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(54) **ILLUMINOUS SOLE**

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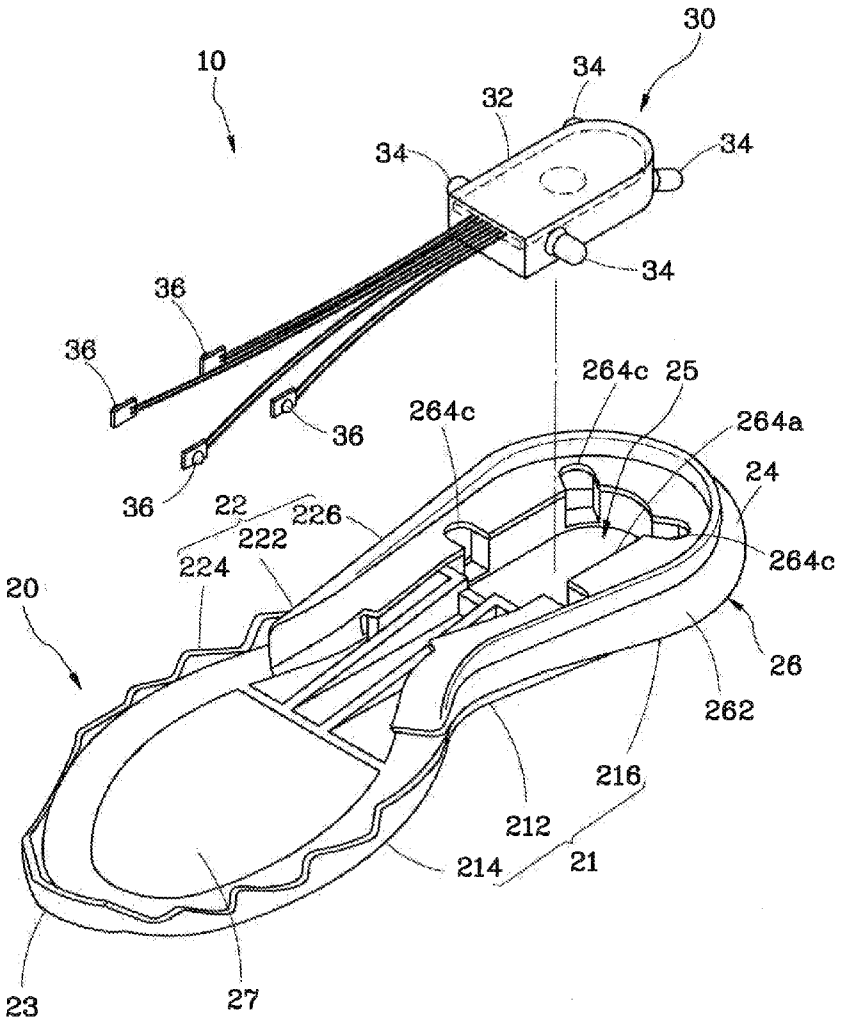
(57) **ABSTRACT**

An illuminous sole (**10**) is configured with a sole body (**20**) and electronic device (**30**). The sole body (**20**) defines a compartment (**25**) and a transparent portion (**26**) surrounding the compartment (**25**). The transparent portion (**26**) has an external side (**262**) and an internal side (**264**) which having a plurality of reflecting surfaces (**264***b*). The electronic device (**30**) is arranged within the compartment (**25**) and includes at least a first light-emitting device (**34**). Portion of the light beam projected from the first light emitting device (**34**) is directed outward from the outer side of the transparent portion (**26**) after the portion of light beam is redirected by the reflecting surfaces (**264***b*). By this arrangement, the light beam from the first light-emitting device (**34**) is redirected and broadened to cover winder scope and range. In addition, interweaving of the light beams creates more brighter and colorful effect.



