The invention relates to a shoe and method for making a shoe with divided ground contact surfaces including a toe area covered in part by a toe material; the toe material for contacting a ground; a heel area covered in part by a heel material; wherein the heel material is for contacting the ground. The shoe also has a flex member between the toe and heel areas; the flex member extends both in lateral and longitudinal directions for spreading the toe and heel materials toward a periphery of the shoe and for reducing friction between the ground and the toe and heel materials; and wherein the flex member is contoured for facilitating flexing of the shoe.
SHOE WITH DIVIDED GROUND CONTACT SURFACES

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit under 35 U.S.C. §119(e) of U.S. Provisional Patent Application No. 61/984, 368, filed on Apr. 25, 2014, the content of which is incorporated herein by reference.

BACKGROUND OF THE INVENTION

[0002] Bowling shoes have traditionally been constructed using the same surface material for all ground contact surfaces. Typically, this surface material has been leather, due to the necessity for the shoe to slide during parts of the approach. Increasingly it is being recognized, however, that bowlers benefit from different parts of the shoe having different traction characteristics, and indeed from the left and right shoe on the same bowler having different traction characteristics.

[0003] The term “traction characteristic” encompasses any quality of the traction surface of the shoe that affects the amount of traction between the shoe and the surface on which it is placed. The traction surfaces are those surfaces of the shoe which come into contact with the ground during use. Traction refers to the friction between the traction surface and the surface upon which it is placed. Traction characteristics can be varied by changing the material of the traction surface. For example, a traction surface made of rubber will typically have a higher coefficient of friction than a traction surface made of leather, leading to higher traction, and soft, spongy rubber typically has higher traction than hard, smooth rubber. Traction characteristics can also be varied by surface treatments such as waxing, or oiling to reduce traction, or adding resins or adhesives to increase traction. Traction characteristics can be further varied and can be varied in directional manner by varying the surface texture of the traction surface by adding, for example, grooves, ridges, protrusions, or cavities.

[0004] The typical bowler will approach the foul line with the leading foot stopping just short of the foul line, and in many cases it is desirable to have a shoe for the leading foot having lower traction than the shoe for the trailing foot. The shoes are frequently referred to as having either a “traction sole” or a “sliding sole”, and a bowler will typically use a traction sole on the strong or trailing foot and a sliding sole on the weak or leading foot. The condition at the lane and the speed, height, weight, and shoe size of the bowler are just a few of the many factors which determine how much traction the bowler will need. A taller, heavier bowler with small foot and fast approach on a slick lane will require more traction than a shorter, lighter bowler with large feet and a slow approach on a rougher lane.

[0005] The amount of friction between the shoe and the ground surface also varies with the area of the shoe in contact with the ground surface and with the weight on that area of the shoe. Consequently, the traction characteristic of a shoe can be reduced by reducing the total area of the shoe that is in contact with the ground surface. Further, if the total ground contact surface of the shoe is comprised of smaller areas having different traction characteristics, the amount of friction between the shoe and the ground surface will depend on the distribution of the bowler’s weight across the various traction surfaces. If more of the bowler’s weight is distributed along higher traction areas of the sole, the traction will be greater than if it is distributed along lower traction areas of the sole.

[0006] It can be appreciated that different portions of the same shoe are in contact with the ground during different parts of the approach, that a further improvement in performance may be realized by varying the traction characteristics in discrete portions of the same shoe, or by incorporating sections of ground-contact surface in which a traction characteristic varies across the section. During the bowling stride, a forepart of the shoe sole typically goes through a motion wherein different areas of the forepart make contact with the bowling lane at different times.

SUMMARY OF THE INVENTION

[0008] It is an object of the invention to provide a shoe with a plurality of ground contact surfaces, each having a selected traction characteristic, such that changes in the orientation and pressure of the foot against the lane will change the number, area, and orientation of ground contact surfaces in contact with the lane, and therefore the total friction between the shoe and the ground surface at that point in the bowler’s stride. The traction characteristics of the plurality of ground contact surfaces could then be individually adjusted to provide a shoe with traction characteristics matched to the requirements of the bowler at each point in the bowling stride, depending on which portions of the sole were in contact with the lane at each point in the stride. At least one flex member on the bottom of the shoe facilitates the above described adjustment to the shoe’s traction characteristics by permitting the bowler to bend the shoe and utilize the different ground contact surfaces.

[0009] In one embodiment, a shoe with divided ground contact surfaces includes: a toe area covered in part by a toe material, wherein the toe material is for contacting a ground; a heel area covered in part by a heel material, wherein the heel material is for contacting the ground. The shoe also has a flex member between the toe and heel areas, wherein the flex member extends both in lateral and longitudinal directions for spreading the toe and heel materials toward a periphery of the shoe and for reducing friction between the ground and the toe and heel materials, and wherein the flex member is contoured for facilitating flexing of the shoe.

[0010] In some embodiments, the flex member follows a contour of a user’s toes for facilitating flexing of shoe 10 in the area of the toes. In another embodiment, the flex member is recessed and spaced apart from the ground for reducing friction.

[0011] In further embodiments, the shoe has a second flex member extending around a recessed area, wherein the recessed area is spaced apart from the ground.

[0012] In other embodiments, the flex member includes a general shape selected from the group consisting of a V shape, a U shape, a Y shape, a W shape, an X shape, a circular shape, a triangular shape, a saw tooth shape, a polygonal shape, and combinations thereof.

[0013] In some embodiments, the flex member bisects the toe material for facilitating flexing about an axis passing longitudinally through the flex member. In other embodiments, the flex member bisects the toe material for facilitating flexing about an axis passing longitudinally through the flex member. In some of these embodiments, the flex member bisects the heel.
material for facilitating flexing about an axis passing longitudinally through the flex member.

In an optional embodiment, the flex member includes a spring selected from the group consisting of a leaf spring, a coil spring, a molded memory material spring, and combinations thereof.

In another embodiment, the toe material is located on one side of the first flex member. In a further embodiment, the flex member extends from a periphery of the toe material to a periphery of the heel material for bisecting the toe and heel materials.

In another aspect of the invention, a method for providing a shoe with divided ground contact surfaces includes the steps of providing a toe area; covering a part of the toe area with a toe material; providing a heel area; covering a part of the heel area with a heel material; placing a first flex member between the toe and heel areas; extending the first flex member in an arcuate direction; spreading the toe material towards a periphery of the shoe for reducing friction between the ground and the toe material; extending a second flex member longitudinally through the heel material; dividing the heel material; extending the second flex member around a recessed area; spacing the recessed area apart from the ground for reducing friction; and spacing the first and second flex members apart from the ground for reducing friction.

