



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
04.09.2019 Bulletin 2019/36

(51) Int Cl.:
A47G 25/90 (2006.01)

(21) Application number: **19160016.2**

(22) Date of filing: **28.02.2019**

(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

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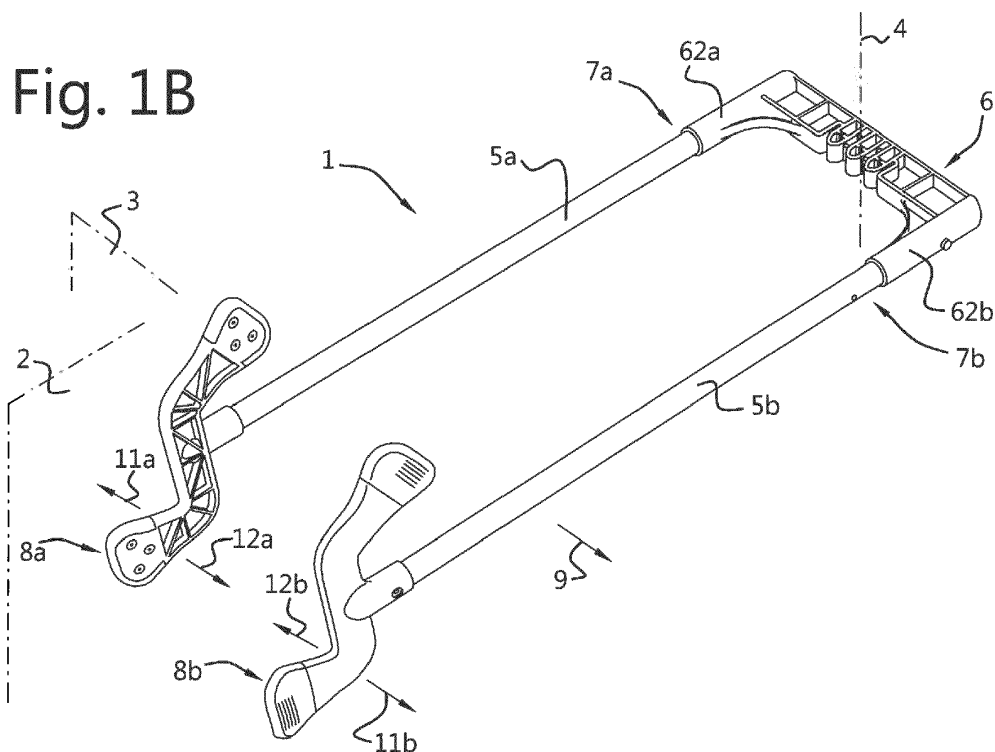
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(30) Priority: **01.03.2018 NL 2020515**

(54) **ASSIST DEVICE FOR PULLING COMPRESSION STOCKINGS ON AND OFF**

(57) An assist device (1) for pulling a compression stocking on and off a leg is disclosed. The assist device (1) has a pair of elongated support poles (5a, 5b), each with a proximal end (7a, 7b) and a distal end (8a, 8b). The support poles (5a, 5b) are joined at their proximal end (7a, 7b) by a grip member (6) and at their distal end (8a, 8b) each comprise a stocking expanding element

(14a, 14b, 15a, 15b) forming an adjacently placed pair over which an compression stocking can be arranged. The grip member (6) is also equipped with a spring element (60) configured to move the distal ends (8a, 8b) of the support poles (5a, 5b) under bias towards and away from one another in a transverse direction. A method using the assist device (1) is also described.



Description

TECHNICAL FIELD OF THE INVENTION

[0001] The invention relates to an assist device for pulling on and off compression stockings, in particular therapeutic compression stockings. The invention likewise relates to a method for pulling compression stockings on and off while making use of the device.

BACKGROUND OF THE INVENTION

[0002] A therapeutic compression stocking is frequently applied as medical aid for users with varicose veins and other vascular problems. For a good therapeutic effect the compression stocking must exert pressure on the leg with a determined tensioning force. Owing to the desired tensioning force the user encounters problems when pulling on and pulling off the compression stocking, this requiring sufficient strength and mobility of the user. It is however precisely in this respect that the user group is often limited, for instance due to advanced age, illness, limited mobility or disorders of the support and locomotion system.

SUMMARY OF THE INVENTION

[0003] The invention has for its object to provide an assist device for pulling on and off compression stockings, in particular therapeutic compression stockings, more easily.

[0004] According to the invention this object is achieved by an assist device comprising a pair of elongated support poles, each with a proximal end and a distal end, wherein the support poles are joined at their proximal end by a grip member and at their distal end each comprise a stocking expanding element forming an adjacently placed pair over which an compression stocking can be arranged, wherein the grip member comprises a spring element configured to move the distal ends of the support poles under bias towards and away from one another in a transverse direction. Preferably, the initial spring force experienced when moving the distal ends towards one another differs from the initial spring force experienced when moving the distal ends away from one another.

[0005] The initial spring force is the force that is needed to perform the indicated movements starting from a state of rest in which the assist device is not solicited.

[0006] In an embodiment the spring element is configured such that the initial spring force experienced when moving the distal ends towards one another is smaller than the initial spring force experienced when moving the distal ends away from one another.

[0007] The invented assist device allows bringing the poles relatively easily towards one another to mount a compression stocking on the device. In the same time, the device offers sufficient spring force against the elastic

energy stored in the stocking applied to the device. This prevents a too high force around the leg.

[0008] The assist device is particularly suitable for users with reduced mobility, possibly in combination with decreased strength. Only a limited degree of mobility is expected of the user, for instance in that he/she is able to reach his/her ankle when bending at the hip and knee.

[0009] According to another embodiment of the invention, the spring element is configured such that the spring force experienced when moving the distal ends towards one another increases from the initial spring force to an end spring force larger than the initial spring force. This is particularly useful since unnecessary high levels of pressure exerted by the (expanding elements of) device on the leg are counteracted.