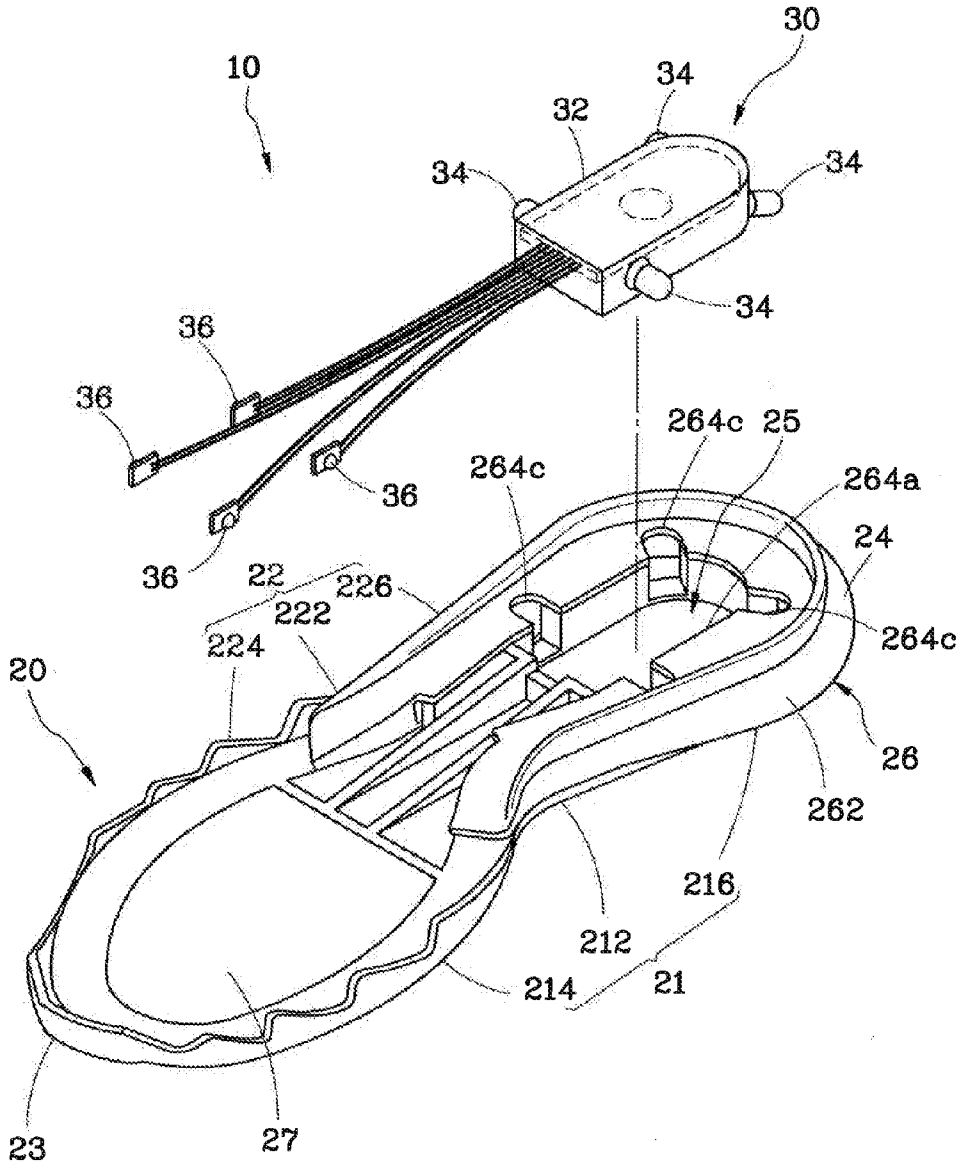

30
10
34
32
34
34
34
36
36
36
36
264c
25
264c
264a
24
22
226
222
224
264c
20
26
262
216
212
214
21
23
27

