

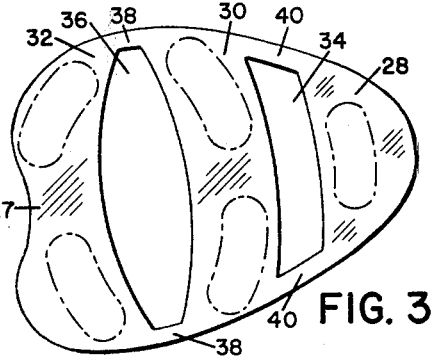
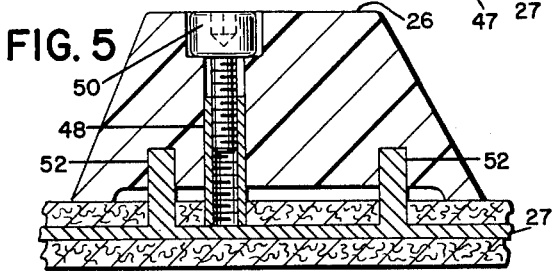
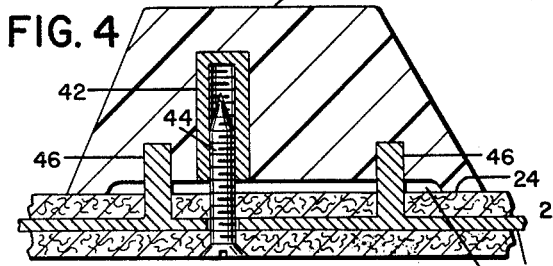
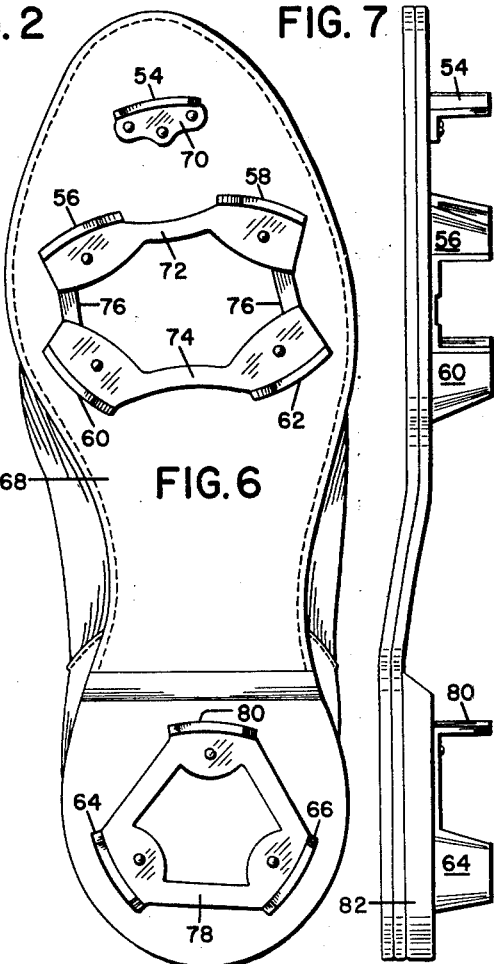
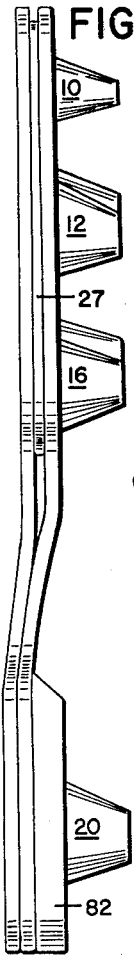
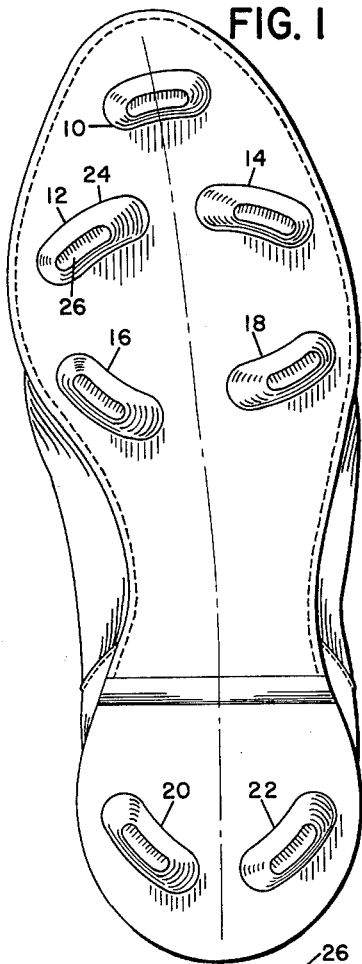
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ATHLETIC SHOE

