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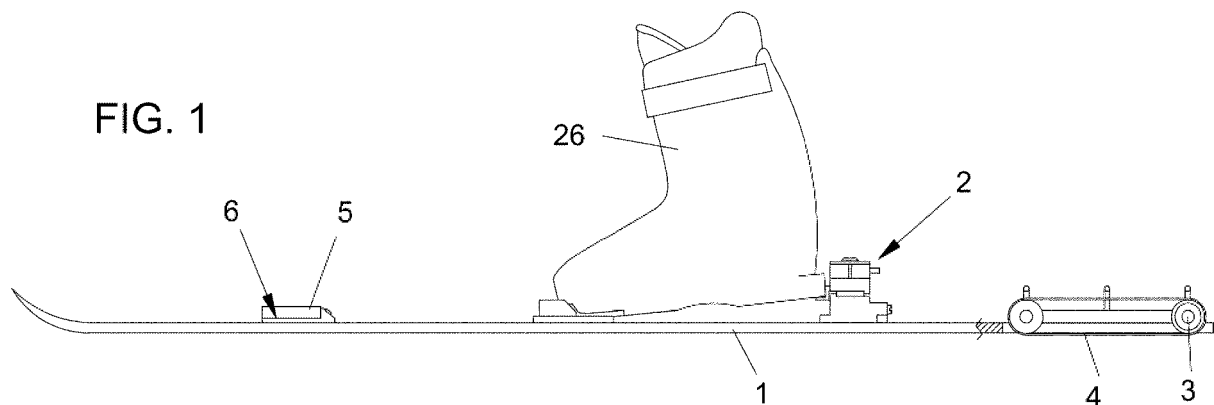
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MOUNTAINEERING SKI BINDING WITH ASSISTED FOOT MOVEMENT DURING THE ASCENT

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Mountaineering ski, of a kind equipped with a crawler belt (4) motorized by a motor (3) powered by a battery (5), having a binding (2) equipped with a micro-switch (21) working between an operating position of said crawler belt (4) when the boot (26) is in a raised position relative to the binding, and a stop position for the move-
- ment of the crawler belt (4) when the boot (26) is in the leaning position on the binding itself. In comparison with the prior art mountaineering ski bindings, the one according to the invention offers the advantage of being simpler, less cumbersome and easier to use.



Description

BACKGROUND OF THE INVENTION

[0001] The present invention concerns a binding for mountaineering ski with assisted movement of the skier's foot during the ascent phase, in particular for the assisted movement of the stride.

[0002] The field of the invention is that of skis for the sport of mountaineering, equipped with motorization that facilitates the ascent thus reducing the efforts required from the skier when climbing the slope.

[0003] The current systems of this type provide for the use of a motorized belt, put into operation by means of complex electronic devices, which are mechanically bulky and difficult to operate in coordination with the movements of the skier's feet.

[0004] In addition, the well-known systems described above need to be removed in the descent phase and generally provide a continuous and/or discontinuous propulsion, difficult to control by the skier, who finds it difficult to coordinate the movement of the ski with the activation of the propulsion.

SUMMARY OF THE INVENTION

[0005] The main object of the present invention is to provide a new binding for mountaineering skis which, unlike current motorized systems, is simpler, less cumbersome and easier to use.

[0006] This and other objects are achieved by the binding of claim 1. Some preferred embodiments of the invention result from the remaining claims.

[0007] In comparison with the prior art mountaineering ski bindings, the one according to the invention offers the advantage of being easier to use, thanks to the possibility of operating an electric motor depending on the movement of the boot and the possibility of locking to face the descent.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] These and other objects, advantages and characteristics result from the following description of a preferred embodiment of the binding of the invention illustrated, by way of non-limiting example, in the figures of the attached drawings.

[0009] In them:

- Figure 1 illustrates in a synthetic form a ski for mountaineering according to the invention;
- Figure 2 illustrates the detail of the propulsion belt of the ski in Figure 1;
- Figures 2A, 2B, 2C illustrate the driving mechanism of the motorized crawler belt of the ski;
- Figure 3 illustrates in cross section the detail of the ski in Figure 1 at the boot binding position;
- Figure 4 illustrates the detail of the binding in Figure

3;

- Figure 4A illustrates in perspective the detail of the support of the heelpiece on the base of the binding fixed to the ski;
- Figure 5 illustrates the position of the ski binding of the invention with the boot in the descent position;
- Figure 6 illustrates the position of the ski binding of the invention with the boot in the ascent phase;
- Figure 7 illustrates the position of the ski binding of the invention with the boot raised in the ascent phase;
- Figures 8 to 12 illustrate a variant of the binding of the invention.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[0010] In Figure 1 a ski 1 provided with a binding 2 for the boot 26, suitable to activate and stop the driving motor 3 of the crawler belt 4 for facilitated progress of the ski during the ascent phase of the slope by the skier is depicted.

[0011] On the ski 1 is also fitted the battery 5 for electrical power supply of the motor 3, said battery being preferably housed in a respective seat 6 provided on the upper face of the ski.

[0012] The rear part of the ski 1 is further equipped with a slot 7 suitable to allow the access of the crawler belt 4 to the snowy bottom.

[0013] As is best illustrated in Figures 2A, 2B and 2C, the crawler belt 4 can operate between a lowered position (Figure 2A), in which it is in contact with the snowy bottom during the assisted ascent phase of the ski, and a raised position (Figure 2B), in which the crawler belt 4 is placed completely above the ski during the descent phase.

[0014] These oscillation movements of the crawler belt 4 are allowed by respective torsion springs 14 that push the crawler belt in the resting position of Figure 2B, in combination with two lateral oscillating pressure small pistons 8a, 8c and a lock/unlock central arm 8b supported by respective brackets 9, whose opposite ends are hinged to the frame 10 of the crawler belt 4 itself.

[0015] As shown in Figure 2C, the central arm 8b is locked in the working position of the crawler belt 4 by means of a pin 11 which, in contrast to a spring 12, engages into a respective seat 13 provided on the corresponding bracket 9.

[0016] As shown in Figure 3, the binding 2 has a base 15 fixed to the body of the ski 1, as well as a spring mechanism 16 that allows the rotation of the heelpiece 17 in the four positions of operation of the ski binding (arrow F2).

[0017] The heelpiece 17 of the ski of the invention is movable perpendicularly to the ski 1 in the direction of the arrows F1, in contrast to a spring 18 housed inside the seat 19 of the heelpiece. This spring 18 leans on a cylinder 20 housing a microswitch 21.

[0018] A ring 22 is provided integral to the heelpiece

17 to guide, in the sense of said arrows F1, the stroke of the latter inside the respective seat 23 of the base 15 of the binding. A shaped disc 24 is provided on the binding 2 to anchor the cylinder 20 to this base 15.

[0019] The heelpiece 17 is further equipped with pins 25 for attachment to the boot 26 during the descent phase. On the same heelpiece 17 is also provided a plate 27 for supporting the boot 26 on the ski in the ascent phase.

[0020] The microswitch 21 has an internal contact 28, whose electrical conductors are connected to the motor 3 and the battery 5, respectively, through a potentiometer 29, whose function is to turn on and off the electrical power supply of the motor 3, with the ability of also adjusting the rotation speed of the latter.

[0021] As shown in Figure 4A, in the descent phase of the ski the heelpiece 17 fits, sliding and rotating, with its hub 17a inside the hole 15a of the base 15 leaning, with its higher or more raised first sector 17b, on a first sector 15b of the base 15. Thus, in the descent position the heelpiece is blocked as the sector 17b is leaning on the sector 15b. In the ascent phase the heelpiece 17 is instead inserted with its second sector 17c, which is lower, on a second sector 15c of the base 15, located in a lower or lowered position relative to the sector 15b.

