(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 3 991 807 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
04.05.2022 Bulletin 2022/18

(21) Application number: **20204824.5**

(22) Date of filing: **30.10.2020**

(51) International Patent Classification (IPC):
A63B 5/11 *(2006.01)*

(52) Cooperative Patent Classification (CPC):
A63B 5/11; A63B 21/0557; A63B 69/0057

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

(71) Applicant: **SensoPro AG**
3110 Münsingen (CH)

(72) Inventor: **Mumenthaler, Felix**
3752 Wimmis (CH)

(74) Representative: **Piticco, Lorena**
Isler & Pedrazzini AG
Giesshübelstrasse 45
Postfach 1772
8027 Zürich (CH)

(54) SUSPENSION ARRANGEMENT FOR A TRAINING DEVICE

(57) A suspension arrangement (1) for suspending at least one standing device (8) on a frame device (9) of a training device (10) comprises at least one fixation device (2) for fixation to the frame device (9), at least one connection device (3) for connection with the standing device (8), and at least one resilient device (4, 4a) for resiliently connecting the fixation device (2) with the connection device (3). The resilient device (4, 4a) extends inclined between the fixation device (2) and the connection device (3) so as to form at least one first inclination (4u) running along a first inclination direction (du) and at least one second inclination (4d) running along a second inclination direction (dd) being different from the first inclination direction (du).

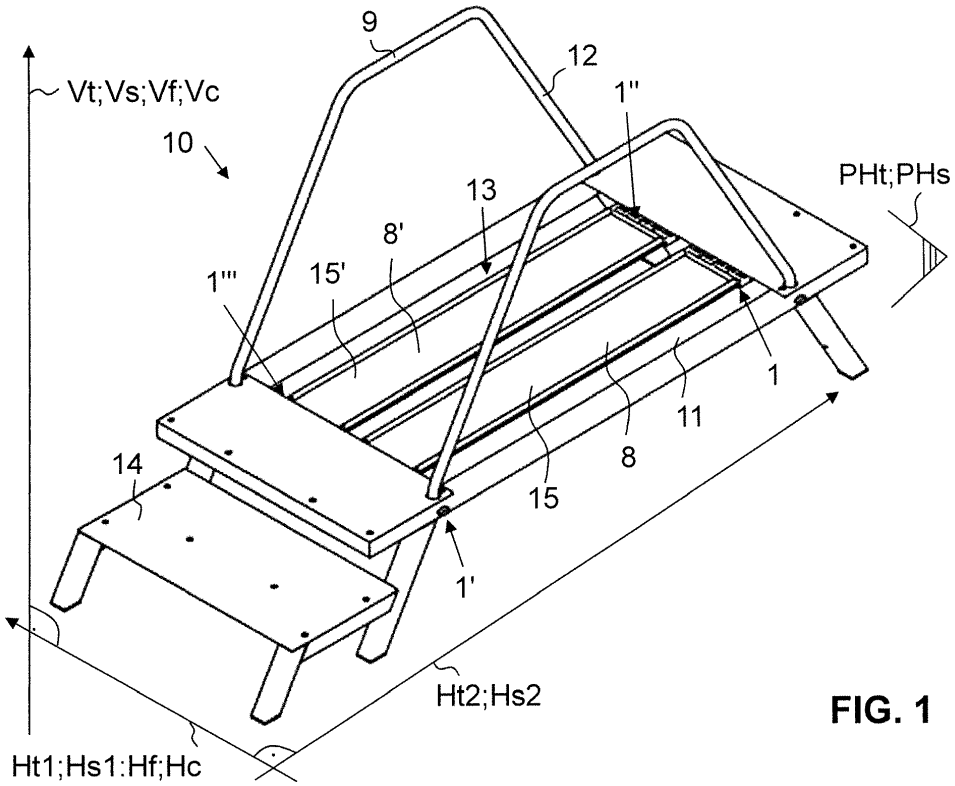

FIG. 1

EP 3 991 807 A1

Description

TECHNICAL FIELD

[0001] The present invention relates to a suspension arrangement for suspending at least one standing device on a frame device of a training device according to claim 1, a training device comprising such a suspension arrangement according to claim 11, the use of such a suspension arrangement for suspending at least one standing device on a frame device of a training device according to claim 13, a method of suspending at least one standing device on a frame device of a training device according to claim 14, as well as to a method of producing such a suspension arrangement according to claim 15.

PRIOR ART

[0002] Various suspension arrangements for training devices such as rebound and balance training devices or trampolines are known in the art. For example, US 2016/0096056 A1 discloses a trampoline including a frame, a jumping sheet and a plurality of suspension members. The suspension members extend horizontally between the frame and the jumping sheet. US 10 183 194 B1 discloses a rebound and balance training device that includes a frame, a footboard, a carrier for the footboard and a plurality of resilient spring elements extending essentially vertically between and being attached to the frame and the carrier to support the footboard.

[0003] Disadvantages associated with the suspension arrangements of the prior art are a heavy wear and correspondingly high maintenance work, for example.

SUMMARY OF THE INVENTION

[0004] It is an object of the present invention to overcome the drawbacks of the prior art. In particular, it is an object to provide a suspension arrangement that has a low maintenance and which is cost-optimized.

[0005] This object is achieved with a suspension arrangement according to claim 1. In particular, a suspension arrangement for suspending at least one standing device on a frame device of a training device is provided, wherein the suspension arrangement comprises at least one fixation device for fixation to the frame device, at least one connection device for connection with the standing device, and at least one resilient device for resiliently connecting the fixation device with the connection device. At least in an unused state of the suspension arrangement, the resilient device extends inclined between the fixation device and the connection device so as to form at least one first inclination running along a first inclination direction and at least one second inclination running along a second inclination direction. The first inclination direction differs from the second inclination direction.

[0006] That is to say, the suspension arrangement comprises at least one fixation device that can be fixed to, i.e. that can be connected to or brought into connection with a frame device of a training device. The suspension arrangement furthermore comprises at least one connection device that can be connected to or brought into connection with a standing device. The connection device and the fixation device are in connection with one another via at least one resilient device, whereby the standing device can be resiliently suspended on the frame device of the training device. At least in the unused state of the suspension arrangement, the resilient device is arranged between the connection device and the fixation device with inclinations extending along different inclination directions. The unused state of the suspension arrangement is understood as a state wherein no user uses the suspension arrangement, i.e. a state where no external forces such as a weight force or a pressure force exerted by a user act on the resilient device. Hence, at least in this unused state of the suspension arrangement the resilient device extends inclined. This inclined extension of the resilient device results in less wear of the components of the suspension arrangement, which results in a suspension arrangement that has a low maintenance. At the same time, the suspension arrangement is inexpensive to produce and operate, which leads to low manufacturing and maintenance costs.

[0007] In the unused state of the suspension arrangement an angle of inclination being formed between the first inclination and the second inclination, in particular between a central axis running centrally through the resilient device forming the first inclination and a central axis running centrally through the resilient device forming the second inclination, is preferably at least 1 degree or more, preferably at least 5 degree or more, particularly preferably at least 10 degree or more. Additionally or alternatively said angle of inclination, in the unused state of the suspension arrangement, preferably is in the range of about 1 degree to 90 degree, preferably in the range of about 5 degree to 70 degree, particularly preferably in the range of about 10 degree to 30 degree. It is particularly preferred that the angle of inclination in the unused state of the suspension arrangement is about 10 degree.

[0008] It is particularly preferred that the resilient device extends inclined between the fixation device and the connection device so as to form at least one first inclination and at least one second inclination also in a used state of the suspension arrangement, i.e. in a state wherein a user uses the suspension arrangement and wherein external forces such as a

weight force or a pressure force exerted by a user act on the resilient device. In this used state, an angle of inclination between the first inclination and the second inclination, in particular between the central axis running centrally through the resilient device forming the first inclination and the central axis running centrally through the resilient device forming the second inclination, is preferably at least 1 degree or more, preferably at least 5 degree or more, particularly preferably at least 10 degree or more. Additionally or alternatively said angle of inclination, in the used state of the suspension arrangement, preferably is in the range of about 1 degree to 90 degree, preferably in the range of about 5 degree to 70 degree, particularly preferably in the range of about 10 degree to 30 degree.

[0009] Furthermore, the angle of inclination being formed between the first inclination and the second inclination in the used state of the suspension arrangement preferably essentially equals the angle of inclination being formed between the first inclination and the second inclination in the unused state of the suspension arrangement. For example, it is conceivable that the suspension arrangement is configured such, that the angle of inclination in the used state of the suspension arrangement and the angle of inclination in the unused state of the suspension arrangement are about 10 degree. However, it is likewise conceivable that the angle of inclination in the used state of the suspension arrangement differs from the angle of inclination in the unused state of the suspension arrangement. Such a deviation in the angle of inclination can be at least 1 degree or more, such as at least 3 degree or more, or such as at least 9 degree or more. For example, if the angle of inclination in the unused state of the training device is 10 degree, it is preferred that the angle of inclination in the used state of the training device is 9 degree or less, such as 7 degree or less, or such as 1 degree or less. However, other deviations in the angle of inclination are likewise conceivable. For example, a deviation in the angle of inclination could be at least 30 degree or more, such as at least 65 degree or more, or at least 75 degree or more. For example, if the angle of inclination in the unused state of the suspension arrangement is 90 degree, the angle of inclination in the used state of the suspension arrangement is preferably 60 degree or less, such as 25 degree or less, or such as 15 degree or less.

[0010] Again in other words, it is conceivable that the angle of inclination in the used state of the suspension arrangement is at least 10 % or more of the angle of inclination in the unused state of the training device, such as at least 15 % or more or 30 % or more or 50 % or more or 70 % or more or even 90 % or more.

[0011] If the angles of inclination in the unused state and the used state differ from one another it is preferred that the angle of inclination when the suspension arrangement is in the unused state is larger than the angle of inclination when the suspension arrangement is in its used state.

[0012] Moreover, it should be noted that the suspension arrangement can adapt two or more used states as a result of different external forces being exerted by the user on the resilient device. Consequently, it is conceivable that two or more angles of inclination are formed when the suspension arrangement is in its used state, wherein said two or more angles of inclination differ from one another.

[0013] At least in the unused state of the suspension arrangement the first inclination preferably runs upward between the connection device and the fixation device with respect to a horizontal plane of the suspension arrangement. That is, the first inclination can be seen as an upward inclination running along an upward direction. Hereinafter the first inclination is therefore referred to as upward inclination, irrespective of the state of the suspension arrangement, i.e. whether the suspension arrangement is in its used state or unused state. Additionally or alternatively, at least in the unused state of the suspension arrangement, the second inclination preferably runs downward between the connection device and the fixation device with respect to said horizontal plane of the suspension arrangement. Consequently, the second inclination can be seen as a downward inclination running along a downward direction, which is why said second inclination is hereinafter referred to as downward inclination irrespective of the state of the suspension arrangement, i.e. whether the suspension arrangement is in its used state or unused state.

[0014] Said horizontal plane of the suspension arrangement is a plane being spanned by two horizontal direction of the suspension arrangement that run perpendicular to one another as well as perpendicular with respect to a vertical direction of the suspension arrangement. The vertical direction is understood as a direction that extends from a ground the training device is arranged on vertically upwardly.

[0015] The suspension arrangement preferably comprises two or more, in particular a plurality of upward inclinations and downward inclinations. It is furthermore preferred that the upward inclinations and downward inclinations are provided in an alternating manner, i.e. it is preferred that one or more upward inclinations are followed by one or more downward inclinations. Moreover, and as will be explained in greater detail below, one particular upward inclination or downward inclination can be provided by means of one particular resilient device. In other words it is preferred that the suspension arrangement comprises at least one resilient device that runs upward between the connection device and the fixation device and at least one further resilient device that runs downward between the connection device and the fixation device. That is to say, the suspension arrangement can comprise two or more resilient devices. However, it is likewise conceivable that one resilient device is arranged such, that it runs upward as well as downward.

[0016] The resilient device preferably has a tensile force of at least 100 N at a strain of 100 %, more preferably of at least 140 N at a strain of 100 %, and particularly preferably of at least 160 N at a strain of 100 %. Additionally or alternatively a maximal strain of the resilient device is preferably at least 100 % or more, more preferably at least 130

% or more, and particularly preferably 170 % or more.

[0017] The resilient device and/or the further resilient device preferably are an elastic rope. A particularly preferred elastic rope has a tensile force of 160 N at a strain of 100 % and a maximal strain of about 170 %. Further preferred properties of the elastic rope are a diameter of about 10 mm to 15 mm, preferably 14 mm and/or a braiding of PES 1100x1. Furthermore, it is preferred that the elastic rope is provided by rubber threads, particularly preferably by so-called High Performance rubber (synthetic). An advantage of resilient devices in the form of elastic ropes are an improved vibration behaviour as compared to springs, for example. The elastic ropes therefore enable a user a joint-friendly training.

[0018] However, other resilient devices such as springs, in particular steel springs, are likewise conceivable and are well-known to the skilled person.

[0019] The fixation device preferably comprises at least one first fixation element and at least one second fixation element, wherein the fixation device and the connection device are in connection with one another via the first and second fixation elements of the fixation device. The first fixation element and the second fixation element can be arranged staggered from one another with respect to a vertical direction of the fixation device.

[0020] That is to say, the inclined arrangement of the resilient device can be achieved by the provision of a fixation device comprising fixation elements that are arranged staggered with respect to one another and which respect to a vertical direction of the fixation device. The vertical direction of the fixation device runs vertically with respect to a ground the training device stands on. In other words, the vertical direction of the fixation device runs parallel to the vertical direction of the suspension arrangement.

[0021] Hence, the object of providing a suspension arrangement that has a low maintenance and which is cost-optimized could likewise be achieved by the provision of a suspension arrangement comprising at least one fixation device for fixation to the frame device, at least one connection device for connection with the standing device, and at least one resilient device for resiliently connecting the fixation device with the connection device, wherein the fixation device comprises at least one first fixation element and at least one second fixation element, wherein the fixation device and the connection device are in connection with one another via the first and second fixation elements of the fixation device, and wherein the first fixation element and the second fixation element are arranged staggered from one another with respect to a vertical direction of the fixation device.

[0022] Alternatively, it is however likewise conceivable that the first fixation element and the second fixation element are arranged in a non-staggered manner from one another with respect to the vertical direction of the fixation device.

[0023] The first fixation element and the second fixation element are preferably arranged staggered from one another with respect to a horizontal direction of the fixation device running perpendicularly to the vertical direction of the fixation device.