In some embodiments, the method includes the step of locating the toe material on one side of the first flex member. In another embodiment, the method extends the first flex member from a periphery of the toe material to a periphery of the heel material for bisecting the toe and heel materials.

In further embodiments, the method selects a general shape of the flex member from the group consisting of a V shape, a U shape, a Y shape, a W shape, an X shape, a circular shape, a triangular shape, a saw tooth shape, a polygonal shape, and combinations thereof.

In yet another embodiment, the method bisects the toe material with the first flex member for facilitating flexing about an axis passing longitudinally through the first flex member. In some of these embodiments, the method bisects the heel material with the second flex member for facilitating flexing about an axis passing longitudinally through the second flex member.

In other embodiments, the method uses a spring as the flex member.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 depicts the shoe in accordance with the invention.
FIG. 2 more particularly depicts the shoe shown in FIG. 1.
FIG. 3 more particularly depicts the shoe shown in FIG. 1.
FIG. 4 more particularly depicts the shoe shown in FIG. 1.
FIG. 5 more particularly depicts the shoe shown in FIG. 1.
FIG. 6 more particularly depicts a flex member shown in FIG. 1.
FIG. 7 more particularly depicts a flex member shown in FIG. 1.
FIG. 8 more particularly depicts a flex member shown in FIG. 1.
FIG. 9 more particularly depicts a flex member shown in FIG. 1.
FIG. 10 more particularly depicts a flex member shown in FIG. 1.
FIG. 11 more particularly depicts a flex member shown in FIG. 1.
FIG. 12 more particularly depicts a flex member shown in FIG. 1.
FIG. 13 more particularly depicts a flex member shown in FIG. 1.
FIG. 14 more particularly depicts a flex member shown in FIG. 1.
FIG. 15 more particularly depicts a flex member shown in FIG. 1.
FIG. 16 more particularly depicts a flex member shown in FIG. 1.
FIG. 17 more particularly depicts a flex member shown in FIG. 1.
FIG. 18 more particularly depicts a flex member shown in FIG. 1.
FIG. 19 more particularly depicts a flex member shown in FIG. 1.
FIG. 20 more particularly depicts a flex member shown in FIG. 1.
FIG. 21 more particularly depicts a flex member shown in FIG. 1.
FIG. 22 more particularly depicts a flex member shown in FIG. 1.
FIG. 23 more particularly depicts a flex member shown in FIG. 1.
FIG. 24 more particularly depicts a flex member shown in FIG. 1.
FIG. 25 more particularly depicts a flex member shown in FIG. 1.
FIG. 26 more particularly depicts a flex member shown in FIG. 1.
FIG. 27 more particularly depicts a flex member shown in FIG. 1.
FIG. 28 more particularly depicts a flex member shown in FIG. 1.
FIG. 29 more particularly depicts a flex member shown in FIG. 1.
FIG. 30 more particularly depicts a flex member shown in FIG. 1.
FIG. 31 more particularly depicts a flex member shown in FIG. 1.
FIG. 32 more particularly depicts a flex member shown in FIG. 1.
FIG. 33 more particularly depicts a flex member shown in FIG. 1.
FIG. 34 more particularly depicts a flex member shown in FIG. 1.
FIG. 35 more particularly depicts a flex member shown in FIG. 1.
FIG. 36 more particularly depicts a flex member shown in FIG. 1.
FIG. 37 more particularly depicts a flex member shown in FIG. 1.
FIG. 38 depicts a method for providing the shoe shown in FIG. 1.

DETALL ED DESCRIPTION OF THE INVENTION

As depicted in FIG. 1, the invention is a configuration for the sole of a slide shoe 10, comprising a plurality of
slide soles 100, 300, 601, and 602 which may contact the ground, each slide sole composed of a material possessing a certain coefficient of friction.

[0060] As shown in FIG. 2, shoe 10 with divided ground contact surfaces includes toe area 40 covered in part by toe material or ground contact surface 101. Toe area 40 includes toe slide sole 100, wherein toe slide sole 100 includes toe material or ground contact surface 101.

[0061] Heel area 80 is covered in part by heel material or ground contact surface 603, 604 (see FIG. 5). Heel area 80 includes heel slide sole 601, 602, wherein heel slide sole 601, 602 includes heel material or ground contact surface 603, 604.

[0062] In some embodiments, a slide sole has a flex member dividing slide soles in a lateral direction. In other embodiments, the flex member divides the slide soles in a longitudinal direction. In further embodiments, the flex member divides the slide soles in an arcuate direction. Some embodiments have the slide soles divided by the flex member in any combination of lateral, longitudinal, and arcuate directions.

[0063] FIGS. 2 and 5 show first flex member 200 in a forepart of shoe 10 and second flex member 500 in a rearpart of shoe 10, respectively. In these embodiments shown, flex members 200 and 500 bisect the slide soles and spread slide sole contact surfaces 101, 301, 603, 604 to periphery 13 of the sole. The function of flex members 200 and 500 is to facilitate flexing of shoe 10 and to control which of the plurality of slide soles contacts the ground. In some embodiments, flex members 200 and 500 allow a user to control a total surface area of ground contact made by all of the plurality of contact surfaces 101, 301, 603, and 604 for slide soles 100, 300, 601, and 602.

[0064] As shown in FIG. 1, shoe 10 comprises four separate slide soles each with a different ground contact surface, namely toe slide sole 100, rear forefoot slide sole 300, medial heel slide sole 601, and lateral heel slide sole 602 with contact surfaces 101, 301, 603, and 604.

[0065] Toe slide sole 100 has ground contact surface or toe material 101 which provides a bowler a controllable amount of horizontal ground friction, determined by the coefficient of friction of toe slide sole’s 100 selected surface material composition, and by the bowler’s chosen amount of flexing of slide shoe 10 to vary the amount of toe slide sole’s 100 surface area in contact with the ground.

[0066] Rear forefoot slide sole 300, also in toe area 40 and shown in FIG. 2, has ground contact surface 301 which provides the bowler a controllable amount of horizontal ground friction, determined by the coefficient of friction of the rear forefoot slide sole’s 300 selected surface material composition, and by the bowler’s chosen amount of flexing of slide shoe 10 to vary the amount of contact surface 301 in contact with the ground.

