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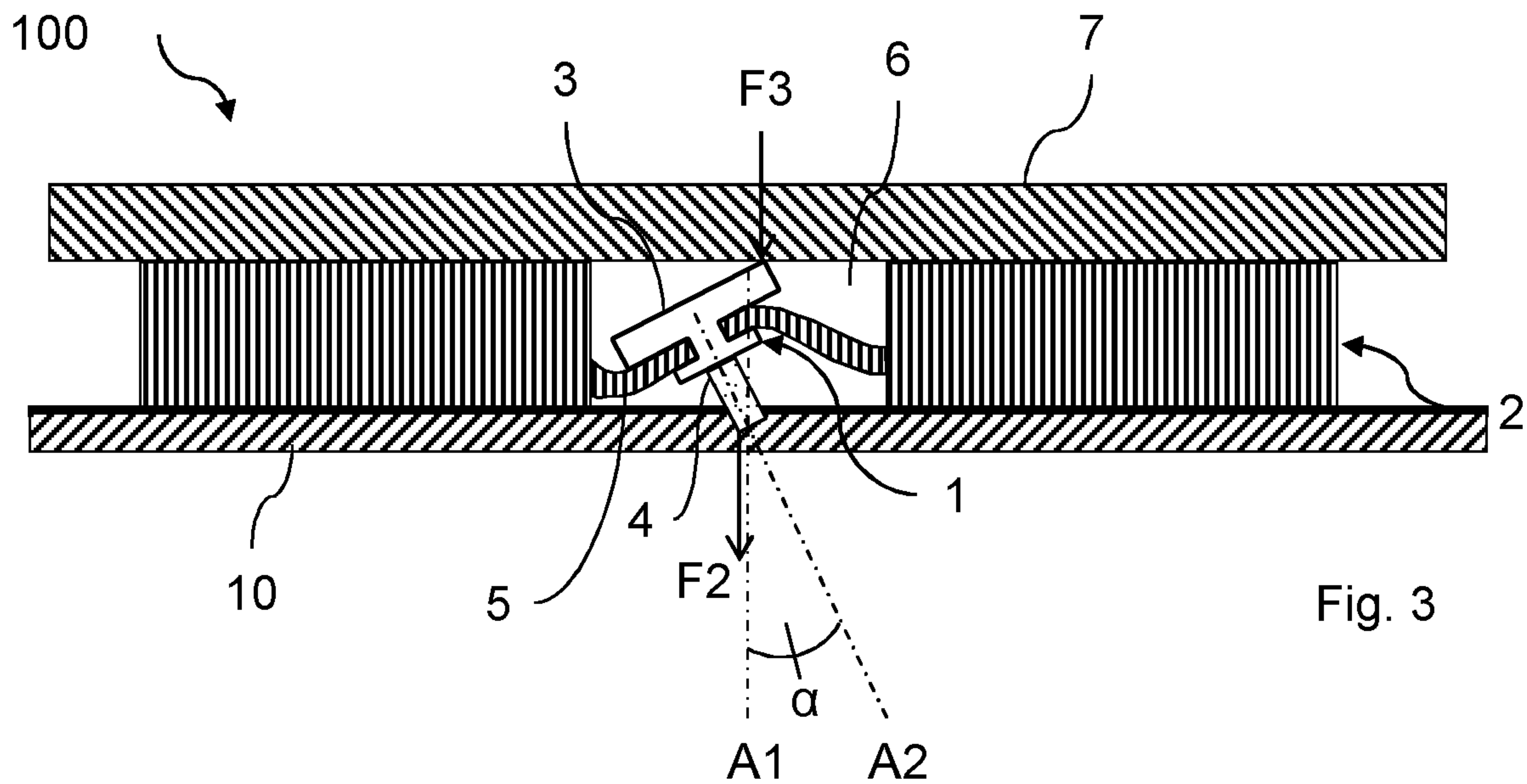

Fig. 3

(57) **Abrégé/Abstract:**
A device for slip-damping effect, comprising a sole unit and a spike with a resilient, circumferential fastening which allows the spike to be tilted in case of shearing motion against the ground surface, wherein the device provides grip on hard ground surfaces as a result of the sole unit, and at the same time the risk of slipping on hard, slippery ground surfaces is reduced by the spike.

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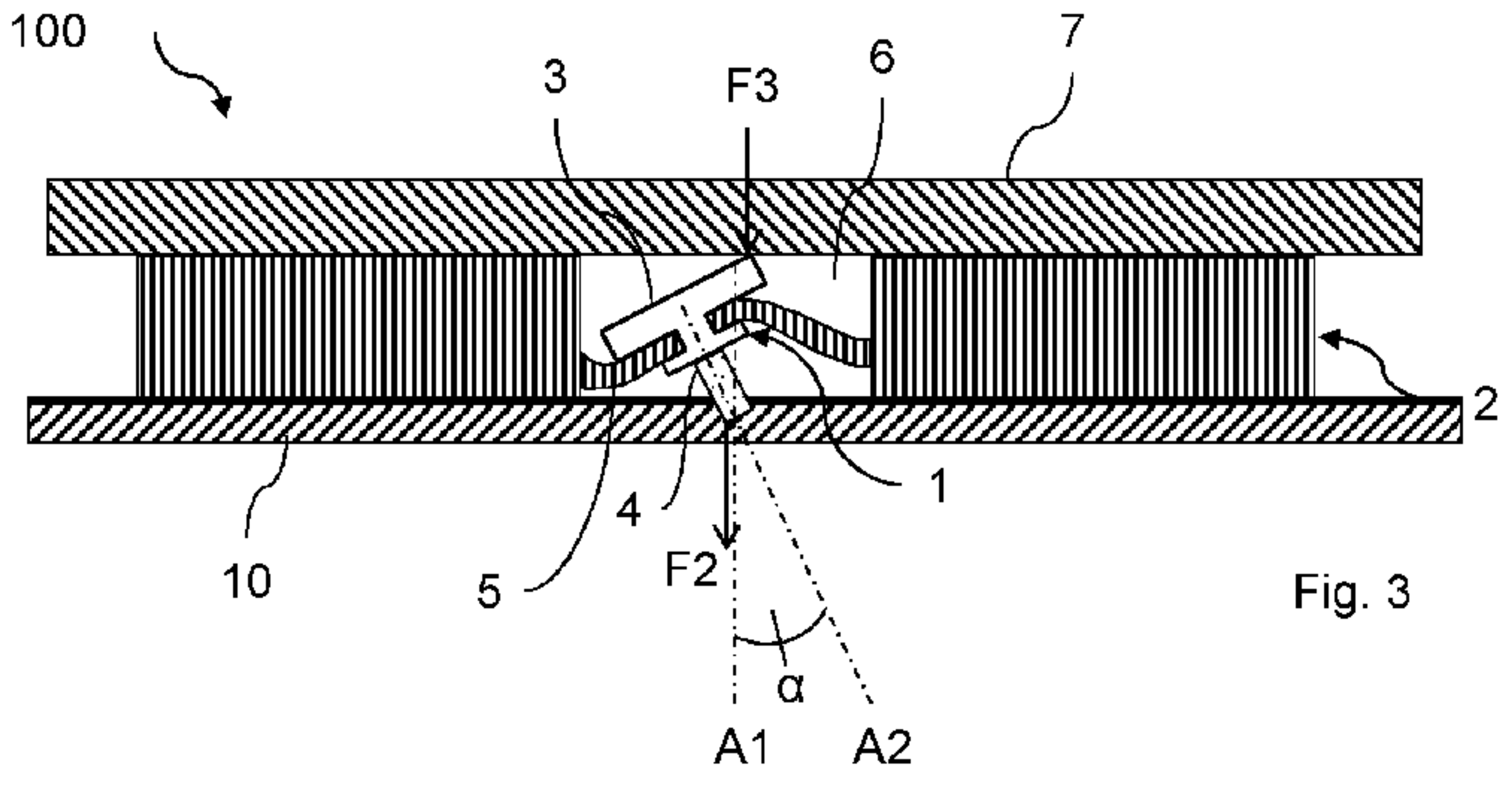

Fig. 3

(57) Abstract: A device for slip-damping effect, comprising a sole unit and a spike with a resilient, circumferential fastening which allows the spike to be tilted in case of shearing motion against the ground surface, wherein the device provides grip on hard ground surfaces as a result of the sole unit, and at the same time the risk of slipping on hard, slippery ground surfaces is reduced by the spike.

