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Juncker(10) **Pub. No.: US 2010/0087301 A1**(43) **Pub. Date: Apr. 8, 2010**(54) **BALANCING DEVICE**(30) **Foreign Application Priority Data**(76) Inventor: **Bo Juncker, AARHUS (DK)**

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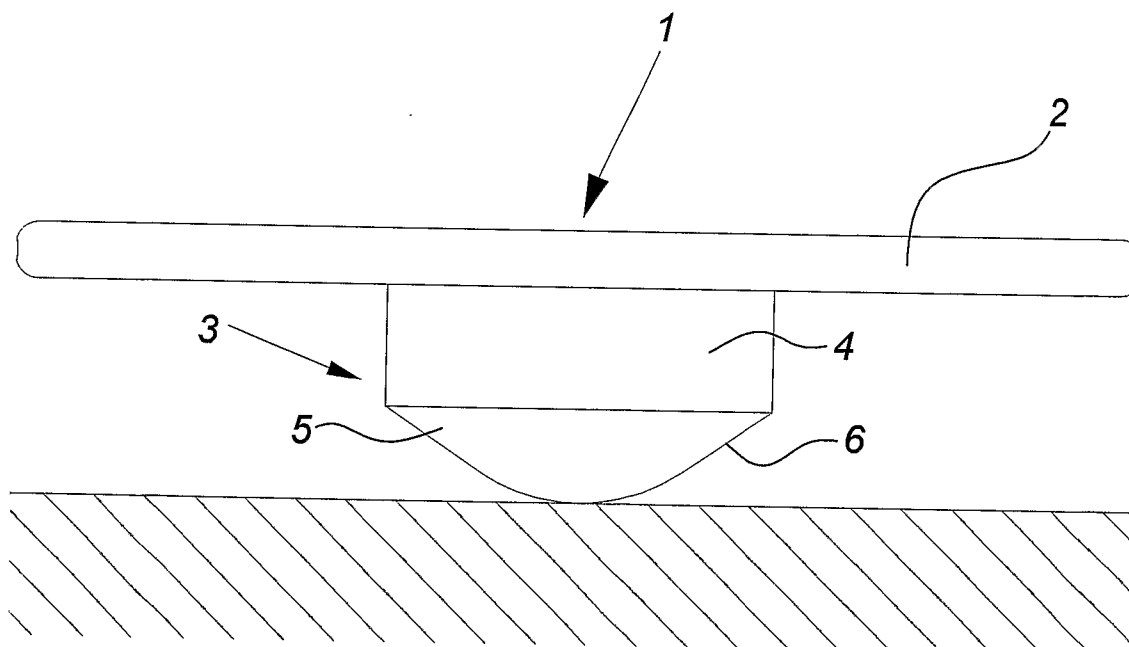
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Apr. 30, 2009(57) **ABSTRACT**

The invention relates to a balancing device (1) comprising a board member (2) and a pivoting member (3, 103) comprising a contact face (6, 106) for abutting a surface, wherein said pivoting member (3, 103) comprises integrated contact face (6, 106) adjusting means (5, 7, 8, 9, H5 12, 13, 105, 107, 108, 109, 111, 112, 113) for changing the geometrical shape of said contact face (6, 106).



