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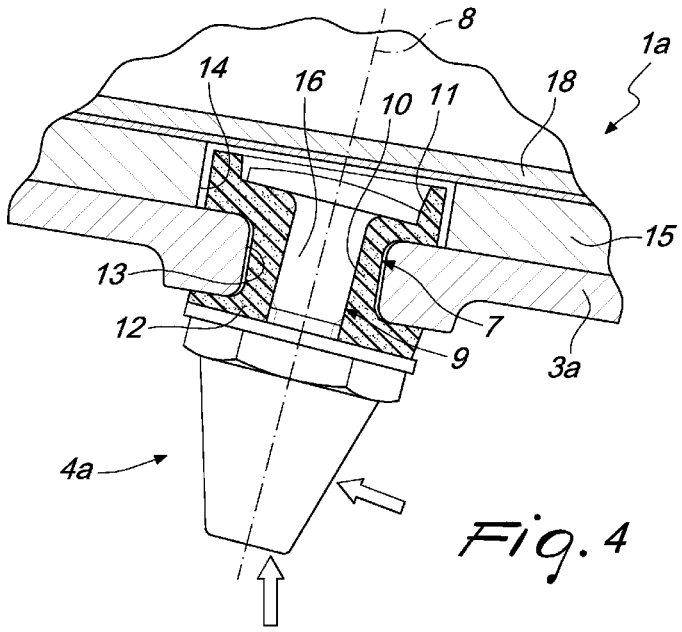

Fig. 4

(57) Abstract: A sports shoe (1a, 1b, 1c, 1d), particularly for soccer use and the like, comprising an upper (2) and a sole (3a, 3b, 3c, 3d) which is provided with one or more studs (4a, 4b, 4c, 4d), each stud (4a, 4b, 4c, 4d) being associated with the sole (3a, 3b, 3c, 3d) by way of at least one elastically deformable element (7) for the movement of at least part of the stud (4a, 4b, 4c, 4d) about its own longitudinal axis (8) in such a manner as to follow the movements of change of direction, traction and stopping of the athlete who is wearing the sports shoe (1a, 1b, 1c, 1d), the sports shoe further comprising a stripping prevention element (9) that lies inside the sole (3a, 3b, 3c, 3d) and the stud (4a, 4b, 4c, 4d), passing through the elastically deformable element (7) in order to prevent accidental breakages of the elastically deformable element (7) and/or the separation of the stud (4a, 4b, 4c, 4d) during the use of the sports shoe (1a, 1b, 1c, 1d).

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SPORTS SHOE, PARTICULARLY FOR SOCCER USE AND THE LIKE

The present invention relates to a sports shoe, particularly for soccer use and the like.

In many sporting disciplines which involve running on grassy terrain, such as for example soccer and rugby, the use is known of special shoes which enable the athlete to have excellent traction between sole and ground so as to prevent unwanted slipping while the sporting activity is in progress.

More specifically, sports shoes are known which have spikes or studs on the tread side of the sole, which consist of a plurality of rigid studs that are fixed integrally to the sole.

In this way, the weight of the athlete is discharged completely onto such studs, making them sink into the ground and allowing the athlete to make stopping or traction movements or changes of direction even on particularly slippery terrain.

Though the market is capable of offering a wide range of sports shoes with studs, such shoes exhibit a common drawback in that, under particular conditions of traction in which the shoe is strongly engaged with the ground, the athlete's kinetic energy is discharged on the joints of the athlete's lower limbs, leading to muscular fatigue and, in some cases, even to problems of greater or lesser seriousness which translate to injuries.

More precisely, such conventional sports shoes, by not being capable of absorbing and/or discharging the thrust forces between the ground and the shoe proper, can cause spraining of the ankle and/or knee joints and/or straining of the ligamentous structures affecting such joints.

For example, a soccer player during normal sporting activity moves mainly by way of running with continuous changes of direction which are repeated over time, with a high frequency, including work steps of concentric and eccentric type which are executed at high speeds, just as the steps of acceleration and stopping can be.

Since the cruciate ligaments are the ligamentous structures of the knee

that are most sensitive to twisting movements and, in particular, given the central position of the anterior cruciate ligament and its function in the stability of the knee, together with the collateral ligaments, these are frequently subjected to stress, micro-trauma, lesion and total rupture, all induced by the torsion/flexion movements which stimulate them.

More specifically, valgus traumas with outer rotation can cause lesions to the inner collateral ligament, the posterior oblique ligament and the anterior cruciate ligament.

Moreover, varus traumas with inner rotation can cause lesions to the anterior cruciate ligament and can also cause anterolateral and posterolateral capsular-ligamentous lesions.

More precisely, the anterior cruciate ligament, by way of its sophisticated structure of bundles of fibers which have different lengths and directions, provides stability on the sagittal and frontal plane of the knee joint by aiding in the rolling and sliding movement of the bone extremities in flexion and extension and actively controlling the rotation movement, both in flexion and in extension, of the leg in order to maintain the stability of the knee in rotation.

The anterior cruciate ligament moreover prevents excessive anterior translational movements of the tibia and the entrainment of the femur on the tibia when the latter is locked and, vice versa, is stressed by the load when the femur is locked and the tibia is mobile.

Trauma to the anterior cruciate ligament is in most cases caused by a movement in which the tibia remains locked and the femur is mobile, thus executing the movement commonly referred to as "foot planted on the ground".

Such trauma is due to the fact that there is an exponential and continuous engagement which depends on the cruciate ligament owing to the contraction of the quadriceps muscle both in flexion and in extension.

In order to overcome such drawback, in recent years a damping

system has been devised which is applied to the sports shoe and is capable of at least partially absorbing the work released during the steps of stopping, traction and/or change of direction described previously.

More precisely, such damping system consists of the interposition of elastically deformable material between the sole and the studs.

In this way, the work released during the steps of stopping, traction and/or change of direction is absorbed by such elastically deformable material, thus safeguarding the athlete's joints.

Conventional sports shoes provided with such damping systems are also not devoid of drawbacks, among which is the fact that, under particular heavy conditions, the cutting and flexion force to which the elastically deformable material is subjected can lead to its being stripped and to the loss of the stud with which it is associated.

The aim of the present invention consists in providing a sports shoe, particularly for soccer use and the like, which makes it possible to prevent and avoid injuries to the entire joint system of the lower limbs, without depriving the athlete who is wearing the shoes of the essential perceptions of traction between the shoe and the ground that the athlete demands when practising sport, and which above all is capable of withstanding the continuous stresses to which it is subjected.

Within this aim, an object of the present invention consists in providing a sports shoe that improves stability in the kinematics of movement of the athlete's lower limb.

This aim and these and other objects which will become better apparent hereinafter are achieved by a sports shoe, particularly for soccer use and the like, comprising an upper and a sole which is provided with at least one stud, said at least one stud being associated with said sole by means of at least one elastically deformable element for the movement of at least part of said at least one stud about its own longitudinal axis in such a manner as to follow the movements of change of direction, traction and

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stopping of the athlete who is wearing the sports shoe, characterized in that it comprises a stripping prevention element that lies inside said sole and said at least one stud, passing through said at least one elastically deformable element in order to prevent accidental breakages of said at least one elastically deformable element and/or the separation of said at least one stud during the use of said sports shoe.