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ANTI-SLIP DEVICE HAVING RETRACTABLE SPIKES

Technical field

The present invention relates to slip-damping devices, and specifically to devices having retractable spikes, which can be worn as a cover for a shoe or which are incorporated in the sole of a shoe or for some other slip-damping purpose.

Background of the invention

Traditionally, anti-slip devices are used to prevent a user from slipping on a slippery ground surface. A problem with many anti-slip devices is that when the ground surface for the user is changed, for example from an icy street to a stone or wooden floor, the anti-slip device can cease to provide grip and sometimes even has the opposite effect and becomes slippery. It may then become necessary for the user to remove the anti-slip device in order to obtain a grip on the hard surface.

A known solution to this problem is presented in, for example, US 5,289,647, which shows an anti-slip device for a shoe having spring-loaded spikes which are movable in a vertical groove into the sole and are fixed in a helical spring on the upper part of the spike. The spring suspension means that, when the user walks onto a hard ground surface, the spikes go into the outer sole, whereupon the rubber in the shoe sole provides grip in the hard ground surface. One problem with the solution in US 5,289,647 is that the anti-slip device does not work on a slippery ground surface which is also hard, such as ice or hard-packed snow.

There is thus a need for an anti-slip device which both allows grip on hard ground surfaces and at the same time reduces the risk of slipping on hard, slippery ground surfaces.

Summary of the invention

The object of the present invention is to provide an anti-slip device which reduces the problem of hard ground surfaces such as stone floors becoming slippery when an anti-slip device is being worn, at the same time as the anti-slip device reduces the risk of slipping on hard, slippery ground surfaces.

The invention is based on the fact that the inventors realized that, by providing a device having a sole unit and a spike with a resilient, circumferential fastening which allows the spike to be tilted in case of shearing motion against the ground surface, the device provides grip on hard ground surfaces by virtue of the sole unit, at the same time as the risk of slipping on hard, slippery ground surfaces is reduced by the spike.

According to a first aspect of the inventive concept, the abovementioned object and other objects are achieved by means of a slip-damping device for covers for, or incorporated in, a shoe, comprising a sole unit, at least one spike having a top part and a projecting part which is suited to gripping in a ground surface in case of slipping, said spike being arranged such that said projecting part extends out from the sole unit, wherein in said sole unit there is defined a cavity above the top part of the spike, wherein the spike is suspended from a resilient, circumferential fastening in said sole unit, wherein said resilient, circumferential fastening is arranged to spring said spike, so that said spike can be received by said cavity when said sole unit is pressed against the ground surface such that a force is applied to said projecting part, wherein said resilient, circumferential fastening is adapted to allow tilting of said spike in case of shearing motion against the ground surface, and wherein said resilient, circumferential fastening is adapted to allow spring-back of said spike when said force decreases.

By a sole unit is meant, in the context of the application, a unit intended to bear against a ground surface. Where the device, for example, is incorporated in a shoe, the sole unit refers to the outer shoe sole. In addition, said cavity refers to a space in the sole unit in which the spike can move. This cavity is typically filled with air, but could also be filled with another gas, liquid or a solid material with high flexibility, such as, for example, foam material. In addition, by shearing motion is meant a motion in substantially the same plane as the ground surface, so that the sole unit slides against the ground surface. For example, if the ground surface is wholly horizontal, then a shearing motion is a motion substantially without vertical component, so that the sole unit slides on the ground surface.

With a device which is configured according to the above with a circumferential fastening and a cavity above the spike, the spike is allowed to be pressed in and, at the same time, to be tilted relative to a rest position. The tilting means that, despite the spike being pressed into the cavity, it provides a foothold against the ground surface when the impression and angle of the spike are altered on the basis of the magnitude and direction of a force from the ground surface to which the spike is subjected. For example, where the device is arranged on or incorporated in a shoe and the user pushes away with his foot or slips, the spike can be tilted and can bore down into the ground surface, thereby providing an effective grip when so required.

The device thereby provides grip in the ground surfaces which allow deformation, such as, for example, ice and packed snow. At the same time, in the case of hard ground surfaces, such as, for example, a stone, wooden or clinker floor, the device provides good grip by virtue of the fact that the force from the ground surface is sufficiently large and directed vertically upwards, so that the spike is pressed into the cavity and hence the surrounding sole unit, which can be made of, for example, a flexible polymer material or rubber material, can come into contact with the surface and thus allow grip against the hard ground surface without risk of the user slipping on the spikes.

The abovementioned device provides an anti-slip function which also facilitates use for the user by eliminating the factor of removing the anti-slip device in the event of the ground surface changing.

With the inventive concept, furthermore, wear to the metal spike is reduced by the spike being pressed into the cavity, and the life of the anti-slip device is thus increased.

According to a second aspect of the inventive concept, the abovementioned object and other objects are achieved by means of a slip-damping device for covers for, or incorporated in, a shoe, comprising a sole unit, at least one spike having a top part and a projecting part, in which the projecting part is made of a hard material which is suited to gripping in a ground surface in case of slipping, said spike being arranged such that said projecting part extends out from the sole unit, wherein in said sole unit there is defined a cavity above the top part of the spike, wherein the spike is suspended from a resilient, circumferential fastening in said sole unit, wherein said resilient, circumferential fastening is arranged to spring said spike, so that said spike can be received by said cavity when said sole unit is pressed against the ground surface such that a force is applied to said projecting part, wherein said resilient, circumferential fastening is adapted to allow tilting of said spike in case of shearing motion against the ground surface, and wherein said resilient, circumferential fastening is adapted to allow spring-back of said spike when said force decreases.

The projecting part can be made of a hard material, by which is typically meant hard in relation to the slippery ground surface, so that the projecting part is allowed to descend into the ground surface and thus provide grip. The hard material can be, for example, a hard plastic, ceramic, metal or the like, which is able to provide sufficient grip. The choice of material can depend, for example, on requirements in terms of economy, quality or production method, or other aspects which may be deemed to be of importance. A slip-damping device in which the projecting part is made of a hard material has the same advantages as the slip-damping device above.

According to one embodiment of the inventive concept, the hard material can be a hard plastic. A hard plastic can be easy to mass-produce, for example, and thus the costs of an anti-slip device, which can be intended to be produced in large quantities, can be kept down. Another solution can be to utilize a hard plastic which is given a coating of a hard wear-resistant material, such as a metal or a ceramic material.

According to another embodiment, the hard material can be a metal material. A metal can in many cases be made very hard, and can thus provide a secure grip against a slippery hard ground surface such as ice. It can be an advantage to choose a metal which has good resistance to external influence such as salt and water and thus is not at risk of destructive corrosion. For example, a metal such as stainless steel, or some other steel with suitable alloy, can be a suitable metal. It is also possible to choose a variant comprising a metal which is coated with a hard and wear-resistant material, such as another metal or, for example, a ceramic, in order thereby to secure a good grip and give high resistance to wear.

According to a further embodiment, the hard material can be a ceramic. Ceramics are known to be able to be made very hard and, moreover, to have very high strength and be resistant to corrosion, which can be a good characteristic of an anti-slip device. It is also conceivable for a spike having a projecting part made of an arbitrary hard material to be coated with or mixed with a ceramic material, in order thereby to acquire a suitable strength.