[0024] At least in the unused state of the suspension arrangement, the horizontal direction of the fixation device runs parallel to a horizontal direction of the suspension arrangement.

[0025] A vertical distance between the first fixation element and the second fixation element when seen along the vertical direction of the fixation device preferably is in the range of about 1 cm to 10 cm, more preferably in the range of about 2 cm to 6 cm, and particularly preferably about 3.5 cm.

[0026] A horizontal distance between the first fixation element and the second fixation element when seen along the horizontal direction of the fixation device preferably is in the range of about 1 cm to 10 cm, more preferably in the range of about 2 cm to 6 cm, and particularly preferably about 4 cm.

[0027] The fixation device preferably comprises at least one further first fixation element. The first fixation element and the further first fixation element are preferably arranged staggered from one another with respect to the horizontal direction of the fixation device. Additionally or alternatively the first fixation element and the further first fixation element are preferably arranged in a non-staggered manner from one another with respect to the vertical direction of the fixation device.

[0028] A vertical distance between the first fixation element and the further first fixation element when seen along the horizontal direction of the fixation device preferably is in the range of about 1 cm to 10 cm, more preferably in the range of about 2 cm to 6 cm, and particularly preferably about 3 cm.

[0029] The first fixation element and the further first fixation element are preferably arranged in pairs, wherein hereinafter said pairs are called first pairs. The suspension arrangement preferably comprises a plurality of such first pairs. Said plurality of first pairs are preferably arranged staggered from one another with respect to the horizontal direction of the fixation device. A horizontal distance between successive first pairs when seen along the horizontal direction of the fixation device preferably is about 1 cm or more, more preferably about 2 cm or more. Said plurality of first pairs are preferably arranged in a non-staggered manner from one another with respect to the vertical direction of the fixation device, i.e. said plurality of first pairs are preferably arranged on a same vertical height.

[0030] The fixation device preferably comprises at least one further second fixation element. The second fixation element and the further second fixation element are preferably arranged staggered from one another with respect to the horizontal direction of the fixation device. Additionally or alternatively the second fixation element and the further second fixation element are preferably arranged in a non-staggered manner from one another with respect to the vertical direction

of the fixation device.

[0031] A horizontal distance between the second fixation element and the further second fixation element when seen along the horizontal direction of the fixation preferably is in the range of about 1 cm to 10 cm, more preferably in the range of about 2 cm to 6 cm, and particularly preferably about 3 cm.

[0032] The second fixation element and the further second fixation element are preferably arranged in pairs, wherein hereinafter said pairs are called second pairs. The suspension arrangement preferably comprises a plurality of such second pairs. Said plurality of second pairs are preferably arranged staggered from one another with respect to the horizontal direction of the fixation device. Said plurality of second pairs are preferably arranged in a non-staggered manner from one another with respect to the vertical direction of the fixation device, i.e. said plurality of second pairs are preferably arranged on a same vertical height. A vertical distance between the plurality of first pairs and the plurality of second pairs is preferably the same. The vertical distance between a first pair and a second pair with respect to the vertical direction of the fixation device preferably is 2 cm or more, more preferably 4 cm or more.

[0033] The connection device preferably comprises at least one first connection element and at least one second connection element. The fixation device and the connection device are preferably in connection with one another via the first and second connection elements of the connection device. The first connection element and the second connection element are preferably arranged in a staggered manner from one another with respect to a horizontal direction of the connection device. Additionally or alternatively the first connection element and the second connection element can be arranged in a staggered manner from one another with respect to a vertical direction of the connection device running perpendicularly to the horizontal direction of the connection device.

[0034] That is to say, the inclined arrangement of the resilient device can also be achieved by the provision of a connection device comprising connection elements that are arranged staggered with respect to one another and which respect to a vertical direction of the connection device.

[0035] Hence, the object of providing a suspension arrangement that has a low maintenance and which is cost-optimized could likewise be achieved by the provision of a suspension arrangement comprising at least one fixation device for fixation to the frame device, at least one connection device for connection with the standing device, and at least one resilient device for resiliently connecting the fixation device with the connection device, wherein the connection device comprises at least one first connection element and at least one second connection element, wherein the fixation device and the connection device are in connection with one another via the first and second connection elements of the connection device, and wherein the first connection element and the second connection element are arranged staggered from one another with respect to a vertical direction of the connection device.

[0036] However, it is of course likewise conceivable that the first connection element and the second connection element are arranged in non-staggered manner from one another with respect to the vertical direction of the connection device.

[0037] The vertical direction of the connection device runs vertically with respect to a ground the training device stands on. In other words, the vertical direction of the connection device runs parallel to the vertical direction of the fixation device and/or to the vertical direction of the suspension arrangement. At least in the unused state of the suspension arrangement, the horizontal direction of the connection device runs parallel to the horizontal direction of the fixation device and/or to a horizontal direction of the suspension arrangement.

[0038] A horizontal distance between the first connection element and the second connection element when seen along the horizontal direction of the connection device preferably is about 0.1 cm or more, preferably about 1 cm or more. Additionally or alternatively conceivable horizontal distance between the first connection element and the second connection element when seen along the horizontal direction of the connection device is preferably in the range of about 1 cm to 25 cm, more preferably in the range of about 2 cm to 15 cm. Additionally or alternatively a preferred horizontal distance is about 1 cm, more preferably about 4 cm or more.

[0039] If applicable, a vertical distance between the first connection element and the second connection element when seen along the vertical direction of the connection device preferably is in the range of about 1 cm to 10 cm, more preferably in the range of about 2 cm to 6 cm, and particularly preferably about 3.5 cm.

[0040] The suspension arrangement preferably comprises a plurality of connection elements, wherein said plurality of connection elements are particularly preferably arranged at a uniform distance from one another with respect to the horizontal distance of the connection device.

[0041] A number of connection elements preferably equals to or is smaller than or larger than a number of fixation elements. It is particularly preferred that a number of connection elements is smaller than, in particular half the number of fixation elements. In other words, it is preferred that one connection element is in each case provided for two fixation elements. Said two fixation elements particularly preferably correspond to fixation elements constituting a first pair or a second pair, see above.

[0042] It should furthermore be noted that connection elements being arranged staggered from one another with respect to the vertical direction of the connection device can likewise be provided in the form of first pairs and second pairs as described above in the context of the staggered fixation elements. Hence, explanations provided in this regard

likewise apply to vertically staggered connection elements.

[0043] The resilient device preferably is in connection with the first fixation element and/or with the further first fixation element. Additionally, said resilient device could also be in connection with the first connection element.

[0044] As mentioned initially, the suspension arrangement preferably comprises at least one further resilient device. Said at least one further resilient device preferably is in connection with the second fixation element and/or with the further second fixation element. Additionally, said further resilient device could also be in connection with the second connection element.

[0045] One resilient device preferably connects one pair of fixation elements with one connection element. That is, in the event of one first pair and one second pair a first resilient device could connect the first connection element with the first pair and a second resilient device could connect the second connection element with the second pair. In the event of a plurality of first pairs and second pairs, a first resilient device could connect the first connection element with the first pair, a second resilient device could connect the second connection element with the second pair, a third resilient device could connect a third connection element with a further first pair, a fourth resilient device could connect a fourth connection element with a further second pair, etc. However, it is likewise preferred that one individual fixation element is connected with one individual resilient device. In this case, the fixation elements constituting a pair are individually connected with a common connection element via a corresponding resilient device. For example, a first connection element could be connected with a first fixation element via a first resilient device, and said same first connection element could be connected with a further first fixation element via a second resilient device. Furthermore, it is conceivable that in each case one connection element is connected with one fixation element via one resilient device.

[0046] Other connections of the connection elements and the fixation elements via one or more resilient devices are however likewise conceivable.

[0047] The first fixation element and/or the further first fixation element and/or the second fixation element and/or the further second fixation element preferably has the shape of a hook. In this case, the resilient device and/or the further resilient device is preferably hooked in one or more of the hooks.

[0048] The first connection element and/or the second connection element preferably has the shape of a bar. In this case, the resilient device and/or the further resilient device is preferably looped around one or more of the bars.

[0049] The resilient device preferably is provided in the form of a loop, particularly preferably in the form of a closed loop. For example, if the resilient device corresponds to an elastic rope, it is preferred that said rope is arranged as a loop, for example by connecting the free ends of the elastic rope to one another.

[0050] It is particularly preferred that a resilient device is looped around a connection element in the form of a bar as well as hooked in a first fixation element and/or further first fixation element and/or second fixation element and/or further second fixation element in the form of a hook. Thus, it is preferred that a number of connection elements equals a number of resilient devices which in turn equals a number of total fixation elements, i.e. the total number of first and further first fixation elements as well as second and further second fixation elements. It is likewise preferred that a resilient device is looped around a connection element in the form of a bar and hooked in two fixation elements. In this case it is thus likewise conceivable that there are as many resilient devices as connection elements as fixation elements, wherein however one or more resilient devices are not in connection with one or more connection elements or one or more fixation elements. Alternatively, it is conceivable that less resilient devices are provided than connection elements and/or than fixation elements, and wherein one or more resilient devices are in each case in connection with two or more fixation elements and/or two or more connection elements. If one resilient device is in connection with two fixation elements, said two fixation elements particularly preferably constitute a first pair or a second pair as described above. It is furthermore preferred that the hooks constituting a first pair or a second pair are oriented differently from one another. In particular, it is preferred that the hook constituting the first fixation element (second fixation element) and the hook constituting the further first fixation element (further second fixation element) extend in opposite directions and/or are arranged in a mirror-inverted manner with respect to one another and with respect to a plane extending along the vertical direction of the fixation device and between the first fixation element (second fixation element) and the further first fixation element(further second fixation element). In this way the resilient device can be laterally hooked in the fixation elements.

[0051] The fixation device furthermore preferably comprises an elongate element such as a plate or the like, and wherein the fixation elements are arranged on said plate, particularly preferably on a surface of said plate. The plate and/or the fixation elements can be made of the same or different materials. To this end it is preferred that the plate and the fixation elements are made of metal. The plate and the fixation elements can constitute a single-piece element or a multi-piece element. In the later case it is conceivable that the plate is provided with bores or the like, and wherein the fixation elements are screwed into said bores. Other fastenings such as an adhesive fastening or a welded connection are of course likewise conceivable.

[0052] The connection elements in the form of the bar can be provided by means of a single bar. In other words, the connection elements can be provided in the form of a single-piece element. Alternatively, it is likewise conceivable that the connection elements are configured separately from one another such as several individual bars. The connection device furthermore preferably comprises an elongate element that can be connected to the bar. For example, it is

conceivable that said elongate member comprises two or more through holes, through which the bar can be slid and thereby fastened to the elongate member. A further connection of the elongate member and the bar is preferably achieved by mechanical and/or chemical fastening means, for example by means of a screw, in particular a hub screw, or an adhesive. These and any further conceivable fastening means are well-known to the skilled person. To this end it is particularly preferred that the elongate member comprises an elongate base body with two or more protrusions, and wherein the through holes are provided in said protrusions. In other words, it is preferred that the connection device has the shape of a rake. The protrusions preferably protrude laterally from the base body and are facing towards the fixation device. The base body is preferably facing away from the fixation device and facing towards the standing device instead.

[0053] The resilient device and/or the at least one further resilient device are preferably releasably fastenable to the first fixation element and/or the further first fixation element and/or the second fixation element and/or the further second fixation element and/or to the first connection element and/or the second connection element. That is, it is preferred that the one or more resilient devices can be looped around one or more bars and/or hooked in one or more hooks in a non-permanent manner. Such a design allows a user of the training device to adjust the suspension of the standing device(s) and to consequently adjust a training mode of the training device. In fact, the more resilient devise are used for suspending the suspension arrangement the more force is needed from a user to overcome the resilient force exerted by the resilient devices.

[0054] In another aspect a training device comprising at least one standing device, a frame device and at least one suspension arrangement as described above is provided. Any of the above and below explanations regarding the suspension arrangement therefore likewise apply to the training device comprising such a suspension arrangement and vice versa.

[0055] At least in an unused state of the training device, the standing device and the suspension arrangement are preferably arranged in a common plane. The unused state of the training device is understood as a state wherein no user uses the training device, i.e. a state where no external forces such as a weight force or a pressure force exerted by a user act on the training device. Thus, when the training device is in its unused state the suspension arrangement is in its unused state as well. Consequently, a used state of the training device is understood as a state wherein a user of the training device uses the training device and wherein external forces act on the training device. When the training device is in its used state the suspension arrangement is in its used state as well.

[0056] Thus, at least in the unused state of the training device, the resilient device preferably extends inclined between the connection device and the fixation device so as to form at least one first inclination and at least one second inclination. The first inclination preferably runs upward between the connection device and the fixation device with respect to a horizontal plane of the training device, and/or wherein the second inclination preferably runs downward between the connection device and the fixation device with respect to the horizontal plane of the training device. Said horizontal plane of the training device preferably corresponds to the common plane the standing device and the suspension arrangement are arranged in.

[0057] At least in the unused state of the training device, the horizontal plane of the training device preferably runs parallel to the horizontal plane of the suspension arrangement.

[0058] The suspension arrangement is preferably arranged within a base element of the frame element that extends along the horizontal plane of the training device.

[0059] The horizontal plane of the training device is spanned by a first horizontal direction of the training device and a second horizontal direction of the training device running perpendicularly to the first horizontal direction of the training device. Said first and second horizontal directions of the training device running perpendicularly to a vertical direction of the training device. The vertical direction of the training device extends vertically upwardly from a ground the training device is arranged on. The vertical direction of the training device runs parallel to the vertical direction of the fixation device and the vertical direction of the connection device. At least in the unused state of the training device the first horizontal direction of the training device runs parallel to the horizontal direction of the connection device and the horizontal direction of the fixation device. Said first horizontal direction of the training device preferably extends along a transverse direction of the training device. The transverse direction of the training device in turn runs preferably runs perpendicular to a longitudinal direction of the training device. Said longitudinal direction of the training device preferably runs parallel to the second horizontal direction of the training device.

[0060] At least in the unused state of the training device, the connection device, in particular its one or more connection elements, are arranged on a vertical height that lies between a vertical height of the first fixation element and a vertical height of the second fixation element with respect to the vertical direction of the training device. This arrangement is preferred in the event of vertically staggered fixation elements and non-staggered connection elements.