The present invention provides a sports shoe comprising an upper and a sole which is provided with at least one stud, said at least one stud being associated with said sole by means of at least one elastically deformable element for the movement of at least part of said at least one stud about its own longitudinal axis in such a manner as to follow the movements of change of direction, traction and stopping of an athlete who is wearing the sports shoe, and a stripping prevention element that lies inside said sole and said at least one stud, passing through said at least one elastically deformable element in order to prevent accidental breakages of said at least one elastically deformable element and/or separation of said at least one stud during use of said sports shoe, said at least one elastically deformable element being defined by a collar element which has, at its axial ends, two radial flanges, said collar element passing from one side to another of said sole by means of a through hole which is defined in said sole so that said sole remains interposed between one of the said two radial flanges, said radial flange arranged inside said sports shoe being accommodated in a compartment which is defined in a compensation mid-sole of said sports shoe and the other of the said two radial flanges arranged on a tread side of said sole being associated with said at least one stud, characterized in that said stripping prevention element is defined by a screw which is inserted in said collar element from a side for said radial flange arranged inside said sports shoe and is screwed into a respective threaded hole which is defined in said at least one stud.

Comprises/comprising and grammatical variations thereof when used in this specification are to be taken to specify the presence of stated features, integers, steps or components or groups thereof, but do not preclude the presence or addition of one or more other features, integers, steps, components or groups thereof.

There is also described herein a sports shoe, particularly for soccer use and the like, comprising an upper and a sole which is provided with at least one stud, said at least one stud being associated with said sole by means of at least one elastically deformable element for the movement of at least part of said at least one stud about its own longitudinal axis in such a manner as to follow the movements of change of direction, traction and stopping of an athlete who is wearing the sports shoe, and characterized in that it comprises a stripping prevention element that lies inside said sole and said at least one stud, passing through said at least one elastically deformable element in order to prevent accidental breakages of said at least one elastically deformable element and/or separation of said at least one stud during use of said sports shoe, characterized in that said at least one stud is defined by a first end portion and by a second disk-like portion that has an outer profile that is adapted to be gripped by screwing means and is provided with a threaded shank that protrudes from said second disk-like portion and is screwed into a threaded pawl that is associated with said sole on a tread side, said at least one elastically deformable element being defined by a disk-like element that is interposed between said first end portion and said second disk-like portion.

There is further described herein a sports shoe, particularly for soccer use and the like, comprising an upper and a sole which is provided with at least one stud, said at least one stud being associated with said sole by means of at least one elastically deformable element for the movement of at least part of said at least one stud about its own longitudinal axis in such a manner as to follow the movements of change of direction, traction and stopping of an athlete who is wearing the sports shoe, and a stripping prevention element that lies inside said sole and said at least one stud, passing through said at least one elastically deformable element in order to prevent accidental breakages of said at least one elastically deformable element and/or separation of said at least one stud during use of said sports shoe, said at least one stud being defined by a first end portion and by a second disk-like portion, which is integral with said sole, said at least one elastically deformable element being defined by a disk-like element which is interposed between said first end portion and said second disk-like portion, said stripping prevention element is defined by a flexible cable which is associated

with said second disk-like portion and passes through said disk-like element and has an end that is embedded in said first end portion.

There is also described herein a sports shoe, particularly for soccer use and the like, comprising an upper and a sole which is provided with at least one stud, said at least one stud being associated with said sole by means of at least one elastically deformable element for the movement of at least part of said at least one stud about its own longitudinal axis in such a manner as to follow the movements of change of direction, traction and stopping of the athlete who is waring the sports shoe, and a stripping prevention element that lies inside said sole and said at least one stud, passing through said at least one elastically deformable element in order to prevent accidental breakages of said at least one elastically deformable element and/or the separation of said at least one stud during the use of said sports shoe, characterized in that said at least one stud is defined by an inner part which is made of an elastically deformable material and by an outer shell which is made of a rigid material and has an outer profile that is adapted to be engaged by screwing means, said at least one elastically deformable element being defined by a disk-like element which is interposed between said outer shell and said sole.

Further characteristics and advantages of the present invention will become better apparent from the description of four preferred, but not exclusive, embodiments of a sports shoe, particularly for soccer use and the like, according to the invention, which are illustrated for the purposes of non-limiting example in the accompanying drawings wherein:

Figure 1 is a schematic side elevation view of a sports shoe, particularly for soccer use and the like, which has all the characteristics of the four embodiments proposed according to the invention;

Figure 2 is a view from below of the sports shoe shown in Figure 1;

Figure 3 is a sectional view of a detail of a stud, not subjected to external stresses, of the first embodiment of the sports shoe according to the invention;

Figure 4 is a sectional view of a detail of the stud shown in Figure 3, subjected to external stresses;

Figure 5 is a sectional view of a detail of a stud, not subjected to external stresses, of the second embodiment of the sports shoe according to the invention;

Figures 6 and 7 are sectional views of a detail of the stud shown in Figure 5, subjected to external stresses;

Figure 8 is a sectional view of a detail of a stud, not subjected to external stresses, of the third embodiment of the sports shoe according to the invention;

Figure 9 is a sectional view of a detail of the stud shown in Figure 8, subjected to external stresses;

Figure 10 is a sectional view of a detail of a stud, not subjected to external stresses, of the fourth embodiment of the sports shoe according to the invention;

Figure 11 is a sectional view of a detail of the stud shown in Figure 10, subjected to external stresses.

With reference to the figures, the sports shoe, particularly for soccer use and the like, which is generally designated in the four proposed embodiments with the reference numerals 1a, 1b, 1c and 1d, comprises an upper 2 and a sole 3a, 3b, 3c or 3d which is provided with studs 4a, 4b, 4c or 4d.

More specifically, the upper 2, in all the embodiments, can have a front opening that can be closed by means of laces 5 or tear-off closing systems and can be provided with lateral and frontal reinforcements 6 where the impact with the ball occurs.

Conveniently, as will be better described hereinafter, each stud 4a, 4b, 4c or 4d is associated with the respective sole 3a, 3b, 3c or 3d by way of at least one elastically deformable element 7 for the movement of at least part of at least one stud 4a, 4b, 4c or 4d about its own longitudinal axis 8 in such a manner as to follow the movements of change of direction, traction and stopping of the athlete who is wearing the sports shoe 1a, 1b, 1c or 1d.

According to the invention, all the proposed embodiments have a stripping prevention element 9 that lies inside the sole 3a, 3b, 3c or 3d and the stud 4a, 4b, 4c or 4d, passing through the elastically deformable element 7 substantially along the longitudinal axis 8 in order to prevent accidental breakages thereof and/or the separation of the stud 4a, 4b, 4c or 4d during the use of the sports shoe 1a, 1b, 1c or 1d.

With particular reference to Figures 3 and 4, in the first embodiment proposed, in the sports shoe 1a the elastically deformable element 7 is defined by a collar element 10 which has, at its axial ends, two radial flanges 11 and 12.

