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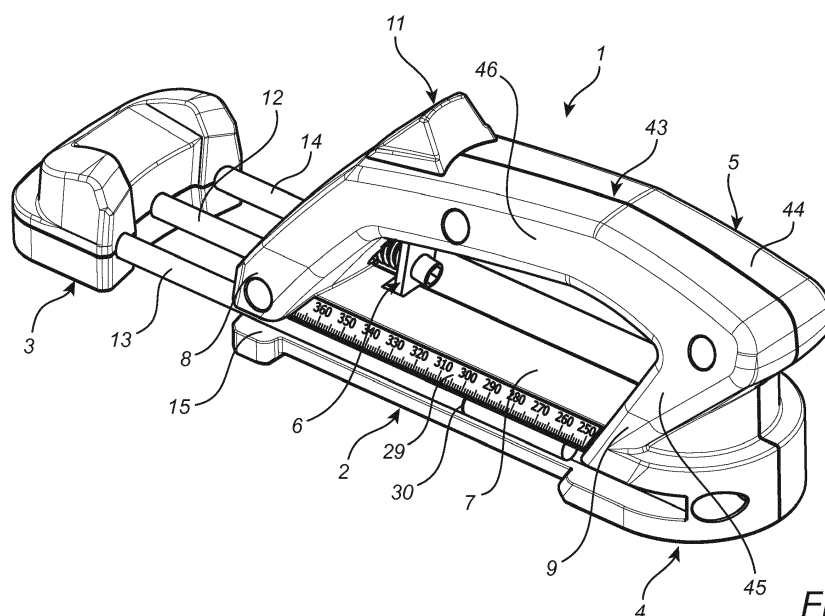
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(54) **A DEVICE FOR ADJUSTING A SKI BINDING**

(57) A device for adjusting a ski binding, wherein the device (1) has an elongated base portion (2), first and second binding engagement portions (3, 4) forming respective opposite first and second end portions of the base portion, and corresponding to toe and heel parts of a ski boot when engaging with the ski binding. The first and second binding engagement portions comprise a movable binding engagement portion (3), which is movable relative to an intermediate portion (7) of the base portion, and longitudinally of the base portion, to adjust the total length of the base portion. Furthermore, the de-

vice has a handle (5) connected with the base portion, and a locking mechanism (6), which is operable between a locked state where the locking mechanism locks the longitudinal movement of the movable binding engagement portion, and an unlocked state where the locking mechanism admits the longitudinal movement of the movable binding engagement portion. The locking mechanism has an operation element (11) for operating the locking mechanism between the locked and unlocked states, wherein the operation element is arranged at the handle.



**Fig. 1**

## Description

### FIELD OF THE INVENTION

**[0001]** The present invention relates to a device for adjusting a ski binding, wherein the device comprises an elongated base portion, first and second binding engagement portions forming respective opposite first and second end portions of the base portion, and corresponding to toe and heel parts of a ski boot when engaging with the ski binding, wherein the first and second binding engagement portions comprise a movable binding engagement portion, which is movable relative to an intermediate portion of the base portion, and longitudinally of the base portion, to adjust the total length of the base portion.

### BACKGROUND OF THE INVENTION

**[0002]** When a ski binding, of the kind used, inter alia, for alpine skis is to be adjusted to fit with a particular size of ski boot, the traditional way of performing the adjustment is to fetch a ski boot of the desired size, make an initial adjustment of the binding, and try to push the boot into the binding to see if it fits. If it does not fit, the boot is removed, the binding is further adjusted, and another try with the boot is made. The work of adjusting ski bindings in this way is physically demanding, non-ergonomic and time consuming. In particular at facilities where a large number of ski bindings are adjusted during a working day, such as at a ski rental facility or a ski store, the procedure is both exhausting and inefficient. In order to facilitate the work of adjusting ski bindings, efforts have been made to construct a device which can be used instead of the boots.

**[0003]** The published patent application JP 2003135646 discloses a device for adjusting a ski binding of the kind mentioned above. It has a structure with two movable binding engagement portions which are connected with a central member having a drive mechanism. The drive mechanism has a wheel. When the wheel is rotated, the binding engagement portions move longitudinally, either away from or towards the central member, depending on the direction of rotation. The prior art device of JP 2003135646 has several drawbacks. For instance, a single device can only cover a minor part of the whole range of sizes, and the drive mechanism is cumbersome and slow to use.

### SUMMARY OF THE INVENTION

**[0004]** It would be advantageous to improve the device to facilitate the handling of the device.

**[0005]** To better address this concern, in a first aspect of the invention there is presented a device for adjusting a ski binding, the device comprising an elongated base portion, first and second binding engagement portions forming respective opposite first and second end portions of the base portion, and corresponding to toe and heel

parts of a ski boot when engaging with the ski binding, wherein the first and second binding engagement portions comprise a movable binding engagement portion, which is movable relative to an intermediate portion of the base portion, and longitudinally of the base portion, to adjust the total length of the base portion. The device further comprises a handle extending along the base portion at a distance from the base portion, and being connected with the base portion at opposite first and second ends of the handle, thereby forming an opening between the handle and the base portion. Furthermore, the device comprises a locking mechanism, which is operable between a locked state where the locking mechanism locks the longitudinal movement of the movable binding engagement portion, and an unlocked state where the locking mechanism admits the longitudinal movement of the movable binding engagement portion. The locking mechanism comprises an operation element for operating the locking mechanism between the locked and unlocked states, wherein the operation element is arranged at the handle. By means of the locking mechanism, the adjustment of the length of the base portion has been facilitated, and by means of the handle it is more convenient to push the device in place at a ski binding and to remove it from the ski binding. Thereby, the handling of the device has been facilitated.

