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Description

[0001] The present invention generally relates to bicycle shoes for clipless pedals. More specifically, the present invention is related to a bicycle shoe with a cleat fixedly coupled to the sole of the bicycle shoe, particularly a shoe suitable for use with a low profile bicycle pedal and cleat assembly as disclosed in EP 0,826,588A.

Background of the Invention

[0002] In recent years, bicycle pedals have been designed for specific purposes such as for pleasure, off road biking, road racing, etc. One particular type of bicycle pedal which is gaining more popularity is the step-in or clipless pedal which releasably engages a cleat secured to the sole of a cyclist's shoe. In this type of bicycle pedal, the rider steps onto the pedal and a clamping mechanism automatically grips on to the cleat secured to the bottom of the cyclist's shoe. A tension mechanism is usually provided in the pedal for adjusting the force required to release the shoe cleat from the step-in pedal.

[0003] More specifically, when attaching the cyclist's shoe to the step-in pedal through the cleat, the cyclist moves the shoe obliquely downwardly and forwardly relative to the pedal body such that the front end of the cleat engages a front hook or clamping member of the pedal body. Once the front end of the cleat is engaged with the front hook of the pedal body, the cyclist places the rear end of the cleat in contact with a guide portion of the rear hook or clamping member of the pedal body. In this position, the cyclist presses the shoe downwardly against the pedal to cause the rear hook or clamping member to initially pivot rearwardly against the force of a spring to move the rear hook or clamping member to a cleat releasing position. The rear end of the cleat then enters a position opposite a back face of the rear hook or clamping member. Then, the rear hook or clamping member returns under the force of a biasing member or spring so that the rear hook or clamping member engages the rear end of the cleat. This engagement fixes the cyclist's shoe to the pedal via the cleat.

[0004] When releasing the shoe from the pedal, the cyclist will typically turn the shoe about an axis perpendicular or approximately perpendicular to the tread of the pedal, using the front end of the cleat as a pivoting point. As a result of this pivoting action, the rear hook or clamping member is pivoted rearwardly against the force of the spring to a cleat releasing position to release the shoe. Examples of cyclist's shoes which can be used in conjunction with such pedals can be seen in EP 0726037A, US 4679335 A, US 4815222 and DE 29702071A.

[0005] When step-in pedals are used for road type bikes, the pedal is typically only provided with a single clamping assembly such that the cyclist's shoe can only be coupled to one of the two sides of the pedal. Off road or mountain type bikes, on the other hand, usually have a pair of clamping assemblies such that the cyclist's shoe can be clamped to either side of the pedal. In either case, it is desirable to design the pedal to be as compact and light weight as possible. Moreover, it is desirable to have the cyclist's foot as close as possible to the center longitudinal axis of the pedal shaft. Moreover, it is desirable to have the pedal as thin and small as possible to cut down on wind resistance and to increase the amount of rubber on the sole of the cyclist's shoe.

[0006] In view of the above, it is apparent that there exists a need for a bicycle shoe which can be used with a low profile bicycle pedal and cleat assembly. Moreover, there exists a need for a bicycle shoe which can accommodate different types of cleats. This invention addresses these needs in the art, along with other needs which will become apparent to those skilled in the art once given this disclosure.

Summary of the Invention

[0007] The present invention is directed to a bicycle shoe adapted to fixedly receive a cleat thereto for use with a bicycle pedal in accordance with Claim 1.

[0008] A preferred embodiment provides a bicycle shoe adapted to fixedly receive a cleat thereto for use with a bicycle pedal, comprising: a shoe sole portion having an inner surface facing the foot of the cyclist, an outer surface facing the pedal, a toe portion, a heel portion longitudinally spaced from the toe portion and a ball section located between the toe portion and the heel portion with first and second elongated attachment slots formed in the ball section which extend substantially parallel to each other in a substantially longitudinal direction between the toe portion and the heel portion, the first slot having a first longitudinal length and the second slot having a second longitudinal length which is longer than the first longitudinal length of the first slot, the first slot being laterally disposed relative to the second slot in the ball section with the first slot being located between first and second ends of the second slot.

[0009] These objects of the present invention can also be attained by providing a bicycle shoe adapted to fixedly receive a cleat thereto for use with a bicycle pedal, comprising a shoe sole portion having an inner surface facing the foot of the cyclist, an outer surface facing the pedal, a toe portion, a heel portion longitudinally spaced from the toe portion and a ball section located between the toe portion and the heel portion, the ball section including first and second elongated attachment slots extending substantially parallel to each other in a substantially longitudinal direction between the toe portion and the heel portion to form a pair of first attachment points, the first slot having a first longitudinal length and the second slot having a second longitudinal length which is longer than the first longitudinal length of the first slot, the first slot being laterally disposed relative to the second slot in the ball section with the first slot being located

between first and second ends of the second slot, the ball section further including three secondary attachment points arranged to form an isosceles triangular with one of its apexes pointing towards the toe portion, the three secondary attachment points being formed by secondary attachment apertures.

[0010] Other objects, advantages and salient features of the present invention will become apparent to those skilled in the art from the following detailed description, which, taken in conjunction with the annexed drawings, discloses preferred embodiments of the present invention.

Brief Description of the Drawings

[0011] Referring now to the attached drawings which form a part of this original disclosure:

Fig. 1 is an inside elevational view of a left bicycle shoe with a cleat coupled thereto in accordance with a first embodiment of the present invention;

Fig. 2 is a rear elevational view of the left bicycle shoe with the cleat coupled thereto as illustrated in Fig. 1;

Fig. 3 is a top plan view of the left bicycle shoe illustrated in Figs. 1 and 2;

Fig. 4 is a bottom plan view of the left bicycle shoe illustrated in Figs. 1-3, with the cleat coupled thereto;

Fig. 5 is a partially, exploded outside elevational view of a low profile bicycle pedal and cleat assembly coupled to the right bicycle shoe in accordance with the first embodiment of the present invention;

Fig. 6 is an outside elevational view of the bicycle shoe with the low profile bicycle pedal and cleat assembly illustrated in Fig. 5, after the cleat has been clipped into the bicycle pedal;

Fig. 7 is a partial, exploded perspective view of the sole portion of the right bicycle shoe and cleat assembly in accordance with the first embodiment of the present invention;

Fig. 8 is an inside elevational view of the sole portion for the right bicycle shoe in accordance with the first embodiment of the present invention as illustrated in Figs. 1-7;

Fig. 9 is a top plan view of the inner surface of the sole portion for the right bicycle shoe in accordance with the first embodiment of the present invention as illustrated in Figs. 1-7;

Fig. 10 is an outside elevational view of the sole portion for the right bicycle shoe in accordance with the first embodiment of the present invention as illustrated in Figs. 1-7;

Fig. 11 is a bottom plan view of the sole portion of the bicycle shoe illustrated in Figs. 1-7, with the cleat assembly removed from the sole portion for purposes of illustration;

Fig. 12 is a bottom plan view of the attachment member or plate for the cleat assembly with three cleat nuts for attaching a cleat thereto;

Fig. 13 is a longitudinal cross-sectional view of the attachment member illustrated in Fig. 12 as seen along section line 13-13 of Fig. 12;

Fig. 14 is a top plan view of the cleat which is utilized in connection with the low profile bicycle pedal illustrated in Figs. 5 and 6 and the sole portion illustrated in Figs. 1-7 as well as with subsequent embodiments of the present invention illustrated herein;

Fig. 15 is a side elevational view of the cleat illustrated in Fig. 14 for use with the bicycle shoe and pedal illustrated in Figs. 1-7 and subsequent embodiments of the present invention illustrated herein;

Fig. 16 is a longitudinal cross-sectional view of the cleat illustrated in Figs. 14 and 15 as seen along section line 16-16 of Fig. 14;

Fig. 17 is a bottom plan view of the cleat illustrated in Figs. 14-16 for use with the bicycle shoe and pedal illustrated in Figs. 1-7 and subsequent embodiments of the present invention illustrated herein;

Fig. 18 is a partial, exploded perspective view of the sole portion of the bicycle shoe in accordance with the first embodiment of the present invention, but utilizing a standard cleat assembly which is currently on the market;

Fig. 19 is a diagrammatic, bottom plan view of a left bicycle sole with a universal sole attachment portion in accordance with a sixth embodiment of the present invention, with details being removed from the sole portion for purposes of illustration;

Fig. 20 is a bottom plan view of the left bicycle shoe coupled to the sole illustrated in Fig. 19 with an attachment plate or member installed therein for attaching a cleat thereto;

Fig. 21 is a bottom plan view of the left bicycle shoe illustrated in Figs. 19 and 20 with an attachment plate or member installed therein for attaching a cleat thereto;

Fig. 22 is a top plan view of a modified cleat which can be utilized in connection with the bicycle shoe illustrated in the first embodiment of the present invention;

Fig. 23 is a side elevational view of the cleat illustrated in Fig. 22 for use with the bicycle shoe of the first embodiment of the present invention;

Fig. 24 is a bottom plan view of the cleat illustrated in Figs. 22 and 23 for use with the bicycle shoe of the first embodiment of the present invention;

Fig. 25 is a partially, exploded outside elevational view of a low profile bicycle pedal used in conjunction with the cleat illustrated in Figs. 22-24 which is coupled to a right bicycle shoe in accordance with the present invention;

Fig. 26 is an outside elevational view of the bicycle shoe with the low profile bicycle pedal and cleat assembly illustrated in Fig. 25, after the cleat of Figs.

22-24 has been clipped into the bicycle pedal; and Fig. 27 is a top plan view of the low profile bicycle pedal with the cleat coupled thereto as illustrated in Figs. 25 and 26.

Detailed Description of the Preferred Embodiments

[0012] Referring initially to Figs. 1-6, a bicycle shoe 10 in accordance with a first embodiment is illustrated with a cleat assembly 12 coupled thereto. Basically, bicycle shoe 10 and cleat assembly 12 is designed to be used with clipless pedals such as the low profile bicycle pedal 14 shown in Figs. 5 and 6. Bicycle shoe 10 as illustrated in Figs. 1-4 is a left bicycle shoe, while a portion of a right bicycle shoe 10 is illustrated in Figs. 5-7. Of course, the right bicycle shoe would be substantially identical to the left bicycle shoe illustrated in Figs. 1-4, but substantially a mirror image thereof. Therefore, bicycle shoe 10 as used herein refers to either a left bicycle shoe or a right bicycle shoe, and the drawings and description used herein will not differentiate therebetween.

[0013] Basically, bicycle shoe 10 has an upper peripheral portion 16, a shoe sole portion 18 fixedly coupled to upper peripheral portion 16 and an inner sole or cushion 20 overlying shoe sole portion 18. The precise construction of upper peripheral portion 16, shoe sole portion 18 and inner sole 20 will not be discussed or illustrated in detail herein, since the basic construction of a bicycle shoe is old and well-known in the prior art. Moreover, it should be apparent to those skilled in the art that the present invention should not be limited to the precise construction of the non-claimed portion of bicycle shoe 10 as discussed and illustrated herein.

[0014] Bicycle shoe 10 with cleat assembly 12 coupled thereto is releasably coupled to bicycle pedal 14. Pedal 14 basically includes a pedal body 22 for supporting a cyclist's foot, a pedal shaft 23 rotatably coupling pedal body 22 to crank arm 21, a front clamping member 24 fixedly coupled to pedal body 22 and a rear clamping member 26 pivotally coupled to pedal body 22. A biasing member or torsion spring 28 is coupled between pedal body 22 and rear clamping member 26 to bias rear clamping member 26 from a cleat releasing position to a cleat engaging position. Pedal body 22 can also be provided with a gap adjusting mechanism which is described in EP 0,826,588A.

Reference is made to EP 0,826,588A to further explain the gap adjusting mechanism as well as to further understand the structure and functions of pedal 14.

[0015] Upper peripheral portion 16 is adapted to receive a foot of a cyclist, and is fixedly secured to shoe sole portion 18. Upper peripheral portion 16 is preferably constructed of conventional materials which are well-known in the bicycle art. For example, the major portions of upper peripheral portion 16 can be constructed of a flexible material such as leather or nylon or the like.

[0016] As best seen in Figs.8-10, shoe sole portion 18 has an inner surface 30, an outer surface 32, a toe portion 34, a heel portion 36 and a ball section 38. Preferably, shoe sole portion 18 is constructed of any conventional shoe sole material which is known to be used in making bicycle shoes. In the first embodiment, bicycle shoe 18 is illustrated as a road bike shoe. Thus, shoe sole portion 18, in this embodiment, is constructed of a substantially hard, rigid material such as a carbon graphite composite. Of course, it will be apparent to those skilled in the art from this disclosure that shoe sole portion 18 could be constructed of a more flexible material.