FIG. 1

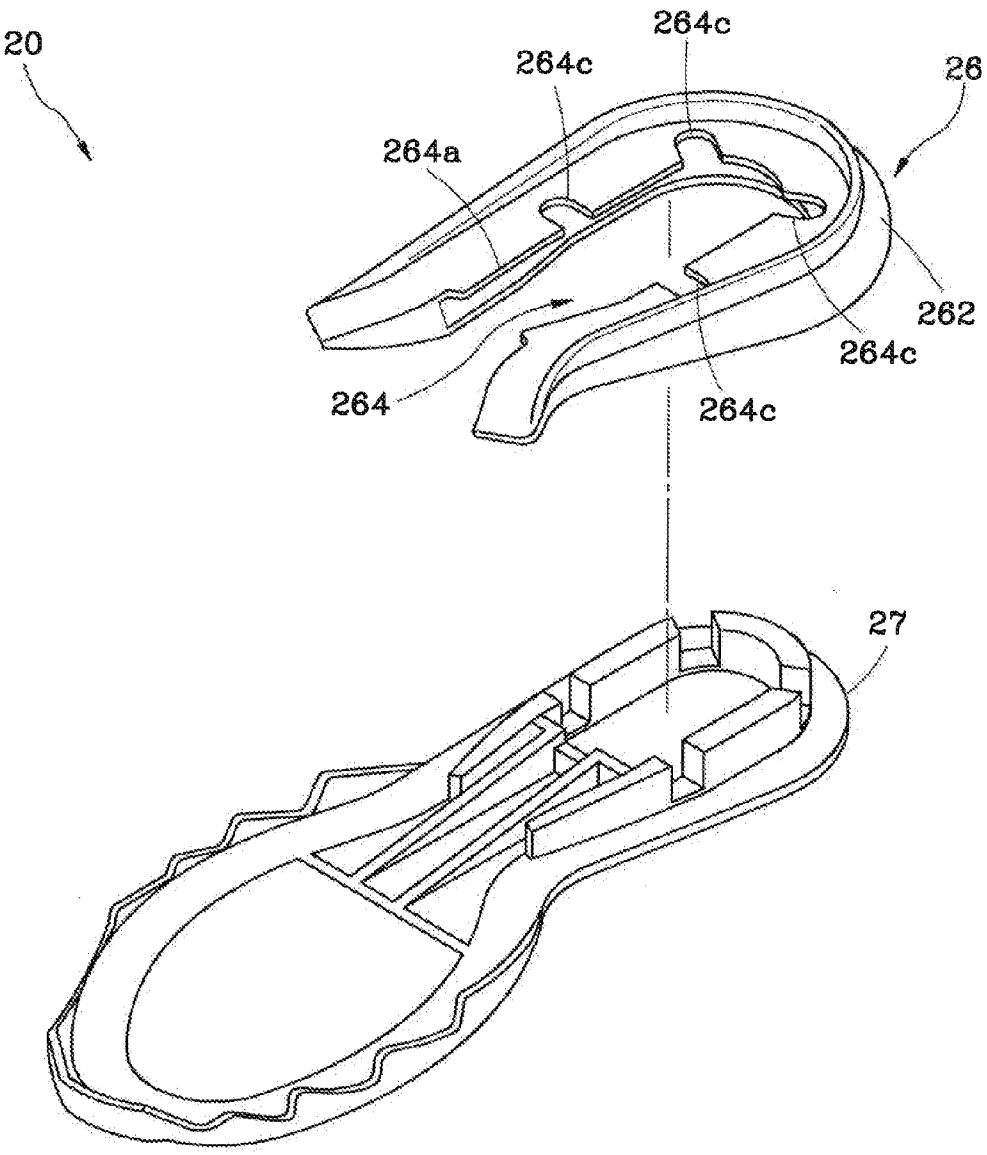


FIG. 2

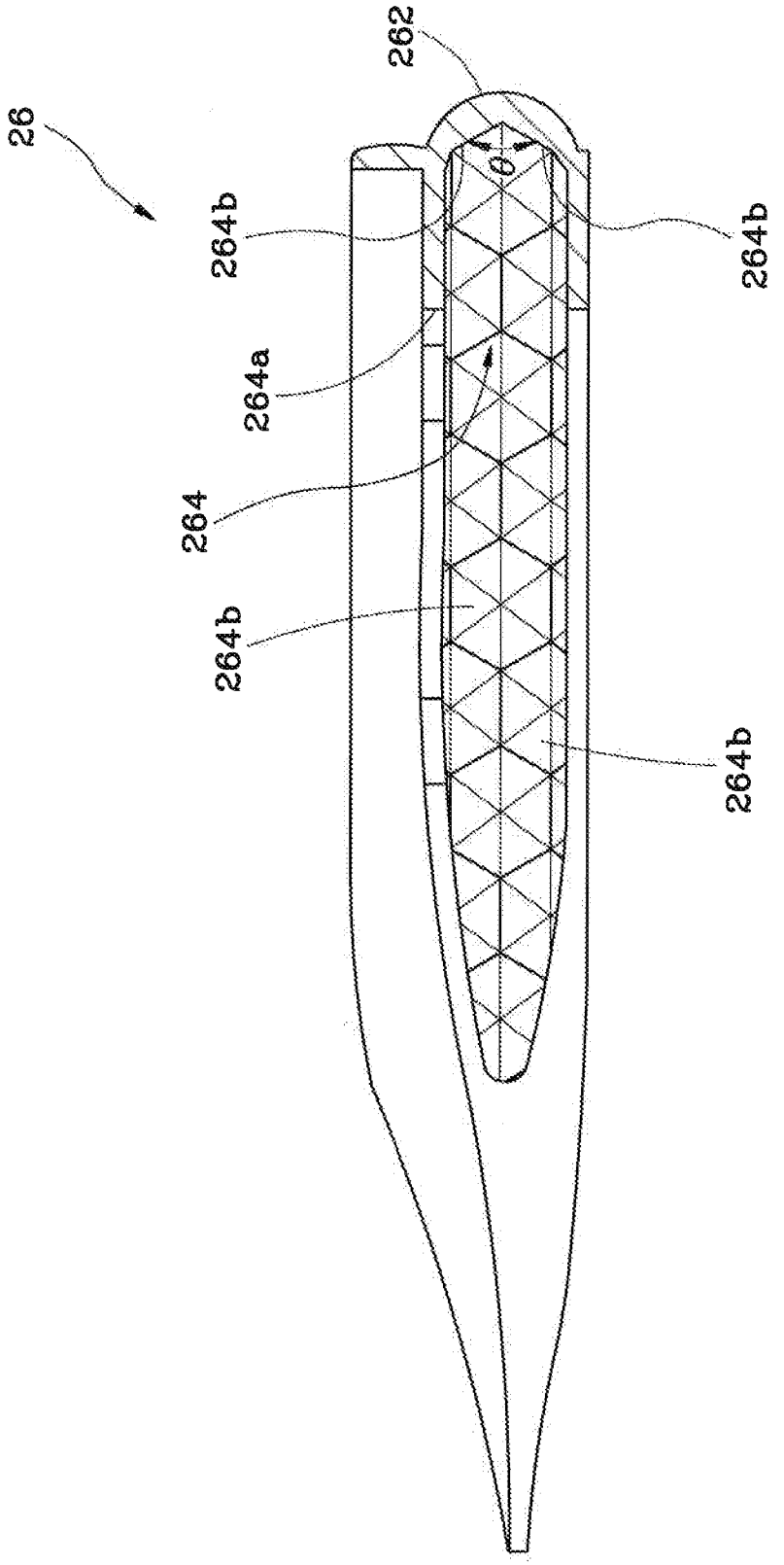


FIG. 3

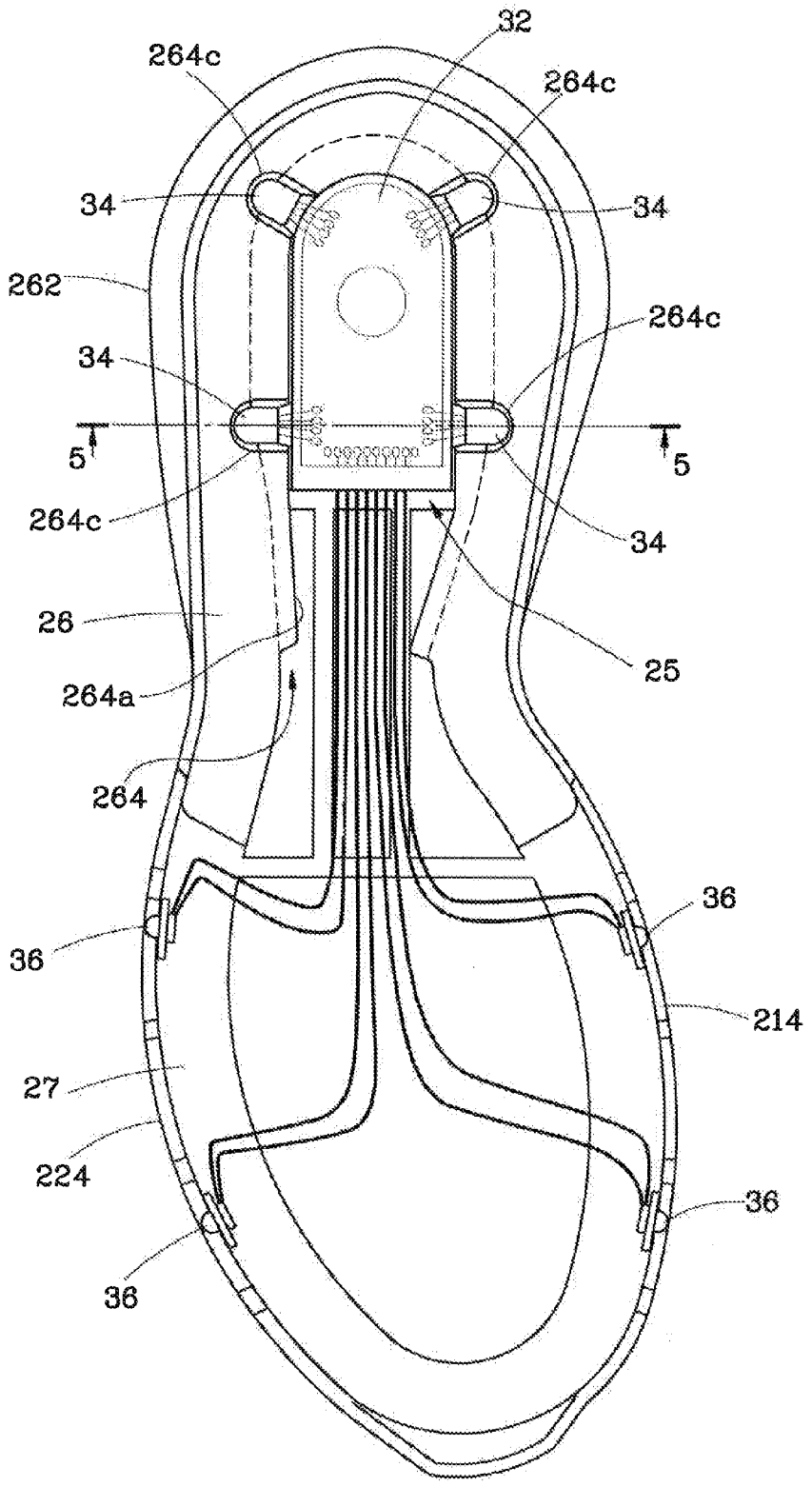

32
264c
264c
34
34
262
264c
34
5
5
264c
34
26
25
264a
264
36
36
214
27
224
36
36

FIG. 4

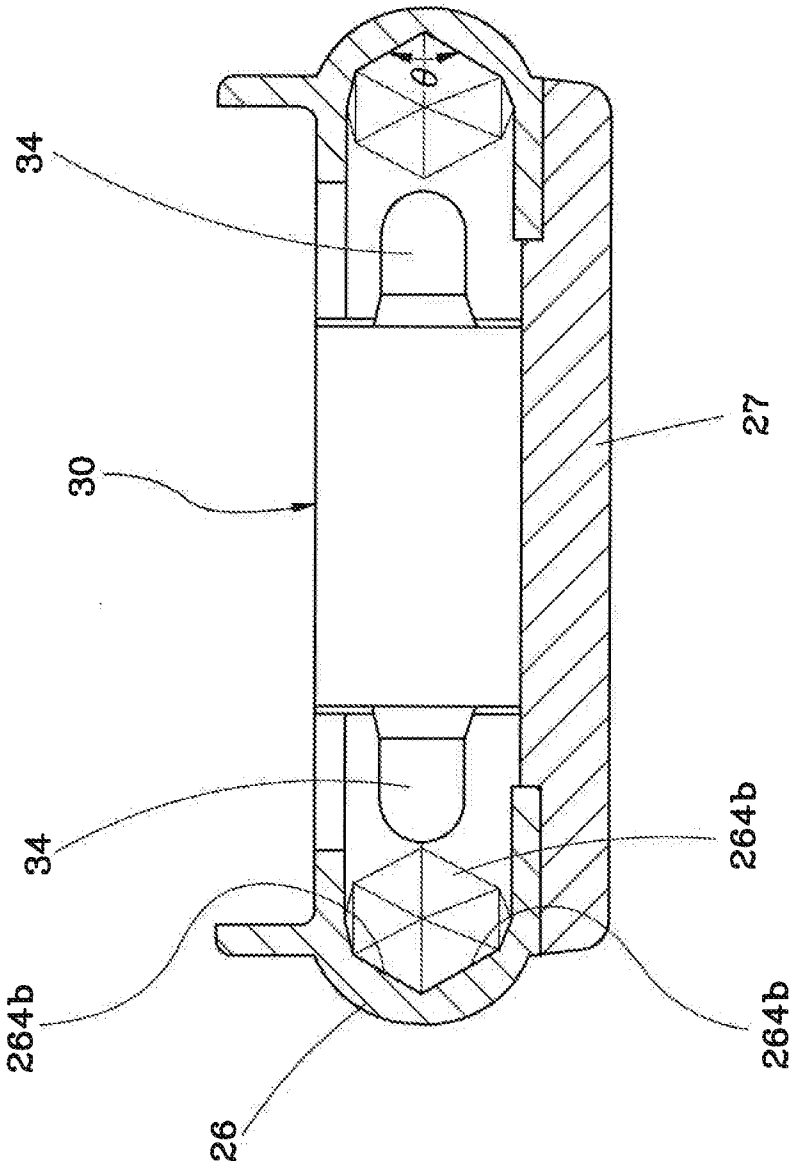


FIG. 5

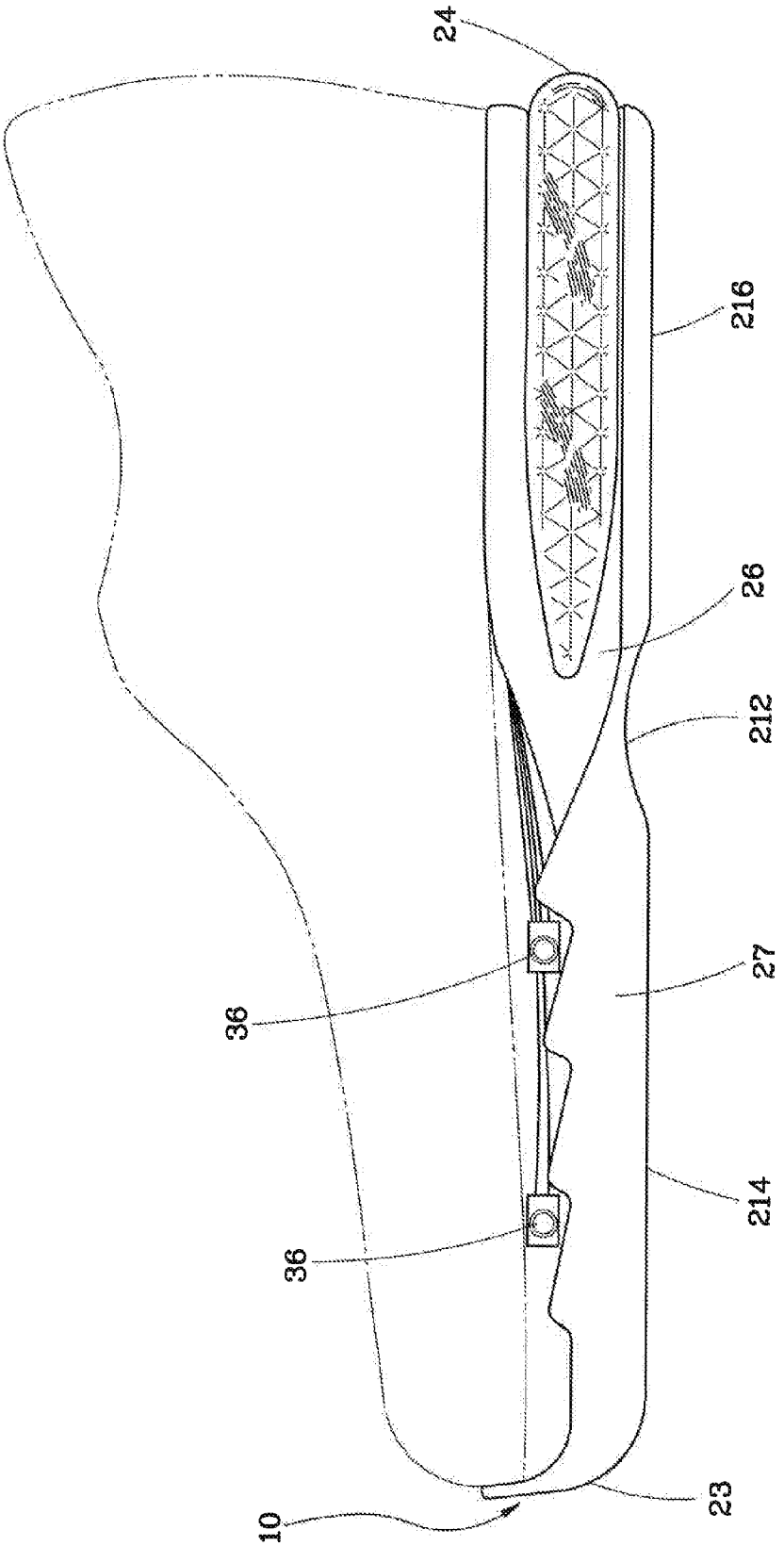


FIG. 6

ILLUMINOUS SOLE

BACKGROUND OF THE INVENTION

[0001] 1. Technical Field

[0002] The present invention relates to a sole, and more particularly to an illuminous sole with bright, colorful, homogeneous and excellent illumination effect to cover a certain scope and range.

[0003] 2. Description of Related Art

[0004] There is a variety of footwear with illuminated sole available in the market. The light beam projected from the sole serves a purpose for giving both illumination as well as courtesy to observer during night or in dark environment. In addition, the illuminated sole can also provide a dramatic effect for certain performing art. Taiwanese Utility Patent No. M408,261(US2012/0192462) discloses a footwear with a transparent sole in which a plurality of light sources are arranged so as to provide an illumination effect.