**[0006]** In accordance with an embodiment of the device, the movable binding engagement portion comprises a longitudinal first bar, which is movably connected with the intermediate portion of the base portion, wherein the locking mechanism comprises a bar engagement element, which is arranged to, in the locked state, be engaged with the first bar to fix the position of the movable binding engagement portion relative to the intermediate portion, and to, in the unlocked state, be disengaged from the first bar, wherein the operation element is connected with the bar engagement element, and is arranged to operate the bar engagement element between the engagement with the bar and the disengagement from the bar. Thereby, a quick adjustment is possible.

**[0007]** In accordance with an embodiment of the device, the movable binding engagement portion comprises second and third longitudinal bars, which are guiding bars, movably connected with the intermediate portion at guiding portions thereof, and extending in parallel with the first bar and laterally displaced from the first bar at opposite sides thereof. Thereby an increased stability of the device is obtained.

**[0008]** In accordance with an embodiment of the device, the locking mechanism comprises a spring device, which is connected with the bar engagement element, and with the handle, at the first end of the handle, wherein the bar engagement element is spring biased, by means of the spring device, towards the engagement with the first bar. The spring biased bar engagement element facilitates the operation of the locking mechanism.

**[0009]** In accordance with an embodiment of the device, the bar engagement element is elongated and has

a first end portion, which is received at a seat of the intermediate portion enabling the first end portion to pivot within the seat, and an opposite second end portion, which is connected with the operation element. Thereby a simple yet reliable construction is obtained.

**[0010]** In accordance with an embodiment of the device, the bar engagement element extends through an aperture of the handle, which aperture extends between an inner surface of the handle at the opening defined by the handle and the base portion, and an outer surface of the handle opposite to the inner surface, wherein the operation element is arranged at the outer surface. Thereby, for instance, the operation element can be located on top of the handle to be comfortably operated by means of the thumb while holding the handle with the rest of the fingers.

**[0011]** In accordance with an embodiment of the device, the bar engagement element protrudes into the opening defined by the handle and the base portion, and wherein the operation element is arranged in the opening. Thereby, for instance, the operation element can be located below the handle to be comfortably operated by means of the fingers while simultaneously holding the handle with the rest of the fingers.

**[0012]** In accordance with an embodiment of the device, the bar engagement element comprises a hole through which the first bar extends.

**[0013]** In accordance with an embodiment of the device, the second binding engagement portion has an inclined end wall arranged to engage with the heel portion of the binding, the end wall sloping towards the first binding engagement portion in a downward direction. Thereby, when the device is pushed downwards into the binding, the entrance of the device into the binding is facilitated.

#### BRIEF DESCRIPTION OF THE DRAWINGS

**[0014]** The invention will now be described in more detail and with reference to the appended drawings in which:

- Fig. 1 is a perspective view of an embodiment of the device according to the present invention;
- Fig. 2 is a cross-sectional view of the device of Fig. 1 in a locked position;
- Fig. 3 is a cross-sectional view of the device of Fig. 1 in an unlocked position;
- Fig. 4 is a cross-sectional view of another embodiment of the device according to the present invention in a locked state;
- Fig. 5 is a cross-sectional view of the device of Fig. 4 in an unlocked state; and
- Fig. 6 is a side view of another embodiment of the device according to the present invention.

#### DESCRIPTION OF EMBODIMENTS

**[0015]** In a first embodiment of the device for adjusting a ski binding, as shown in Figs. 1-3, the device 1 comprises an elongated base portion 2, first and second binding engagement portions 3, 4 forming respective opposite first and second end portions of the base portion 2, a handle 5, and a locking mechanism 6. The device 1 has an adjustable length, which is adjusted according to the desired boot size that the binding is meant to fit with. For the purposes of this description, the base portion 2 is defined to be elongated in a horizontal direction, which refers to the usual position the device is placed in during use thereof, the first binding engagement portion is considered to be positioned at a front portion of the device 1, and the second binding engagement portion 4 is considered to be positioned at a rear portion of the device 1.

**[0016]** The first and second binding engagement portions 3, 4 respectively correspond to toe and heel parts of a ski boot when engaging with the ski binding. The first and second binding engagement portions 3, 4 comprise a movable binding engagement portion, which in this first embodiment is the first binding engagement portion 3, which is movable relative to an intermediate portion 7 of the base portion 2. More particularly, the first binding portion is movable longitudinally of the base portion 2 to adjust the total length of the base portion 2.

**[0017]** The handle 5 extends along the base portion 2 at a distance from the base portion 2, here above the base portion 2, and is connected with the base portion 2 at opposite first, or front, and second, or rear, end portions 8, 9 of the handle 5, thereby forming an opening 10 between the handle 5 and the base portion 2. The locking mechanism 6 is operable between a locked state, as shown in Fig. 2, where the locking mechanism 6 locks the longitudinal movement of the first binding engagement portion 3, and an unlocked state, as shown in Fig. 3, where the locking mechanism 6 admits the longitudinal movement of the first binding engagement portion 3.