In one embodiment, said cavity can have a depth at least corresponding to the vertical distance between the outermost tip of the projecting part of said spike and a plane defined by the underside of said sole unit.

By a plane defined by the underside of said sole unit is meant the plane in which that part of the sole unit which is intended to bear against the ground surface during use is substantially located.

Thus, when the spike is only acted upon by a substantially vertically upwardly directed force from the ground surface, the projecting part of the spike can be pressed into the cavity. When the spike is subjected to no force other than substantially vertical, there is no tendency to slip and thus no slip-damping function of the spike is required. Unwanted wear can thus be prevented, by virtue of the fact that the spike is not subjected to wear when it is not required.

Furthermore, when the spike is substantially pressed into the cavity and the force with which it acts upon the ground surface is limited, the greatest part of the force against the ground surface is transmitted from the sole unit. A better grip on hard ground surfaces such as stone or wooden floors can thus also be offered to the user, instead of the spikes being active and becoming slippery.

In another embodiment of the inventive concept, in the rest position of said spike there is defined a longitudinal rest position axis in the extent of said projecting part, wherein, when said spike is tilted, a tilt axis is defined in the tilted extent of said projecting part, and wherein, when said spike is tilted, an angle is formed between said rest position axis and the tilt axis.

In another embodiment, the top part of the spike can have a width such that, when said spike is tilted, said top part is pressed down by said top side of the cavity, so that said projecting part is pressed down through the plane defined by the underside of the sole unit.

The force with which the spike in the tilted position acts upon the ground surface is hence able to increase further. As a result of a user placing load upon the sole unit, the spike will also be subjected to load and the effect of the slip-damping will increase. This means that, whenever slip-damping is needed, i.e. when the spike has been sheared against the ground surface, the slip-damping is extremely large. In one embodiment, the device absorbs between about 200 N and about 400 N before a sliding against the ground surface can be visually observed. In another embodiment, the device absorbs between about 250 N and about 300 N before a sliding against the ground surface can be visually observed.

In yet another embodiment, said sole unit can be a cover adapted to be arranged on a shoe.

Hence one and the same device can be used for several different pairs of shoes, and even for different users. This means that the user can save money by only investing in one device.

In another embodiment, said device is arranged in a shoe, the sole unit being incorporated in the outer sole of a shoe.

The slip-damping can hence be built directly into a shoe, which can be preferable in case of running or other frequent activity on a slippery ground surface. With such a device, the user avoids having to spend time to remove the device from and put the device onto the shoes. Moreover, the user is not at risk of leaving the device somewhere.

In yet another embodiment, said device can be suited to fitting on a ferrule for use for a crutch or stick, said sole unit being incorporated in the sole unit of the ferrule.

A user can hence acquire a slip-damping device on a stick or crutch, which can be desirable where a stick or crutch is used to support the balance of a user and where there is a risk of the user stumbling and getting hurt if the crutch or stick slides against the ground surface. By providing the stick or crutch with the device above, the safety for a user can thus be considerably increased.

The device can also be arranged directly on a stick or crutch without a special ferrule, or can possibly be mounted separately on a pre-existing ferrule. It is also possible to adapt the slip-damping device to fit on other aids, such as walking poles, or other devices such as wheels for wheelchairs or prams.

In yet another embodiment, said device can comprise a plurality of said spikes, with said resilient, circumferential fastening, arranged at a distance from one another.

The ground surface can hence act upon the spikes with forces which are of different magnitude and/or have different directions and thereby give a still greater slip-damping effect. Such a device can thus further improve the slip-damping effect for a user.

In another embodiment, said cavity can be filled with a medium which allows said spike to be tilted when said projecting part is acted upon by a sufficiently large force having a directional component in the plane defined by the underside of the sole unit.

The resistance of the spike can hence be adapted for different users and/or fields of use. For example, the device can then be adapted to the weight and size of the user, such that an anti-slip device for children can be adapted such that it requires less force than a device for an adult and/or a device for running requires a higher force than a device suited for walking. Examples of medium which can fill the cavity can be a gas such as air, a liquid or some other material having high flexibility, such as foam material or the like.

In yet another embodiment, said spike can have a circular cross section.

According to one embodiment, the spike and the circumferential fastening are rotationally symmetric about said rest position axis.

The device hence has a slip-damping action regardless of the direction in which the user tends to slide relative to the ground surface. This means that, for example, a runner has as good a foothold when accelerating as when braking or making sideways movements, or that a user with the device on a stick has a grip with the stick regardless of the direction in which the stick is subjected to load.

In another embodiment, said circumferential fastening in said sole unit can have an annular flange.

The spike is hence allowed to be fastened in the sole unit in a way which gives a flexible motion in many degrees of freedom, thereby further improving the slip-damping effect.

In yet another embodiment, said spike can comprise a groove portion, along at least partially the circumference of said spike, adapted to enclose said annular flange.

The spike can thus be fastened to the sole unit via the flange without glue, tape, weld or equivalent, which gives the advantage that the user can, if necessary, easily replace the spikes. The device hence has a longer life and less environmental impact, since there is no need to replace the whole of the device if the spikes become worn.

In one embodiment, the material in the flange for fastening differs from the rest of the material of the sole unit in order to adjust the spring effect. The material can be a flexible polymer material such as, for example, TPE plastic or rubber.

Brief description of the drawings

The invention will now be described in greater detail with the aid of the following drawings. The drawings should be regarded only for illustrative purposes and have no limiting effect, wherein:

Fig. 1 shows a detailed side view in cross section of a slip-damping device according to the above, in which the device is located at a distance from a ground surface,

Fig. 2 also shows a detailed side view in cross section, in which the device is pressed down against a ground surface,

Fig. 3 shows a detailed side view in cross section, in which the device is pressed down against a ground surface and in which the device has been sheared against the ground surface such that the spike is tilted,

Fig. 4 shows a side view in cross section in which the device has a plurality of spikes and in which the device is pressed down against a ground surface and has been sheared against the ground surface such that the spikes are tilted,

Fig. 5 shows an embodiment where the device is an external anti-slip device for a shoe,

Fig. 6 shows an embodiment where the device is an anti-slip device incorporated in the sole of a shoe.

Detailed description

The present invention will be described in detail below on the basis of the drawings, in which drawings embodiments of the inventive concept are shown. The inventive concept can assume many different embodiments, however, and shall not be limited by the embodiments which are described below. The embodiments below are only included in order that the inventive concept shall be described sufficiently clearly for a person skilled in the art.

In the description below is described a device for slip-damping effect, comprising a sole unit and a spike with a resilient, circumferential fastening which allows the spike to be tilted in case of shearing motion against the ground surface, wherein the device provides grip on hard ground surfaces and at the same time reduces the risk of slipping on hard, slippery ground surfaces.

The description below primarily describes a situation in which a device according to the inventive concept is suited for an article of footwear such as a shoe, ski boot, sandal or the like. The present inventive concept is equally applicable, however, to a ferrule, for example for a crutch or stick. The inventive concept can thus be said to be used on all products which have a unit which is pressed against a ground surface and in which shearing against the ground surface is to be avoided.

Figure 1 shows a detailed side view in cross section of a slip-damping device 100. The device 100 has a spike 1, which is fastened in a sole unit 2. The spike has a projecting part 4, which in the rest position in the figure has a longitudinal extent substantially towards a ground surface 10. In addition, the spike 1 has a top part 3 in which the spike is fixed in the sole unit 2. In one embodiment, the top part 3 is made of hard plastic, but can also be made of metal or another relatively hard material.

The sole unit 2 has a flexible projecting part which is suited for resilient and circumferential fastening 5 of the spike 1 in the sole unit 2. In one embodiment, the projecting part is an annular flange. In a further embodiment, the spike 1 comprises a groove portion 9, along at least partially the circumference of said spike 1, suited to enclose the annular flange.

