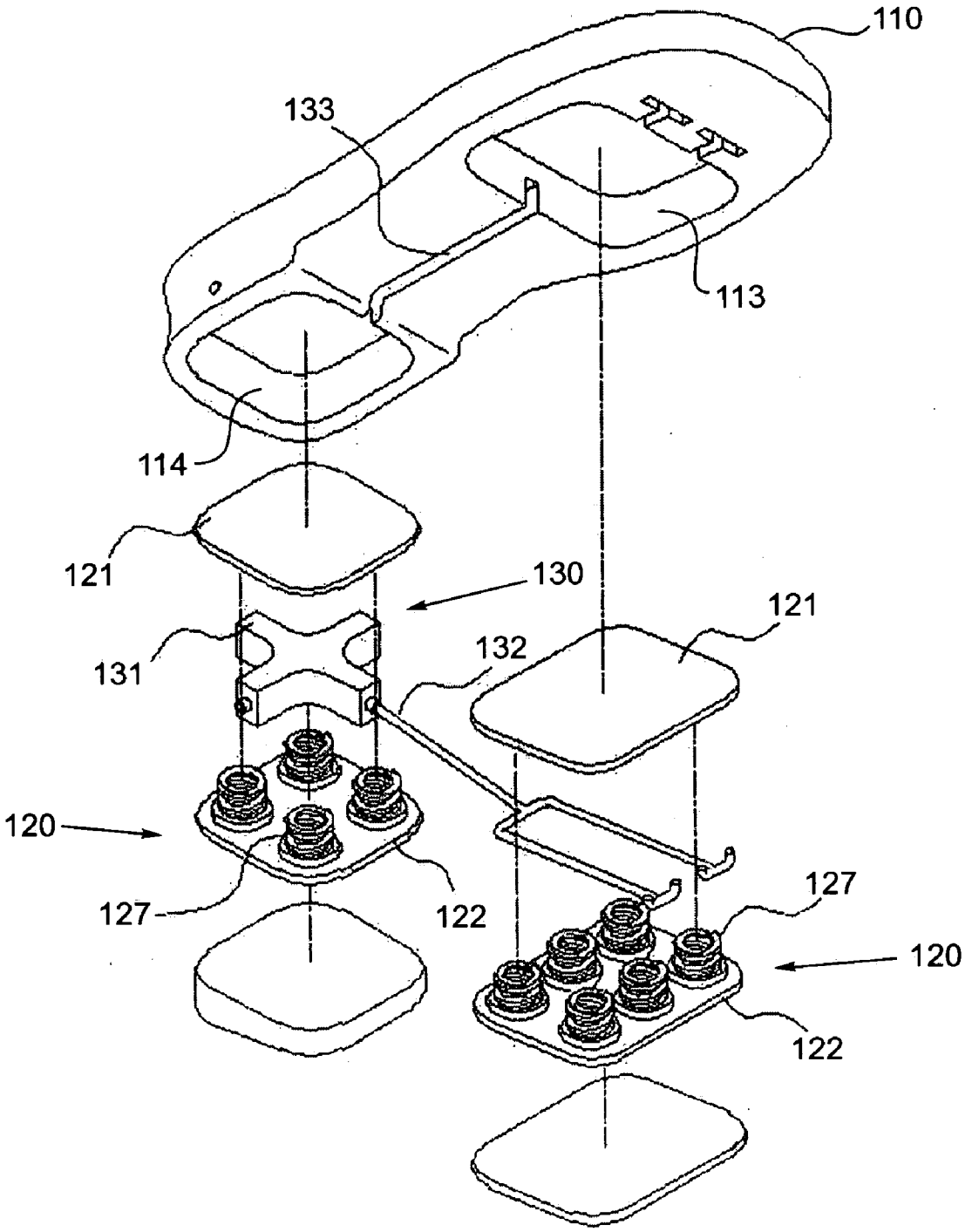


FIG. 2

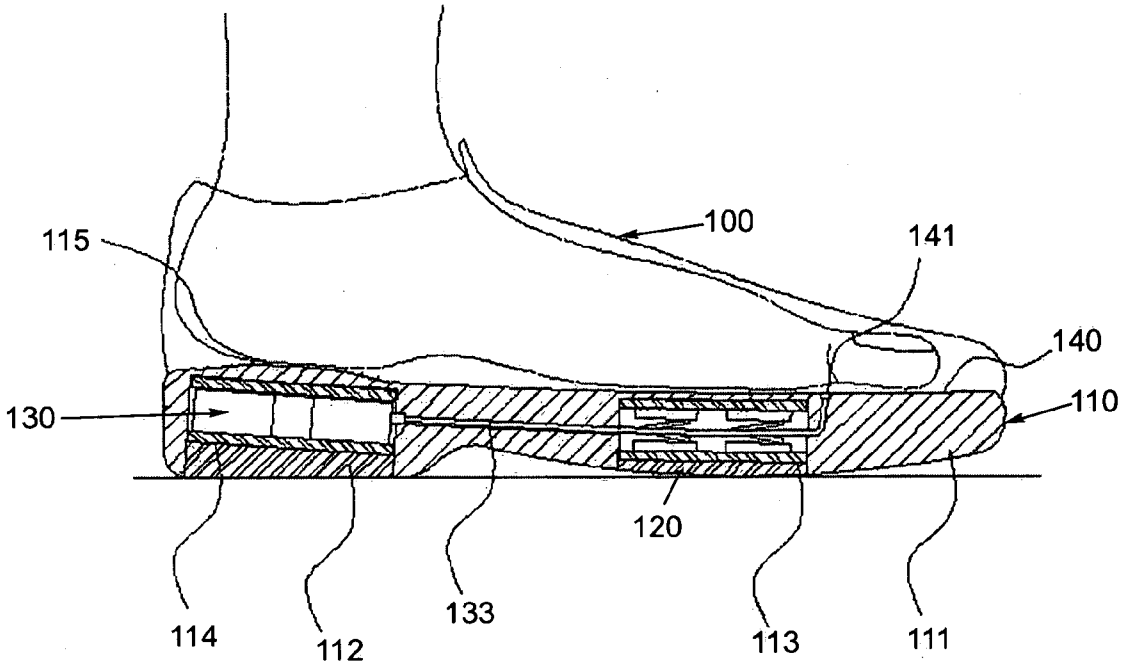


FIG. 3