[0017] Inner surface 30 of sole portion 18 faces upwardly towards the foot of the cyclist 'and has inner sole 20, which can be one or more layers, overlying inner surface 30. Outer surface 32 of sole portion 18 faces downwardly for engaging pedal 14 via cleat assembly 12. Inner and outer surfaces 30 and 32 of shoe sole portion 18 has a typical outer peripheral shoe sole shape which basically conforms to the outer shape of a cyclist's foot. Moreover, sole portion 18 is a concaved contour as viewed from inner surface 30, with a further depression 49 formed longitudinally therealong.

[0018] Sole portion 18 has a longitudinally extending center line C which extends from a first center point of toe portion 34 to a second center point of heel portion 36. In other words, center line C substantially bisects the front curve of toe portion 34 and substantially bisects the rear curve of heel portion 36.

[0019] In this first embodiment, shoe sole portion 18 is provided with a pair of longitudinally extending attachment apertures 40 and 42 for coupling cleat assembly 12 thereto as seen in Figs. 1, 2, 4 and 5-10. Of course, it will be apparent to those skilled in the art from this disclosure that first and second attachment apertures 40 and 42 could be combined as one single attachment aperture having either a generally T-shaped or a generally H-shaped configuration. Moreover, it will be apparent to those skilled in the art from this disclosure that attachment apertures 40 and 42 could be constructed of a plurality of holes for accommodating cleat assembly 12.

[0020] In the first embodiment, first attachment aperture 40 is a longitudinally extending slot which lies on the center line C of bicycle shoe 10. Second attachment aperture 42 is spaced laterally from first attachment aperture 40 and extends substantially parallel thereto. More specifically, second attachment aperture 42 is spaced laterally towards the outside edge of bicycle shoe 10, and is in the form of an elongated slot which is parallel to first attachment aperture or elongated slot 40, but longer in length. In particular, first attachment aperture or slot 40 has a first longitudinal length and second attachment aperture or slot 42 has a second longitudinal length which is longer than the first longitudinal length of first attachment aperture or slot 40. For example in the preferred embodiment, first attachment aperture extends approximately 21.3 millimeters in longitudinal

length and second attachment aperture 42 extends approximately 56.9 millimeters in length.

[0021] The first attachment aperture or slot 40 is laterally disposed relative to second attachment aperture or slot 42 in ball section 38 with first attachment aperture or slot 40 being located between first and second ends of the second attachment aperture or slot 42. Preferably, attachment apertures or slots 40 and 42 have substantially the same transverse width with their longitudinal axes being spaced approximately 14.0 millimeters apart from each other. Preferably, attachment apertures or slots 40 and 42 each have first and second center points or axes at each end which are longitudinally spaced approximately 32.0 millimeters to approximately 34.0 millimeters (preferably approximately 33.5 millimeters) apart from each other. Also, second attachment aperture 42, preferably, has its center line spaced approximately 12.0 millimeters from the longitudinal center line C of bicycle shoe 10.

[0022] As seen in Fig. 7, cleat assembly 12 basically includes a cleat attachment plate or member 50, a cleat 52, a pair of washers 54 and a pair of threaded fasteners or screws 56. Cleat assembly 12 is basically fixedly coupled to shoe sole portion 18 such that cleat attachment plate or member 50 engages inner surface 30 of sole portion 18 and cleat 52 engages outer surface 32 of sole portion 18. Cleat assembly 12 is longitudinally adjustable along the ball section 38 of shoe sole portion 18.

[0023] As seen in Figs. 7, 12 and 13, cleat attachment member 50 has a generally T-shaped outline and has a base portion 60 and four cleat nuts 61-64 fixedly coupled to base portion 60. Base portion 60 has a first fixing portion with cleat nuts 62-64 formed thereon and a second fixing portion with cleat nut 61 formed thereon. Preferably, base portion 60 and cleat nuts 61-64 are constructed as a one-piece, unitary member from a suitable rigid material. For example, attachment member 50 can be constructed of a hard rigid metallic material such as those commonly used for cleat nuts known in the prior art.

[0024] As seen in Fig. 13, base portion 60 is preferably curved to match the curvature of inner surface 30 of sole portion 18. Cleat nuts 61-64 are preferably internally threaded tubes which are selectively adapted to threadedly receive fasteners 56 therein. As seen in Fig. 12, cleat nuts 62-64 are longitudinally aligned for portions thereof being received within second attachment aperture 42 of sole portion 18, while cleat nut 61 is laterally spaced from cleat nuts 62-64 such that cleat nut 61 is aligned with first attachment aperture 40 of sole portion 18 with a portion of cleat nut 61 to be received in first attachment aperture 40 of sole portion 18. Of course, cleat nuts 61-64 can be replaced with unthreaded holes such that fasteners can be threaded into the cleat 52.

[0025] Preferably, the centers of cleat nuts 61 and 63 are spaced approximately 14.0 millimeters apart such that cleat nuts 61 and 63 can be used to attach a conventional cleat such as the ones manufactured by Shimano, Inc. (see Fig. 18). The centers of cleat nuts 62 and 64 are spaced approximately 32.0 millimeters to approximately 34.0 millimeters (preferably approximately 33.5 millimeters) apart such that when cleat 52 is attached thereto by fasteners 56, the pedal shaft 23 of pedal 14 is located between cleat nuts 62 and 64. Preferably, cleat nuts 61 and 64 are spaced longitudinally from cleat nut 62 by a measurement of approximately 16.0 millimeters to approximately 16.5 millimeters as measured from the center axes of the holes of the cleat nuts 61, 62 and 64.

[0026] As seen in Figs. 5 and 6, cleat 52 is designed to releasably couple sole portion 18 of bicycle shoe 10 to bicycle pedal 14. Specifically, cleat 52 is engaged with pedal 14 by pressing cleat 52 into pedal 14 with a forward and downward motion. This releasably locks cleat 52 to pedal 14. Cleat 52 can be released from pedal 14 by twisting the heel portion 36 of the shoe 10 to the outside of pedal 14.

[0027] Referring now to Figs. 14-17, cleat 52 has a front attachment portion 70 for engaging front clamping member 24 of pedal 14, a rear attachment portion 72 for engaging and moving rear clamping member 26, and a center or connecting portion 74 extending between front attachment portion 70 and rear attachment portion 72. Preferably, front and rear attachment portions 70 and 72, together with center portion 74 are integrally formed together as a one-piece, unitary member which is constructed from a suitable rigid material.

[0028] Front attachment portion 70 and rear attachment portion 72 each has a hole or slot 76 for receiving one of the fasteners 56 therethrough for coupling cleat 52 to sole portion 18 of the bicycle shoe 10 in a relatively conventional manner as seen in Fig. 7. This interconnection of cleat 52 to sole portion 18 is relatively well-known in the art, and thus, this interconnection will not be discussed or illustrated in detail herein.

[0029] As seen in Figs. 14-17, front attachment portion 70 has a nose portion 82 for engaging front clamping member 24 of pedal 14. Nose portion 82 has a front coupling surface 84 and a curved stop surface 86 formed thereon. Front coupling surface 84 is preferably a substantially flat, planar surface which is designed to engage front cleat engaging surface 25 of front clamping member 24. Curved stop surface 86 is designed to engage a cutout portion of front clamping member 24 to prevent forward movement of cleat 54 relative to the pedal body 22. Curved stop surface 86 engages front clamping member 24 to form a pivot point for pivotally releasing cleat 52 from pedal body 22.

[0030] Rear attachment portion 72 has a pair of rear coupling surfaces 88 for engaging rear cleat engaging surface 27 of rear clamping member 26 to secure cleat 52 to pedal body 22 via rear clamping member 26. Rear coupling surfaces 88 are preferably substantially flat, planar surfaces which are substantially parallel to front coupling surface 84 of cleat 52. Rear attachment portion

72 also has a curved or angled cam surface 90 which is designed to engage rear clamping member 26 during coupling of cleat 52 to pedal body 22. In particular, cam surface 90 is designed to rotate rear clamping member 26 rearwardly from its normal cleat engaging position to its cleat releasing position during downward movement of cleat 52 relative to pedal body 22. Rear attachment portion 72 also has a curved stop surface 92 for engaging rear clamping member 26 to prevent rearward movement of cleat 52 relative to pedal body 22 when coupled thereto. Rear attachment portion 72 is also provided with a pair of upwardly extending protrusions 93 for engaging sole portion 18 to properly locate cleat 52 to sole portion 18.

[0031] Center portion 74 has a substantially planar bottom surface 94 which is designed to engage a cleat supporting surface of pedal 14. The upper surface 96 of center portion 74 is recessed relative to front and rear attachment portions 70 and 72 and has a center opening 98 therein.

[0032] In coupling cleat 52 to bicycle pedal 14, the rider steps on to the pedal body 22 which in turn causes clamping members 24 and 26 to automatically grip onto cleat 52 for securing pedal 14 to the sole portion 18 of bicycle shoe 10. More specifically, when attaching bicycle shoe 10 to step-in pedal 14 via cleat 52, the cyclist moves shoe 10 obliquely downwardly and forwardly relative to pedal body 22 such that the front end or nose portion 82 of cleat 52 engages front clamping member 24 of pedal body 22.

[0033] Once the front end of cleat 52 is engaged with front clamping member 24 of pedal body 22, the cyclist places the rear end of cleat 52 in contact with rear clamping member 26 of pedal body 22. This causes cam surface 92 to engage rear clamping member 26. In this position, the cyclist presses shoe 10 downwardly against pedal 14 to cause rear clamping member 26 to initially pivot rearwardly against the force of biasing spring 28 to pivot rear clamping member 26 to a cleat releasing position. The rear end of cleat 52 then enters a position opposite a back face of rear clamping member 26. Then, rear clamping member 26 returns under the force of biasing member or spring 28 such that rear clamping member 26 engages the rear end of cleat 52. This engagement fixes the cyclist's shoe 10 to pedal 14 via cleat 52.

[0034] When releasing the shoe from the pedal 14, the cyclist will typically turn the shoe about an axis perpendicular or approximately perpendicular to the axis of the pedal 14, using the front end or nose portion 82 of cleat 52 as a pivot point. As a result of this pivoting action, rear clamping member 26 is pivoted rearwardly against the force of the spring 28 to a cleat releasing position to release the shoe 10 with cleat 52 from pedal 14.

[0035] As seen in Fig. 18, shoe sole portion 18 can be utilized in conjunction with a conventional cleat assembly 12'. Conventional cleat assembly 12' is well-known in the prior art, and thus, will not be discussed or illustrated in detail herein. Basically, cleat assembly 12 is of the type manufactured by Shimano, Inc. for their line of SPD® shoes and pedals. More particularly, cleat assembly 12' has an attachment plate or member 50', a cleat 52', an adapter 54' and a pair of threaded fasteners or screws 56'.

[0036] Cleat assembly 12' is basically fixedly coupled to sole portion 18 such that attachment plate 50' engages inner surface 30 of sole portion 14, and cleat 52' engages outer surface 32 of sole portion 18. More specifically, cleat nuts.61' and 63' of attachment plate 50' are received in attachment apertures 40 and 42, respectively, such that attachment plate 50' mounts substantially transverse to the longitudinal axis of sole portion 18.

Second Embodiment

[0037] Referring now to Figs. 19-21-27, the bottom of left bicycle shoe 10E having a modified shoe sole portion 18E is illustrated in accordance with a sixth embodiment of the present invention. For purposes of the present invention, shoe sole portion 18E is substantially identical to shoe sole portion 18 discussed above, except that sole portion 18E has three additional circular attachment apertures 43E-45E. Apertures 43E-45E are arranged to accommodate attachment plate 50E as seen in Fig. 20 for coupling "Look®" compatible cleats thereto. More specifically, sole portion 18E is a universal sole which can accommodate several different types of cleat assemblies such as the ones discussed herein. For example, cleat attachment plate 50 of cleat assembly 12 of Fig. 7 can be attached to sole portion 18E as seen in Fig. 21 Moreover, cleat attachment plates 50', 50A, 51C, 53C and 50E can be attached to sole portion 18E for coupling either cleats 52 or 52' thereto. In view of the similarities between sole portions 18 and 18E, sole portion 18E will not be discussed or illustrated in detail herein.

[0038] Basically, sole portion 18E is designed to be coupled to upper peripheral portion 16E in substantially the same manner as in the first embodiment and is designed to be utilized with cleat assembly 12E in substantially the same manner as in the first embodiment. Basically, shoe sole portion 18E can be divided into the sections, i.e., a toe portion 34E, a heel portion 36E and a ball section 38E.

