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(71) Applicant: **Picanol**
8900 Ieper (BE)

(72) Inventors:
- **Demeersseman, Pavel**
  9000 Gent (BE)
- **Degraeve, Bram**
  8900 Ieper (BE)
- **Brouckaert, Robbe**
  8560 Wevelgem (BE)

(74) Representative: **Patentanwälte**
Ruff, Wilhelm, Beier, Dauster & Partner mbB
Kronenstraße 30
70174 Stuttgart (DE)

(54) **DEVICE FOR SELECTING AND PRESENTING WEFT THREADS**

(57) The invention relates to a device (1) for selecting and presenting weft threads to an insertion element (103) of a weaving machine comprising a holding plate (2) and a number of weft feeder modules (3), each weft feeder module (3) comprising a weft feeder element (4) with a weft thread guide (5) at its distal end, a drive mechanism (6), a drive motor (8), which drive motor (8) is mounted to the holding plate (2) in a motor mounting region (12), and a guide structure (9) mounted to the holding plate (2) in a guide structure mounting region (13), wherein the weft feeder element (4) is connected via the drive mechanism (6) to the drive motor (8) for a movement of the weft feeder element (4) between a rest position and a presenting position, and wherein the weft feeder element (4) is guided by the guide structure (9), wherein an opening (14) is provided in the holding plate (2) between the motor mounting region (12) and the guide structure mounting region (13) allowing incidence of light to improve a visibility in a thread feeding zone The invention further relates to a weaving machine comprising an insertion element (103), in particular a gripper, and a device (1) for selecting and presenting weft threads to the insertion element (103).

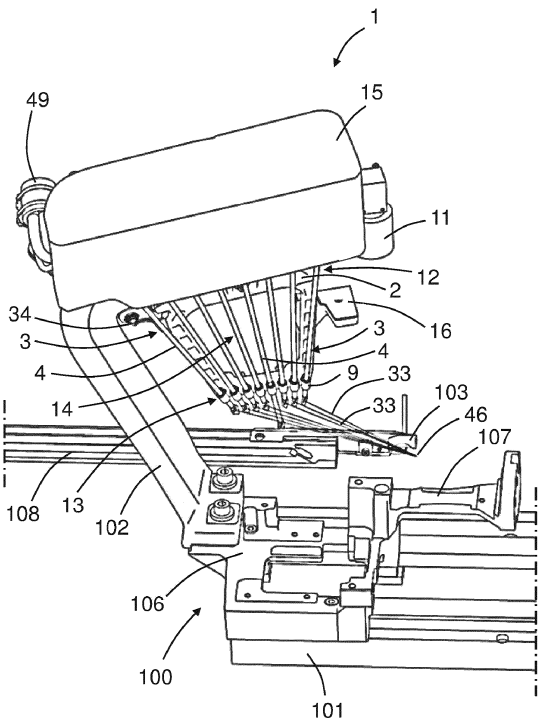

Fig. 1

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Description

TECHNICAL FIELD AND PRIOR ART

[0001] The invention relates to a device for selecting and presenting weft threads to an insertion element of a weaving machine. The invention further relates to a weaving machine comprising an insertion element, in particular a gripper, and a device for selecting and presenting weft threads to the insertion element.

[0002] US 5,400,834 shows a device for selecting and presenting weft threads to an insertion element of a weaving machine, which device comprises a number of weft feeder modules. Each weft feeder module comprises a weft feeder element with a weft thread guide at its distal end, an eccentric drive mechanism, a drive motor, and a guide structure for the weft feeder element. Each weft feeder module further comprises a support plate, wherein the drive motor is affixed to a first side of the support plate and the weft feeder element and the guide structure are located on a second side, which is opposite the first side. The support plates of the number of weft feeder modules are mounted between two holding plates to which they are also affixed by screws. The holding plates are connected to each other by crossbars. One of the holding plates is affixed by screws to a machine frame. An alternative device for selecting and presenting weft threads to an insertion element of a weaving machine is shown in EP2893067 B1.