[0067] Medial heel slide sole 601 and lateral heel slide sole 602 collectively define heel area 80, as shown in FIG. 5. Like rear forefoot slide sole 300 and toe slide sole 100, each has ground contact surfaces 603 and 604, respectively, which collectively define heel material and provide the bowler a controllable amount of horizontal ground friction, determined by the coefficient of friction of the corresponding slide sole’s selected surface material composition, and by the bowler chosen amount at flexing of slide shoe 10 to vary the amount of heel material 603, 604 in contact with the ground.

[0068] FIG. 2 outlines the location of a space between toe slide sole 100 and the rear forefoot slide sole 300, wherein flex member 200 occupies. In some embodiments, flex member 200 is composed of a resilient material. In other embodiments, flex member 200 is contoured in order to further facilitate flexing of shoe 10.

[0069] In further embodiments, flex member 200 functions as a hinge along its axis, thus facilitating flexing of shoe 10 in a direction perpendicular to flex member’s 200 centerline.

[0070] As FIG. 1 shows, flex member 200 extends in both lateral and longitudinal directions, serving to spread slide sole ground contact surfaces 101 and 301 toward periphery 13 of shoe 10. This advantageously spreads contact surfaces 101 and 301 over a greater extent of shoe 10 with a reduced amount (measured by volume or surface area) of contact surfaces 101 and 301. In some embodiments, flex member 200 spreads contact surfaces 101 and 301 over a greater portion of shoe 10’s footprint, thereby improving stability of shoe 10.

[0071] In other embodiments, flex member 200 provides a reduced total ground contact surface area of the two foregoing slide sole parts 100 and 300, and reduces friction as compared to a shoe 10 that does not spread the ground contact surfaces towards a periphery 13 of the shoe 10.

[0072] In further embodiments, as shown in FIGS. 9 and 13, flex member 200 facilitates transverse flexing of shoe 10 to the left or right in the area of the toes and the ball of the foot by functioning as a hinge along flex member 200’s longitudinal axis. FIGS. 14-15 illustrate flex member 200 extending from periphery 13 to periphery 13 of shoe 10, thereby bisecting toe and rear forefoot materials 101 and 301, respectively.

[0073] In additional embodiments, flex member 200 facilitates diagonal flexing of shoe 10 in the area of the toes and the ball of the foot, by functioning as a hinge along flex member 200’s longitudinal axis. See FIGS. 14-15.

[0074] To achieve the above desired flexing, whether transverse, diagonal, and combinations thereof, flex member 200 has various shapes and a variety of geometries.

[0075] FIGS. 6-21 show various embodiments of flex member 200 having different shapes and geometries for facilitating flexing of shoe 10 in different directions for different bowlers.

[0076] In some embodiments, leaf spring 410 is embedded in a part of the length of flex member 200, as shown in profile view in FIGS. 22 and 25, leaf spring 410 having its equilibrium or neutral point adjusted so that shoe 10 is in a slightly flexed position, thereby facilitating flexing of shoe 10 in the area of leaf spring 410.

[0077] In some embodiments, coil spring 414 is embedded in a part of the length of flex member 200, as shown in profile view in FIGS. 23 and 26, wherein coil spring 414 has its equilibrium or neutral point adjusted so that shoe 10 is in a slightly flexed position, thereby facilitating flexing of shoe 10 in the area of coil spring 414.

[0078] In other embodiments, molded memory material spring structure 418 is embedded in a part of the length of flex member 200, as shown in profile view in FIGS. 24 and 27, molded memory material spring structure 418 having its equilibrium or neutral point adjusted so that shoe 10 is in a slightly flexed position, thereby facilitating flexing of shoe 10 in the area of molded memory material spring structure 418.

[0079] Embodiments containing the spring structures shown in profile view in FIGS. 22-27 offer enhanced shoe 10 flexure capability. The various spring structures apply a certain initial amount of force to shoe 10 to deflect it slightly into
the flexed position as its initial condition. This provides advantage in that there is less input force required to further flex shoe 10.

[0080] In some embodiments, in addition to the various springs 410, 414, and 418 used in the forepart of shoe 10, various springs 510, 514, and 518 are also used in heel area 80, as shown in FIGS. 25-27. In further embodiments, in lieu of the various springs 410, 414, and 418 in the toe area 40 and the various springs 510, 514, and 518 in the heel area 80 of shoe 10, various springs 511, 515, and 519 run essentially the entire length of shoe 10 from toe area 40 to heel area 80, as shown in FIGS. 28-30.

[0081] In some embodiments, flex member 200 approximates a V-shape in the plan view, as shown in FIGS. 1, 2, 5, 6, 16, and 17 for facilitating flexing of shoe 10 in the area of the toes and the ball of the foot, by functioning as a hinge along flex member 200’s longitudinal axis.

[0082] In some embodiments, flex member 200 approximates a U-shape in the plan view, as shown in FIGS. 7 and 18, for facilitating flexing of shoe 10 in the area of the toes and the ball of the foot, by functioning as a hinge along flex member 200’s longitudinal axis.

[0083] In some embodiments, flex member 200 approximates a W-shape in the plan view, as shown in FIG. 8, for facilitating flexing of shoe 10 in the area of the toes and the ball of the foot, by functioning as a hinge along flex member 200’s longitudinal axis.

[0084] In some embodiments, flex member 200 approximates a Y-shape in the plan view, as shown in FIG. 9, for facilitating transverse, diagonal, and longitudinal flexing of shoe 10 in the area of the toes and the ball of the foot, by functioning as a hinge along flex member 200’s longitudinal axis.

[0085] In some embodiments, flex member 200 approximates a circular shape in the plan view, as shown in FIG. 10, for facilitating omnidirectional flexing of shoe 10 in the area of the toes and the ball of the foot, by functioning as a hinge along flex member 200’s longitudinal axis.

[0086] In some embodiments flex member 200 approximates a triangular shape in the plan view, as shown in FIG. 11, for facilitating flexing of shoe 10 in the area of the toes and the ball of the foot, by functioning as a hinge along flex member 200’s longitudinal axis.

[0087] In some embodiments, flex member 200 approximates an X-shape in the plan view, as shown in FIGS. 12 and 13, for facilitating flexing of shoe 10 in any direction in the area of the toes and the ball of the foot, by functioning as a hinge along flex member 200’s longitudinal axis.