[0039] Sole portion 18E has a longitudinally extending center line C which extends from a first center point of toe portion 34E to a second center point of heel portion 36E. In other words, center line C substantially bisects the front curve of toe portion 34E and substantially bisects the rear curve of heel portion 36E. Preferably, shoe sole portion 18E is constructed of any conventional shoe sole material which is known to be used in making bicycle shoes. Shoe sole portion 18E, in this embodiment, is preferably constructed of a substantially hard, rigid material such as a carbon graphite composite. Of

course, it will be apparent to those skilled in the art from this disclosure that shoe sole portion 18E could be constructed of a flexible, resilient material.

[0040] As mentioned above, the basic difference between sole portion 18 of the first embodiment and the sole portion 18E of the second embodiment is that sole portion 18E utilizes three additional attachment apertures 43E-45E. Apertures 43E-45E are arranged to accommodate the attachment plate 50E of a "Look®" compatible cleats as seen in Fig. 20. In particular, the three threaded holes 63E-65E of attachment plate 50E are aligned with apertures 43E-45E of sole portion 18E so that bolts can be used to secure a Look® compatible cleat thereto.

[0041] The "Look®" compatible cleats require that the three additional attachment apertures 43E-45E be arranged in the pattern of an isosceles triangle, with one of the attachment apertures 43E-45E being located at each apex of the triangle. Moreover, the triangle formed by apertures 43E-45E has the apex formed by the intersection of the two equal sides of the isosceles triangle pointing toward toe portion 34E of shoe sole portion 18E. More specifically, the front most aperture 43E is located midway between slots 40E and 42E with the front most aperture 43E intersecting with slot 42E. The remaining two rear apertures 43E and 45E are arranged substantially perpendicular to center line C and has slots 40E and 42E located therebetween. In other words, the unequal side of the isosceles triangle formed by apertures 44E and 45E is perpendicular to center line C of bicycle shoe 10E. In a typically Look® compatible arrangement, the centers of apertures 44E and 45E are spaced approximately 37.0 millimeters apart, while the center of aperture 43E is spaced approximately 34.0 millimeters from the centers of apertures 44E and 45E. Of course, it will be apparent to those skilled in the art from this disclosure that the isosceles triangle formed by apertures 43E could be rotated as needed and/or desired. It will also be apparent to those skilled in the art that apertures 43E could be other shapes and/or sizes as needed and/or desired to fit other types of cleat arrangements. For example, apertures 43E could be hexagonally shaped.

[0042] In this second embodiment, shoe sole portion 18E is provided with a pair of longitudinally extending attachment apertures 40E and 42E which substantially identical to apertures 40 and 42 in shoe sole portion 18 of the first embodiment as seen in Figs. 1, 2, 4 and 5-10. First attachment aperture 40E is a longitudinally extending slot which substantially lies on the center line C of bicycle shoe 10E. Second attachment aperture 42E is spaced laterally from first attachment aperture 40E and extends substantially parallel thereto. More specifically, second attachment aperture 42E is spaced laterally towards the outside edge of bicycle shoe 10E, and is in the form of an elongated slot which is parallel to first attachment aperture or elongated slot 40E, but longer in length. In particular, first attachment aperture or slot 40E has a first longitudinal length and second attachment aperture or slot 42E has a second longitudinal length which is longer than the first longitudinal length of first attachment aperture or slot 40E. For example in the second embodiment, first attachment aperture 40E extends approximately 21.3 millimeters in longitudinal length and second attachment aperture 42E extends approximately 56.9 millimeters in length.

[0043] The first attachment aperture or slot 40E is laterally disposed relative to second attachment aperture or slot 42E in ball section 38E with first attachment aperture or slot 40E being located between first and second ends of the second attachment aperture or slot 42E. Preferably, attachment apertures or slots 40E and 42E have substantially the same transverse width with their longitudinal axes being spaced approximately 14.0 millimeters apart from each other. Preferably, attachment apertures or slots 40E and 42E have first and second center end points which are longitudinally spaced approximately 32.0 millimeters to approximately 34.0 millimeters (preferably approximately 33.5 millimeters) apart from each other. Also, second attachment aperture 42E, preferably, has its center line spaced approximately 12.0 millimeters from the longitudinal center line C of bicycle shoe 10E.

[0044] Of course it will be apparent to those skilled in the art from this disclosure that first and second attachment apertures 40E and 42E could be combined as one single attachment aperture having either a generally T-shaped or a generally H-shaped configuration. Moreover, it will be apparent to those skilled in the art from this disclosure that attachment apertures 40E and 42E could be constructed of a plurality of holes for accommodating cleat assembly 12E.

Modified Cleat and Pedal

[0045] Referring now to Figs. 22-27, a modified cleat 52A in accordance with the present invention is illustrated to be used with the modified pedal 14A. This cleat and pedal is fully described and illustrated in EP 0,826,588A, to which reference is made. Basically, fasteners 54 can be utilized to attach cleat 52A to either sole portion 18, 18A or 18B in substantially the same manner as discussed above with respect to cleat 52. Accordingly, cleat 52A and pedal 14A will not be discussed or illustrated in detail herein.

[0046] Basically, cleat 52A has a front attachment portion 70A for engaging front clamping member 24A of pedal 14A, a rear attachment portion 72A for engaging and moving rear clamping member 26A, and a center or connecting portion 74A extending between front attachment portion 70A and rear attachment portion 72A. Preferably, front and rear attachment portions 70A and 72A, together with center portion 74A are integrally formed together as a one-piece, unitary member which is constructed from a suitable rigid material.

[0047] Front attachment portion 70A and rear attach-

ment portion 72A each has a hole or slot 76A for receiving one of the fasteners 56 therethrough for coupling cleat 52A to sole portion 18 of the bicycle shoe 10 in a relatively conventional manner. This interconnection of cleat 52A to sole portion 18 is relatively well-known in the art, and thus, this interconnection will not be discussed or illustrated in detail herein.

[0048] Front attachment portion 70A has a nose portion 82A for engaging front clamping member 24A of pedal 14A. Nose portion 82A has a front coupling surface 84A and a curved stop surface 86A formed thereon. Front coupling surface 84A is preferably a substantially flat, planar surface which is designed to engage front cleat engaging surface 25A of front clamping member 24A. Curved stop surface 86A is designed to engage a cutout portion of front clamping member 24A to prevent forward movement of cleat 54A relative to the pedal body 22A. Curved stop surface 86A engages front clamping member 24A to form a pivot point for pivotally releasing cleat 52A from pedal body 22A.

[0049] Rear attachment portion 72A has a pair of rear coupling surfaces 88A for engaging rear cleat engaging surface 27A of rear clamping member 26A to secure cleat 52A to pedal body 22A via rear clamping member 26A. Rear coupling surfaces 88A are preferably substantially flat, planar surfaces which are substantially parallel to front coupling surface 84A of cleat 52A. Rear attachment portion 72A also has a curved or angled cam surface 90A which is designed to engage rear clamping member 26A during coupling of cleat 52A to pedal body 22A. In particular, cam surface 90A is designed to rotate rear clamping member 26A rearwardly from its normal cleat engaging position to its cleat releasing position during downward movement of cleat 52A relative to pedal body 22A. Rear attachment portion 72A also has a curved stop surface 92A for engaging rear clamping member 26A to prevent rearward movement of cleat 52A relative to pedal body 22A when coupled thereto.

[0050] Center portion 74A has a substantially planar bottom surface 94A which is designed to engage a cleat supporting surface of pedal 14A. The upper surface 96A of center portion 74A is designed to engage outer surface 32 of sole portion 18.

[0051] While several embodiments have been chosen to illustrate the present invention, it will be understood by those skilled in the art that various changes and modifications can be made herein without departing from the scope of the invention as defined in the appended claims.

Claims

1. A bicycle shoe (10) adapted to fixedly receive a cleat (52) thereto for use with a bicycle pedal (14), comprising:

   a shoe sole portion (18) having an inner surface (30) facing the foot of the cyclist, an outer surface (32) facing the pedal (14), a toe portion (34), a heel portion (36) longitudinally spaced from said toe portion (34) and a ball section (38) located between said toe portion (34) and said heel portion (36) with first and second elongated attachment slots (40,42) formed in said ball section (38) which extend substantially parallel to each other in a substantially longitudinal direction between said toe portion (34) and said heel portion (36), said first slot (40) being laterally disposed relative to said second slot (42) in said ball section(38), **characterised in that** said first slot (40) has a first longitudinal length and said second slot (42) has a second longitudinal length which is longer than said first longitudinal length of said first slot (40), said first slot (40) being located between first and second ends of said second slot (42).

2. A bicycle shoe (10) according to Claim 1, wherein said first and second slots (40,42) have first and second longitudinal axes which are spaced approximately 14.0 millimetres apart from each other.

3. A bicycle shoe (10) according to either Claim 1 or Claim 2 further comprising a cleat attachment member (50) overlying said inner surface (30) of said sole portion (18), said cleat attachment member (50) having a first fixing portion overlying said second slot (42) to fixedly couple the cleat (52) to said outer surface (32) of said sole portion (18).

4. A bicycle shoe (10) according to Claim 3, wherein said first fixing portion has first and second holes (62,64) aligned with said second slot (42), which are adapted to receive fasteners (56) therethrough.

5. A bicycle shoe (10) according to either Claim 3 or Claim 4, wherein said cleat attachment member (50) further includes a second fixing portion overlying said first slot (40) to fixedly couple the cleat (52) to said outer surface (32) of said sole portion (18).

6. A bicycle shoe (10) according to Claim 5, wherein said first fixing portion has a third hole (63) aligned with said second slot (42), which is adapted to receive a fastener (56) therethrough, and
   said second fixing portion has a fourth hole (61) aligned with said first slot (40), which is adapted to receive a fastener (56) therethrough..

7. A bicycle shoe (10) according to Claim 6, wherein said first, second, third and fourth holes (62,64,63,61) are threaded.

8. A bicycle shoe (10) according to either Claim 6 or Claim 7, wherein said third hole (62) is located be-

tween said first and second holes (62,64).

9. A bicycle shoe (10) according to any of Claims 6 to 8, wherein said third and fourth holes (63,61) have their centre axes spaced approximately 14.0 millimetres apart from each other.

10. A bicycle shoe (10) according to any of Claims 3 to 9, wherein said cleat attachment member (50) is longitudinally adjustable relative to said second slot (42) of said sole portion (18).

11. A bicycle shoe (10) according to Claim 4, wherein said first and second holes (62,64) are threaded.

12. A bicycle shoe (10) according to either Claim 4 or Claim 11, wherein said first and second holes (62,64) have first and second centre axes which are longitudinally spaced approximately 32.0 millimetres to approximately 34.0 millimetres apart from each other.

13. A bicycle shoe (10) according to Claim 12, wherein said first and second holes (62,64) have their centre axes spaced approximately 33.5 millimetres apart from each other.

14. A bicycle shoe (10E) according to any preceding claim, further including three secondary attachment points (43E,44E,45E) arranged to form an isosceles triangle with one of its apexes pointing towards said toe portion (34E), said three secondary attachment points (43E,44E,45E) being formed by secondary attachment apertures.

15. A bicycle shoe (10E) according to claim 14, wherein said secondary attachment aperture (43E) closest to said toe portion (34E)intersects with at least one of said first and second elongated attachment slots (40E,42E).

16. A bicycle shoe (10E) according to either claim 14 or claim 15, wherein said secondary attachment aperture (43E) closest to said toe portion (34E) intersects with said second elongated attachment slot (42E).

17. A bicycle shoe (10E) according to any of claims 14 to 16, wherein one of said secondary attachment apertures (43E) is located laterally between said first and second elongated attachment slots (40E, 42E).

18. A bicycle shoe (10E) according to any of claims 14 to 17 wherein said first and second elongated attachment slots (40E,42E) extend substantially perpendicular to a line extending between two of said secondary attachment apertures (44E,45E).

19. A bicycle shoe (10E) according to either claim 14 or claim 15, wherein said secondary attachment aperture (43E) closest to said toe portion (34E) intersects with said first attachment slot (40E).

20. A bicycle shoe (10) according to any preceding claim, wherein said first and second slots (40,42) have substantially the same transverse width.

21. A bicycle shoe (10) according to any preceding claim, wherein said sole portion (18) is constructed of substantially flexible, resilient material.

22. A bicycle shoe (10) according to any of Claims 1 to 20, wherein said sole portion (18) is constructed of a substantially hard, rigid material.

23. A bicycle shoe (10) according to Claim 22, wherein said rigid material of said sole portion (18) is made of carbon graphite.