[0010] The assist device according to the invention is suitable for pulling a compression stocking on and off under the knee, wherein the compression stocking can have an open as well as a closed toe piece.

[0011] In the context of the present application the terms proximal, distal, frontal and sagittal are defined in relation to a user who is standing upright (or sitting upright during use) and holding the assist device in upright position at the grip member of the assist device. This position of the assist device is referred to in the context of this application as the tensioning position of the assist device. In a stocking tensioning position of the device, the distal ends of the support poles carrying the expanding elements are located on or close to a substrate such as the ground. A frontal plane is defined in the usual manner as a plane extending transversely (from left to right) of the body of the user or of the assist device. A sagittal plane is defined in the usual manner as a plane extending in the direction of view of a user (from the back to the front). A sagittal plane of the assist device extends perpendicularly of a frontal plane of the assist device.

[0012] In an embodiment of the invention the assist device has the feature that the support poles do not bend when moving the distal ends of the support poles under bias towards and away from one another in the transverse direction. The bending stiffness of the poles is preferably such that the operation of the device does not depend on bending of the poles, and this bending stiffness preferably is at least 2 times larger than the bending stiffness of the grip member comprising the spring element, more preferably at least 5 times larger than the bending stiffness of the grip member comprising the spring element, even more preferably at least 10 times larger than the bending stiffness of the grip member comprising the spring element. Bending is defined around an axis lying in the sagittal plane (or perpendicular to a frontal plane).

[0013] The spring element of the assist device may be made as a separate piece from the grip member. A practical embodiment of the invention however provides a device in which the spring element is integrally formed with the grip member, for instance by injection molding or by compression molding.

[0014] The spring element may be positioned vis-a-vis, or within, the grip member at any position. It is for instance possible to position the spring element close to one side pole attachment to the grip member. Another embodiment may provide two spring members positioned at each side pole attachment to the grip member. In a preferred embodiment, the assist device comprises a spring element positioned at a center position of the grip member, and more preferably at equal distance (in the frontal plane) from the side poles.

[0015] Another useful embodiment provides an assist device wherein the spring element is covered with a flexible sleeve, preferably long enough to accommodate a hand's width. In this embodiment at least part of the covered spring element forms a handle with which the assist device can be safely gripped with at least one hand. The handle preferably extends in a frontal plane.

[0016] Another embodiment of the invention provides an assist device wherein the grip member has a height and the spring element comprises a portion of the grip member having a reduced height. Such an embodiment allows forming the spring element and the grip member in one piece and conveniently provides a bending stiffness of the spring element that is reduced vis-a-vis the bending stiffness of the grip member.

[0017] In yet another embodiment of the assist device, the spring element has a height and has an asymmetrical shape with respect to a line extending at half height. The bending stiffness in this embodiment may then be different, depending on the direction of the bending in a frontal plane.

[0018] Yet another embodiment of the invention is provided by an assist device wherein the spring element comprises a number of deformable wall parts extending substantially in a height direction of the spring element, and arranged parallel to each other in a length direction of the spring element. The deformable wall parts may be solicited when bringing the side poles towards one another thereby bending the grip member and in particular the spring element. The deformation of the wall parts stores elastic energy that is released again when the side poles are allowed to return to their position of rest, i.e. without any soliciting force on these poles. The spring element in this embodiment performs somewhat equal to a bellows.

[0019] Another further improved embodiment of the assist device is characterized in that the deformable wall parts comprise projections. The projections are wall parts that extend out of the plane of the deformable wall parts. The height of the projections may be adjusted as further elucidated below.

[0020] According to an embodiment, an assist device is provided wherein the projections do not contact each other in the rest position and/or in an initial position corresponding to soliciting the device with the initial spring force.

[0021] In another embodiment, the projections of the assist device have such height that the projections con-

tact each other when moving the distal ends of the side poles towards one another over a certain transverse distance. The latter distance is predetermined and for instance depends on the particular size of the device, on the type of compression stockings to be used, their compression classification, etc.

[0022] When bringing the distal ends of the side poles further towards one another, the (contacting surfaces of the) projections come closer until, in yet another embodiment of the invention, substantially all the projections contact each other when moving the distal ends towards one another over an end transverse distance, corresponding to an end spring force. This end spring force may be designed such that the side poles may not be brought further to one another, either by hand, or by the compression stockings provided on the device.

[0023] In another useful embodiment, an assist device is provided wherein deformable wall parts of the spring element are mutually connected through curved wall parts, arranged at an underside of the spring element. The wall parts then form smoothly curved elements that minimize the risk of entrapping skin when holding grip member, even in an embodiment without sleeve.

[0024] The expanding elements provided at distal ends of the side poles may have any form suitable for the attachment of compression stockings. An embodiment of an assist device wherein the stocking expanding elements are placed at a distance from the support poles in a sagittal plane of the assist device by means of spacers has the advantage that neither the support poles nor the grip member are at risk of coming into contact with the shinbone during use of the assist device.

[0025] A further embodiment according to the invention relates to an assist device wherein first stocking expanding elements are directed toward the proximal outer end and second stocking expanding elements toward the distal end, thus forming S-shaped spoon elements.

[0026] The stocking expanding elements of the assist device can in principle take any form. It is thus possible for instance that they are embodied in the form of ball-like elements, for instance made of rubber, arranged on a spacer. A practical embodiment provides an assist device with support poles which each comprise at the distal outer end a spoon element, the outer ends (or spoons) of which form the stocking expanding elements and the middle part of which forms a spacer. The spoons preferably take a flat and to some extent curved form, thereby creating a slightly concave inner surface which fits onto the shape of the lower leg. The contours of the spoons are preferably round and blunt so that an compression stocking can be tensioned thereover without appreciable risk of damage, for instance due to excessive local stretching.

[0027] In yet another embodiment the assist device has the feature that the grip member comprises jackets for releasably receiving the proximal ends of the support poles. This embodiment allows for easy transport, during which the device may be carried in disassembled form.