[0088] In some embodiments, flex member 200 approximates a sawtooth shape in the plan view, as shown in FIG. 36, for facilitating flexing of shoe 10 in any direction in the area of the toes and the ball of the foot, by functioning as a hinge along flex member 200’s longitudinal axis.

[0089] In some embodiments, flex member 200 approximates a polygon shape in the plan view, as shown in FIG. 37, for facilitating flexing of shoe 10 in any direction in the area of the toes and the ball of the foot, by functioning as a hinge along flex member 200’s longitudinal axis.

[0090] In some embodiments, flex member 200 approximates a generally linear shape in the plan view, oriented on a diagonal from the medial midsole to the lateral toe, as shown in FIG. 14, for facilitating flexing of shoe 10 in the area of the toes and the ball of the foot toward the big toe, by functioning as a hinge along flex member 200’s longitudinal axis.

[0091] In some embodiments, flex member 200 approximates a generally linear shape in the plan view, oriented on a diagonal from the lateral midssole to the medial toe, as shown in FIG. 15, for facilitating flexing of shoe 10 in the area of the toes and the ball of the foot toward the little toe, by functioning as a hinge along flex member 200’s longitudinal axis.

[0092] Both diagonally oriented flex member 200 embodiments shown in FIGS. 14 and 15 facilitate additional friction control to shoe 10 that is already flexed longitudinally, by offering the additional feature of facilitating flexing of shoe 10 in a direction with a transverse component.

[0093] In some embodiments, flex member 200 is recessed and spaced apart from the ground for reducing friction, by functioning as a hinge along flex member 200’s longitudinal axis.

[0094] As illustrated by FIG. 3, flex member 200 serves also to elongate the total slide area length SI. 201, measured from the tip of the toe slide sole 100 to that part of the rear foot slide sole 300 closest to the heel contact surfaces 601 and 602. In this embodiment, flexing shoe 10 selects the portion of toe material 101 and rear foot slide sole contact surface 301 in contact with the ground, thereby providing friction control over a longer part of the forward portion of shoe 10.

[0095] FIG. 4 depicts three zones, Zone A 110, Zone B 210 and Zone C 310, each with a contact surface 111, 211, and 311, respectively, which occupy the surfaces of the toe slide sole 100 and the rear foot slide sole 300. This three zone configuration facilitates friction control by spreading selectable zones of friction across a longer longitudinal distance, and providing a middle transition zone.

[0096] As shown in FIG. 4, Zone A 110 encompasses the portion of the toe slide sole 100 closest to the tip of the toe.

[0097] As also shown in FIG. 4, Zone C 310 and its corresponding contact surface 311 encompasses the portion of the rear foot slide sole 300 closest to the heel contact surfaces 601 and 602. Zone B 210 with its corresponding contact surface 211 is the transition zone, which lies between Zone A 110 and Zone C 310, encompassing the rear portion of the toe slide sole 100 not included in Zone A 110 and the forward portion of the rear foot slide sole 300 not included in Zone C 310. Zone A 110 and its corresponding contact surface 111 occupies the forwardmost portion of the toe slide sole 100. Referring to FIGS. 3 and 4, it can be seen that, together, the three zones provide a gradual transition from the toe slide sole to the rear foot slide sole, spread across the entire distance SI. 201, enhancing friction control.

[0098] A longitudinal second flex member 500, shown outlined in FIG. 5, and shown in the plan view in several embodiments in FIGS. 16, 17, and 18, extends around a recessed area which is spaced apart from the ground, reducing friction by eliminating surface contact area.

[0099] In some embodiments, second flex member 500 is itself recessed and spaced apart from the ground, reducing friction.

[0100] In some embodiments, second flex member 500 functions as a hinge along its longitudinal axis, thus facilitating flexing of shoe 10 in a direction perpendicular to flex member’s 500’s longitudinal centerline.

[0101] In some embodiments, second flex member 500 facilitates longitudinal flexing of shoe 10 over the full extent of second flex member’s 500’s length, by functioning as a
hinge along its longitudinal axis, thus facilitating flexing of shoe 10 in a direction perpendicular to flex member’s 500 longitudinal centerline.

[0102] In some embodiments, as shown in FIGS. 5, 16, 17, and 18, second flex member 500 bisects the heel area of the sole, dividing heel area into a medial heel section slide sole 601, with corresponding contact surface 603 and a lateral heel section slide sole 602, with corresponding contact surface, reducing total heel contact surface area, thereby reducing friction.

[0103] In some embodiments, as depicted in FIGS. 5, 16, 17, and 18, second flex member 500 spreads the medial heel section slide sole 601, with corresponding contact surface 503 and the lateral heel section slide sole 602, with corresponding contact surface 604, to the periphery 13 of shoe 10, providing greater stability than shoe 10 of equal contact surface area concentrated at its center.

[0104] In some embodiments, second flex member 500 facilitates transverse flexing of shoe 10 along the entire length of second flex member 500 by functioning as a hinge along its longitudinal axis, thus facilitating flexing of shoe 10 in a direction perpendicular to second flex member 500’s longitudinal centerline.

[0105] In some embodiments, second flex member 500 facilitates longitudinal flexing of shoe 10 along the entire length of second flex member 500 by functioning as a hinge along its transverse axis, thus facilitating flexing of shoe 10 in a direction parallel to second flex member 500’s longitudinal centerline.

[0106] In some embodiments, second flex member 500 facilitates diagonal flexing of shoe 10 along the entire length of second flex member 500 by functioning as a hinge along its longitudinal axis, thus facilitating flexing of shoe 10 in a direction perpendicular to second flex member’s 500’s longitudinal centerline.

[0107] In some embodiments, second flex member 500 facilitates diagonal flexing of shoe 10 along the entire length of second flex member 500 by functioning as a hinge along its transverse axis, thus facilitating flexing of shoe 10 in a direction parallel to second flex member 500’s longitudinal centerline.

[0108] In some embodiments, as shown in FIGS. 5 and 18, second flex member 500 does not contact flex member 200, providing separate, independent areas to facilitate flexing of the shoe, by functioning as a hinge along its longitudinal axis, thus facilitating flexing of shoe 10 in a direction perpendicular to second flex member 500’s longitudinal centerline.