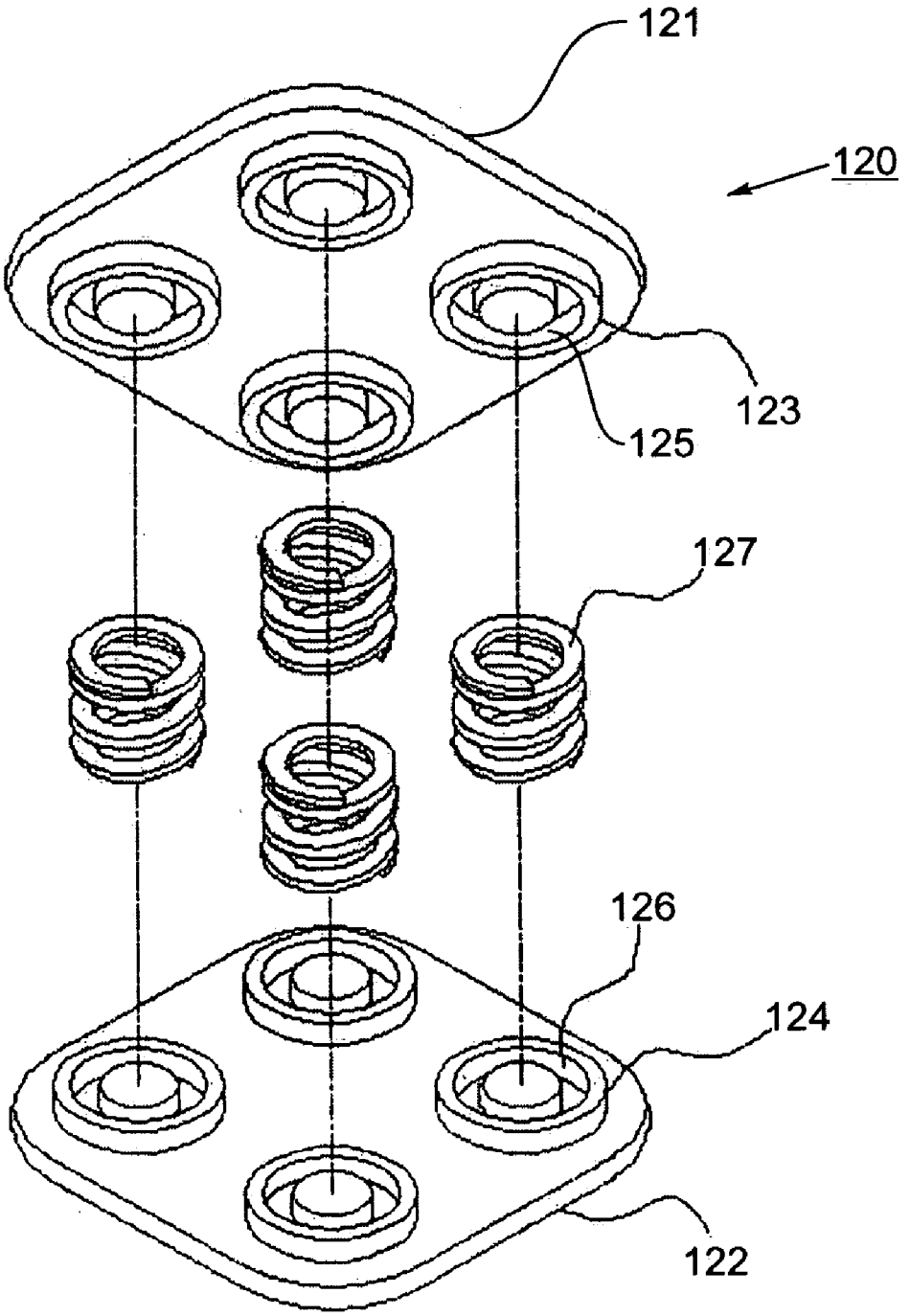


FIG. 4

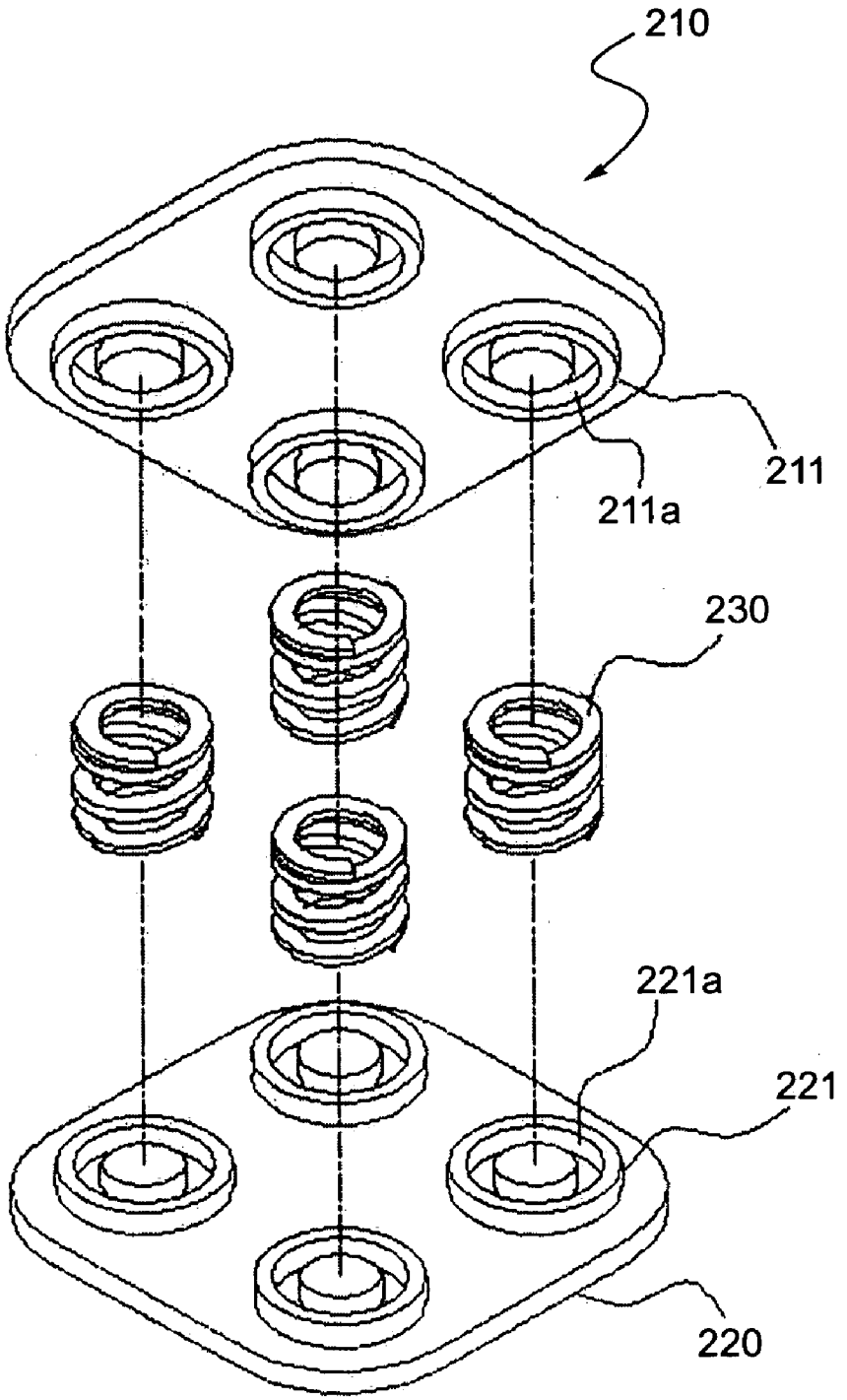


FIG. 5

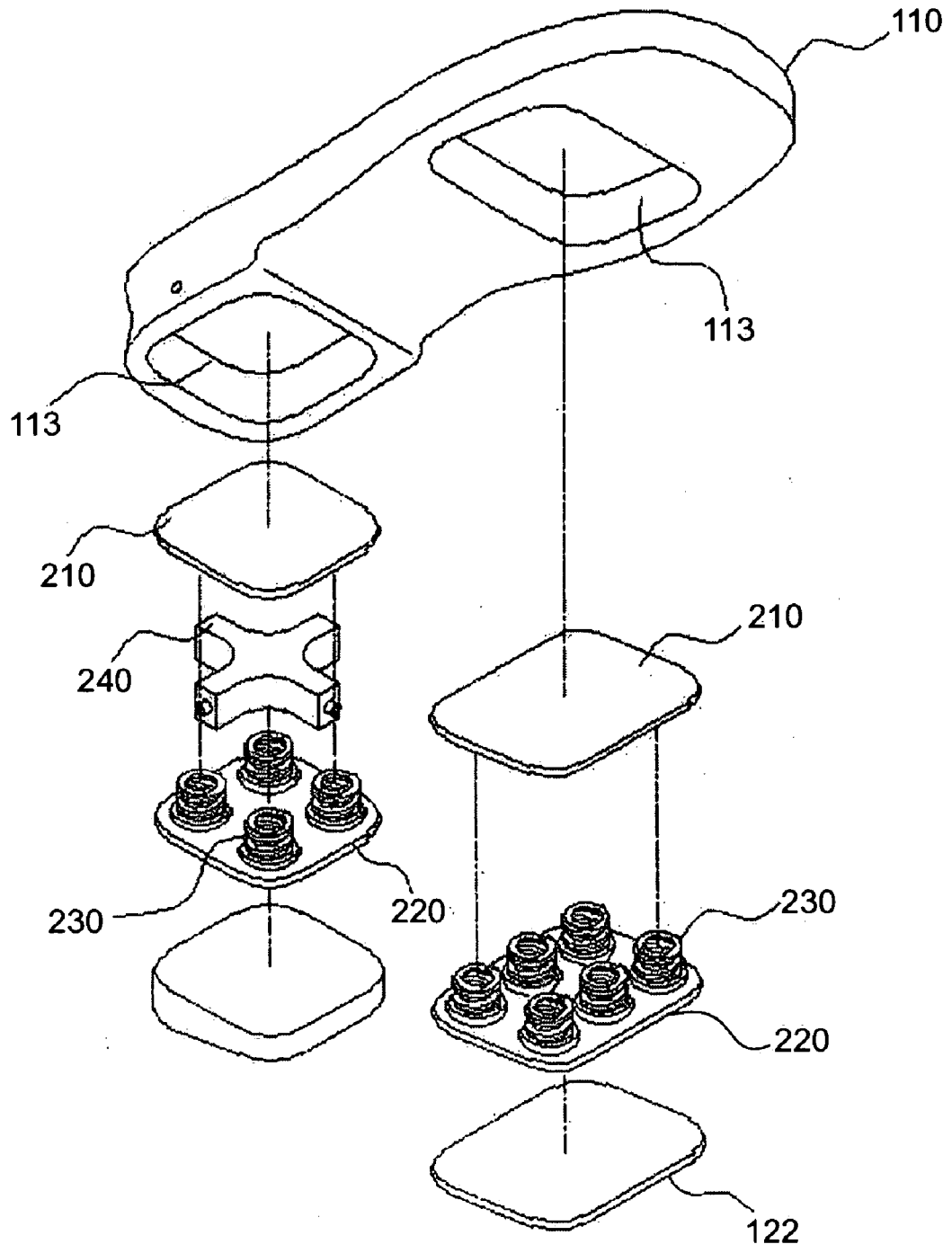