[0022] In particular, in Figure 4A are depicted, on the hub 17a, the four plane faces 30 that serve to define the four positions assumed by the heelpiece in its rotation in the direction of the arrow F2, for engagement in support with the block 31 pushed by the spring 16 of Figure 3.

[0023] As shown in Figure 5, in the descent position the boot 26 is attached to the pins 25 of the heelpiece 17, in turn leaning on the base 15 at its sector 15b. In this position the potentiometer 29 is manually deactivated.

[0024] In the ascent phase the potentiometer 29 is instead turned on and the support position of the boot 26 on the heelpiece 17 is the one represented in Figure 6. At this stage the heelpiece has been rotated in the direction of the arrow F2, so as to free the boot 26 from the pins 25, also bringing the sector 15b of the base 15 into contact with the sector 17c of the heelpiece 17. In this position the button 21a of the microswitch 21 is pressed and opens the electrical power supply circuit of the motor 3, which is then in the stop state.

[0025] In the ascent position illustrated in Figure 7, the boot 26 is raised with respect to the plate 27 and the spring 18 raises the heelpiece 17, releasing the button 21a of the microswitch 21. In this way the electrical power supply circuit of the motor 3 is closed, resulting in the operation of the crawler belt 4.

[0026] In use, during the progress of the skier, the ski in support is in the stop position of the motor, as the boot is leaning on the heelpiece. Conversely, the ski in progress is pushed by the crawler belt, as the boot is in the raised position, thus causing the activation of the microswitch.

[0027] According to the variant illustrated in Figures 8

to 12, the frame 10 is L-shaped and is provided, on its horizontal branch 10a, with holes inside which the end brackets 9a, 9c can slide, in contrast to springs 32 fitted on the latter and pressing on the horizontal branch 10a of the frame 10 of the binding. A locking/unlocking central bracket 9b is further provided.

[0028] The central bracket 9b has no spring and supports the pin 11 which has the function of locking the crawler belt in the raised position only.

[0029] In the working position shown in Figure 9, the pin 11 does not block the crawler belt, which is pressed on the snow by means of the springs 32 of the brackets 9a, 9c (Figure 12).

[0030] In the raised lock position shown in Figures 10 and 11, the pin 11 is located inside the seat 13 of the frame 10 and locks the crawler belt in the raised position.

Claims

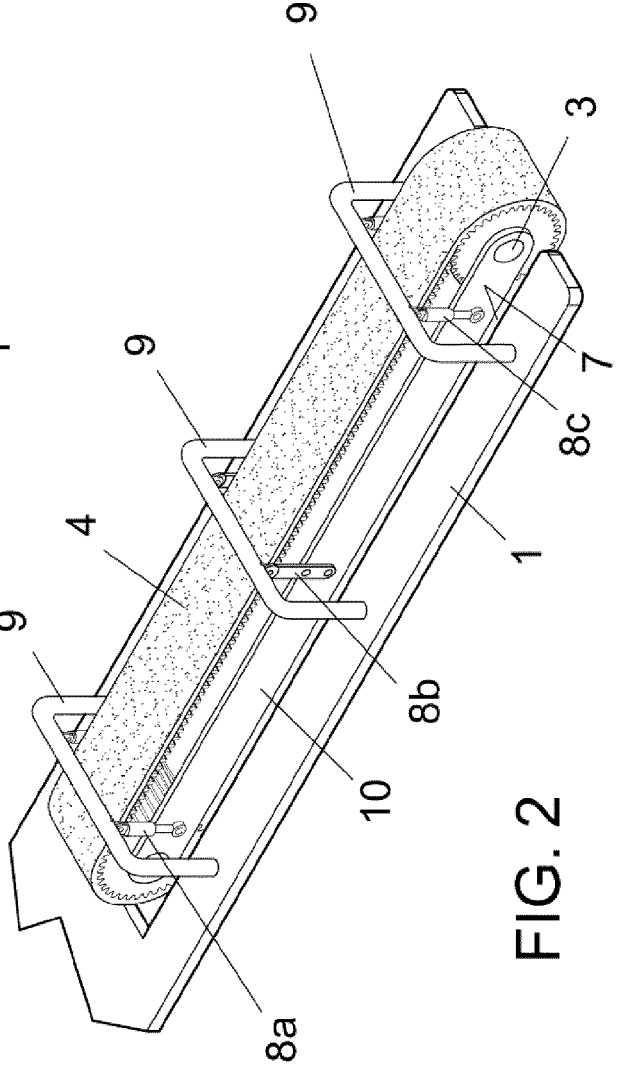
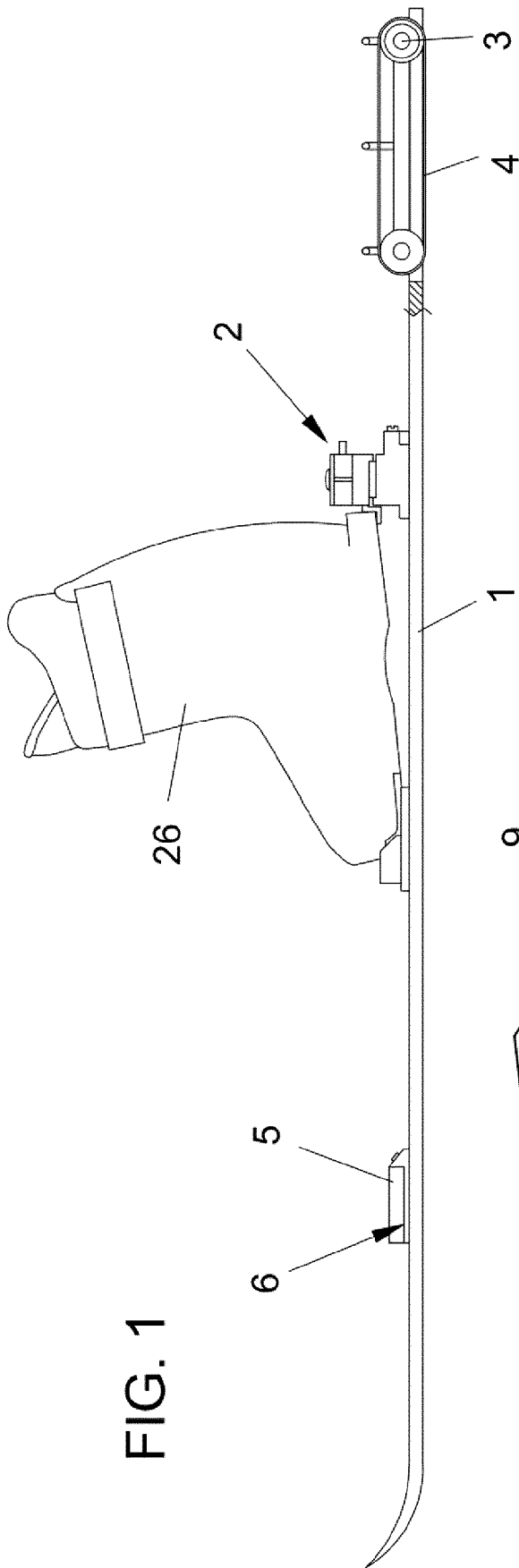
1. A mountaineering ski, of a type provided with a crawler belt (4) motorized by means of a motor (3) powered by a battery (5), comprising a binding (2) equipped with a microswitch (21) working between an operating position of said crawler belt (4) when the boot (26) is in a raised position with respect to the binding, and a stop position of the movement of the crawler belt (4) when the boot (26) is in the leaning position on the binding itself; **characterized in that** said binding (2) is provided with a heelpiece (17) movable, in a direction perpendicular to the ski in contrast to the action of a spring (18), between a raised position of activation of a microswitch (21) and a lowered position of deactivation of said microswitch.
2. The ski according to claim 1, **characterized in that** said heelpiece (17) further comprises a base (15) provided with a seat (15a) for sliding and rotation of the hub (17a) of the heelpiece (17) itself, a ring (22) being provided to slidably hold said heelpiece (17) on said base (15).
3. The ski according to claim 1, **characterized in that** it comprises torsion springs (14) cooperating with two lateral oscillating pressure small pistons (8a, 8c) and a locking/unlocking central arm (8b) supported by respective brackets (9), whose opposite ends are hinged to the frame (10) of the crawler belt (4) itself.
4. The ski according to claim 3, **characterized in that** said central arm (8b) is locked in the working position of the crawler belt (4) by means of a pin (11) which, in contrast to a spring (12), engages into a respective seat (13) provided on the corresponding bracket (9).
5. The ski according to claim 1, **characterized in that** if further comprises a spring mechanism (16) that