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3,127,687

## ATHLETIC SHOE

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Continuation of application Ser. No. 118,076, June 19, 1961. This application Oct. 17, 1962, Ser. No. 231,381  
17 Claims. (Cl. 36-2.5)

This invention relates to shoes for athletic wear, such, for example, as football or baseball shoes, one object of the invention being to provide an improved shoe of the above character having ground-engaging cleats constructed and arranged to provide increased traction while facilitating rotation of the foot without locking in the turf in pivoting movement of the shoe.

Another object is to provide a shoe having cleats constructed and arranged to afford greater lateral support on the ground to prevent sidewise tilting of the foot.

Another object is a construction and arrangement of cleats on the shoe sole providing more uniform and even distribution of the weight of the body on the foot.

A further object is the provision of means for supporting the cleats on the shoe sole which maintains the flexibility of the sole at the fore part of the shoe, thus improving forward traction, less clogging of the cleats by dirt and greater freedom in the motion of the foot when standing, crouching or running.

A further object is an improved form of cleat, cleat arrangement and sole construction, eliminating torsional stress on the ankle, leg and knee caused in conventional cleat arrangement by locking in the ground and eliminating necessity to lift the foot from the ground in order to shift direction of the foot in motion.

Still a further object is to provide an athletic shoe having the above advantages and capable of being readily and economically manufactured.

This application is a continuation of our pending application, Serial No. 118,076, filed June 19, 1961, Athletic Shoe, now abandoned.

To these and other ends the invention resides in certain improvements and combinations of parts, all as will be hereinafter more fully described, the novel features being pointed out in the claims at the end of the specification.

In the drawings:

FIG. 1 is a bottom plan view of a football shoe for the left foot and its sole and cleats embodying the present invention;

FIG. 2 is a side elevation of the sole and cleats shown in FIG. 1;

FIG. 3 is a plan view of a metal plate for enclosure in the sole for anchoring the cleats;

FIG. 4 is an enlarged longitudinal sectional elevation of one of the cleats to illustrate one form of attachment to the sole;

FIG. 5 is a view similar to FIG. 4, but showing a modified construction;

FIG. 6 is a view similar to FIG. 1, but showing similar cleats for a baseball shoe, and

FIG. 7 is a side elevation of the shoe sole and cleats shown in FIG. 6.

The invention thus relates to the cleat anchoring construction of the insole and outsole of the shoe and the construction and arrangement of the cleats on its bottom face, embodying principles applicable generally to athletic footwear, for providing improved traction and increased ease in rotation at the ball of the foot, without slippage on or locking with the ground. It preferably includes a plurality of separate cleats on the fore part of the shoe and a plurality on the heel part, all constructed and arranged in a way to best accomplish such functions.