[0061] However, it is likewise conceivable that, at least in the unused state of the training device, the fixation device, in particular the first fixation element and/or the second fixation element, is arranged on a vertical height that lies between a vertical height of the first connection element and a vertical height of the second connection element. This arrangement is preferred in the event of vertically staggered connection elements and non-staggered fixation elements.

[0062] The standing device is preferably configured inelastic and/or bendable and/or not stretchable and/or load-

bearing and/or torsion-proof and/or having a medium strength, i.e. being stable but not hard. The standing device is furthermore preferably configured such that a user can stand on it. That is, it preferably corresponds to an elongated element comprising a surface the user can stand on.

[0063] The standing device can be directly connected to the connection device. It is however likewise conceivable that the standing device and the connection device are indirectly connected with one another, for example via one or more ribbons or the like. To this end it is preferred that the connection device on the side facing the standing device comprises connection elements, and wherein a connection between the connection device and the standing device takes place via said connection elements. Likewise, the fixation device can be connected directly or indirectly to the frame device. The fixation device is particularly preferably welded or screwed to the frame device.

[0064] It is particularly preferred that the training device comprises two suspension arrangements per standing device. The standing device preferably is of an elongate shape that extends, in the unused state of the training device, along the second horizontal direction of the training device. The standing device furthermore preferably comprises two opposed ends, wherein a first end of the standing device is connected to or in connection with a first suspension arrangement and a second end of the standing device is connected to or in connection with a second suspension arrangement. It is particularly preferred that the training device comprises two standing devices and consequently four suspension arrangements. To this end it is conceivable that one or more components of two suspension arrangements that are arranged on a same side of the training device are configured separately from one another or can be joined together so as a single-piece element. For example, it is conceivable that the two fixation devices of the two suspension arrangements in the shape of elongated plates are provided as two separate plates or in the form of a common plate. The same applies to the connection devices.

[0065] The training device is preferably configured such that it can adopt one or more used states. As mentioned earlier, the used state is understood as a state wherein a user of the training device stands on the one or more standing devices and presses or pushes the standing devices against the resilient force of the resilient device. As a consequence, during the action of a pressing force or pushing force the standing devices are moved with respect to the frame device along the vertical direction of the training device towards a ground. In other words, the standing devices are lowered. Said position of the standing devices can be referred to as use position. In the absence of such a pressing or pushing force, the resilient force of the resilient device returns the standing devices into an initial position. A user can be said to perform a training if he or she transfers the standing device(s) into their used position and initial position several times. However, it is likewise conceivable that the training device is used for balance exercises, wherein the user merely stands on the one or more standing devices. The balance exercise is enabled by the resilient suspension of the standing device(s) by the suspension arrangement.

[0066] In another aspect at least one suspension arrangement as described above is used for suspending at least one standing device on a frame device of a training device.

[0067] In another aspect a method of suspending at least one standing device on a frame device of a training device is provided, wherein the method comprises the steps of: i) providing at least one suspension arrangement as described above, ii) fixing the at least one fixation device to the frame device, iii) connecting the at least one connection device with the at least one standing device, and iv) connecting the at least one fixation device and the at least one connection device via the at least one resilient device. It should be noted that the steps ii) to iv) can be carried out in any order.

[0068] In another aspect a method of producing a suspension arrangement for suspending at least one standing device on a frame device of a training device is provided, wherein the method comprises the steps of: i) providing at least one fixation device for fixation to the frame device, ii) providing at least one connection device for connection with the standing device, and iii) providing at least one resilient device for resiliently connecting the fixation device with the connection device. The resilient device extends inclined between the fixation device and the connection device so as to format least one first inclination running along a first inclination direction and at least one second inclination running along a second inclination direction being different from the first inclination direction. The first inclination preferably runs upward between the connection device and the fixation device with respect to a horizontal plane of the suspension arrangement, and/or wherein the second inclination direction preferably runs downward between the connection device and the fixation device with respect to the horizontal plane of the suspension arrangement. Here again it should be noted that the steps i) to iii) can be carried out in any order.

BRIEF DESCRIPTION OF THE DRAWINGS

[0069] Preferred embodiments of the invention are described in the following with reference to the drawings, which are for the purpose of illustrating the present preferred embodiments of the invention and not for the purpose of limiting the same. In the drawings,

Fig. 1 shows a perspective view of a training device with two standing devices that are suspended on a frame device with suspension arrangements according to the invention;

Fig. 2 shows another perspective view of the training device according to figure 1;
Fig. 3 shows a bottom view of the training device according to figure 1;
Fig. 4 shows a perspective view of the standing devices and the suspension arrangements according to figure 1;
Fig. 5 shows an enlarged perspective view of region A indicated in figure 4;
Fig. 6 shows an enlarged top view of region A indicated in figure 4;
Fig. 7 shows an enlarged side view of region A indicated in figure 4;
Fig. 8 shows a perspective view of a fixation device of the suspension arrangement according to figure 1;
Fig. 9 shows a bottom view of the fixation device of the suspension arrangement according to figure 1;
Fig. 10 shows a front view of the fixation device of the suspension arrangement according to figure 1;
Fig. 11 shows a perspective view of a fixation element of the fixation device of the suspension arrangement according to figure 1;
Fig. 12 shows a perspective view of a fixation device according to another embodiment of a suspension arrangement according to the invention;
Fig. 13 shows a sectional view along the sectional line B-B according to figure 12;
Fig. 14 shows a perspective view of a connection device of the suspension arrangement according to figure 1;
Fig. 15 shows a top view of the connection device of the suspension arrangement according to figure 1;
Fig. 16 shows a perspective view of a connection device according to another embodiment of a suspension arrangement according to the invention;
Fig. 17 shows a top view of the connection device according to figure 16;
Fig. 18 shows a diagram depicting a force as a function strain of a resilient device of the suspension arrangement according to figure 1.

DESCRIPTION OF PREFERRED EMBODIMENTS

[0070] Different aspects of a suspension arrangement 1 for suspending one or more standing devices 8 on a frame device 9 of a training device 10 as well as of a training device 10 comprising such a suspension arrangement 1 and standing device(s) 8 are discussed with reference to the figures.

[0071] As best seen in figures 1 and 2, the training device 10 comprises a frame device 9 comprising a base element 11 in the form of a rectangular plate that extends within a horizontal plane PHt of the training device 10. The horizontal plane PHt is spanned by a first horizontal direction Ht1 of the training device 10 and a second horizontal direction Ht2 of the training device 10 running perpendicularly to the first horizontal direction Ht1 of the training device 10. The frame device 9 furthermore comprises two rail elements 12 that have the shape of a reverse "V". Said rail elements 12 extend through the base element 11 of the frame device 9 and fix the base element 11 at a distance from a ground the training device 10 is arranged on. In other words, the base element 11 is arranged vertically spaced apart from the ground and with respect to a vertical direction Vt of the training device 10 running perpendicularly to the horizontal directions Ht1, Ht2 of the training device 10. The base element 11 comprises a rectangular recess 13 that extends completely through the base element 11 with respect to the vertical direction Vt of the training device 10. Said recess 13 can be said to form a through-opening. The suspension arrangement 1 is arranged within the recess 13 of the base element 11.

[0072] As will be explained in greater detail below, the suspension arrangement 1 according to the invention comprises one or more fixation devices 2, one or more connection devices 3, and one or more resilient devices 4, 4a that are configured for resiliently connecting the fixation device 2 with the connection device 3. In other words, the suspension arrangement 1 serves the purpose of resiliently suspending one or more standing devices 8 on the frame device 9 of the training device 10.

[0073] In the present case, four suspension arrangements 1 are arranged within the recess 13 of the base element11 of the frame device 9, and wherein two suspension arrangements 1 are used for suspending one standing device 8, 8'. Thus, the training device 10 depicted in the figures comprises two standing devices 8, 8' that are arranged next to one another. Here, said standing devices 8, 8' have in each case the shape of a rectangular element that extends within the recess 13 of the base element 11 and, at least in an unused state of the training device 10, along the horizontal directions Ht1, Ht2 of the training device 10. The standing devices 8, 8' are thus vertically spaced apart from the ground as well. In order to facilitate access of the standing devices 8, 8' to a user the frame device 9 comprises here a step element 14 the user can step on when he or she wants to use the training device 10. Said step element 14 can of course also serve the purpose of assisting the descending from the training device 10. Furthermore, more than one step element 14 is conceivable.

[0074] The standing devices 8, 8' are made of an inelastic and bendable, however not stretchable material. The standing devices 8, 8' are furthermore arranged and configured such that a user of the training device 10 can stand on a surface 15 of the standing devices 8, 8'. The training device 10 is configured such that it can adopt one or more used states. A used state is understood as a state wherein a user of the training device 10 stands on the one or more standing devices 8, 8', in particular on their surfaces 15, 15', and presses or pushes the standing devices 8, 8' against a resilient

force of the suspension arrangement 1, in particular of its resilient devices 4, 4a. As a consequence, during the action of a pressing force or pushing force the standing devices 8, 8' are moved with respect to the base element 11 of the frame device 9 along the vertical direction Vt of the training device 10 towards the ground. In other words, the standing devices 8, 8' are lowered. Said position of the standing devices 8, 8' can be referred to as use position. In the absence of such a pressing or pushing force, the resilient force of the suspension arrangement 1, in particular of the resilient devices 4, 4a, returns the standing devices 8, 8' into their initial position, wherein the standing devices 8, 8' essentially extend along the horizontal plane PHt of the training device 10. A user can be said to perform a training if he or she transfers the standing device(s) 8, 8' into their used position and initial position several times. However, the training device 10 can also be used for other exercises such as balance exercises, wherein the user stands and balances with one of his legs on one or more of the standing devices 8, 8'. This balance exercise is likewise enabled by the resilient suspension of the standing device(s) 8, 8' by the suspension arrangement 1.

[0075] Each standing device 8, 8' comprises two opposed ends 16, 16'; 17, 17', wherein a first end of a first standing device 8 is connected to a first suspension arrangement 1, a second end 17 of the first standing device 8 is connected to a second suspension arrangement 1', a first end 16' of a second standing device 8' is connected to a third suspension arrangement 1", and a second end 17' of the second standing device 8' is connected to a fourth suspension arrangement 1"', respectively.

[0076] As best seen in figures 1 to 4, each suspension arrangement 1, 1', 1", 1"' comprises here one fixation device 2, 2', 2", 2"' and one connection device 3, 3', 3", 3"'. Whereas all connection devices 3, 3', 3", 3"' are configured separately from one another, two fixation devices 2, 2" and 2', 2"' being arranged on a same side of the training device 10 are provided as a single-piece element. It is of course likewise conceivable that the fixation devices 2, 2', 2", 2"' are in each case provided as individual devices as well. Furthermore, it is conceivable that the two connection devices 3, 3" and 3', 3"' being arranged on the same side of the training device 10 are provided as a single-piece element. The fixation devices 2, 2', 2", 2"' are connected to the frame device 9, in particular to a side wall 18 of the base element 11 of the frame device 9 that delimits the recess 13 of the base element 11. The connection devices 3, 3', 3", 3"' are in connection with the standing devices 8, 8' via straps 19, 19a, ... In other words, the fixation devices 2, 2', 2", 2"' are directly connected to the frame device 9 whereas the connection devices 3, 3', 3", 3"' are indirectly connected to the standing devices 8, 8'.

[0077] Each fixation device 2, 2', 2", 2"' comprises an elongate element 20 such as a plate or the like that defines a front surface 21 and an opposing back surface 22. The back surface 22 is connected to the frame device 9, in particular screwed to the side wall 18 of the base element 11. The front surface 21 comprises a plurality of fixation elements 5, 5a, 6, 6a that are used for the resilient connection of the fixation device 2, 2', 2", 2"' with the connection device 3, 3', 3", 3"', see also explanations provided further below with reference to figures 8 to 13.

[0078] Each connection device 3, 3', 3", 3"' defines a front region 23 and an opposing back region 24. The back region 24 is in connection with the standing device 8, 8' and the front region 23 comprises a plurality of connection elements 7, 7a, that are used for the resilient connection of the connection device 3, 3', 3", 3"' with the fixation device 2, 2', 2", 2"', see also explanations provided further below with reference to figures 14 to 17.

[0079] As follows from figure 4, a vertical direction Vf of the fixation device 2, 2', 2", 2"' and a horizontal direction Hf of the fixation device 2, 2', 2", 2"' running perpendicularly to said vertical direction Vf can be assigned to the fixation device 2, 2', 2", 2"'. Likewise, a vertical direction Vc of the connection device 3, 3', 3", 3"' and a horizontal direction Hc of the connection device 3, 3', 3", 3"' running perpendicularly to said vertical direction Vc can be assigned to the connection device 3, 3', 3", 3"'. In an installed position of the suspension arrangement 1, 1', 1", 1"', i.e. when the fixation devices 2, 2', 2", 2"' are fixed or connected to the frame device 9 and the connection device 3, 3', 3", 3"' is in connection with or connected to the standing device 8, 8', and in the unused state of the training device 10,the vertical direction Vf of the fixation device 2, 2', 2", 2"' runs parallel to the vertical direction Vc of the connection device 3, 3', 3", 3"'. In these positions, both, said vertical direction Vf of the fixation device 2, 2', 2", 2"' and said vertical direction Vc of the connection device 3, 3', 3", 3"' run parallel to a vertical direction Vs of the suspension arrangement 1, 1', 1", 1"', which in turn runs parallel to the vertical direction Vt of the training device, see figure 1. Likewise, in this installed position of the suspension arrangement 1, 1', 1", 1"' and when the training device 10 is in its unused state, the horizontal direction Hf of the fixation device 2, 2', 2", 2"' runs parallel to the horizontal direction Hc of the connection device 3, 3', 3", 3"'. In these positions, both said horizontal direction Hf of the fixation device 2, 2', 2", 2"' and said horizontal direction Hc of the connection device 3, 3', 3", 3'" run parallel to a first horizontal direction Hs1 of the suspension arrangement 1, 1', 1", 1"', which in turn runs parallel to the first horizontal direction Ht1 of the training device 10. Furthermore, in the unused state of the training device 10, the standing device 8, 8' and the suspension arrangement 1, 1', 1", 1"' are arranged in a common plane, in particular in the horizontal plane PHt of the training device 10. In the one or more used states of the training device 10 the standing devices 8, 8' have been moved along the vertical direction Vt of the training device 10 away from the base element 11 of the frame device 9 and towards the ground. In other words, the standing devices 8, 8' have been moved out of said common plane or horizontal plane PHt. Also in this used state of the training device 10 the vertical direction Vf of the fixation device 2, 2', 2", 2"' runs parallel to the vertical direction Vt of the training device 10 and the horizontal direction Hf of the fixation device 2, 2', 2", 2"' runs parallel to the horizontal direction Ht of the training device

10. However, because the standing devices 8, 8' are at least partially bent in the used state because of the weight of the user standing on them, the connection devices 3, 3', 3", 3"' being in connection with the standing devices 8, 8' are tilted (not depicted). Consequently, in a used state of the training device 10 the vertical direction Vc of the connection device 3, 3', 3", 3"' does no longer run parallel to the vertical direction Vf of the fixation device 2, 2', 2", 2'" or the vertical direction Vt of the training device 10. The same applies to the horizontal direction Hc of the connection device 3, 3', 3", 3"', which is no longer parallel to the horizontal direction Hf of the fixation device 2, 2', 2", 2"' or the first horizontal device Ht1 of the training device 10.

