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(54) **Shoe sole having a plurality of studs thereadedly attached thereto.**

(57) A shoe sole (10) has a plurality of studs (30), and a plurality of stud seats (11) for attachment of the studs (30) to the shoe sole (10). Each of the studs (30) has a first screw member (31) and each of the stud seats (11) has a second screw member

(12). The first and second screw members (31, 12) are interengaged with each other. An elastic disc (20) is clamped between each of the stud seats (11) and each of the studs (30).

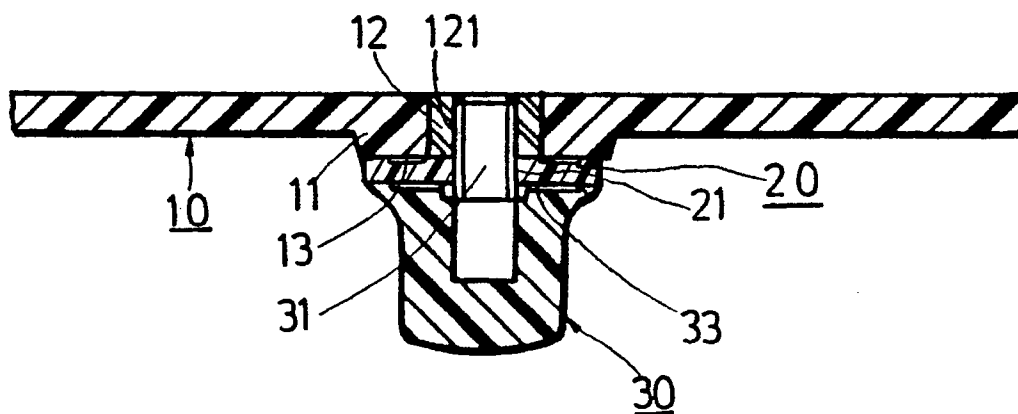


FIG. 5

This invention relates to a shoe sole having a plurality of studs attached thereto, more particularly to a shoe sole having a plurality of studs threadedly attached thereto.

Conventionally, a stud construction shoe, especially a screw-in stud construction shoe, is provided with a plurality of screw-in studs on the sole thereof for increasing the ground-grasping force thereof. Referring to Fig. 1A, a conventional shoe sole 1 has a plurality of stud seats 1a formed thereon each of which has a threaded hole 2b formed therein and a plurality of radial ribs 1b provided on the outer face of the stud seat 1a. A plurality of studs 3 are connected to the shoe sole 1 by screwing the threaded rod 3a fixed to said studs 3 in the stud seat 1a. Each of said studs 3 has a plurality of radial grooves 3c at one end face thereof. The radial grooves 3c are engaged with the radial ribs 1b when the stud 3 is rotated by a wrench until said end face of said stud 3 abuts against the stud seat 3c. In addition, the threaded rod may be provided on the stud seat and the threaded hole may be provided on the stud for screw-coupling purposes, as best illustrated in Fig. 1C. However, such a conventional shoe sole suffers from the following disadvantages:

(1) Because the studs are engaged with the shoe sole by the screw-coupling mechanism, the manufacturer can not exactly know the position where said studs are tightened to the stud seats on said shoe sole. Therefore, each of the studs must be in the shape of a cylinder to ensure that all of said studs have the same figuration in all directions, although said studs may be triangular in cross section or elliptic in cross section in order to achieve an improved exercising performance in specific directions.

(2) Because of unavoidable errors in the manufacturing process, the end face of the stud 3 can not completely abut against the shoe sole 1, but contacts the stud seat 1a in a slightly inclined position, as best illustrated in Fig. 1B. Therefore, the studs 3 are liable to become loose relative to the shoe sole.

(3) Moisture and/or water usually enters the shoe via a clearance, which is formed between the end face of the stud 3 and the stud seat 1a, and the threaded hole 2b.

(4) Referring to Figs. 2A, 2B, when a torsion force externally applied to said stud 3 exceeds a release torsion force (Pr), even though the stud 3 is applied by a tightening torsion force (Pf) to screw the threaded rod 3a into the threaded hole 2b, the stud 3 is liable to loosen because the effective safe range (Pp) is narrow (less than 15 degrees).

(5) Such a screw-coupling mechanism of the stud and the shoe sole can not provide a shock-

absorbing effect.

It is therefore a main object of this invention to provide a shoe sole having a plurality of studs threadedly connected thereto, wherein each of the studs can be securely attached to the shoe sole and prevented from moisture entering the shoe, as well as provide a shock-absorbing effect.

It is another object of this invention to provide a shoe sole having a plurality of studs threadedly connected thereto, wherein said studs can be directional in cross section so as to reduce the forward resisting force thereof and increasing the backward ground-grasping force thereof during exercising, thus improving the exercising performance.