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It is preferred, in the present instance, to employ seven cleats in all, including a toe cleat 10 and four cleats 12 to 18, inclusive, under the central area for supporting the ball of the foot. Such assembly of ball cleats comprises a pair of cleats 12 and 14, spaced from each other transversely of the sole and located somewhat forwardly of the center of the ball area. Also a pair of cleats 16 and 18, similarly spaced transversely of the sole and somewhat in rear of the ball center, these cleats, 12 to 18, inclusive, being arranged in a generally symmetrical pattern about the area for the ball of the foot. The heel part of the sole is provided with a pair of spaced cleats 20 and 22 for supporting the ball of the heel.

Each cleat is preferably, although not necessarily, molded of known and suitable plastic material, such as nylon, to produce an oblong arcuate shape, tapered from the cleat base 24 at the sole, inwardly to a smaller, ground-engaging surface 26 parallel with the base. Representative dimensions are a base area having a width of  $\frac{3}{4}$  of an inch and a length of  $1\frac{1}{2}$  inches with rounded ends. A satisfactory face area has a width of  $\frac{1}{4}$  of an inch and a length of  $\frac{3}{4}$  of an inch and a height of  $\frac{3}{4}$  of an inch from base to face has been found satisfactory. Each cleat is curved from end to end, as shown, preferably with a radius of about 3 inches, with the center line on or somewhat offset from the longitudinal median axis of the sole.

This radius is preferred for the reason that when the foot is placed on the ground and rotated about a vertical axis, the heel is necessarily swung in an arc to perform this rotation. The center of rotation or normal pivotal axis is through the instep just back of the ball of the foot. Cleats 12 and 14, therefore, are formed and placed on the arc of this radius about a center located as stated. Cleats 16 and 18 are formed with the same curvature so that rotation of the foot with the heel lifted higher can take place about a point just back of cleat 10.

The sloping opposite sides of each cleat have a steeper slope or taper on the side toward the heel than on the side toward the toe of the shoe, to provide more positive forward driving contact with the ground. The toe cleat 10 and the heel cleats 20 and 22 preferably have the same angle of slope or taper at their opposite ends, while the cleats, 12 to 18, at the ball of the foot, have a steeper slope or taper at their outer ends so as to locate their ground-engaging surfaces 26 nearer to the side edges of the sole, to provide a wider area of contact with the ground and increased stability for the foot, as well as effectiveness in cutting the turf. Cleats 12, 14 and 18 have a center of curvature in the longitudinal median axis of the sole, while cleat 16 preferably has its center of curvature offset somewhat to the side of the axis toward the outer side of the sole, as shown.

Heel cleats 20 and 22 are located under the center of the ball of the heel with their concave sides toward the toe of the shoe, each of these cleats as a whole being positioned to slope outwardly and forwardly at an angle of about  $45^\circ$  to the median axis of the sole. Each of cleats 12 to 18 has the outer end of its ground-engaging surface extending to about  $\frac{1}{4}$  of an inch from the adjacent edge of the sole, to provide a wide base for stable support of the foot.

It will be seen from the above that the five cleats on the fore part of the outsole are arranged about a center which is located under the ball of the foot whereas the heel cleats are arranged about a center which is located forwardly under the heel center.

The construction of the sole for anchoring such cleats involves departures from conventional construction. Shoes of this type have been commonly constructed with a solid metal plate interposed between the inner and outer soles of the shoe to provide an anchorage for the cleats.

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This prior construction has been found to have the disadvantage of stiffening the fore part of the shoe and imposing objectionable stresses on the muscles of the foot and leg. We employ instead a plate 27 so located but of different construction, comprising three plates or plate segments (FIG. 3) spaced longitudinally of the sole, one, 28, underlying toe cleat 10, another, 30, underlying cleats 12 and 14 and another, 32, underlying cleats 16 and 18, these segments being substantially separated by cutting openings 34 and 36 therethrough, but leaving narrow and flexible connecting strips 38 and 40 between the segments at their outer ends to promote flexibility from end to end of the fore part of the shoe. Plate 27 is as wide as the space between the side stitches and is preferably constructed of blue spring steel. This plate may be from 0.015 to 0.02 of an inch thick.