Patentansprüche

1. Ein Fahrradschuh (10), der ausgeführt ist, um darauf einen Schuhnagel (52) fest aufzunehmen, zur Verwendung mit einem Fahrradpedal (14), bestehend aus:

einem Schuhsohlenteil (18) mit einer Innenfläche (30), die dem Fuß des Fahrers gegenüberliegt, einer Außenfläche (32), die dem Pedal (14) gegenüberliegt, einem Zehenteil (34), einem Fersenteil (36), der der Länge nach mit einem Abstand von dem Zehenteil (34) angeordnet ist und einem Ballenteil (38), der zwischen dem Zehenteil (34) und dem Fersenteil (36) angeordnet ist, wobei erste und zweite verlängerte Befestigungsschlitze (40, 42) in dem Ballenteil (38) geformt sind, die sich im wesentlichen parallel zueinander in einer im wesentlichen longitudinalen Richtung zwischen dem Zehenteil (34) und dem Fersenteil (36) erstrecken, wobei der erste Schlitz (40) seitlich relativ zu dem zweiten Schlitz (42) in dem Ballenteil (38) angeordnet ist, **dadurch gekennzeichnet, daß** der erste Schlitz (40) eine erste longitudinale Länge aufweist und der zweite Schlitz (42) eine zweite longitudinale Länge aufweist, die länger als die erste longitudinale Länge des ersten Schlitzes (40) ist, wobei der erste Schlitz (40) zwischen dem ersten und zweiten Ende des zweiten Schlitzes (42) befindlich ist.

2. Fahrradschuh (10) gemäß Anspruch 1, wobei der erste und zweite Schlitz (40, 42) erste und zweite longitudinale Achsen aufweisen, die ungefähr 14,0 Millimeter voneinander getrennt angeordnet sind.

3. Fahrradschuh (10) gemäß Anspruch 1 oder Anspruch 2, ferner bestehend aus einem Schuhnagelbefestigungselement (50), das die Innenfläche (30) des Sohlenteils (18) überlagert, wobei das Schuhnagelbefestigungselement (50) einen ersten den zweiten Schlitz (42) überlagernden Befestigungsteil zum festen Koppeln des Schuhnagels (52) mit der Außenfläche (32) des Sohlenteils (18) aufweist.

4. Fahrradschuh (10) gemäß Anspruch 3, wobei der erste Befestigungsteil erste und zweite auf den zweiten Schlitz (42) ausgerichtete Löcher (62, 64) aufweist, die angepaßt sind, um Verbindungsstükke (56) durch diese aufzunehmen.

5. Fahrradschuh (10) gemäß Anspruch 3 oder Anspruch 4, wobei das Schuhnagelbefestigungselement (50) ferner einen zweiten den ersten Schlitz (40) überlappenden Befestigungsteil zum festen Koppeln des Schuhnagels (52) mit der Außenfläche (32) des Sohlenteils (18) aufweist.

6. Fahrradschuh (10) gemäß Anspruch 5, wobei
der erste Befestigungsteil ein drittes auf den zweiten Schlitz (42) ausgerichtetes Loch (63) aufweist, das angepaßt ist, um ein Verbindungsstück (56) durch dieses aufzunehmen und
wobei der zweite Befestigungsteil ein viertes auf den ersten Schlitz (40) ausgerichtetes Loch (61) aufweist, das angepaßt ist, um ein Verbindungsstück (56) durch dieses aufzunehmen.

7. Fahrradschuh (10) gemäß Anspruch 6, wobei die ersten, zweiten, dritten und vierten Löcher (62, 64, 63, 61) mit einem Gewinde versehen sind.

8. Fahrradschuh (10) gemäß Anspruch 6 oder Anspruch 7, wobei das dritte Loch (62) zwischen den ersten und zweiten Löchern (62, 64) angeordnet ist.

9. Fahrradschuh (10) gemäß einem der Ansprüche 6 bis 8, wobei die Mittelachsen der dritten und vierten Löcher (63, 61) ungefähr 14,0 Millimeter voneinander getrennt angeordnet sind.

10. Fahrradschuh (10) gemäß einem der Ansprüche 3 bis 9, wobei der Schuhnagelbefestigungsteil (50) relativ zum zweiten Schlitz (42) des Sohlenteils (18) longitudinal einstellbar ist.

11. Fahrradschuh (10) gemäß Anspruch 4, wobei die ersten und zweiten Löcher (62, 64) mit einem Gewinde versehen sind.

12. Fahrradschuh (10) gemäß Anspruch 4 oder Anspruch 11, wobei die ersten und zweiten Löcher (62, 64) erste und zweite Mittelachsen aufweisen, die longitudinal ungefähr 32,0 Millimeter bis ungefähr 34,0 Millimeter voneinander getrennt angeordnet sind.

13. Fahrradschuh (10) gemäß Anspruch 12, wobei die Mittelachsen der ersten und zweiten Löcher (62, 64) ungefähr 33,5 Millimeter voneinander getrennt angeordnet sind.

14. Fahrradschuh (10E) gemäß einem der vorhergehenden Ansprüche, ferner bestehend aus drei sekundären Befestigungspunkten (43E, 44E, 45E), die so angeordnet sind, daß sie ein gleichschenkeliges Dreieck bilden, wobei einer ihrer Scheitelpunkte in Richtung Zehenteil (34E) zeigt und wobei die drei sekundären Befestigungspunkte (43E, 44E, 45E) durch sekundäre Befestigungsöffnungen gebildet sind.

15. Fahrradschuh (10E) gemäß Anspruch 14, wobei die sekundäre Befestigungsöffnung (43E), die dem Zehenteil (34E) am nächsten liegt, sich mit mindestens einem der ersten und zweiten verlängerten Befestigungsteile (40E, 42E) überschneidet.

16. Fahrradschuh (10E) gemäß Anspruch 14 oder Anspruch 15, wobei die sekundäre Befestigungsöffnung (43E), die dem Zehenteil (34E) am nächsten liegt, sich mit dem zweiten verlängerten Befestigungsschlitz (42E) überschneidet.

17. Fahrradschuh (10E) gemäß einem der Ansprüche 14 bis 16, wobei eine der sekundären Befestigungsöffnungen (43E) seitlich zwischen den ersten und zweiten verlängerten Befestigungsschlitzen (40E, 42E) angeordnet ist.

18. Fahrradschuh (10E) gemäß einem der Ansprüche 14 bis 17, wobei sich die ersten und zweiten verlängerten Befestigungsschlitze (40E, 42E) im wesentlichen senkrecht zu einer sich zwischen zwei der sekundären Befestigungsöffnungen (44E, 45E) erstreckenden Linie, erstrecken.

19. Fahrradschuh (10E) gemäß Anspruch 14 oder Anspruch 15, wobei die sekundäre Befestigungsöffnung (43E), die dem Zehenteil (34E) am nächsten liegen, sich mit dem ersten Befestigungsschlitz (40E) überschneidet.

20. Fahrradschuh (10) gemäß einem der vorhergehenden Ansprüche, wobei die ersten und zweiten Schlitze (40, 42) im wesentlichen dieselbe transversale Breite aufweisen.

21. Fahrradschuh (10) gemäß einem der vorhergehenden Ansprüche, wobei der Sohlenteil (18) aus einem im wesentlichen flexiblen, elastischen Material hergestellt ist.

22. Fahrradschuh (10) gemäß einem der Ansprüche 1 bis 20, wobei der Sohlenteil (18) aus einem im wesentlichen harten, unbiegsamen Material hergestellt ist.

23. Fahrradschuh (10) gemäß Anspruch 22, wobei das unbiegsame Material des Sohlenteils (18) aus Kohlenstoff-Graphit besteht.

Revendications

1. Une chaussure de cyclisme (10) conçue de façon à recevoir de façon fixe une barrette (52) fixée à celle-ci et destinée à être utilisée avec une pédale de bicyclette (14), comprenant :

une portion de semelle de chaussure (18) présentant une surface interne (30) faisant face au pied du cycliste, une surface externe (32) faisant face à la pédale (14), une portion de bout (34), une portion de talon (36) espacée longitudinalement de ladite portion de bout (34) et une section de plante de pied (38) située entre ladite portion de bout (34) et ladite portion de talon (36), des première et deuxième fentes d'attache allongées (40, 42) qui s'étendent de façon sensiblement parallèle l'une à l'autre dans un sens sensiblement longitudinal entre ladite portion de bout (34) et ladite portion de talon (36) étant pratiquées dans ladite section de plante de pied (38), ladite première fente (40) étant disposée latéralement par rapport à ladite deuxième fente (42) dans ladite section de plante de pied (38), **caractérisée en ce que** ladite première fente (40) présente une première longueur longitudinale et ladite deuxième fente (42) présente une deuxième longueur longitudinale, laquelle est plus longue que ladite première longueur longitudinale de ladite première fente (40), ladite première fente (40) étant située entre des première et deuxième extrémités de ladite deuxième fente (42).

2. Une chaussure de cyclisme (10) selon la revendication 1, dans laquelle lesdites première et deuxième fentes (40, 42) présentent des premier et deuxième axes longitudinaux, lesquels sont espacés l'un-de l'autre de 14,0 millimètres approximativement.

3. Une chaussure de cyclisme (10) selon soit la revendication 1, soit la revendication 2, comprenant en outre un élément d'attache de barrette (50) recouvrant ladite surface interne (30) de ladite portion de semelle (18), ledit élément d'attache de barrette (50) présentant une première portion de fixation recouvrant ladite deuxième fente (42) de façon à accoupler de façon fixe la barrette (52) à ladite surface externe (32) de ladite portion de semelle (18).

4. Une chaussure de cyclisme (10) selon la revendication 3, dans laquelle ladite première portion de fixation présente des premier et deuxième trous (62, 64) alignés sur ladite deuxième fente (42), lesquels sont conçus de façon à recevoir et être traversés par des éléments d'immobilisation (56).

5. Une chaussure de cyclisme (10) selon soit la revendication 3, soit la revendication 4, dans laquelle ledit élément d'attache de barrette (50) comporte en outre une deuxième portion de fixation recouvrant ladite première fente (40) de façon à accoupler de façon fixe la barrette (52) à ladite surface externe (32) de ladite portion de semelle (18).

6. Une chaussure de cyclisme (10) selon la revendication 5, dans laquelle
ladite première portion de fixation présente un troisième trou (63) aligné sur ladite deuxième fente (42), lequel est conçu de façon à recevoir et être traversé par un élément d'immobilisation (56), et
ladite deuxième portion de fixation présente un quatrième trou (61) aligné sur ladite première fente (40), lequel est conçu de façon à recevoir et être traversé par un élément d'immobilisation (56).

7. Une chaussure de cyclisme (10) selon la revendication 6, dans laquelle lesdits premier, deuxième, troisième et quatrième trous (62, 64, 63, 61) sont taraudés.

8. Une chaussure de cyclisme (10) selon soit la revendication 6, soit la revendication 7, dans laquelle ledit troisième trou (63) est situé entre lesdits premier et deuxième trous (62, 64).

9. Une chaussure de cyclisme (10) selon n'importe lesquelles des revendications 6 à 8, dans laquelle les axes médians desdits troisième et quatrième trous (63, 61) sont espacés l'un de l'autre de 14,0 millimètres approximativement.

10. Une chaussure de cyclisme (10) selon n'importe lesquelles des revendications 3 à 9, dans laquelle ledit élément d'attache de barrette (50) est réglable longitudinalement par rapport à ladite deuxième fente (42) de ladite portion de semelle (18).

11. Une chaussure de cyclisme (10) selon la revendication 4, dans laquelle lesdits premier et deuxième trous (62, 64) sont taraudés.

12. Une chaussure de cyclisme (10) selon soit la revendication 4, soit la revendication 11, dans laquelle lesdits premier et deuxième trous (62, 64) présen-

tent des premier et deuxième axes médians, lesquels sont espacés longitudinalement l'un de l'autre de 32,0 millimètres approximativement à 34,0 millimètres approximativement.

13. Une chaussure de cyclisme (10) selon la revendication 12, dans laquelle les axes médians desdits premier et deuxième trous (62, 64) sont espacés l'un de l'autre de 33,5 millimètres approximativement.

14. Une chaussure de cyclisme (10E) selon n'importe quelle revendication précédente, comportant en outre trois points d'attache secondaires (43E, 44E, 45E) agencés de façon à former un triangle isocèle dont l'un des sommets pointe en direction de ladite portion de bout (34E), lesdits trois points d'attache secondaires (43E, 44E, 45E) étant formés par des orifices d'attache secondaires.

15. Une chaussure de cyclisme (10E) selon la revendication 14, dans laquelle ledit orifice d'attache secondaire (43E) le plus proche de ladite portion de bout (34E) et l'une au moins desdites première et deuxième fentes d'attache allongées (40E, 42E) s'entrecoupent.

16. Une chaussure de cyclisme (10E) selon soit la revendication 14, soit la revendication 15, dans laquelle ledit orifice d'attache secondaire (43E) le plus proche de ladite portion de bout (34E) et ladite deuxième fente d'attache allongée (42E) s'entrecoupent.