[0028] A practical embodiment provides an assist device wherein the releasable connection between the support poles and the sleeves comprises a locking pin that engages in aligned wall openings of the jacket and a support pole, is held in a locking position by means of a spring and can be pushed into an unlocking position in which the locking pin leaves the wall opening of the jacket clear. This is for instance helpful for carrying the device into a suitcase when travelling. It may be helpful to provide support poles with telescopically extendable parts.

[0029] The invention also relates to a method for pulling a compression stocking on a leg. The method comprises the steps of

- a) providing an assist device according to the invention;
- b) moving the distal ends of the support poles under bias towards one another in a transverse direction and apply an compression stocking over the stocking expanding elements, thereby forming an opening for a foot;
- c) inserting the foot into the opening;
- d) moving the assist device in the proximal direction, wherein the compression stocking is moved together with the stocking expanding elements along the lower leg towards the knee and into the desired position; and
- e) remove the stocking expanding elements from the compression stocking.

[0030] Another embodiment of the method has the feature that a flexible body made of a smooth material with low frictional resistance is introduced into the opening prior to insertion of the foot. Such a flexible body is for instance known from NL 8902619 and preferably comprises a flexible tube-like peripheral body of a smooth material with an insertion end for a foot, the peripheral body being provided with a lining of a smooth material. The lining is attached to the peripheral body at the position of the insertion end and can otherwise be moved freely relative to the peripheral body from an inward folded position, in which the lining is situated in the peripheral body, to an outward folded position in which the lining is situated outside the peripheral body. Such a flexible and smooth body makes the sliding of a compression stocking along a surface considerably easier in that the body arranged between stocking and surface perceptibly reduces the friction forces. It is noted that the flexible body need in no way be tube-like. A single strip of flexible smooth material can also suffice, for instance a strip which is slightly longer than the compression stocking and has a width of about 15 cm.

[0031] In an embodiment, the device may be used in conjunction with a rubbing mat, for instance a (foam) rubber or silicone mat of some thickness, preferably at least 5 to 10 mm.

[0032] In an embodiment which comprises first stocking expanding elements directed toward the proximal out-

er end and second stocking expanding elements toward the distal end, thus forming S-shaped spoon elements, the shape of the spoon elements allows a whole foot to rest on the mat such that the foot in this position is able to slide over the mat while being accommodated in the opening of a compression stocking provided and stretched on the spoon elements. There is therefore no need to lift and stretch the foot to insert toes in the opening of the compression stocking.

[0033] The device assists merely in holding the compression stocking in place, and there is no need to pull on the stocking to bring it further along the leg. Instead, by sliding the foot provided with the compression stocking around it, over the rubbing mat in a repeated movement, the foot further slides into the compression stocking provided around the spoon elements. This process may be repeated until the compression stocking extends over the heel, and completely surrounds the foot.

[0034] By loosely pulling the device upwards by the grip member, which requires relatively little force, the compression stocking is pulled up further along the lower leg until about halfway. In that position, the compression stocking may be released from the spoon elements and pulled up further by hand.

[0035] In an embodiment that makes use of a flexible smooth body having a tension loop, the loop of the body may protrude from a toe portion of the compression stocking. To remove the smooth body, the loop may be provided around spoon elements of the device and these are then used to pull the smooth body from underneath the compression stocking.

[0036] The rubbing mat also allows performing some positional corrections, for instance in case the compression stocking is slightly turned.

[0037] A rubbing mat may also be used when removing the compression stocking from a leg.

[0038] The invention likewise relates to a method for pulling a compression stocking off a leg, comprising the steps of

- a) providing an assist device according to the invention;
- b) attaching the stocking expanding elements to a compression stocking arranged around the leg by positioning the stocking expanding elements under an upper edge of the compression stocking;
- c) moving the assist device in the distal direction, wherein the compression stocking is moved together with the stocking expanding elements along the lower leg towards the foot;
- d) peeling off the compression stocking over the foot until it is free from the foot; and
- e) removing the stocking expanding elements from the compression stocking.

[0039] The assist device according to the invention need not be adjusted at all for the purpose of pulling off compression stockings as according to the above stated

method. The dual functionality of the assist device, among other reasons because of the presence of the extension means, provides a great advantage for the user.

[0040] Finally, it is stated that the embodiments of the invention described in this patent application can be combined in any possible combination of these embodiments, and that each embodiment can individually form the subject-matter of a divisional patent application.

BRIEF DESCRIPTION OF THE FIGURES

[0041] The invention will now be further elucidated on the basis of the exemplary embodiments shown in the figures, without otherwise being limited thereto. Herein:

Fig. 1A is a schematic perspective view of an embodiment of the assist device according to the invention provided with a sleeve;

Fig. 1B is a schematic perspective view of the embodiment shown in figure 1A without the sleeve and showing the spring element;

Fig. 2 represents a schematic perspective view a grip member comprising a spring element in accordance with the embodiment shown in figure 1B;

Fig. 3 is a schematic front view of the grip member shown in figure 2 coupled to a pair of support poles;

Fig. 4 is a schematic perspective detailed view of the spring element of the grip member shown in figures 2 and 3; and finally

Fig. 5 is a schematic cross-sectional view of a releasable connection between the grip member and a support pole in accordance with an embodiment of the invention.

DETAILED DESCRIPTION OF THE INVENTION

[0042] Figure 1 shows an assist device 1 for pulling on and off a compression stocking in a rest position. Assist device 1 is shown in a horizontal position whereas in use the device is generally held in an upright position. For the relative positioning of the assist device components, reference is made in the context of this description to a sagittal plane 2 and a frontal plane 3 running at a right angle thereto in accordance with the planes defined in a user. Indeed, a frontal plane of a user extends from shoulder to shoulder, whereas a sagittal plane extends perpendicular to the frontal plane. Assist device 1 comprises a pair of elongated support poles (5a, 5b) running in a longitudinal direction 4 and having a length that can vary in accordance with the user. The support poles (5a, 5b) preferably have a low specific weight and are for instance made of aluminium, which is optionally anodized in the desired colour. The anodizing helps to prevent the aluminium giving off black residue onto body and clothing. Each support pole (5a, 5b) has a proximal end (7a, 7b) and a distal support end (8a, 8b).