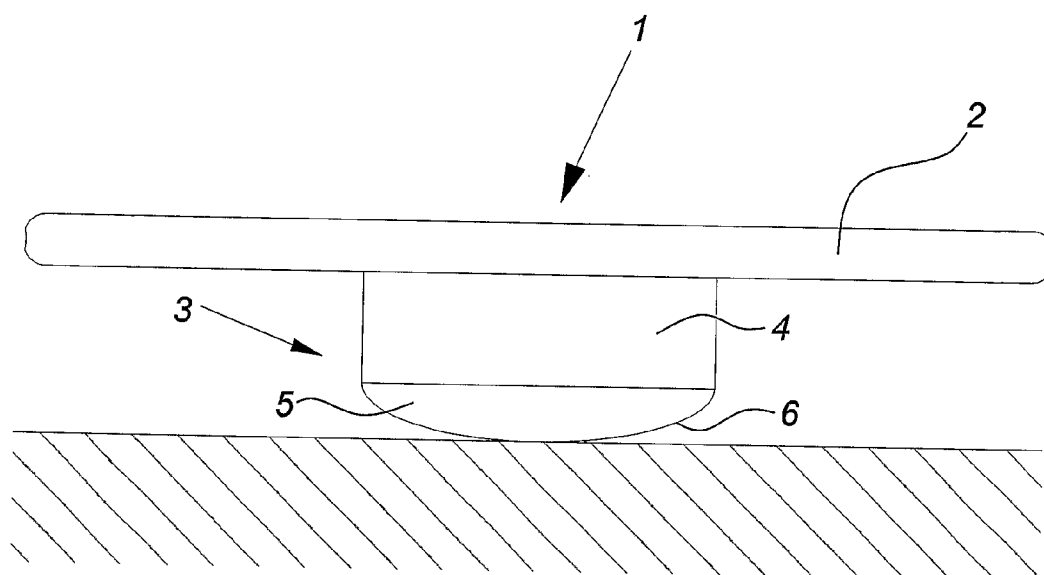


Fig. 1

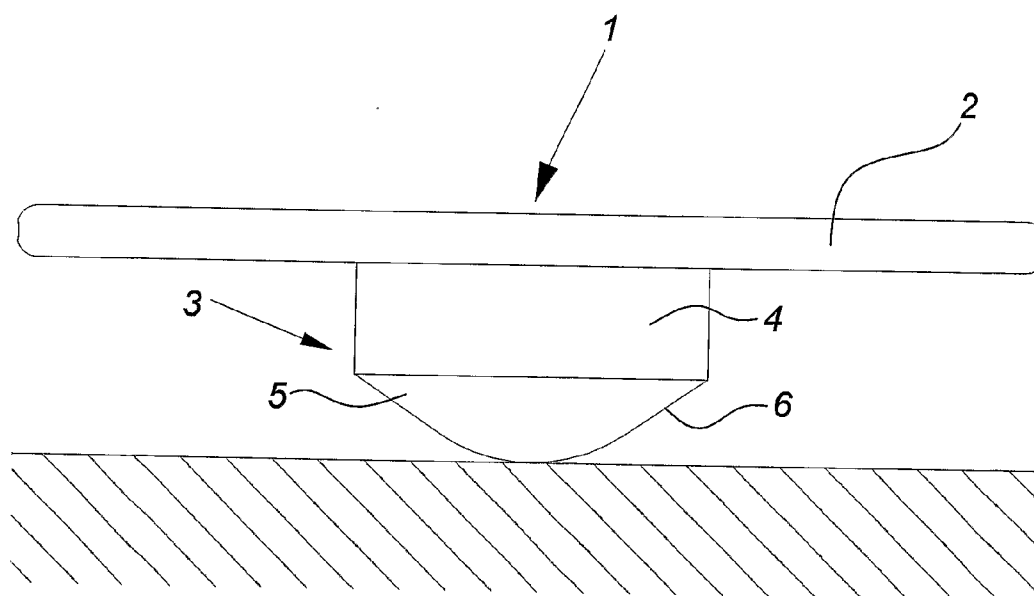


Fig. 2

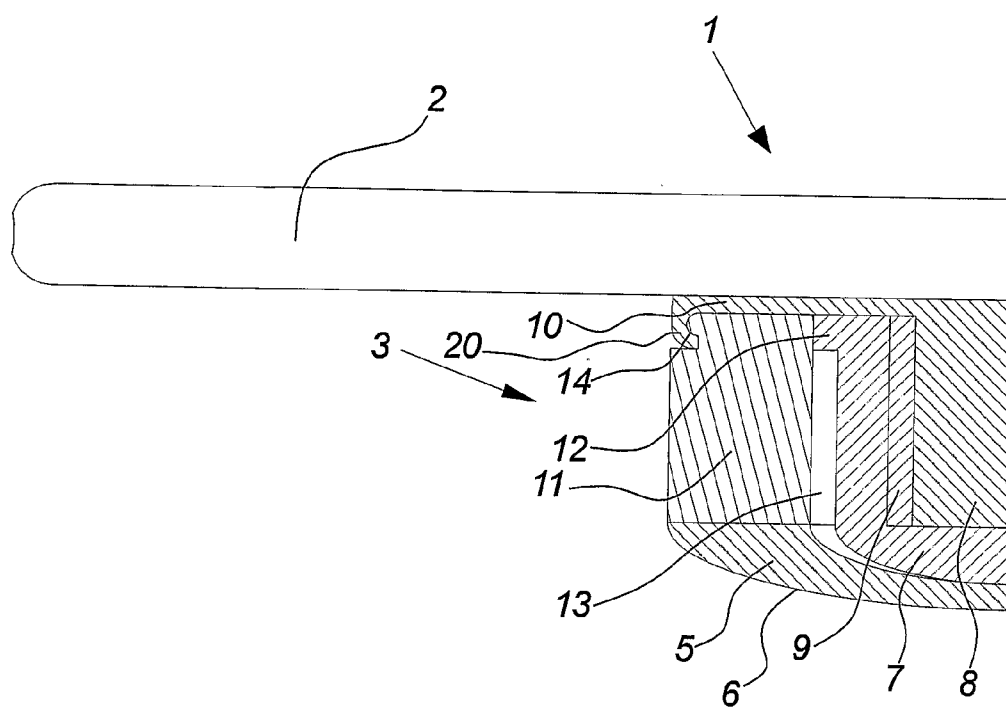


Fig. 3

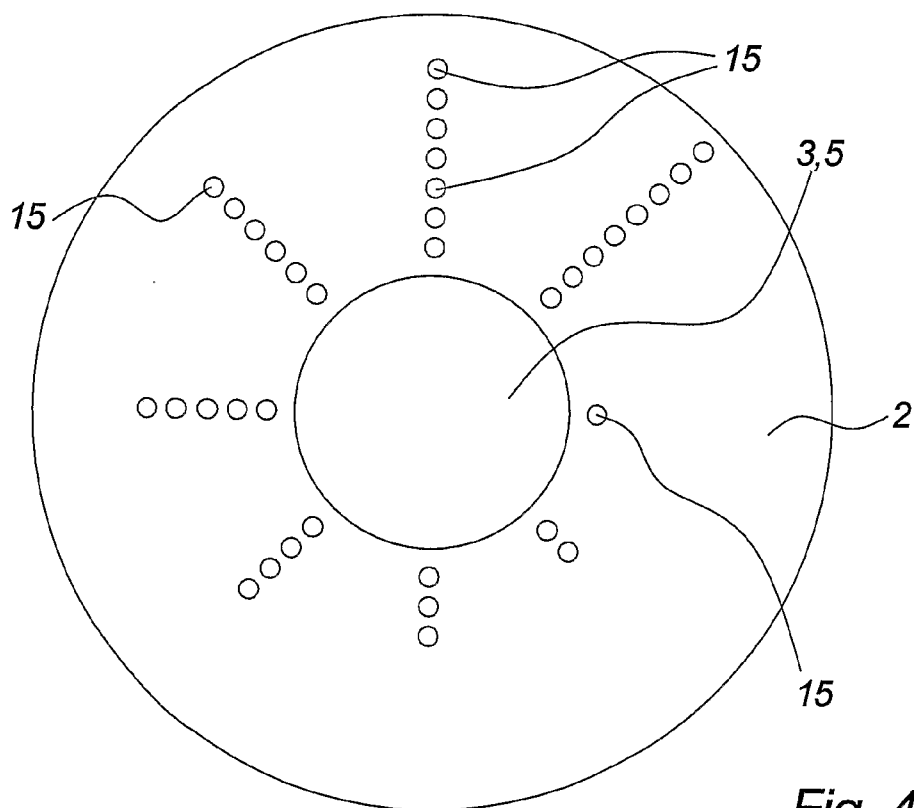
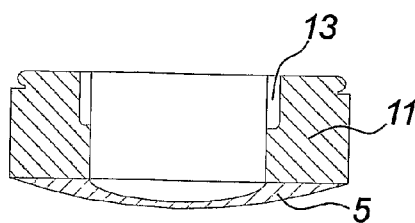
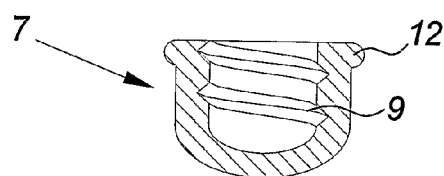
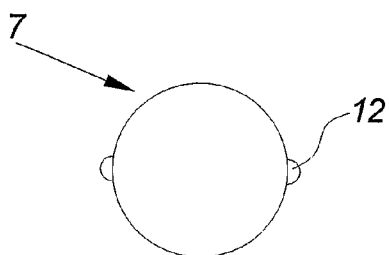
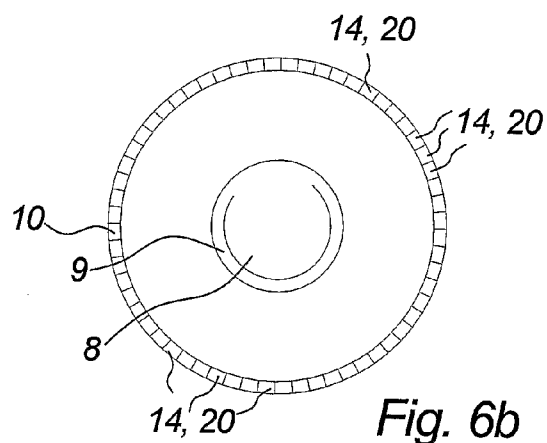
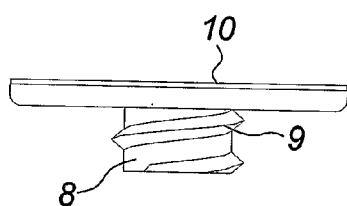
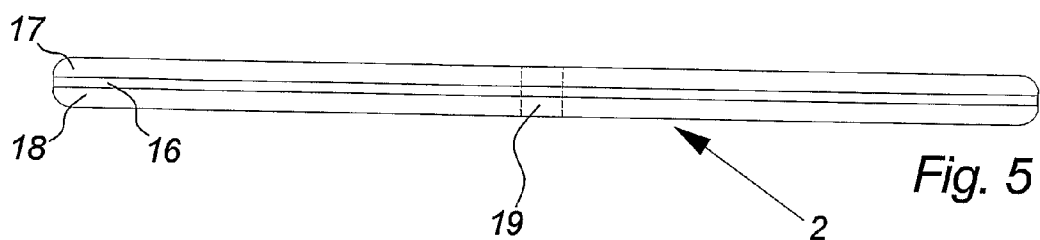
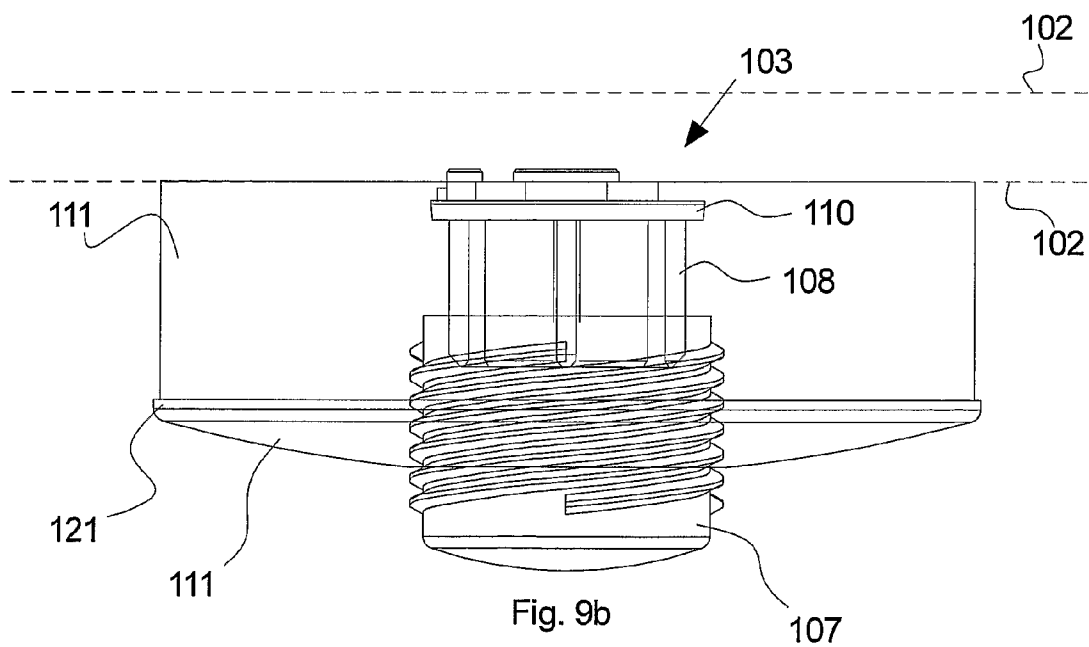
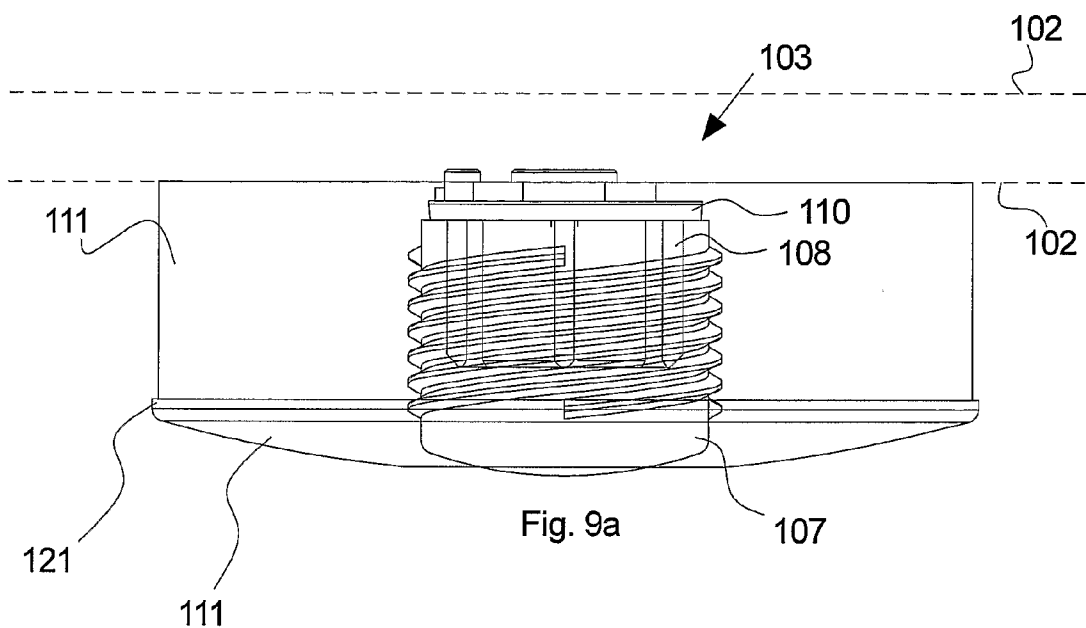
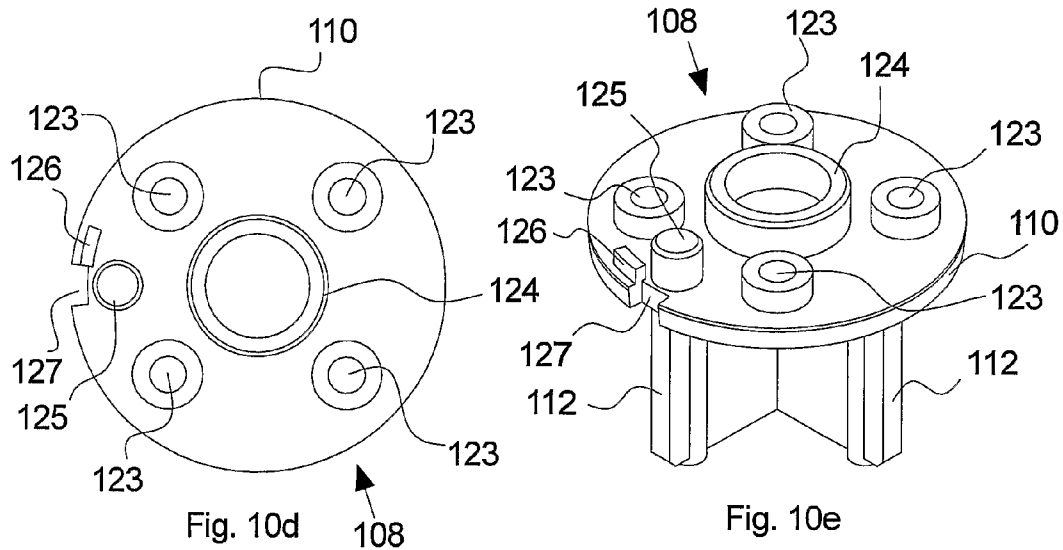
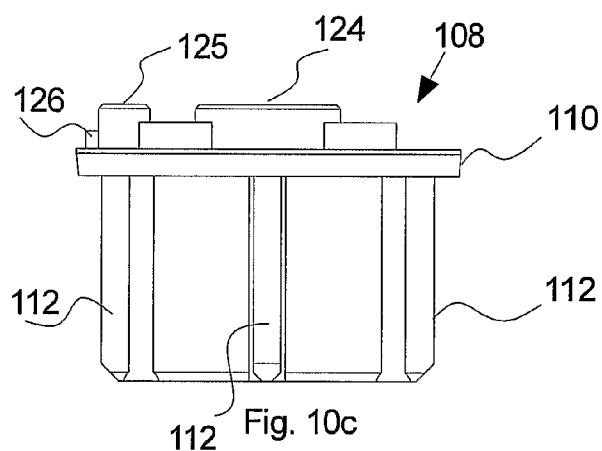
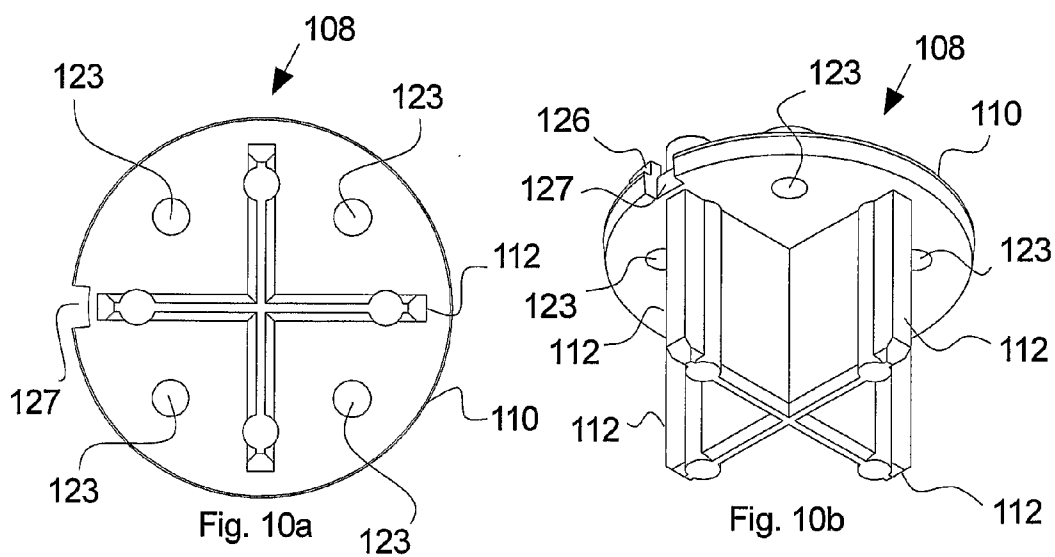
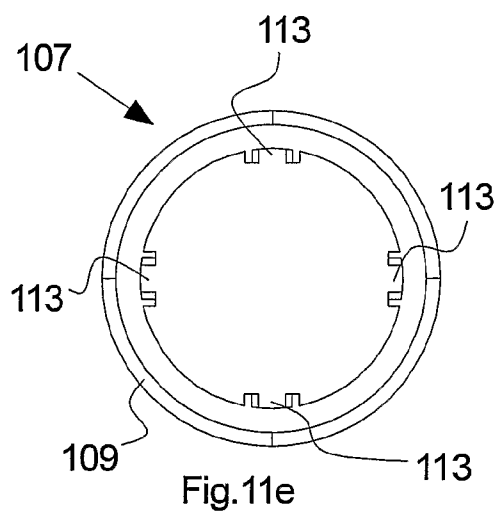
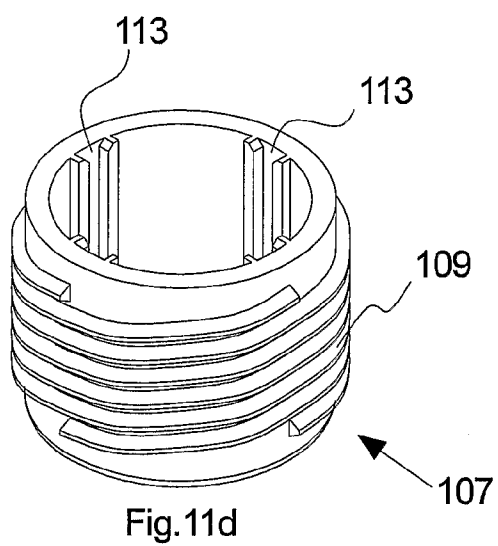
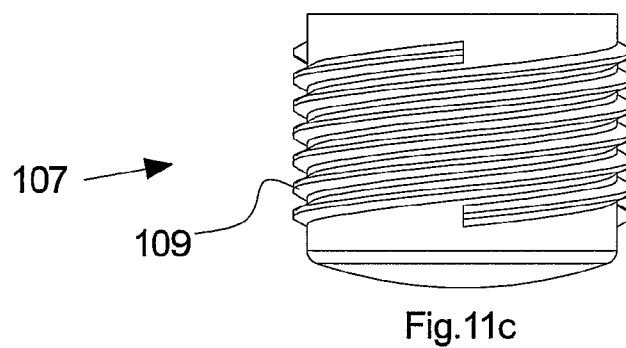
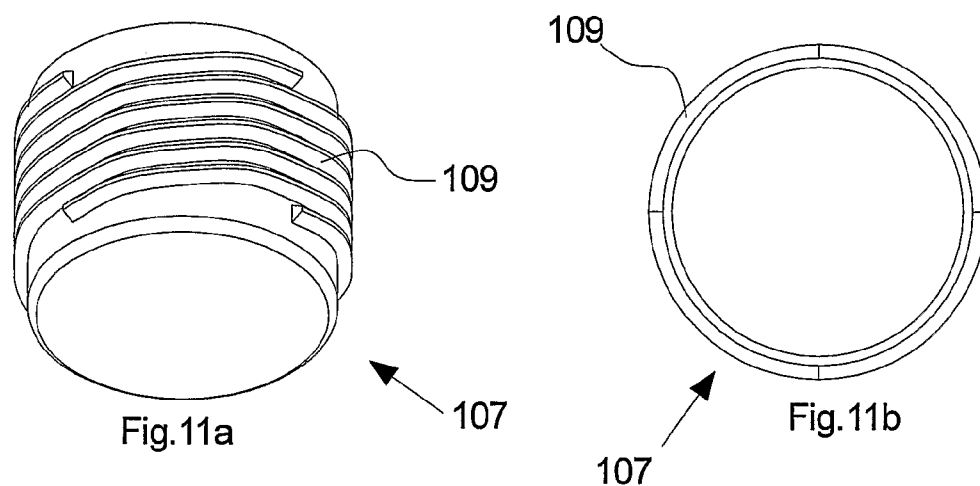