More precisely, the collar element 10 passes from one side of the sole 3a to the other by means of a through hole 13 which is defined in the sole 3a so that the sole 3a remains interposed between the two radial flanges 11 and 12.

In this manner, the radial flange 11 arranged inside the sports shoe 1a remains accommodated in a compartment 14 which is defined in the compensation mid-sole 15 of the sports shoe 1a and the radial flange 12 arranged on the tread side of the sole 3a is associated with stud 4a which is frustum-shaped.

Considering the stripping prevention element 9, in this first embodiment this is defined by a screw 16 which is inserted in the collar element 10 on the side of the radial flange 11, removing the inner sole 18, and is screwed into a respective threaded hole 17 which is defined in the stud 4a.

Differently, with particular reference to Figures 5 to 7, in the second embodiment proposed, in the sports shoe 1b the stud 4b is defined by a first end portion 19, which is frustum-shaped, and by a second disk-like portion 20 which has an outer profile that is adapted to be engaged by screwing means, for example by a hexagonal key.

More precisely, the stud 4b is provided with a threaded shank 21 that protrudes from the second disk-like portion 20 and is screwed into a threaded pawl 22 that is associated with the sole 3b on the tread side.

Considering the elastically deformable element 7 and the stripping prevention element 9, these are defined, respectively, by a disk-like element 23 which is interposed between the first end portion 19 and the second disk-like portion 20 and by a flexible cable 24 which is associated with the second disk-like portion 21, and passes through the disk-like element 22 substantially along the longitudinal axis 8 and is provided with an end 25 which is embedded in the first end portion 19.

More precisely, the end 25 has a radially expanded shape structure,

substantially spherical, and the flexible cable 24 is made of steel.

With particular reference to Figures 8 and 9, in the third embodiment proposed, in the sports shoe 1c the stud 4c is defined by a first end portion 26, which is frustum-shaped, and by a second disk-like portion 27 which is integral with the sole 3c.

Similarly to the second embodiment, the elastically deformable element 9 and the stripping prevention element 7, are defined, respectively, by a disk-like element 28 which is interposed between the first end portion 26 and the second disk-like portion 27 and by a flexible cable 24 which is associated with the second disk-like portion 27, and passes through the disk-like element 28 substantially along the longitudinal axis 8 and is provided with an end 25 which is embedded in the first end portion 26.

More precisely, the end 25 has a radially expanded shape structure, substantially spherical, and the flexible cable 24 is made of steel.

With particular reference to Figures 10 and 11, in the fourth embodiment proposed, in the sports shoe 1d the stud 4d is defined by an inner part 30 which is made of an elastically deformable material and by an outer shell 31, which is frustum-shaped and is made of a rigid material and is provided with an outer profile that is adapted to be engaged by screwing means, for example by a hexagonal key.

The elastically deformable element 7 is defined by a disk-like element 32 which is interposed between the outer shell 31 and the sole 3d.

Considering the stripping prevention element 9, this is defined by a pin 33 which has, at one end, a spherical head 34 which is embedded in the inner part 30 of the stud 4d and, at the other end, a threaded shank 35 that protrudes from the outer shell 31 and passes through the disk-like element 32 substantially along the longitudinal axis 8 and is screwed into a threaded pawl 36 that is associated with the sole 3d on the tread side.

Operation of the sports shoes 1a, 1b, 1c and 1d is the following.

In the first embodiment 1a, as shown in Figure 1, when the stud 4a is

subjected to an external lateral stress to the sole 3a, the stud 4a is forced to incline laterally, thus forcing the screw 16 to incline as well. Such inclinations lead to the partial compression of the collar 10 and of the two radial flanges 11 and 12 which, by deforming elastically, absorb part of the athlete's kinetic energy thus safeguarding him /her from injury.

Differently, in the second embodiment 1b and in the third embodiment 1c, when the studs 4b and 4c are subjected to an external lateral stress, they tend to rotate, thus deforming the respective disk-like element 23 and 28.

The hold between the stud 4b and 4c and the respective disk-like element 22 or 27 is ensured by the flexible cable 24 which deforms without breaking.

With particular reference to Figure 7, in the event of compression stress only, the flexible cable 24 can curve and then return to assume a straight form when the stress has ended.

Similarly, with reference to Figure 11, in the fourth embodiment 1d, the stud 4d, when it is subjected to an external lateral stress, tends to rotate about the spherical head 34 of the pin 33 which acts as a joint.

During such rotation, the disk-like element 32 deforms elastically, absorbing part of the athlete's kinetic energy thus safeguarding him/her from injury.

In fact, in all the embodiments proposed, the studs 4a, 4b, 4c and 4d, thanks to the elastically deformable element 7, make it possible for the sports shoes 1a, 1b, 1c and 1d to accompany the athlete's change of direction movement thus making his/her athletic movement more natural and harmonic.

More precisely, the equilibrium and thrust of the athlete during the change of direction are localized at the first metatarsus of the foot; the position of the studs 4a, 4b, 4c and 4d in this region favors better safety for athletes in multi-directional movements, but above all it enables the athlete to better respond to the negative forces of friction that arise in change of

direction while maintaining good coordination with a modulability of the force exerted by the athlete on the ground, or vice versa.

Completing a sudden change of direction with full stability and with maximum coordination means optimizing the forces involved in favor of performance and prevention.

In practice it has been found that the sports shoe, particularly for soccer use and the like, according to the present invention, fully achieves the intended aim and objects in that it makes it possible to decrease the risk of injury by ensuring a correct stability of the foot without being subjected to structural weakening.

In more detail, in the rotation step of any change of direction, the elastic deformability of the stud, or of at least part of it, reduces the angle of rotation in the rotary movements between femur and tibia and reduces the angle of rotation of the ankle so as to limit the load applied on the anterior cruciate ligament and the twisting stress applied to the knee joint.

The rotation of the shoe with respect to the ground makes it possible to maintain better stability of the axes of the body and confers better directivity and safety on the movement.

Moreover, during rotation of the knee joint, with the aid of the stud according to the invention, locking of the tibia is reduced thus making it freer to follow the rotation movement induced by the femur and thus avoiding ending up in the condition that most frequently results in indirect traumas to the knee joint, which consists in having the foot planted on the ground, the tibia locked and the femur mobile.

Moreover, in consideration of the fact that in the change of direction, the load point is at the first metatarsus on the antero-inner side of the foot, the stud according to the invention positioned in this thrust area, by means of its elastic deformability, enables a movement that is directed toward the effective direction of travel.

With regard to prevention of injury, including substantial injury, the

stud according to the invention is an efficient injury prevention element in that makes it possible to reduce the athlete's response time to generate a correct voluntary muscular response, thus reducing the time for the anterior cruciate ligament to be damaged.

Another advantage of the sports shoe according to the present invention consists in that it ensures a correct stability of the fulcrum of the foot while favoring, moreover, the equilibrium of the athlete in the step of changing direction and grip, both when stopping and in traction, with respect to the ground.

Another advantage of the sports shoe according to the present invention consists in that it reduces the friction between the athlete's foot and the ground, thus contributing considerably to saving energy when restarting after a sudden stop in that the elastic return of the elastically deformable portion of the stud is exploited.