**[0018]** Furthermore, the locking mechanism 6 comprises an operation element 11 for operating the locking mechanism 6 between the locked and unlocked states, wherein the operation element 11 is arranged at the handle 5. In this first embodiment the operation element 11 is a knob arranged on top of the handle 5. At least a rear portion of a top surface 43 of the handle 5, constitutes a push surface 44, which provides support for the hand when pushing the device 1 down in place at the binding. The push surface 43 thereby enhances the ergonomics of the device 1. Additionally, the push surface 44 can be arranged to slope downwards at a small angle in a rearward direction. In order to advantageously position the push force and to increase the area of the push surface 44, the handle 5 protrudes to the rear of a rear end of the second binding engagement portion 4. Furthermore, at the rear end portion 9 of the handle 5 it comprises a sloping portion 45 extending upwards and obliquely rearwards, forming an acute angle A with a top portion 46 of

the handle 5, which top portion 46 includes said push surface.

**[0019]** The first binding engagement portion 3 comprises a longitudinal first, second and third bars 12, 13, 14, which are movably, and more particularly slidably, connected with the intermediate portion 7 at guiding portions 15, thereof, and extend in parallel with each other. The second and third bars 13, 14 are laterally displaced from the first bar 12 at opposite sides thereof. Furthermore, the first binding engagement portion 3 comprises a toe block 40, which is attached to the first, second and third bars 12-14 at front ends thereof. The toe block 40 has a lip portion 41 at a front end thereof, which lip portion substitutes the toe portion of a ski boot. The second binding engagement portion 4 is rigidly connected with the intermediate portion 7, and can be integral therewith. The second binding engagement portion 4 has a shoulder portion 42 at a rear end thereof, which substitutes a corresponding shoulder portion of a ski boot. The locking mechanism 6 comprises a bar engagement element 16, which is arranged to, in the locked state, be engaged with the first bar 12 to fix the position of the first binding engagement portion 3 relative to the intermediate portion 7, and to, in the unlocked state, be disengaged from the first bar 12, wherein the operation element 11 is connected with the bar engagement element 16, and is arranged to operate the bar engagement element 16 between the engagement with the first bar 12 and the disengagement from the first bar 12.

**[0020]** The locking mechanism 6 comprises a spring device 17, which is connected with the bar engagement element 16, and with the handle 5, at the first end portion 8 of the handle 5, wherein the bar engagement element 16 is spring biased, by means of the spring device 17, towards the engagement with the first bar 12. The bar engagement element 16 is elongated and has a first end portion 22, which is received at a seat 23 of the intermediate portion 7 enabling the first end portion 22 to pivot within the seat 23. Furthermore, the bar engagement element 16 has an opposite second end portion 24, which is connected with the operation element 11. In the shown embodiments the bar engagement element 16 is constituted by an elongated metal plate. The spring device 17 comprises a spring 26 received in a boring 27 of the handle 5, and a guide pin 28 attached to the bar engagement element 16. The guide pin 28 protrudes towards the first end portion 8 and into the spring 26. The spring is biased to exert a force on the bar engagement element 16 in rearward direction, i.e. towards the second end portion 9 of the handle 5. In other words, the spring is pre-compressed.

**[0021]** In this first embodiment, the bar engagement element 16 extends through an aperture 18 of the handle 5, which aperture 18 extends between an inner surface 19 of the handle 5, at the opening 10, and an outer surface 20 of the handle 5 opposite to the inner surface 19, wherein the operation element 11 is arranged at the outer surface 20.

**[0022]** Furthermore, the bar engagement element 16 comprises a hole 25 through which the first bar 12 extends. The bar engagement element 16 is arranged to engage with the first bar 12 by being inclined relative to the first bar 12, thereby gripping the first bar 12 with edge portions of the hole 25. The engagement between the first bar 12 and the edges of the hole 25 becomes strong enough to keep the longitudinal setting of the first bar 12 during the operation of adjusting the ski binding accordingly. Preferably, the bars 12-14 are provided with a friction surface, i.e. the surface of the metal bars 12-14 has been treated to make it non-even, or at least non-glossy, to provide an even better grip at relatively low spring force in the locked position. One way of preparing the friction surface is to use steel for the bars, and harden the steel. However, a rougher surface can be provided if necessary, such as by machining the surface.

**[0023]** The intermediate portion 7 is provided with a ruler 29, shown in Fig. 1. The ruler 29 indicates a range of shoe sizes S covering at least a range from the smallest to the largest size that the device can be set at. The shoe size S is presented in some appropriate quantity, such as millimetres. The currently set size S, i.e. the length from the front end to the rear end of the device 1, is indicated by means of a size indicator 30 on the second bar 13, such as a vertical stripe, which is visible below the ruler 29. Preferably, there is a ruler 29 at each side of the device 1, in order to make it equally suitable for both right-handed and left-handed persons.

**[0024]** The device 1 is operated as follows. When a ski binding is to be adjusted to a particular size S, an operator sets the device 1 to that size S by gripping the device 1 by the handle 5 with one hand and pushing the operation element 11 forward with the thumb to the unlocked position. Then, the operator grips the first binding engagement portion 3 and pulls it further out or pushes it in until the size mark 30 is positioned at the desired size S. This size setting operation is quick due to the design of the device 1, taking but a few seconds or less. When the operator lets go of the operation element 11 the bar engagement element 16 is pushed to the locked position by the spring 29 and locks the first binding engagement portion 3 in the set position. After having adjusted the binding to a presumed position, the operator pushes the device 1 into the binding, as would he/she have done with a ski boot. If the binding needs some further adjustment, the operator releases the device 1 from the binding, adjusts the binding and applies the device 1 once more, etc. until the binding is correctly adjusted. The handle 5 facilitates the operation in several ways. It is easy to carry/hold the device 1, to push the device into and pull it out of the binding. When pushing the operation element 11 forward, the hand can find good support by abutting against an inner surface of the sloping portion at the rear end portion.