[0080] As best seen in figures 5 to 7, the suspension arrangement 1, 1', 1", 1"' comprises here a plurality of resilient devices 4, 4a, 4b, ... in the form of elastic ropes. Said elastic ropes 4, 4a, ... are arranged on the front region 23 of the connection device 3, 3', 3", 3"', in particular in connection with the connection elements 7, 7a, ..., as well as on the front surface 21 of the fixation device 2, 2', 2", 2"', in particular in connection with the fixation elements 5, 5a, 6, 6a,....

[0081] As is readily evident from figures 5 to 7, the resilient devices 4, ... extend inclined between the fixation device 2, 2', 2", 2"' and the connection device 3, 3', 3", 3'" so as to form at least one first inclination running along a first inclination direction du, i.e. an upward inclination 4u, and at least one second inclination running along a second inclination direction dd, i.e. a downward inclination 4d. The upward inclination 4u runs upward between the connection device 3, 3', 3", 3"' and the fixation device(2, 2', 2", 2"' with respect to a horizontal plane PHs of the suspension arrangement 1, 1', 1", 1"' and the horizontal plane PHt of the training device 10 when the training device 10 is in its unused state.

[0082] Similarly, the downward inclination 4d runs downward between the connection device 3, 3', 3", 3"' and the fixation device 2, 2', 2", 2"' with respect to the horizontal plane PHs of the suspension arrangement 1, 1', 1", 1"' and the horizontal plane PHt of the training device 10 when the training device 10 is in its unused state. In other words, the downward inclination 4d and the upward inclination 4u are inclined in opposite directions. The horizontal plane PHs of the suspension arrangement 1, 1', 1", 1"' is defined here by the first horizontal direction Hs1 of the suspension arrangement 1, 1', 1", 1"' and a second horizontal direction Hs2 of the suspension arrangement 1, 1', 1", 1"' running perpendicularly to the first horizontal direction Hs1 of the suspension arrangement 1, 1', 1", 1"'. Said second horizontal direction Hs2 of the suspension arrangement 1, 1', 1", 1" furthermore runs perpendicularly to the vertical direction Vf of the fixation device 2, 2', 2", 2"', the vertical direction Vc of the connection device 3, 3', 3", 3"', to the vertical direction Vt of the training device 10, as well as to the vertical direction Vs of the suspension arrangement 1, 1', 1", 1"'.

[0083] As mentioned earlier, when the training device 10 is transferred in its used state the standing devices 8, 8' are moved along the vertical direction Vt of the training device 10 towards the ground. Because the connection devices are in connection with the standing devices 8, 8' the connection devices are consequently moved along the vertical direction Vt of the training device 10 towards the ground as well. In this used state of the training device 10 both the upward inclination 4u and the downward inclination 4d formed by the resilient devices 4, ... extend vertically upward between the connection devices and the fixation devices and with respect to a horizontal plane running horizontally through the standing devices 8, 8'. Said horizontal plane runs parallel to the horizontal plane PHs of the suspension arrangement and the horizontal plane PHt of the training device 10 when the training device is in its unused state. However, and as is illustrated with respect to figure 7 below, an angle of inclination α that is formed between a central axis Cu running centrally through the upward inclination 4u and a central axis Cd running centrally through the downward inclination 4d in the unused state of the training device 10 remains the same or essentially the same. As follows from figure 7, the central axis Cu of the upward inclination 4u runs along the first direction du and the central axis Cd of the downward inclination 4d runs along the second direction dd.

[0084] In the depicted embodiment the suspension arrangement 1, 1', 1", 1"' comprises a plurality of upward inclinations 4u and downward inclinations 4d, wherein said plurality of upward inclinations 4u and downward inclinations 4d are provided in an alternating manner, i.e. upward inclinations 4u are followed by downward inclinations 4d which in turn areee followed by upward inclinations 4u etc., when seen along the horizontal directions Hf, Hc, Ht1, Hs1. Here, each inclination 4u, 4d is provided by a particular resilient device 4, 4a, ... That is, a first resilient device 4 is arranged so as to form an upward inclination 4u, its neighbouring second resilient device 4a is arranged so as to form an upward inclination 4u, the neighbouring third resilient device 4b is arranged so as to form a downward inclination 4detc. It should be noted that it is likewise conceivable that one resilient device is arranged such, that it runs upward as well as downward. Other arrangements of the inclinations are of course likewise conceivable.

[0085] The angle of inclination α that is formed between the central axis Cu running centrally through the upward inclination 4u and the central axis Cd running centrally through the downward inclination 4d in the unused state of the training device 10 is here about 10°, see figure 7. In the used state of the training device 10, said angle of inclination α remains about 10° when the training device is subject to a normal use. However, when the training device is used intensively said angle of inclination could be smaller.

[0086] The inclination of the resilient devices 4, 4a, ... is achieved here by the provision of staggered fixation elements 5, 5a, 6, 6a, ... of the fixation devices 2, 2', 2", 2"'. For the sake of simplicity the following explanations are made with regard to two of such staggered fixation elements 5, 6 of the plurality of fixation elements. Namely, and as follows from figures 8 to 13, the fixation device 2 comprises at least one first fixation element 5 and at least one second fixation

element 6, and wherein the first fixation element 5 and the second fixation element 6 are arranged staggered from one another with respect to the vertical directionVf) of the fixation device 2. Furthermore, the first fixation element 5 and the second fixation element 6 are arranged staggered from one another with respect to the horizontal direction Hf of the fixation device 2.

[0087] As mentioned earlier, the connection device 3 comprises a plurality of connection elements 7, 7a, ... For the sake of simplicity reference is again made to two connection elements 7, 7a of said plurality of connection elements. Hence, and as follows from figures 14 and 15, at least one first connection element 7 and at least one second connection element 7a are arranged in a staggered manner from one another with respect to the horizontal direction Hc of the connection device 3. However, said first connection element 7 and said second connection element 7a are arranged in a non-staggered manner from one another with respect to the vertical direction Vc of the connection device 3.

[0088] Thus, by providing a first resilient device 4 that connects the first connection element 7 with the first fixation element 5 and a further resilient device 4b that connects the second connection element 7a with the second fixation element 6, the first resilient device 4 and the further resilient device 4b extend between the connection device 3 and the fixation device 2 at different inclinations, namely an upward inclination 4u and a downward inclination 4d.

[0089] Furthermore, and as also best seen in figure 7, the connection device 3 is arranged with respect to the fixation device 2 such, that its connection elements 7, 7a, ... lie between the first fixation elements 5, 5a, ... and the second fixation elements 6, 6a, ... with respect to the vertical direction Vs of the suspension arrangement 1. That is, at least in the unused state of the training device 10, the connection device 3, in particular its connection elements 7, 7a, .. are arranged on a vertical height that lies between a vertical height of the first fixation element 5, 5a, ... and a vertical height of the second fixation element 6, 6a, ... with respect to the vertical direction Vs) of the suspension arrangement 1 and consequently with respect to the vertical direction Vt of the training device 10.

[0090] It is essential to note that said inclinations 4u, 4d of the resilient devices 4, 4a, ... can likewise be obtained if the connection elements 7, 7a, ... of the connection device 3, 3', 3", 3"' are arranged staggered from one another with respect to the vertical direction Vc of the connection device 3, 3', 3", 3"' and if the fixation elements 5, 5a, 6, 6a, ... of the fixation device are arranged in a non-staggered manner from one another with respect to the vertical direction Vf of the fixation device 2, 2', 2", 2"'. Finally, it should be noted that said inclinations 4u, 4d of the resilient devices 4, 4a, ... could also be obtained if both, the connection elements 7, 7a, ... as well as the fixation elements 5, 5a, 6, 6a, ... are arranged in a staggered manner from one another with respect to the vertical direction Vc of the connection device 3, 3', 3", 3"' and the vertical direction Vf of the fixation device 2, 2', 2", 2"', respectively. Hence, any explanations that are provided herein with regard to fixation elements 5, 5a, 6, 6a, ... being staggered with respect to the vertical direction Vf of the fixation device 2, 2', 2", 2"' likewise apply to connection elements 7, 7a, ... being arranged in a staggered manner with respect to the vertical direction Vc of the connection device 3, 3', 3", 3"'.

[0091] Regarding the plurality of fixation elements 5, 5a, 6, 6a, ... and the plurality of connection elements 7, 7a, ... the following should be noted as well. In fact, and as follows from figures 8 to 13, it can be said that the fixation device 2, 2', 2", 2"' comprises at least one further first fixation element 5a, wherein the first fixation element 5 and the further first fixation element 5a are arranged staggered from one another with respect to the horizontal direction Hf of the fixation device 2. Furthermore, the first fixation element 5 and the further first fixation element 5a are arranged in a non-staggered manner from one another with respect to the vertical direction Vf of the fixation device 2, 2', 2", 2"'. The first fixation element 5 and further first fixation element 5a are arranged in pairs, wherein hereinafter said pairs are called first pairs Pf1. Because the fixation device 2, 2', 2", 2"' comprises a plurality of first and further first fixation elements 5, 5a, ... it can be said to comprise a plurality of such first pairs Pf1, wherein said plurality of first pairs Pf1 are arranged staggered from one another with respect to the horizontal direction Hf of the fixation device 2, 2', 2", 2"'. However, said plurality of first pairs Pf1 are arranged in a non-staggered manner from one another with respect to the vertical direction Vf of the fixation device 2, 2', 2", 2"', i.e. said plurality of first pairs Pf1 are arranged on a same vertical height with respect to the vertical direction Vf of the fixation device 2, 2', 2", 2"'.

[0092] The fixation device 2, 2', 2", 2"' likewise comprises at least one further second fixation element 6a, wherein the second fixation element 6 and the further second fixation element 6a are arranged staggered from one another with respect to the horizontal direction Hf of the fixation device 2, 2', 2", 2"'. Moreover, the second fixation element 6 and the further second fixation element 6a are arranged in a non-staggered manner from one another with respect to the vertical direction Vf of the fixation device 2, 2', 2", 2"'. Hence, here again it is noted that the second fixation element 6 and the further second fixation element 6a are arranged in pairs, wherein hereinafter said pairs are called second pairs Pf2. Since the fixation device 2, 2', 2", 2"' comprises a plurality of second and further second fixation elements 6, 6a, ... it can be said to comprise a plurality of such second pairs Pf2, wherein said plurality of second pairs Pf2 are arranged staggered from one another with respect to the horizontal direction Hf of the fixation device 2, 2', 2", 2"'. However, said plurality of second pairs Pf2 are arranged in a non-staggered manner from one another with respect to the vertical direction Vf of the fixation device 2, 2', 2", 2"', i.e. said plurality of second pairs Pf2 are arranged on a same vertical height with respect to the vertical direction Vf of the fixation device 2, 2', 2", 2"'. As is readily evident from figures 8 and 10 and from figures 12 and 13, a vertical distance between the plurality of first pairs Pf1 and the plurality of second pairs

Pf2 is the same with respect to the vertical direction Vf of the fixation device. Furthermore, a horizontal distance between successive first pairs Pf1 with respect to the horizontal direction Hf of the fixation device 2, 2', 2", 2'" is in each case the same. The horizontal distance between successive second pairs Pf2 however differs. As also follows from these figures, the number of first pairs Pf1 is larger than the number of second pairs Pf2. In fact, six first pairs Pf1 are provided whereas only four second pairs Pf2 are provided in the present example. However, the first pairs Pf1 and the second pairs Pf2 are arranged symmetrically with respect to a mirror plane extending centrally through the fixation device 2, 2', 2", 2"' and perpendicularly to the vertical direction Vf and the horizontal direction Hf of the fixation device 2, 2', 2", 2"'. As indicated in figure 10, a vertical distance dvf between the first fixation element and the second fixation element, in particular a (fictitious) central point of the first fixation element and a (fictitious) central point of the second fixation element is here about 3.5 cm. A horizontal distance dhf between said first fixation element and second fixation element, in particular between their (fictitious) central points, is here about 4 cm. Furthermore, a horizontal distance dhfa between the first fixation element and its neighbouring further first fixation element is here about 3 cm. Moreover, a horizontal distance dhfb between two neighbouring first fixation elements of neighbouring first pairs Pf1 is here about 5 cm.

[0093] As becomes readily apparent from a comparison of figures 8 to 11 with figures 12 and 13, different designs of the fixation elements 5, 5a, 6, 6a, ... are conceivable. In fact, figures 8 to 11 depict a first embodiment of a fixation device 2, 2', 2", 2'" and figures 12 to 13 depict a second embodiment of a fixation device 2, 2', 2", 2"', wherein the fixation elements 5, 5a, 6, 6a, ... of the first embodiment are designed as single hooks, and whereas the fixation elements 5, 5a, 6, 6a, ... of the second embodiment are designed as double hooks. In fact, the single hooks 5, 5a, 6, 6a, ... according to the first embodiment comprise a straight region 25 extending perpendicularly away from the front surface 21 of the fixation device 2, 2', 2", 2"', wherein said straight region 25 transitions into a bent region 26 facing away from the front surface 21 of the fixation device 2, 2', 2", 2"'. As best seen in figure 11, said bent region 26 is bent by approximately 180° and forms a free end 27 which, in turn, faces the front surface 21 of the fixation device 2, 2', 2", 2"'. The double hooks 5, 5a, 6, 6a, ... according to the second embodiment are provided by a common straight region 25 extending perpendicularly away from the front surface 21 of the fixation device 2, 2', 2", 2"', and wherein said straight region 25 transitions into two bent regions 26 in a region facing away from the front surface 21 of the fixation device 2, 2', 2", 2"'. Here again said bent regions 26 are bent in each case by approximately 180° and form in each case a free end 27 facing the front surface 21 of the fixation device 2, 2', 2", 2"'.