The sole unit can be an integral part of a shoe or ferrule for a crutch, stick or the like. In another embodiment, the sole unit 2 can be a support element in an anti-slip device suited for attachment to a shoe or ferrule for a crutch, stick or the like. The sole unit in one embodiment is made of an elastic material such as TPE plastic or other flexible polymer or rubber material. In one embodiment, where the device is arranged in an anti-slip device which is fastened to a shoe or the like, the material of the sole unit is suited for temperatures between -40°C and 10°C.

Above the circumferential fastening 5 of the spike 1, the support element forms a cavity 6. The cavity is delimited in the lateral direction by walls 11, 12 of the sole unit 2, and is further delimited downwards in the vertical direction by the top part 3 of the spike 1 together with the circumferential fastening 5, and also upwards in the vertical direction by a top side 13 of the cavity. The top side 13 which upwardly delimits the cavity can be constituted by the sole unit 2, or by another support element 7 which can be part of a shoe or ferrule for a crutch, stick or the like, alternatively a part of an anti-slip device suited for fastening to a shoe or ferrule for a crutch, stick or the like.

The side walls 11, 12 can be one and the same circular wall if the cavity is of circular configuration. In other embodiments, the cavity 6 can have other geometric configurations such as triangular, rectangular, in the shape of a hexagon, square, pentagon, heptagon, octagon, other geometric shapes or irregular.

In Figure 1, the device 100 is situated at a distance from the ground surface 10, which means that the spike 1 is in a rest position relative to the flexible circumferential fastening.

In the rest position, which is shown in Figure 1, the depth of the cavity 6, between the top part 3 of the spike 1 and the top side 13 of the cavity 6, constitutes a distance D1. The distance D1 can vary between, for example, 1 and 15 mm.

Furthermore, the projecting part 4 of the spike 1 protrudes with a distance D2 from the plane which is defined by the underside 8 of the sole unit 2 when the spike is in the rest position. The distance D2 can vary between, for example, 1 mm and 15 mm.

In the rest position, the longitudinal extent of the spike 1 defines a rest position axis A1, which is substantially perpendicular to the plane defined by the underside 8 of the sole unit 2.

In one embodiment, the distance D1 can be substantially as large as, or larger than, the distance D2. Thus, when the device 100 is pressed down against the ground surface 10, as is shown in Figure 2, the sole unit 2 is in contact with the ground surface, at the same time as the bottom edge of the projecting part 4 of the spike lies in line with the plane of the sole unit and thus is also in contact with the ground surface.

In the embodiment in which the distance D1 is larger than the distance D2, the distance D1 is preferably only about 1 mm to about 4 mm larger than the distance D2. The device can thus be made with a relatively thin thickness.

In the position in which the device bears against the ground surface, a normal force from the ground surface (not shown) pushes up the spike in the cavity 6. The deformation of the flexible circumferential fastening 5 of the spike in the sole unit 2 gives rise to a force F1 which the projecting part 4 of the spike 1 exerts on the ground surface 10. The magnitude of the force F1 can be varied according to the configuration of the flexible circumferential fastening, but the principle is based on the same principle as is used in, for example, a catapult.

In one embodiment, the flexible circumferential fastening is made of rubber or TPE plastic, but it can also be made of other suitable flexible polymer materials. In another embodiment, the fastening consists of a plurality of materials with varying properties, depending on how the spring effect is to be adjusted. Since the device is suited for use primarily in winter time, then it may be preferable for the material to be suited to low temperatures, preferably suited to a temperature range from -40°C to +10°C. The material can hence retain its flexible property and is not at risk of cracking or being otherwise destroyed. A material which meets these conditions is TPE plastic, which has good properties in cold.

In one embodiment of the device, the configuration of the flexible circumferential fastening 5 can be adapted for the weight of the user, for example between 10-30 kg, 30-70 kg and 70-100 kg or more and/or other ranges. In another embodiment, the configuration can be adapted to the field of use, such as, for example, jogging, support for crutch usage or walking. The force of the flexible circumferential fastening 5 on the spike, and thus also the force F1, F2 which the spike 1 exerts on the ground surface, can thus be adjusted according to requirement based on the weight of the user and the field of use.

In the position which is shown in Figure 2, it is not the spike 1 but the sole unit 2 which gives rise to frictional force against the ground surface 10. If the ground surface is bare ground, such as, for example, dry asphalt, stone, clinker flooring in a shop etc., the sole unit acts like any other grip-providing sole.

If the sole unit 2, and thus also the projecting part 4 of the spike 1, bears against the ground surface 10, and at the same time is sheared in any direction, then the spike 1 is tilted in the cavity, since it has contact with the ground surface, as is shown in Figure 3. The tilting will occur as a rotation about an axis substantially parallel with the ground surface. By a shearing motion is meant a motion in the same plane as the ground surface, i.e. a motion substantially without vertical component, so that the sole unit 2 slides on the ground surface 10.

In the tilted position, the longitudinal extent of the spike 1 thus defines a tilt axis A2, which forms an angle α to the rest position axis A1.

As a result of the spike being tilted, the force F2 with which the projecting part 4 of the spike 1 acts upon the ground surface 10 increases by comparison with the force F1 with which the spike acts upon the ground surface if the spike is not tilted. The sole unit is thus prevented from sliding against the ground surface. The increased force F2 is due to the fact that the normal force (not shown) from the ground surface increases when the spike is tilted, which in turn means that corresponding force generated by the flexible circumferential fastening 5 of the spike 1 increases.

In one embodiment, the increased force F2 with which the spike acts upon the ground surface 10 is also affected by the top side 13 of the cavity 6 pressing down on the top part 3 of the spike 1 with a force F3 which is generated by the load from the user. The top part 3 of the spike 1 is pressed downwards approximately with the full weight of the pedestrian divided by the number of spikes in the device. According to the design described above, this does not occur until the device starts sliding relative to the ground surface. It is sufficient, however, for the device to slide a very short distance, for example 3-10 mm, in any direction in the plane of the ground surface. This means that the spike only acts with a significant force upon the ground surface when the user slips, in other words when so required. In one embodiment, the force with which the device acts upon the ground surface has increased from between about 20 N - about 25 N to between about 250 N - about 300 N when the device slides against the ground surface and the spike is tilted.

In one embodiment, the construction is rotationally symmetric about a vertical axis, so that it acts in a similar manner regardless of the direction in which the user tends to slide.

In Figure 4, a device 110 having three adjoining spikes 1a, 1b, 1c is shown as an example of a device being able to have a plurality of spikes. In Figure 4, two of the spikes 1a, 1b are tilted in the same direction, whilst the third spike 1c is tilted in another direction, which is made possible by independent fastenings and by spacing apart of the spikes. In the event of, for example, a rotary shearing motion of the sole unit 2 relative to the ground surface 10 or when the ground surface is uneven, the effect can be obtained that the spikes 1a, 1b, 1c acquire different tilted directions.

Figure 5 shows in cross section how the device can be implemented in an anti-slip device suited for attachment to a shoe 14. In Figure 5, the device comprises two sections 100a, 100b having three spikes in each section. In other embodiments, a different number of spikes can be used. In the variant shown in Figure 5, furthermore, the support element 7 is a part of the anti-slip device suited for attachment to a shoe. The fastening device of anti-slip devices on shoes is found in many established solutions and will thus not be described in detail, but such fastening devices can be, for example, clasps, Velcro fastenings, or elastic materials which are drawn across the shoe.

Figure 6 shows in cross section how the device can be implemented directly in a shoe 14. In Figure 6, the device comprises two sections 100a, 100b having three spikes in each section. In other embodiments, a different number of spikes can be used. In the embodiment shown in Figure 5, furthermore, the support element 7 is an integral part of the sole of the shoe.