**[0025]** A second embodiment of the device 31, shown in Figs. 4 and 5, corresponds with the first embodiment except for the locking mechanism. In this second embod-

iment, the locking mechanism 32 comprises a bar engagement element 33, which is similarly arranged in the seat 23 at a first end portion 34 of the bar engagement element 33, has a similar engagement with the first bar 12, and protrudes into the opening 10 defined by the handle 5 and the base portion 2, but not further through an aperture of the handle 5. To the contrary, the bar engagement element 33 ends in the opening 10, and the operation element 35 is arranged in the opening 10 and is attached to an upper end portion 36 of the bar engagement element 33. More specifically, the operation element 35 is constituted by an elongated pin, which extends rearwards from the bar engagement element 33 approximately longitudinally of the base portion 2 and beneath the handle 5.

**[0026]** In order to operate the device 31 from the locked state to the unlocked state, the operator grips the handle 5 including the operation element 35, and clamps the operation element 35, i.e. lifts it up, towards the inner surface 19 of the handle 5.

**[0027]** In a third embodiment of the device 37, as shown in Fig. 6, the second binding engagement portion 38 has an end wall 39, at least a part of which is inclined. Thereby, the entrance of the end wall 39 into the heel portion of the binding is facilitated, i.e. the inclination makes it easier to push the device 37 into the binding. More particularly, the inclined part of the end wall 39 is sloping towards the first binding engagement portion 3 in a downward direction. It should be noted that the whole end wall 39 is inclined in Fig. 6. If merely a lower portion of the end wall is inclined, then the rest of it is vertical, as is the whole end wall in the other embodiments. Furthermore, the angle of the inclination shown in Fig. 6 is merely an example and other angles are useful as well.

**[0028]** While the invention has been illustrated and described in detail in the drawings and foregoing description, such illustration and description are to be considered illustrative or exemplary and not restrictive; the invention is not limited to the disclosed embodiments.

**[0029]** For instance, the first binding engagement portion can be provided with a sloping bottom surface, which slopes slightly downwards in a rearward direction from its front end.

**[0030]** Other variations to the disclosed embodiments can be understood and effected by those skilled in the art in practicing the claimed invention, from a study of the drawings, the disclosure, and the appended claims. In the claims, the word "comprising" does not exclude other elements or steps, and the indefinite article "a" or "an" does not exclude a plurality. The mere fact that certain measures are recited in mutually different dependent claims does not indicate that a combination of these measures cannot be used to advantage. Any reference signs in the claims should not be construed as limiting the scope.

## Claims

1. A device for adjusting a ski binding, the device (1) comprising an elongated base portion (2), first and second binding engagement portions (3, 4) forming respective opposite first and second end portions of the base portion, and corresponding to toe and heel parts of a ski boot when engaging with the ski binding, wherein the first and second binding engagement portions comprise a movable binding engagement portion (3), which is movable relative to an intermediate portion (7) of the base portion, and longitudinally of the base portion, to adjust the total length of the base portion, **characterized in** further comprising a handle (5) connected with the base portion, and a locking mechanism (6), which is operable between a locked state where the locking mechanism locks the longitudinal movement of the movable binding engagement portion, and an unlocked state where the locking mechanism admits the longitudinal movement of the movable binding engagement portion, wherein the locking mechanism comprises an operation element (11) for operating the locking mechanism between the locked and unlocked states, wherein the operation element is arranged at the handle.
2. The device according to claim 1, wherein the handle extends along the base portion at a distance from the base portion, and is connected with the base portion at opposite first and second end portions of the handle, thereby forming an opening between the handle and the base portion.
3. The device according to claim 1 or 2, wherein the movable binding engagement portion (3) comprises a longitudinal first bar (12), which is movably connected with the intermediate portion (7) of the base portion (2), wherein the locking mechanism (6) comprises a bar engagement element (16), which is arranged to, in the locked state, be engaged with the first bar to fix the position of the movable binding engagement portion relative to the intermediate portion, and to, in the unlocked state, be disengaged from the first bar, wherein the operation element is connected with the bar engagement element, and is arranged to operate the bar engagement element between the engagement with the first bar and the disengagement from the first bar.
4. The device according to claim 3, wherein the movable binding engagement portion (3) comprises longitudinal second and third bars (13, 14), movably connected with the intermediate portion, and extending in parallel with the first bar (12) and laterally displaced from the first bar at opposite sides thereof.
5. The device according to claim 3 or 4, wherein the

locking mechanism (6) comprises a spring device (17), which is connected with the bar engagement element, and with the handle (5), at the first end of the handle, wherein the bar engagement element is spring biased, by means of the spring device, towards the engagement with the first bar (12). 5

6. The device according to any one of claims 3 to 5, wherein the bar engagement element (16) is elongated and has a first end portion (22), which is received at a seat (23) of the intermediate portion (7) enabling the first end portion to pivot within the seat, and an opposite second end portion (24), which is connected with the operation element (11). 10

7. The device according to claim 6, wherein the bar engagement element (16) extends through an aperture (18) of the handle (5), which aperture extends between an inner surface (19) of the handle at the opening (10) defined by the handle and the base portion (2), and an outer surface (20) of the handle opposite to the inner surface, wherein the operation element (11) is arranged at the outer surface. 15 20

8. The device according to claim 6, wherein the bar engagement element protrudes into the opening defined by the handle and the base portion, and wherein the operation element is arranged in the opening. 25