Fig. 4









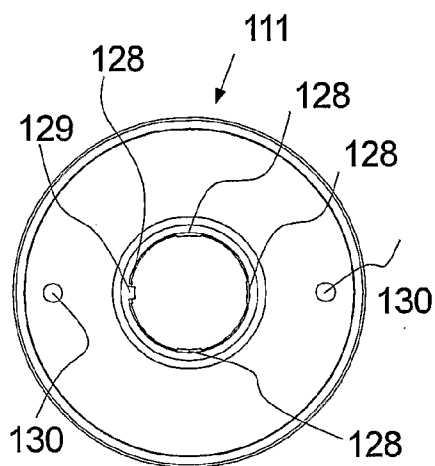


Fig 12a

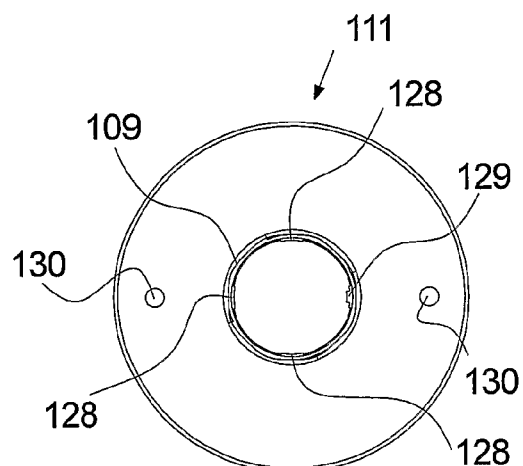


Fig 12b

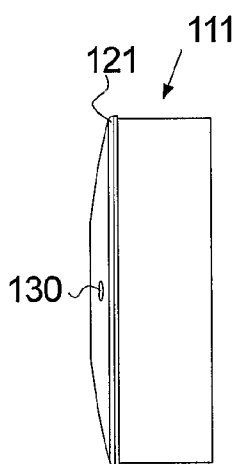


Fig 12c

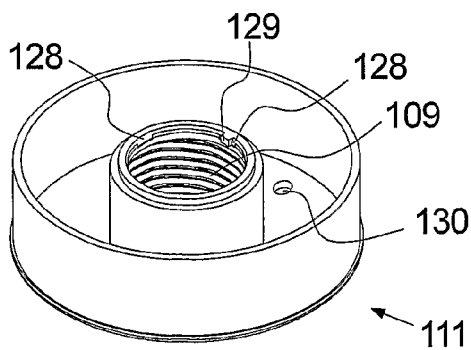


Fig 12d

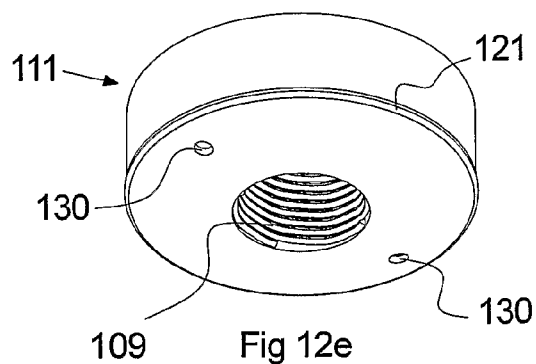
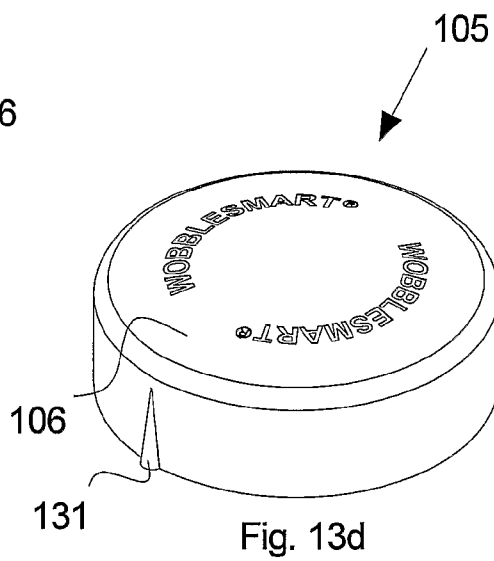
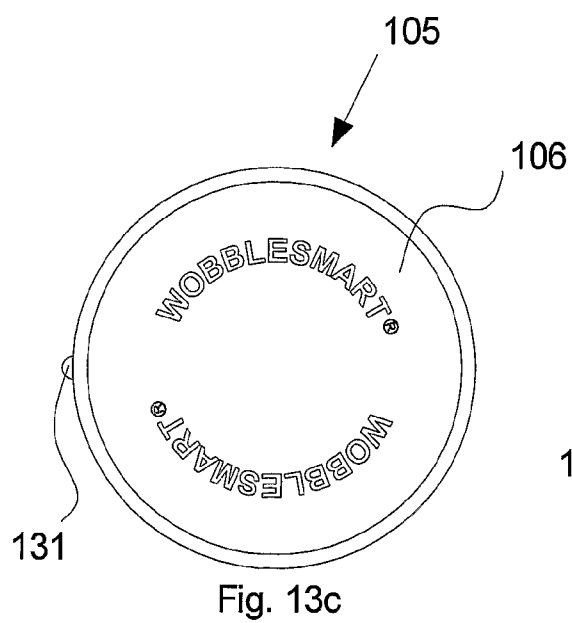
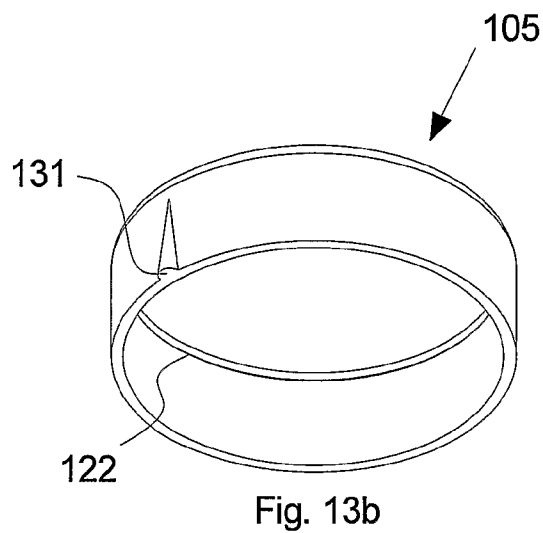
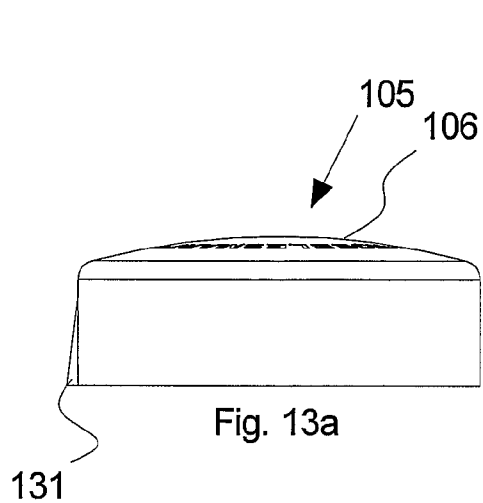


Fig 12e



BALANCING DEVICE

FIELD OF THE INVENTION

[0001] The present invention relates to a balancing device (1) according to the preamble of claim 1, and a method for adjusting the difficulty of a balancing device.