More precisely, a shoe with elastically deformable studs improves the athlete's overall performance in that the biomechanical fulcrum of the foot is moved closer to the point of thrust, i.e. in the direction of the change of direction, and not in the direction of the previous stroke.

The time to perform the body rotation movement and to complete a change of direction is moreover considerably lower than with shoes with studs of the conventional type, thus boosting the athlete's performance levels.

The sports shoe, particularly for soccer use and the like, thus conceived, is susceptible of numerous modifications and variations, all of which are within the scope of the appended claims.

Moreover, all the details may be substituted by other, technically equivalent elements.

In practice the materials employed, provided they are compatible with the specific use, and the contingent dimensions and shapes, may be any according to requirements and to the state of the art.

The disclosures in Italian Patent Application No. MI2011A002089 from which this application claims priority are incorporated herein by reference.

Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

CLAIMS

1. A sports shoe comprising an upper and a sole which is provided with at least one stud, said at least one stud being associated with said sole by means of at least one elastically deformable element for the movement of at least part of said at least one stud about its own longitudinal axis in such a manner as to follow the movements of change of direction, traction and stopping of an athlete who is wearing the sports shoe, and a stripping prevention element that lies inside said sole and said at least one stud, passing through said at least one elastically deformable element in order to prevent accidental breakages of said at least one elastically deformable element and/or separation of said at least one stud during use of said sports shoe, said at least one elastically deformable element being defined by a collar element which has, at its axial ends, two radial flanges, said collar element passing from one side to another of said sole by means of a through hole which is defined in said sole so that said sole remains interposed between one of the said two radial flanges, said radial flange arranged inside said sports shoe being accommodated in a compartment which is defined in a compensation mid-sole of said sports shoe and the other of the said two radial flanges arranged on a tread side of said sole being associated with said at least one stud, characterized in that said stripping prevention element is defined by a screw which is inserted in said collar element from a side for said radial flange arranged inside said sports shoe and is screwed into a respective threaded hole which is defined in said at least one stud.

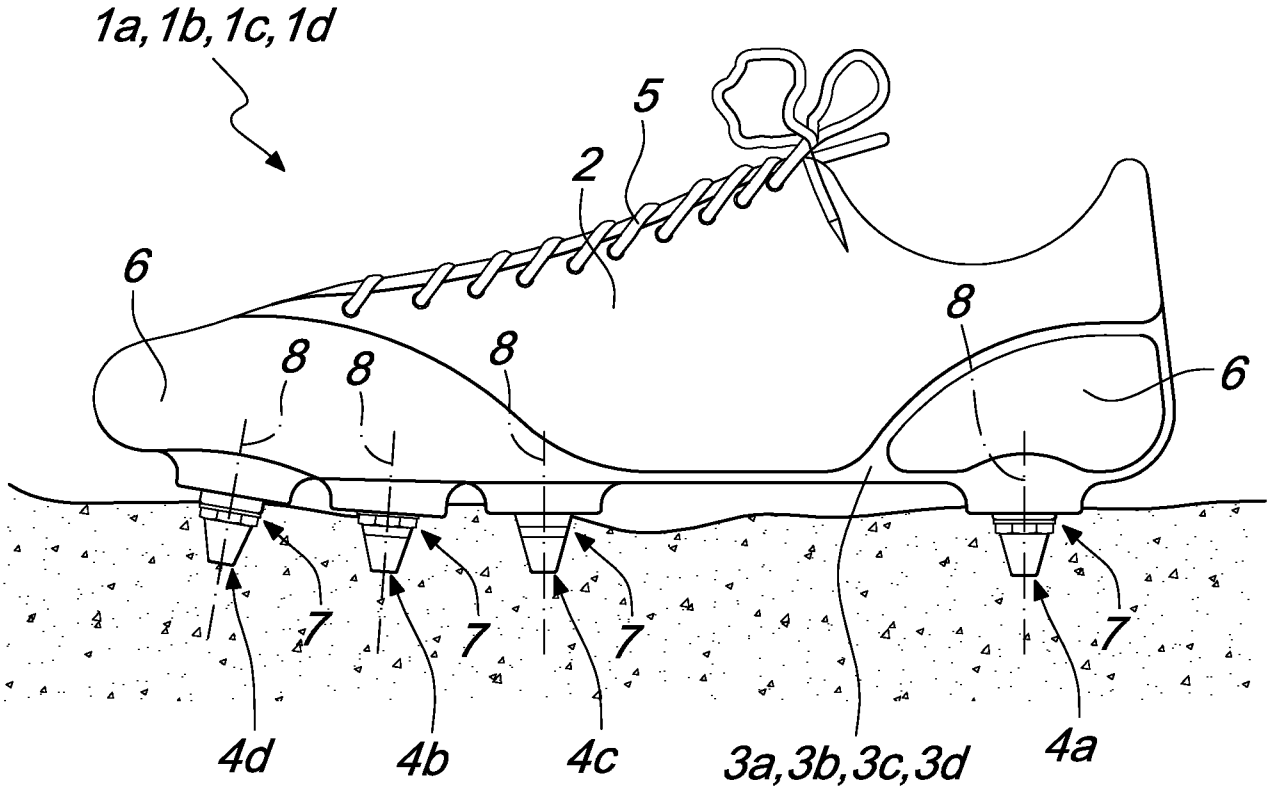
2. A sports shoe according to claim 1, wherein the sports shoe is a soccer shoe.

3. A sports shoe according to claim 1 or 2, wherein the at least one stud is frustum-shaped.

4. A sports shoe according to any one of the preceding claims, wherein the at least one stud is configured to incline laterally when the at least one stud is subjected to an external lateral stress to the sole.

5. A sports shoe according to any one of the preceding claims, wherein the screw is configured to incline when the at least one stud is subjected to an external lateral stress to the sole.

6. A sports shoe according to claim 4 and 5, wherein inclination of the at least one stud and the screw causes compression of the collar and the two radial flanges.