[0043] The support poles (5a, 5b) are joined at their

proximal end (7a, 7b) by a grip member 6. For the purpose of arranging the compression stockings the support poles (5a, 5b) are each provided at the distal end (8a, 8b) with a spoon element (13a, 13b), the outer ends (the spoons) of which form stocking expanding elements (14a, 14b, 15a, 15b). The middle portion of the a pair of spoon elements (13a, 13b) holds the stocking expanding elements (14a, 14b, 15a, 15b) at a distance from support poles (5a, 5b) in the sagittal plane 2 of assist device 1, and therefore forms a spacer for stocking expanding elements (14a, 14b, 15a, 15b). Each spoon element (13a, 13b) comprises a first stocking expanding element (15a, 15b) situated between the distal outer end (8a, 8b) and pivoting connection 6. The a pair of first stocking expanding elements (15a, 15b) form an adjacently placed pair over which a compression stocking (not shown) can be arranged. Each spoon element (13a, 13b) is also provided with a second stocking expanding element (14a, 14b) situated at the distal outer end (8a, 8b) of each support (5a, 5b). The pair of second stocking expanding elements (14a, 14b) likewise form an adjacently placed pair over which a compression stocking (not shown) can be arranged. Spoon elements (13a, 13b) can for instance be connected to support poles (5a, 5b) by means of a pin-hole connection or by means of gluing. If desired, the spoons (14a, 15a, 14b, 15b) of spoon elements (13a, 13b) are provided on the inward facing side or all around with inserts (not shown) of a relatively frictional material such as for instance rubber.

[0044] The grip member 6 of the assist device 1 comprises a spring element 60, configured to move the distal ends (8a, 8b) of the support poles (5a, 5b) under bias towards and away from one another in a transverse direction 9 (parallel to the frontal plane 3). Preferably, the initial spring force experienced when moving the distal ends (8a, 8b) towards one another according to the arrows (12a, 12b) differs from the initial spring force experienced when moving the distal ends (8a, 8b) away from one another according to the arrows (11a, 11b).

[0045] In the embodiment shown in figure 1A, the spring element 60 is not visible because it is concealed from view by a rubber sleeve 10 arranged over the spring element 60. In the shown embodiment the rubber sleeve 10 forms a handle for the user.

[0046] The grip member 6 provided with a spring element 60 is shown in more detail in figures 2 and 3, whereas the spring element 60 itself is shown in more detail in figure 4. In the embodiment shown, the spring element 60 is integrally formed with the grip member 6 by injection moulding of a suitable plastic, and is positioned at a center position of the grip member 6. The grip member 6 comprises a cross-element 61 having a longitudinal direction 62 extending about parallel to the frontal plane 3. Provided at the ends of the crossbar are two jackets (62a, 62b) for releasably receiving the proximal ends (7a, 7b) of the support poles (5a, 5b). The spring element 60 is positioned at a center position of the grip member 6, and in particular forms a central part of the cross-element 61.

End parts (63a, 63b) of the cross-element 61 are relatively stiff compared to the spring element 60. To this end, parts (63a, 63b) are provided with stiffening ribs 63c as shown. This not only provides sufficient bending stiffness of parts (63a, 63b) about an axis 4 running perpendicular to a plane of the cross-element 61 and to the frontal plane 3 with the device in an upright position, but also provides sufficient torsional stiffness to the device 1.

[0047] As shown in figure 5, the releasable connection between the support poles (5a, 5b) and the jackets (62a, 62b) comprises a locking pin 11 that engages in aligned wall openings 80 of the jacket (62a, 62b) and wall openings 50 of a support pole (5a, 5b). The locking pin 11 is held in a locking position by means of a spring 110 and can be pushed in the direction 111 into an unlocking position in which the locking pin 11 leaves the wall opening 80 of the jacket (62a, 62b) clear. In this position, each pole (5a, 5b) may be slid out of the corresponding jacket (62a, 62b).

[0048] As shown in figure 4, the spring element 60 comprises a portion of the grip member 6 having a reduced height 64, relative to the (mean) height 65 of the grip member 6 and of the cross-element 61 in particular. Since the spring element 60 has an upper rim that is thicker than a lower rim, the spring element 60 is configured such that the initial spring force experienced when moving the distal ends (8a, 8b) towards one another (according to arrows (70a, 70b) is smaller than the initial spring force experienced when moving the distal ends (8a, 8b) away from one another according to the arrows (71a, 71b).

[0049] As also, shown, the spring element 60 has a total height about equal to the height 65 of the cross-element 61 yet has an asymmetrical shape with respect to a line 66 extending at half height. The spring element 60 further comprises a number of deformable wall parts 67 extending substantially in a height direction 68 of the spring element 60. The deformable wall parts 67 are arranged parallel to each other in a length direction 62 of the grip member 6 and spring element 60. The deformable wall parts 67 comprise projections 69 that extend out of a plane of the deformable wall parts 67. Some wall parts 69a extend outward whereas other projections 69b extend inward. Yet other projections 69c extend from the end parts (63a, 63b) of the grip member 6.

[0050] As shown in figures 3 and 4 in particular, the projections 69 do not contact each other in an initial or rest position of the device 1, nor when the support poles (5a, 5b) are initially brought towards one another with a force corresponding to the initial spring force.

[0051] Increasing the spring force in bringing the distal end (8a, 8b) of the support poles (5a, 5b) towards one another will deform the deformable wall parts 67 until projections 69 or at least some of them contact each other when moving the distal ends (8a, 8b) towards one another over a certain transverse distance. This distance is a design consideration and can be chosen by varying the distance between the projections 69 and/or varying the stiffness of the wall parts 67.

[0052] Increasing the spring force still further causes substantially all the projections 69 to contact each other when moving the distal ends (8a, 8b) towards one another over an end transverse distance, corresponding to an end spring force. The embodiment described above yields a spring element 60 that is configured such that the spring force experienced when moving the distal ends (8a, 8b) towards one another increases from the initial spring force to an end spring force larger than the initial spring force. This benefits the functionality of the device 1.