9. The device according to any one of claims 3 to 8, wherein the bar engagement element comprises a hole through which the first bar extends. 30

10. The device according to claim 9, wherein the bar engagement element is arranged to engage with the first bar by being inclined relative to the first bar, thereby gripping the first bar with edge portions of the hole. 35

11. The device according to any one of the preceding claims, wherein the intermediate portion is provided with a ruler. 40

12. The device according to any one of the preceding claims, wherein the second binding engagement portion has an end wall, at least a part of which is inclined such that it is sloping towards the first binding engagement portion in a downward direction. 45

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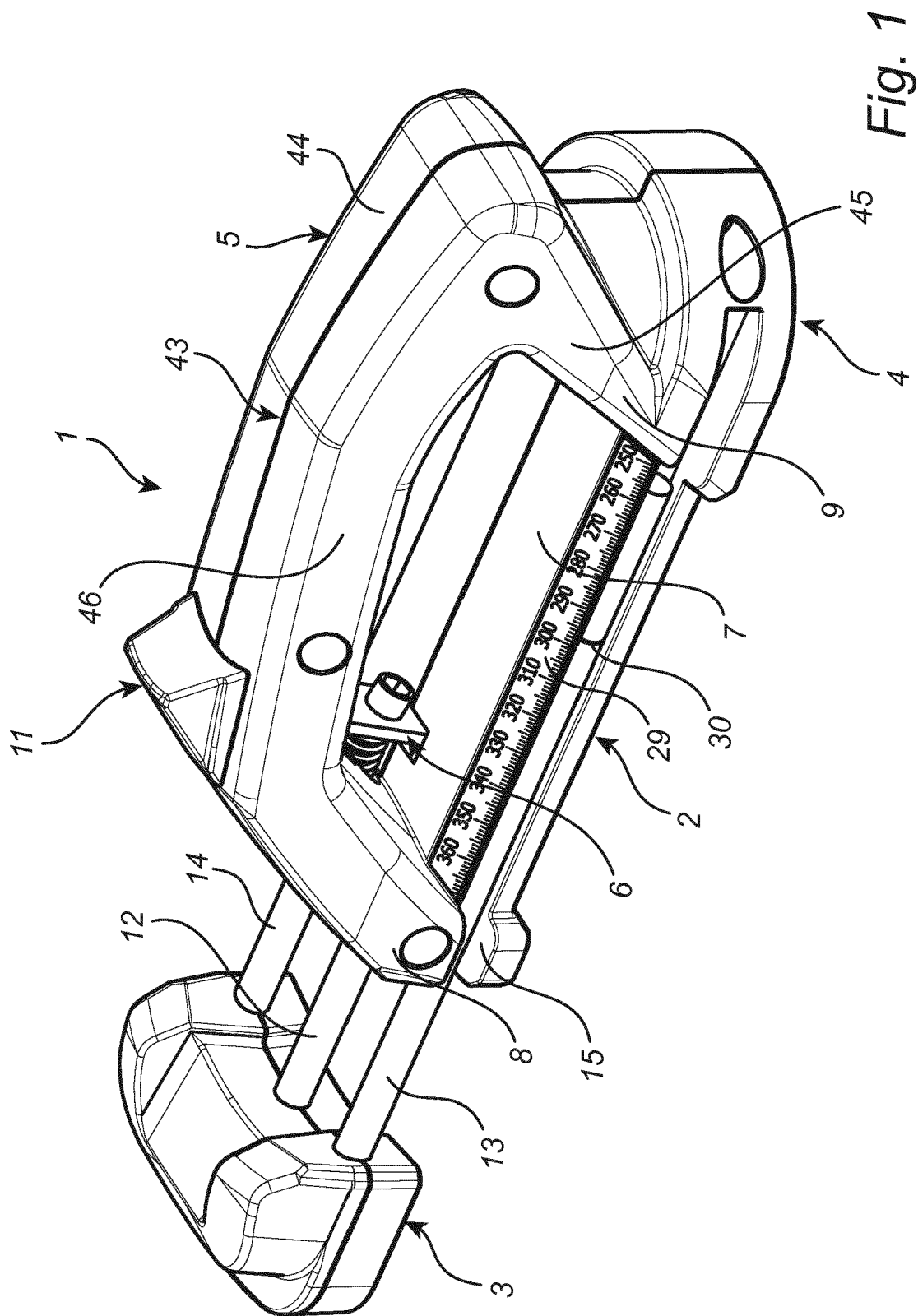
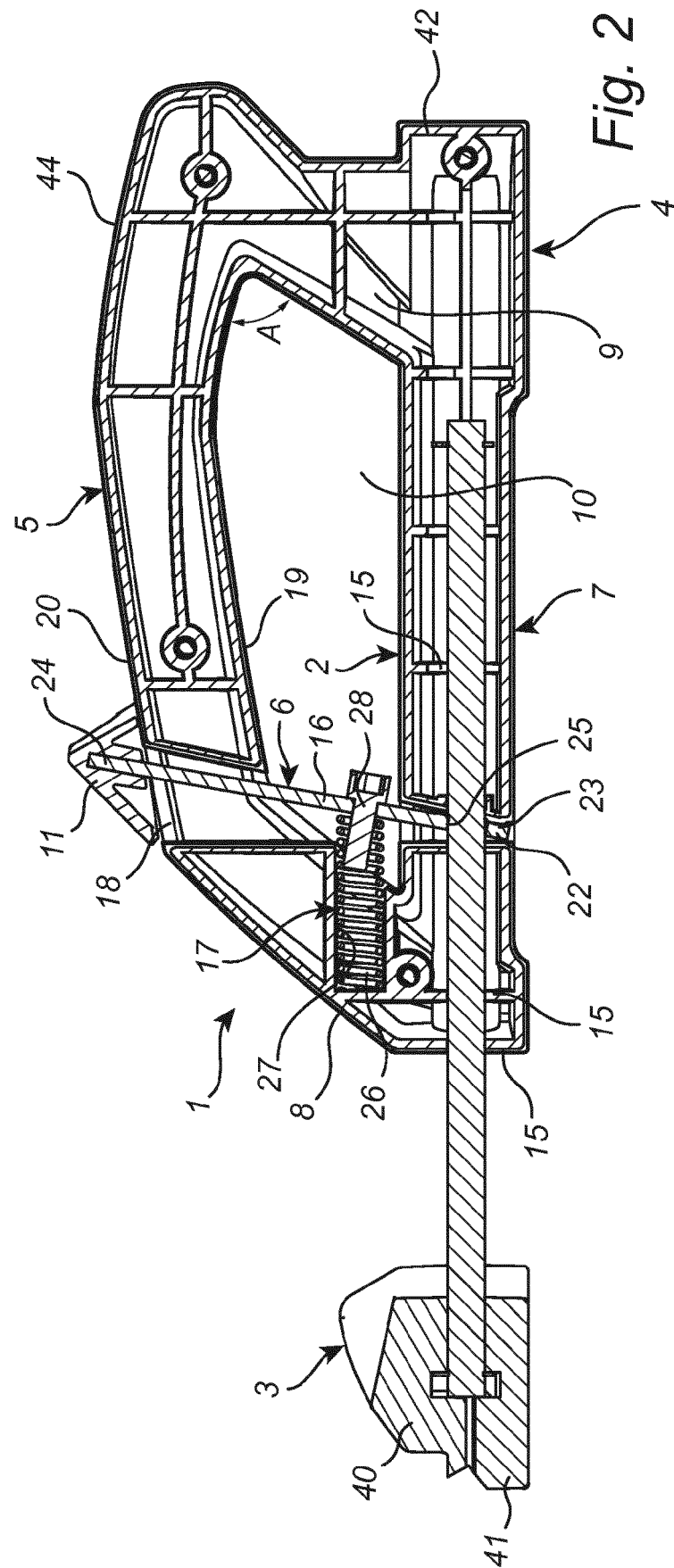