The cleats may be molded integrally with a molded outsole of rubber or other known and suitable material, or may be separately molded as described above, and secured to plate 27 by suitable mechanical means. Where the cleats are separately molded, we prefer to employ threadedly connected parts between the cleats and the plate 27 comprising an internally threaded sleeve or tube 42 molded in the cleat and engaged by a screw 44 extending through the insole, plate 27, the outer sole and into the sleeve, as shown, for drawing all of these parts tightly together. In addition, a pair of studs 46 are riveted or welded to plate 27 so as to extend through the outer sole and into sockets in the cleat, to prevent rotation of the cleat on the sole. The base of the cleat may be slightly recessed, as at 47, so as to increase the pressure and tight fit of the outer edge of the cleat base against the sole.

In a modified construction of such attaching means (FIG. 5), an internally threaded sleeve 48 is welded at one end to plate 27 and extended through the outer sole for engagement by an Allen cap screw 50 having its head in a recess in the end of the cleat, to draw the same tightly against the sole. In this construction also, plate 27 has studs 52 welded thereto so as to extend through the outer sole and into sockets in the cleat to secure it against rotation.

The above construction of the sole and the construction, arrangement and attachment of the cleats provides improved traction for the shoe. The arcuate shape of the cleat and its arrangement on the sole facilitate rotation of the foot without locking in the turf. The positioning of the cleats adjacent the marginal edges of the sole affords greater lateral support on the ground and stability in stance against sidewise rocking of the foot. The arcuate arrangement of the cleats and their positioning on the sole increases sidewise traction while promoting rotation without slipping or interlocking with the turf. The construction of the sole with its flexible plate insert allows for the flexing of the sole, thus improving forward traction and less clogging of the cleats with turf. This promotes natural flexing of the foot, so as to reduce stresses on the metatarsal arch, the long arch and the muscles of the ankle, leg and knee, eliminating the necessity for lifting of the foot from the ground in order to shift its direction.

The same principles of construction are applicable to a baseball shoe, such as shown in FIG. 6, having a toe cleat 54, a pair of cleats 56 and 58 forwardly of the ball of the foot and an associated pair of cleats 60 and 62 in rear thereof. Also a pair of heel cleats 64 and 66 located under the ball of the heel. These cleats are formed with curvatures and located on the sole as described above for a football shoe, but they are formed as flanges on metal plates fixed to the bottom of the outsole 68. Toe cleat 54 is flanged up from a plate 70 riveted to the sole. Cleats 56 and 58 are flanged up at the ends of a plate 72 riveted to the sole and having its ends extending adjacent the marginal edges of the sole. These cleats 54, 56 and 58 are curved concavely toward the heel as shown, to correspond with cleats 10, 12 and

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14, described above. Cleats 60 and 62 are formed as flanges on a metal plate 74 riveted to the sole and having its ends extending adjacent the edges of the sole, with the cleat flanges curved concavely toward the toe to correspond with cleats 16 and 18, described above. Plates 72 and 74 may be formed integrally with narrow strips connecting their ends, in the manner shown in FIG. 3 but plates 72 and 74 may be connected by narrow flexible strips 76 separately formed and welded thereto to connect the ends of the plates as shown. This arrangement provides the same flexibility for the fore part of the shoe as described above. Heel plates 64 and 66 are concavely curved toward the toe of the shoe, corresponding to the curvature of cleats 20 and 22 and are formed as flanges turned up from a metal plate 78 riveted to the bottom of the sole. In this instance, however, we prefer to give plate 78 a substantially triangular shape and form a flange cleat at each of its apices, thus providing a third heel cleat 80 concavely curved toward the rear of the heel, as shown. In all of the above modifications, a lift element 82 is added on the outer face of the heel. This serves to place the foot in natural alignment so as to reduce stress in the muscles of the foot, ankle and leg through better support of the heel, where a conventional shoe without such heel lift tends to overstress and strain such muscles.