[0003] EP0896075 A2 shows a device for selecting and presenting weft threads to an insertion element of a weaving machine, which device comprises a holding plate and a number of weft feeder modules. Each weft feeder module comprises a drive motor, wherein all drive motors are mounted to the common holding plate.

SUMMARY OF THE INVENTION

[0004] It is the object of the invention to provide a device for selecting and presenting weft threads having a compact design and a good usability. It is a further object of the invention to provide a weaving machine with such a device.

[0005] This object is solved by the device for selecting and presenting weft threads and the weaving with the features of claims 1 and 14. Preferred embodiments are defined in the dependent claims.

[0006] According to a first aspect, a device for selecting and presenting weft threads to an insertion element of a weaving machine is provided, which device comprises a holding plate and a number of weft feeder modules, each weft feeder module comprising a weft feeder element with a weft thread guide at its distal end, a drive mechanism, a drive motor, which drive motor is mounted to the holding plate in a motor mounting region, and a guide structure mounted to the holding plate in a guide structure mounting region, wherein the weft feeder element is connected via the drive mechanism to the drive motor for a movement of the weft feeder element between a rest position and a presenting position, wherein the weft feeder element is guided by the guide structure, wherein an opening is provided in the holding plate between the motor mounting region and the guide structure mounting region allowing incidence of light to improve a visibility in a thread feeding zone.

[0007] Throughout this specification and the following claims, the indefinite article "a" or "an" means "one or more".

[0008] The thread feeding zone is defined as a zone comprising a presenting zone and a threading zone. The presenting zone is defined as a zone including an area in which the weft thread guides, for example needle eyes, of the weft feeder elements of the weft feeder modules are arranged when the weft feeder element is moved into the presenting position for presenting a weft thread threaded thereto to the insertion element, in particular to a gripper, and including an area in which the weft threads presented by the weft feeder elements are taken over by the insertion element, in particular the gripper. The threading zone is defined as a zone in which the weft thread guides of the weft feeder elements of the modules are arranged for supplying and/or fitting, in particular threading, a weft thread to the weft feeder element. In embodiments, a position of the weft feeder element for arranging the weft thread guide in the threading zone is the same as the presenting position, into which the weft feeder element is moved for presenting to the insertion element a weft thread supplied and/or fitted, in particular threaded, to the weft feeder element. In other words, in these embodiments, the threading zone is the same as the presenting zone. In other embodiments, for supplying and/or fitting, in particular threading, a weft thread to the weft feeder element, the weft feeder element is arranged between the rest position and the presenting position of the weft feeder element. In particular, in embodiments the weft feeder element is arranged between the rest position and the presenting position, but closer to the presenting position, so that the operator can easily reach the weft thread guide. So, the threading zone is at or above the presenting zone.

[0009] By providing an opening in the holding plate, which allows the passage of light, the visibility in the threading zone and/or the presenting zone is improved. This means that body parts of an operator or objects arranged in the threading zone and/or the presenting zone are better visible or become visible in the first place. For example, by providing the opening, it is possible to improve inter alia the visibility of a hand of an operator supplying and/or fitting the weft thread to the weft thread guide, the visibility of a weft thread that is broken and/or the visibility of the insertion element, in particular the gripper, and the weft thread guide arranged in the presenting zone for verifying a correct timing of a taking over of the weft thread by the insertion element. In embodiments of the device, the opening has an unclosed circumference. In other embodiments of the device, the opening has a

closed circumference allowing for an increased stiffness of the holding plate compared to an opening having an unclosed circumference.

[0010] An incident light in the threading zone and/or the presenting zone could be either an ambient light or the light from a dedicated light source used for illuminating the threading zone and/or presenting zone. The ambient light in embodiments is a natural light. In other embodiments, the ambient light is an artificial light.

[0011] The drive mechanism is configured for driving the weft feeder element to move between the rest position and the presenting position. In an embodiment, the drive mechanism is an eccentric drive mechanism. The eccentric drive mechanism in embodiments comprises a crank to which the weft feeder element is directly or via an intermediate element coupled in an eccentric position. In an embodiment, the guide structure comprises a bearing bush for slidingly receiving the weft feeder element, wherein the bearing bush is directly mounted rotatably to the holding plate using a pin having an axis parallel to the motor axis. The rotatable pin allows for a compensation of a lateral displacement of an end of a weft feeder element mounted to the crank. However, the invention is not limited to embodiments having an eccentric drive mechanism with a crank or alternative eccentric drive mechanisms and various other drive mechanisms are conceivable, which can be suitably selected by the person skilled in the art.