Fig. 1





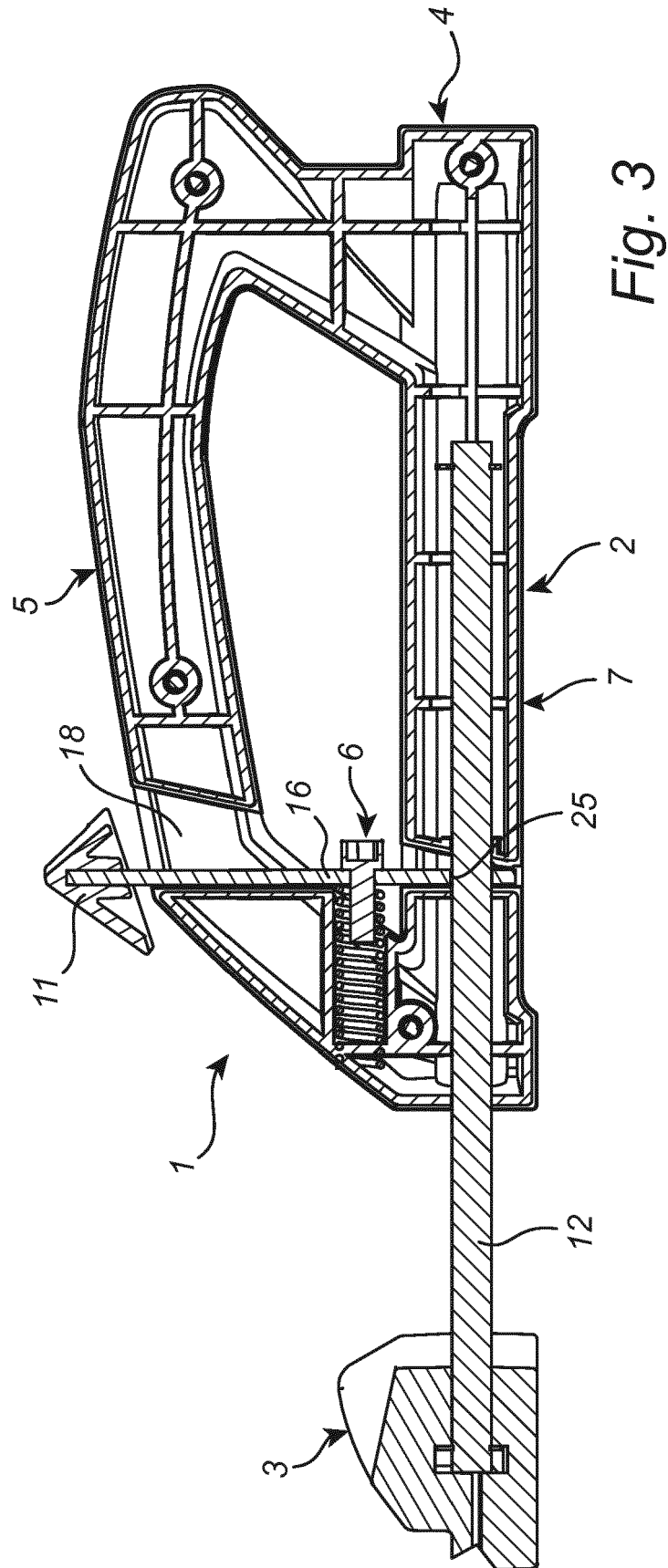
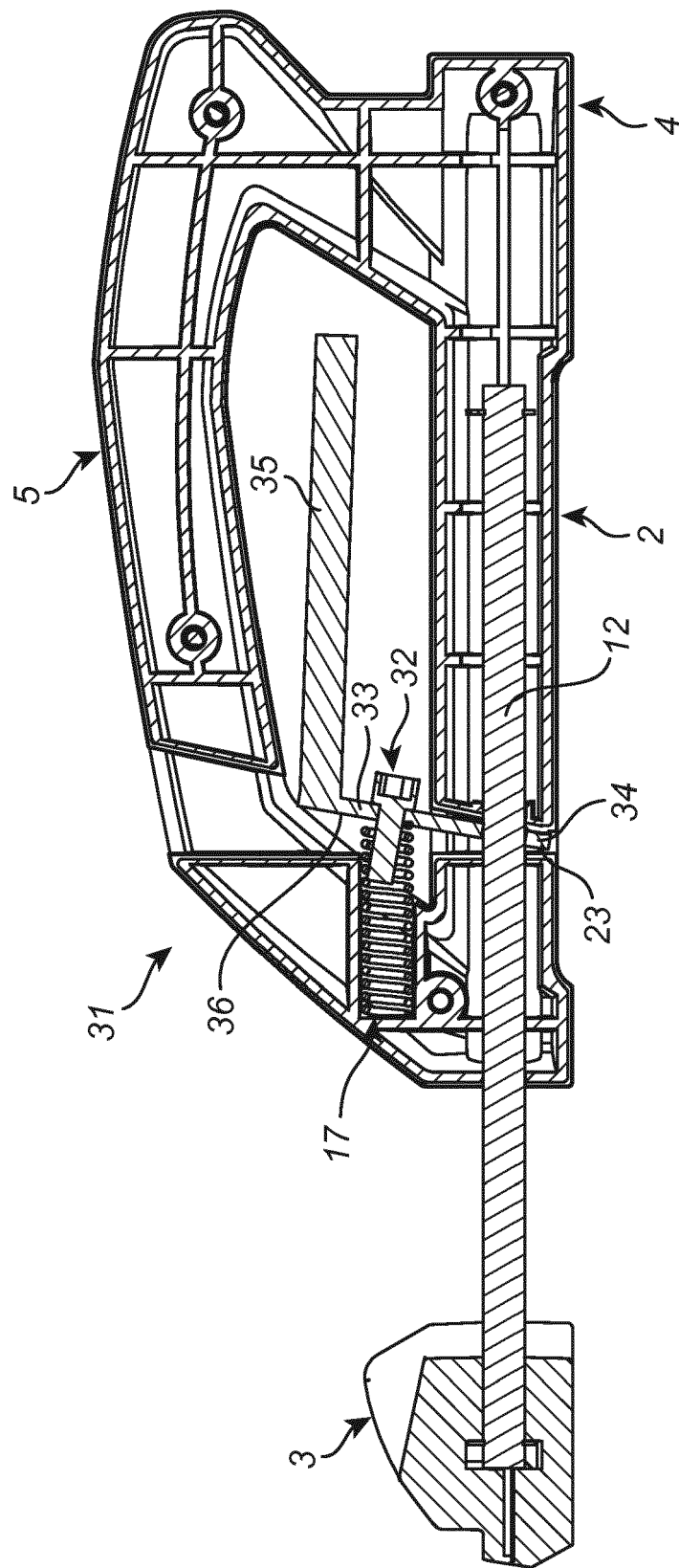