In accordance with this invention, the shoe sole has a plurality of studs, a plurality of stud seats for attachment of the studs to the shoe sole. Each of the studs has a first screw member and each of the stud seats has a second screw member provided therewith. The first and second screw members are interengaged each other. An elastic disc is clamped between each of the stud seats and each of the studs. Therefore, each of the studs can be applied by a predetermined torsion to rotate so that the elastic disc can be snugly clamped between each of the studs and each of the stud seats. In this way, the studs can firmly and securely be attached to the stud seat of the shoe sole without any clearance formed therebetween, preventing moisture from entering the shoe. In addition, the elastic disc can provide a shock-absorbing effect to the shoe. Moreover, the effective safe range of the rotation of the studs relative to the stud seats is wider than that of the conventional studs.

Other features and advantages of this invention will become apparent in the following detailed description of the preferred embodiments of this invention with reference to the accompanying drawings, in which:

Fig. 1 is a sectional view of a conventional shoe sole having a stud threadedly connected thereto; Figs. 2A, 2B are diagrams showing the relation between the torsion force and the rotating angle of the stud of a conventional shoe sole;

Figs. 3A, 3B are diagrams showing the relation between the torsion force and the rotating angle of the stud according to this invention;

Fig. 4 is a perspective view of a first preferred embodiment of a shoe sole having a plurality of studs threadedly connected thereto according to this invention;

Fig. 5 is a sectional view of the first preferred embodiment of a shoe sole having a plurality of studs threadedly connected thereto according to this invention;

Figs. 6A, 6B are sectional views of a second and a third preferred embodiment of the shoe

sole having studs threadedly connected thereto according to this invention;

Figs. 6C, 6D are bottom views of a fourth and a fifth preferred embodiment of a shoe sole having studs threadedly connected thereto according to this invention;

Fig. 6E is a bottom schematic view of the second embodiment of a shoe sole having studs threadedly connected thereto according to this invention, in which some of the studs are rotated at an angle; and

Fig. 7 is a sectional schematic view showing the stud in a inclined position relative to the sole according to this invention.

Referring to Figs. 4, 5, a first preferred embodiment of a shoe sole 10 includes six studs 30 threadedly connected thereto. The shoe sole 10 has six stud seats 11 integrally formed therein for attachment of the studs 30 to the shoe sole 10. Each of the stud seats 11 has a threaded hole 12 formed therein and a plurality of radial ribs 13 formed on an end face thereof. Each of the studs 30 has a threaded rod 31 connected thereto so that said stud 30 can be attached to the shoe sole 10 by screwing said threaded rod 31 into the threaded hole 12 of the stud seat 11. The stud 30 is in the shape of a cylinder. However, the stud 30 may be in the shape of a truncated cone which has a circular base and a vertex offset from an axis of said circular base, as shown in Fig. 6A; or elliptical in cross section, as shown in Fig. 6B; or generally triangular in cross section, as best illustrated in Fig. 6C; or in the shape of a cylinder having an end replaced by an inclined plane section relative to the other end thereof, as best illustrated in Fig. 6D. The abovementioned shapes of the stud 30 can be used in accordance with the different exercise requirements. A plurality of radial grooves 33 are formed in the abutting face of the stud 30 in a conventional manner. An elastic disc 20, which is made of polyurethane resin, has a diameter of 18 mm and a thickness of 2 mm. The elastic disc 20 has a central hole 21 having a diameter of 4.7 mm formed therein. The elastic disc 20 is passed through by the threaded rod 31 of the stud 30 via the central hole 21 thereof and clamped between the stud 30 and the stud seat 11. The diameter of the threaded rod 31 of the stud 30 is slightly greater than that of the central hole 21 of the elastic disc 20 in order to increase the engaging force therebetween. The stud 30 can be rotated to a position where the elastic disc 20 is firmly clamped between said stud 30 and the stud seat 11 so that said stud 30 can be securely attached the shoe sole 10. In this position, the radial ribs 13 of the stud seat 11 and the radial grooves 33 of the stud 30 will respectively firmly engage with the opposite sides of the elastic disc 20, preventing the

stud 30 and/or the elastic disc 20 from being rotated with respect to the shoe sole 10.

Referring now to Figs. 3A, 3B, two diagrams of the relation between the torsion force and the rotating angle of the stud by the use of a rotating speed of 15 r.p.m. according to this invention are shown. It can be seen from the diagrams that when exercising, even though the stud 30 is applied by a release torsion force (W_r) which exceeds the tightening torsion force (W_f) and has a tendency of being loosened, the stud 30 can still be firmly attached to the shoe sole 10 within a relatively broad effective safe range (P_w). That is to say, the stud 30 of this invention is allowed to be rotated at a larger angle by a release torsion force without the worry of being detached from the shoe sole 10 as opposed to the conventional stud. In addition, during exercise, by the use of the stud in the abovementioned shape of a truncated cone which has a circular base and a vertex offset from an axis of said circular base, elliptical in cross section, triangular in cross section, etc., the forward resistant force relative to the ground which is exerted to the stud 30, can be reduced, and the backward ground-grasping force relative to the ground can be increase. Moreover, the studs of this invention can be rotated without worrying about the separation of said studs from the shoe sole, so as to adjust the proper direction thereof for either increasing the effective contact area between the shoe and the ground, as best illustrated as the solid line in Fig. 6E, or reducing the effective contact area between the shoe and the ground, as best illustrated as the phantom line in Fig. 6E.