[0012] In an embodiment of the device, each weft feeder module is mounted to the holding plate via the drive motor and the guide structure so as to be detachable and/or attachable as a whole. In other words, it is possible to assemble the weft feeder module remote from the weaving machine and mounting the assembled weft feeder module to the holding plate, which holding plate is attached to a frame of the weaving machine. Likewise, in case of wear and tear, the assembled weft feeder module can be detached from the holding plate and replaced.

[0013] In an embodiment, a fixation element is provided, which is detachably mounted to the holding plate in the guide structure mounting region, wherein the guide structure is mounted to the holding plate via the fixation element. In an embodiment, the holding plate is provided with a gap in the guide structure mounting region, which allows for a collision free movement of the guide structure relative to the holding plate for detaching the weft feeder module from the holding plate, wherein the fixation element allows for a precise mounting of the guide structure despite the gap. In an embodiment, the fixation element is a plate like structure, which at least partly covers the gap in the holding plate.

[0014] In particular, in an embodiment the guide structure comprises a bearing bush for slidingly receiving the weft feeder element, wherein the bearing bush is mounted rotatably to the fixation element using a pin having an axis parallel to the motor axis of the drive motor. The pin can be rotatably mounted in the fixation element with a high precision, wherein the fixation element has a pin opening for receiving the pin. The gap at least partly covered by the fixation element has a diameter which is larger than a diameter of the pin opening. The gap allows to detach the guide structure from the holding plate, without the necessity to move the pin exclusively in a direction perpendicular to the holding plate, wherein the fixation element to which the pin is rotatably mounted ensures a support of the pin with a sufficient precision.

[0015] In an embodiment, the holding plate is provided with a passage opening for the motor axis of each weft feeder module, wherein the passage opening is sufficiently large to allow the drive mechanism, in particular a crank of an eccentric drive mechanism, the weft feeder element, and the guide structure of the assembled weft feeder module to pass through the passage opening. In other words, the assembled weft feeder module, possibly with the exception of the drive motor, can pass through passage opening for detaching and/or attaching the weft feeder module from the holding plate.

[0016] In an embodiment, the drive motors of the weft feeder modules are arranged at a backside of the holding plate and the weft feeder elements are arranged at a frontside of the holding plate. In this case, fixing elements such as screws fixing the drive motor and the fixation element to the holding plate can be loosened and/or removed and the weft feeder module can be tilted with respect to the holding plate and removed from the holding plate by passing the parts of the weft feeder module arranged in use, in other words of the assembled weft feeder module, at the frontside through the passage opening. The expressions "backside" and "frontside" are only used to distinguish two opposing sides of an object from another and not to indicate any exclusive orientation when mounting the device to a weaving machine.

[0017] In an embodiment, the drive mechanism of at least one of the weft feeder modules comprises a crank, wherein the holding plate is provided with a clearance for a movement of the crank. In embodiments, the clearance is bounded by two end stops limiting a movement of the crank. In embodiments, all weft feeder modules are structurally identical or structurally similar and each comprise a crank, wherein the holding plate is provided with a clearance for a movement of the crank of each weft feeder module.

[0018] In an embodiment, the holding plate is provided with a mounting structure via which the holding plate is mountable to a support arm attached to a frame of the weaving machine. The support arm in embodiments is arranged and shaped to so it does not impede the visibility in the thread feeding zone. For this purpose, in embodiments, the support arm is L-shaped having a first section extending upwards from a cross beam of the weaving machine and a second section extending transverse to the first section, wherein the holding plate is mounted to the second section such that the first section does not coincide with a position of the opening and does not impede the visibility in the thread feeding zone.