[0094] As also follows from figures 8 to 13, hooks constituting the first pairs Pf1 and the second pairs Pf2 are oriented differently from one another. In particular, the hook constituting the first fixation element 5 (second fixation element 6) and the hook constituting the further first fixation element 5a (further second fixation element 6a) comprise bent regions 26 extending in opposite directions and/or which are arranged in a mirror-inverted manner with respect to a mirror plane extending along the vertical direction Vf of the fixation device 2, 2', 2", 2"' and between the first fixation element 5 (second fixation element 6) and the further first fixation element 5a (further second fixation element 6a). In this way, the resilient devices 4, 4a, ... can be laterally hooked in the fixation elements 5, 5a, 6, 6a, ...

[0095] With reference to figures 14 and 17 aspects of the connection device 3, 3', 3", 3"' are explained in greater detail. As is apparent from a comparison of these figures, different designs of the connection device 3, 3', 3", 3"' are likewise conceivable. In fact, a first embodiment depicted in figures 14 and 15 depict a connection device 3, 3', 3", 3"' that comprises an elongate base body 28 extending along the horizontal direction Hc of the connection device 3, 3', 3", 3"'. The base body 28 comprises several protrusions 29 protruding from said base body 28 along the second horizontal direction Hs2 of the suspension arrangement 1, 1', 1", 1"' when seen in the installed position. In other words, the protrusions 29 protrude laterally from the base body 28 when the suspension arrangement 1, 1', 1", 1"' is in the installed position, and wherein the protrusions 29 are facing towards the fixation device 2, 2', 2", 2"'. That is, the protrusions 29 constitute the front region 23 of the connection device 3, 3', 3", 3"' mentioned above. In the installed position, the base body 28 is facing away from the fixation device 2, 2', 2", 2"' and facing towards the standing device 8, 8'. That is, the base body 28 constitutes the back region 24 of the connection device 3, 3', 3", 3"' mentioned above. Here, said protrusions 29 are uniformly spaced from one another with respect to the horizontal direction Hc of the connection device 3, 3', 3", 3"'. Each protrusion 29 comprises in a region of its free end 30 a through hole 31. A bar 32 extends through the through-holes 31 of the protrusions 29, whereby connection elements 7, 7a, ... being provided by the bar 32 and being furthermore laterally delimited by the protrusions 29 are generated. The back region 24 of the connection device 3, 3', 3", 3"', i.e. the base body 28, comprises several oblong holes 33 that are arranged along the horizontal direction Hc of the connection device 3, 3', 3", 3"'. Said oblong holes 33 serve the purpose of connecting the connection device 3, 3', 3", 3"' to the standing device 8, 8', e.g. via straps or ribbons 19, .. or the like that are fastened to said oblong holes 33 on the one side and to the standing device 8, 8' on the other side. As indicated in figure 15, a horizontal distance dhc between two consecutive connection elements, in particular between their (fictitious) central points is here about 4 cm. Furthermore, a horizontal distance dhca between two consecutive projections 23 is here about 4 cm. Moreover, a horizontal width dhcb of the projection 23 is here about 1 cm.

[0096] The second embodiment of the connection device depicted in figures 16 and 17, wherein the bar providing the connection elements 3, 3', 3", 3"' has been omitted, differs from the first embodiment in the design of the base body 28.

In fact, instead of an elongate base body comprising oblong holes, protrusions 34 in the back region 24 of the connection device 3, 3', 3", 3"' are provided. That is, the second embodiment comprises protrusions 29, 34 extending from opposite sides of the base body 28. The protrusions 34 in the back region 24 of the connection device 3, 3', 3", 3"' are designed analogous to the protrusions 29 in the front region 23 of the connection device 3, 3', 3", 3"' and likewise comprise through-holes 35 in the region of their free ends 36, which through-holes 35 can accommodate a bar (not depicted) so as to generate connection elements that allow a connection of the back region 24 of the connection device 3, 3', 3", 3"' with the standing devices 8, 8'.

[0097] Hence, in any case a fixation device 2, 2', 2", 2"' comprising fixation elements 5, 5a, 6, 6a, ... in the form of hooks and a connection device 3, 3', 3", 3"' comprising connection elements 7, 7a, ... in the form of a bar are provided. These designs allow a connection of the resilient device 4, 4a, ... by means of hooking the resilient device 4, 4a, ... in a hook 5, 5a, 6, 6a, ... and by looping the resilient device 4, 4a, ... around the bar 7, 7a, ...

[0098] In the disclosed figures one individual fixation element 5, 5a, 6, 6a, ... is connected with one individual resilient device 4, 4a, ..., wherein the fixation elements 5, 5a, 6, 6a, ... constituting a pair Pf1, Pf2 are individually connected with a common connection element 7, 7a, ... via a corresponding resilient device 4, 4a, ..., see figures 5 to 7. That is, a first connection element 7 is connected with a first fixation element 5 via a first resilient device 4, and said same first connection element 7 is connected with a further first fixation element 5a via a second resilient device 4a. A second connection element 7a is connected with a second fixation element 6 via a third resilient device 4b, and said same second connection element 7a is connected with a further second fixation element 6a via a fourth resilient device 4c, etc. The first fixation element 5 and the further first fixation element 5a constitute a first pair Pf1 as described above. The second fixation element 6 and the further second fixation element 6a constitute a second pair Pf2 as described above. Here, the resilient devices 4, 4a, ... are arranged inclined upwardly and downwardly in an alternating manner, wherein the resilient devices 4, 4a connecting to the first connection element 7 extend inclined upwardly, and the resilient devices 4b, 4c connecting to the second connection element 7a extend inclined downwardly, etc.

[0099] It has been found out that the characteristics of the resilient devices 4, 4a, ... have an essential impact on the training possibilities offered by the training device 10. In fact, resilient devices exhibiting elastic properties as disclosed in the diagram of figure 18 are particularly preferred. Said properties are a tensile force of at least 100 N at a strain of 100 %, more preferably of at least 140 N at a strain of 100 %, and particularly preferably of at least 160 N at a strain of 100 %. These properties are here provided by a commercially available elastic rope having a diameter of 14 millimetre, a braiding of PES 1100x1, and so-called High Performance rubber (synthetic) rubber threads.

LIST OF REFERENCE SIGNS

1, 1', ...	suspension arrangement	28	base body
2, 2', ...	fixation device	29	protrusion
3, 3', ...	connection device	30	free end
4, 4a, ...	resilient device	31	through hole
4d	downward inclination	32	bar
4u	upward inclination	33	oblong holes
5, 5a, ...	first fixation element	34	protrusions
6, 6a, ...	second fixation element	35	through hole
7	first connection element	36	free end
7a	second connection element		
		PHs	horizontal plane
8. 8'	standing device	PHt	horizontal plane
9	frame device	Ht1	horizontal direction
10	training device	Ht2	horizontal direction
11	base element	Hc	horizontal direction
12	rail element	Vc	vertical direction
13	recess	Hf	horizontal direction
14	step element	Vf	vertical direction
15, 15'	surface	Vt	vertical direction
16, 16'	end	Pf1	first pair
17, 17'	end	Pf2	second pair
18	side wall	dvf	vertical distance
19, 19a, ...	strap	dhf	horizontal distance
20	element	dhfa	horizontal distance

(continued)

21	front surface	dhfb	horizontal distance
22	back surface	dhc	horizontal distance
23	front region	dhca	horizontal distance
24	back region	dhcb	horizontal width
25	region	du	first inclination direction
26	region	dd	second inclination direction
27	free end		

Claims

1. A suspension arrangement (1) for suspending at least one standing device (8) on a frame device (9) of a training device (10), the suspension arrangement (1) comprising:

   - at least one fixation device (2) for fixation to the frame device (9);
   - at least one connection device (3) for connection with the standing device (8); and
   - at least one resilient device (4, 4a) for resiliently connecting the fixation device (2) with the connection device (3);

   characterized in that the resilient device (4, 4a) extends inclined between the fixation device (2) and the connection device (3) so as to form at least one first inclination (4u) running along a first inclination direction (du) and at least one second inclination (4d) running along a second inclination direction (dd) being different from the first inclination direction (du).

2. The suspension arrangement according to claim 1, wherein the fixation device (2) comprises at least one first fixation element (5) and at least one second fixation element (6),

   wherein the fixation device (2) and the connection device (3) are in connection with one another via the first and second fixation elements (5; 6) of the fixation device (2), and
   wherein the first fixation element (5) and the second fixation element (6) are arranged staggered from one another with respect to a vertical direction (Vf) of the fixation device (2), or
   wherein the first fixation element (5) and the second fixation element (6) are arranged in a non-staggered manner from one another with respect to the vertical direction (Vf) of the fixation device (2).

3. The suspension arrangement (1) according to claim 2, wherein the first fixation element (5) and the second fixation element (6) are arranged staggered from one another with respect to a horizontal direction (Hf) of the fixation device (2) running perpendicularly to the vertical direction (Vf) of the fixation device (2).

4. The suspension arrangement (1) according to claim 2 or 3, wherein the fixation device (2) comprises at least one further first fixation element (5a),

   wherein the first fixation element (5) and the further first fixation element (5a) are arranged staggered from one another with respect to the horizontal direction (Hf) of the fixation device (2), and/or
   wherein the first fixation element (5) and the further first fixation element (5a) are arranged in a non-staggered manner from one another with respect to the vertical direction (Vf) of the fixation device (2).

5. The suspension arrangement (1) according to any one of the preceding claims 2 to 4, wherein the fixation device (2) comprises at least one further second fixation element (6a),

   wherein the second fixation element (6) and the further second fixation element (6a) are arranged staggered from one another with respect to the horizontal direction (Hf) of the fixation device (2), and/or
   wherein the second fixation element (6) and the further second fixation element (6a) are arranged in a non-staggered manner from one another with respect to the vertical direction (Vf) of the fixation device (2).

6. The suspension arrangement (1) according to any one of the preceding claims, wherein the connection device (3) comprises at least one first connection element (7) and at least one second connection element (7a),

wherein the first connection element (7) and the second connection element (7a) are arranged in a staggered manner from one another with respect to a horizontal direction (Hc) of the connection device (3), and/or
wherein the first connection element (7) and the second connection element (7a) are arranged in a staggered or non-staggered manner from one another with respect to a vertical direction (Vc) of the connection device (3) running perpendicularly to the horizontal direction (Hc) of the connection device (3).

7. The suspension arrangement (1) according to any one of claims 2 to 6, wherein the resilient device (4, 4a) is in connection with the first fixation element (5) and/or with the further first fixation element (5a), and wherein the resilient device (4, 4a) is preferably in connection with the first connection element (7).

8. The suspension arrangement (1) according to any one of claims 2 to 7, further comprising at least one further resilient device (4b, 4c), wherein the further resilient device (4b, 4c) is in connection with the second fixation element (6) and/or with the further second fixation element (6a), and wherein the further resilient device (4b, 4c) is preferably in connection with the second connection element (7a).

9. The suspension arrangement (1) according to any one of the preceding claims 2 to 8, wherein the first fixation element (5) and/or the further first fixation element (5a) and/or the second fixation element (6) and/or the further second fixation element (6a) has the shape of a hook, and
wherein the resilient device (4, 4a) and/or the further resilient device (4b, 4c) is preferably hooked in one or more of the hooks.

10. The suspension arrangement (1) according to any one of the preceding claims 6 to 9, wherein the first connection element (7) and/or the second connection element (7a) has the shape of a bar, and
wherein the resilient device (4, 4a) and/or the further resilient device (4b, 4c) is preferably looped around one or more of the bars.

11. A training device (10) comprising at least one standing device (8), a frame device (9) and at least one suspension arrangement (1) according to any one of the preceding claims.

12. The training device (10) according to claim 11, wherein, at least in an unused state of the training device (10), the standing device (8) and the suspension arrangement (1) are arranged in a common plane (PHt), and/or

wherein, at least in the unused state of the training device (10), the resilient device (4, 4a) extends inclined between the connection device (3) and the fixation device (2) so as to form at least one first inclination (4u) and at least one second inclination (4d),
wherein the first inclination (4u) preferably runs upward between the connection device (3) and the fixation device (2) with respect to a horizontal plane (PHt) of the training device (10), and/or
wherein the second inclination (4d) preferably runs downward between the connection device (3) and the fixation device (2) with respect to the horizontal plane (PHt) of the training device (10).

13. Use of at least one suspension arrangement (1) according to any one of the preceding claims 1 to 10 for suspending at least one standing device (8) on a frame device (9) of a training device (10).

14. A method of suspending at least one standing device (8) on a frame device (9) of a training device (10), the method comprising the steps of:

- Providing at least one suspension arrangement (1) according to any one of claims 1 to 10;
- Fixing the at least one fixation device (2) to the frame device (9);
- Connecting the at least one connection device (3) with the at least one standing device (8); and
- Connecting the at least one fixation device (2) and the at least one connection device (3) via the at least one resilient device (4, 4a).

15. A method of producing a suspension arrangement (1) for suspending at least one standing device (8) on a frame device (9) of a training device (10), the method comprising the steps of:

- Providing at least one fixation device (2) for fixation to the frame device (9);
- Providing at least one connection device (3) for connection with the standing device (8); and
- Providing at least one resilient device (4, 4a) for resiliently connecting the fixation device (2) with the connection

device (3);

characterized in that the resilient device (4, 4a) extends inclined between the fixation device (2) and the connection device (3) so as to form least one first inclination (4u) running along a first inclination direction (du) and at least one second inclination (4d) running along a second inclination direction (dd) being different from the first inclination direction (du).