[0109] In some embodiments, as shown in FIG. 16, second flex member 500 terminates as it contacts flex member 200, providing a synergistic effect in that location to facilitate flexing of the shoe, by functioning as a hinge along its longitudinal axis, thus facilitating flexing of shoe 10 in a direction perpendicular to second flex member 500’s longitudinal centerline.

[0110] In yet another embodiment, as shown in FIG. 17, second flex member 500 intersects and crosses flex member 200, providing a synergistic effect across a large area to facilitate flexing of the shoe, by functioning as a hinge along its longitudinal axis, thus facilitating flexing of shoe 10 in a direction perpendicular to second flex member 500’s longitudinal centerline.

[0111] In other embodiments, as shown in FIG. 17, second flex member 500 runs longitudinally for the entire length of the shoe from toe to heel, to facilitate flexing of shoe 10 over its entire length, by functioning as a hinge along its longitudinal axis, thus facilitating flexing of shoe 10 in a direction perpendicular to second flex member 500’s longitudinal centerline.

[0112] In other embodiments, as shown in FIG. 17, second flex member 500 runs longitudinally for the entire length of shoe 10 from toe to heel, dividing the toe sole 100 into a left part and a right part, and spreading them toward the periphery of shoe 10, reducing friction, saving surface contact material and reducing friction by reducing surface contact area.

[0113] In other embodiments, as shown in FIGS. 16 and 17, second flex member 500 is of a generally linear shape in the plan view, facilitating flexing of shoe 10 over second flex member’s 500 length, by functioning as a hinge along its longitudinal axis, thus facilitating flexing of shoe 10 in a direction perpendicular to second flex member 500’s longitudinal centerline.

[0114] In some embodiments, as shown in FIG. 19, second flex member 500 is of a generally triangular shape in the plan view, facilitating flexing of shoe 10 over second flex member’s 500 length, by functioning as a hinge along its longitudinal axis, thus facilitating flexing of shoe 10 in a direction perpendicular to second flex member 500’s longitudinal centerline.

[0115] In still other embodiments, as shown in FIGS. 18 and 20, second flex member 500 is of a generally polygonal shape in the plan view, facilitating flexing of shoe 10 over second flex member’s 500’ length, by functioning as a hinge along its longitudinal axis, thus facilitating flexing of shoe 10 in a direction perpendicular to second flex member 500’s longitudinal centerline.

[0116] In further embodiments, as shown in FIG. 21, second flex member 500 is of a generally oval shape in the plan view, facilitating flexing of shoe 10 over second flex member’s 500’ length, by functioning as a hinge along its longitudinal axis, thus facilitating flexing of shoe 10 in a direction perpendicular to second flex member 500’s longitudinal centerline.

[0117] In another embodiment, as shown in FIG. 34 flex member 200 or second flex member 500 approximate a U-shape in their cross section, for facilitating flexing of shoe 10 over flex member 200 or second flex member 500’s length, by functioning as a hinge along their longitudinal axes, thus facilitating flexing of shoe 10 in a direction perpendicular to flex member 200 or second flex member 500’s longitudinal centerline.

[0118] In some embodiments, as shown in FIG. 35, flex member 200 or second flex member 500 approximate a V-shape in their cross sections, for facilitating flexing of shoe 10 over flex member 200 or second flex member 500’s length, by functioning as a hinge along their longitudinal axes, thus facilitating flexing of shoe 10 in a direction perpendicular to flex member 200 or second flex member 500’s longitudinal centerline.

[0119] In other embodiments, as shown in the profile view in FIG. 28, a leaf spring 511 is embedded in a portion of the length of second flex member 500, said leaf spring 511 having its equilibrium or neutral point adjusted so that the shoe is in a slightly flexed position, thereby facilitating flexing of shoe 10 in the area of the toes and the ball of the foot.

[0120] In some embodiments, as shown in the profile view in FIG. 29, a coil spring 515 is embedded in a part of the length of second flex member 500, said coil spring 515 having its equilibrium or neutral point adjusted so that the shoe is in
a slightly flexed position, thereby facilitating flexing of shoe 10 in the area of the toes and the ball of the foot.

[0121] In some embodiments, as shown in the profile view in FIG. 30, a molded memory material spring structure 519 is embedded in a part of the length of second flex member 500, said molded memory material spring structure 519 having its equilibrium or neutral point adjusted so that shoe 10 is in a slightly flexed position, thereby facilitating flexing of shoe 10 in the area of the toes and the ball of the foot.

[0122] In some embodiments, as shown in the elevation view in FIG. 31, a leaf spring structure is embedded in a part of the transverse extent of flex member 200, said leaf spring having its equilibrium or neutral point adjusted so that shoe 10 is in a slightly flexed position, thereby facilitating flexing of shoe 10 in the area of the toes and the ball of the foot.

[0123] In some embodiments, as shown in the elevation view in FIG. 32, a coil spring structure is embedded in a part of the transverse extent of flex member 200, said coil spring having its equilibrium or neutral point adjusted so that shoe 10 is in a slightly flexed position, thereby facilitating flexing of shoe 10 in the area of the toes and the ball of the foot.

[0124] In some embodiments, as shown in the elevation view in FIG. 33, a molded memory material spring structure is embedded in a part of the transverse extent of flex member 200, said molded memory material spring structure having its equilibrium or neutral point adjusted so that shoe 10 is in a slightly flexed position, thereby facilitating flexing of shoe 10 in the area of the toes and the ball of the foot.

[0125] In some embodiments, second flex member 500 is composed of hard rubber.

[0126] In some embodiments, second flex member 500 is composed of flexible plastic.

[0127] In the preferred embodiment, the contact surface 111 of Zone A 110 is 100 percent fibrous material with cotton, the contact surface 311 of Zone C 310 is 100 percent microfiber, and the contact surface 211 of Zone B 210 is a mixture of 50 percent fibrous material with cotton and 50 percent microfiber.

[0128] In some embodiments, the contact surface 111 of Zone A 110 is felt, the contact surface 211 of Zone B 210 is leather, and the contact surface 311 of Zone C 310 is hard plastic. The contact surface 603 of the medial heel 601 and the contact surface 604 of the lateral heel 602 is sponge rubber.

[0129] In some embodiments, the contact surface 111 of Zone A 110 is felt, the contact surface 211 of Zone B 210 is leather, and the contact surface 311 of Zone C 310 is hard plastic. The contact surface 603 of the medial heel 601 is sponge rubber, and the contact surface 604 of the lateral heel 602 is hard rubber.