[0019] In an embodiment, the holding plate is provided

with holes, in particular a set of slotted holes and/or two different sets of holes, allowing the holding plate to be mounted to the support arm in two different positions. This allows the holding plate to be used with two different insertion elements and/or in two different weaving machines.

[0020] In an embodiment, the motor mounting region of the holding plate is covered by a cover element. The cover element allows for an increased safety and hinders objects and/or dust from getting into the motor mounting region. The cover also shields an area of the device arranged below the motor mounting region.

[0021] In an embodiment, a light source is attached to the holding plate, wherein in particular the light source is attached for illuminating the thread feeding zone. The use of a light source can improve the visibility in the thread feeding zone.

[0022] In an embodiment, a camera is attached to the holding plate. The camera takes advantage of the improved visibility in the thread feeding zone for taken pictures of the thread feeding zone. The pictures taken by the camera can be viewed on a display of the weaving machine or a peripheral device, wherein the pictures can also be viewed in slow motion. This allows for a good analyzation of the processes in the thread feeding zone, in particular in the threading zone and/or the presenting zone.

[0023] In an embodiment, the device comprises a number of weft feeder modules attached in a staggered arrangement to the holding plate. The staggered arrangement allows for a compact design.

[0024] According to a second aspect, a weaving machine comprising an insertion element, in particular a gripper, and the device for selecting and presenting weft threads to the insertion element is provided.

[0025] In an embodiment of the weaving machine, the device is detachably mounted to a cross beam of the weaving machine via a support arm, wherein in particular the support arm has a first section extending upwards from the cross beam and a second section extending transverse to the first section.

[0026] Throughout this specification and the following claims, the expressions "first" and "second" are only used to distinguish one element from another element and not to indicate any order of the elements.

BRIEF DESCRIPTION OF THE DRAWINGS

[0027] In the following, embodiments of the invention will be described in detail with reference to the drawings. Throughout the drawings, the same elements will be denoted by the same reference numerals.

Fig. 1 shows parts of a weaving machine with a device for selecting and presenting weft threads to an insertion element of a weaving machine in a perspective view, wherein the device is provided with a cover element covering a motor mounting region.

Fig. 2 shows schematically the parts of the weaving machine of Fig. 1 and a device for selecting and presenting weft threads to an insertion element of a weaving machine in a perspective view, wherein the device is not provided with a cover element.

Fig. 3 shows a front view of the holding plate of the device shown in Fig. 1 in isolation.

Fig. 4 shows in perspective view the holding plate of Fig. 3 together with one weft feeder module.

Fig. 5 shows the weft feeder module of Fig. 4 in isolation.

Fig. 6 shows a detail of a guide structure of the weft feeder module of Fig. 5 and a part of the holding plate.

Fig. 7 shows the holding plate of Fig. 4 together with a number of weft feeder modules upon removal of one of the weft feeder modules in a first position.

Fig. 8 shows the device of Fig. 7 upon removal of one of the weft feeder modules in a second position.

Fig. 9 shows the device of Fig. 7 upon removal of one of the weft feeder modules in a third position.

Fig. 10 shows the device of Fig. 2 seen from the back.

Fig. 11 shows a support arm of the weaving machine of Fig. 1 for supporting the device.

Fig. 12 shows the holding plate of Fig. 4 together with one disassembled weft feeder module upon removal of parts of the weft feeder module.

Fig. 13 shows an alternative embodiment of a device for selecting and presenting weft threads to an insertion element comprising a holding plate and a number of weft feeder modules, with one disassembled weft feeder module upon removal of parts of the weft feeder module.

Fig. 14 shows another alternative embodiment of a device for selecting and presenting weft threads to an insertion element comprising two holding plates, each with a number of weft feeder modules.

Fig. 15 shows parts of a weaving machine with an al-

ternative device for selecting and presenting weft threads to an insertion element of a weaving machine in a perspective view, wherein the device is provided with a cover element covering a motor mounting region.

DETAILED DESCRIPTION OF EMBODIMENTS OF THE INVENTION

[0028] Figs. 1 and 2 show in a perspective view parts of a weaving machine 100, in particular a cross beam 101 of the weaving machine 100, a support arm 102 mounted to the cross beam 101, an insertion element 103, which in the embodiment shown is a gripper mounted on a rapier, and a device 1 for selecting and presenting weft threads 33 to the insertion element 103. Figs. 3 to 10 show the device 1 or parts of the device 1 in isolation.