17. Une chaussure de cyclisme (10E) selon n'importe lesquelles des revendications 14 à 16, dans laquelle l'un desdits orifices d'attache secondaires (43E) est situé latéralement entre lesdites première et deuxième fentes d'attache allongées (40E, 42E).

18. Une chaussure de cyclisme (10E) selon n'importe lesquelles des revendications 14 à 17, dans laquelle lesdites première et deuxième fentes d'attache allongées (40E, 42E) s'étendent de façon sensiblement perpendiculaire à une ligne s'étendant entre deux desdits orifices d'attache secondaires (44E, 45E).

19. Une chaussure de cyclisme (10E) selon soit la revendication 14, soit la revendication 15, dans laquelle ledit orifice d'attache secondaire (43E) le plus proche de ladite portion de bout (34E) et ladite première fente d'attache (40E) s'entrecoupent.

20. Une chaussure de cyclisme (10) selon n'importe quelle revendication précédente, dans laquelle lesdites première et deuxième fentes (40, 42) ont sensiblement la même largeur transversale.

21. Une chaussure de cyclisme (10) selon n'importe quelle revendication précédente, dans laquelle ladite portion de semelle (18) est réalisée en matière élastique sensiblement souple.

22. Une chaussure de cyclisme (10) selon n'importe lesquelles des revendications 1 à 20, dans laquelle ladite portion de semelle (18) est réalisée en une matière rigide sensiblement dure.

23. Une chaussure de cyclisme (10) selon la revendication 22, dans laquelle ladite matière rigide de ladite portion de semelle (18) est faite en graphite de carbone.