[0130] In some embodiments, the contact surface 111 of Zone A 110 is felt, the contact surface 211 of Zone B 210 is leather, and the contact surface 311 of Zone C 310 is hard plastic. The contact surface 603 of the medial heel 601 and the contact surface 604 of the lateral heel 602 is sponge rubber.

[0131] In some embodiments, the contact surface 111 of Zone A 110 is hard plastic, the contact surface 211 of Zone B 210 is leather, and the contact surface 311 of Zone C 310 is hard plastic. The contact surface 603 of the medial heel 601 and the contact surface 604 of the lateral heel 602 is hard rubber.

[0132] In some embodiments, the contact surface 111 of Zone A 110 is hard rubber with a texture of large bump protrusions, the contact surface 211 of Zone B 210 is hard rubber with a texture of small bump protrusions, and the contact surface 311 of Zone C 310 is hard rubber with a smooth surface. The contact surface 603 of the medial heel 601 and the contact surface 604 of the lateral heel 602 is hard rubber with a smooth surface.

[0133] In some embodiments, the contact surface 111 of Zone A 110 is hard rubber with a smooth surface, the contact surface 211 of Zone B 210 is hard rubber with a lateral grooved surface, and the contact surface 311 of Zone C 310 is hard rubber with a smooth surface. The contact surface 603 of the medial heel 601 and the contact surface 604 of the lateral heel 602 is hard rubber with a smooth surface.

[0134] In some embodiments, Zones A 110, B 210 and C 310 are eliminated. The surface contact material 101 of the toe slide sole 100 is fibrous material with cotton. The surface contact material 301 of the rear forefoot slide sole 300 is microfiber. The contact surface 603 of the medial heel 601 is hard rubber, and the contact surface 604 of the lateral heel 602 is microfiber.

[0135] In some embodiments, flex members 200 and 500 are composed of hard rubber.

[0136] In some embodiments, flex members 200 and 500 are composed of flexible plastic.

[0137] In some embodiments, the contact surface 101 of the toe slide sole 100, the contact surface 301 of the rear forefoot slide sole 300, the contact surface 603 of the medial heel slide sole 601, and the contact surface 604 of the lateral heel slide sole 602 are composed of material with a very low coefficient of friction, for greatly reducing friction.

[0138] In some embodiments, the contact surface 101 of the toe slide sole 100, the contact surface 301 of the rear forefoot slide sole 300, the contact surface 603 of the medial heel slide sole 601, and the contact surface 604 of the lateral heel slide sole 602 are composed of 50 percent fibrous material with cotton material and 50 percent microfiber material, for greatly reducing friction.

[0139] In some embodiments, contact surface 101 of the toe slide sole 100, the contact surface 301 of the rear forefoot slide sole 300, the contact surface 603 of the medial heel slide sole 601, and the contact surface 604 of the lateral heel slide sole 602 are composed of 50 percent fibrous material with cotton material and 50 percent microfiber material, for greatly reducing friction.

[0140] In some embodiments, contact surface 101 of the toe slide sole 100, the contact surface 301 of the rear forefoot slide sole 300, the contact surface 603 of the medial heel slide sole 601, and the contact surface 604 of the lateral heel slide sole 602 are composed of microfiber material, for reducing friction.

[0141] In some embodiments, contact surface 101 of the toe slide sole 100, the contact surface 301 of the rear forefoot slide sole 300, the contact surface 603 of the medial heel slide sole 601, and the contact surface 604 of the lateral heel slide sole 602 are composed of microfiber material, for reducing friction.

[0142] In some embodiments, contact surface 101 of the toe slide sole 100, the contact surface 301 of the rear forefoot slide sole 300, the contact surface 603 of the medial heel slide sole 601, and the contact surface 604 of the lateral heel slide sole 602 are composed of felt material, for reducing friction.

[0143] In some embodiments, contact surface 101 of the toe slide sole 100, the contact surface 301 of the rear forefoot slide sole 300, the contact surface 603 of the medial heel slide sole 601, and the contact surface 604 of the lateral heel slide sole 602 are composed of felt material, for reducing friction.

[0144] In some embodiments, contact surface 101 of the toe slide sole 100, the contact surface 301 of the rear forefoot
slide sole 300, the contact surface 603 of the medial heel slide sole 601, and the contact surface 604 of the lateral heel slide sole 602 are composed of cotton material, for reducing friction.

[0145] In some embodiments, contact surface 101 of the toe slide sole 100, the contact surface 301 of the rear forefoot slide sole 300, the contact surface 603 of the medial heel slide sole 601, and the contact surface 604 of the lateral heel slide sole 602 are composed of leather material, for reducing friction.

[0146] In some embodiments, contact surface 101 of the toe slide sole 100, the contact surface 301 of the rear forefoot slide sole 300, the contact surface 603 of the medial heel slide sole 601, and the contact surface 604 of the lateral heel slide sole 602 are composed of wood material, for reducing friction.

[0147] In some embodiments, contact surface 101 of the toe slide sole 100, the contact surface 301 of the rear forefoot slide sole 300, the contact surface 603 of the medial heel slide sole 601, and the contact surface 604 of the lateral heel slide sole 602 are composed of hard rubber material, for reducing friction.

[0148] In some embodiments, contact surface 101 of the toe slide sole 100, the contact surface 301 of the rear forefoot slide sole 300, the contact surface 603 of the medial heel slide sole 601, and the contact surface 604 of the lateral heel slide sole 602 have concave dimples, for reducing friction.

[0149] In some embodiments, contact surface 101 of the toe slide sole 100, the contact surface 301 of the rear forefoot slide sole 300, the contact surface 603 of the medial heel slide sole 601, and the contact surface 604 of the lateral heel slide sole 602 have large convex bumps, for reducing friction.

[0150] In some embodiments, contact surface 101 of the toe slide sole 100, the contact surface 301 of the rear forefoot slide sole 300, the contact surface 603 of the medial heel slide sole 601, and the contact surface 604 of the lateral heel slide sole 602 are composed of spongy rubber, for increasing friction.

[0151] In some embodiments, contact surface 101 of the toe slide sole 100, the contact surface 301 of the rear forefoot slide sole 300, the contact surface 603 of the medial heel slide sole 601, and the contact surface 604 of the lateral heel slide sole 602 are composed of soft rubber, for increasing friction.