[0029] As shown in Figs. 1 and 2, the device 1 for selecting and presenting weft threads 33 to the insertion element 103 is mounted by the support arm 102 via a support 106 to the crossbeam 101 of the weaving machine 100. Other units can be mounted on the support 106, for example a holder 107 for holding a temple (not shown). Further a guide 108 for the insertion element 103, for example a rapier guide, is shown.

[0030] The device 1 comprises a holding plate 2 and a number of weft feeder modules 3 mounted to the holding plate 2. In the embodiment shown, eight weft feeder modules 3 are mounted to the holding plate 2. However, in other embodiments, more or less than eight weft feeder modules 3 are provided. In the embodiment shown, the weft feeder modules 3 are attached in a staggered arrangement to the holding plate 2.

[0031] In Fig. 1, the device 1 is provided with a cover element 15 covering a motor mounting region 12 of the holding plate 2. The cover element 15 is fixed via an arm 47 (see Fig. 4) to the holding plate 2. In contrast, the device 1 shown in Fig. 2 is not provided with a cover element.

[0032] As best seen in Fig. 5, the weft feeder modules 3 each comprise a weft feeder element 4 with a weft thread guide 5 at its distal end, a drive mechanism 6, a drive motor 8, and a guide structure 9. The weft feeder element 4 is connected via the drive mechanism 6 to the drive motor 8 for a movement of the weft feeder element 4 between a rest position, wherein for example seven weft feeder elements 4 of the device 1 shown in Fig. 1 are arranged in a rest position, and a presenting position, wherein for example the weft feeder element 4 of the fourth weft feeder module 3 seen from the right in Figs. 1 and 2 is arranged in the presenting position. In the embodiment shown, the drive mechanism 6 is an eccentric drive mechanism and comprises a crank 7. The weft feeder element 4 is connected to the crank 7 via a shaft 10. As seen in Figs. 4 and 5, each crank 7 can move in an associated clearance 51 in the holding plate 2 that is bounded by two end stops 52 and 53 limiting a movement of the crank 7.

[0033] A zone including an area in which the weft thread guides 5 of the weft feeder modules 3 are arranged when the weft feeder element 4 is moved into the presenting position, and further including an area in which the weft threads presented by the weft feeder elements 4 are taken over by the insertion element 103, in particular the gripper, is referred to a presenting zone. Further, a zone in which the weft thread guides 5 of the weft feeder elements 4 are arranged for supplying and/or fitting, in particular threading, a weft thread 33 to the weft feeder element 4, is referred to as threading zone. The threading zone in embodiments is in the presenting zone. In other embodiments, the threading zone is above the presenting zone. The presenting zone and the threading zone together define the thread feeding zone.

[0034] For mounting a weft feeder module 3 to the holding plate 2, the drive motor 8 is mounted to the holding plate 2 in a motor mounting region 12, wherein in the embodiment shown, as best seen in Fig. 7, the drive motor 8 was fixed with screws 27 to the holding plate 2. As best seen in Fig. 10, the drive motor 8 is mounted to a backside of the holding plate 2. Further, the guide structure 9 is mounted to the holding plate 2 in a guide structure mounting region 13, wherein in the embodiment shown, as best seen in Fig. 4, the guide structure 9 is mounted to a frontside of the holding plate 2.

[0035] The holding plate 2 has an opening 14, which opening 14 is provided between the motor mounting region 12 and the guide structure mounting region 13, and which opening 14 is dimensioned for allowing incidence of light to improve a visibility in the threading zone and/or the presenting zone. In the embodiment shown, the opening 14 has a closed circumference. In embodiments, the holding plate 2 is provided with an opening having an unclosed circumference.

[0036] The holding plate 2 comprises a motor support part 36, a guide support part 39 and two beams 37, 38 connecting the motor support part 36 to the guide support part 39, wherein the opening 14 is surrounded by the motor support part 36, the guide support part 39 and the two beams 37, 38 connecting the motor support part 36 to the guide support part 39.