TECHNICAL BACKGROUND AND PRIOR ART

[0002] U.S. Pat. No. 5,810,703 describes a wobble board with the capability of varying the height, as a sphere section is positioned in different heights relative to the board.

[0003] Another approach within the same technical field is represented and disclosed by U.S. Pat. No. 5,897,474. This document discloses a balancing and exercising device comprising a rectangular shaped platform with a central semi flexible ball member and a pair of rigid ball-shaped members mounted on opposite sides of the central semi flexible ball.

[0004] A further device in the prior art is described in WO 01/24887 disclosing an inflatable device for physical therapy, conditioning or training. The device has a support platform and a flexible member, which is inflatable to a pressure for supporting a person. The characteristics of the device may according to the description be changed by changing the pressure, and for that purpose the device is equipped with valve means.

[0005] A problem, related to the prior art balancing boards is generally that they are troublesome, when an adjustment is desired. Moreover, unsatisfactory adjustment of level of difficulty is generally a problem experienced in practical use of the boards.

[0006] It is therefore an object of the invention to provide a balancing device for balancing exercises comprising alternative means and an improved way of adjusting level of difficulty.

SUMMARY OF THE INVENTION

[0007] The present invention relates to a balancing device (1) comprising a board member (2) and a pivoting member (3, 103) comprising a contact face (6, 106) for abutting a surface, wherein said pivoting member (3, 103) comprises integrated contact face (6, 106) adjusting means (5, 7, 8, 9, 11, 12, 13, 105, 107, 108, 109, 111, 112, 113) for changing the geometrical shape of said contact face (6, 106).

[0008] The balancing device (1) according to the invention is suitable as a device used for doing balancing exercises, e.g. for the purpose of a preventive action, or rehabilitation, and may advantageously be available for use in hospitals, clinical applications and sports training facilities. Using the balancing device (1) according to an embodiment of the invention may for example help retrain the proprioceptors and improve coordination after an injury, and hence help preventing further injury. The balancing device (1) according to the invention may typically be recognized as a balance board such as a wobble board, weeble board, or further balance exercise boards known in the art.

[0009] According to an embodiment of the invention, a balancing device (1) has been provided, which comprises integrated means for adjusting the geometrical shape of the contact face (6, 106) of the pivoting member (3, 103) for abutting a surface, such as a floor. It is an essential feature according to the invention that the geometrical shape of the contact face (6, 106) may be adjusted by means, which are integrated in the device.

[0010] By the adjustment of the geometrical shape of the contact face (6, 106) between the pivoting member (3, 103) and the floor, different levels of difficulty of the balancing device (1) may be obtained according to the invention. The difficulty experienced when using the balancing device (1) is affected by the geometrical shape of the contact face (6, 106) of the pivoting member (3, 103) to the abutting surface, such as the ground, a floor, etc. Thus, according to the invention, a balancing device (1) has been provided, which is adjustable in difficulty, and at least a part of the change in difficulty may be obtained as a result of changing the geometrical shape of said contact face (6, 106) by use of adjusting means (5, 7, 8, 9, 11, 12, 13, 105, 107, 108, 109, 111, 112, 113), which are integrated in the device.

[0011] According to the invention, advantageous effects have been obtained by providing contact face (6, 106) adjusting means (5, 7, 8, 9, 11, 12, 13, 105, 107, 108, 109, 111, 112, 113), which are integrated in the pivoting member (3, 103). When adjusting the difficulty to another level, a user is immediately provided with the means for adjusting the geometrical shape of the contact face (6, 106), as the means are integrated in the pivoting member (3, 103).

[0012] According to an embodiment of the invention, adjusting the difficulty may be accomplished without any replacement of parts of the balancing device (1) with external parts and without making use of any external tools. Thus, an advantage experienced by the user may e.g. be that no storage of external pivoting member (3, 103) parts, such as different sized ball-shaped parts, is necessary, or e.g. that the user does not need to use his mouth or a pump for injecting air into a ball-part of the pivoting member (3, 103).

[0013] In an embodiment of the invention, said integrated contact face (6, 106) adjusting means (5, 7, 8, 9, 11, 12, 13, 105, 107, 108, 109, 111, 112, 113) comprise pushing means (7, 8, 9, 107, 108, 109) and said contact face (6, 106) is formed by a flexible member (5, 105).

[0014] According to an embodiment of the invention, the integrated adjusting means (5, 7, 8, 9, 11, 12, 13) for adjusting the contact face (6) are a combined arrangement of the flexible member (5), and the pushing means (7, 8, 9) and guiding means (11) using a key (12) and groove (13) in order for the guiding means to control the movement of the pushing means (7, 8, 9), in particular the movement of a center pin cap (7).

[0015] According to an embodiment of the invention, the integrated adjusting means (105, 107, 108, 109, 111, 112, 113) for adjusting the contact face (106) are a combined arrangement of the flexible member (105), and the pushing means (107, 108, 109) and guiding means (111), in which arrangement the guiding means are equipped with a threading (109) in order to control the movement of the pushing means, in particular the movement of a center pin cap (107).

[0016] According to an embodiment of the invention, the balancing device (1) is provided with a pivoting member (3, 103) in which the pushing means (7, 8, 9, 107, 108, 109) are composed of a center pin core (8, 108), a center pin thread (9, 109) and a center pin cap (7, 107). When turning a center pin guide (11, 111), the center pin cap (7, 107) is moving forward to push a flexible member (5, 105). Turning in the opposite direction will move the center pin cap (7, 107) backwards, and the push is relieved, and the flexible member (5, 105) is returning to its starting position.

[0017] Generally, according to an embodiment of the invention, a balancing device (1) has been provided, which has a contact face (6, 106) (for abutting a surface) having a

geometrical shape formed by a flexible member (5, 105), which is affected by the position of pushing means (7, 107). Because of their movability, the pushing means (7, 107) are suitable for applying and releasing of a push or pressure onto the flexible member (5, 105), thereby adjusting a desired level of difficulty. According to a preferred embodiment of the invention, the adjusted level is fixed and kept until it is desired to adjust into another level.

[0018] According to an advantageous embodiment of the invention, the flexible member (5, 105) may be formed from a flexible material such as a synthetic material including plastic, e.g. a rubber-like plastic.

[0019] In an embodiment of the invention, said pushing means (7, 8, 9, 107, 108, 109) are located between the board member (2) and the flexible member (5, 105), which forms the contact face (6, 106) for abutting a surface.

[0020] In an embodiment of the invention, said pushing means comprise a center pin arrangement (7, 8, 107, 108), which is capable of elongation and shortening.

[0021] Basically, the center pin arrangement (7, 8, 107, 108) is capable of adjustment into different lengths. According to the invention, it is hereby advantageously obtained that the center pin arrangement is capable of affecting a flexible member (5, 105) to different extents.

[0022] In an embodiment of the invention, said integrated contact face (6, 106) adjusting means (5, 7, 8, 9, 11, 12, 13, 105, 107, 108, 109, 111, 112, 113) comprise guiding means (11, 111).

[0023] According to an embodiment of the invention, the pivoting member (3, 103) may be provided with guiding means (11, 111), e.g. formed as a center pin guide (11, 111), which may function to control the movement of a center pin or center pin cap (7, 107).

[0024] In an embodiment of the invention, said integrated contact face (6, 106) adjusting means (5, 7, 8, 9, 11, 12, 13, 105, 107, 108, 109, 111, 112, 113) comprise means for adjusting the height of said balancing device.

[0025] According to an embodiment of the invention, the length of the pivoting member (3) may be adjusted by use of its integrated adjusting means (5, 7, 8, 9, 11, 12, 13, 105, 107, 108, 109, 111, 112, 113). An advantageous feature of the invention may thus be obtained, as the adjusting means (5, 7, 8, 9, 11, 12, 13, 105, 107, 108, 109, 111, 112, 113) may provide a simultaneous change of the height of the balancing device (1) and the geometrical shape of the contact face (6, 106).

[0026] In an embodiment of the invention, the means for adjusting the height comprise a thread (9, 109).

[0027] In an embodiment of the invention, said balancing device (1) comprises fixation means (14, 20) for substantially fixing said geometrical shape of said contact face (6).

[0028] According to an advantageous embodiment of the invention, the fixation means (14, 20) are efficient by way of a locking member to substantially maintain the geometrical shape of the contact face (6) in a fixed shape during use of the balancing device. As a consequence of the flexibility of the flexible member (5), the fixation of the geometrical shape of said contact face (6) is substantial and may be influenced slightly by the forces exerted onto the balancing device (1) during use.

[0029] In an embodiment of the invention, said balancing device (1) comprises fixation means (14, 20) and at least one locking member for fixing said integrated contact face (6)

adjusting means (5, 7, 8, 9, 11, 12) and holding said pivoting member (3) and said flexible member (5) in a substantially fixed position during use.

[0030] In an embodiment of the invention, the fixation means comprise friction between elements in the pivoting member (3, 103).

[0031] In an embodiment of the invention, the integrated contact face (6, 106) adjusting means (5, 7, 8, 9, 11, 12, 13, 105, 107, 108, 109, 111, 112, 113) are stepless adjusting means.

[0032] Accordingly, an advantageous embodiment of the invention has been obtained, as different levels of difficulty may be adjusted and kept at a fixed level during use of the balancing device.

[0033] According to an embodiment of the invention, the function of the fixation means (14, 20) and locking members may be to clamp together, firmly fix, interlock, etc. the adjusting means (5, 7, 8, 9, 11, 12) in relation to the board member (2).

[0034] In an embodiment of the invention, said integrated contact face (6) adjusting means (5, 7, 8, 9, 11, 12) comprise a center pin core (8) and a center pin cap (7), which are movable in relation to each other by means of a thread (9).

[0035] When the integrated contact face (6) adjusting means (5, 7, 8, 9, 11, 12) involves a center pin core (8), a center pin cap (7), and a center pin thread (9) there between, an advantageous embodiment of the invention may be provided, as a part of the center pin, the cap, may be moved in relation to a stationary part of the center pin, the core. The movable part of the center pin may then advantageously be applied to perform a pressure onto the flexible member (5) of the pivoting member (3).

[0036] According to an embodiment of the invention, as a starting point, the pivoting member (3) may typically remind of a hemisphere, however, as the geometrical shape is adjustable, the contact face (6) may divert considerably from a hemisphere shape in the different levels of adjusted difficulty. A center pin cap (7) may be turned in relation to a center pin core (8) by means of a thread (9) and may be adjusted to thrust the flexible member (5) into, or out of, or between different shapes being similar to hemisphere-like shapes.