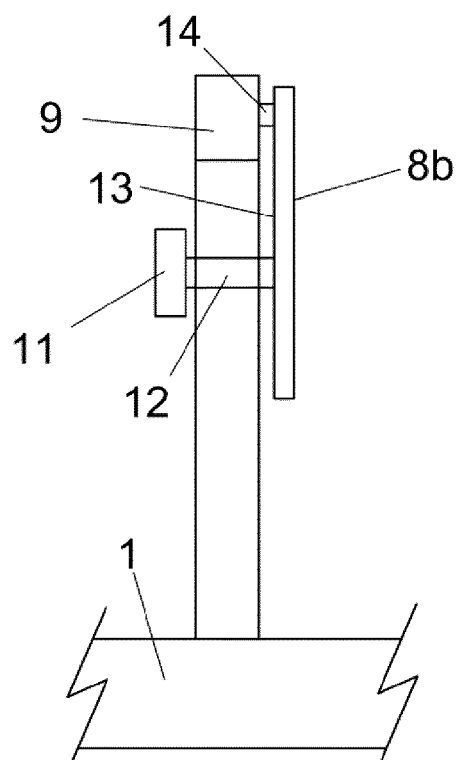
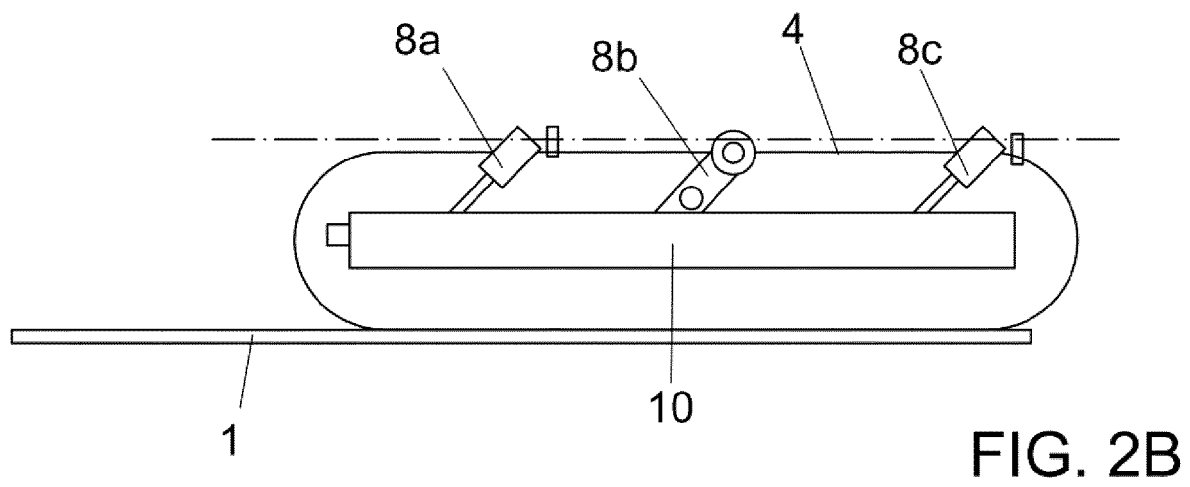
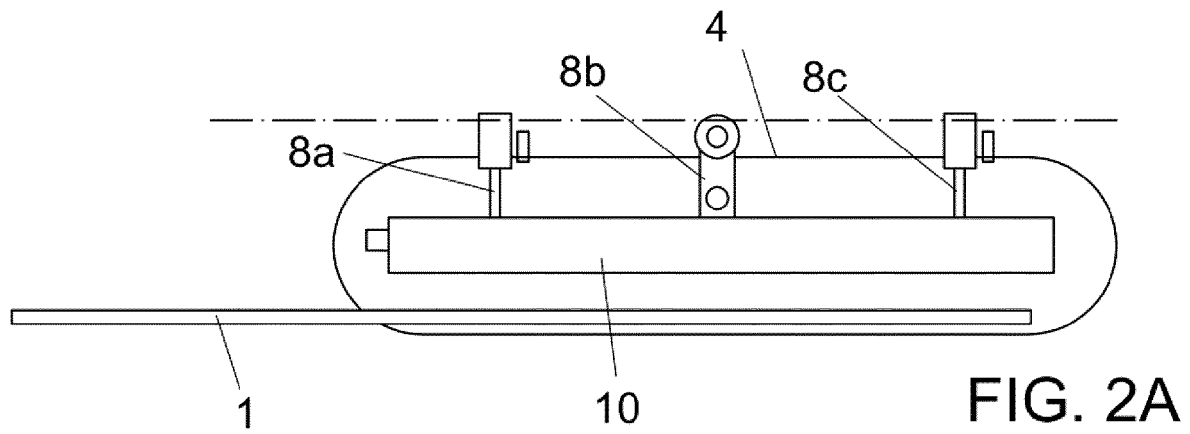
allows the rotation of the heelpiece (17) in the four operating positions of the binding (2) of the ski.

6. The ski according to claim 1, **characterized in that** said heelpiece (17) is also provided with a spring (18) housed inside a seat (19) in the heelpiece (17) and that the same spring (18) leans on a cylinder (20) housing said microswitch (21). 5
7. The ski according to claim 2, **characterized in that** said base (15) is provided with a seat (23) for said heelpiece (17). 10
8. The ski according to claim 6, **characterized in that** it comprises a shaped disc (24) to anchor said cylinder (20) to the base (15). 15
9. The ski according to claim 1, **characterized in that** said heelpiece (17) is provided with pins (25) to hook the boot (26) to the ski during the descent phase. 20
10. The ski according to claim 9, **characterized in that** said heelpiece (17) is also provided with a plate (27) supporting the boot on the ski during the ascent phase. 25
11. The ski according to claim 1, **characterized in that** said microswitch (21) has an internal contact (28) whose electrical conductors are connected to the motor (3) and the battery (5), respectively, through a potentiometer (29). 30
12. The ski according to claim 1, **characterized in that** said heelpiece (17) is provided with a hub (17a) and a first sector (17b) located in a more raised position compared to a second sector (17c). 35
13. The ski according to claim 2, **characterized in that** said base (15) is provided with a first sector (15b) and a second sector (15c) located in a lowered position compared to the first sector (15b). 40
14. The ski according to claims 12 and 13, **characterized in that**, during the descent phase of the ski, the heelpiece (17) fits, sliding and rotating, with its hub (17a) inside the hole (15a) of the base (15) leaning, with its higher or more raised sector (17b), on the sector (15b) of the base (15) itself, during the ascent phase of the ski the heelpiece (17) fitting instead, with its lower sector (17c), on a sector (15c) of said base (15), located in a lower or lowered position relative to the sector (15b) of the latter. 45 50
15. The ski according to claim 1, **characterized in that** it comprises an L-shaped frame (10). 55
16. The ski according to claim 15, **characterized in that** it is equipped with end brackets (9a, 9c) and a central

bracket (9b) sliding inside corresponding holes provided on the horizontal branch (10a) of said frame (10).