[0005] However, the estate of the sole has its inherited limitation, and the light beam is projected directly from inside of the sole, consequently, the scope and range of illumination is also limited. In order to increase the range and scope of illumination, the power of the light source has to be increased, or the number of the light source has to be increased. Nevertheless, the energy consumption will also be increased inevitably.

SUMMARY OF THE INVENTION

[0006] In view of the foregoing, it is an objective of the present invention to provide an illuminous sole featured with bright, colorful, homogeneous and excellent illumination effect to cover a certain scope and range, while without increasing the quantity of light emitting devices as well as power consumption.

[0007] An illuminous sole is configured with a sole body and electronic device. The sole body defines a compartment and a transparent portion surrounding the compartment. The transparent portion has an external side and an internal side which having a plurality of reflecting surfaces. The electronic device is arranged within the compartment and includes at least a first light-emitting device. Portion of the light beam projected from the first light emitting device is directed outward from the outer side of the transparent portion after the portion of light beam is redirected by the reflecting surfaces.

[0008] By this arrangement, the light beam from the first light-emitting device will be redirected by the reflecting surfaces instead directly projecting outward in a straightforward manner. As a result, a wider range and scope of illumination can be reached. In addition, the light beams from the first emitting device will interweave with each other so as to make it brighter. A bright, colorful, homogeneous and excellent illumination effect to cover a certain scope and range can be reached while without increasing the quantity of light emitting devices as well as power consumption.

[0009] In order to give a better and thorough understanding to the whole and other intended purposes, features and advantages of the technical solution of the illuminous sole made in accordance with the present invention, detailed description will be given with respect to preferred embodiments provided and illustrated herebelow in accompanied drawings. Apparently, with the spirit of the embodiments disclosed, person in the skilled in the art can readily come out with other modifications as well as improvements without undue experiment. It should be noted that the embodiments disclosed and illustrated herewith are all by way of elaboration instead of imposing any limitations to the appended claims.

BRIEF DESCRIPTION OF DRAWINGS

[0010] FIG. **1** is a perspective and exploded view of an illuminous sole made in accordance with the present invention;

[0011] FIG. **2** is a perspective and exploded view of a sole body of the illuminous sole made in accordance with the present invention;

[0012] FIG. **3** is a cross-sectional view of a transparent portion of the illuminous sole made in accordance with the present invention;

[0013] FIG. **4** is a top view of the illuminous sole made in accordance with the present invention;

[0014] FIG. **5** is a cross-sectional view taken along line **5-5** of FIG. **4**; and

[0015] FIG. **6** is a side elevation view of the illuminous sole made in accordance with the present invention, in which the actual implementation is depicted.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[0016] Referring to FIG. **1**, an illuminous sole **10** made in accordance with the present invention includes a sole body **20**, and an electronic device **30**.

[0017] The sole body **20** includes a left side **21**, a right side **22**, a front portion **23** and a rear portion **24**. A left recess **212** pointing toward the right side **22** is defined on the left side **21**, and a front-left portion **214** is arranged between the left recess **212** and the front portion **23**. A rear-left portion **216** is arranged between the left recess **212** and the rear portion **24**. A. right recess **222** pointing toward the left side **21** is defined on the right side **22**, and a front right portion **224** is arranged between the right recess **222** and the front portion **23**. A rear-right portion **226** is arranged between the right recess **222** and the rear portion **24**.

[0018] The sole body **20** defines a compartment **25** located between the rear-left portion **216** and the rear-right portion **226**, and includes a transparent portion **26** surrounding the compartment **25**. As shown in FIG. **2**, in the current embodiment, the sole body **20** includes an opaque bottom **27**, and the transparent portion **26** is made from transparent plastic material, and then attached to the opaque bottom **27** by means of glue or the equivalent. It should be readily appreciated that the sole body **20** can also be integrally formed with a transparent material.

[0019] Referring further to FIGS. **1**, and **3-5**, the transparent portion **26** has an external side **262** and an internal side **264**. The internal side **264** includes an inner edge **264***a*, and a plurality of reflecting surfaces **264***b* located between the inner edge **264***a* and the external side **262**. The transparent portion **26** further defines four cells **264***c* extending from the inner edge **264***a* toward the external side **262**. The reflecting surfaces **264***b* are adjoining with each other, and extending from the rear-left side **216** to the rear portion **24** and the rear-right side **226** of the sole body **20**. Every two adjacent reflecting surfaces **264***b* jointly defines an obtuse angle θ.

[0020] Referring to FIGS. **1** and **4**, the electronic device **30** includes a box **32** with a battery and a controlling circuit (not disclosed in Figures) installed therein. The electronic device **30** includes four first light emitting devices **34** extending out

of the box **32**. The electronic device **30** further includes four second light emitting devices **36** terminated to electrical wires extending out of the box **32**. The box **32** is securely disposed within the compartment **25** located in the inner edge **264***a* of the transparent portion **26** of the sole body **20**. The plurality of first light emitting devices **34** are securely disposed within the corresponding cells **264***c*, and therefore properly disposed in the rear-left side **216**, the rear-right side **226**, and the rear portion **24** of the sole body **20**. As shown in FIGS. **4** and **6**, the second light emitting devices **36** are disposed in the front-left side **214** and the front-right side **224** of the sole body **20**.

[0021] When the electronic device **30** is powered on, the first and second light emitting devices **34**, **36** will start to emit lights from illuminous sole **10**'s different positions. According to preferred embodiments, the first and second light emitting devices **34**, **36** can he implemented with LED (light emitting diode) of different colors, such as red, green, blue and white. With this arrangement, a colorful visual effect can be reached.