[0037] According to an embodiment of the invention, the guiding means (11) are formed as a center pin guide (11), i.e. guiding means for a center pin, which is formed from a center pin core (8), a center pin cap (7) and thread (9).

[0038] According to an embodiment of the invention, the center pin cap (7) is typically linked to a center pin guide (11) by a key(12)- and groove(13)-arrangement, in which case, a user is typically turning the center pin guide (11) in order to obtain the movement of the center pin cap (7) and consequently of the flexible member (5) and thus adjusting the shape of the contact face (6), by which the pivoting member (3) abuts a surface.

[0039] In an embodiment of the invention, said integrated contact face (106) adjusting means (105, 107, 108, 109, 111, 112, 113) comprise a center pin core (108) and a center pin cap (107), which are movable in relation to each other by means of a key- and groove-arrangement (112, 113).

[0040] In an embodiment of the invention, said integrated contact face (106) adjusting means (105, 107, 108, 109, 111, 112, 113) comprise a center pin cap (107) and a center pin guide (111), which are engaged to each other by means of a threading (109).

[0041] When the integrated contact face (106) adjusting means (105, 107, 108, 109, 111, 112, 113) involves a center pin core (108), a center pin cap (107), which are connected to each other by a key- and groove arrangement (112, 113) and when the center pin cap (107) is further connected to a center pin guide (111) by means of a threading (109), an advantageous embodiment of the invention may be provided. A part of the center pin, the cap (107), may be moved in relation to a stationary part of the center pin, the core (108). The movable part of the center pin, the cap (107), may then advantageously be employed to perform a pressure onto the flexible member (105) of the pivoting member (103).

[0042] According to an embodiment of the invention, the center pin cap (107) is linked to a center pin guide (111) by a threading (109), in which case, a user is typically turning the center pin guide (111) in order to obtain the movement of the center pin cap (107) and consequently of the flexible member (105) and thus adjusting the shape of the contact face (106), by which the pivoting member (103) abuts a surface.

[0043] In an embodiment of the invention, the pushing means comprise the center pin cap (7, 107) and the center pin core (8, 108).

[0044] According to an advantageous embodiment of the invention, pushing means in the form of a center pin arrangement comprising a center pin cap (7, 107) and a center pin core (8, 108) forms an essential part of the integrated contact face adjusting means.

[0045] Moreover, according to an advantageous embodiment of the invention, the center pin core (8, 108) forms a stable and stationary part in the pivoting member (3, 103), and the center pin cap (7, 107) forms a movable part in the pivoting member (3, 103). According to an advantageous embodiment of the invention, the center pin cap (7, 107) is connected to the center pin core (8, 108) either by a threading or by a key- and groove arrangement, or by any other connection arrangement known in the art, by which it is obtained that the center pin cap (7, 107) is movable backward and forward in relation to the center pin core (8, 108). By the same movement, the center pin cap (7, 107) is advantageously also movable backward and forward in relation to the board member of the balancing device.

[0046] The movement forward and backward of the center pin cap (7, 107) is advantageously resulting in an elongation and shortening, respectively, of the length of the center pin arrangement. A flexible member (5, 105) is thereby advantageously affected resulting in an adjustment of the shape of the contact face (6, 106).

[0047] In an embodiment of the invention, the center pin cap (7) comprise an inside threading (9).

[0048] In an embodiment of the invention, the center pin cap (107) comprise an outside threading (109).

[0049] In an embodiment of the invention, the guiding means comprise a center pin guide (11, 111).

[0050] According to an advantageous embodiment of the invention, the function of the center pin guide (111) implies that turning of the center pin guide (11, 111) results in a forward- and backward-going movement of the center pin cap (7, 107). In an advantageous embodiment of the invention, a clockwise turning of the center pin guide (11, 111) results in a forward movement of the center pin cap (7, 107) and thus an increased level of difficulty of the balancing device, while a counter clockwise turn of the center pin guide has the opposite result.

[0051] In an embodiment of the invention, said thread (9, 109) has a pitch of between 2 and 50 mm, preferably between 5 and 35 mm, most preferably between 10 and 25 mm, such as 17 mm.

[0052] According to a preferred embodiment of the invention, a 360° turn by the thread (9, 109) corresponds to a change between the highest and lowest level of difficulty. Accordingly, a rise of between 2 and 50 mm, such as e.g. 17 mm may be a difference in height of the pivoting member (3, 103) from the lowest to the highest extreme positions.

[0053] In an embodiment of the invention, the thread (9, 109) has a pitch, which is adapted to provide the maximum difference in level of difficulty within a rotation angle of at most 360°.

[0054] According to an embodiment of the invention, an advantage is obtained when a turn of at most 360° of a part of the pivoting member, such as the center pin guide, results in a change in level of difficulty from the most difficult, to the least difficult, and vice versa. A particular advantage obtained hereby is that the correlation between the obtained adjustment and the level indicating means on the board member may easily be recognized by a user.

[0055] Despite the advantages obtained when reaching each and all levels of difficulty within a 360° turn, it may in some embodiments of the invention be preferred to extend the turn above 360°, such as up to 720° or 1080°.

[0056] In an embodiment of the invention, said thread (9, 109) is a multi thread (109).

[0057] In an embodiment of the invention, the multi thread (109) comprises two or more parallel threads.

[0058] According to an advantageous embodiment of the invention, the thread (9) may actually itself be a center pin, which is suitable for thrusting the flexible member (5). According to an embodiment of the invention, a center pin cap (7) is not necessary, as a center pin core (8) itself, possibly threaded, may be arranged in a way so as to be adjusted in different positions in relation to the flexible member (5), thereby affecting the geometrical shape of the flexible member (5), and hence the contact face (6), to different extents.

[0059] In an embodiment of the invention, said balancing device (1) comprises level indicating means (15).

[0060] In advantageous embodiments of the invention, the balancing device (1) is provided with level indicating means (15), which are visible and possibly also noticeable by other means such as by feeling with one's fingers. The levels may preferably be indicated on the board member (2), preferably by numbers, letters, dots, or any marking by which different level indications may be distinguished by a user of the device.

[0061] In an embodiment of the invention, the level indicating means (15) are preferably positioned on the same side of the board member (2) as the pivoting member (3, 103). They may be positioned on the board member (2) and/or on the pivoting member (3, 103), preferably in an easily noticeable way.

[0062] Moreover, the invention relates to a method for adjusting the difficulty of a balancing device (1) according to any of its embodiments, said method comprising the steps of

[0063] changing the geometrical shape of the contact face (6, 106) by adjusting the integrated contact face (6, 106) adjusting means (5, 7, 8, 9, 11, 12, 13, 105, 107, 108, 109, 111, 112, 113), and

[0064] substantially fixing said geometrical shape.

[0065] By the term substantially, it should be understood, that the geometrical shape of said contact face (6, 106)

formed by the flexible member (5, 105) may be affected by the forces exerted and imposed during use, because of the flexibility of the material.

[0066] In an embodiment of the invention, the method of adjusting the difficulty of the balancing device (1) involves that the geometrical shape of the contact face (6, 106) of the flexible member (5, 105) is changed by displacing a center pin or a center pin cap (7, 107).

[0067] According to an embodiment of the invention, the fixing of the geometrical shape is obtained by way of friction between the elements in the pivoting member. According to an embodiment of the invention, friction between the center pin cap (7, 107) and the flexible member (5, 105) results in a fixation of the adjusted position of the center pin cap (7, 107). Thus, the chosen level of difficulty and the certain geometrical shape of the contact face (6, 106) are due to friction forces maintained during use of the balancing device. Also, the friction in the threading (9, 109) may contribute to the fixing of the geometrical shape.

[0068] In an embodiment of the invention, the changing of the geometrical shape of the contact face (6, 106) is performed by stepless adjustment.

[0069] According to an advantageous embodiment of the invention, the stepless adjustment of the balancing device is enabled by constructing the balancing device with sufficient friction between the elements to secure a friction-based fixing of the geometrical shape.

[0070] In an embodiment of the invention, the method involves that a turn in the range of 90° to 360° of at least a part of said pivoting member (3, 103) in relation to said board member (2) is changing said geometrical shape of said contact face (6, 106) from a most curved to a least curved position, and vice versa. Hereby, the advantage is obtained that all levels from the lowest to the highest may be reached during one single turn of the pivoting member (3, 103). In other words, according to an embodiment of the invention, each level of difficulty may be adjusted by fixing the center pin guide (11, 111) and the pushing means (7, 8, 9, 107, 108, 109) in a position within the range of 0° to 360°.

FIGURES

[0071] The invention will be described in the following with reference to the figures of which

[0072] FIG. 1 illustrates a balancing device 1 according to an embodiment of the invention, as seen from the side,

[0073] FIG. 2 illustrates a balancing device 1 according to an embodiment of the invention, as seen from the side, the device is seen as adjusted to a further level of difficulty,

[0074] FIG. 3 illustrates a cross section of a half balancing device 1 according to an embodiment of the invention,

[0075] FIG. 4 illustrates a bottom view of a balancing device 1 according to an embodiment of the invention, showing level indicating means 15, i.e. markings of level of difficulty,

[0076] FIG. 5 illustrates a board member 2 according to an embodiment of the invention, as seen from the side,

[0077] FIG. 6a illustrates a center pin core 8 and a base part 10 according to an embodiment of the invention, as seen from the side,

[0078] FIG. 6b illustrates a center pin core 8 a base part 10 according to an embodiment of the invention, as seen from below,

[0079] FIG. 7a illustrates a center pin cap 7 according to an embodiment of the invention, as seen from below,

[0080] FIG. 7b illustrates a cross section of a center pin cap 7 according to an embodiment of the invention,

[0081] FIG. 8 illustrates a cross section of a center pin guide 11 and a flexible member 5 according to an embodiment of the invention.

[0082] FIG. 9a illustrates a side view of the interior of a pivoting member 103 according to an embodiment of the invention including a center pin cap 107 in a retreated position,

[0083] FIG. 9b illustrates a side view of the interior of a pivoting member 103 according to an embodiment of the invention including a center pin cap 107 in a forwarded position,

[0084] FIG. 10a illustrates a bottom view of a center pin core 108 according to an embodiment of the invention,

[0085] FIG. 10b illustrates a perspective view of a center pin core 108 according to an embodiment of the invention,

[0086] FIG. 10c illustrates a side view of a center pin core 108 according to an embodiment of the invention,

[0087] FIG. 10d illustrates a top view of a center pin core 108 according to an embodiment of the invention,

[0088] FIG. 10e illustrates a perspective view of a center pin core 108 according to an embodiment of the invention,

[0089] FIG. 11a illustrates a perspective view of a center pin cap 107 according to an embodiment of the invention,

[0090] FIG. 11b illustrates a bottom view of a center pin cap 107 according to an embodiment of the invention,

[0091] FIG. 11c illustrates a side view of a center pin cap 107 according to an embodiment of the invention,

[0092] FIG. 11d illustrates a perspective view of a center pin cap 107 according to an embodiment of the invention,

[0093] FIG. 11e illustrates a top view of a center pin cap 107 according to an embodiment of the invention,

[0094] FIG. 12a illustrates a top view of a center pin guide 111 according to an embodiment of the invention,

[0095] FIG. 12b illustrates a bottom view of a center pin guide 111 according to an embodiment of the invention,

[0096] FIG. 12c illustrates a side view of a center pin guide 111 according to an embodiment of the invention,

[0097] FIG. 12d illustrates a perspective view of a center pin guide 111 according to an embodiment of the invention,

[0098] FIG. 12e illustrates a perspective view of a center pin guide 111 according to an embodiment of the invention,

[0099] FIG. 13a illustrates a side view of a flexible member 105 according to an embodiment of the invention,

[0100] FIG. 13b illustrates a perspective view of a flexible member 105 according to an embodiment of the invention,

[0101] FIG. 13c illustrates a bottom view of a flexible member 105, that is the contact face 106 to the ground or another surface, according to an embodiment of the invention, and

[0102] FIG. 13d illustrates a perspective view of a flexible member 105 according to an embodiment of the invention.