17. The ski according to claim 16, **characterized in that** said end brackets (9a, 9c) are provided with springs (32) pressing on the horizontal branch (10a) of said frame (10) of said binding (2) and **characterized in that** said central bracket (9b) is provided with a pin (11) for locking/unlocking the crawler belt (4).





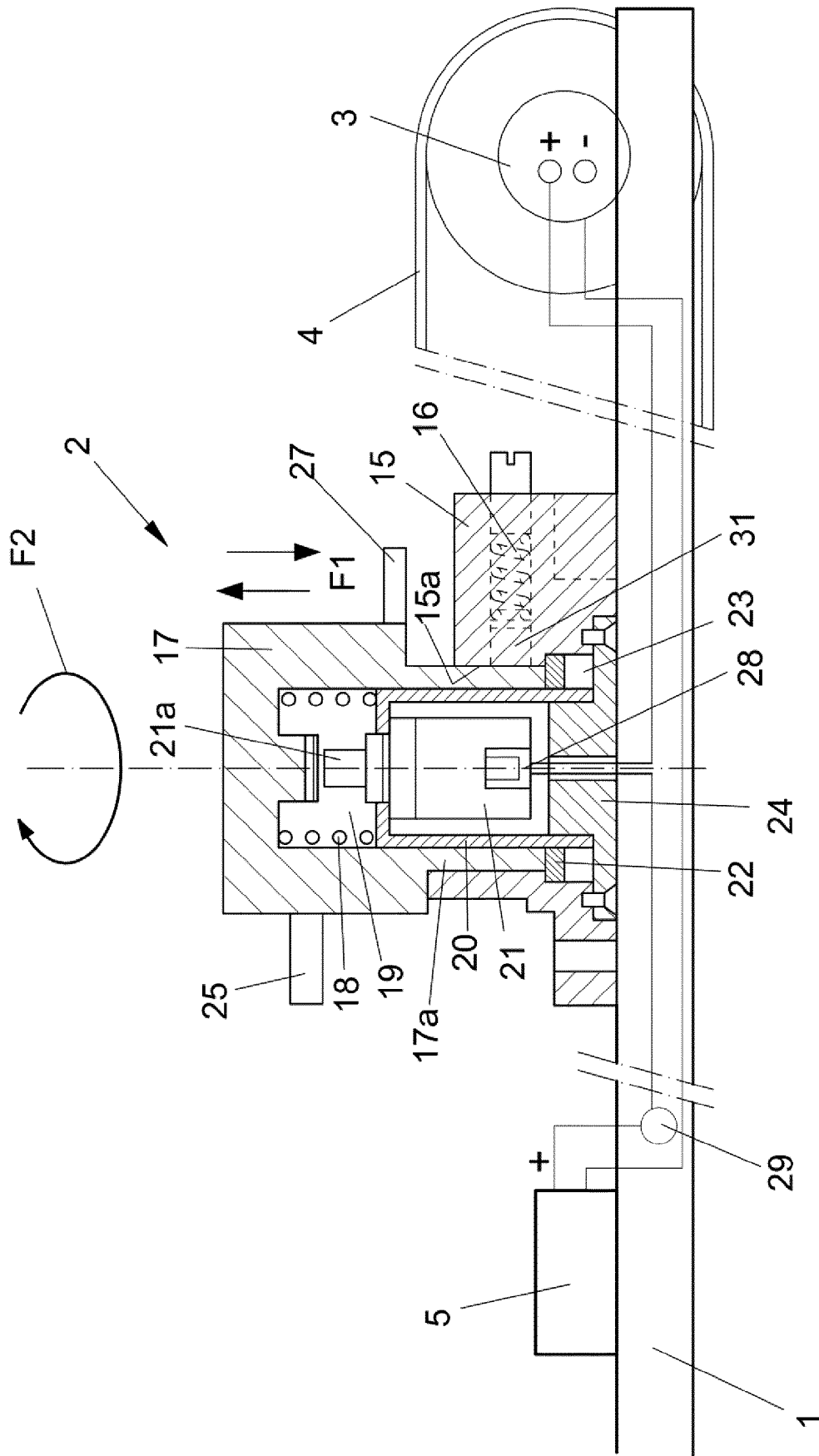
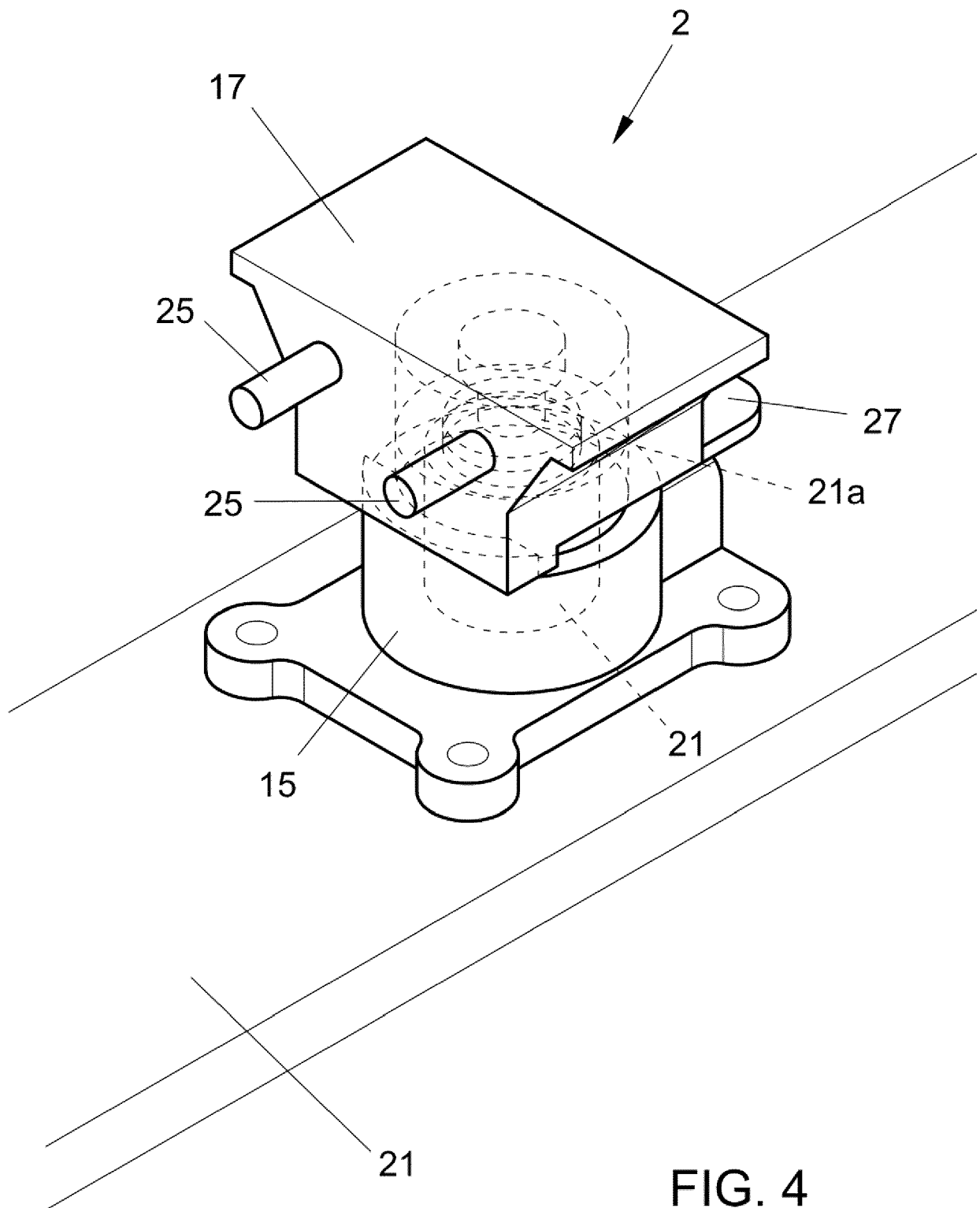