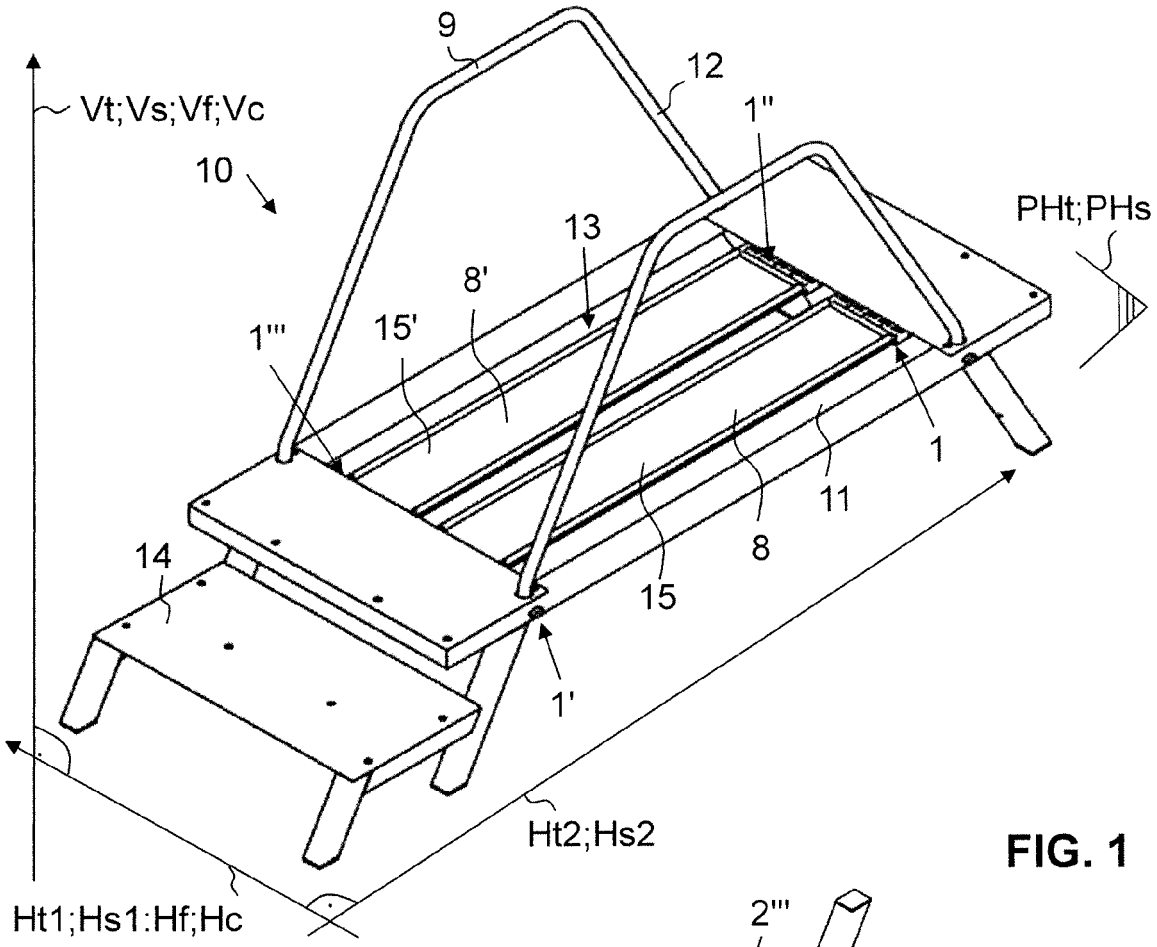
9
12
1"
Vt;Vs;Vf;Vc
10
PHt;PHs
13
8'
1'''
15'
1
11
8
14
15
1'
Ht2;Hs2
Ht1;Hs1:Hf;Hc

FIG. 1

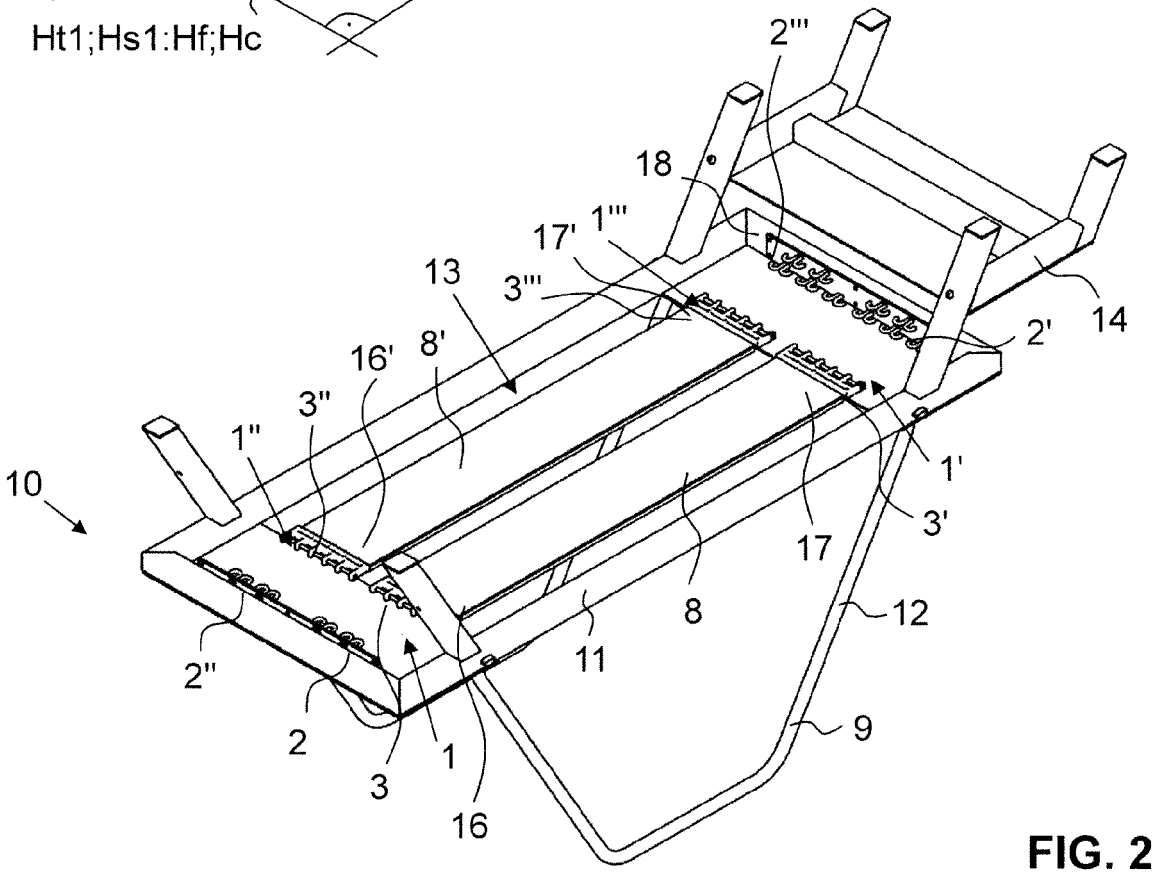
2'''
18
17'
1'''
13
3'''
14
2'
16'
8'
3"
1"
1'
10
3'
17
8
12
11
2"
9
2
1
3
16

FIG. 2

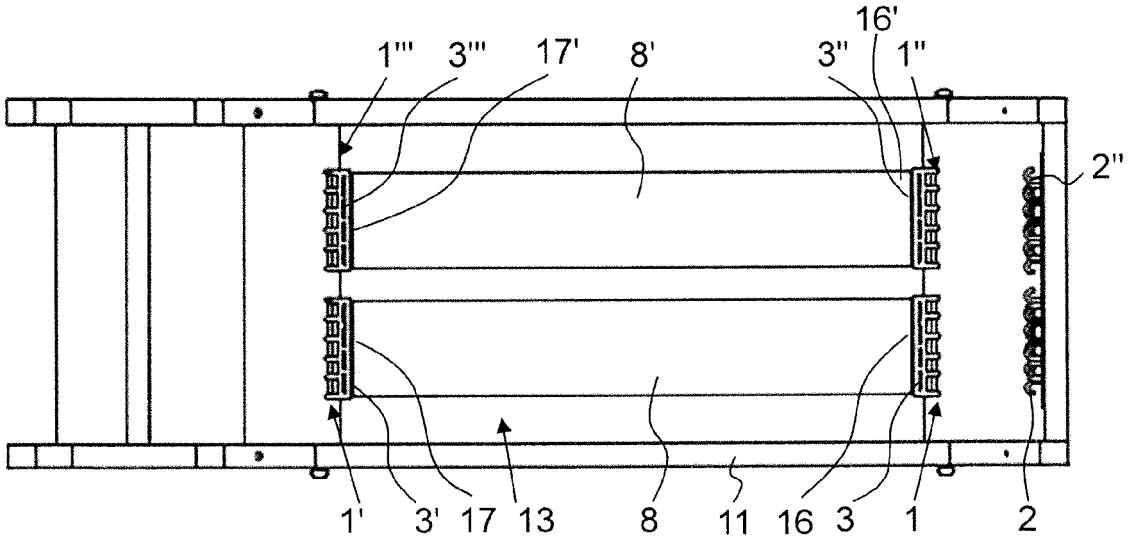
1'''
3'''
17'
8'
16'
3''
1''
2''
1'
3'
17
13
8
11
16
3
1
2

FIG. 3

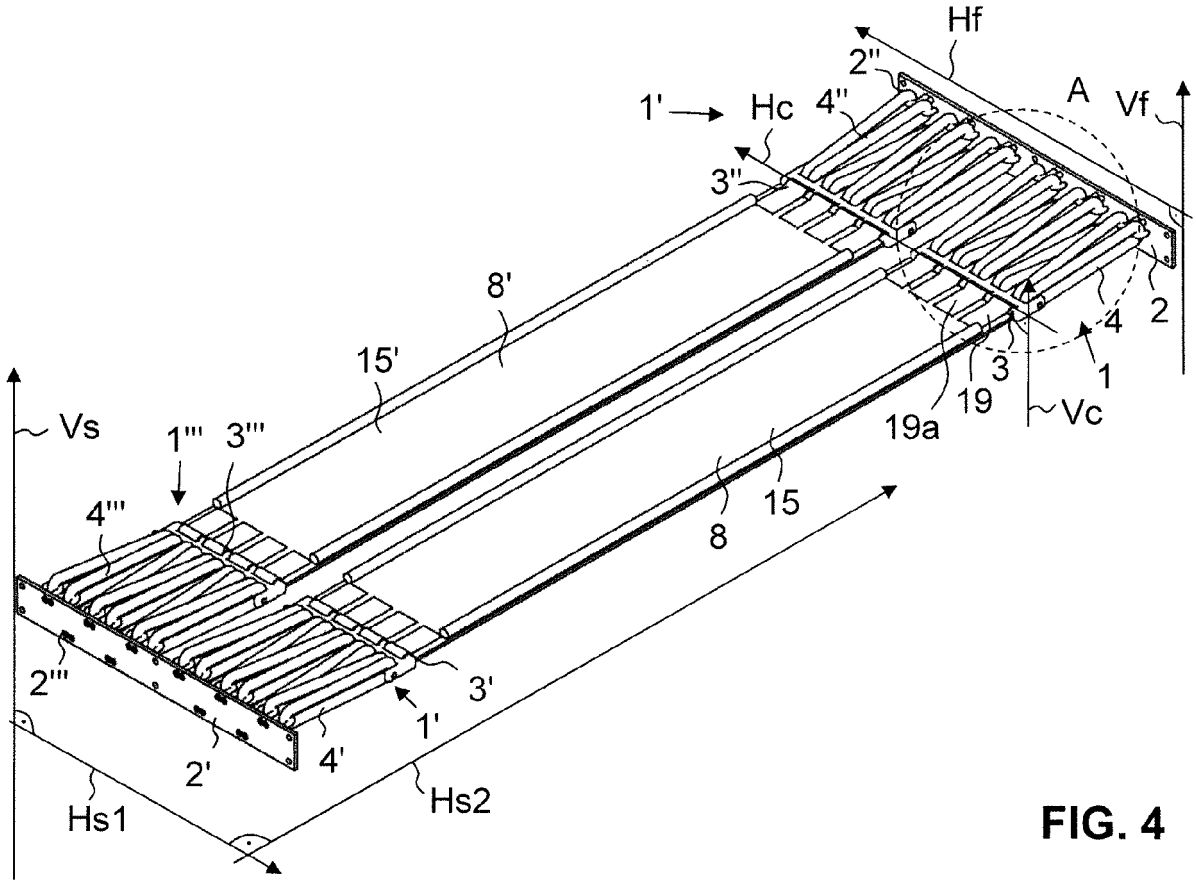
Hf
2''
1'
Hc
4''
A
Vf
3''
8'
15'
2
4
3
1
19
19a
Vc
Vs
1'''
3'''
4'''
8
15
2'''
3'
1'
2'
4'
Hs1
Hs2