DETAILED DESCRIPTION

[0103] FIG. 1 illustrates a balancing device 1 according to an embodiment of the invention, as seen from the side. The balancing device 1 comprises a board member 2 and a pivoting member 3 situated in the centre of the board member 2. The pivoting member 3 comprises an upper part 4 being connected to the board member 2 and a lower part 5 comprising a contact face 6 for abutting a surface.

[0104] A typical use of the balancing device 1 implies that a person is placing at least a part of his or her body weight on the board member 2, while the pivoting member 3 is abutting

a surface, such as the ground, a floor, a ramp, etc. When exercising, a user is typically placing his or her body weight on the board member 2 by placing his or her foot, feet, hand(s), knee(s) or bottom on the board member 2.

[0105] In the most typical embodiments of the invention, the board member 2 is circular, and the pivoting member 3 is circular.

[0106] In further embodiments of the invention, the board member 2 may be shaped in a non-circular form, such as rectangular, pentagon, hexagon, heptagon, etc., or various kinds of alternative shapes including a star, a heart, a bear, etc., or any shape having an axis of symmetry. A circular pivoting member 3 may enable rotations of the balancing device 1 in any of the 360° and tilting in any of the directions in the rotational movement, while a rectangular pivoting member 3 may restrict the movement to tilting of the balancing device 1 in two directions, i.e. back and forth or side to side.

[0107] A balancing device 1 made according to the invention may typically be recognised as a balance board, wobble board, weeble board or rocker board.

[0108] Various materials such as wood, plastic, metal, etc. or combinations thereof are suitable as construction materials for the board member 2.

[0109] In preferred embodiments, the board member 2 is covered or coated with an anti-slipping material, e.g. rubber, cork, fabric, plastic, maybe a nubby material, e.g. a grip-tape, or any material helping to keep the grip and reducing the risk of skidding or slipping, thereby making it easier to stand on or lean on to the board member 2.

[0110] The size of the board member 2 may typically be in the range of $\frac{1}{12}$ m² to $\frac{1}{2}$ m², and in case of a circular board member 2, the diameter is preferably in the range of 15 cm to 80 cm, and in particularly preferred embodiments the board diameter is in the range of 20 cm to 60 cm, such as 40 cm. The difficulty of balancing on the device is influenced by the diameter. The thickness of the board member 2 may typically be in the range of 10 mm to 80 mm, preferably in the range of 15 mm to 40 mm, such as 20 mm.

[0111] According to an embodiment of the invention, the height of the balancing device 1 including board member 2 and pivoting member 3 may preferably be in the range of 4 cm to 20 cm.

[0112] According to an embodiment of the invention, it is preferred that the lower part 5 is formed from or covered by an anti-slipping material, e.g. such as rubber, plastic, fabric, or any material reducing the risk of skidding or sliding on the underlying surface such as e.g. a floor.

[0113] To carry out one of the most common wobble balance board exercises, a person may place his or her body weight on the balancing device 1 by standing on one or two legs on the board member 2 trying to maintain balance, while the pivoting member 3 is abutting a surface. The exercise may for example involve trying to avoid that the board member 2 is touching the underlying surface (the ground), or trying to keep the board member 2 horizontal, or to rock the board forwards and backwards, or to rock the board from side to side, or to rotate the board in a circle. Further examples of common use may involve leaning onto the board member 2, e.g. while doing push-ups or sitting on the board member 2 doing sit-ups or kneeling on the board member 2 doing a rotational movement.

[0114] In an embodiment of the invention, a further pivoting section (not shown on the figures) may be situated on the

opposite side of the board member 2 as compared to the pivoting member 3. The further pivoting section may be situated in the centre or in the periphery of the board member 2 to e.g. function as support for hands or feet during use of the balancing device 1.

[0115] FIG. 2 illustrates a balancing device 1 according to an embodiment of the invention, as seen from the side. The device is seen as adjusted to a further, i.e. higher, level of difficulty as compared to FIG. 1.

[0116] According to the invention, the adjustment is brought about by a change of the geometrical shape of the lower part 5 of the pivoting member 3, thereby changing the geometrical shape of the contact face 6. As it may be realized when comparing FIG. 2 to FIG. 1, the geometrical shape of the contact face 6 is more sharply curved in FIG. 2.

[0117] Generally according to the invention, by providing a more sharply curved geometrical shape of the contact face 6, an increased level of difficulty may be obtained. A more sharply curved geometrical shape may in each point of its curve be described by a curvature having a smaller radius of curvature. When the geometrical shape is adjusted to smaller radius of curvature the difficulty of carrying out a balancing exercise on the balancing device 1 is increased.

[0118] According to the invention, a curvature does not necessarily describe the entire contact face 6, as the contact face 6 may comprise one or more flat portions. A flat portion may e.g. be facing down towards the underlying surface (e.g. the floor).

[0119] Furthermore, according to the invention, a more sharply curved geometrical shape may be accompanied by a reduction of the contact face 6 area in touch with, i.e. abutting, the underlying surface as measured when the balancing device 1 is in equilibrium, i.e. in balance position.

[0120] According to the invention, the balancing device 1 is provided with integrated contact face 6 adjusting means 5, 7, 8, 9, 11, 12 by which the level of difficulty may be changed by changing the geometrical shape of the contact face 6. Additionally, in an embodiment of the invention, the adjusting means 7, 8, 9, 11, 12 may furthermore be used for changing the height of the balancing device 1. Changing of the height may e.g. involve lengthening and shortening of the pivoting member 3, or lengthening and shortening of a spacing (not shown on the figures) between the pivoting member 3 and the board member 2.

[0121] According to an embodiment of the invention, the height of the balancing device 1 may be changed concurrently with adjustment of the geometrical shape of the contact face 6.

[0122] According to well-known terminology, the maximum angle of tilting the balancing device 1 is the angle formed between the board member 2 and the underlying surface, when the board member 2 is tilted enough to touch the underlying surface.

[0123] In an embodiment of the invention, the maximum angle of tilting is in the range of 5° to 45°, preferably in the range of 10° to 30°. The maximum degree of tilting may be adjusted when adjusting the height of the balancing device 1. A higher degree of maximum tilting may contribute to making balancing exercises more difficult.

[0124] Moreover, according to the invention, change of the geometrical shape affects the ease with which the balancing device 1 is tilting. In other words, the force being sufficient to cause a tilting is lower when the geometrical shape is more sharply curved and/or the contact face 6 area in equilibrium is

smaller, both of which may contribute to an increased level of difficulty. In other words, it may be somewhat harder to perform balancing exercises on the balancing device.

[0125] Conversely, the geometrical shape may according to the invention also be adjusted to a less sharp curvature, and the contact face 6 area in balance position be adjusted to a larger area. Hereby, balancing exercises on the device 1 may be made easier.

[0126] FIG. 3 illustrates a cross section of half of a balancing device 1 according to an embodiment of the invention. The balancing device 1 comprises a board member 2 and a pivoting member 3. The pivoting member 3 comprises a base part 10, a center pin core 8, a center pin thread 9, a center pin cap 7, a center pin guide 11, and a flexible member 5, also referred to as the lower part 5, which comprises a contact face 6.

[0127] According to the illustrated embodiment of the invention, the balancing device comprises guiding means 11, which are formed as a center pin guide 11, i.e. guiding means for the center pin, which is formed from the center pin core 8, the center pin cap 7 and thread 9.

[0128] According to the illustrated embodiment of the invention, pushing means 7, 8, 9 being capable of thrusting the flexible member 5 are formed from a center pin arrangement comprising a center pin core 8, a center pin cap 7 a center pin thread 9.

[0129] According to the illustrated embodiment of the invention, the integrated contact face 6 adjusting means 5, 7, 8, 9, 11, 12 in the pivoting member 3 are provided as an arrangement of the center pin core 8 and thread 9, and the center pin guide 11 and cap 7 capable of adjusting the shape of the flexible member 5, and thus of the geometrical form of the contact face 6.

[0130] The base part 10 is connected to the board member 2 and furthermore connected to the center pin core 8. The connections may be joints made e.g. by gluing, bolting, or by any other fixation means 14, 20. Alternatively, the connections may imply that two of or all three parts are formed in one piece, i.e. the base part 10 and the center pin core 8 in one (as shown in FIG. 3), or the base part 10 and the board member 2 in one (not shown in the figures), or the board member 2, base part 10, and the center pin core 8 in one (not shown in the figures).

[0131] In order to fix a position adjusted by the integrated contact face 6 adjusting means 5, 7, 8, 9, 11, 12, the balancing device 1 is provided with fixation means 14, 20, which in the illustrated embodiment are formed as engaging means 14 comprising flexible hook members 20 for engaging the base part 10 and the center pin guide 11 with each other. Advantageously, the engaging means 14 facilitates engaging and disengaging repeatedly. A user may fix the integrated contact face 6 adjusting means 5, 7, 8, 9, 11, 12 and thus the geometrical shape of the contact face 6 in a position, and subsequently unlock the fixation and adjust the shape of the contact face 6 into a different position, resulting in a higher or lower level of difficulty of the balancing device.

[0132] The center pin cap 7 is provided with a key 12, which is fitting into a groove 13. Hereby, the key 12 is holding the center pin cap 7 in position in relation to the center pin guide 11. While turning the pivoting member 3, i.e. turning the center pin guide 11, the center pin cap 7 is also turned, and by way of the center pin thread 9, the center pin cap 7 is moved away from or closer to the board member 2, the mode of operation being similar to a nut and bolt. During the move-

ment, the key 12 is moving in the groove 13 while holding the center pin cap 7 in position. By turning the center pin guide 11 and moving the center pin cap 7 as described, the center pin cap 7 is affecting the flexible member 5, and the geometrical shape of the contact face 6 is adjusted. Concurrently, the movement of the center pin cap 7 away from or closer to the board member 2 results in an increased or decreased height, respectively, of the balancing device. The center pin cap 7, 107 may be described as a kind of piston. In some embodiments of the invention, two or more center pin cap's may be applied in continuation of each other, for example positioned inside each other and connected by threading.

[0133] In further embodiments of the invention (not shown), the pivoting member 3 may be provided with a center pin arrangement in alternative designs, which are also working to thrust onto a flexible member 5, to thereby affect and adjust the geometrical shape of the contact face 6 of the pivoting member 3 to an abutting surface.

[0134] According to the invention, a variety of materials are applicable for the described parts of the pivoting member 3. Examples of suitable materials may include wood, metal, and various synthetic materials including plastics.