To sum up: when the ground surface is not slippery, the spikes press in against the ground surface only with little force and the sole unit provides for the necessary grip, and thus both the spike and the ground surface are spared from unnecessary wear. When the ground surface is slippery, in case of the slightest tendency to slide in some direction, the spikes will press against the ground surface with great force, which makes the sliding stop immediately.

Claims

1. Slip-damping device (100) for covers for, or incorporated in, a shoe, comprising

a sole unit (2),

at least one spike (1) having a top part (3) and a projecting part (4), which projecting part (4) is made of a hard material which is suited to gripping in a ground surface (10) in case of slipping, said spike (1) being arranged such that said projecting part (4) extends out from the sole unit (2),

wherein in said sole unit (2) there is defined a cavity (6) above the top part (3) of the spike,

characterized in that

the spike is suspended from a resilient, circumferential fastening (5) in said sole unit (2),

said resilient, circumferential fastening (5) is arranged to spring said spike (1), so that said spike can be received by said cavity (6) when said sole unit (2) is pressed against the ground surface (10) such that a force is applied to said projecting part (4),

said resilient, circumferential fastening (5) is adapted to allow tilting of said spike (1) in case of shearing motion against the ground surface (10), and in that

said resilient, circumferential fastening (5) is adapted to allow spring-back of said spike (1) when said force decreases.

2. Slip-damping device according to Claim 1, wherein said hard material is a hard plastic.

3. Slip-damping device according to Claim 1, wherein said hard material is a metal.

4. Slip-damping device according to Claim 1, wherein said hard material is a ceramic.

5. Slip-damping device (100) for covers for, or incorporated in, a shoe, comprising

a sole unit (2),

at least one spike (1) having a top part (3) and a projecting part (4), which is suited to gripping in a ground surface (10) in case of slipping, said spike (1) being arranged such that said projecting part (4) extends out from the sole unit (2),

wherein in said sole unit (2) there is defined a cavity (6) above the top part (3) of the spike,

characterized in that

the spike is suspended from a resilient, circumferential fastening (5) in said sole unit (2),

wherein said resilient, circumferential fastening (5) is arranged to spring said spike (1), so that said spike can be received by said cavity (6) when said sole unit (2) is pressed against the ground surface (10) such that a force is applied to said projecting part (4),

wherein said resilient, circumferential fastening (5) is adapted to allow tilting of said spike (1) in case of shearing motion against the ground surface (10), wherein said resilient, circumferential fastening (5) is adapted to allow spring-back of said spike (1) when said force decreases.

6. Slip-damping device (100) according to any one of the preceding claims, wherein said cavity (6) has a depth (D1) at least corresponding to the vertical distance (D2) between the outermost tip of the projecting part (4) of said spike (1) and a plane defined by the underside (8) of said sole unit.

7. Slip-damping device (100) according to any one of the preceding claims, wherein the top part (3) of the spike (1) has a width (D3) such that, when said spike (1) is tilted, said top part (3) is pressed down by said top side (13) of the cavity (6), so that said projecting part (4) is pressed down through the plane defined by the underside (8) of the sole unit (2).

8. Slip-damping device (100) according to any one of the preceding claims, wherein said sole unit (2) is a cover adapted to be arranged on a shoe (14).

9. Slip-damping device (100) according to any one of Claims 1-7, wherein said device is arranged in a shoe (14), the sole unit (2) being incorporated in the outer sole (7) of a shoe.

10. Slip-damping device (100) according to any one of Claims 1-7, wherein said device is suited to fitting on a ferrule for use for a crutch or stick, said sole unit (2) being incorporated in the sole unit of the ferrule.

11. Slip-damping device (100) according to any one of the preceding claims, wherein said device comprises a plurality of said spikes (1a, 1b, 1c), with said resilient, circumferential fastening (5), arranged at a distance from one another.

12. Slip-damping device (100) according to any one of the preceding claims, wherein said spike (1) has a circular cross section.

13. Slip-damping device (100) according to any one of the preceding claims, wherein said circumferential fastening (5) in said sole unit (2) is an annular flange.

14. Slip-damping device (100) according to Claim 13, wherein said spike (1) comprises a groove portion (9), along at least partially the circumference of said spike (1), adapted to enclose said annular flange.