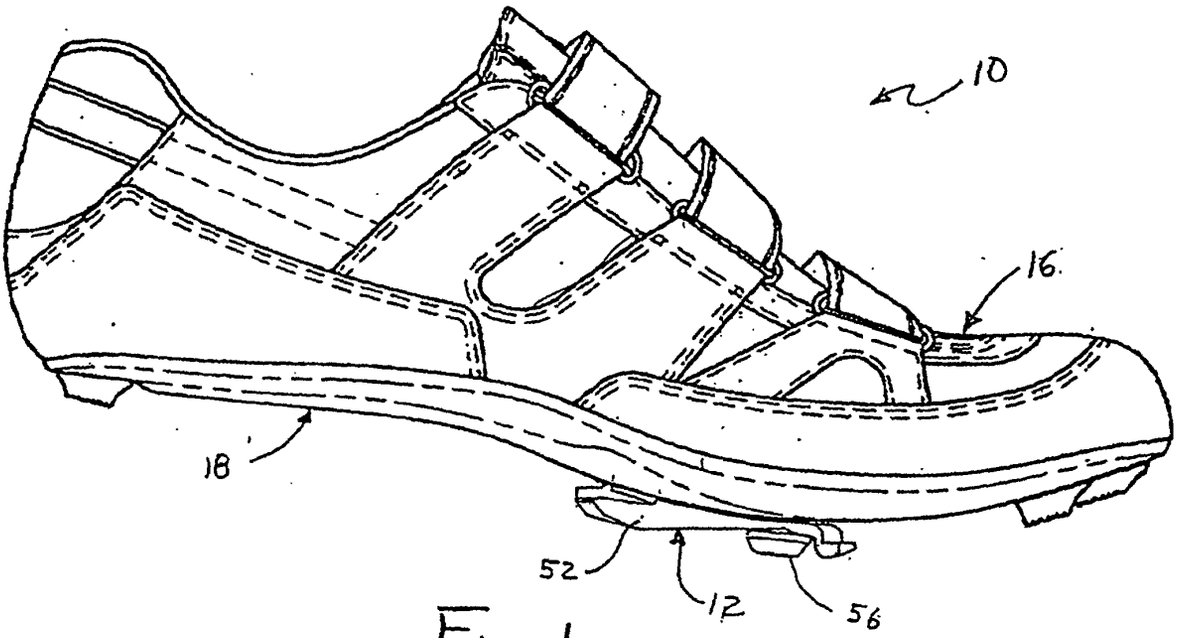


Fig. 1

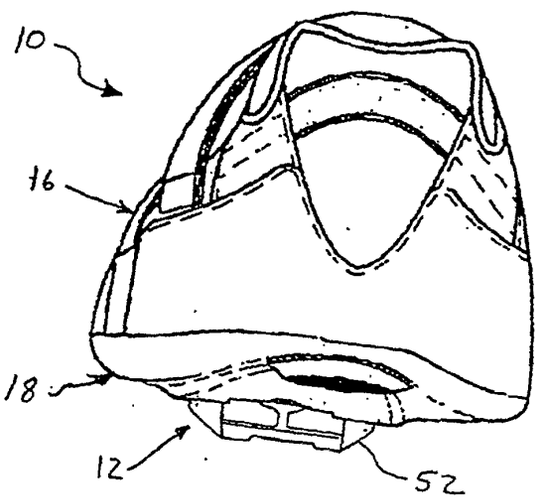


Fig. 2

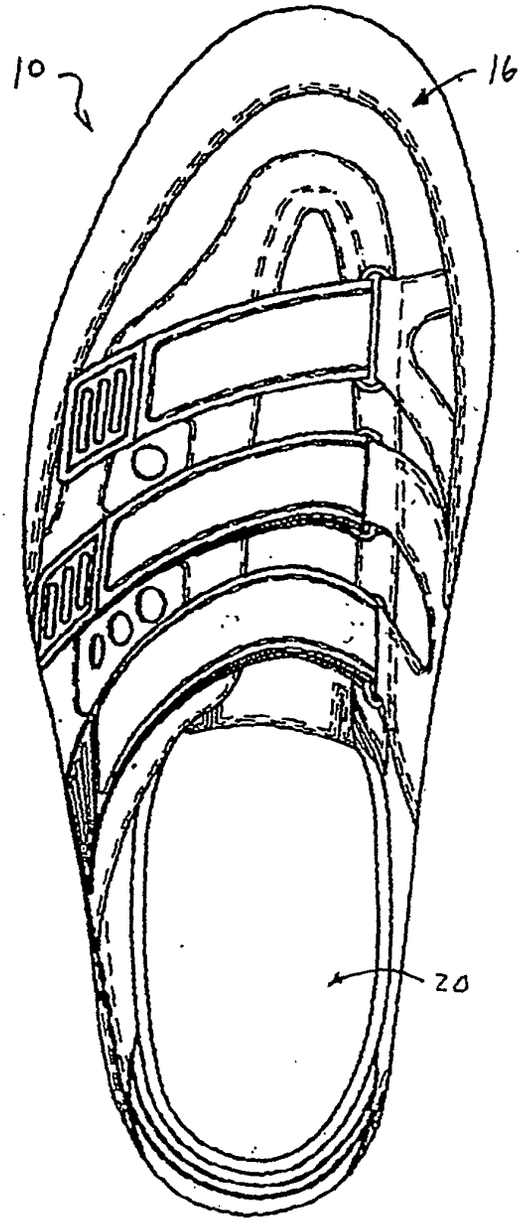


Fig. 3

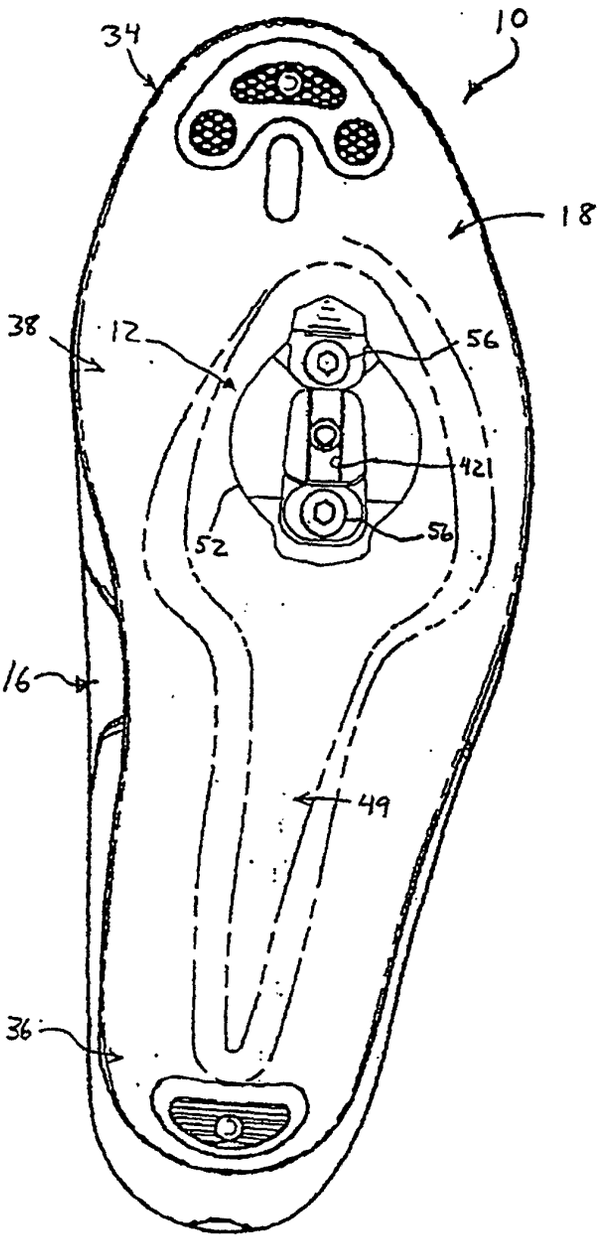


Fig. 4

Fig. 5

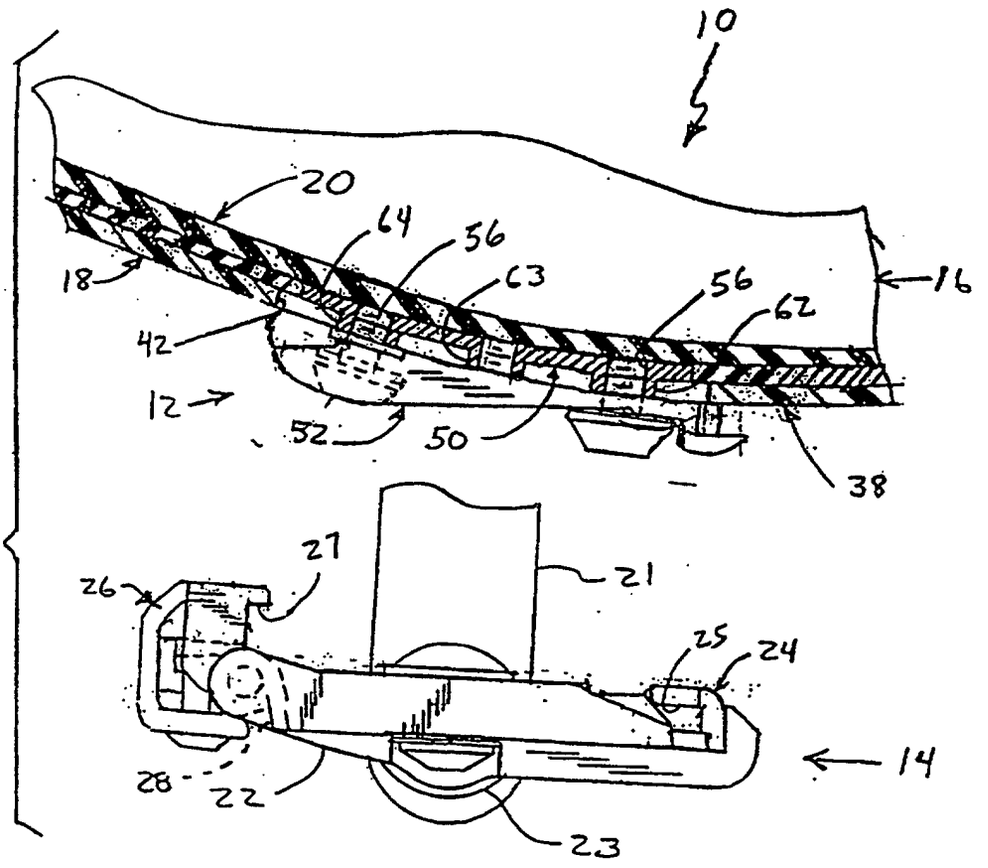

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Fig. 6

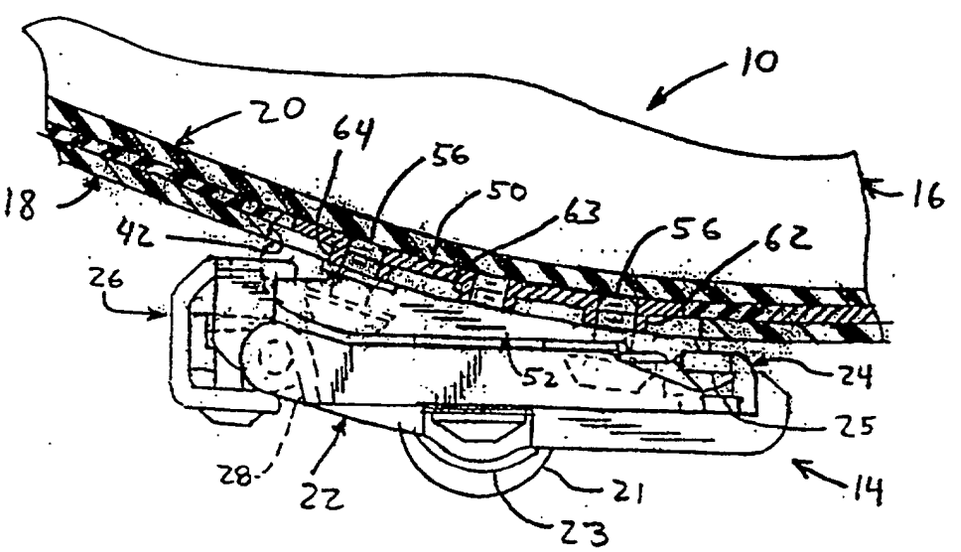
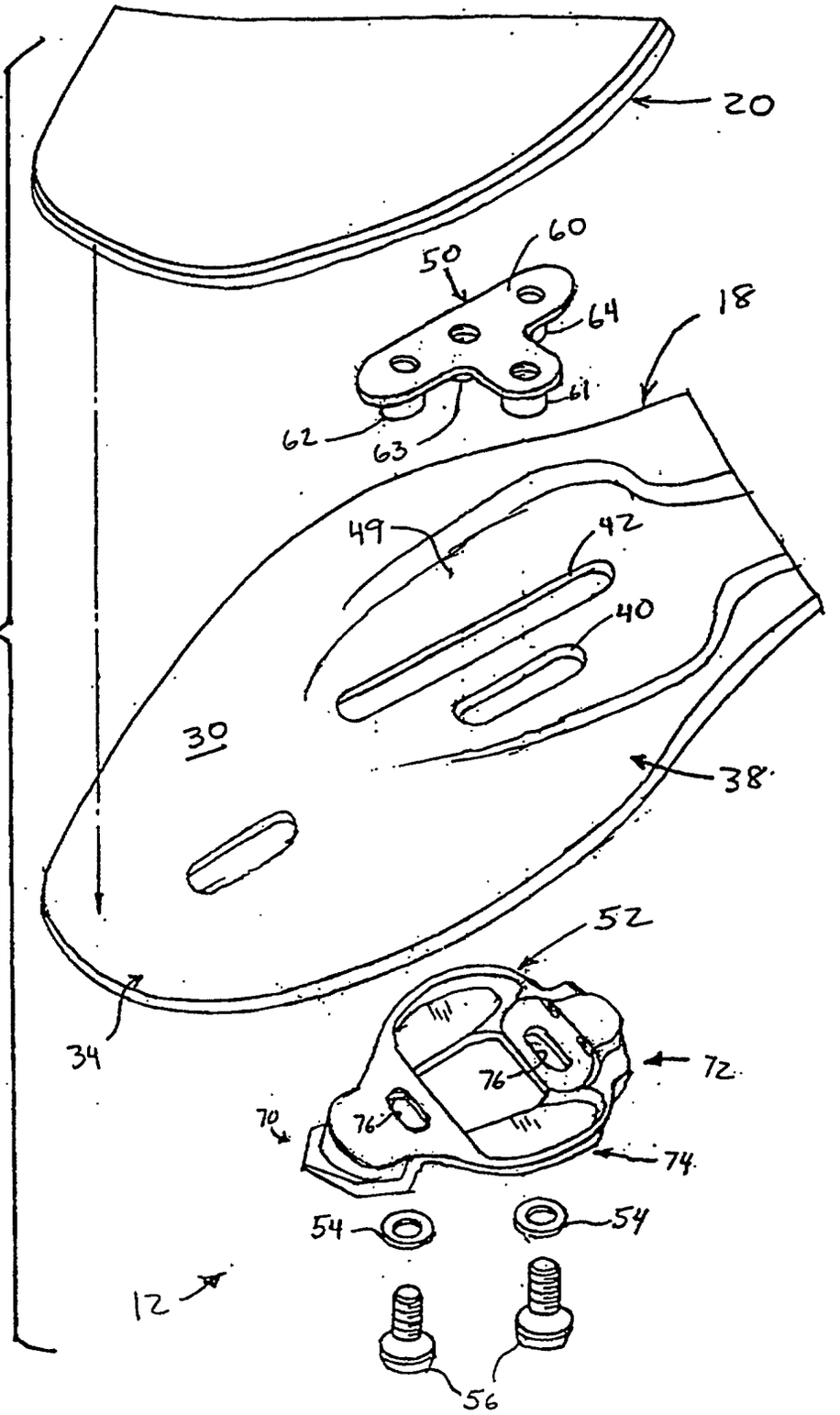

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Fig. 7



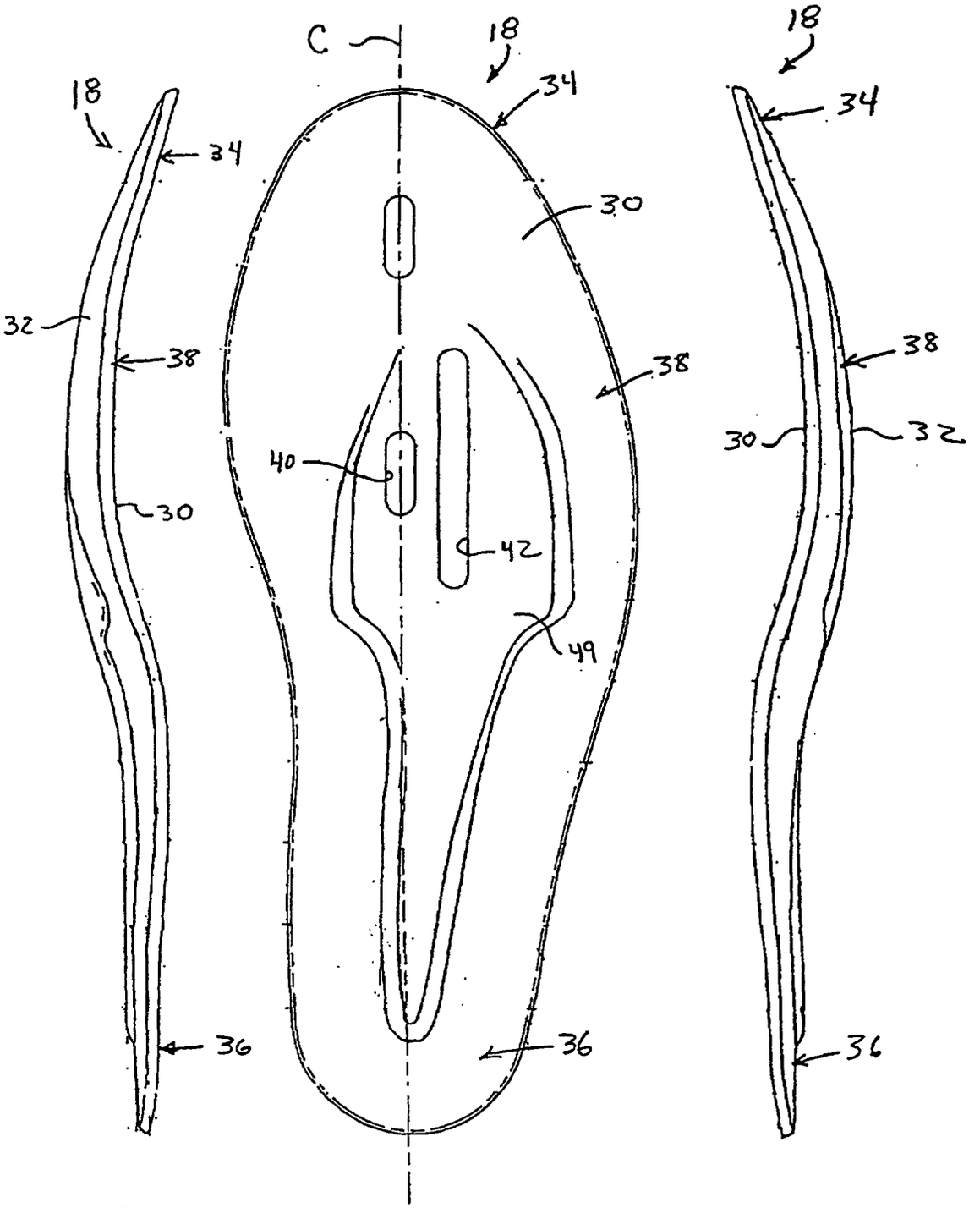


Fig. 8

Fig. 9

Fig. 10

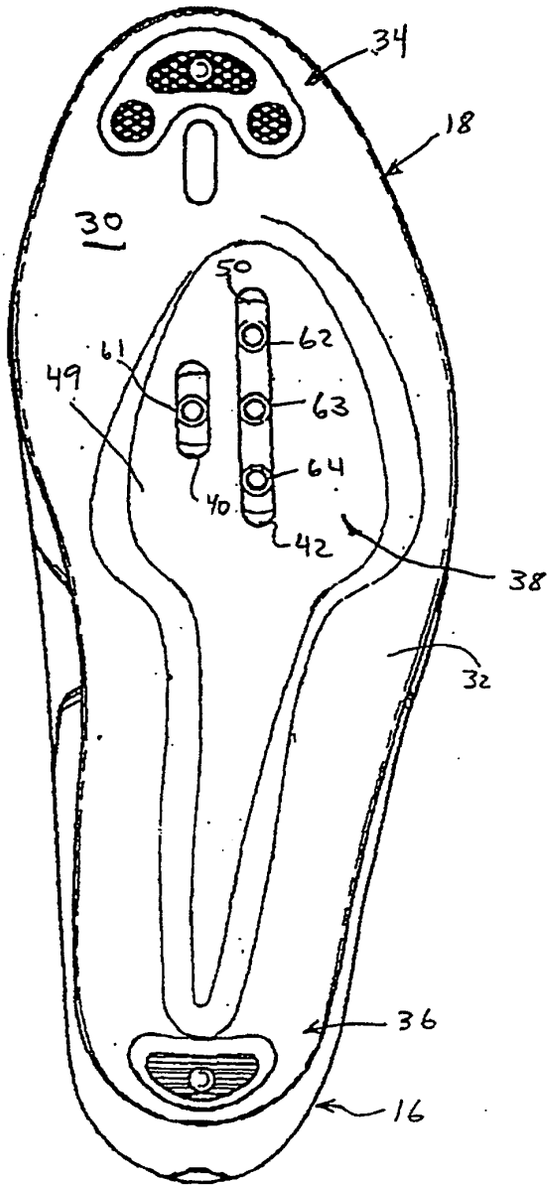


Fig. 11

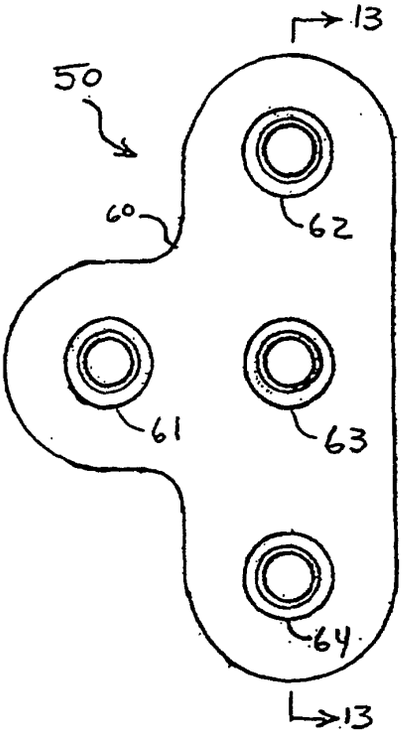


Fig. 12

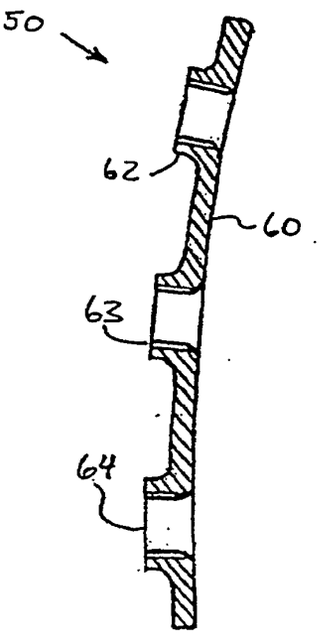


Fig. 13

Fig.14

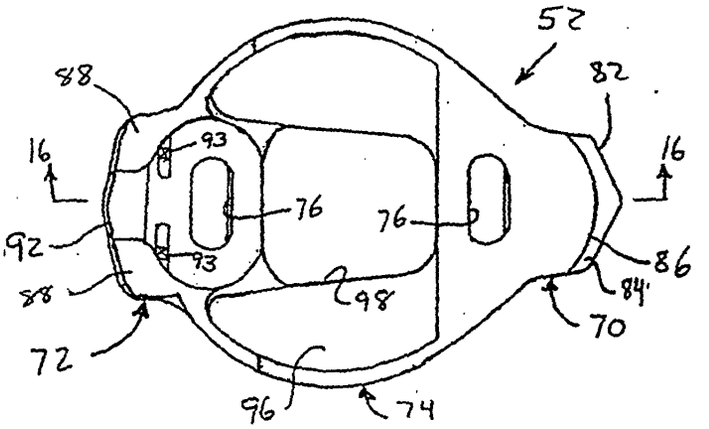


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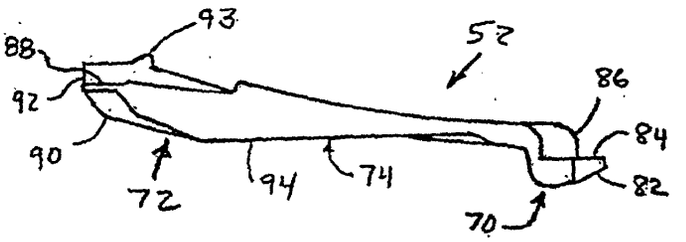