Our design of baseball shoe with our cleats makes it possible for the sole of the shoe to be substantially parallel with the ground throughout its length. The present customary cleats are so arranged that the toe cleats lie wholly forward of the ball of the foot; thus causing the front end of the sole to cock up. In fact, the upper of the shoe is so constructed as to provide for this upward cocking. Our shoe, on the other hand, can be made and worn with the sole parallel to the ground. This obviously greatly increases the comfort and provides superior function of the shoe in baseball play.

In this modification, also, the cleats have their ends tapered to form ground-engaging edges of less length than the bases of the cleats. Cleats 56 to 62 likewise have their ground-engaging edges offset toward the outer ends of the cleats, as shown and described above. This construction for baseball use thus embodies the novel principles of construction and advantages pointed out above in connection with the first modification.

It will thus be seen that the invention accomplishes its objects and while it has been herein disclosed by reference to the details of preferred embodiments, it is to be understood that such disclosure is intended in an illustrative, rather than a limiting sense, as it is contemplated that various modifications in the construction and arrangement of the parts will readily occur to those skilled in the art, within the spirit of the invention and the scope of the appended claims.

We claim:

1. A shoe for athletic wear having an insole and an outsole and having the bottom of its outsole provided with a plurality of cleats comprising a toe cleat curved transversely of the shoe about an axis that is disposed rearwardly of the shoe from the cleat, to facilitate pivotal motion of the fore part of the foot about its normal pivotal axis, a pair of transversely spaced, generally transversely extending cleats located adjacent and forwardly of the center of the fore part of the foot and curved concavely toward the rear to facilitate said pivotal motion, with their outer ends disposed respectively adjacent the outer edges of the outsole to promote stability in stance, a pair of transversely spaced, generally transversely extending cleats located adjacent and rearwardly of said center and curved concavely forwardly to facilitate said pivotal motion, with their outer ends disposed respectively adjacent the outer edges of the outsole to promote stability in stance, and a pair of transversely spaced heel cleats curved concavely forwardly to facilitate said pivotal motion with their outer ends disposed respectively adjacent the outer sides of the heel to pro-

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mote stability in stance, said cleats being arcuately arranged and arcuately spaced and formed with narrow ground engaging surfaces extending generally transversely of the outsole to afford traction and being reduced in length to facilitate cutting the turf in said pivotal motion.

2. A shoe for athletic wear as specified in claim 1 including a resilient flexible, segmental plate between the fore parts of its insole and its outsole and having its segments spaced longitudinally of the shoe and connected by resilient integral, flexible, longitudinally extending strips to maintain the flexibility of the fore parts of the shoe, and a heel lift to support the foot in natural alignment and lessen stresses on the foot and the back muscles of the leg.

3. A shoe for athletic wear as specified in claim 1 including a resilient flexible plate between the fore parts of its insole and its outsole and having openings therein spaced from one another longitudinally of the shoe and extending transversely thereof with their ends adjacent the edges of said plate to form segments extending transversely thereof with their ends disposed respectively adjacent the edges of said plate whereby said segments are spaced longitudinally of said shoe, said cleats being attached respectively to said segments and portions of said resilient, flexible plate extending between the ends of said segments and longitudinally of said shoe to provide flexible, resilient strips that interconnect said laterally-extending segments, thereby to maintain the flexibility of the fore part of the shoe.