FIG. 3



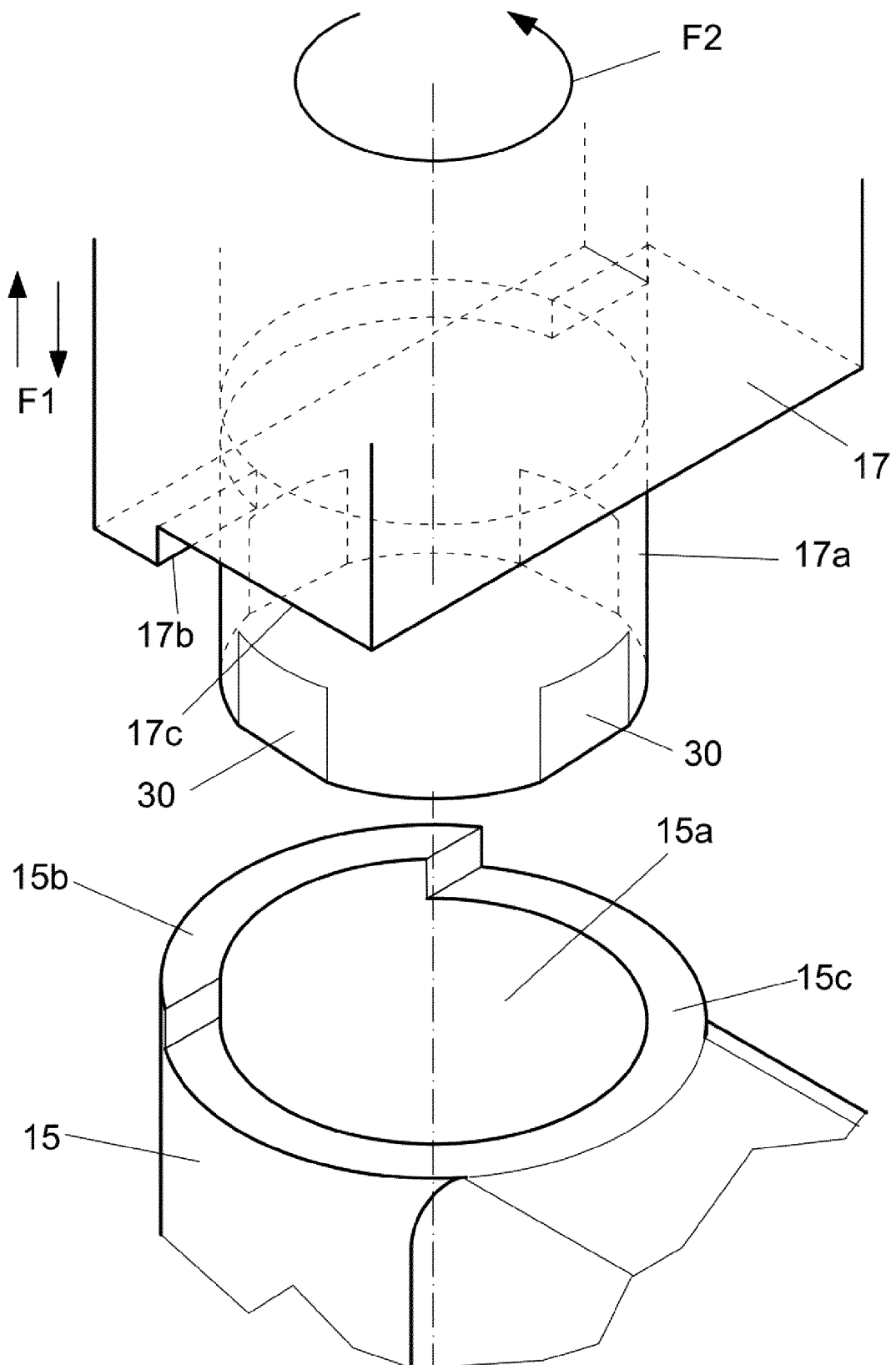
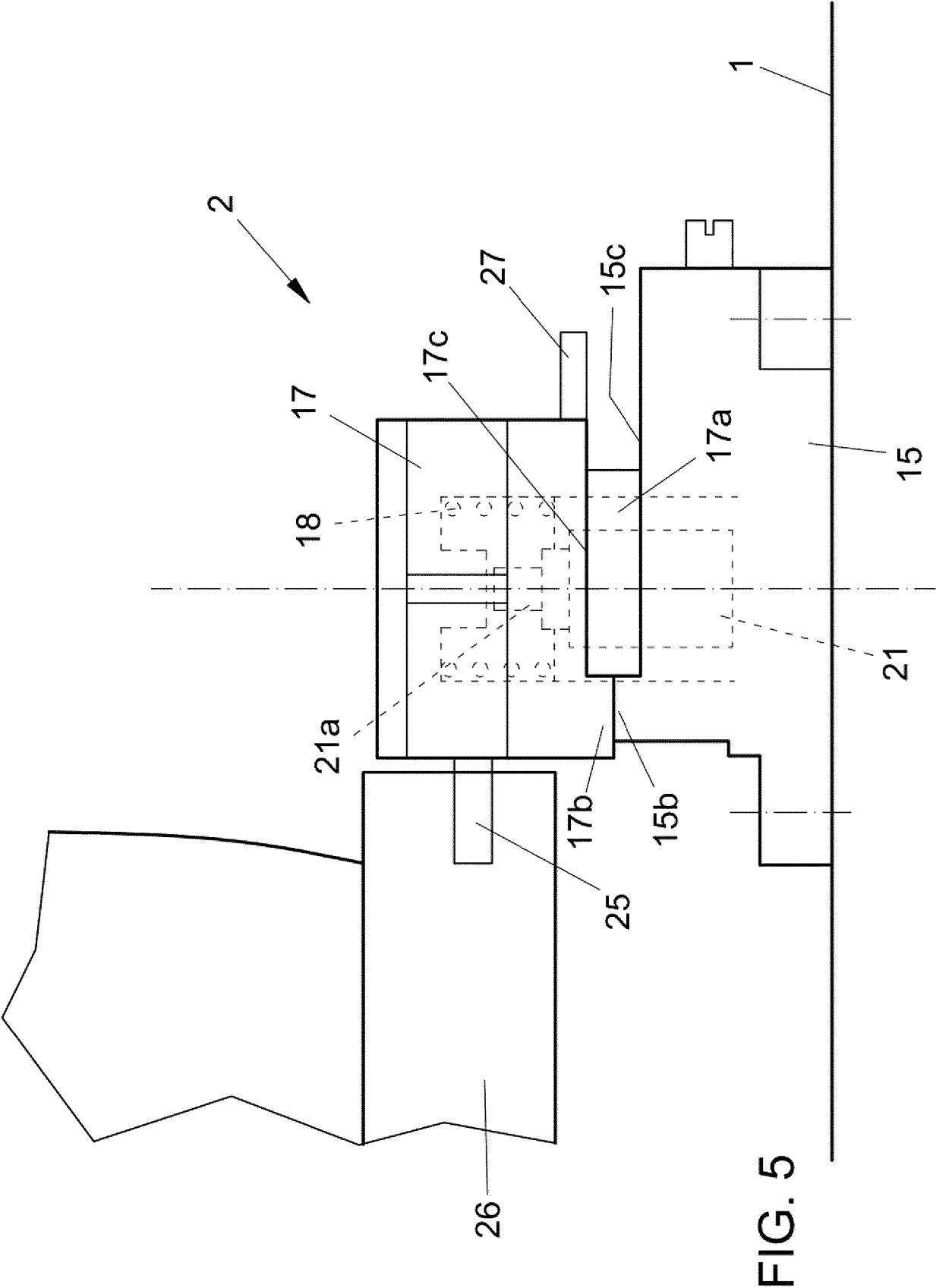