[0152] In some embodiments, contact surface 101 of the toe slide sole 100, the contact surface 301 of the rear forefoot slide sole 300, the contact surface 603 of the medial heel slide sole 601, and the contact surface 604 of the lateral heel slide sole 602 are composed of gel, for increasing friction.

[0153] In some embodiments, contact surface 101 of the toe slide sole 100, the contact surface 301 of the rear forefoot slide sole 300, the contact surface 603 of the medial heel slide sole 601, and the contact surface 604 of the lateral heel slide sole 602 have a nonskid texture, for increasing friction.

[0154] In some embodiments, contact surface 101 of the toe slide sole 100, the contact surface 301 of the rear forefoot slide sole 300, the contact surface 603 of the medial heel slide sole 601, and the contact surface 604 of the lateral heel slide sole 602 have transverse grooves, for increasing friction.

[0155] In some embodiments, contact surface 101 of the toe slide sole 100, the contact surface 301 of the rear forefoot slide sole 300, the contact surface 603 of the medial heel slide sole 601, and the contact surface 604 of the lateral heel slide sole 602 have longitudinal grooves, for increasing friction.

[0156] In some embodiments, as shown in FIG. 4, Zone A 110 contact surface 111 is 100 percent ultra-low friction material.

[0157] In some embodiments, as shown in FIG. 4, Zone B 210 contact surface 211 is 50 percent ultra-low friction material, and 50 percent low friction material.

[0158] In some embodiments, as shown in FIG. 4, Zone C 310 contact surface 311 is 100 percent low friction material.

[0159] In some embodiments, Zone A 110, Zone B 210 and Zone C 310 surface contact materials 111, 211, and 311 have an extremely low coefficient of friction, to greatly reduce friction.

[0160] In some embodiments, Zone A 110, Zone B 210 and Zone C 310 surface contact materials 111, 211, and 311 contain a mixture of a material that has an extremely low coefficient of friction and a material that has a low coefficient of friction, to moderately reduce friction.

[0161] In some embodiments, Zone A 110, Zone B 210 and Zone C 310 surface contact materials 111, 211, and 311 have a low coefficient of friction, to reduce friction.

[0162] In some embodiments, Zone A 110 surface contact materials 111, 211, and 311 are fibrous material with cotton, to greatly reduce friction.

[0163] In some embodiments, Zone A 110 surface contact material 111 is 50 percent fibrous material with cotton and 50 percent microfiber, to greatly reduce friction.

[0164] In some embodiments, Zone A 110 surface contact material 111 is microfiber, to reduce friction.

[0165] In some embodiments, Zone A 110 surface contact material 111 is hard rubber, to reduce friction.

[0166] In some embodiments, Zone A 110 surface contact material 111 is leather, to reduce friction.

[0167] In some embodiments, Zone A 110 surface contact material 111 is wood, to reduce friction.

[0168] In some embodiments, Zone A 110 surface contact material 111 is felt, to reduce friction.

[0169] In some embodiments, Zone A 110 surface contact material 111 has concave dimples, to reduce friction.

[0170] In some embodiments, Zone A 110 surface contact material 111 has convex bumps, to reduce friction.

[0171] In some embodiments, Zone A 110 surface contact material 111 has longitudinal grooves, to reduce friction.

[0172] In some embodiments, Zone C 310 surface contact material 311 is fibrous material with cotton, to greatly reduce friction.

[0173] In some embodiments, Zone C 310 surface contact material 311 is 50 percent fibrous material with cotton and 50 percent microfiber, to greatly reduce friction.

[0174] In some embodiments, Zone C 310 surface contact material 311 is microfiber, to reduce friction.

[0175] In some embodiments, Zone C 310 surface contact material 311 is hard rubber, to reduce friction.

[0176] In some embodiments, Zone C 310 surface contact material 311 is leather, to reduce friction.

[0177] In some embodiments, Zone C 310 surface contact material 311 is wood, to reduce friction.

[0178] In some embodiments, Zone C 310 surface contact material 311 is felt, to reduce friction.

[0179] In some embodiments, Zone C 310 surface contact material 311 has concave dimples, to reduce friction.

[0180] In some embodiments, Zone C 310 surface contact material 311 has convex bumps, to reduce friction.

[0181] In some embodiments, Zone C 310 surface contact material 311 has longitudinal grooves, to reduce friction.
In some embodiments, Zone B 210 surface contact material 211 is fibrous material with cotton, to greatly reduce friction.

In some embodiments, Zone B 210 surface contact material 211 is 50 percent fibrous material with cotton and 50 percent microfiber, to greatly reduce friction.

In some embodiments, Zone B 210 surface contact material 211 is microfiber, to reduce friction.

In some embodiments, Zone B 210 surface contact material 211 is hard rubber, to reduce friction.

In some embodiments, Zone B 210 surface contact material 211 is leather, to reduce friction.

In some embodiments, Zone B 210 surface contact material 211 is wood, to reduce friction.

In some embodiments, Zone B 210 surface contact material 211 is felt, to reduce friction.

In some embodiments, Zone B 210 surface contact material 211 has concave dimples, to reduce friction.

In some embodiments, Zone B 210 surface contact material 211 has convex bumps, to reduce friction.

In some embodiments, Zone B 210 surface contact material 211 has longitudinal grooves, to reduce friction.

Optional embodiments, the contact surface 101 of the toe section slide sole 100, the contact surface 301 of the rear foot section slide sole 300, the contact surface 603 of the medial heel section slide sole 601, and the contact surface 604 of the lateral heel section slide sole 602 are removable, to enable customization by means of choice of surface materials and textures.

In some of these embodiments, Zones A 110, B 210 and C 310 are eliminated. The surface contact materials 101, 301, 603, and 604 of the toe section slide sole 100, rear foot slide sole 300, medial heel 601 and lateral heel 602 are appropriately sized and shaped swatches permanently affixed to flexible plastic backs that are removably attached to shoe 10 by means of a snap mechanism. The surface contact materials of the said swatches are 100 percent fibrous material with cotton, 25 percent microfiber and 75 percent fibrous material with cotton, 50 percent microfiber and 50 percent fibrous material with cotton, 75 percent microfiber and 25 percent fibrous material with cotton, and 100 percent microfiber.