[0053] It is essential to the invention that the support poles (5a, 5b) do not substantially bend when moving the distal ends (8a, 8b) of the support poles (5a, 5b) under bias towards and away from one another in a transverse direction according to the arrows (11a, 11b, 12a, 12b).

[0054] By pushing the support poles (5a, 5b) slightly inwards, the distal outer ends (8a, 8b) are moved inward by deformation of the spring element 60 as according to the arrows (12a, 12b). Should the support poles (5a, 5b) be pulled slightly outwards, the distal outer ends (8a, 8b) then move outward in a direction opposite to that of arrows (12a, 12b), i.e. according to arrows (11a, 11b).

[0055] As can be seen in figures 1A and 1B, first stocking expanding elements (15a, 15b) are directed toward the proximal outer end (7a, 7b), while the second stocking expanding elements (14a, 14b) are directed toward the distal outer end (8a, 8b). Because the first and second stocking expanding elements point in opposite directions, spoon elements (13a, 13b) take a substantially S-like form. The stocking expanding elements (14a, 14b, 15a, 15b) have a form which is substantially flat and to some extent curved, whereby a more or less concave surface fitting onto the shape of the lower leg is created on the inner side of stocking expanding elements (14a, 14b, 15a, 15b). Stocking expanding elements (14a, 14b, 15a, 15b) are rounded and made somewhat blunt at the corners so that a compression stocking can be tensioned there over without much risk of damage due to excessive local stretching. Because the first stocking expanding elements (15a, 15b) in the sagittal plane 2 form an angle of 120 degrees with the longitudinal axis of the associated support (5a, 5b) and the second stocking expanding elements (14a, 14b) in the sagittal plane 2 form an angle of 90 degrees with the longitudinal axis of the associated support (5a, 5b), and are held a distance of 6 to 7 centimetres from the support poles (5a, 5b), support poles (5a, 5b) or the grip member 6 are prevented from coming into contact with the shinbone during use of the assist device 1.

[0056] The above described components of assist device 1 can be manufactured from any material suitable for the purpose. Components such as the spoon elements (13a, 13b), grip member 6 and optionally sleeve handle 10 are thus preferably made by injection moulding of glass fibre-reinforced plastic. Other components such as the fixing pins 11 and spring 110 are preferably made of steel, while support poles (5a, 5b) are typically made

of anodized aluminium.

[0057] Because assist device 1 consists of pre-assembled components, it can be easily assembled or disassembled by a user. The division into components further ensures that assist device 1 can be packaged, shipped and stored in compact form. This moreover provides the option of length adjustment in accordance with build, height and reach, and adjustment of the opening range of a compression stocking arranged on the assist device.

[0058] A compression stocking can be pulled on as follows using assist device 1. Assist device 1 is placed upside down with the grip member 6 resting on a ground surface between the legs of the user. The compression stocking is then clamped with the seam (or rear side) directed upward at the heel between the second stocking expanding elements (14a, 14b), which point upward in the upside down position. The upper edge of the compression stocking is then folded back over the other (first) stocking expanding elements (15a, 15b). This does not involve any appreciable tension. An elongated sliding strip of a flexible, smooth material, for instance spinnaker cloth, can then also be placed with a relatively short outer end in the compression stocking, wherein the remaining, relatively long part is likewise clamped between the second stocking expanding elements (14a, 14b) together with the heel part of the compression stocking. Assist device 1 is then turned over again and placed in a position in which the grip member 6 is allocated above the expanding elements (13a, 13b). The latter rest on the ground, at least the second expanding elements (14a, 14b). The support poles (5a, 5b) are then slightly brought outward. This movement places the compression stocking under tension and widens the opening for a foot of the user. The first stocking expanding elements (15a, 15b) over which the compression stocking is tensioned are set down on the ground close to the foot, in front of the toes, after which the foot is pushed into the opening of the compression stocking. The opening is sufficiently large due to the compression energy stored in the spring element 60. In a subsequent step the compression stocking is pulled further upward. The upper body can hereby optionally also assist in pulling up the compression stocking along the leg by leaning backwards a little. The compression stocking is pulled further until it is in place. Stocking expanding elements (15a, 15b) are then removed from the compression stocking, and the optionally present sliding strip is pulled from between the leg and the stocking via the top side. If desired, the compression stocking can be pulled slightly further using manual force.

[0059] The same assist device 1 can likewise be used for the purpose of pulling off a compression stocking. The distal (second) stocking expanding elements (14a, 14b) point downward here, and support poles (5a, 5b) rest along the body with the grip member 6 resting in the lap of a patient. The second stocking expanding elements (14a, 14b) are pushed into the compression stocking on either side of the lower leg via the top side of the compression stocking. The compression stocking is then

pushed downward using the grip member 6 of support poles (5a, 5b). Once the compression stocking has in this way been peeled off the lower leg, stocking expanding elements (14a, 14b) are removed from the compression stocking. If desired, use can also be made of a sliding strip when the stocking is being pulled off.

[0060] A (therapeutic) compression stocking can be pulled on and off as described in simple manner using little force and small movements. The assist device is easy to handle, light in weight and, owing to the modular structure, saves storage space. Arranging a compression stocking over the stocking expanding elements is also simple. Because the spoon elements take an ergonomic form and are covered with relatively smooth rubber, these elements cause less friction and do not press painfully into the skin of a user. The assist device may further be adjustable in length, which increases the convenience of use and the flexibility thereof.

[0061] The invention is not limited to the above described exemplary embodiments. It will be apparent that within the scope of the invention different modifications can be made which will be self-evident to the skilled person.