FIG. 6

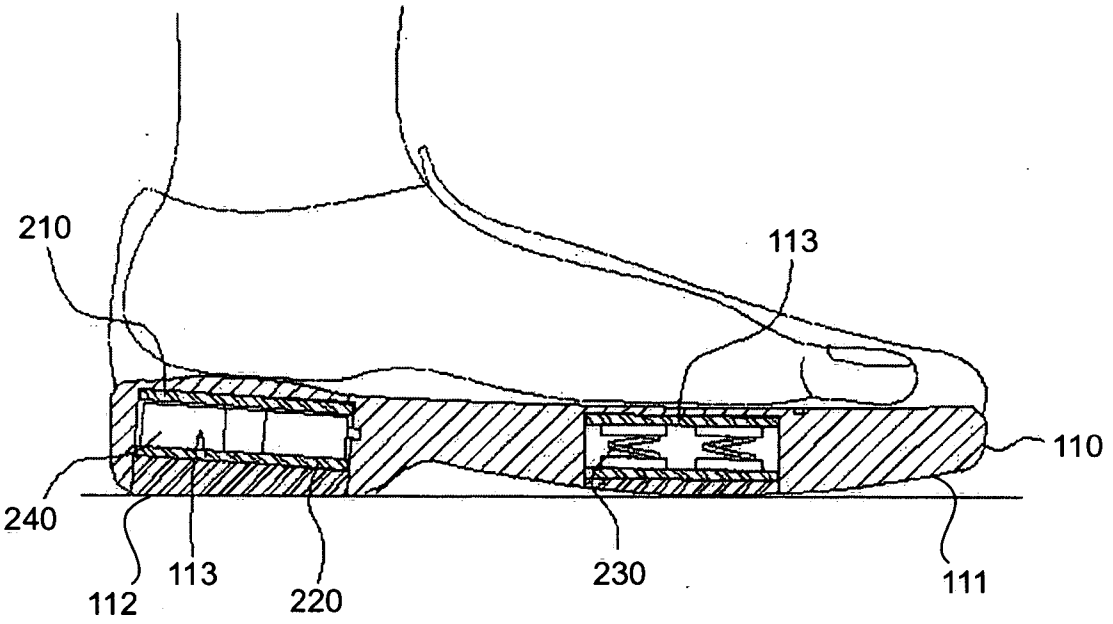


FIG. 7

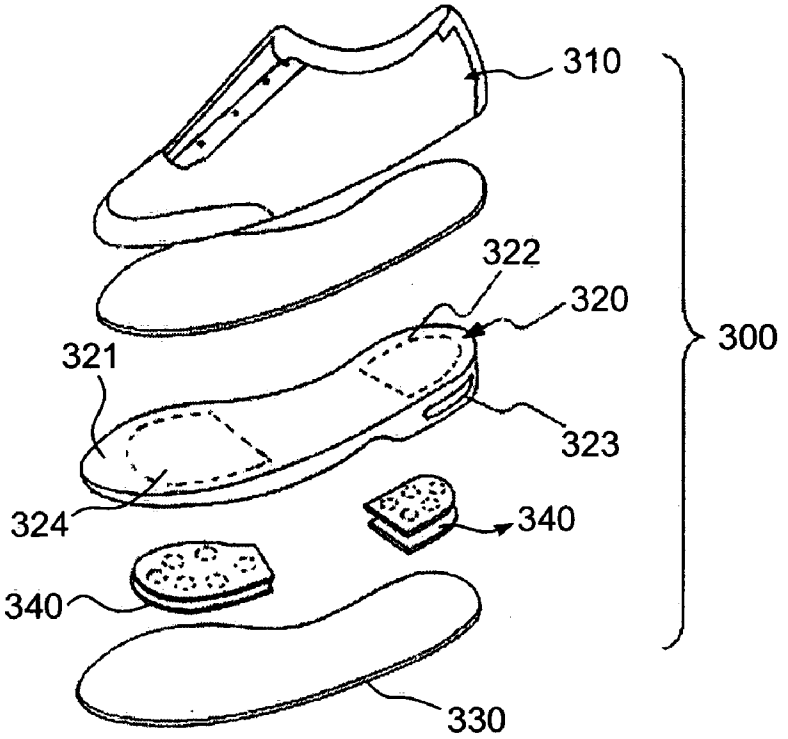

310
322
320