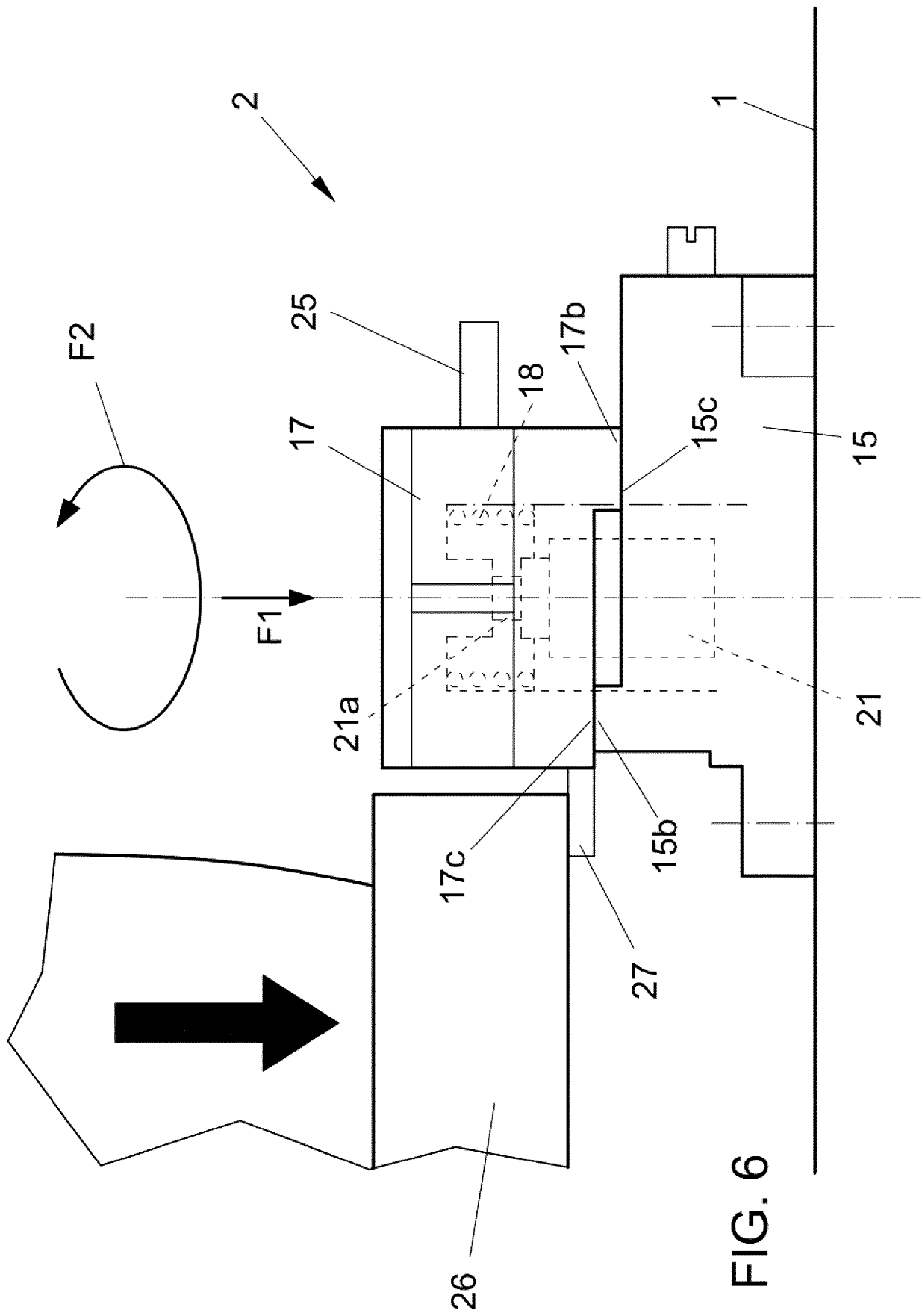
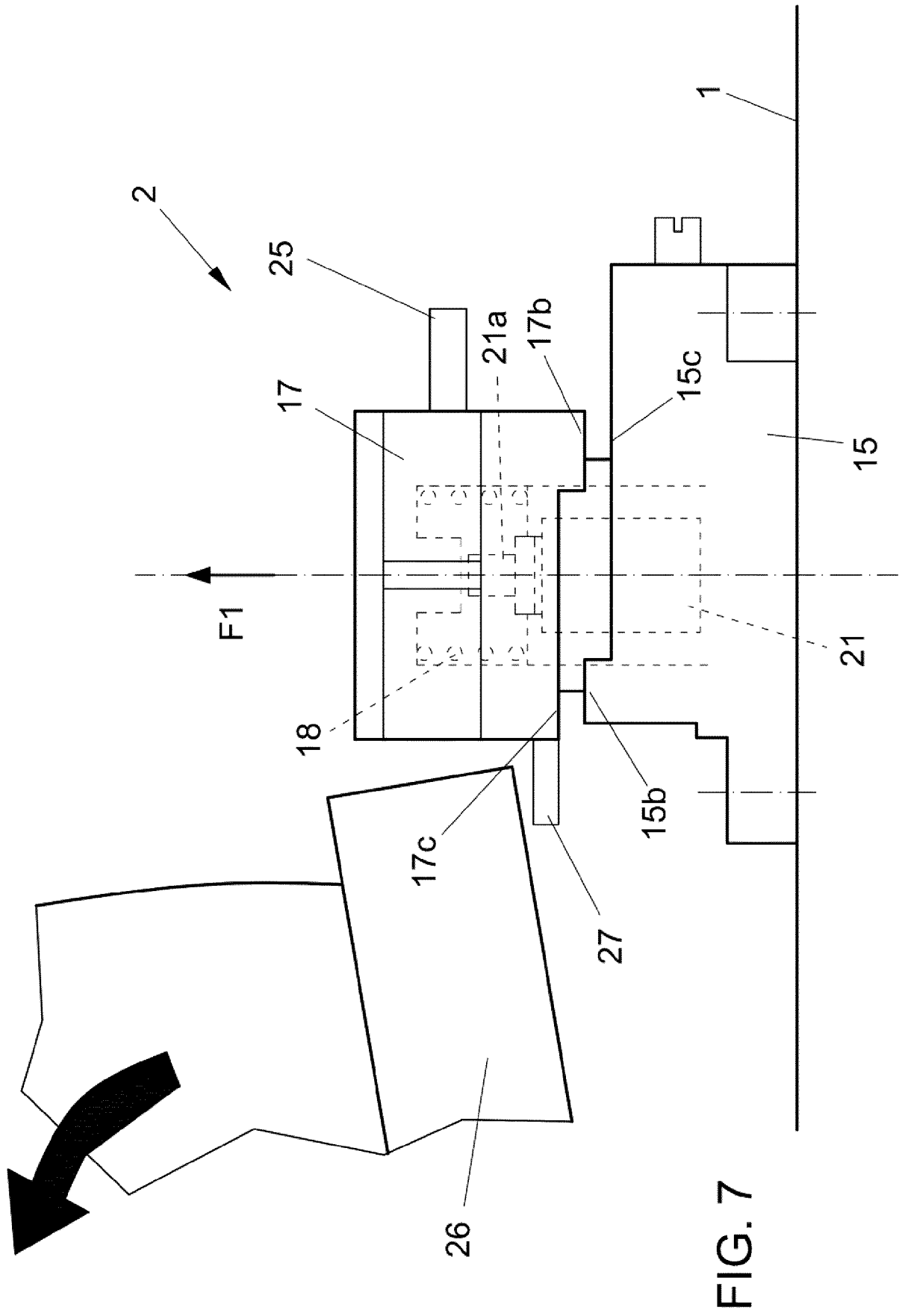