Claims

1. Assist device for pulling a compression stocking on and off a leg, comprising a pair of elongated support poles, each with a proximal end and a distal end, wherein the support poles are joined at their proximal end by a grip member and at their distal end each comprise a stocking expanding element forming an adjacently placed pair over which a compression stocking can be arranged, wherein the grip member comprises a spring element configured to move the distal ends of the support poles under bias towards and away from one another in a transverse direction, wherein the spring element has a height and has an asymmetrical shape with respect to a line extending at half height.
2. Assist device according to claim 1, wherein the spring element is configured such that the initial spring force experienced when moving the distal ends towards one another differs from the initial spring force experienced when moving the distal ends away from one another, and is preferably smaller than the initial spring force experienced when moving the distal ends away from one another.
3. Assist device according to claim 1 or 2, wherein the spring element is configured such that the spring force experienced when moving the distal ends towards one another increases from the initial spring force to an end spring force larger than the initial spring force.

4. Assist device according to any one of the preceding claims, wherein the support poles do not substantially bend when moving the distal ends of the support poles under bias towards and away from one another in the transverse direction. 5
5. Assist device according to any one of the preceding claims, wherein the spring element is integrally formed with the grip member. 10
6. Assist device according to any one of the preceding claims, wherein the grip member has a height and the spring element comprises a portion of the grip member having a reduced height. 15
7. Assist device according to any one of the preceding claims, wherein the spring element comprises a number of deformable wall parts extending substantially in a height direction of the spring element, and arranged parallel to each other in a length direction of the spring element. 20
8. Assist device according to claim 8, wherein the deformable wall parts comprise projections, wherein the projections do not contact each other in an initial position corresponding to the initial spring force. 25
9. Assist device according to claim 8, wherein the projections contact each other when moving the distal ends towards one another over a certain transverse distance. 30
10. Assist device according to any one of the preceding claims, wherein deformable wall parts of the spring element are mutually connected through curved wall parts, arranged at an underside of the spring element. 35
11. Assist device according to any one of the preceding claims, wherein the spring element is covered with a flexible sleeve. 40
12. Assist device according to any one of the preceding claims, wherein the grip member comprises jackets for releasably receiving the proximal ends of the support poles. 45
13. Assist device according to claim 12, wherein the releasable connection between the support poles and the sleeves comprises a locking pin that engages in aligned wall openings of the jacket and a support pole, is held in a locking position by means of a spring and can be pushed into an unlocking position in which the locking pin leaves the wall opening of the jacket clear. 50
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14. Method for pulling a compression stocking on a leg, comprising of

- a) providing an assist device according to any one of the preceding claims;
- b) moving the distal ends of the support poles under bias towards one another in a transverse direction and apply an compression stocking over the stocking expanding elements, thereby forming an opening for a foot;
- c) inserting the foot into the opening;
- d) moving the assist device in the proximal direction, wherein the compression stocking is moved together with the stocking expanding elements along the lower leg towards the knee and into the desired position; and
- e) removing the stocking expanding elements from the compression stocking.

15. Method for pulling a compression stocking off a leg, comprising of

- a) providing an assist device according to any of the claims 1-13;
- b) attaching the stocking expanding elements to a compression stocking arranged around the leg by positioning the stocking expanding elements under an upper edge of the compression stocking;
- c) moving the assist device in the distal direction, wherein the compression stocking is moved together with the stocking expanding elements along the lower leg towards the foot;
- d) peeling off the compression stocking over the foot until it is free from the foot; and
- e) removing the stocking expanding elements from the compression stocking.