300
321
323
324
340
340
330

FIG. 8

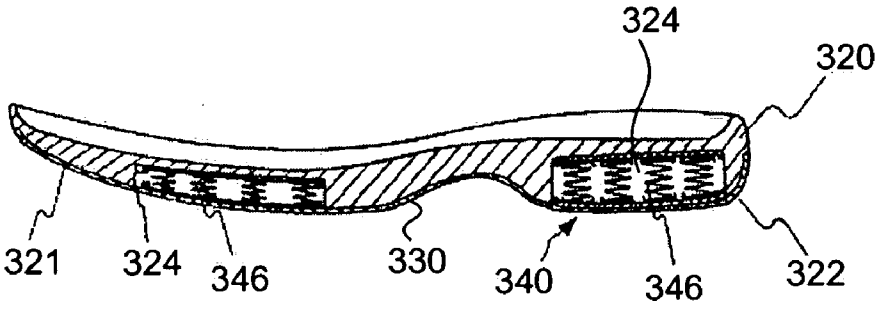
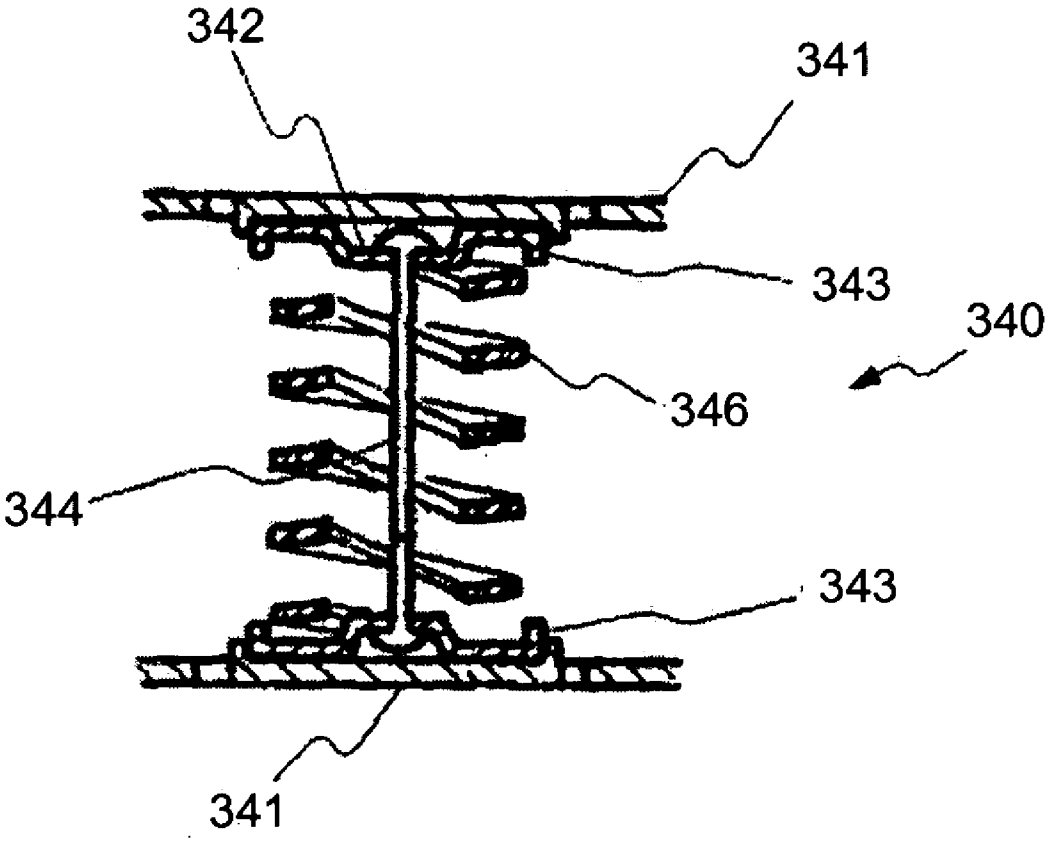