Fig. 3



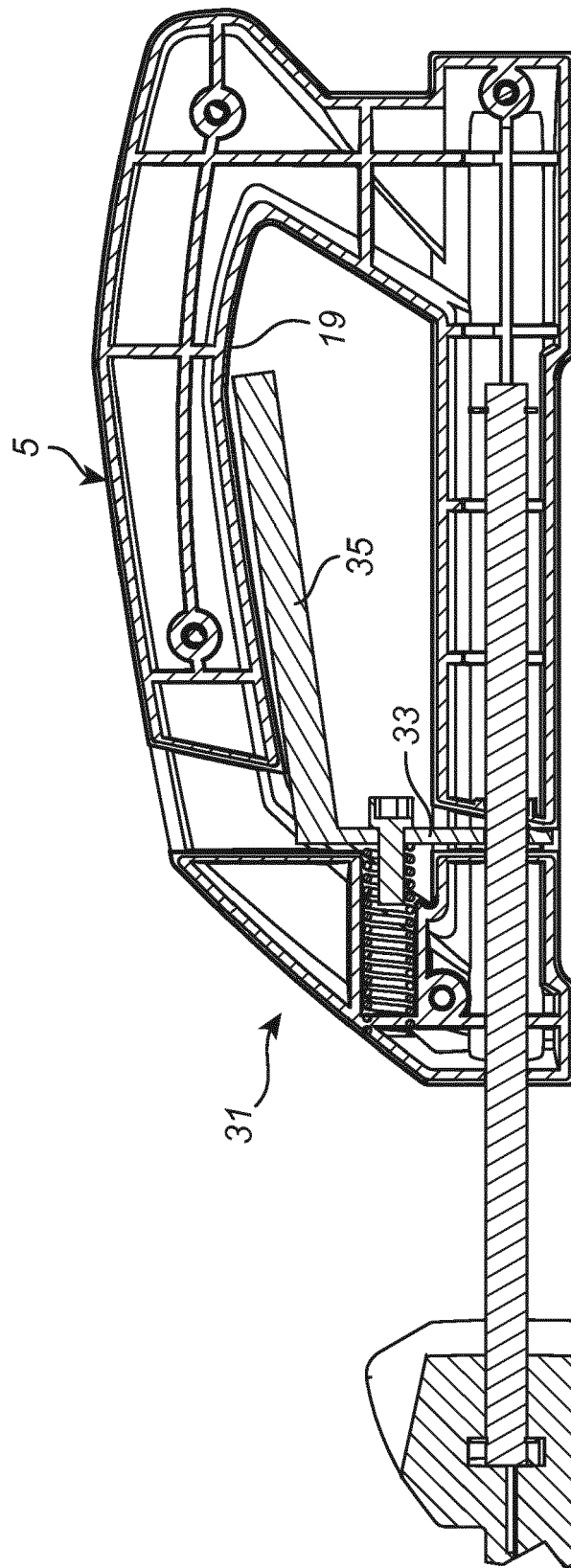
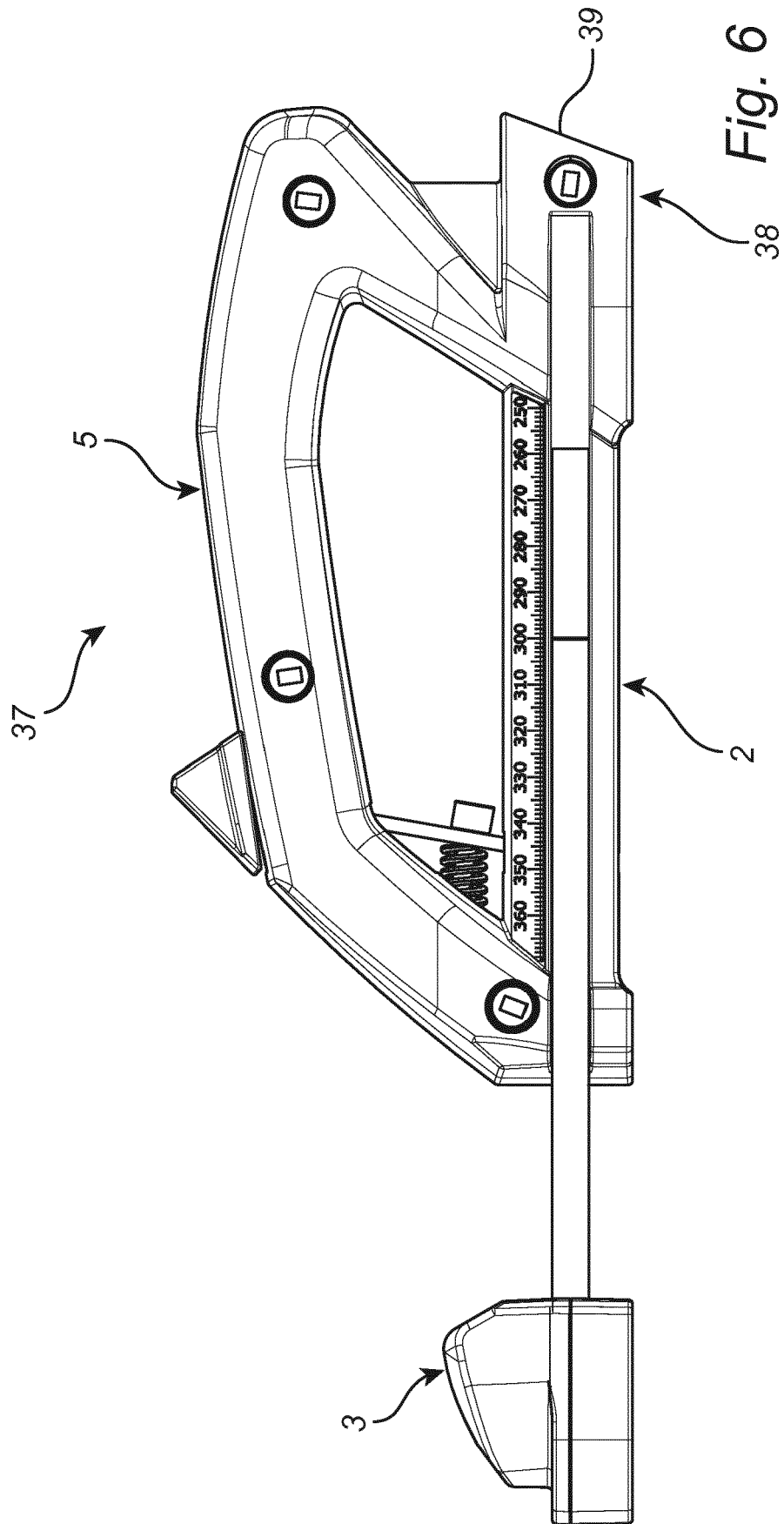


Fig. 5





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Application Number  
EP 16 19 9352

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The present search report has been drawn up for all claims			
Place of search <b>Munich</b>		Date of completion of the search <b>23 May 2017</b>	Examiner <b>Brunie, Franck</b>
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT  
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