[0135] In preferred embodiments, the board member 2 is formed substantially in wood or plastic and is coated with an anti-slipping material, and the pivoting member 3 comprises one or more plastic materials.

[0136] Casting of plastic material may facilitate that two or more parts of the balancing device 1 may be provided in one piece, e.g. the center pin core 8 and the base part 10 and the board member 2.

[0137] In an embodiment of the invention, the flexible member 5 may typically be made of a material different from the other parts of the pivoting member 3. Materials suitable for the flexible member 5 may for example be rubber materials or synthetic materials having similar properties. Generally, any material having both rigidity and flexible properties may be suitable for the flexible member 5 according to the invention. It is essential according to the invention, that the flexible properties enable the flexible member 5 to change its shape by the force of the center pin arrangement. Moreover, it is important that the flexible member 5 is constructed from a material, which is capable of substantially maintaining its shape during use.

[0138] It is within the scope of the invention that the flexible member 5 is adjusted to a geometrical shape of the contact face 6, which is substantially, not completely maintained during use. It is generally the case that small variations in shape may occur during use, as a result of the weight and pressure applied onto the balancing device 1 and as a result of the flexible properties of the flexible member 5.

[0139] The shape of the flexible member 5 may comprise a thicker part in the area of connection to the center pin guide 11 and a thinner part in the center, as may be recognized from FIG. 3. However, in other embodiments of the invention, the flexible material may have a uniform thickness, in case of which a certain rigidity or stiffness of the flexible material is required in order to maintain a curved geometrical shape without sudden sharp bends.

[0140] According to the illustrated embodiment of the invention, the center pin guide 11 is made from a rigid compact material such as hard plastic, wood, etc., and the flexible member 5 is made from a flexible material such as softer plastic, rubber, etc. According to the illustrated embodiment

of the invention, the center pin guide **11** and the flexible member **5** are joined by welding.

[0141] According to an embodiment of the invention, the flexibility of the flexible member **5** has the effect that the contact face **6** area, which is abutting a surface, is increased when weight is placed on the board member **2**, and thus a pressure is imposed to the balancing device **1** and to the pivoting member **3**.

[0142] FIG. 4 illustrates a bottom view of a balancing device **1** according to an embodiment of the invention. The board member **2** and the pivoting member **3** with the flexible member **5** are apparent from FIG. 4, and the markings, i.e. level indicating means **15** are illustrating settings of different levels of difficulty. The level indicating means **15** are shown as dots but any indication of different levels may be applicable as well.

[0143] As described above, the level of difficulty is according to the invention adjusted by turning the pivoting member **3**. FIG. 4 illustrates that according to an embodiment of the invention, each and all of the different levels of difficulty may be adjusted during one single 360° turn of the pivoting member **3**.

[0144] FIG. 5 illustrates a board member **2** according to an embodiment of the invention, as seen from the side. Numbers **16**, **17** and **18** indicate that the board member **2** in the pictured embodiment is constructed from a lamination, although in other preferred embodiments, the board member **2** is carved or cast as a one-layer board. Typically, the board is provided with an anti-slipping layer for reasons of safety when using the balancing device.

[0145] In the illustrated embodiment, the board member **2** comprises an upper layer **17** suitable as supporting surface for the user when standing on or holding on to the board member **2**. The illustrated embodiment further comprises a lower or downwards facing layer **18** having a surface, which may e.g. have level indicating means **15** applied to it, as illustrated in FIG. 4. According to the illustrated embodiment of the invention, the board member **2** comprises a middle layer **16**. Generally, the board member **2** whether formed in one layer or as a lamination should possess a certain strength, preferably a strength large enough for the board member **2** to carry a persons weight without breaking or deforming.

[0146] For mounting purposes, the board member **2** may e.g. be provided with a hole **19**, through which a screw may pass and securely attach the board member **2** and the pivoting member **3** to each other. Alternative means for assembling may for example be to use more than one screw, or to use glue, dowels, nails, welding, etc. Alternatively, the board member **2** and a part of the pivoting member **3** may be formed as a single piece.

[0147] The size of the board member **2** according to the embodiment may preferably be 30 to 50 cm, such as e.g. 39.5 cm.

[0148] FIG. 6a illustrates a part of the pivoting member **3** referred to as a center pin core **8** and a base part **10** according to an embodiment of the invention, as seen from the side. The center pin core **8** is provided with a thread **9** having a rather large pitch in this embodiment of 17 mm in order to provide a change of height in one single turn being large enough to account for the full difference in height desired to be obtainable by the present balancing device **1** according to the embodiment.

[0149] According to preferred embodiments of the invention, the diameter of the base part **10** may be 5 cm to 40 cm,

preferably 10 cm to 20 cm, such as e.g. 13.5 cm, and the core diameter **8** may preferably be 1 cm to 10 cm, more preferably 2 cm to 6 cm, such as e.g. 4.8 cm.

[0150] FIG. 6b illustrates according to an embodiment of the invention the center pin core **8** and thread **9** and the base part **10** according to FIG. 6a, as seen from below. In this embodiment, the edge of base part **10** is provided with fixation means **14**, **20** in the form of engaging means **14** comprising a number of flexible hook members **20** capable of retaining the center pin guide **11**, when the centre pin guide **11** is engaged with the base part **10**. In the embodiment, the flexible hook members **20** further forms part of fixation means **14**, **20**. The fixation means **14**, **20** are provided for fixing the center pin guide **11** to the base part **10**. In combination with locking members, the fixation means **14**, **20** are moreover helping to at least substantially fixing the geometrical shape of the contact face **6**.

[0151] In this embodiment the centre pin guide **11** is provided with a locking member (not shown) pressing against one of the flexible hook members **20** forcing the specific flexible hook member **20** slightly outwards hereby preventing that the center pin guide **11** can rotate in relation to the base part **10**.

[0152] The number and width of flexible hook members **20** decide how many different geometrical shapes, in which the contact face **6** can be locked, and also how different these shapes are.

[0153] The present fixation system is only one of a number of possible systems for substantially fixing a specific geometrical shape of the contact face **6**. In other embodiments, the geometrical shape of the contact face **6** could be substantially fixed by means of a wing screw, by means of one or more releasable interlocking parts, by means of friction, etc. One or more of these embodiments would also provide means for positioning the geometrical shape in a stepless arrangement.

[0154] FIG. 7a illustrates a center pin cap **7** according to an embodiment of the invention, as seen from below. The key **12** is illustrated. The diameter of the cap **7** may preferably be 2 cm to 15 cm, more preferably 5 cm to 10 cm, such as e.g. 7 cm, and the height of the cap may preferably be 1 cm to 10 cm, more preferably 3 cm to 7 cm, such as e.g. 5.4 cm. The key **12** may extend preferably 2 mm to 20 mm from the cap, more preferably 4 mm to 10 mm, such as e.g. 5 mm.

[0155] FIG. 7b illustrates a cross section of a center pin cap **7** according to an embodiment of the invention. The key **12** and the thread **9** are illustrated. The center pin core **8** and thread **9** of FIGS. 6a and 6b fits into the center pin cap **7**.

[0156] FIG. 8 illustrates a cross section of a center pin guide **11** and a flexible member **5** according to an embodiment of the invention. A groove **13** is illustrated. Unlike in FIG. 3, the groove **13** in FIG. 8 is stopped halfway through the height of the center pin guide **11**. Both embodiments are suitable examples according to the invention. The choice of groove **13** length may depend on the desired height increase from the lowest to the highest level of difficulty, and the concurrent change in geometrical shape of the flexible member **5**.

[0157] The outer diameter of the center pin guide **11** is according to the embodiment of the invention corresponding to the diameter of the base part **10** illustrated in FIG. 6a. In starting position, lowest level, the height of the center pin guide **11** and the flexible member **5** in total may according to the embodiment of the invention preferably be in the range of 2 cm to 20 cm, more preferably 4 cm to 10 cm, such as e.g. 5.5

cm. The increase in height appearing as a consequence, when adjusting the geometrical shape may be in the range of 0 cm to 5 cm, preferably in the range of 0.5 cm to 3 cm, such as e.g. 1.7 cm.

[0158] In a further embodiment of the invention, the integrated contact face adjusting means may be arranged as described in the following with reference to FIGS. 9 to 13. In this embodiment of the invention, the balancing device 1 is formed from a board member, which is indicated with dotted lines 102, and a pivoting member 103 comprising a contact face 106 for abutting a surface and comprising integrated contact face 106 adjusting means 105, 107, 108, 109, 111 for changing the geometrical shape of the contact face 106.

[0159] In general, according to the invention, the contact face adjusting means for changing the geometrical shape of the contact face 6, 106 comprises a significant part, which may be referred to as pushing means, and which is illustrated herein especially by the center pin core 8, 108 and center pin cap 7, 107 and center pin guide 11, 111. In general though, the pushing means are basically composed of one or more elements in such a way that at least one of the elements is capable of movement or extension away from the board member in a direction substantially perpendicular to the board member. Thereby, the pushing means are capable of pushing a flexible member. The flexible member forms the contact face 6, 106, and therefore the pushing of the flexible member from the “inside” of the pivoting member is adjusting the geometrical shape of the contact face 6, 106.

[0160] FIGS. 9a and 9b illustrate according to an embodiment of the invention a pivoting member 103 assembled from a center pin cap 107, a center pin core 108 comprising a base part 110, and a center pin guide 111 comprising a protrusion 121, which protrusion 121 is useful for mounting of a flexible member, which is illustrated in FIG. 13. The base part 110 comprises means for mounting to a board member. The means for mounting includes a center steer member 124 and an angular steer member 125, both of which are protrusions from the base part and are fitting into a corresponding groove and recess in the board member.

[0161] Pushing means according to this embodiment of the invention are constituted by the center pin core 108 and in particular by the center pin cap 107, which is the back- and forward-movable part of the pushing means, which is touching the flexible member 105 (not shown in FIG. 9) and, when in a forwarded position, is forcing the flexible member to a more curved contour, i.e. a more curved shape of the contact face 106 (not shown in FIG. 9). The movability of the pushing means is in this embodiment strongly related the construction of the center pin core 108 and cap 107 allowing the center pin cap 107 to slide forwards and backwards, and moreover strongly related to the threading of the center pin cap 107 and center pin guide 111 allowing a turn of the guide 111 to bring about a movement of the cap 107.

[0162] FIGS. 9a and 9b are illustrating the pivoting member 103 with the center pin cap 107 in different positions. In FIG. 9a, the center pin cap 107 is in its most retreated position, and accordingly the balancing device will be adjusted to its easiest setting. In FIG. 9b, the center pin guide 111 has been turned and has thereby forced the center pin cap 107 to move to a forwarded position. When the center pin cap 107 is in such forwarded position, the balancing device will be adjusted to a more difficult setting in which the contact face 106 (not shown in FIG. 9) is more curved.

[0163] FIGS. 10a, 10b, 10c, 10d, and 10e illustrate the center pin core 108 in different views. The center pin core 108 comprises a base part 110 and key members 112 extending from the base part 110. The key members 112 are fitting into grooves in the center pin cap 107, which is illustrated in FIG. 11. The base part 110 is moreover equipped with mounting means 123, 124, 125 for mounting to a board member. In this embodiment of the invention, the mounting means comprise holes 123 for fasteners such as screws, and moreover comprise the center steer member 124 and the angular steer member 125. When the balancing device according to this embodiment of the invention is assembled, the base part 110 is centered on a board member by positioning the base part 110 with the center steer member 124 fitting into a corresponding groove in the board member. Moreover, the base part 110 is positioned with the angular steer member 125 fitting into a corresponding recess in the board member, and thereby the angular steer member 125 is serving to secure a proper angular positioning of the base part 110 in relation to markings, i.e. level indicating means, advantageously drawn on the board member. Fastening of the base part 110 and thus the center pin core 108 is achieved by fasteners such as screws, which are inserted through the, optionally threaded, holes 123 and fastened such as screwed into the board member. The base part 110 is moreover provided with a turn stop 126 and a notch or cut 127.