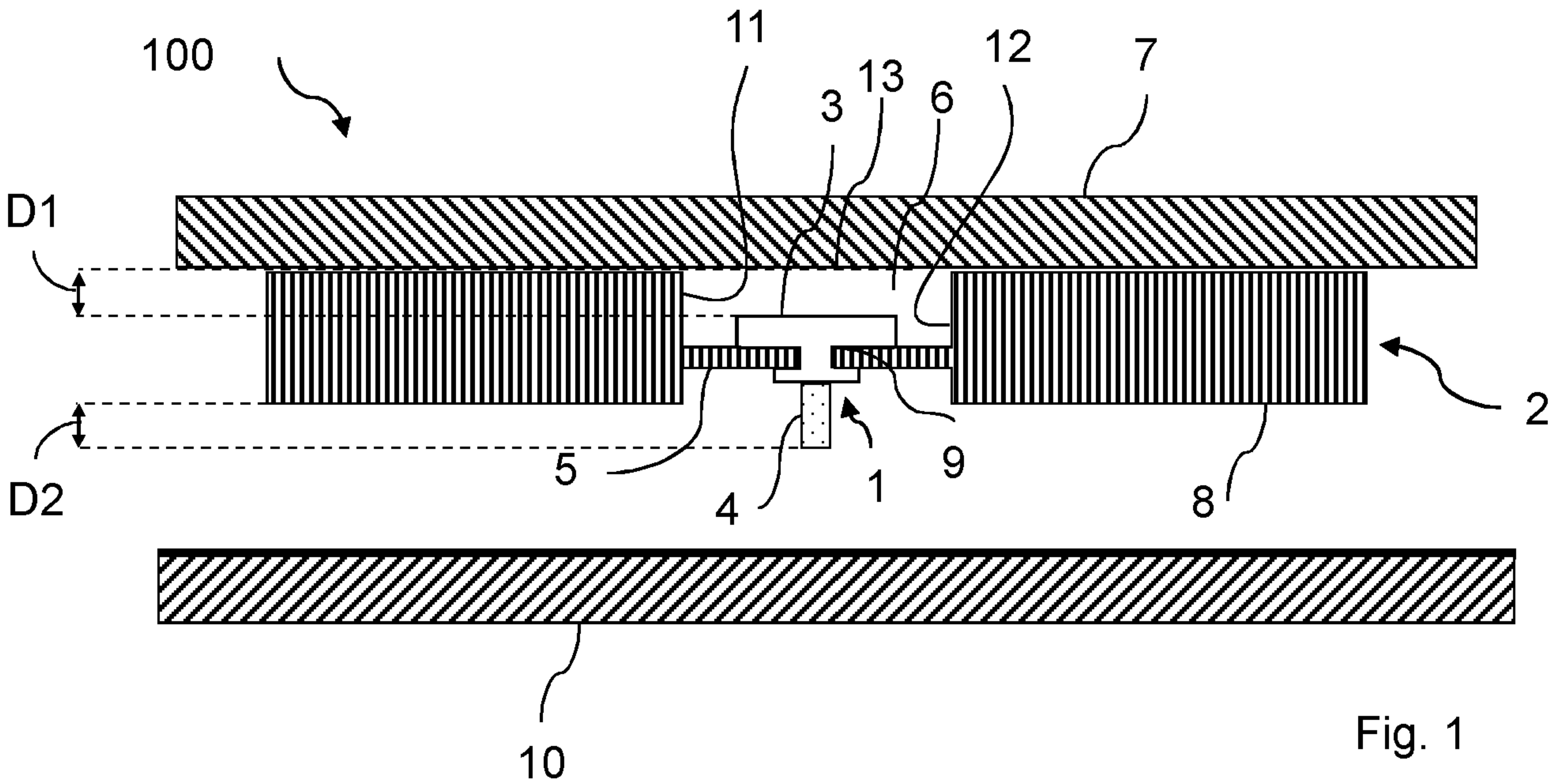

Fig. 1

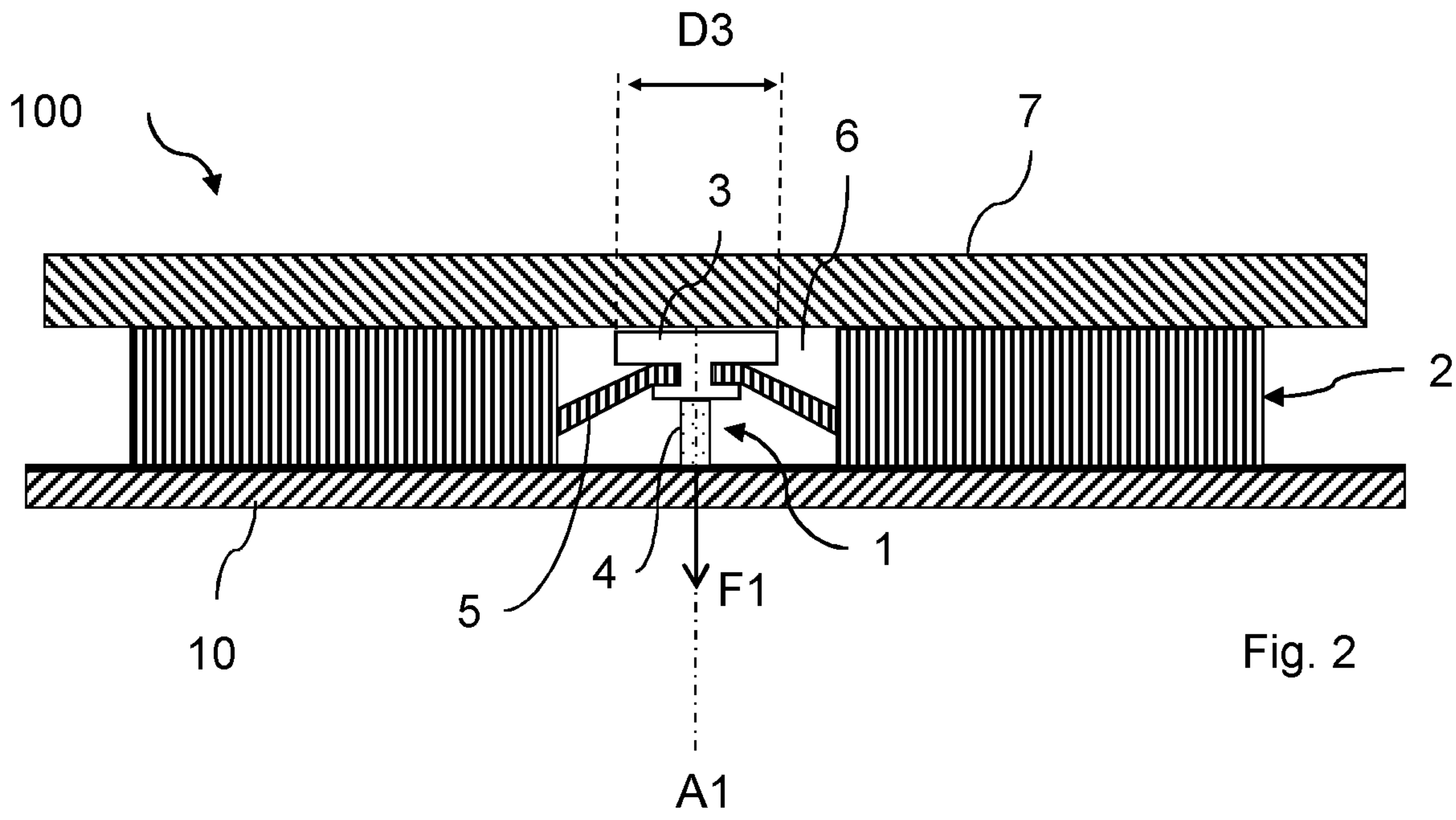

Fig. 2

2/3