1a, 1b, 1c, 1d
5
2
6
8
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4d
4b
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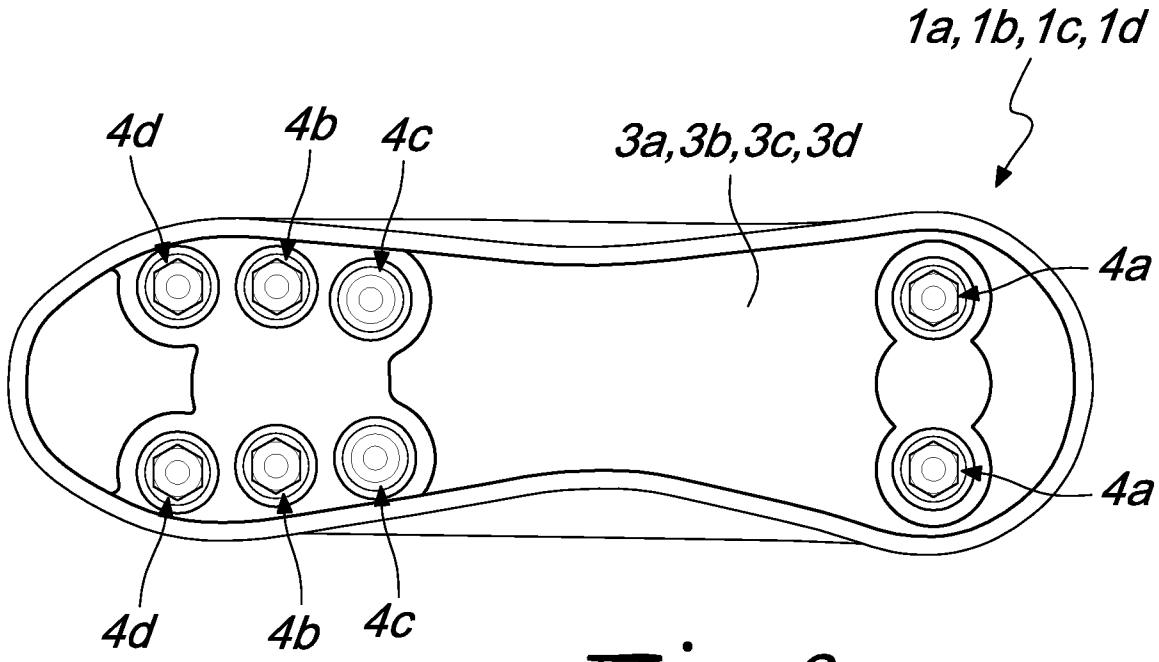
3a, 3b, 3c, 3d
4a

Fig. 1


1a, 1b, 1c, 1d
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4b
4c
3a, 3b, 3c, 3d
4a
4a
4d
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4c