[0164] FIGS. 11a, 11b, 11c, 11d, and 11e illustrate the center pin cap 107 in different views. The center pin cap 107 is provided with a threading 109. As it appears from the figures, the threading 109 is a multi thread, which in this case is composed of four threads. The angular displacement between each of the four parallel threads is here 90°. In general, it is advantageous according to the invention to apply a multi thread in the integrated contact face adjusting means in order to obtain adequate strength of the construction during longer time of use of the balancing device according to the invention.

[0165] In general, the pitch of the threads 9, 109 according to the invention is advantageously designed to encompass both the most easy and the most difficult setting of the balancing device in one single turn of about 350-360°. In other words, the center pin cap 7, 107 is moved between the most retreated position and the most forwarded position by one single turn of the center pin guide 11, 111 of about 350-360° clockwise or counter-clockwise. In one embodiment of the invention, the pivoting member is constructed with a center pin cap 7, which is provided with threading 9 on the inside (as it e.g. appears from FIG. 7b), and in a further embodiment of the invention, the pivoting member is constructed with a center pin cap 107, which is provided with threading on the outside (as it e.g. appears from FIG. 11). According to the invention, the pitch is advantageously adequate for a movement of the center pin cap between its extreme positions (most and least forwarded) in one full clockwise or counter clockwise turn, regardless if the threading is located on the inside or on the outside of the center pin cap.

[0166] The center pin cap 107 is moreover provided with grooves 113 (clearly noticable in FIGS. 11d and 11e) matching the key members 112 illustrated in FIG. 10. The key members 112 and grooves 113 are adapted to each other in order for the key members 112 to be able to slide in the grooves 113, when the center pin guide 111 (not shown in FIG. 11) is turned and the center pin cap 107 is moved forward or backward to adjust the balancing device to another level of

difficulty. According to advantageous embodiments of the invention, the friction between the elements in the pivoting member is enough to maintain the level of difficulty chosen by the user of the balancing device, and thereby a stepless adjustment of the balancing device is advantageously obtained. In an embodiment of the invention, friction occurs between the center pin cap **107** and the flexible member **105** and friction also occurs in the threading **109** between the center pin cap **107** and the center pin guide **111**. Hereby, enough friction is obtained to secure that the adjustment, chosen by the user and reached in a stepless turning of the center pin guide, is maintained during use of the balancing device, until the user again chooses to turn the center pin guide **111** to obtain another level of difficulty.

[0167] FIGS. **12a**, **12b**, **12c**, **12d**, and **12e** illustrate the center pin guide **111** in different views. A threading **109** on the center pin guide corresponds to the threading **109** on the center pin cap **107** (illustrated in FIG. **11**). The center pin guide moreover comprises a protrusion **121**, flaps **128**, and a projection **129**. Additionally, the center pin guide **111** has two holes **130**.

[0168] According to an embodiment of the invention, the assembling of the balancing device involves mounting of the base part **110** and thus the center pin core **108** to a board member. The center pin cap **107** is fitted on the center pin core **108** by sliding the key members **112** into the grooves **113**. The center pin guide **111** is then mounted by way of the threading **109** and by substantially a 360° turn. The mounting of the center pin guide **111** is completed when the flaps **128** passes the edge of the base part **110** and due to their construction prevent the center pin guide **111** from turning backwards. Thus, the flaps **128** prevent undesired disassembly of the center pin guide **111** from the center pin cap **107** and core **108**. In other words, the flaps **128** prevent the center pin guide **111** from falling off, and thus prevent the balancing device from falling apart. In the mounting method, when the flaps **128** passes the edge of the base part **110**, the projection **129** passes through the notch or cut **127** in the base part **110**. When the balancing device is adjusted to a desired level of difficulty by turning the center pin guide **111**, the projection **129** is freely turned until it hits the turn stop **126**. Hereby it is obtained that the center pin guide **111** is freely turned clockwise and counter-clockwise about 350°-360°, and further turning is prevented by the projection **129** and the turn stop **126**.

[0169] The function of the holes **130** is related to assembly of the balancing device, particularly to the assembling step in which the flexible member **105** (see FIG. **13**) is mounted on the pivoting member **103**. Air may be blown through or injected through the holes **130** from the inside of the center pin guide **111** and out into the flexible member **105** in order to slightly blow up and slightly distend the flexible member **105** during the process of attaching the flexible member to the center pin guide **111**. In some cases, the distension of the flexible member **105** is advantageous in order to enable a flapping edge **122** (FIG. **13**) to pass the protrusion **121**. When relieving the blow of air, the flapping edge **122** fits the protrusion **121**, and the flexible member **105** is fixed to the center pin guide **111**. Often, though, the flexibility of the flexible member **105** is sufficient for mounting without injection of any air.

[0170] FIGS. **13a**, **13b**, **13c**, **13d**, and **13e** illustrate the flexible member **105** in different views. The flexible member **105** comprises the contact face **106**, which is the contact face for abutting a surface, when the balancing device is used. For

mounting purposes, the flexible member **105** is provided with the above-mentioned flapping edge **122**, and for indication of level of difficulty of the balancing device, the flexible member is provided with a marker **131**. When adjusting the level of difficulty of the balancing device, the center pin guide **111**, and at the same time the flexible member **105**, is turned, and the marker **131** is advantageously positioned at a desired indication on the board member. The position of the marker **131** reflects a desired level of difficulty and reflects a certain adjustment of the center pin cap **107** and thus a certain adjustment of the shape of the contact face **106** for abutting a surface during use of the balancing device.

[0171] Of course the present invention is not intended to be restricted to any particular form or arrangement, or any specific embodiment disclosed herein, or any specific use, since the same may be modified in various particulars or relations without departing from the spirit or scope of the claimed invention hereinabove shown and described. The device shown is intended only for illustration and for disclosure of an embodiment and not to show all of the various forms or modifications in which the present invention might be embodied or operated. The description is not intended in any way to limit the broad features or principles of the present invention.

1. Balancing device (1) comprising a board member (2) and a pivoting member (3, 103) comprising a contact face (6, 106) for abutting a surface characterized in that said pivoting member (3, 103) comprises integrated contact face (6, 106) adjusting means (5, 7, 8, 9, 11, 12, 13, 105, 107, 108, 109, 111, 112, 113) for changing the geometrical shape of said contact face (6, 106).
2. A balancing device (1) according to claim 1, wherein said integrated contact face (6, 106) adjusting means (5, 7, 8, 9, 11, 12, 13, 105, 107, 108, 109, 111, 112, 113) comprise pushing means (7, 8, 9, 107, 108, 109) and said contact face (6, 106) is formed by a flexible member (5, 105).
3. A balancing device according to any of the claims 1 or 2, wherein said pushing means (7, 8, 9, 107, 108, 109) are located between the board member (2) and the flexible member (5, 105), which forms the contact face (6, 106) for abutting a surface.
4. A balancing device according to any of the claims 1-3, wherein said pushing means comprise a center pin arrangement (7, 8, 107, 108), which is capable of elongation and shortening.
5. A balancing device (1) according to any of the claims 1-4, wherein said integrated contact face (6, 106) adjusting means (5, 7, 8, 9, 11, 12, 13, 105, 107, 108, 109, 111, 112, 113) comprise guiding means (11, 111).
6. A balancing device (1) according to any of the claims 1-5, wherein said integrated contact face (6, 106) adjusting means (5, 7, 8, 9, 11, 12, 13, 105, 107, 108, 109, 111, 112, 113) comprise means for adjusting the height of said balancing device.
7. A balancing device (1) according to any of the claims 1-6, wherein the means for adjusting the height comprise a thread (9, 109).

8. A balancing device (1) according to any of the claims 1-7, wherein said balancing device (1) comprises fixation means (14, 20) for substantially fixing said geometrical shape of said contact face (6).
9. A balancing device (1) according to any of the claims 1-8, wherein the fixation means comprise friction between elements in the pivoting member (3, 103).
10. A balancing device (1) according to any of the claims 1-9, wherein the integrated contact face (6, 106) adjusting means (5, 7, 8, 9, 11, 12, 13, 105, 107, 108, 109, 111, 112, 113) are stepless adjusting means.
11. A balancing device (1) according to any of the claims 1-10, wherein said integrated contact face (6) adjusting means (5, 7, 8, 9, 11, 12) comprise a center pin core (8) and a center pin cap (7), which are movable in relation to each other by means of a thread (9).
12. A balancing device (1) according to any of the claims 1-11, wherein said integrated contact face (106) adjusting means (105, 107, 108, 109, 111, 112, 113) comprise a center pin core (108) and a center pin cap (107), which are movable in relation to each other by means of a key- and groove-arrangement (112, 113).
13. A balancing device (1) according to any of the claims 1-12, wherein said integrated contact face (106) adjusting means (105, 107, 108, 109, 111, 112, 113) comprise a center pin cap (107) and a center pin guide (111), which are engaged to each other by means of a threading (109).
14. A balancing device according to any of the claims 1-13, wherein the pushing means comprise the center pin cap (7, 107) and the center pin core (8, 108).
15. A balancing device according to any of the claims 1-14, wherein the center pin cap (7) comprise an inside threading (9).
16. A balancing device according to any of the claims 1-15, wherein the center pin cap (107) comprise an outside threading (109).
17. A balancing device (1) according to claim 16, wherein the guiding means comprise a center pin guide (11, 111).

18. A balancing device (1) according to any of the claims 1-17, wherein said thread (9, 109) has a pitch of between 2 and 50 mm, preferably between 5 and 35 mm, most preferably between 10 and 25 mm, such as 17 mm.
19. A balancing device (1) according to any of the claims 1-18, wherein the thread (9, 109) has a pitch, which is adapted to provide the maximum difference in level of difficulty within a rotation angle of at most 360°.
20. A balancing device (1) according to any of the claims 1-19, wherein said thread (9, 109) is a multi thread (109).
21. A balancing device (1) according to any of the claims 1-20, wherein the multi thread (109) comprises two or more parallel threads.
22. A balancing device (1) according to any of the claims 1-21, wherein said balancing device (1) comprises level indicating means (15).
23. A method for adjusting the difficulty of a balancing device (1) according to any of the claims 1 to 22, said method comprising the steps of
- changing the geometrical shape of the contact face (6, 106) by adjusting the integrated contact face (6, 106) adjusting means (5, 7, 8, 9, 11, 12, 13, 105, 107, 108, 109, 111, 112, 113), and
- substantially fixing said geometrical shape.
24. A method according to claim 23, whereby the changing of the geometrical shape of the contact face (6, 106) is performed by stepless adjustment.
25. A method according to any of the claims 23-24, wherein a turn in the range of 90° to 360° of at least a part of said pivoting member (3, 103) in relation to said board member (2) is changing said geometrical shape of said contact face (6, 106) from a most curved to a least curved position, and vice versa.

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