324
320
321
324
346
330
340
346
322

FIG. 9



SHOCK ABSORBING SHOE

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates to a shoe, and more particularly, to a shock absorbing shoe which is able to absorb shocks applied to the foot of a wearer while walking or running.

[0003] 2. Description of the Related Art

[0004] A shoe is typically constructed of an upper member that protects the instep and ankle and a sole that protects the sole of a foot, improves walking and traveling abilities with an increased friction force to the ground and performs an absorbing action, the upper member being connected to the sole.

[0005] In order to absorb shocks upon contacting to the ground through the above-mentioned sole, widely employed are air bags which have the sole made of a material with a superior expansion and contraction, i.e., a superior buffering ability, or which have the buffering function on the sole.

[0006] However, in a case that the sole entirely made of a material with a superior buffering ability is used, it adds consumers' economic burden due to a cost increase. Especially, abrasion is easily occurred upon friction caused by a contact to the ground, this disables a long time wearing.

[0007] Additionally, in case of employing the air bag, it has an advantage that the sole can be made of a material strong to abrasion. On the other hand, it is problematic in that the air bag is torn by a sharp object to thus run off air and resultantly can exhibit no buffering effect at all.

[0008] Moreover, noises are generated from a torn part of the air bag whenever walking, this can make the user feel unpleasant.

SUMMARY OF THE INVENTION

[0009] The present invention has been developed for the purpose of solving the foregoing problems and thus it is an object of the present invention to provide a shock absorbing shoe which absorbs shocks generated upon walking to the maximum by inserting a shock absorbing member with a rectangular cross sectional coil spring into the forefoot and heel portions of the sole of a foot and which allows walking and running without strain by a repulsive force of the spring.

[0010] To achieve the above object, there is provided a shock absorbing shoe according to one aspect of the present invention, comprising: an upper member which wraps and protects the instep and ankle; a cushion member which is sutured to the upper member, improves a frictional force between the sole of a foot and the ground, and consists of a forefoot portion and a heel portion each having a recess of a predetermined depth; a buffering unit which is arranged in the respective recesses of the forefoot and heel portions of the cushion member for absorbing shocks while the wearer is walking or running; an air pumping unit which is arranged in the recess of the heel portion to perform an auxiliary buffering action and which supplies air onto the forefoot portion; and a bottom sole which is mounted on the upper part of the cushion member and to which the foot sole of the user is tightly attached.

[0011] There is provided a shock absorbing shoe according to another aspect of the present invention, comprising: upper and lower caps which are symmetrical to each other and have a plurality of annular flanges projected, the annular flanges having insert grooves on the inside surfaces facing each other; and coil springs which integrally connects the upper and lower caps with both opposite ends being forcedly inserted into annular flange insert grooves of the upper and lower caps and have a predetermined elastic force.

[0012] There is provided a shock absorbing shoe according to still another aspect of the present invention, which has a sole attached to the bottom portion of the shoe for protecting the foot sole and forming a friction with the ground, comprising: a cushion member which has an upper of the shoe attached thereto to form the shape of the shoe and a recess of a predetermined shape provided on the bottom surface; a friction member which is attached to the bottom surface of the cushion member for forming a friction with the ground; and a shock absorbing member which is arranged in the recess and has a predetermined recess formed between the cushion member and the friction member and several rectangular cross sectional coil springs elastically mounted between fixed caps.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] These and other features, aspects, and advantages of preferred embodiments of the present invention will be more fully described in the following detailed description, taken accompanying drawings. In the drawings:

[0014] FIGS. **1** to **3** are explanatory views showing a shock absorbing shoe according to a first embodiment of the present invention;

[0015] FIGS. **4** to **6** are explanatory views showing a shock absorbing shoe according to a second embodiment of the present invention; and

[0016] FIGS. **7** to **9** are explanatory views showing a shock absorbing shoe according to a third embodiment of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

[0017] A characteristic construction and the corresponding operational effects of the present invention will also become apparent from the detail description of the preferred embodiments referring to the accompanying drawings that follow.

[0018] FIGS. **1** to **3** are explanatory views showing a shock absorbing shoe according to a first embodiment of the present invention. FIGS. **4** to **6** are explanatory views showing a shock absorbing shoe according to a second embodiment of the present invention. FIGS. **7** to **9** are explanatory views showing a shock absorbing shoe according to a third embodiment of the present invention.

[0019] Firstly, as shown in FIGS. **1** to **3**, the shock-absorbing shoe according to the first embodiment of the present invention will be described as follows.