[0022] Most importantly, since the internal side **264** of the transparent portion **26** of the sole body **20** is defined with reflecting surfaces **264***b*, and the light beam from the first light-emitting device **34** will be redirected by the reflecting surfaces **264***b* firstly, and then emits out of the transparent portion **26** through the external side **262**. As compared to the direct or straightforward projection, the reflected or redirected light beam of the first light emitting device **34** will create a winder range of illumination after reflection. In addition, the light beams from the first and second light emitting devices **34** and **36** will intertwined with each other so as to create a brighter illumination effect after the directions of light beams are changed, i.e. without increasing the quantity of the first and second light emitting devices **34** and **36** as well as the power consumption, a brighter range and scope of illumination of the illuminous sole **10** can be reached.

[0023] It should be noted that the compartment **25**, the transparent portion **26**, and the first light emitting device **34** of the illuminous sole **10** are arranged adjacent to a heel of a user. However, this implementation should not be construed as a limitation, but an illustration, i.e. that they can be arranged in any suitable position of the luminous sole **10**. In addition, the quantity and style of the first and second light emitting devices **34** and **36** can also be modified according to actual requirements. Since the transparent portion **26** is defined with the reflecting surfaces **264***b* with which the light beam from the first emitting device **34** can be redirected, and the installation of the second light-emitting device **36** can be also omitted.

[0024] Embodiments of the present invention have been described, but not intending to impose any unduly constraint to the appended claims. Any modification of equivalent structure or equivalent process made according to the disclosure and drawings of the present invention, or any application thereof, directly or indirectly, to other related fields of technique, is considered encompassed in the scope of protection defined by the clams of the present invention.

What is claimed is:

1. An illuminous sole (**10**), comprising:

a sole body (**20**) defining a compartment (**25**) and a transparent portion (**26**) surrounding the compartment (**25**), the transparent portion (**26**) having an external side (**262**) and an internal side (**264**) which having a plurality of reflecting surfaces (**264***b*); and

an electronic device (**30**) arranged within the compartment (**25**) and including at least a first light emitting device (**34**), portion of light beam projected from the first light emitting device (**34**) being projected outward from the outer side of the transparent portion (**26**) after the portion of light beam is redirected by the reflecting surfaces (**264***b*).

2. The illuminous sole (**10**) as recited in claim **1**, wherein the reflecting surfaces (**264***b*) are adjoining with each other and creating an Obtuse angle (**0**) therebetween.

3. The illuminous sole (**10**) as recited in claim **1**, wherein the sole body (**20**) includes a left side (**21**), a right side (**22**), a front portion (**23**) and a rear portion (**2.4**); a left recess (**212**) pointing toward the right side (**22**) being defined on the left side (**21**), a front-left portion (**214**) arranged between the left recess (**212**) and the front portion (**23**), and a rear-left portion (**216**) arranged between the left recess (**212**) and the rear portion (**24**); a right recess (**222**) pointing toward the left side (**21**) being defined on the right side (**22**), a front-right portion (**224**) arranged between the right recess (**222**) and the front portion (**23**), and a rear-right portion (**226**) arranged between the right recess (**222**) and the rear portion (**24**); wherein the reflecting surfaces (**264***b*) are arranged on the rear-left portion (**216**), the rear-right portion (**226**), and the rear portion (**24**).

4. The illuminous sole (**10**) as recited in claim **3**, wherein the first light-emitting device (**34**) of the electronic device (**30**) is arranged on the rear-left portion (**216**), the rear-right portion (**226**), and the rear portion (**24**).

5. The illuminous sole (**10**) as recited in claim **1**, wherein the transparent portion (**26**) of the sole body (**20**) includes an inner edge (**264***a*) in which at least a cell (**264***c*) is defined and pointing toward the external side (**262**), wherein in the first light emitting device (**34**) of the electronic device (**30**) is arranged within the cell (**264***c*) of the transparent portion (**26**).

6. The illuminous sole (**10**) as recited in claim **5**, wherein the electronic device (**30**) includes a box (**32**) attached to the inner edge (**264***a*) of the transparent portion (**26**) of the sole body (**20**), and the first light-emitting device (**34**) of the electronic device (**30**) is arranged out of the box (**32**).

7. The illuminous sole (**10**) as recited in claim **5**, wherein the sole body (**20**) includes a left side (**21**), a right side(**22**), a front portion (**23**) and a rear portion (**24**); a left recess (**212**) pointing toward the right side (**22**) being defined on the left side (**21**), a front-left portion (**214**) arranged between the left recess (**212**) and the front portion (**23**), and a rear-left portion (**216**) arranged between the left recess (**212**) and the rear portion (**24**); a right recess (**222**) pointing toward the left side (**21**) being defined on the right side (**22**), a front-right portion (**224**) arranged between the right recess (**222**) and the front portion (**23**), and a rear-right portion (**226**) arranged between the right recess (**222**) and the rear portion (**24**); wherein the reflecting surfaces (**264***b*) are arranged on the rear-left portion (**216**), the rear-right portion (**226**), and the rear portion (**24**).

8. The illuminous sole (**10**) as recited in claim **7**, wherein the first light-emitting device (**34**) of the electronic device (**30**) is arranged on the rear-left portion (**216**), the rear-right portion (**226**), and the rear portion (**24**).