Fig. 2

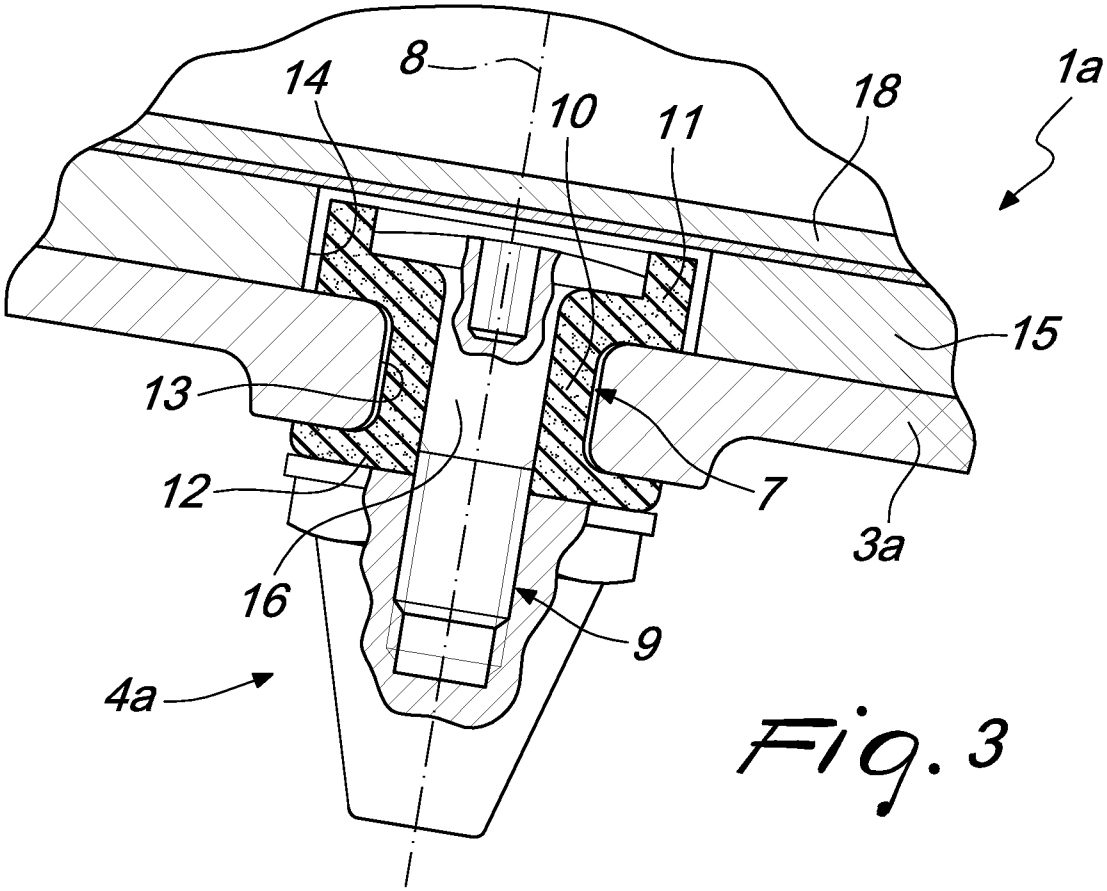
14
8
10
11
18
1a
15
13
12
7
3a
16
9
4a

Fig. 3

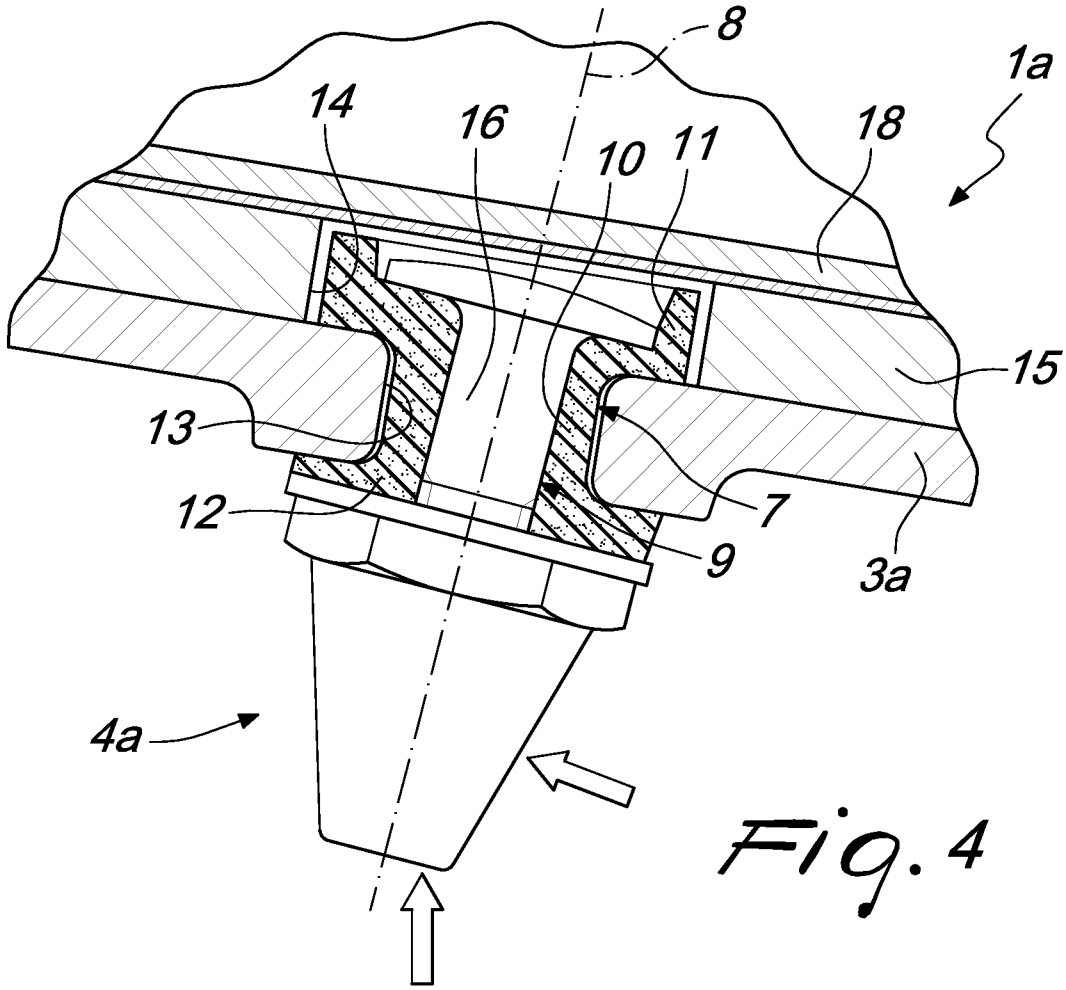
8
1a
14
16
10
11
18
15
13
7
12
9
3a
4a