[0020] As shown therein, the shock-absorbing shoe is roughly divided into an upper member **100**, a cushion member **110**, a buffering unit **120**, an air pumping unit **130** and a bottom sole **140**.

[0021] The upper member **100** is the region wrapping and protecting the instep and ankle, and is typically formed of a fabric or leather.

[0022] The cushion member **110** is integrally formed with the upper member **100** by suturing and carries out the function of improving a frictional force between the sole of a foot and the ground.

[0023] On a forefoot portion **111** and a heal portion **112** of the cushion member **110**, recesses **113** and **114** of a predetermined depth are formed respectively

[0024] To the heel portion **112** of the cushion member **110**, a projecting cushion **115** projecting relatively further than peripheral portions is integrally provided. The projecting cushion **115** is provided to the heel portion **112**, which is the portion where largest shock is applied upon walking or running, in order to avoid a wearer from feeling by its foot the parts of the buffering unit **120** to be described later upon walking or running so that the wearer does not feel uncomfortable.

[0025] The buffering unit **120** is provided on the recesses **113** and **114** respectively that are prepared on the forefoot portion **111** and heel portion **112** of the cushion member **110**. They carry out the function of absorbing shocks while the wearer is walking or running.

[0026] In a detailed structure of this buffering unit **120**, upper and lower caps **121** and **122** having a symmetrical shape to each other are located spaced at a predetermined interval on each of the recesses **113** and **114**, and annular flanges **123** and **124** of a predetermined height are projected on these upper and lower caps **121** and **122** in a direction opposite to each other.

[0027] On the annular flanges **123** and **124**, insert grooves **125** and **126** are formed at a predetermined depth.

[0028] Into the insert grooves **125** and **126** of the annular flanges **123** and **124**, both opposite ends of coil springs **127** are forcedly inserted and fixed. By this forced insertion and fixing of the coil springs **127**, the upper and lower caps **121** and **122** as well as the coil springs **127** are integrally connected to form one assembly.

[0029] Preferably, the coil springs **127** are the ones that are excellent in elastic force and are not easily elastically deformed even by a long time, repetitive shock.

[0030] The air pumping unit **130** is provided at the recess **114** formed on the heel portion **112** of the cushion member **110** and carries out an auxiliary buffering function along with the above-described buffering unit **120**, especially, the function of supplying air to the sole of the wearer's foot by supplying air to the forefoot portion **111**.

[0031] In a detailed structure of this air pumping unit **130**, on the recess **114** of the heel portion **112**, an air pump **131** blasting air as being compressed by a shock from the upside, that is, a shock applied while the wearer is walking or running, is located approximately on the center between the coil springs **127**.

[0032] Additionally, an air supply pipe **132** is prepared on at least one location for guiding the air blasted from the air pump **131** to the recess **113** of the forefoot portion **111**.

[0033] Preferably, the air supply pipe **132** is formed by forming a guide groove **133** on the upper surface of the cushion member **110** to a predetermined depth. But the present invention does not limited thereto and it is also possible to form the air supply pipe **132** as a separate part.

[0034] In order to supply air to the foot of the wearer in a state that air is guided to the recess **113** of the forefoot portion **111** via the air supply pipe **132**, a plurality of through holes **141** are formed on the bottom sole **140** corresponding to the forefoot portion **111**.

[0035] The shock-absorbing shoe thus constructed according to the present invention can acquire the shock absorbing effect as shocks applied to the foot sole while the wearer is walking or running are buffered by the buffering unit **120**, i.e., the coil springs **127**, prepared at the recesses **113** and **114** of the cushion member **110**.

[0036] In other words, the effect of buffering the shocks applied upon walking or running is exhibited as the coil springs **127** are compressed, thereby preventing the foot of the wearer from getting strains applied thereto.

[0037] In addition thereto, since the air pumping unit **130** is provided on the recess **114** formed on the heel portion **112** of the cushion member **110**, that is, since there is provide the air pump **131** that exhibits the buffering effect by blasting air while compressed when a shock is applied, a more effective buffering effect can be acquired.

[0038] Furthermore, the air compressed upon operation of the air pumping unit **130** is guided to the recess **113** of the forefoot portion **111** via the air supply pipe **132** and simultaneously introduced into the shoe via the through holes **141** formed on the bottom sole **140** at the position corresponding to the forefoot portion **111**. By this, the foot of the wearer can be cooled down and the generation of sweat caused by a long time wearing can be prevented.

[0039] Next, as shown in FIGS. **4** to **6**, the shock absorbing shoe according to the second embodiment of the present invention will be described.

[0040] As shown therein, the shock absorbing shoe is roughly divided into an upper cap **210**, a lower cap **220** and coil springs **230**.

[0041] The upper and lower caps **210** and **220** are symmetrical to each other, especially, have annular flanges **211** and **221** of a predetermined diameter formed projected from the facing inside surfaces so as to face each other. On these annular flanges **211** and **221**, insert grooves **211***a* and **221***a* are formed at a predetermined depth.

[0042] The coil springs **230** are arranged between the upper and lower caps **210** and **220** to exhibit an actual buffering effect. Both opposite ends thereof are forcedly inserted into the insert grooves **211***a* and **221***a* of the annular flanges **211** and **221**, thereby additionally carrying out the function of integrally connecting the upper and lower caps **210** and **220**.

[0043] In other words, the upper and lower caps **210** and **220** and the coil springs **230** are integrally connected directly via the coil springs **230** to form one assembly.

[0044] The coil springs **230** of such a type may be ones having a circular cross sectional shape, more preferably,

rectangular cross sectional coil springs **230** which are less deformable and are highly elastic.

[**0045**] Between the upper and lower caps **210** and **220**, there is generated an unnecessary space region except the regions where the coil spring **230** is mounted.

[**0046**] When such a space region is generated, there is a possibility that noises occurring upon a buffering action through the coil springs **230** are emitted to the outside. Thus, in order to prevent this emission and double the buffering effect along with the coil springs **230**, it is preferable that an auxiliary buffering body **240** is sandwiched between the upper and lower caps **210** and **220** so that it can become adjacent to the coil springs **230**.