Referring to Fig. 7, even though the stud 30 can not be vertically attached to the shoe sole 10, said stud can still be securely connected to the shoe sole 10 by the aid of the elastic disc 20.

It is noted that since the elastic disc 20 is firmly clamped between the stud 30 and the stud seat 11, serving as a water-seal, moisture is not allowed to enter the shoe. In addition, the elastic disc 20 can attribute a shock-absorbing effect to the shoe, thus preventing the user from injury during exercise.

Claims

1. A shoe sole (10) having a plurality of studs (30), a plurality of stud seats (11) for attachment of said studs (30) to the shoe sole (10), each of said studs (30) having a first screw member (31) and each of said stud seats (11) having a second screw member (12), said first and second screw members (31, 12) being interengaged with each other, characterised by an elastic disc (20) clamped between each of said stud seats (11) and each of said studs

(30).

2. A shoe sole (10) as claimed in Claim 1, wherein said first screw member is a threaded rod (31) fixed to said stud (30) and said second screw member is a threaded hole (12) formed in said stud seat (11), and wherein said elastic disc (20) has a hole (21) formed therein through which said threaded rod (31) of said stud (30) is passed. 5
10
3. A shoe sole (10) as claimed in Claim 2, wherein said hole (21) of said elastic disc (20) has a diameter which is slightly smaller than that of said threaded rod (31). 15
4. A shoe sole (10) as claimed in Claim 1, 2 or 3, wherein each of said elastic discs (20) is adhered to one of said studs (30). 20
5. A shoe sole (10) as claimed in any one of Claims 1 to 4, wherein said studs (30) are made of polyurethane resin.
6. A shoe sole (10) as claimed in any one of Claims 1 to 5, wherein each of said studs (30) has at least one face inclining in one direction relative to a bottom face of said shoe sole (10). 25
7. A shoe sole (10) as claimed in Claim 6, wherein each of said studs (30) is in the shape of a truncated cone which has a circular base and a vertex offset from an axis of said circular base. 30
35
8. A shoe sole (10) as claimed in Claim 6, wherein each of said studs (30) is elliptical in cross section.
9. A shoe sole (10) as claimed in Claim 6, wherein each of said studs (30) is generally triangular in cross section. 40
10. A shoe sole (10) as claimed in Claim 6, wherein each of said studs (30) is in the shape of a cylinder having an end replaced by an plane section inclined relative to the other end thereof. 45
50
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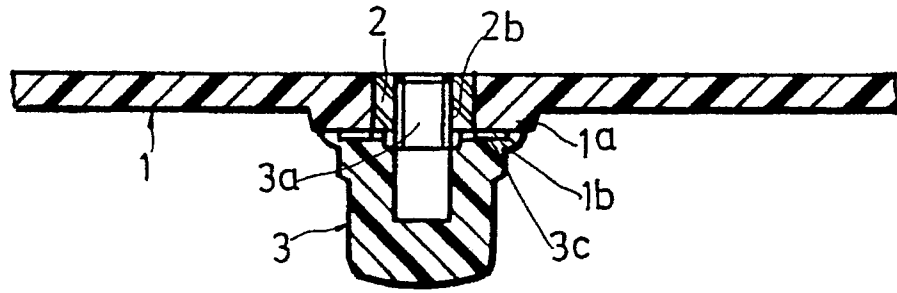