Fig. 4

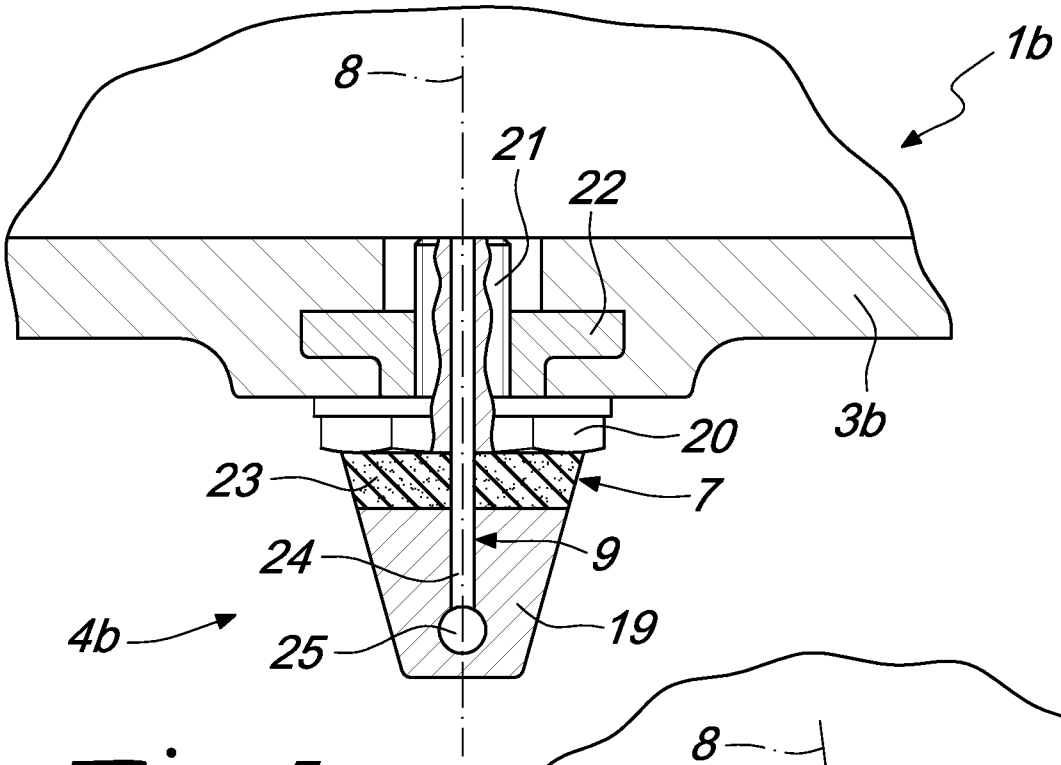

Fig. 5

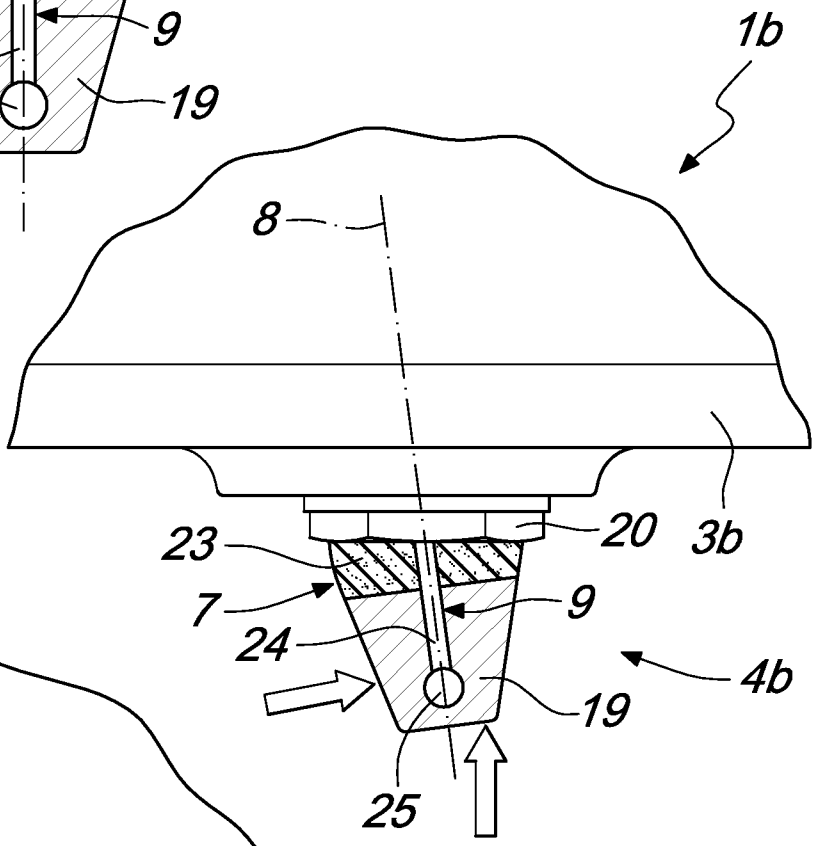

Fig. 6

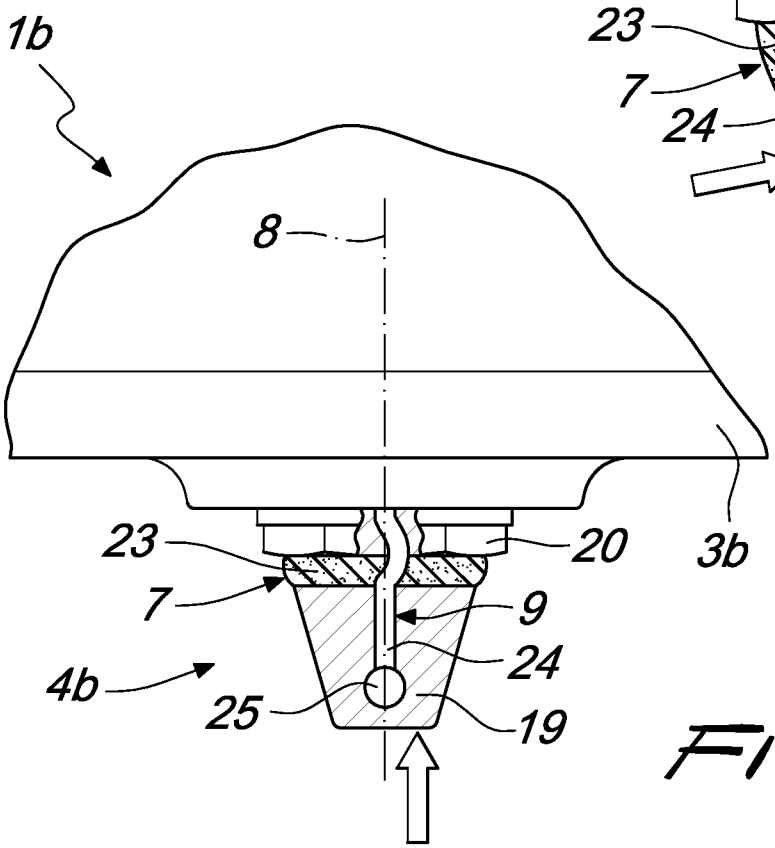

Fig. 7

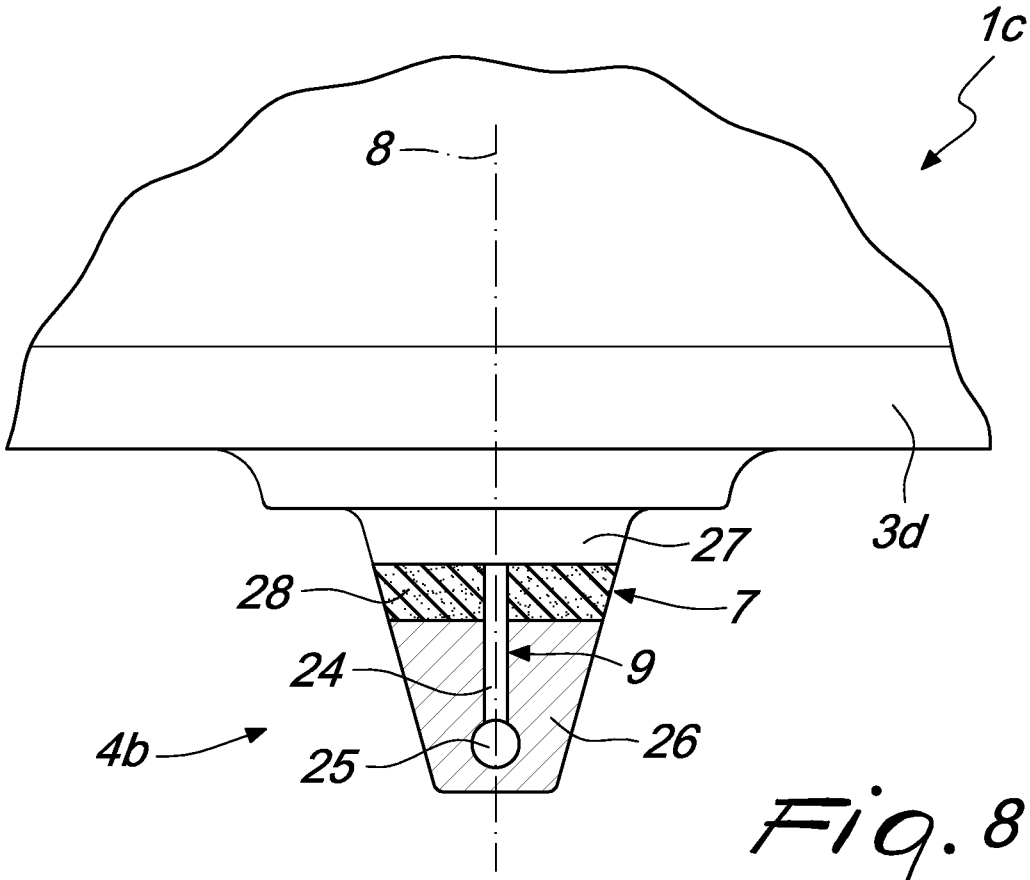