[**0047**] Preferably, the auxiliary buffering body **240** is formed of a material having an elastic force, that is, a rubber or sponge.

[**0048**] In the shock absorbing shoe of this invention, in a state that the coil springs **230** are sandwiched between the upper and lower caps **210** and **220** simultaneously with the auxiliary buffering body **240** being sandwiched therebetween, that is, in a state that one assembly is formed, the assembly is positioned on the recess **113** formed on the forefoot portion **111** and heel portion **112** of the bottom surface of the cushion member **110**.

[**0049**] According to its purpose of use, the auxiliary buffering body **240** may be selectively sandwiched between the forefoot portion **111** and the heel portion **112**.

[**0050**] Consequently, as the coil springs **230** and the auxiliary buffering body **240** carry out a buffering action while the user is walking or running, a burden caused by a shock applied to the user's foot can be alleviated.

[**0051**] Since the coil springs **230** sandwiched between the upper and lower caps **210** and **220** are forcedly inserted into the insert grooves **211***a* and **221***a* formed on the annular flanges **211** and **221** of the upper and lower caps **210** and **220**, it is possible to prevent the coil springs **230** from falling off as well as the upper and lower caps **210** and **220**.

[**0052**] That is to say, it is made possible to maintain a mutual firm assembly state.

[**0053**] Meanwhile, because the auxiliary buffering body **240** sandwiched between the upper and lower caps **210** and **220** carries out the buffering action along with the coil springs **230**, the buffering effect can be doubled. Further, the auxiliary buffering body **240** exhibits the effect of blocking the space region between the upper and lower caps **210** and **220**, thereby preventing a noise generating from the coil springs **230** from being emitted to the outside.

[**0054**] Next, referring to FIGS. **7** to **9**, the shock absorbing shoe according to the third embodiment is of the present invention will be described.

[**0055**] As shown therein, the shock absorbing shoe **300** is comprised of an upper member **310** wrapping and protecting the instep and ankle and a cushion member **320** increasing a frictional force between the sole of a foot and the ground upon walking.

[**0056**] The cushion member **320** is provided with an inner sole which is placed on the surface of the cushion member, which is compressively bonded to the upper member **310** with a bond or coupled thereto by sewing so as to absorb shocks and achieve a stable coupling state and which offers wearing stability, air permeability and absorptivity, but a detailed description and illustration therefore will be omitted.

[**0057**] And, the cushion member **320** has a recess **324** of a predetermined shape concavely formed on the forefoot portion **321** and heel portion **322** of the bottom surface thereof. The heel portion **322** is pierced to form through holes penetrating the recess **324** from the sides.

[**0058**] Into the recess **324**, a shock absorbing member **340** having the same shape and height as the recess is inserted and fixed. In the shock absorbing member **340**, fixed caps **343** are covered onto the upper and lower parts of rectangular cross sectional coil springs **346**, a wire **344** passes through the center of the fixed caps **343** and both ends of the wire **344** are fixed to the fixed caps **343** by welding or riveting. At this time, the rectangular cross sectional coil springs **346** are compressed to a predetermined state and fixed so that it can hold an elastic force suitable for absorbing and alleviating shocks generated from the sole of a shoe during walking or running.

[**0059**] At the center of the fixed caps **343** fixing the wire **344** passing through the center of the rectangular cross sectional coil springs **346**, mounting grooves **342** for fixing the wire **344** are formed concave so that the fixed end of the wire **344** cannot be projected to the outside.

[**0060**] A compression state of the rectangular cross sectional coil springs **346** mounted between the fixed caps **343** is differently set according to whether they are mounted on the heel portion **322** or on the forefoot portion **321**. It means that the fixed caps **343** are arranged on a fixed plate **341** having the same shape as the recess **324** formed on the bottom of the cushion member **320**, taking a shock distribution generated by a human body during walking or running into account.

[**0061**] Another fixed plate **341** is placed above the fixed caps **343** mounted on the fixed plate **341**. In this state, several fixed caps **343** are welded or inserted into fixed protuberances projected from the fixed plates so that they cannot move between the fixed plates **341**.

[**0062**] With the shock absorbing member **340** of the above construction being inserted and fixed into the recess **324** of the cushion member **320**, a friction member **330** made of rubber with high elasticity is attached to the bottom surface of the cushion member **320** and shock absorbing member **340** to achieve a friction to the ground. Being inserted and fixed into the recess **324** of the cushion member **320**.

[**0063**] Further, a cushion material of a transparent type is inserted into a the through hole perforated in the heel region of the cushion member **320**, to thus form a transparent window portion **323** capable of confirming the shock absorbing member **340** mounted in the recess **324**.

[**0064**] In the shock absorbing shoe thus constructed of this invention, the heel portion **322** is firstly contacted to the ground upon walking or running, then the foot sole is contacted, and then the forefoot portion **321** is contacted. When the heel portion **322** is contacted, the shock absorbing member **340** absorbs shocks concentrated on the heel portion **322** as shown in **FIG. 4**. That is, shocks applied to a

certain compressed rectangular cross sectional coil springs **346** are firstly absorbed. Shocks exceeding a compression state are secondly absorbed as the rectangular cross sectional coil springs **346** are further compressed.

[**0065**] In other words, as illustrated in **FIG. 4, a** concentrated load passing through the cushion member **320** is firstly transferred to the fixed plate **341** via the heel portion **322**, and the concentrated load transferred to the fixed plate **341** is dispersed to the rectangular cross sectional coil springs **346** via the fixed caps **343** arranged and fixed at their respective position of the fixed plate **341**. Next, the dispersed load is firstly absorbed in the rectangular cross sectional coil springs **346** that is mounted in a compressed state, and shocks exceeding the compressed state are transferred to the rectangular cross sectional coil springs **346**. At this time, the second compression of the compressed rectangular cross sectional coil springs **346** is performed onto the rectangular cross sectional coil springs **346** over the heel portion **322**, thereby allowing all of the springs to absorb the dispersed and transferred load.

[**0066**] Hence, the concentrated load generated[]upon contacting the heel portion **322** onto the ground is dispersed and transferred to each of the rectangular cross sectional coil springs **346** in the process of transferring to the shock absorbing member **340** of this invention. By this, each of the rectangular cross sectional coil springs **346** receives a load of a dispersed state and compensates the shock caused by the dispersed load with a stress against the load, thereby drastically reducing the shock transferred to the heel and knee joints of the user.