Fig. 1A

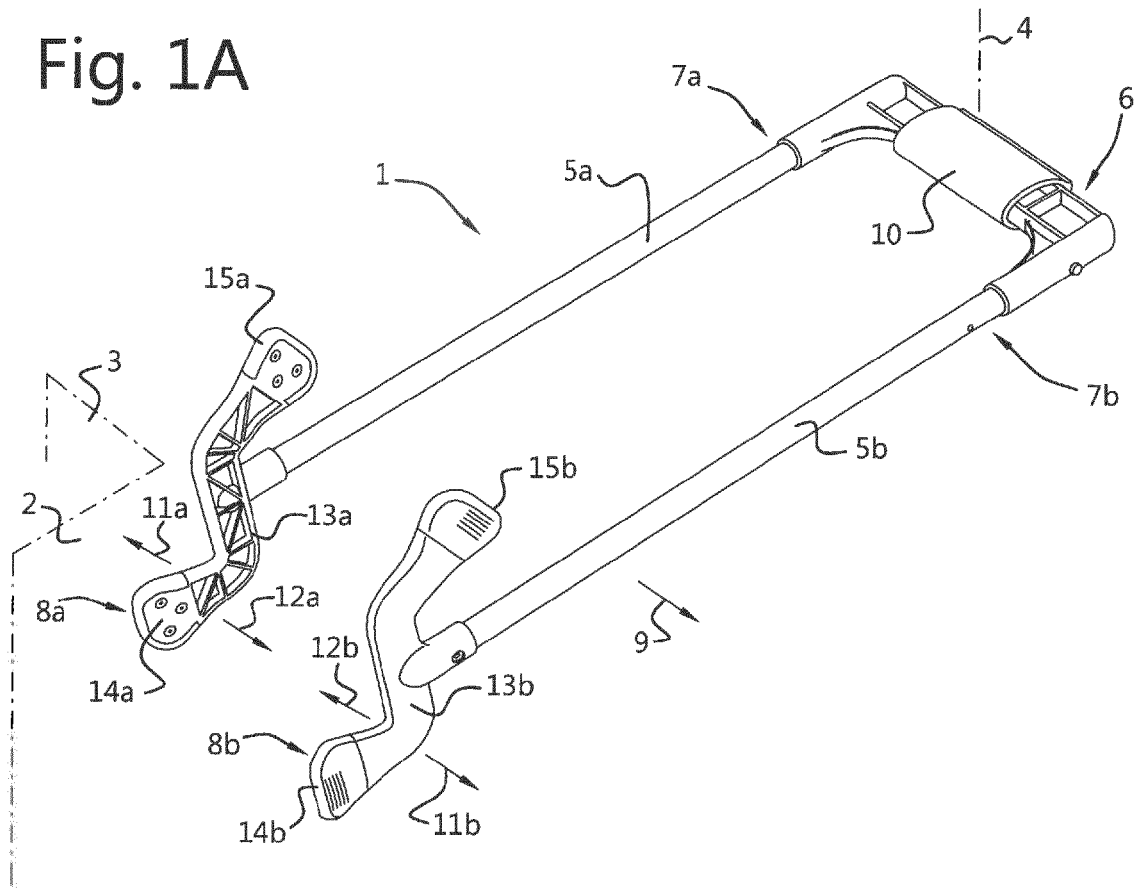
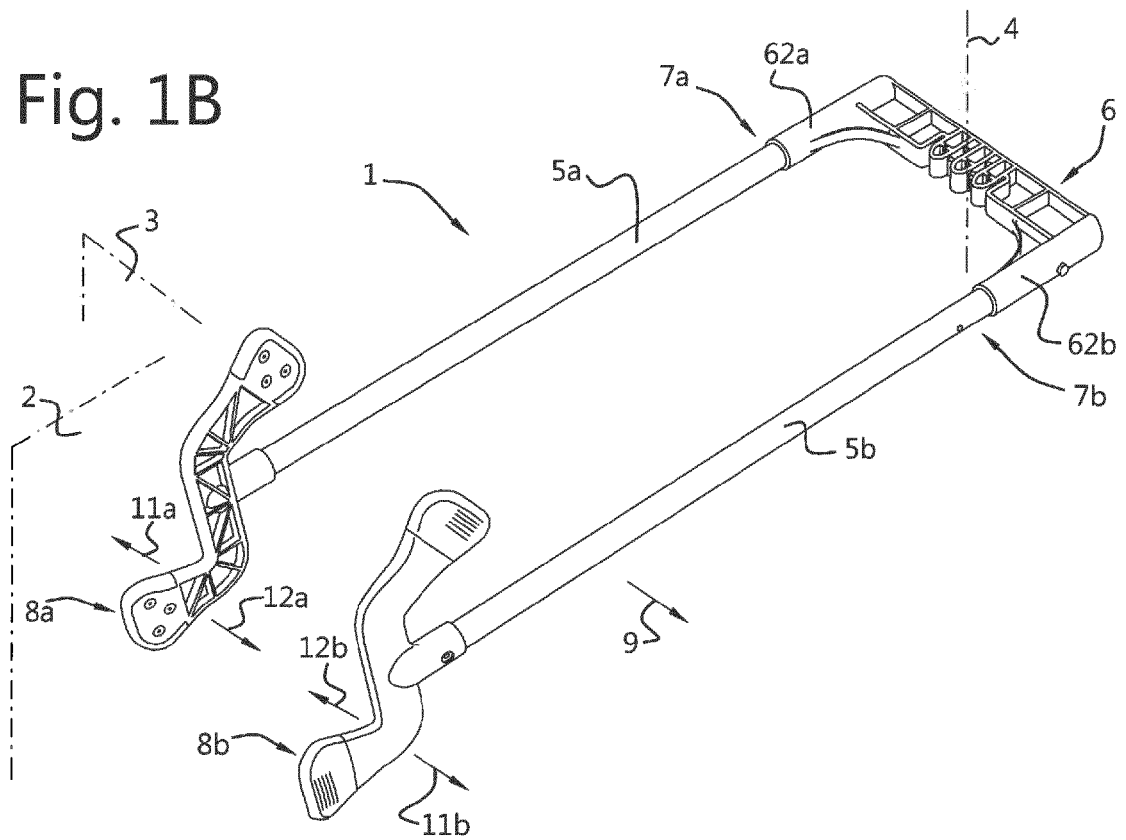