Fig. 8

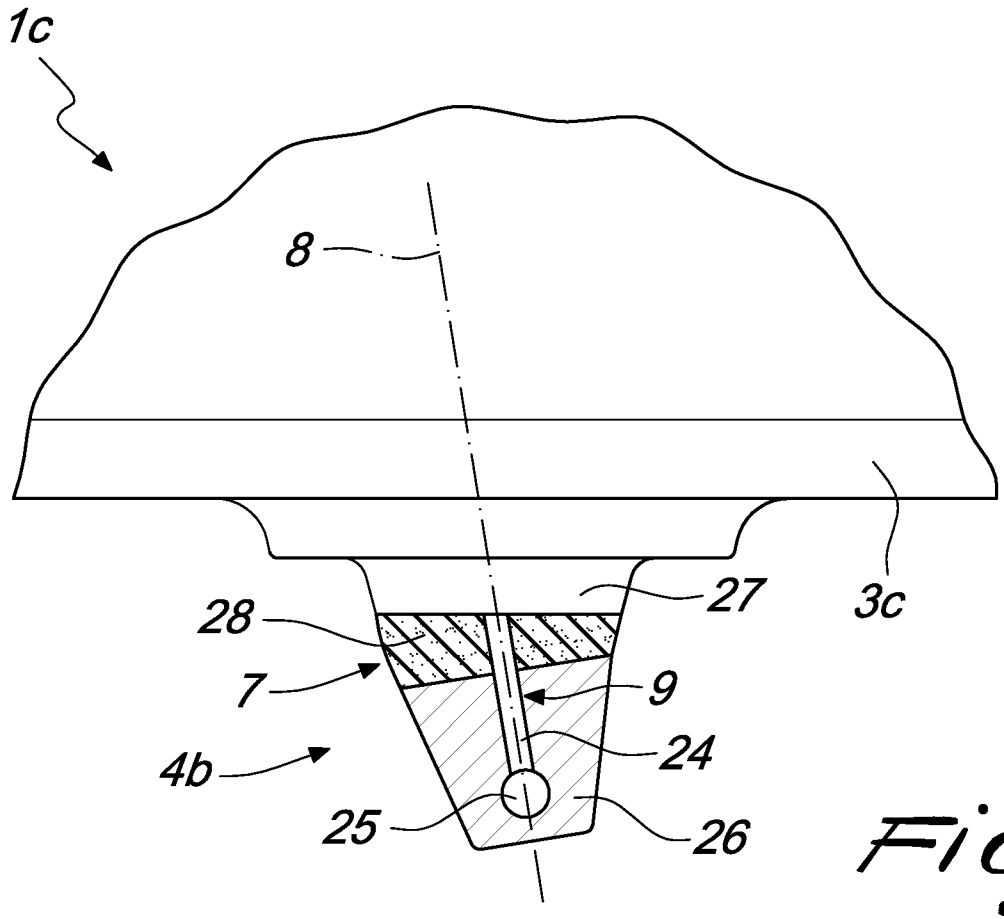

Fig. 9

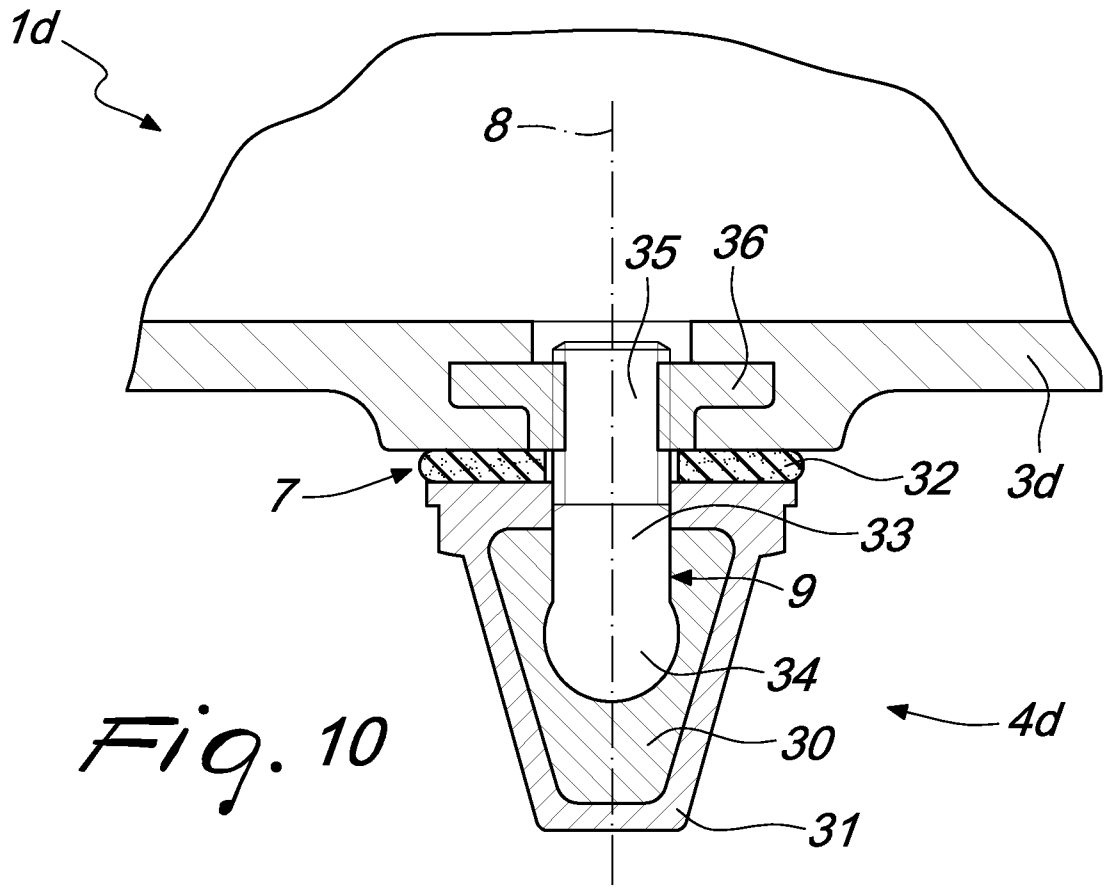

Fig. 10

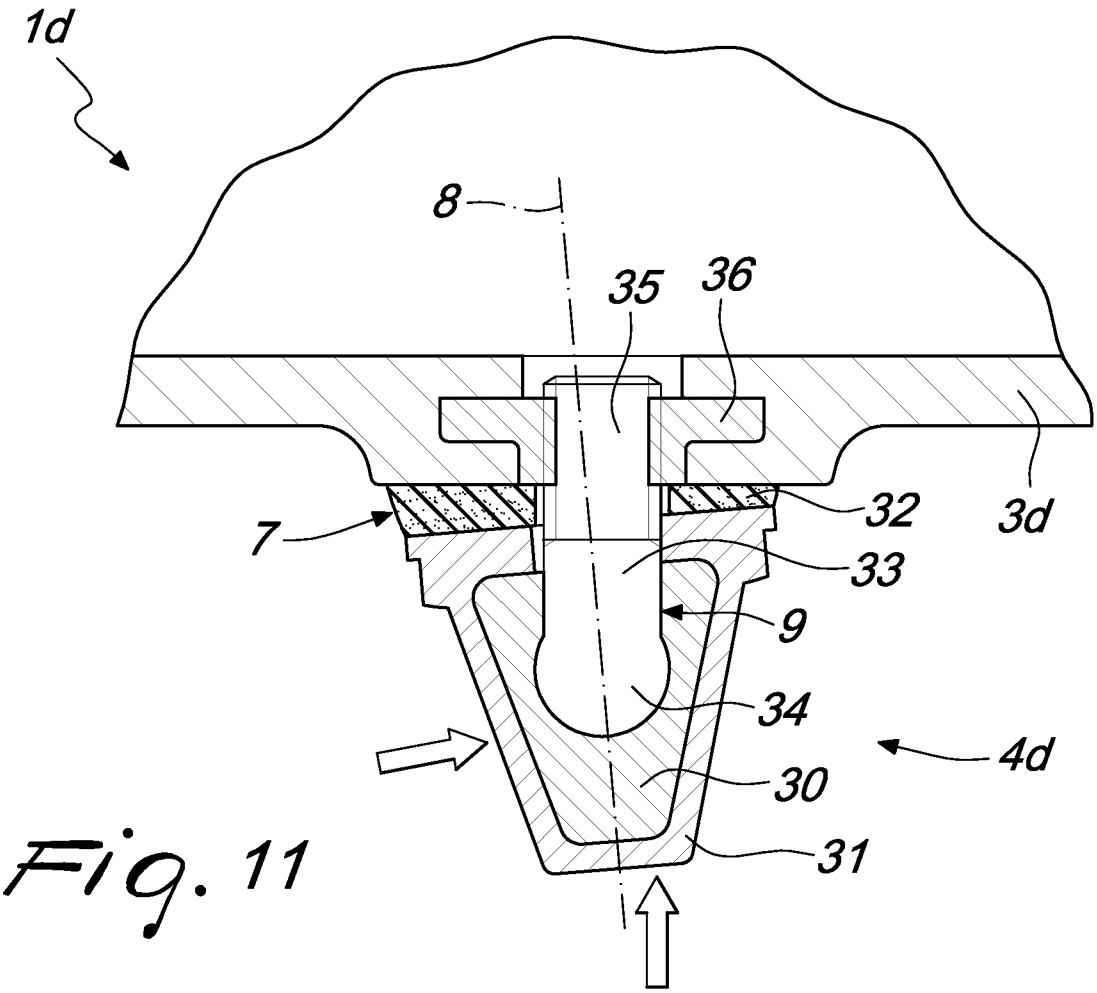

Fig. 11