In other embodiments, Zones A 110, B 210 and C 310 are eliminated. The surface contact materials 101, 301, 603, and 604 of the toe section slide sole 100, rear foot slide sole 300, medial heel 601 and lateral heel 602 are appropriately sized and shaped swatches permanently affixed to flexible plastic backs that are removably attached to shoe 10 by means of a snap mechanism. The surface contact materials of the said swatches are 100 percent fibrous material with cotton, 25 percent microfiber and 75 percent fibrous material with cotton, 50 percent microfiber and 50 percent fibrous material with cotton, 75 percent microfiber and 25 percent fibrous material with cotton, and 100 percent microfiber.

In another aspect of the invention, method 900 for providing shoe 10 with divided ground contact surfaces includes the step of providing 910 a toe area and covering 912 a part of the toe area with a toe material. Method 900 also includes providing 940 a heel area and covering 942 a part of the heel area with a heel material. Method 900 also places 950 a first flex member between the toe and heel areas; extends 952 the first flex member in an arcuate direction; and spreads 954 the toe material towards a periphery of shoe 10 for reducing friction between the ground and said toe material. In a further embodiment, method 900 extends 960 a second flex member longitudinally through the heel material; divides 962 the heel material; and extends 964 the second flex member around a recessed area. Method 900 also includes spacing 970 the recessed area apart from the ground for reducing friction; and spacing 972 the first and second flex members apart from the ground for reducing friction.

In some embodiments, method 900 includes locating 980 the toe material on one side of said first flex member. In another embodiment, method 900 extends 982 the first flex member from a periphery of the toe material to a periphery 13 of the heel material for bisecting the toe and heel materials.

In some embodiments, method 900 includes selecting 984 a general shape of the flex member 200 from the group consisting of a V shape, a U shape, a Y shape, a W shape, an X shape, a circular shape, a triangular shape, a saw tooth shape, a polygonal shape, and combinations thereof.

In further embodiments, method 900 bisects 986 the toe material with the first flex member for facilitating flexing about an axis passing longitudinally through the first flex member.

In other embodiments, method 900 bisects 988 the heel material with the second flex member for facilitating flexing about an axis passing longitudinally through the second flex member.

In an optional embodiment, method 900 includes 992 using a spring as the first or second flex member.

1. A shoe with divided ground contact surfaces, comprising:
   a. A toe area covered in part by a toe material;
   b. Said toe material for contacting a ground;
   c. A heel area covered in part by a heel material;
   d. Said heel material for contacting the ground;
   e. A flex member between the toe and heel material;
   f. Said flex member extends both in lateral and longitudinal directions for spreading said toe and heel materials toward a periphery of the shoe and for reducing friction between the ground and said toe and heel materials; and
   g. Said flex member is contoured for facilitating flexing of the shoe.

2. The shoe according to claim 1, wherein said flex member follows a contour of a user's toes for facilitating flexing of the shoe in the area of the toes.

3. The shoe according to claim 1, wherein said flex member is recessed and spaced apart from the ground for reducing friction.

4. The shoe according to claim 1, further comprising a second flex member extending around a recessed area, wherein said recessed area is spaced apart from the ground.

5. The shoe according to claim 1, wherein said flex member includes a general shape selected from the group consisting of a V shape, a U shape, a Y shape, a W shape, an X shape, a circular shape, a triangular shape, a saw tooth shape, a polygonal shape, and combinations thereof.

6. The shoe according to claim 1, wherein said flex member extends in a generally diagonal direction.

7. The shoe according to claim 1, wherein said flex member bisects said toe material for facilitating flexing about an axis passing longitudinally through said flex member.

8. The shoe according to claim 1, wherein said flex member bisects said heel material for facilitating flexing about an axis passing longitudinally through said flex member.

9. The shoe according to claim 1, wherein said flex member includes a spring selected from the group consisting of a leaf spring, a coil spring, a molded memory material spring, and combinations thereof.
10. A shoe with divided ground contact surfaces, comprising:
   a. A toe area covered in part by a toe material;
   b. Said toe material for contacting a ground;
   c. A heel area covered in part by a heel material;
   d. Said heel material for contacting the ground;
   e. A first flex member placed between the toe and heel areas;
   f. Said first flex member extending in an arcuate direction for spreading said toe material towards a periphery of the shoe and for reducing friction between the ground and said toe material;
   g. A second flex member extending longitudinally through the heel material for dividing the heel material;
   h. Said second flex member extending around a recessed area, wherein said recessed area is spaced apart from the ground for reducing friction; and
   i. Said first and second flex members are spaced apart from the ground for reducing friction.
11. The shoe according to claim 10, wherein said toe material is located on one side of said first flex member.
12. The shoe according to claim 10, wherein said flex member extends from a periphery of said toe material to a periphery of said heel material for bisecting said toe and heel materials.
13. The shoe according to claim 10, wherein said flex member includes a general shape selected from the group consisting of a V shape, a U shape, a Y shape, a W shape, an X shape, a circular shape, a triangular shape, a saw tooth shape, a polygonal shape, and combinations thereof.
14. A method for providing a shoe with divided ground contact surfaces, comprising the steps of:
   a. Providing a toe area;
   b. Covering a part of the toe area with a toe material;
   c. Providing a heel area;
   d. Covering a part of the heel area with a heel material;
   e. Placing a first flex member between the toe and heel areas;
   f. Extending the first flex member in an arcuate direction;
   g. Spreading the toe material towards a periphery of the shoe for reducing friction between the ground and said toe material;
   h. Extending a second flex member longitudinally through the heel material;
   i. Dividing the heel material;
   j. Extending the second flex member around a recessed area;
   k. Spacing the recessed area apart from the ground for reducing friction; and
   l. Spacing the first and second flex members apart from the ground for reducing friction.
15. The method according to claim 14, further comprising the step of locating the toe material on one side of said first flex member.
16. The method according to claim 14, further comprising the step of extending the first flex member from a periphery of the toe material to a periphery of the heel material for bisecting the toe and heel materials.
17. The method according to claim 14, further comprising the step of selecting a general shape of the flex member from the group consisting of a V shape, a U shape, a Y shape, a W shape, an X shape, a circular shape, a triangular shape, a saw tooth shape, a polygonal shape, and combinations thereof.
18. The method according to claim 14, further comprising the step of bisecting the toe material with the first flex member for facilitating flexing about an axis passing longitudinally through the first flex member.
19. The method according to claim 14, further comprising the step of bisecting the heel material with the second flex member for facilitating flexing about an axis passing longitudinally through the second flex member.
20. The method according to claim 14, further comprising the step of using a spring as the flex member.
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