4. A shoe for athletic wear having the bottom of its outsole provided with a plurality of cleats comprising a generally transversely extending toe cleat curved about a rearward center to facilitate pivotal motion of the foot, a pair of transversely spaced, generally transversely extending cleats located adjacent and forwardly of the center of the ball of the foot and curved concavely toward the rear of said outsole to facilitate said pivotal motion, with their outer ends disposed respectively adjacent the outer edges of the outsole to promote stability in stance, a pair of transversely spaced cleats located adjacent and rearwardly of said center and curved concavely forwardly to facilitate the pivoting of the shoe, with their outer ends disposed respectively adjacent the outer edges of the outsole to promote stability in stance, a pair of transversely spaced, generally transversely extending heel cleats curved concavely forwardly to facilitate said pivotal motion, with their outer ends disposed respectively adjacent the outer sides of the heel to promote stability in stance, said cleats being arcuately shaped and arcuately arranged on said outsole to facilitate said pivotal motion, and a plurality of resilient, independently longitudinally flexible plates fixed to the bottom of said outsole under the center of the ball of the foot and to the heel of the outsole, respectively, said cleats being formed as flanges on and at substantially a right angle to said plates.

5. A shoe for athletic wear as specified in claim 4 comprising a pair of metal plates extending transversely of said outsole and spaced from one another longitudinally thereof on opposite sides of the ball of the foot, resilient, longitudinally extending, flexible means connecting the adjacent lateral ends of said plates, and means fixing said plates to said outsole, each of said plates having a pair of said transversely spaced cleats formed thereon by flanges turned up at the edges thereof.

6. In a shoe for athletic wear having an outsole and cleat means mounted on the bottom surface of its outsole, the improvement in the structure and arrangement of said cleat means comprising a pair of transversely spaced, generally transversely extending cleats that are located adjacent and forwardly of the normal pivotal axis of the shoe and that have proximal side surfaces that are disposed at opposite sides respectively of the longitudinal axis of the shoe and that have distal side surfaces that are disposed adjacent the outer edges of the outsole respectively, each of said cleats being formed with leading and

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trailing surfaces that are substantially uniformly spaced from each other in any section of the cleat in a plane parallel to the cleat base at the outsole, the leading surfaces of said cleats being curved respectively so that the arcs of these surfaces in any sections of these surfaces respectively in a plane parallel to the cleat base have centers of curvature that are located rearwardly of the normal pivotal axis of the shoe, whereby the leading surfaces of the cleats are curved concavely rearwardly, said cleats being formed with narrow ground engaging surfaces that extend generally transversely to afford traction and that are reduced in length to facilitate cutting the turf.

7. In a shoe in accordance with claim 6 and that has a heel, the improvement wherein said centers of curvature lie in a common vertical plane through the longitudinal axis of the shoe.

8. In a shoe in accordance with claim 6, the improvement wherein said cleat means also comprises a single toe cleat that is disposed intermediate said pair of cleats and the forward end of the shoe, and that extends generally transversely of the shoe and across its longitudinal axis, said single cleat being similar in shape to the other cleats and having its leading surface curved concavely rearwardly of the shoe.

9. In a shoe in accordance with claim 8, the improvement wherein the centers of curvature of arcuate sections of the leading surface of the toe cleat in planes parallel to the toe cleat base are located respectively in a vertical plane through the longitudinal axis of the shoe.

10. In a shoe in accordance with claim 6 and that has a heel, the improvement comprising a second pair of transversely spaced, generally transversely extending cleats that are located adjacent and rearwardly of the normal pivotal axis of the shoe at opposite sides of the longitudinal axis of the shoe respectively, and generally in transverse alignment with each other, and that are each similar in shape to the cleats of said first pair but that are disposed with their respective leading and trailing surfaces curved concavely forwardly of the shoe, in a generally allochiral arrangement.

11. In a shoe in accordance with claim 10 and that has an inner side, and an outer side, the improvement wherein the outer cleat of said second pair of cleats is formed with the centers of curvature of arcuate sections of the leading edge thereof in planes parallel to the cleat base that are located respectively in a vertical plane through the longitudinal axis of the shoe, forwardly of the normal pivotal axis of the shoe, and wherein the inner cleat is formed with the centers of curvature of arcuate sections of the leading edge thereof in planes parallel to the cleat base that are located respectively on the outer side of the longitudinal axis of the shoe, forwardly of the normal pivotal axis of the shoe.