FIG.1A
PRIOR ART

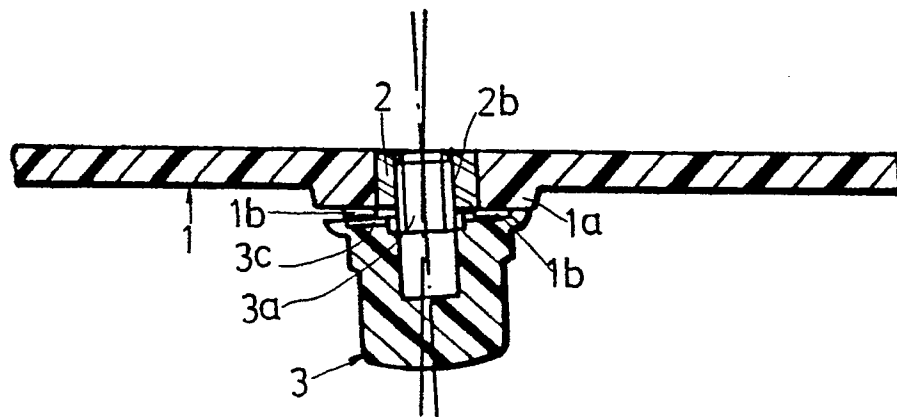


FIG.1B
PRIOR ART

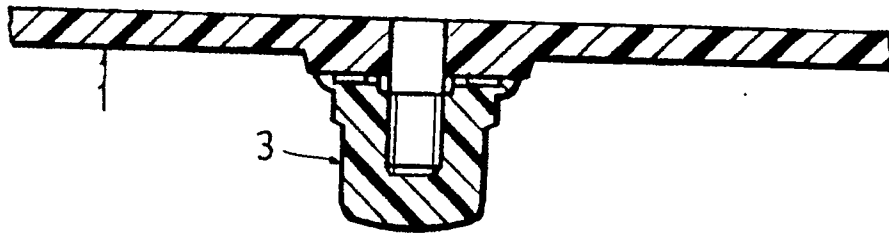


FIG.1C
PRIOR ART

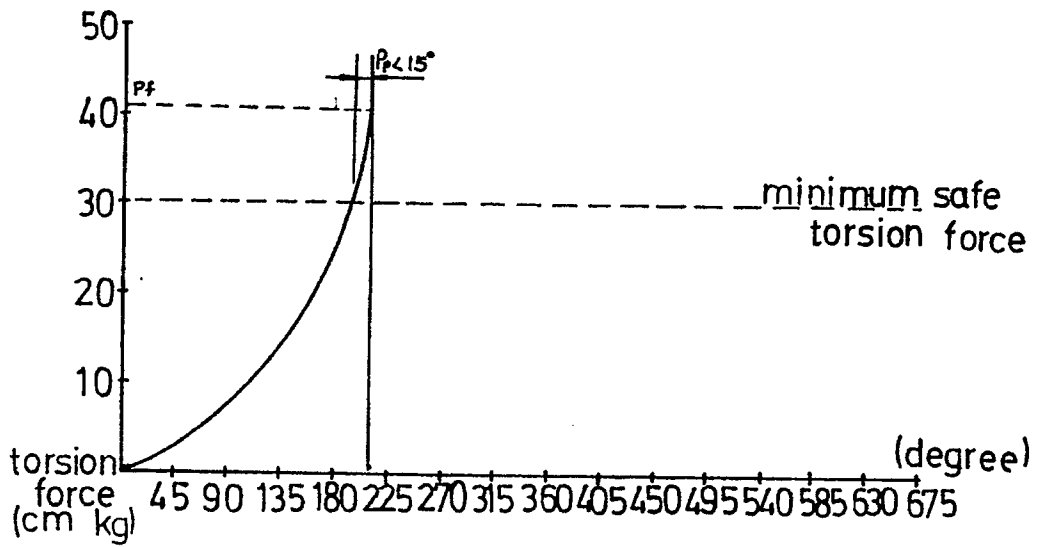


FIG. 2A
PRIOR ART

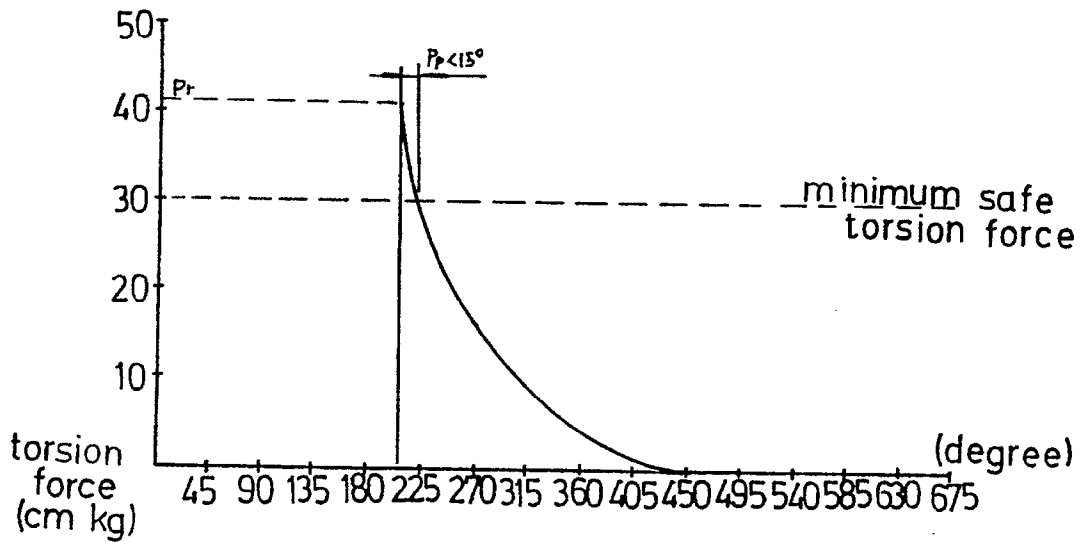


FIG. 2B
PRIOR ART

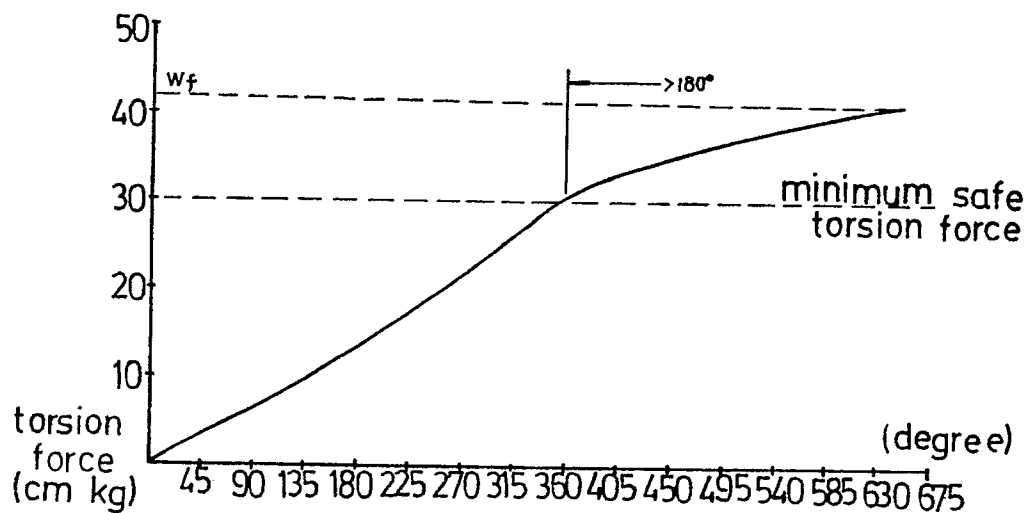


FIG. 3A

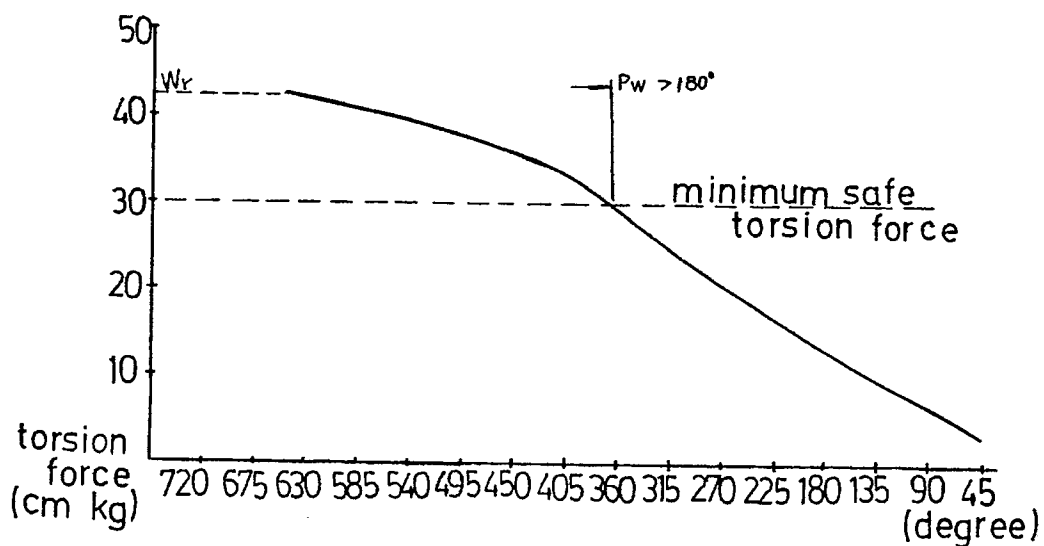


FIG. 3B