FIG. 4A







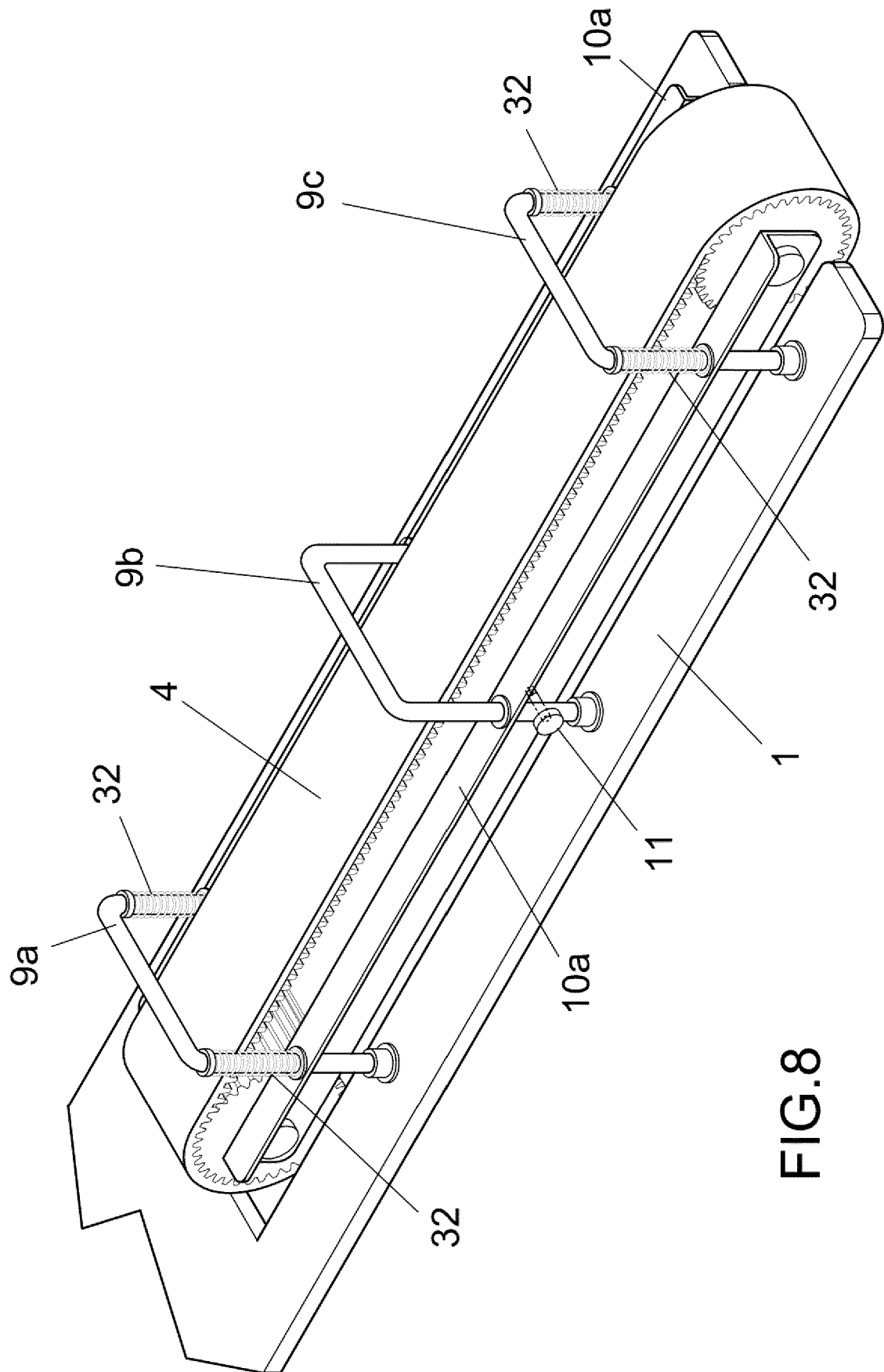
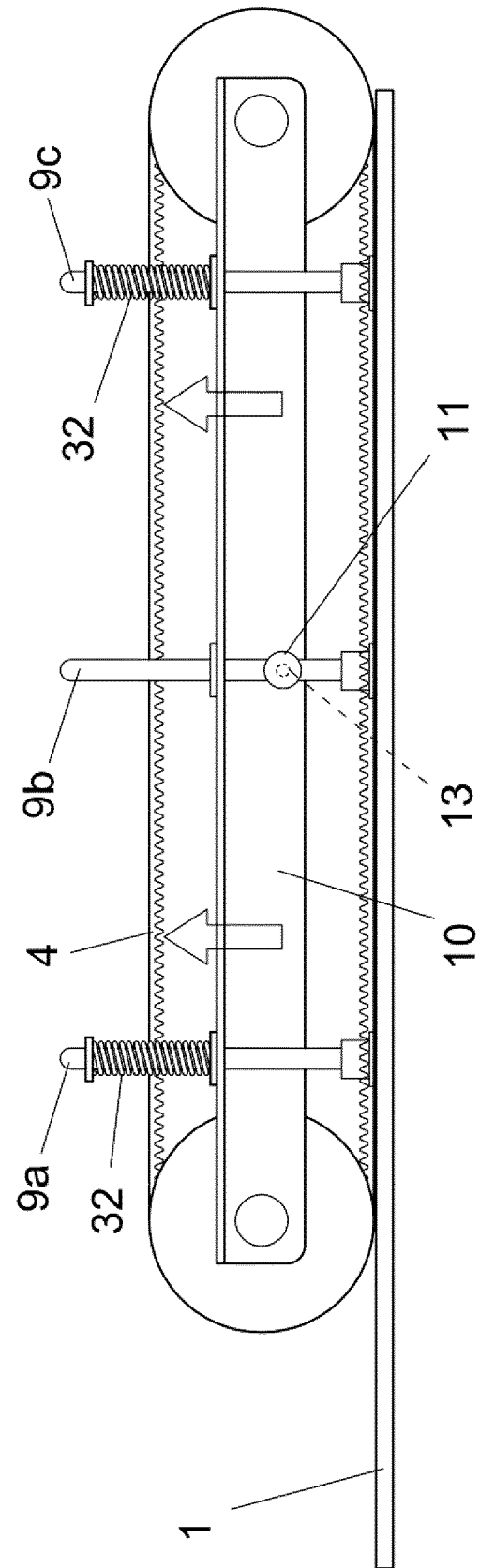
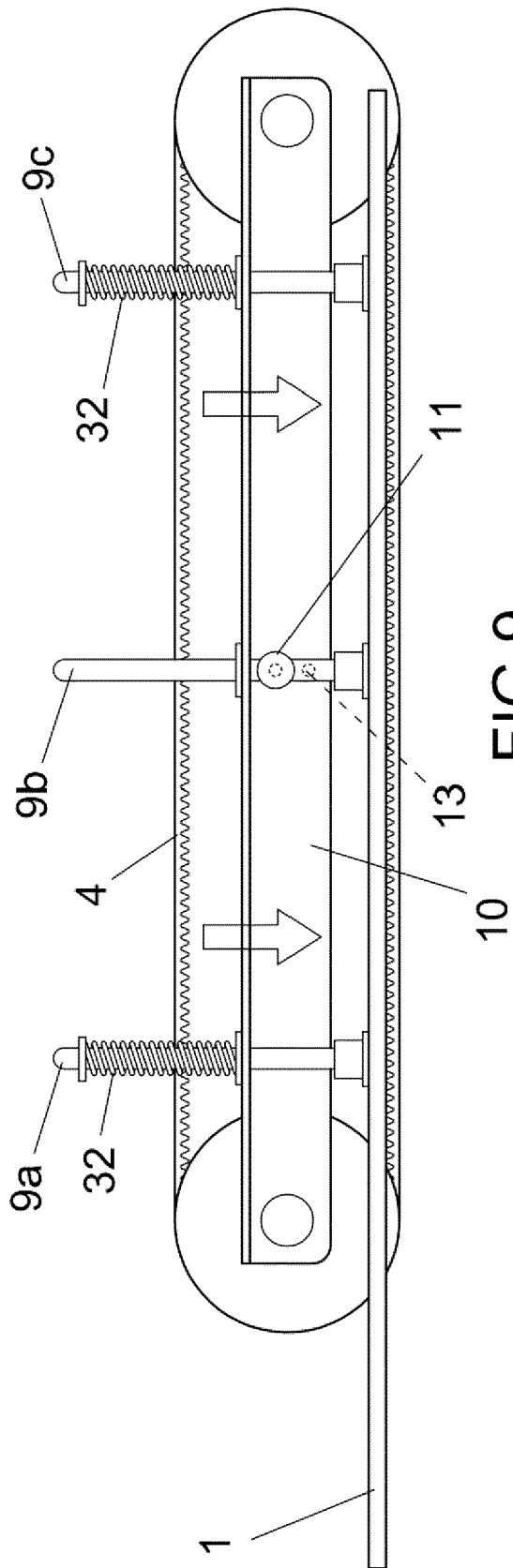