[0037] As a result of the opening 14, a hand of an operator supplying and/or fitting a weft thread 33 to a weft thread guide 5 or objects arranged in the threading zone and/or the presenting zone are better visible or become visible in the first place. When threaded the weft threads 33 extend between an associated weft thread guide 5 and a point 46 near the woven fabric (not shown).

[0038] In the embodiment shown, a light source 16 (see Figs. 1 and 2) is attached via a protrusion 43 (see Fig. 10) to the holding plate 2 for illuminating the thread feeding zone. The protrusion 43 can be part of the holding plate 2 or as shown in Fig. 10 can be fixed via screws 50 to the holding plate 2. In addition or in alternative, in other embodiments a camera 11 is attached to the holding plate 2.

[0039] As best seen in Fig. 10, each of the drive motors

8 is electrically connected via wires 44 to an associated connector 45. For example, in each case four drive motors 8 are connected to one connector 45. The connectors 45 are connected via the wire 49 (see Fig. 1) to a control unit controlling the device 1. The wire 49 is supported by a support 48 (shown in Fig. 2) to the holding plate 2.

[0040] As best seen in Fig. 11, the depicted support arm 102 is L-shaped and has a first section 104 extending upwards from the cross beam 101 (shown in Fig. 1) and a second section 105 extending transverse to the first section 104. The first section 104 is fixed to the support 106. In the embodiment shown, the first section 104 is tilted with respect to a vertical axis, while the second section 105 is slightly tilted with respect to a horizontal axis. The L-shape and a tilt angle of the support arm 102 are chosen, such that when the holding plate 2 is mounted to the second section 105, the first section 104 does not coincide with a position of the opening 14 and does not impede the visibility in the thread feeding zone.

[0041] For mounting the holding plate 2 to the support arm 102, the holding plate 2 is provided with a mounting structure 17. As best seen in Fig. 3, in the embodiment shown, the holding plate 2 comprises three slotted holes 18 and two sets of two slits 19 and 20, wherein the holding plate 2 can be fixed to the support arm 102 in two different associated positions. For example, a first position can be associated with the use of the device 1 together with an insertion element moved by a guided rapier, which is guided in guide hooks, and a second position can be associated with the use of the device 1 together with an insertion element moved by a free flight rapier, which is not guided in guide hooks. Fig. 11 shows the support arm 102 in isolation. As shown in Fig. 11, the support arm 102 is provided with two sets of three screw holes 54 and 55 and with two pins 56. The two pins 56 provided on the support arm 102 can be inserted into the two slits 19 or into the two slits 20, and the holding plate 2 can be fixed using screws 21 (shown in Fig. 3) inserted through the slotted holes 18 into one set of three screw holes 54 or 55. In the embodiment shown in Fig. 3 the two pins 56 are inserted through the slits 19, while the screws 21 are inserted into the screw holes 54 (shown in Fig. 11).

[0042] For manually bringing a weft feeder element 4 in a threading position or into a presenting position, the device 1 is provided with a push button 34 (see Fig. 10) that cooperates with the control device for the drive motors 8 of the device 1. The push button 34 is arranged on a protrusion 35 that can be part of the holding plate 2.

[0043] In the embodiment shown, as shown in Figs. 7 to 9, each weft feeder module 3 is detachably mounted to the holding plate 2 via the drive motor 8 and the guide structure 9, so as to be detachable and/or attachable as a whole, i.e., without disassembling the weft feeder module 3.

[0044] In the embodiment shown, the holding plate 2 in the guide structure mounting region 13 is provided with gaps 22, wherein each guide structure 9 is mounted to the holding plate 2 using a fixation element 23, as best seen in Fig. 6, which fixation element 23 is detachably mounted to the holding plate 2 and - in the embodiment shown - is at least partly covering the gap 22 in the holding plate 2 in the guide structure mounting region 13.