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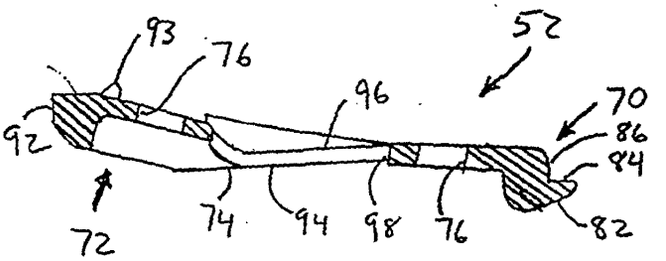


Fig.17

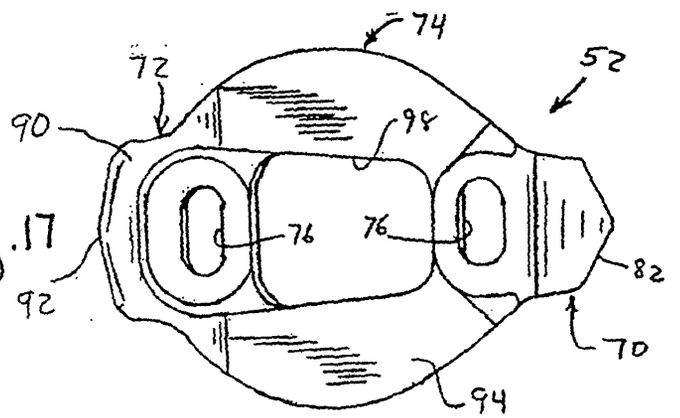
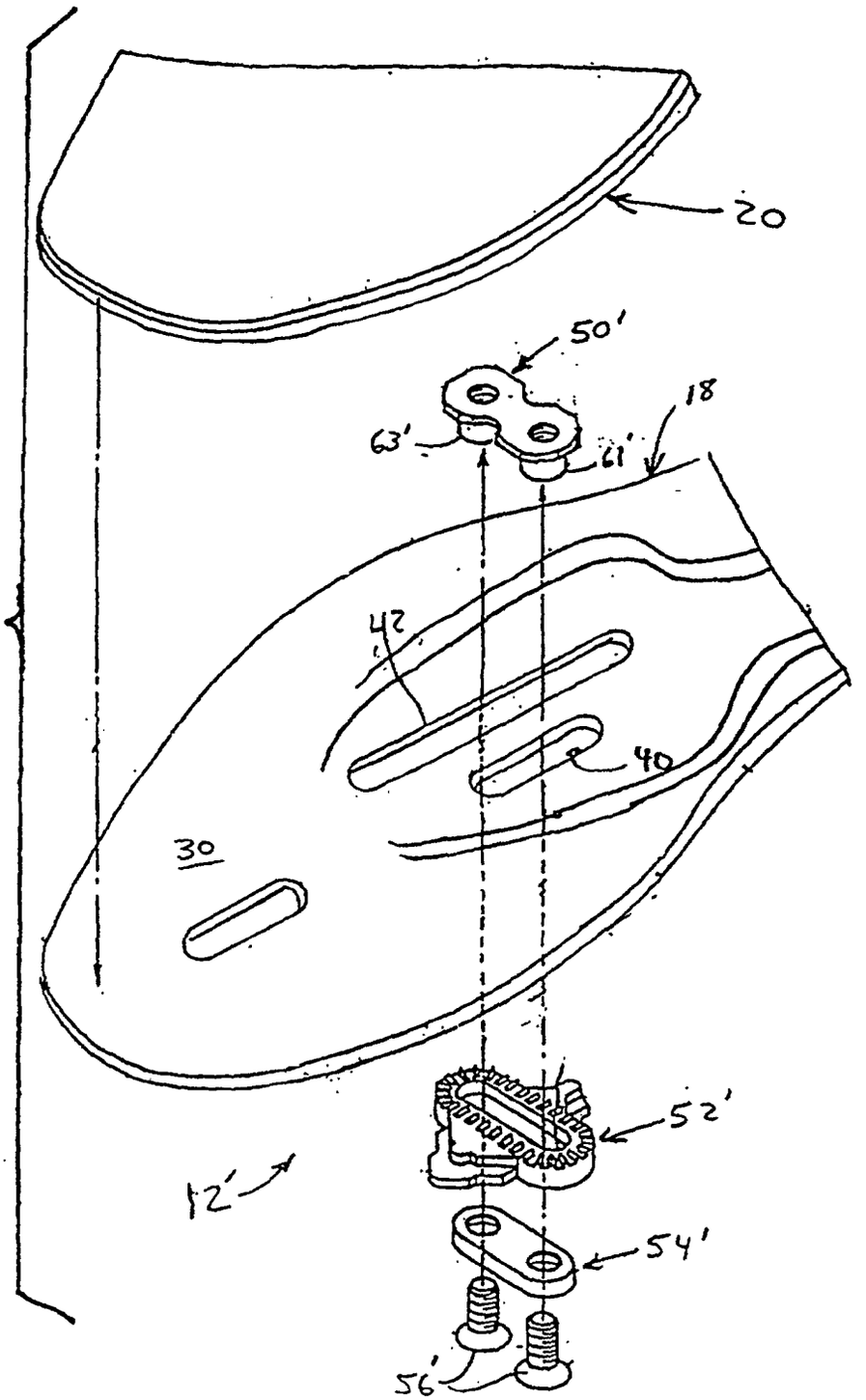