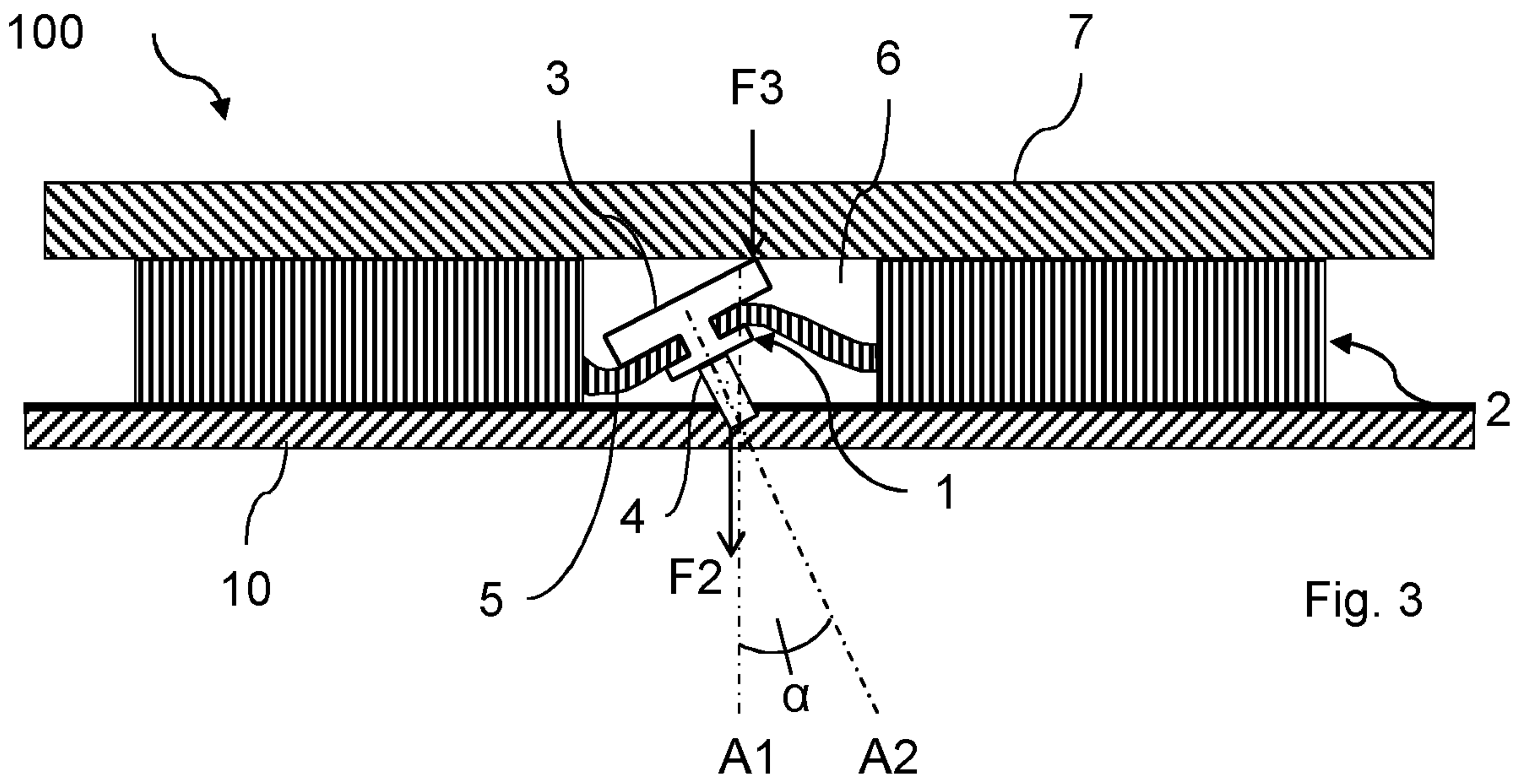

Fig. 3

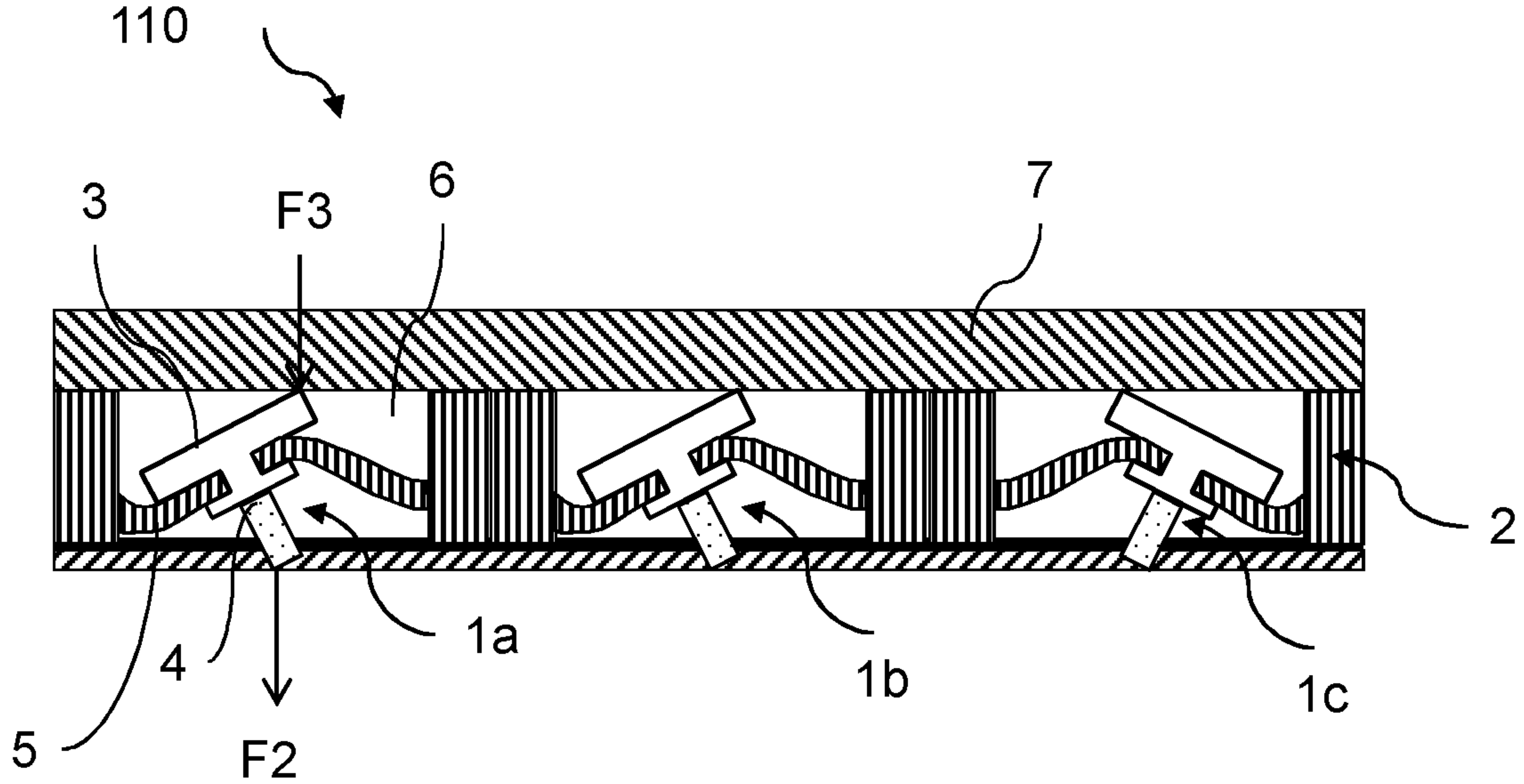

Fig. 4

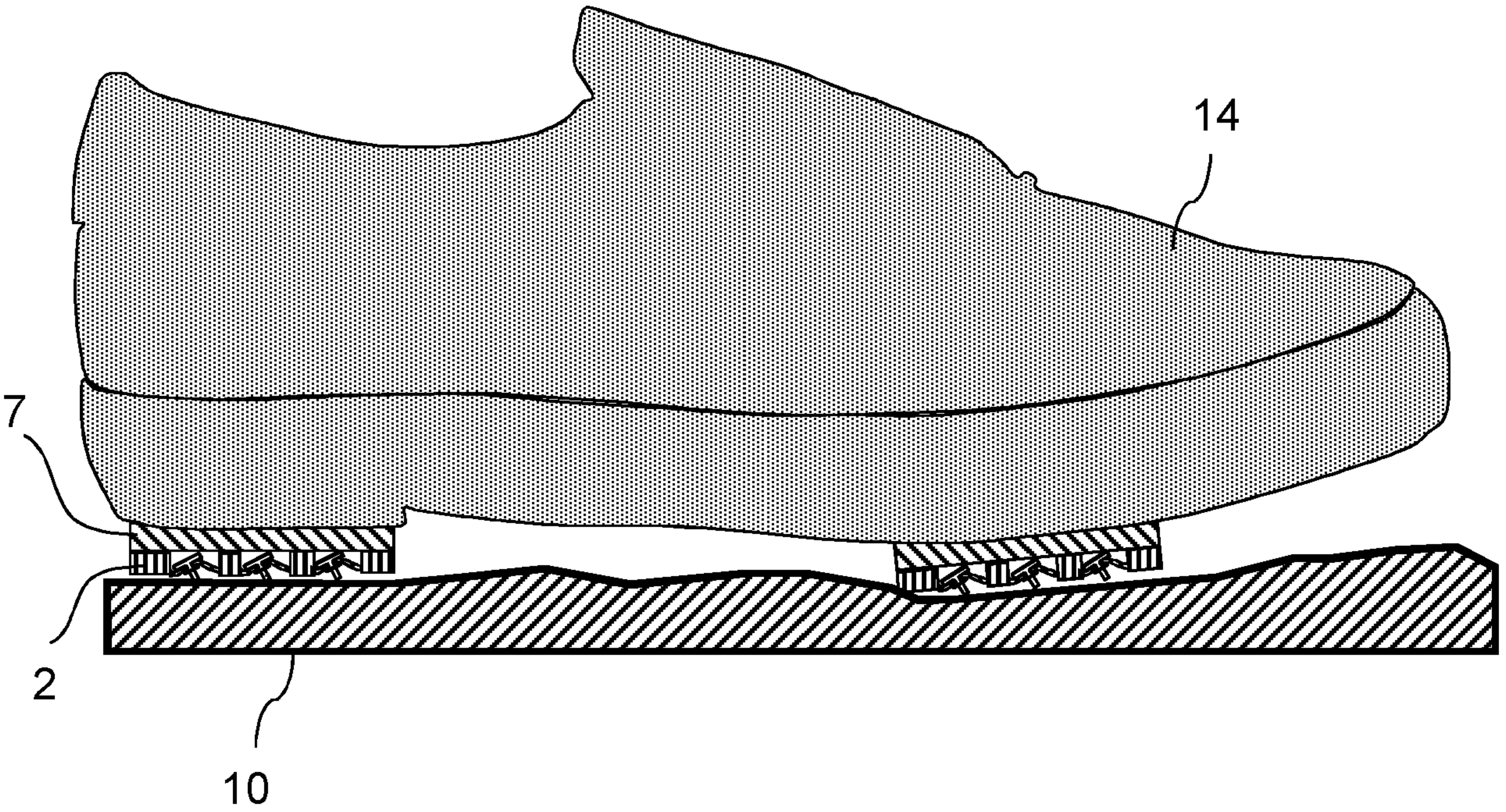