FIG. 4

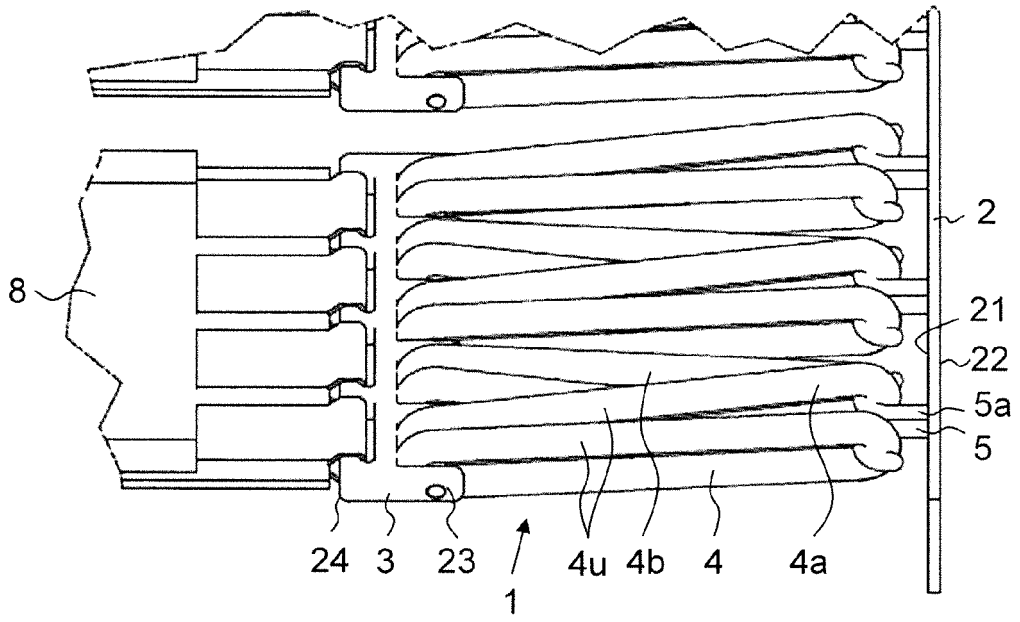

FIG. 5

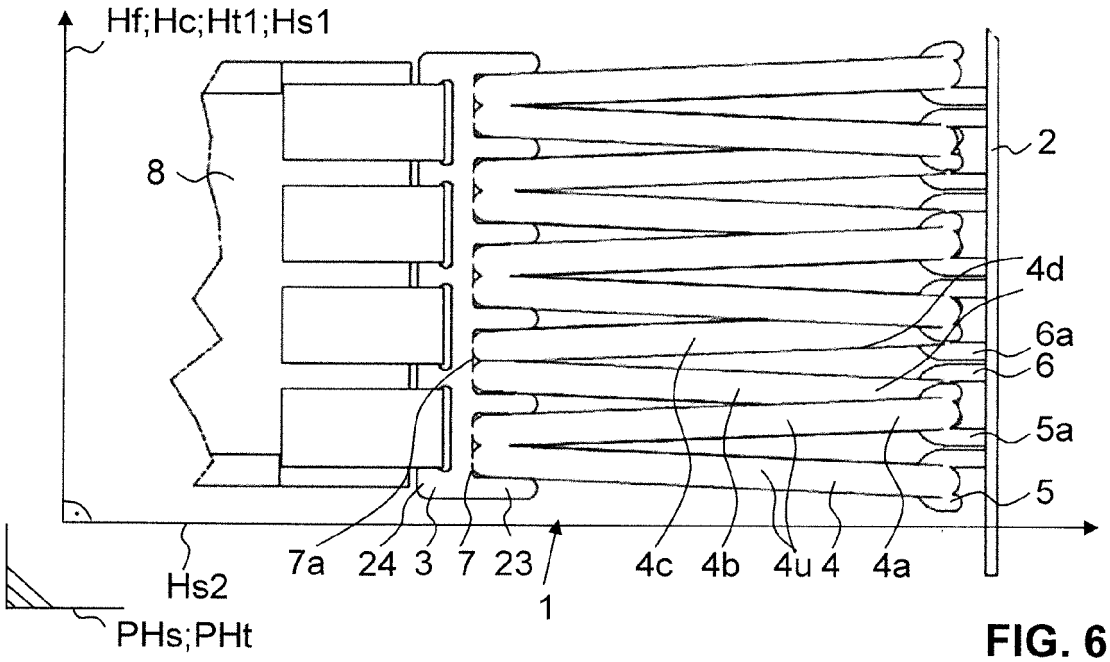

FIG. 6

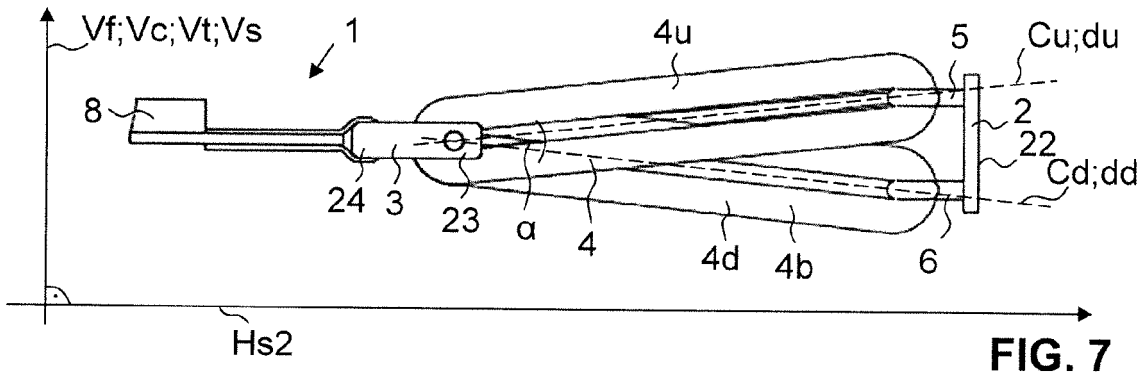

FIG. 7

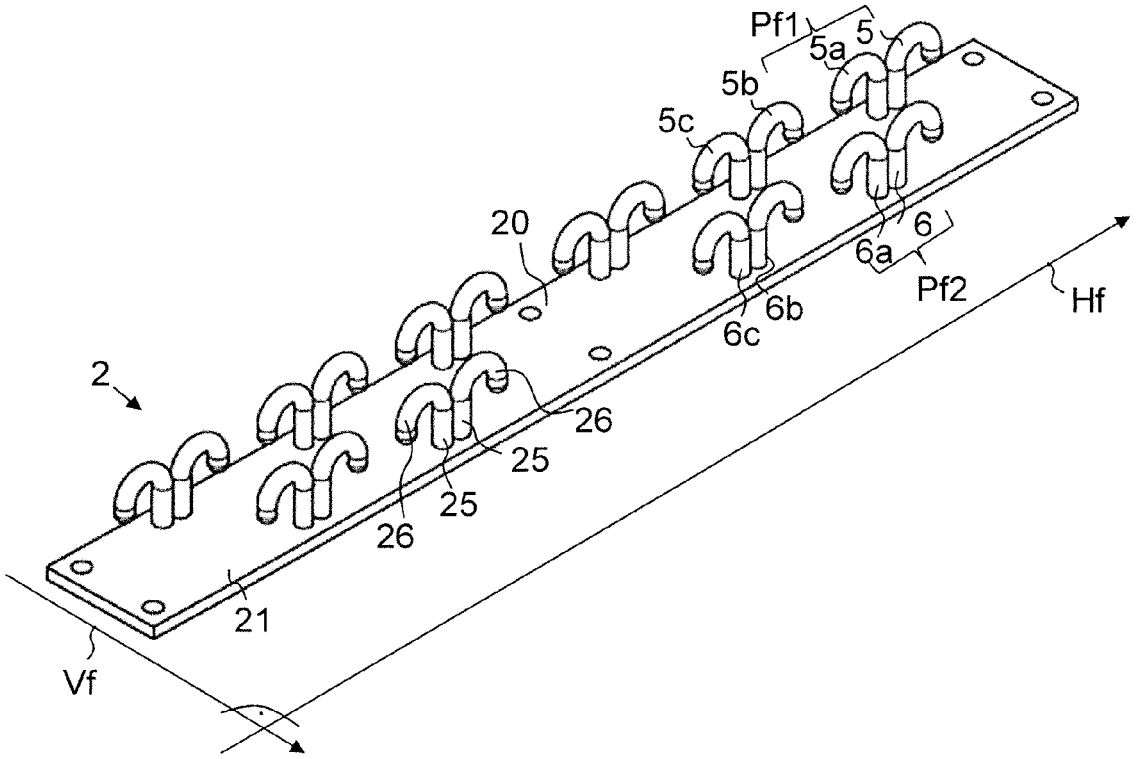

FIG. 8

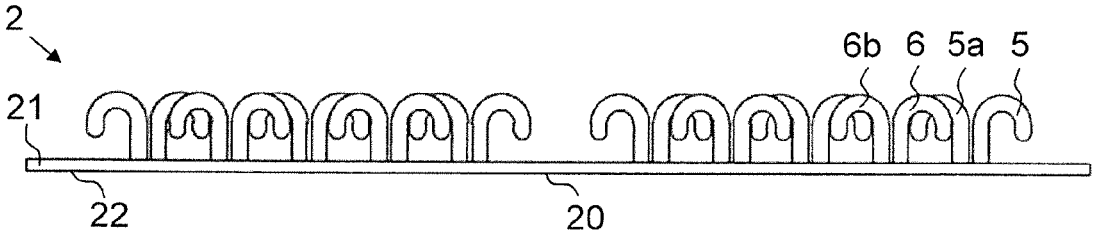

FIG. 9

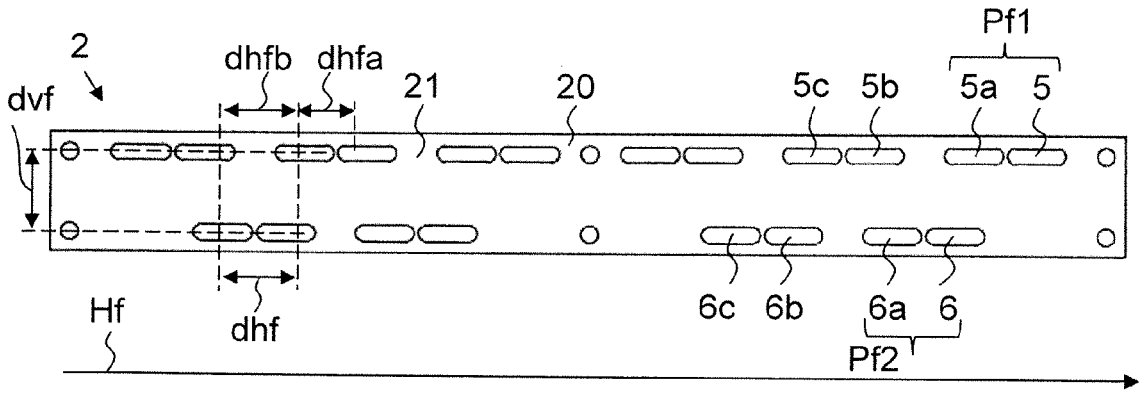

FIG. 10

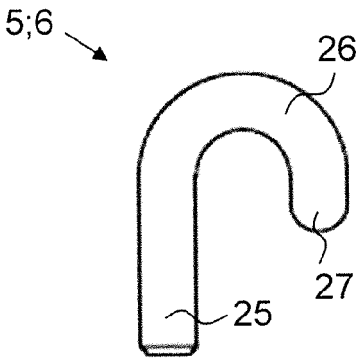

FIG. 11

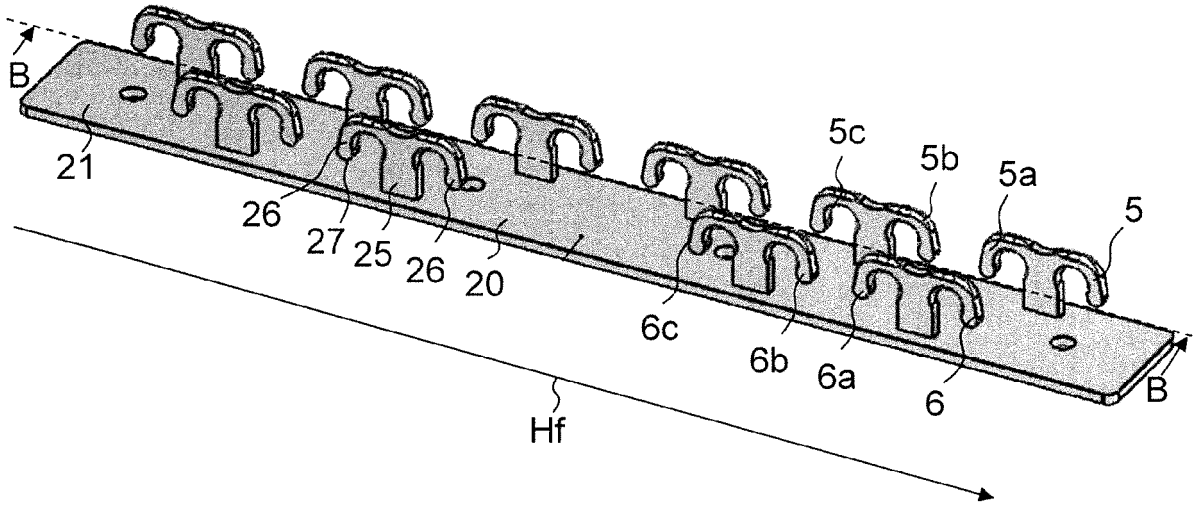

FIG. 12

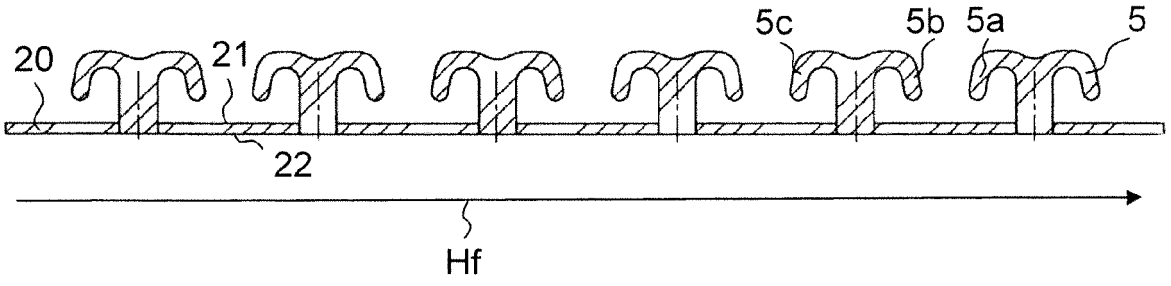

FIG. 13

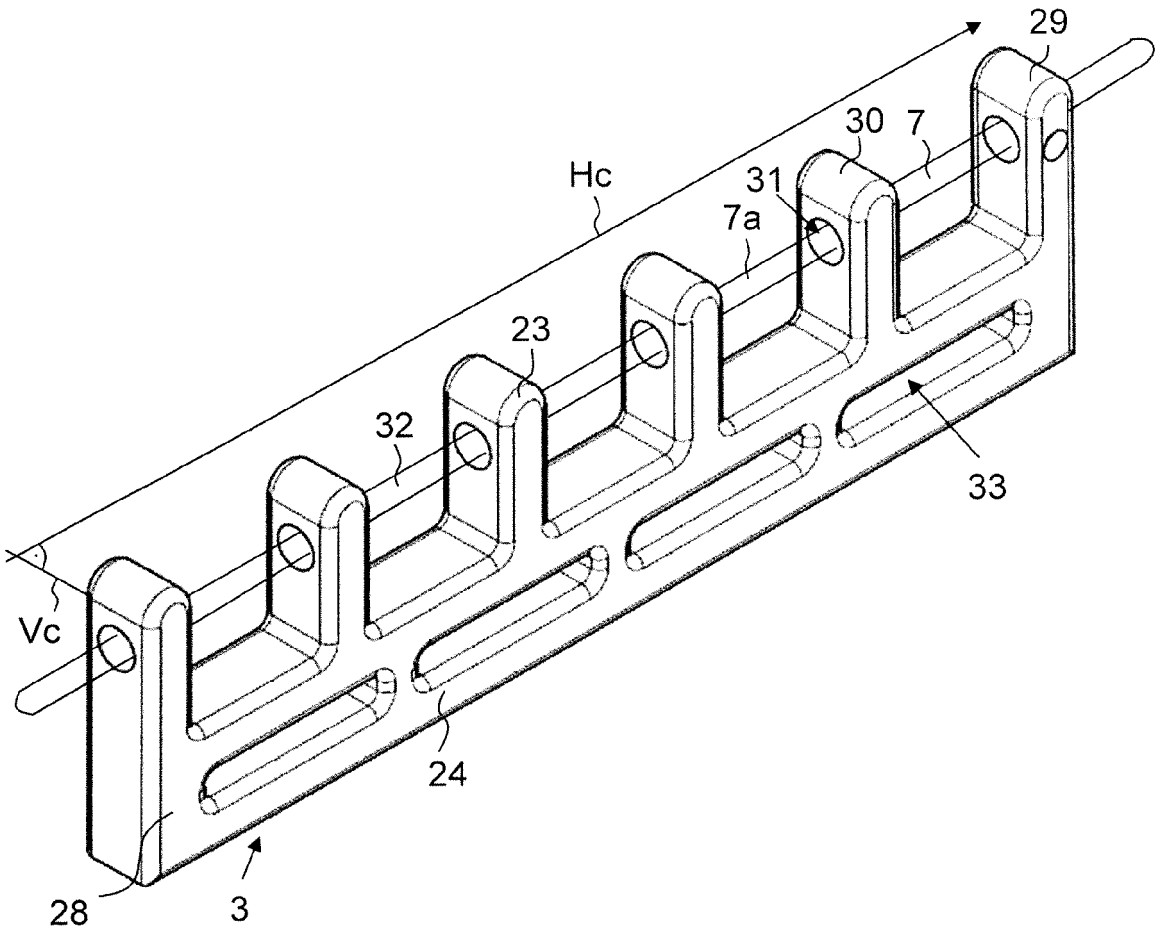
29
30
7
Hc
31
7a
23
32
33
Vc
24
28
3

FIG. 14

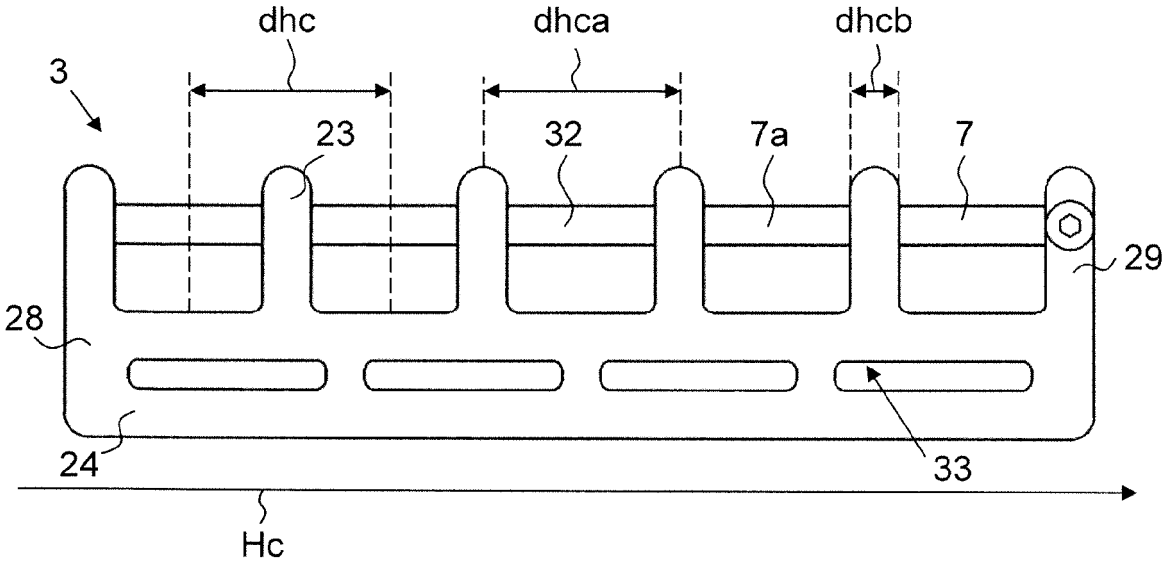
dhc
dhca
dhcb
3
23
32
7a
7
29
28
24
33
Hc

FIG. 15

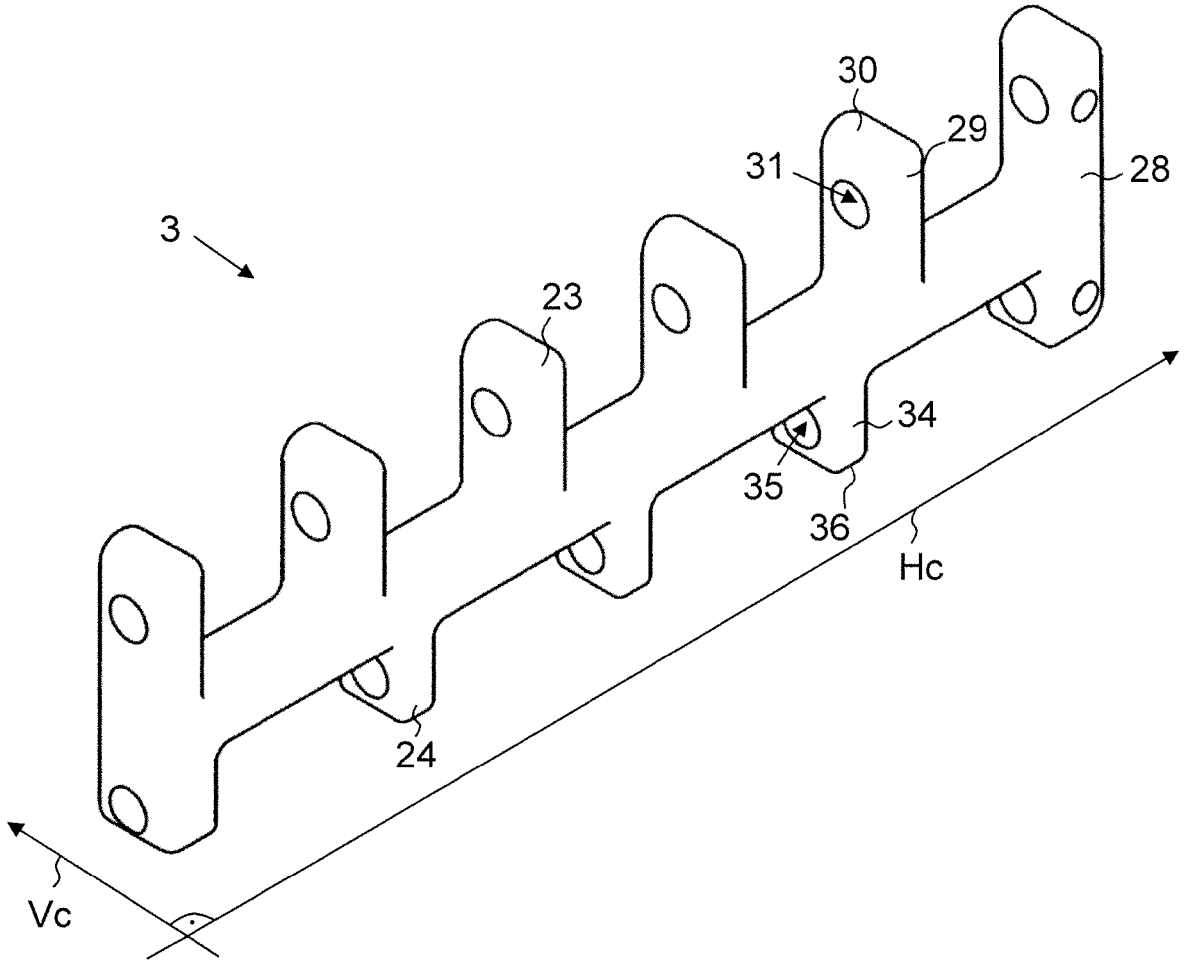

FIG. 16

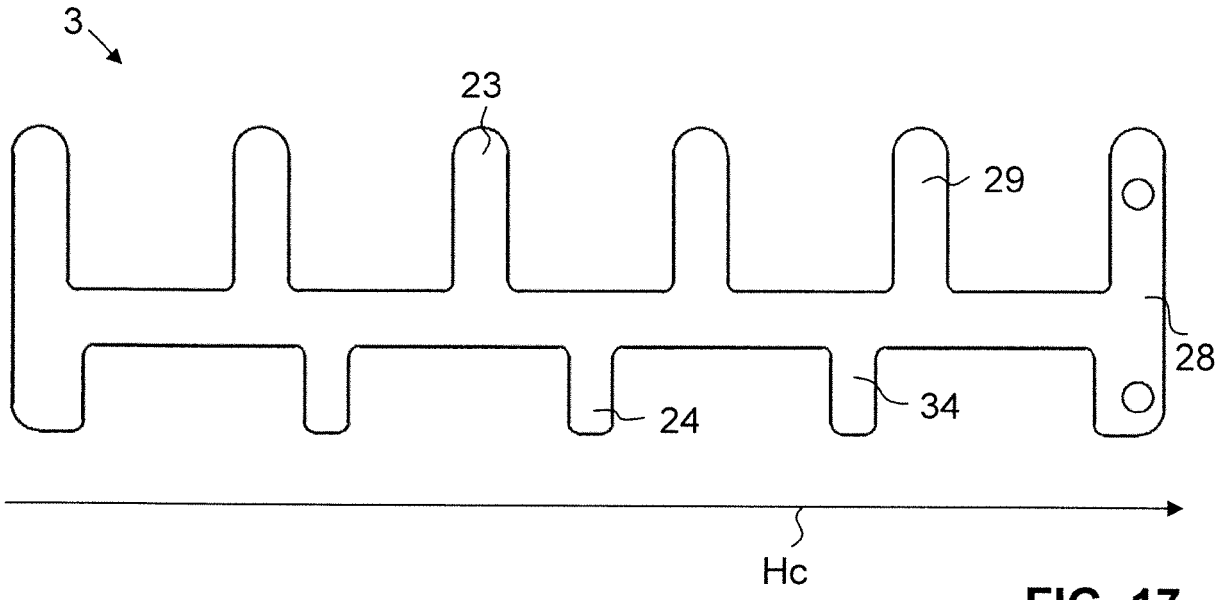

FIG. 17

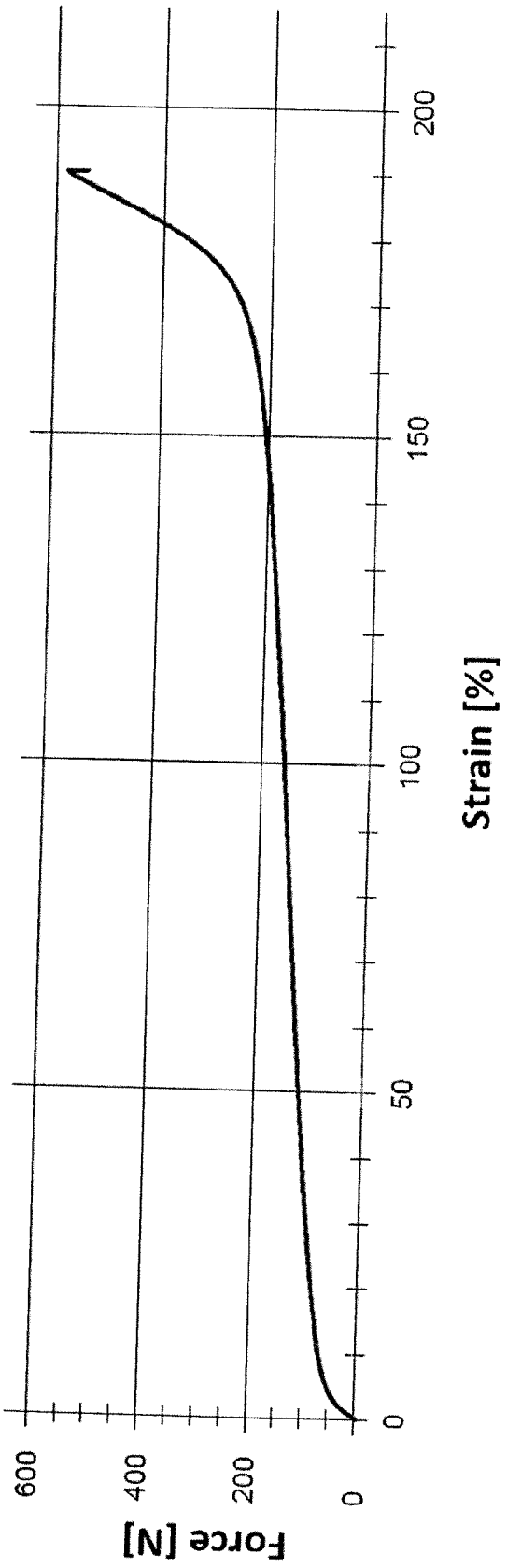

FIG. 18

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 20 20 4824

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X,D	US 2016/096056 A1 (DE BOER EVERT G [NL]) 7 April 2016 (2016-04-07) * figures *	1-8, 10-15	INV. A63B5/11
X	EP 2 477 703 A2 (PUBLICOVER MARK W [US]) 25 July 2012 (2012-07-25) * figures *	1-8, 10-15	
X	CN 109 432 689 A (QINGDAO OCEAN MASTER STEEL AND PLASTIC CO LTD) 8 March 2019 (2019-03-08) * figures *	1,2,4,5, 7-15	
X	WO 2017/157867 A1 (BELLICON AG [CH]) 21 September 2017 (2017-09-21) * figures *	1,2,4,5, 7-15	
			TECHNICAL FIELDS SEARCHED (IPC) A63B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	12 April 2021	Squeri, Michele

CATEGORY OF CITED DOCUMENTS

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
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

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 20 20 4824

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

12-04-2021

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2016096056 A1	07-04-2016	NONE	
EP 2477703 A2	25-07-2012	AU 2010291951 A1	10-05-2012
		CA 2811204 A1	17-03-2011
		EP 2477703 A2	25-07-2012
		JP 2013504392 A	07-02-2013
		WO 2011032173 A2	17-03-2011
CN 109432689 A	08-03-2019	NONE	
WO 2017157867 A1	21-09-2017	DE 102016104782 A1	21-09-2017
		WO 2017157867 A1	21-09-2017

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- US 20160096056 A1 **[0002]**
- US 10183194 B1 **[0002]**