Fig. 18



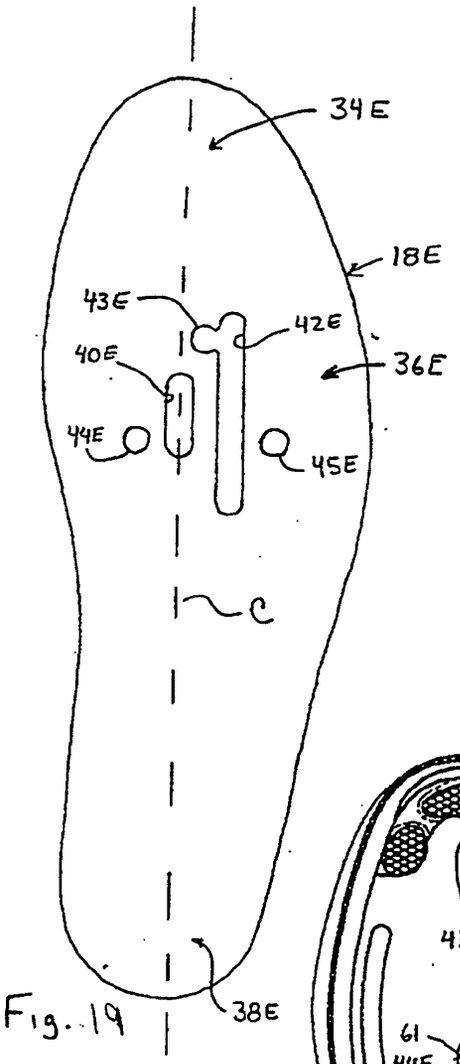


Fig. 19

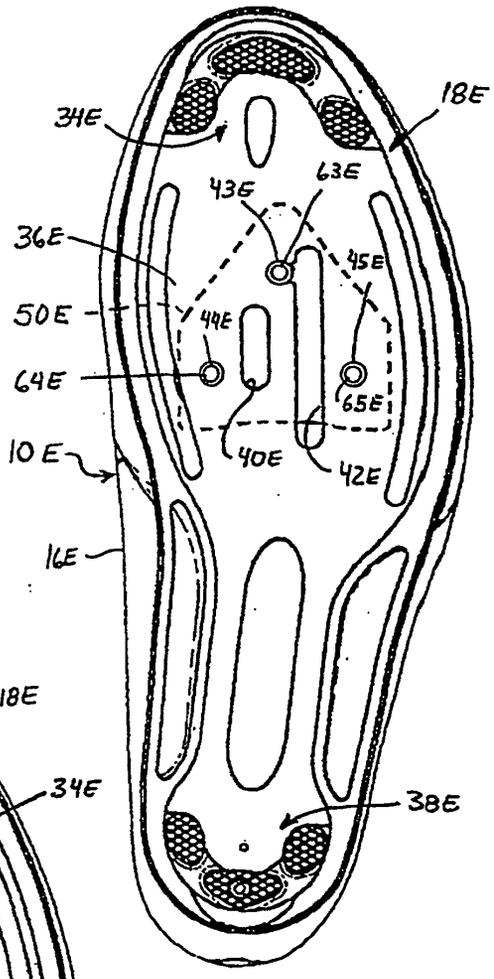


Fig. 20

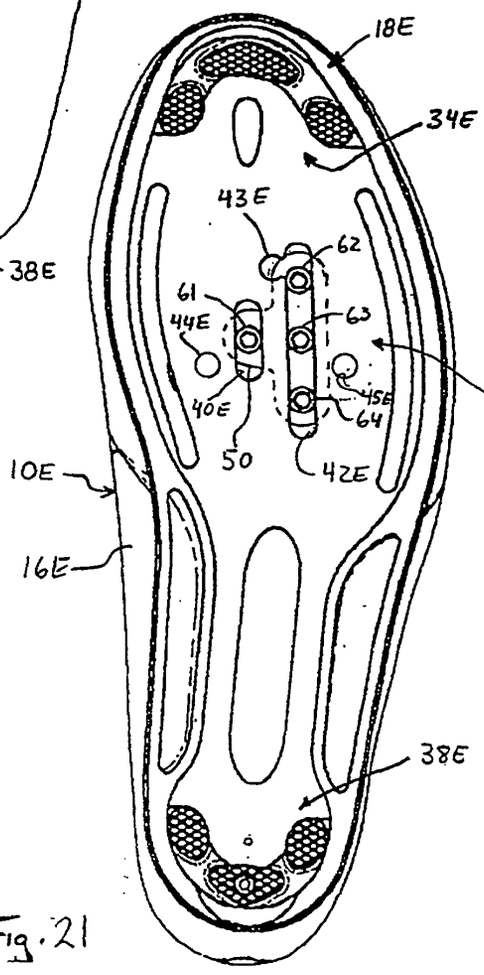


Fig. 21

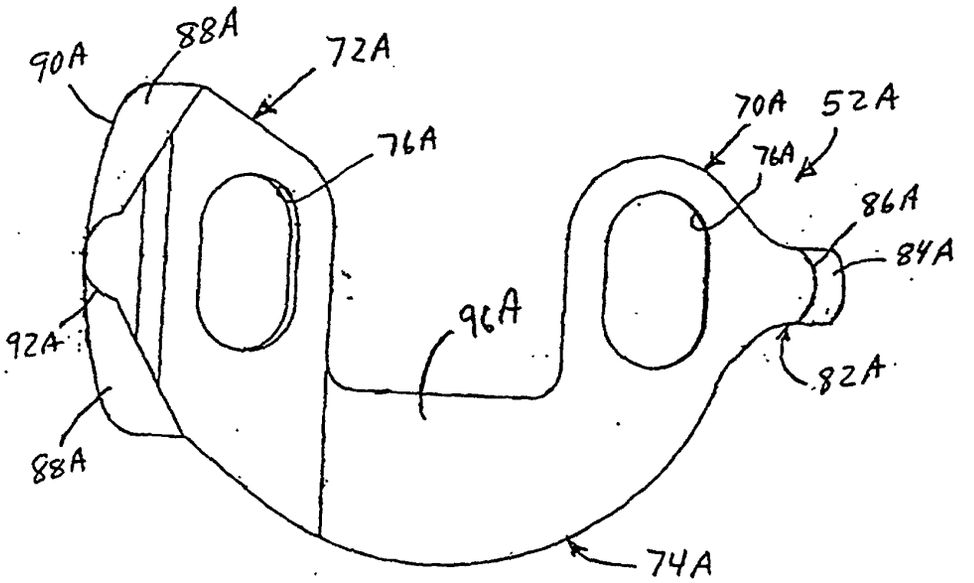


Fig. 22

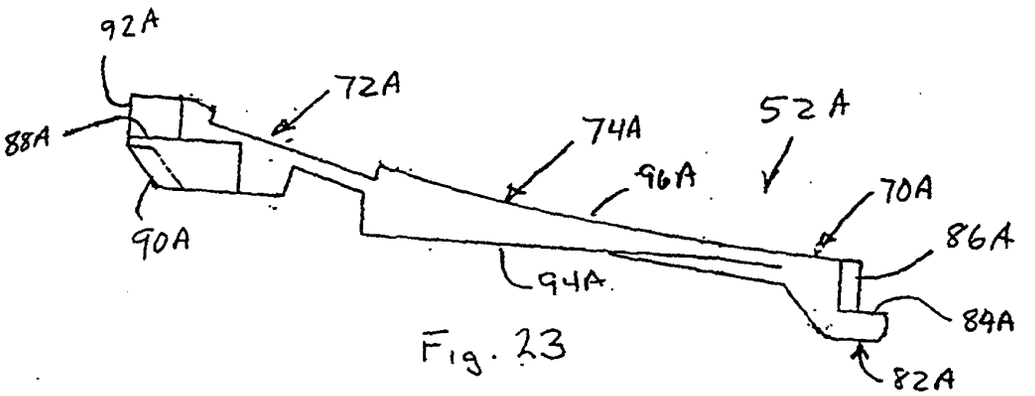


Fig. 23

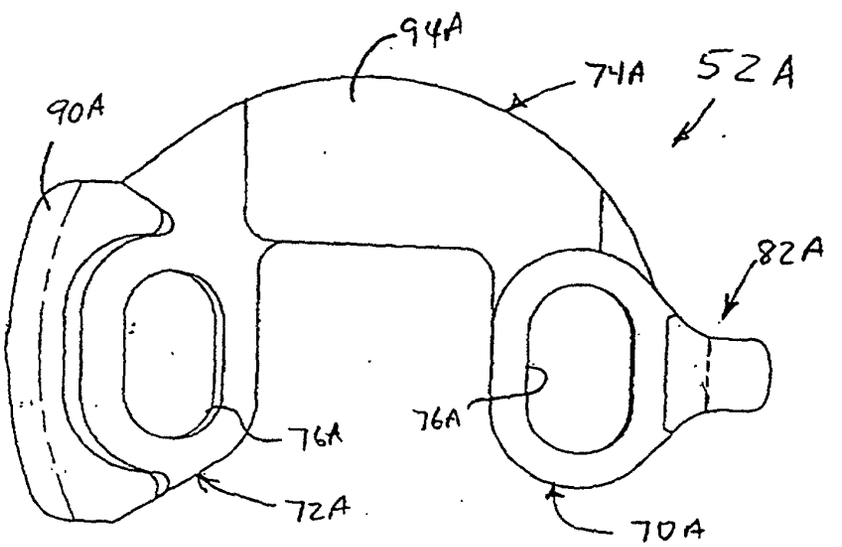


Fig. 24

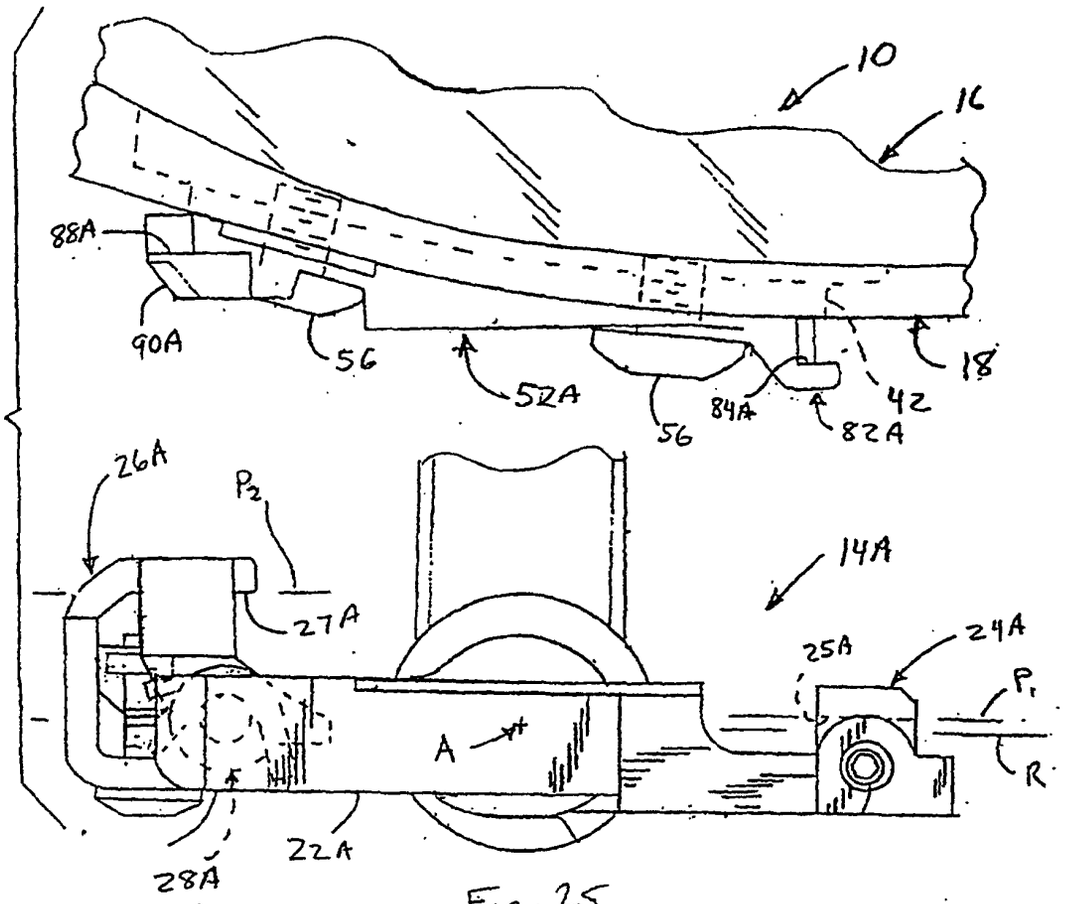

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84A
42
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P1
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Fig. 25

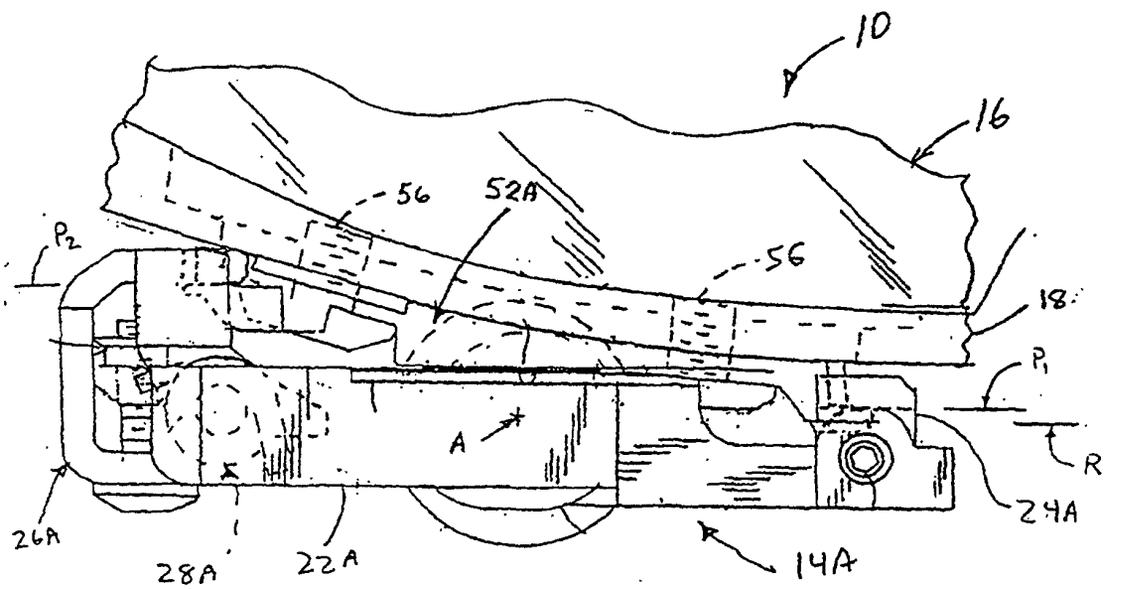

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Fig. 26

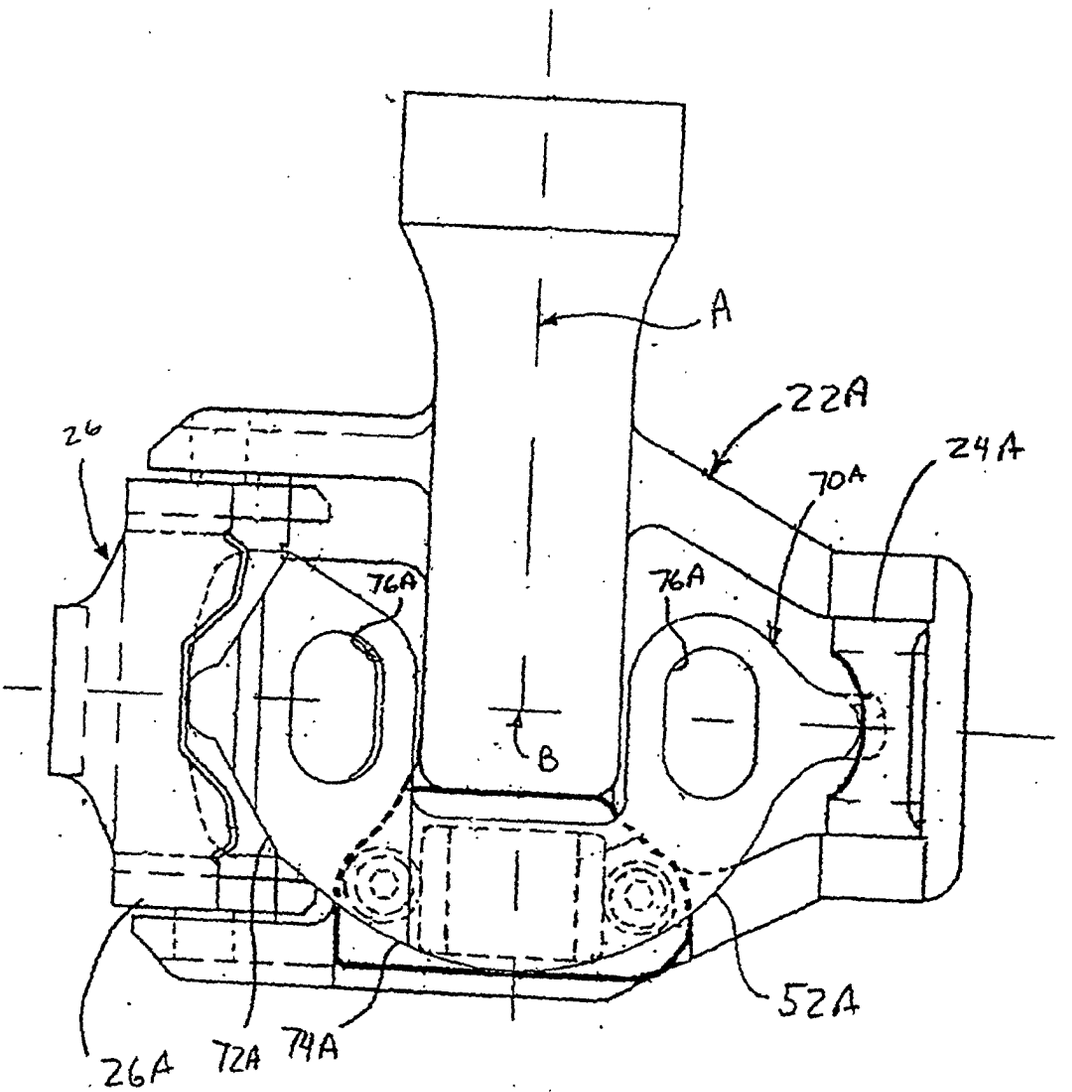


Fig. 27