9. The illuminous sole (**10**) as recited in claim **8**, wherein the electronic device (**30**) includes a box (**32**) attached to the inner edge (**264***a*) of the transparent portion (**26**) of the sole body (**20**), and a plurality of first light emitting devices (**34**) extending out of the box (**32**), a plurality of cells (**264***c*) defined within the transparent portion (**26**), and the plurality

of first light emitting devices (**34**) being each arranged within the corresponding cell (**264***c*) of the transparent portion (**26**).

10. The illuminous sole (**10**) as recited in claim **9**, wherein the reflecting surfaces (**264***b*) are adjoining with each other and creating an obtuse angle (θ) therebetween.

11. The illuminous sole (**10**) as recited in claim **3**, wherein the electronic device (**30**) further includes a plurality of second light emitting devices (**36**) arranged on the front-left portion (**214**) and the front-right portion (**224**) of the sole body (**20**), respectively.

12. The illuminous sole (**10**) as recited in claim **4**, wherein the electronic device (**30**) further includes a plurality of second light emitting devices (**36**) arranged on the front-left portion (**214**) and the front-right portion (**224**) of the sole body (**20**), respectively.

13. The illuminous sole (**10**) as recited in claim **7**, wherein the electronic device (**30**) further includes a plurality of second light emitting devices (**36**) arranged on the front-left portion (**214**) and the front-right portion (**224**) of the sole body (**20**), respectively.

14. The illuminous sole (**10**) as recited in claim **8**, wherein the electronic device (**30**) further includes a plurality of second light emitting devices (**36**) arranged on the front-left portion (**214**) and the front-right portion (**224**) of the sole body (**20**), respectively.

15. The illuminous sole (**10**) as recited in claim **9**, wherein the electronic device (**30**) further includes a plurality of second light emitting devices (**36**) arranged on the front-left portion (**214**) and the front-right portion (**224**) of the sole body (**20**), respectively.

16. The illuminous sole (**10**) as recited in claim **10**, wherein the electronic device further includes a plurality of second light emitting devices arranged on the front-left portion and the front-right portion of the sole body, respectively.

17. The illuminous sole (**10**) as recited in claim **1**, wherein the sole body (**20**) includes a left side (**21**), a right side (**22**), a front portion (**23**) and a rear portion (**24**); a left recess (**212**) pointing toward the right side (**22**) being defined on the left side (**21**), a front-left portion (**214**) arranged between the left recess (**212**) and the front portion (**23**), and a rear-left portion (**216**) arranged between the left recess (**212**) and the rear portion (**24**); a right recess (**222**) pointing toward the left side (**21**) being defined on the right side (**22**), a front-right portion (**224**) arranged between the right recess (**222**) and the front portion (**23**), and a rear-right portion (**226**) arranged between the right recess (**222**) and the rear portion (**24**); wherein the electronic device (**30**) further includes a plurality of second light emitting devices (**36**) arranged in the front-left portion (**214**) and the front-right portion (**224**), respectively.

18. The illuminous sole (**10**) as recited in claim **2**, wherein the sole body (**20**) includes a left side (**21**), a right side (**22**), a front portion (**23**) and a rear portion (**24**); a left recess (**212**) pointing toward the right side (**22**) being defined on the left side (**21**), a front-left portion (**214**) arranged between the left recess (**212**) and the front portion (**23**), and a rear-left portion (**216**) arranged between the left recess (**212**) and the rear portion (**24**); a right recess (**222**) pointing toward the left side (**21**) being defined on the right side (**22**), a front-right portion (**224**) arranged between the right recess (**222**) and the front portion (**23**), and a rear-right portion (**226**) arranged between the right recess (**222**) and the rear portion (**24**); wherein the electronic device (**30**) further includes a plurality of second light emitting devices (**36**) arranged in the front-left portion (**214**) and the front-right portion (**224**), respectively

19. The illuminous sole (**10**) as recited in claim **5**, wherein the sole body (**20**) includes a left side (**21**), a right side (**22**), a front portion (**23**) and a rear portion (**24**); a left recess (**212**) pointing toward the right side (**22**) being defined on the left side (**21**), a front-left portion (**214**) arranged between the left recess (**212**) and the front portion (**23**), and a rear-left portion (**216**) arranged between the left recess (**212**) and the rear portion (**24**); a right recess (**222**) pointing toward the left side (**21**) being defined on the right side (**22**), a front-right portion (**224**) arranged between the right recess (**2**:**22**) and the front portion (**23**), and a rear-right portion (**226**) arranged between the right recess (**222**) and the rear portion (**24**); wherein the electronic device (**30**) further includes a plurality of second light emitting devices (**36**) arranged in the front-left portion (**214**) and the front-right portion (**224**), respectively.

20. The illuminous sole (**10**) as recited in claim **6**, wherein the sole body (**20**) includes a left side (**21**), a right side (**22**), a front portion (**23**) and a rear portion (**24**); a left recess (**212**) pointing toward the right side (**22**) being defined on the left side (**21**), a front-left portion (**214**) arranged between the left recess (**212**) and the front portion (**23**), and a rear-left portion (**216**) arranged between the left recess (**212**) and the rear portion (**24**); a right recess (**222**) pointing toward the left side (**21**) being defined on the right side (**22**), a front-right portion (**224**) arranged between the right recess (**222**) and the front portion (**23**), and a rear-right portion (**226**) arranged between the right recess (**222**) and the rear portion (**24**); wherein the electronic device (**30**) further includes a plurality of second light emitting devices (**36**) arranged in the front-left portion (**214**) and the front-right portion (**224**), respectively.

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