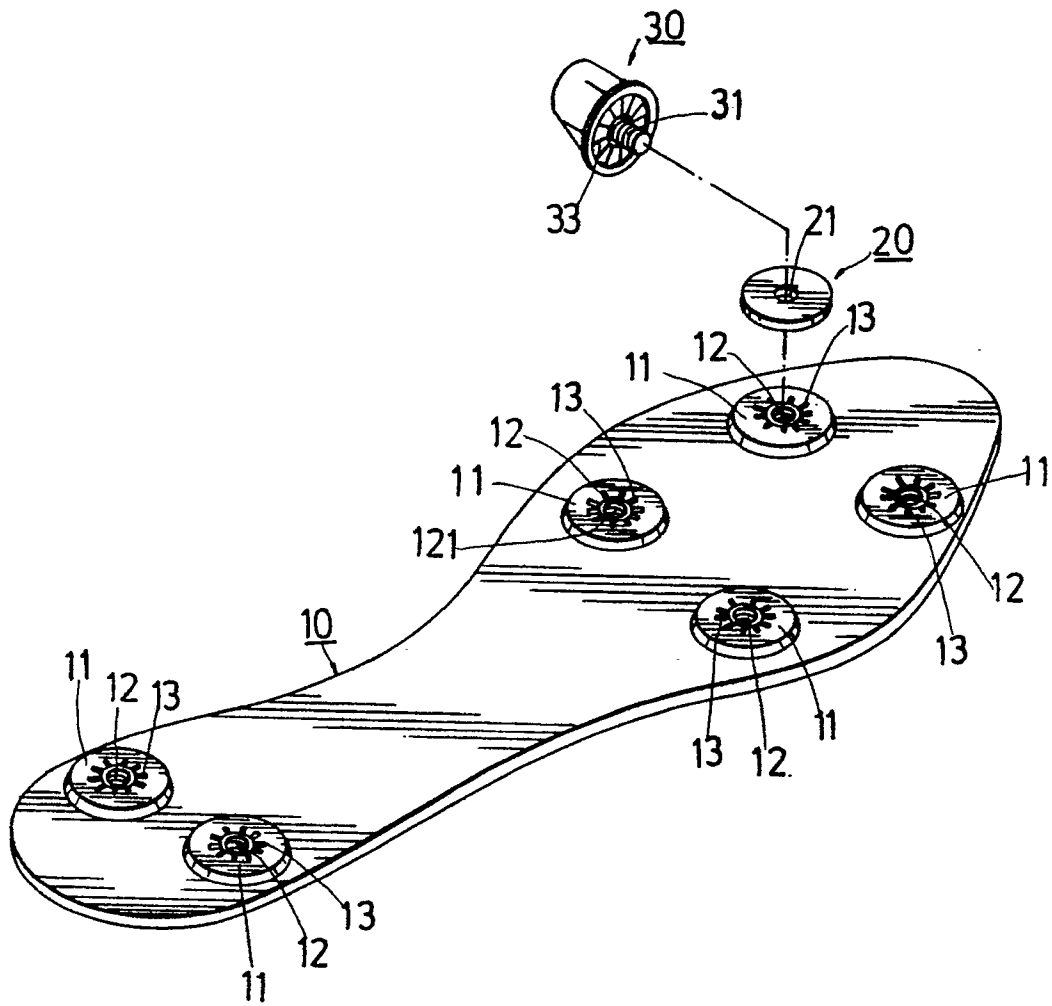


FIG. 4

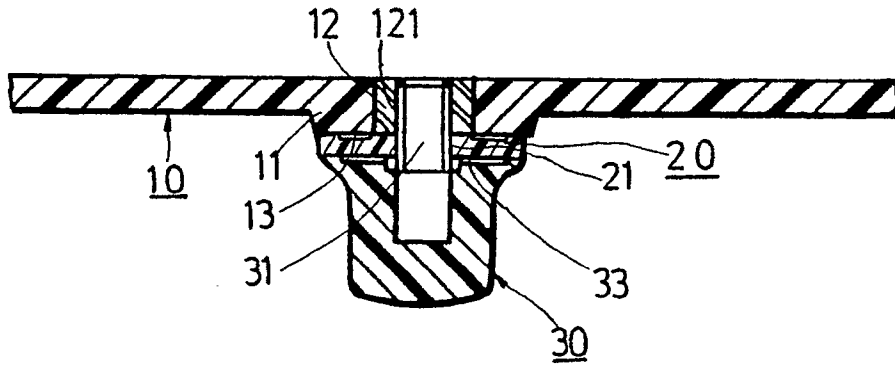


FIG. 5

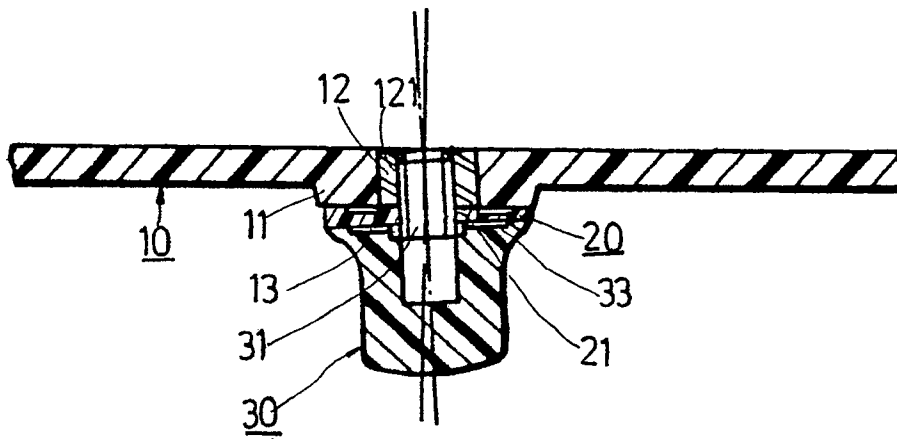


FIG. 7

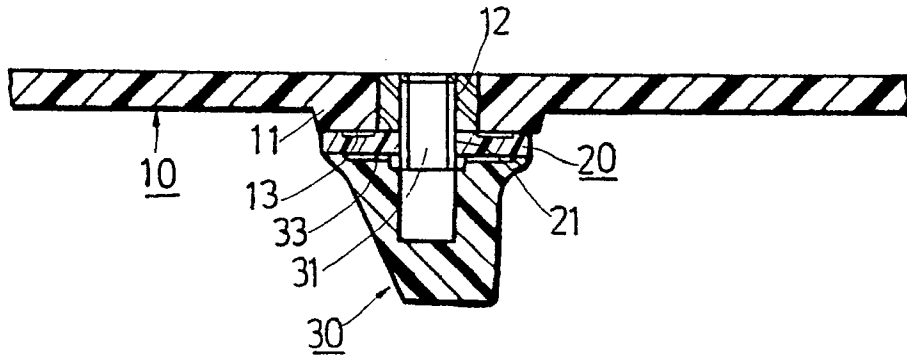


FIG. 6A

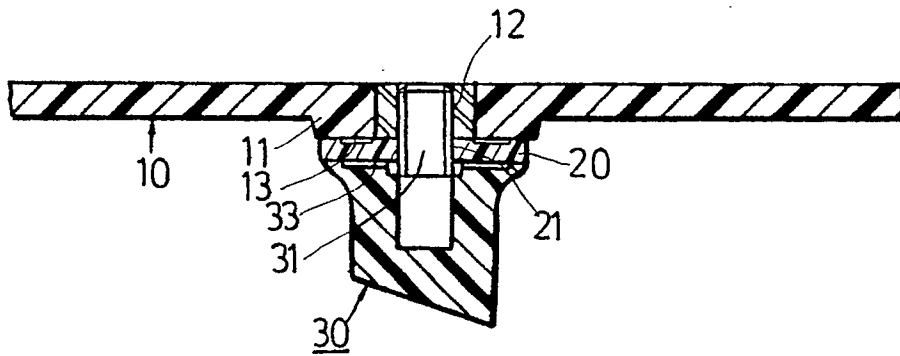


FIG. 6D

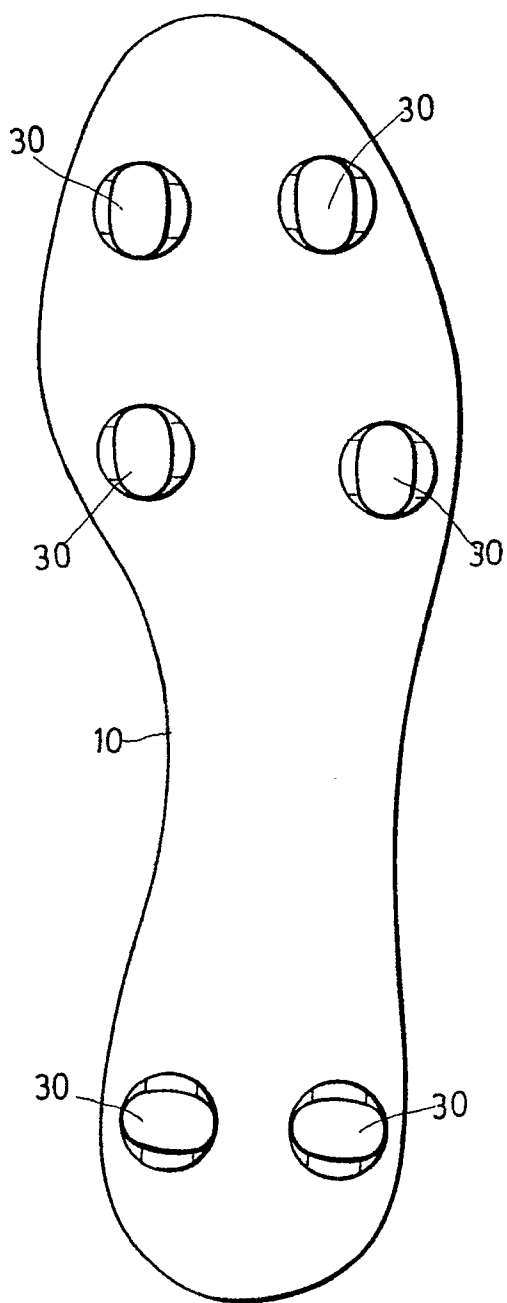


FIG. 6B

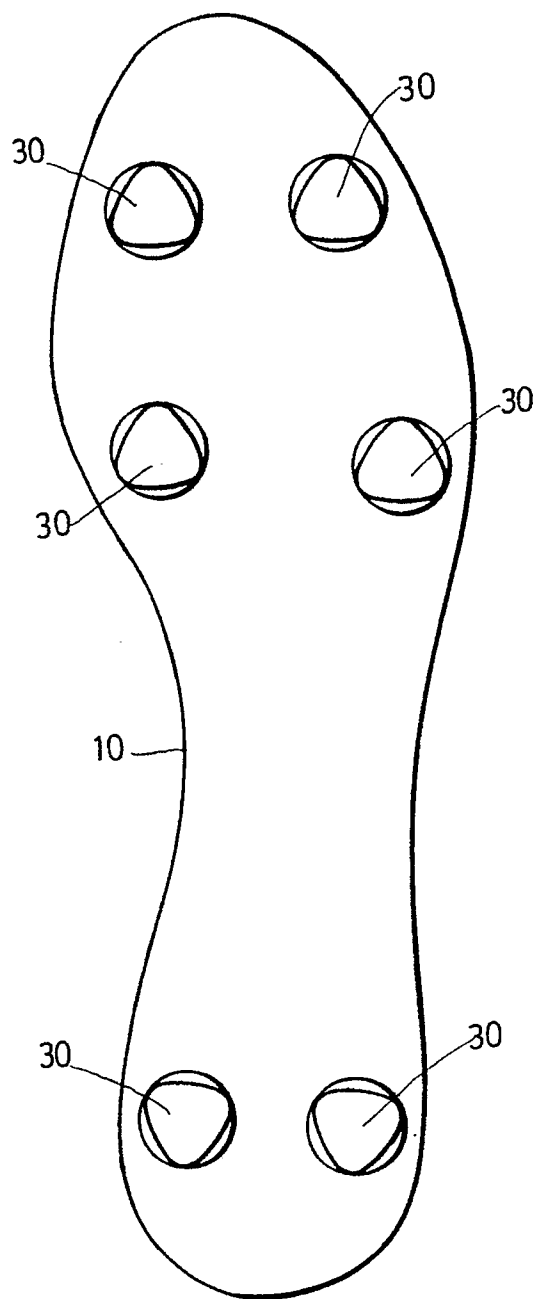


FIG. 6C

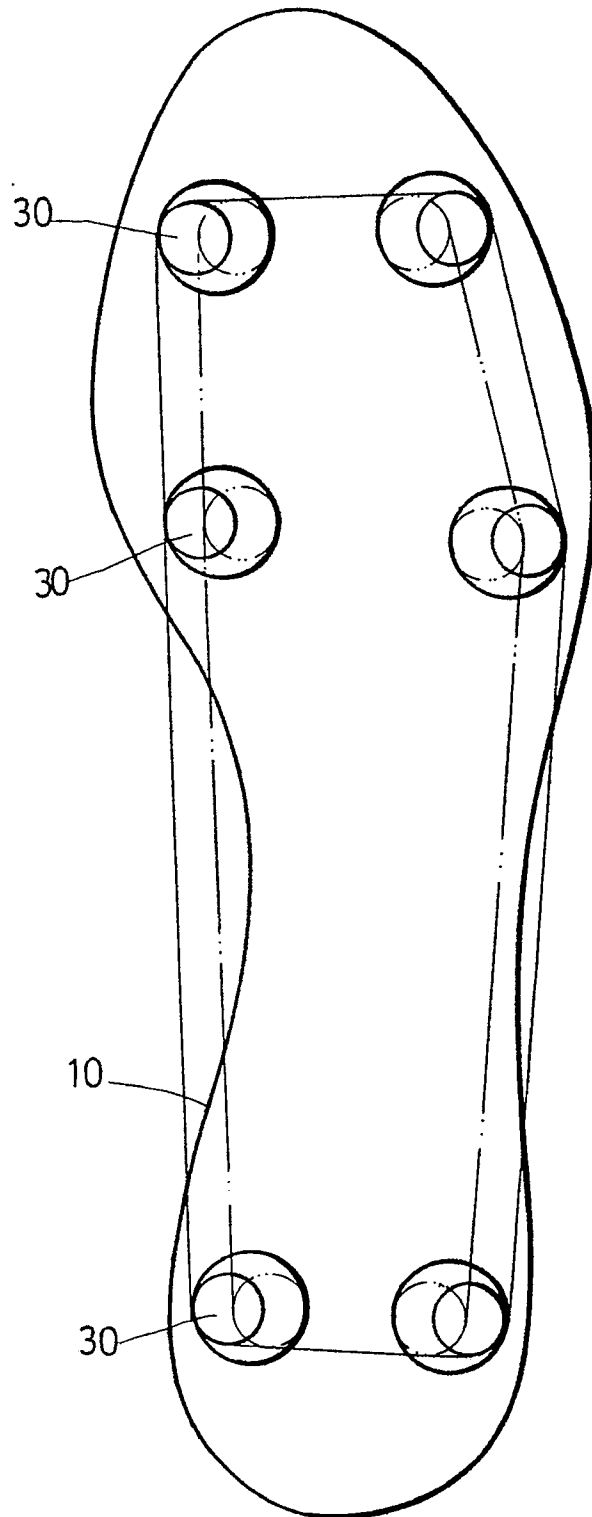


FIG. 6E



**EUROPEAN SEARCH
REPORT**

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	EP-A-0 081 067 (ADIDAS) - - - -	1,2,3,5	A 43 C 15/16
X	EP-A-0 163 823 (M. MIONE) - - - -	1,2	
X	DE-C-5 736 93 (AG. FÜR SCHUHINDUSTRIE IN GLARUS) - - - -	1	
A	US-A-2 911 738 (J. CLERKE) - - - -	1	
A	US-A-3 331 148 (S. HOLLISTER) - - - -	8	
A	US-A-3 352 034 (W. BRAUN) - - - -	9	
A	GB-A-1 437 380 (ONITSUKA) - - - - -	10	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			A 43 C
The present search report has been drawn up for all claims			
Place of search		Date of completion of search	Examiner
The Hague		10 December 90	DECLERCK J.T.
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X: particularly relevant if taken alone Y: particularly relevant if combined with another document of the same category A: technological background O: non-written disclosure P: intermediate document T: theory or principle underlying the invention</p> <p>E: earlier patent document, but published on, or after the filing date D: document cited in the application L: document cited for other reasons &: member of the same patent family, corresponding document</p>			