12. In a shoe in accordance with claim 6 and that has a heel, the improvement wherein said cleat means also comprises another pair of transversely spaced, generally transversely extending cleats that are located at opposite sides of the longitudinal axis of the shoe respectively, and generally in transverse alignment with each other, and that are disposed to project from the bottom surface of the heel of the shoe, and that are similar in shape to the cleats of said first pair but that are disposed with their respective leading and trailing surfaces curved concavely forwardly of the shoe, in a generally allochiral arrangement.

13. In a shoe for athletic wear having an outsole and a heel, and cleat means disposed on the bottom surface of its outsole, the improvement in the structure and arrangement of said cleat means comprising a first pair of transversely spaced, generally transversely extending cleats that are located adjacent and forwardly of the normal pivotal axis of the shoe, each of said cleats being formed with leading and trailing surfaces that are substantially uniformly spaced from each other in any section of the cleat in a plane parallel to the cleat base, the leading

surfaces of said cleats being curved respectively so that the arcs of these surfaces in any sections of these surfaces respectively in a plane parallel to the cleat base have a common center of curvature that is located rearwardly of the normal pivotal axis of the shoe, whereby the leading surfaces of the cleats are curved concavely rearwardly, a single toe cleat that is disposed intermediate said first pair of cleats and the forward end of the shoe and that extends generally transversely of the shoe and across its longitudinal axis, said toe cleat being similar in shape to the other cleats and having its leading surface curved concavely rearwardly of the shoe, and a second pair of transversely spaced, generally transversely extending cleats that are located adjacent and rearwardly of the normal pivotal axis of the shoe, and that are each similar in shape to the cleats of said first pair but that are disposed with their respective leading and trailing surfaces curved concavely forwardly of the shoe.

14. In a shoe in accordance with claim 13, the improvement wherein the centers of curvature of arcs of the leading surfaces of the first pair of cleats, in sections of these surfaces respectively through a plane parallel to the cleat base, lie in a vertical plane through the longitudinal axis of the shoe, and intermediate the normal pivotal axis of the shoe and the heel of the shoe, and wherein the centers of the curvature of arcuate sections of the leading surface of the toe cleat in planes parallel to the cleat base are located respectively in a vertical plane through the longitudinal axis of the shoe.

15. In a shoe in accordance with claim 14, and wherein the shoe has an inner side and an outer side, the improvement wherein the outer cleat of said second pair of cleats is formed with the centers of curvature of arcuate sections of the leading edge thereof in planes parallel to the cleat base that are located respectively in a vertical plane through the longitudinal axis of the shoe, forwardly of the normal pivotal axis of the shoe, and wherein the

inner cleat of said second pair of cleats is formed with centers of curvature of arcuate sections of the leading edge thereof in planes parallel to the cleat base that are located respectively on the outer side of the longitudinal axis of the shoe, forwardly of the normal pivotal axis of the shoe.

16. In a shoe for athletic wear having an outsole and cleat means mounted on the bottom surface of its outsole, the improvement in the structure and arrangement of said cleat means comprising a pair of transversely spaced, generally transversely extending cleats that are located adjacent the normal pivotal axis of the shoe and that have proximal side surfaces that are disposed at opposite sides respectively of the longitudinal axis of the shoe and that have distal side surfaces that are disposed adjacent the outer edges of the outsole respectively, each of said cleats being truncated and having a base at the bottom surface of the outsole that is in the shape of a section of an elongate, generally ellipsoidal body whose lengthwise sides are curved in the same direction, and each of said cleats having similar but gradually smaller sections in successive planes from its base to its bottom surface, so that each cleat is tapered downwardly, to facilitate cutting the turf.

17. In a shoe in accordance with claim 16, the improvement wherein said pair of cleats are formed with greater taper on their respective confronting, proximal surfaces than on their distal surfaces.

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