[**0067**] And, according to a moving state of the foot, when the user is moving by the foot sole and the forefoot portion **321**, the shock absorbing member **340** mounted to the forefoot portion **321** in a first compression state is secondly compressed with a concentrated load. And, the rectangular cross sectional coil springs **346** of the shock absorbing member **340** located in the heel portion **322** forms a repulsive force to provide elasticity to the user's foot.

[**0068**] The rectangular cross sectional coil springs **346** of the shock absorbing member **340**, which are compressed in the forefoot portion **321** by a continuous movement of the foot, transfers to the user a repulsive force corresponding to the compression state as soon as the foot is released from the ground. Thus, while the user is walking or running, the shock caused by its weight is absorbed in the shoe **300**. Besides, the repulsive force corresponding to the elasticity for compression is transferred to the foot, thereby enabling the user to walk or run without strain.

[**0069**] The rectangular cross sectional coil springs **346** contracting and repulsing in the shock absorbing member **340** as seen from above are mounted between the fixed caps **343** and around the wire **344**. In this state, since the fixed caps **343** are located on the fixed plate **341** in a fixed state, a concentrated load is transferred via the fixed plate **341** made of a high surface strength material when the heel portion **322** is contacted to the ground, thereby achieving a stable compressing action. Moreover, since the rectangular cross sectional coil springs **346** have a cross section of a flat, rectangular shape, whatever direction the concentrated load may be applied from, the rectangular cross sectional coil springs **346** achieve a stable compression state by means of the fixed plate **341**.

[**0070**] Furthermore, since the installation state of the shock absorbing member **340** and the elastic state of the rectangular cross sectional coil springs **346** can be visually confirmed through the transparent window portion **323** formed on the heel portion **322** of the cushion member **320**, this improves the user's certainty of the functionality.

[**0071**] As seen from above, according to the shock absorbing shoe according to the present invention, a mutual complementary buffering effect is exhibited by the coil springs and the auxiliary buffering body and so on, thus doubling the shock absorbing effect.

[**0072**] Therefore, there is no strain given to the knee or joints of the user, so the convenience of use and marketability can be enhanced.

What is claimed is:

1. A shock absorbing shoe, comprising:

an upper member which wraps and protects the instep and ankle;

a cushion member which is sutured to the upper member, improves a frictional force between the sole of a foot and the ground, and consists of a forefoot portion and a heel portion each having a recess of a predetermined depth;

a buffering unit which is arranged in the respective recesses of the forefoot and heel portions of the cushion member for absorbing shocks while the wearer is walking or running;

an air pumping unit which is arranged in the recess of the heel portion to perform an auxiliary buffering action and which supplies air onto the forefoot portion; and

a bottom sole which is mounted on the upper part of the cushion member and to which the foot sole of the user is tightly attached.

2. The shoe of claim 1, wherein the buffering unit comprises:

upper and lower caps which are symmetrical to each other and has a plurality of annular flanges projected, the annular flanges having insert grooves on the inside surfaces facing each other; and

coil springs which integrally connect the upper and lower caps with both opposite ends being forcedly inserted into annular flange insert grooves of the upper and lower caps and which have a predetermined elastic force.

3. The shoe of claim 1, wherein the air pumping unit comprises:

an air pump which is arranged in the recess of the heel portion and compress air by a shock from the upside; and

an air supply pipe which is extended from one side of the air pump to penetrate the recess of the forefoot portion and supplies the compressed air from the air pump to the recess of the forefoot portion.

4. The shoe of claim 3, wherein a plurality of through holes are formed on the forefoot portion of the bottom sole.

5. The shoe of claim 3, wherein the air supply pipe is formed by forming a guide groove on the cushion member to a predetermined depth.

6. The shoe of claim 1, wherein a projecting cushion relatively projecting toward the heel of the wearer is formed on the heel portion the cushion member.

7. A shock absorbing shoe, comprising:

upper and lower caps which are symmetrical to each other and have a plurality of annular flanges projected, the annular flanges having insert grooves on the inside surfaces facing each other; and

coil springs which integrally connects the upper and lower caps with both opposite ends being forcedly inserted into annular flange insert grooves of the upper and lower caps and have a predetermined elastic force.

8. The shoe of claim 7, wherein the coil springs have a rectangular cross sectional shape.

9. The shoe of claim 7, wherein an auxiliary buffering body is additionally sandwiched on a space region between the upper and lower caps so that it can be mounted adjacent to each of the coil springs.

10. The shoe of claim 9, wherein the auxiliary buffering body is formed of rubber.

11. A shock absorbing shoe, which has a sole attached to the bottom portion of the shoe for protecting the foot sole and forming a friction with the ground, comprising:

a cushion member which has an upper of the shoe attached thereto to form the shape of the shoe and a recess of a predetermined shape provided on the bottom surface;

a friction member which is attached to the bottom surface of the cushion member for forming a friction with the ground; and

a shock absorbing member which is arranged in the recess and has a predetermined recess formed between the cushion member and the friction member and several rectangular cross sectional coil springs elastically mounted between fixed caps.

12. The shoe of claim 11, wherein the shock absorbing member is formed by mounting fixed caps on upper and lower parts of the rectangular cross sectional coil springs, passing a wire through the center of the fixed caps at the upper and lower parts, with both ends being fixed to the fixed caps, and locating fixed plates having the same shape as the recess on the upper and lower parts of the fixed caps.

13. The shoe of claim 11, wherein the recess to be formed on the bottom surface of the cushion member is formed on the heel portion and a transparent window portion through which the rectangular cross sectional coil springs can be seen is formed on a side face of the recess.

14. The shoe of claim 11, wherein the recess to be formed on the cushion member is formed on the heel portion and the forefoot portion.

15. The shoe of claim 11, wherein the rectangular cross sectional coil springs provided at the shock absorbing member are firstly compressed when mounted between the fixed caps, and the elastic force applied to the heel portion is larger than the one applied to the forefoot portion.

* * * * *