Fig. 1B



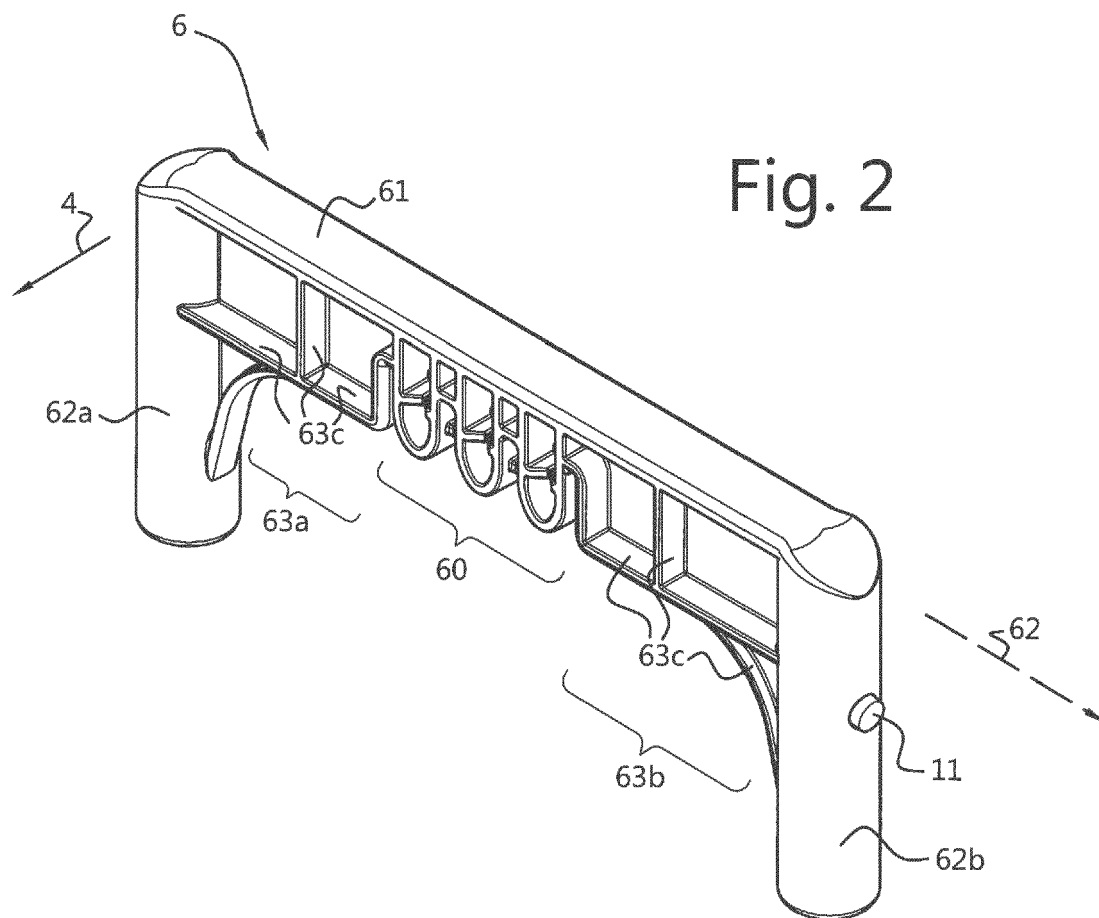


Fig. 3

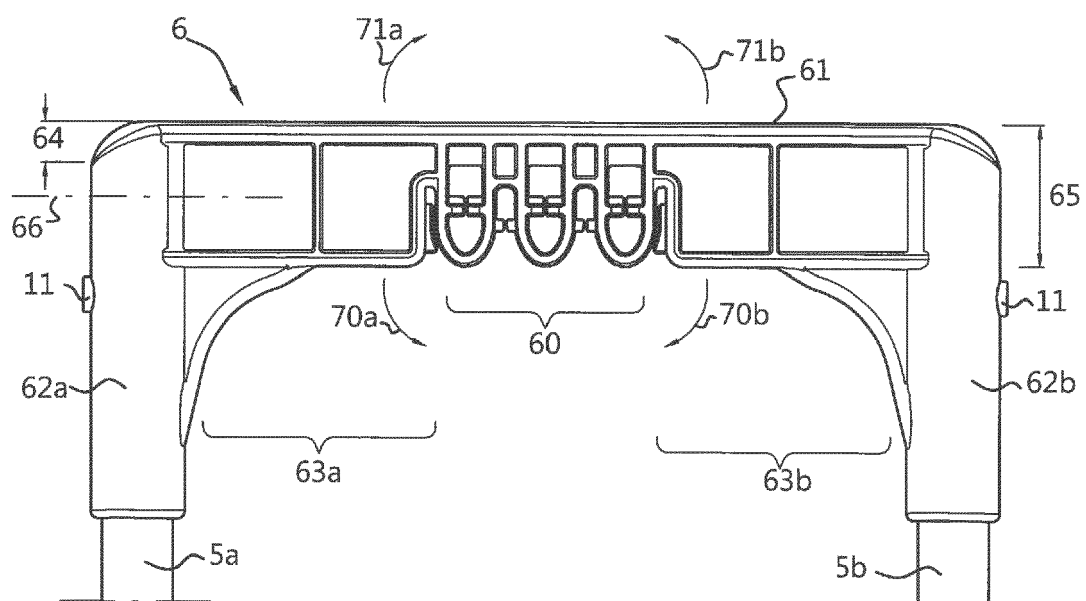


Fig. 4

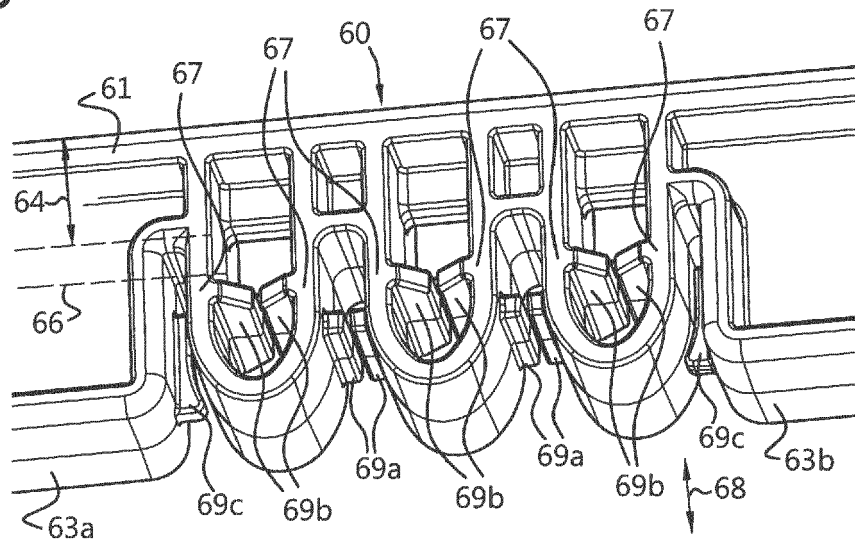
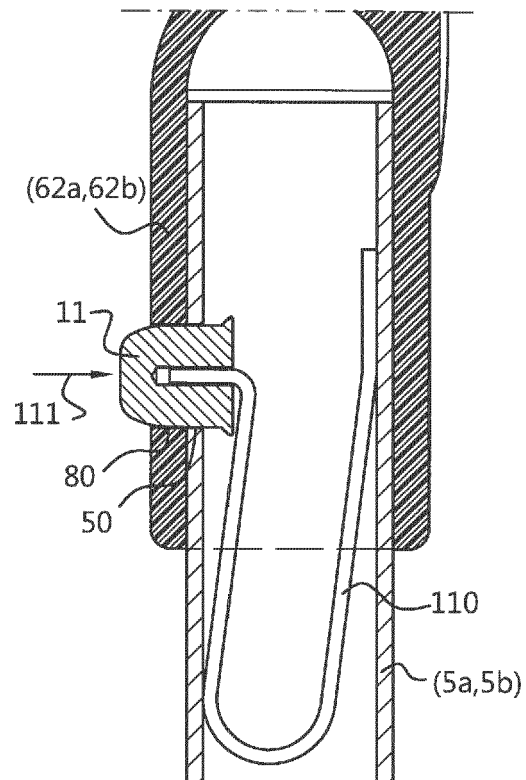


Fig. 5





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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 8 July 2019	Examiner Beugeling, Leo
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