FIG.8



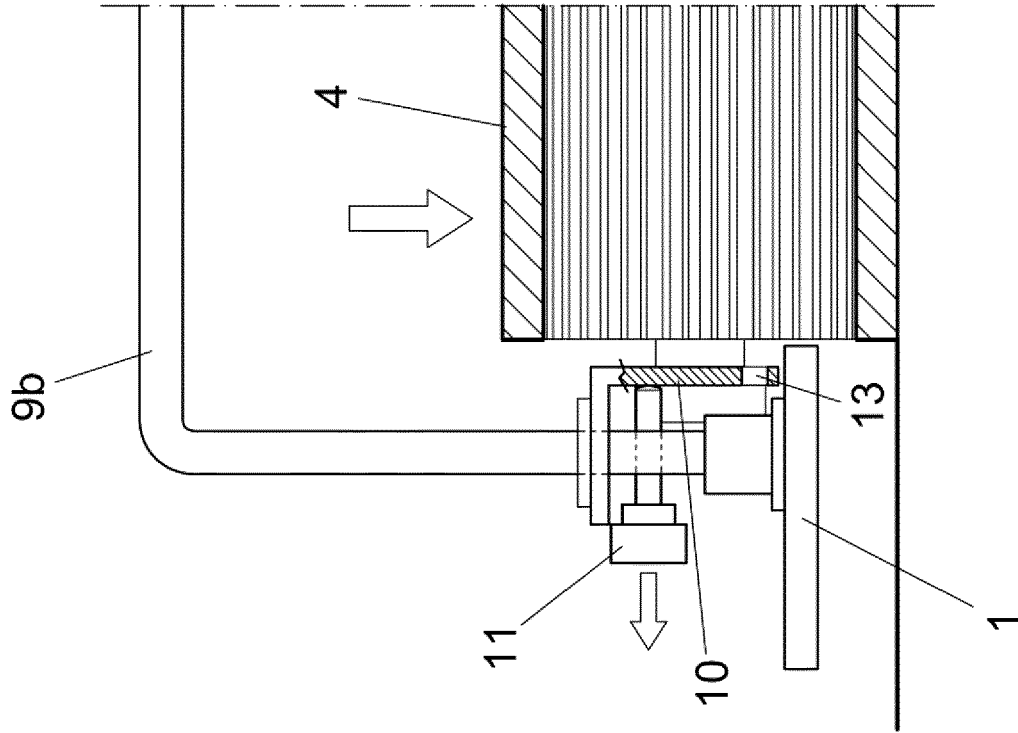


FIG. 12

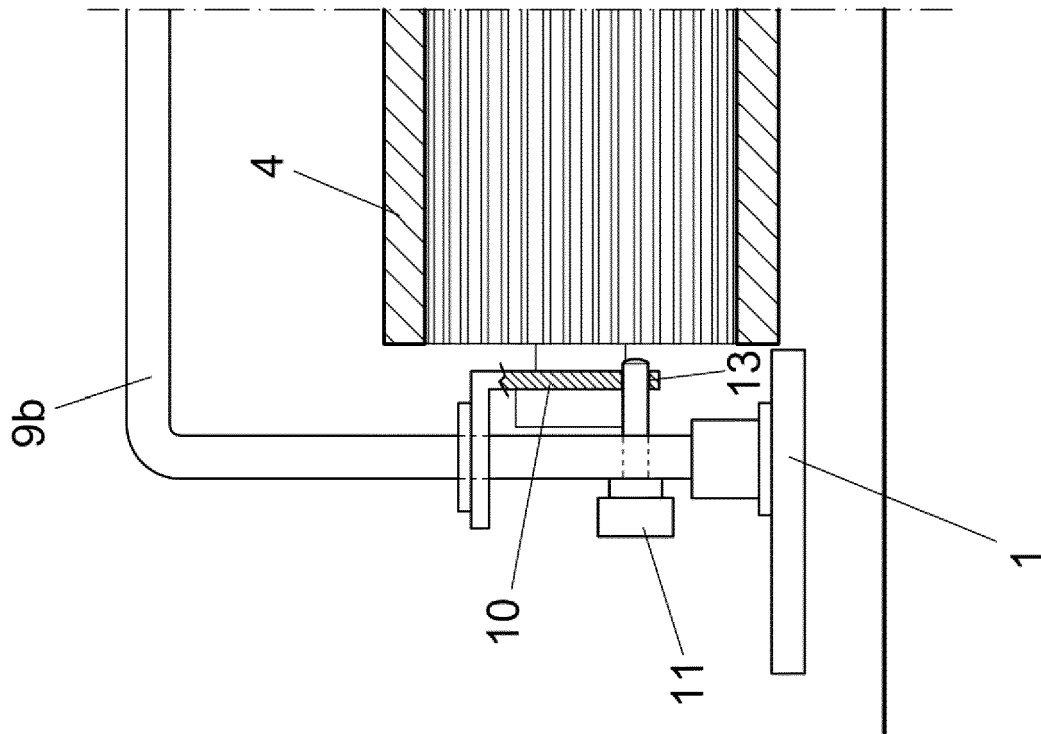


FIG. 11



EUROPEAN SEARCH REPORT

Application Number

EP 23 21 2291

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EPO FORM 1503 03.82 (P04C01)

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 2022/203210 A1 (BLOCKER ROBERT RAY [US] ET AL) 30 June 2022 (2022-06-30) * paragraphs [0031], [0034]; claims 5, 6, 11, 12; figures 2, 7a *	1-17	INV. A63C5/08
A	WO 2022/189930 A1 (BALDITALIA S R L [IT]) 15 September 2022 (2022-09-15) * page 4, line 26 - page 5, line 26; figures 5, 6, 7, 8 *	1-17	
A	WO 2015/104663 A1 (TECHNIKUS AG [LI]) 16 July 2015 (2015-07-16) * paragraph [0007]; claim 12; figures 1, 2, 4, 5 *	1-17	
			TECHNICAL FIELDS SEARCHED (IPC)
			A63C
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 9 April 2024	Examiner Murer, Michael
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EP 23 21 2291

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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09-04-2024

10	Patent document cited in search report		Publication date	Patent family member(s)	Publication date
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15	WO 2022189930	A1	15-09-2022	NONE	

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