Fig. 5

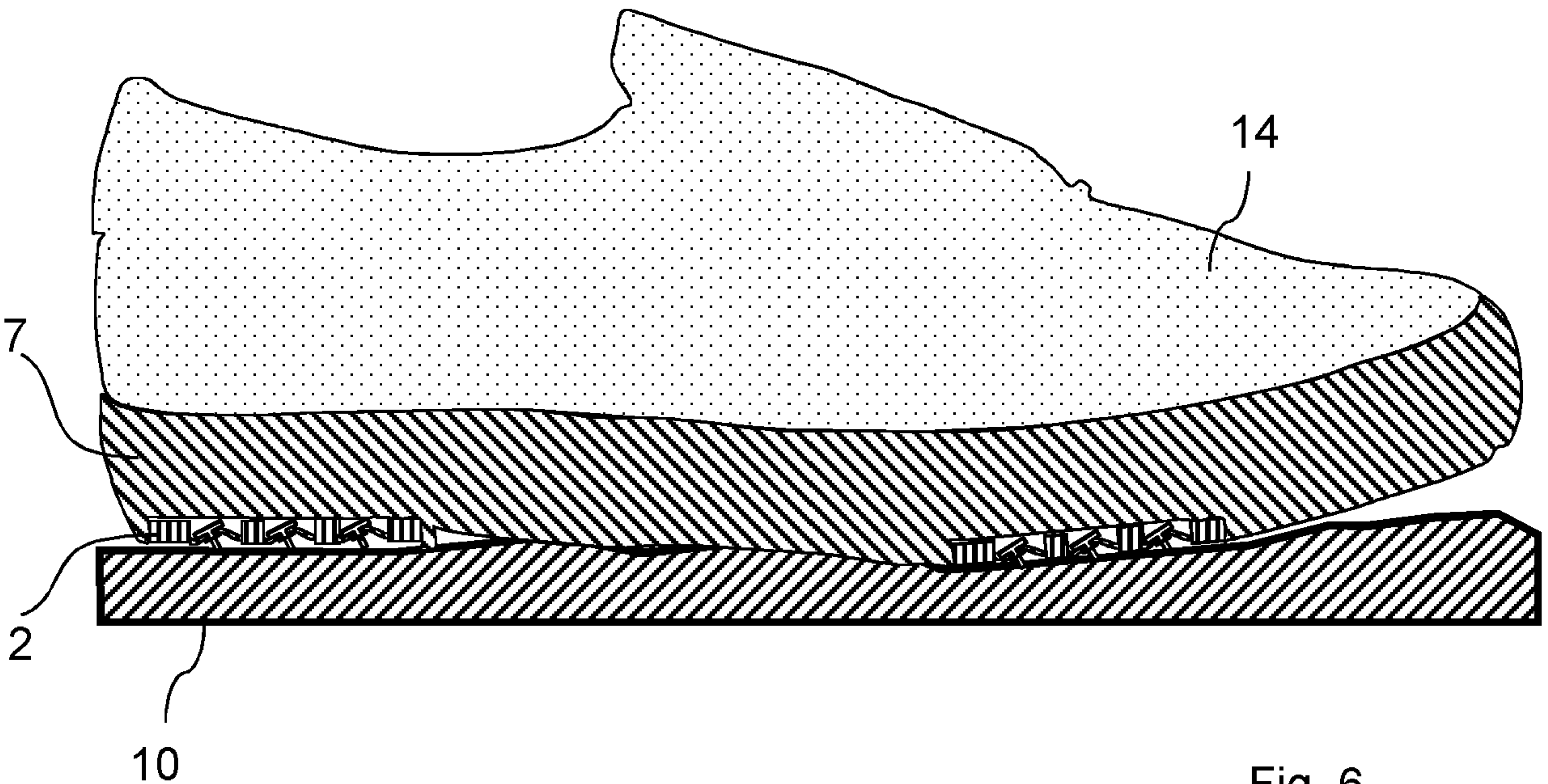

Fig. 6

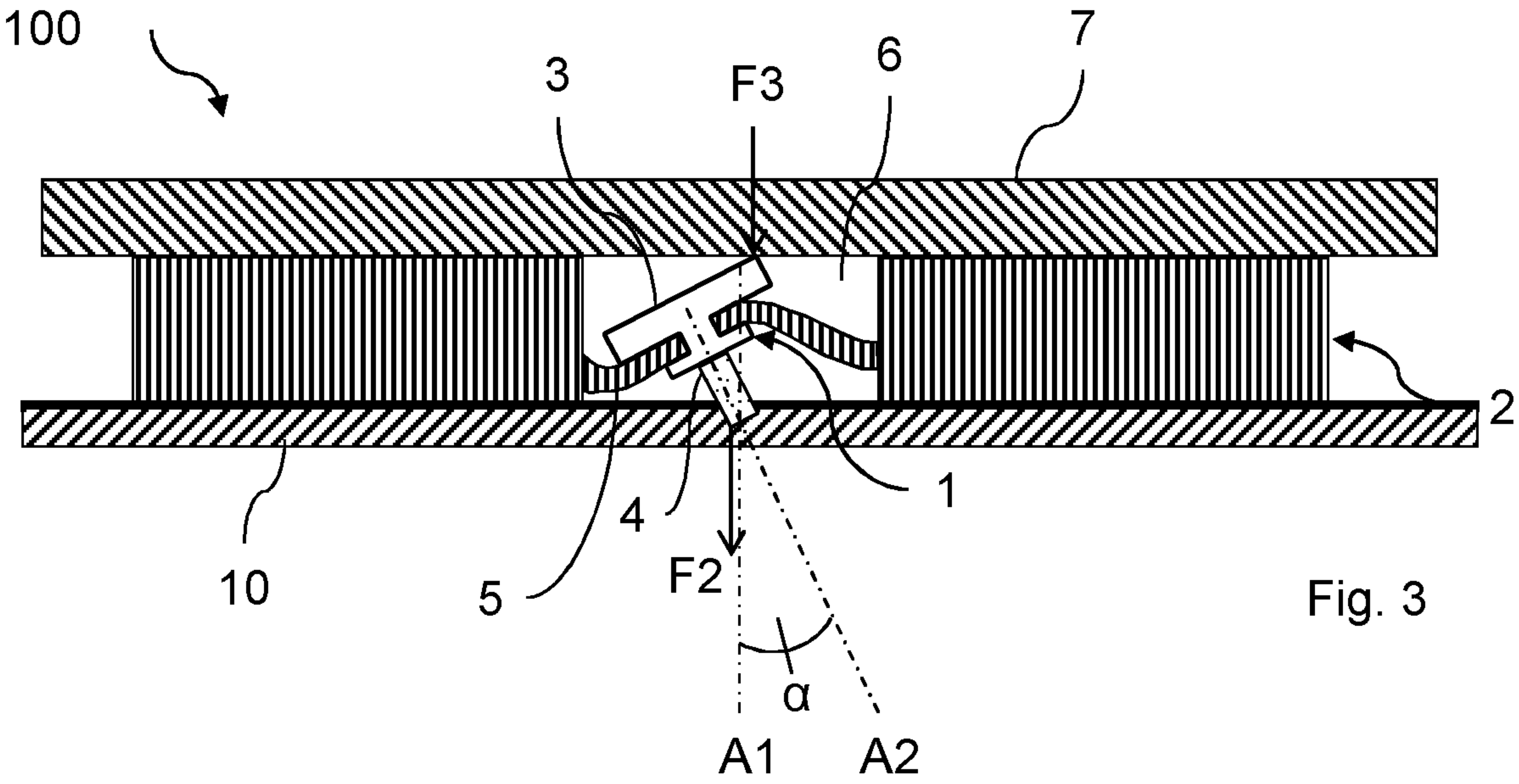

Fig. 3