[0045] As best seen in Figs. 5 and 6, the guide structure 9 comprises a bearing bush 24 for slidingly receiving the weft feeder element 4 and a pin 25 having an axis parallel to a motor axis 28 of the drive motor 8, wherein the bearing bush 24 is mounted rotatably to the fixation element 23 using the pin 25. In the embodiment, the fixation element 23 has for example the shape of a figure eight with two lobes, wherein a first lobe has a through hole for receiving the pin 25 and the second lobe has a through hole for receiving a screw 32 for fixing the fixation element 23 to the holding plate 2.

[0046] In the motor mounting region 12, the holding plate 2 is provided with passage openings 26 (see Fig. 3) for the motor axes of the weft feeder modules 3. In the embodiment shown, each passage opening 26 is sufficiently large to allow the drive mechanism 6, in particular the crank 7, the weft feeder element 4, and the guide structure 9 of the assembled weft feeder module 3 to pass through the passage opening 26.

[0047] As shown with reference to Figs. 6 to 9, for detaching one of the weft feeder modules 3 from the holding plate 2, screws 27 via which the drive motor 8 is fixed to the holding plate 2 are loosened and the fixation element 23 is detached from the holding plate 2 by loosening the screw 32. The gap 22 allows tilting the weft feeder module 3 without any interference between the pin 25 of the guide structure 9 and the holding plate 2. Next the crank 7, the weft feeder element 4, and the guide structure 9 of the assembled weft feeder module 3 are moved through the passage opening 26 for a removal of the assembled weft feeder module 3 from the holding plate 2 by carrying out the steps shown in Figs. 7 to 9. In will be understood, that attaching a weft feeder module 3 is possible by carrying out the steps shown in Figs. 7 to 9 in the reverse order.

[0048] Fig. 12 shows an alternative embodiment of a device 1 for selecting and presenting weft threads to an insertion element (not shown in Fig. 12) comprising a holding plate 2 and a number of weft feeder modules 3. The device 1 shown in Fig. 12 is similar to the device 1 shown in Figs. 1 to 11 and for the same or similar elements, the same reference signs are used. In this embodiment the crank 7 together with the weft feeder element 4 and the guide structure 9 can be removed from the device 1 after detaching the crank 7 from the motor axis 28 of the drive motor 8 and after removing the fixation element 23 from the holding plate 2. The weft feeder modules 3 can be removed towards a frontside of the device 1.

[0049] Fig. 13 shows another alternative embodiment of a device 1 for selecting and presenting weft threads to an insertion element comprising six weft feeder modules 3. In contrast to the embodiments shown in Figs. 1 to 12, an articulated weft feeder element 4 is provided having a first arm 40 connected to the drive mechanism

6, in particular a crank 7 of the drive mechanism 6, and a second arm 41 connected to the first arm 40 via a joint 42, wherein the second arm 41 is provided with a weft thread guide 5 at its distal end. The joint 42 is slidingly mounted in a slot 29 provided in the holding plate 2.

[0050] The weft feeder element 4, more particular the second arm 41, is guided via two guide structures 9. Each guide structure 9 is fixed to the holding plate 2 using a fixation element 23, for example similar to the fixation element shown in Fig. 6. An opening 14 is provided in the holding plate 2 between a motor mounting region 12, in which drive motors 8 of the weft feeder modules 3 are attached to the holding plate 2, and a guide structure mounting region 13, in which the lower guide structures 9 of the weft feeder modules 3 are attached to the holding plate 2. In contrast to the embodiment shown in Figs. 1 to 11, for a disassembly, the drive mechanism 6 is detached from a motor axis 28 and the weft feeder modules 3 are removed towards a frontside of the device 1.

[0051] Fig. 14 shows another alternative embodiment of a device 1 for selecting and presenting weft threads to an insertion element comprising a holding plate 2 and a number of weft feeder modules 3. The device 1 shown in Fig. 14 is similar to the device 1 shown in Figs. 1 to 11 and for the same or similar elements, the same reference signs are used.

[0052] In contrast to the embodiment shown in Figs. 1 to 11, in the embodiment of Fig. 14, two holding plates 2 are provided, which are separately mounted to a support arm 102 by use of a mounting structure 17. In the embodiment shown in Fig. 14, the two holding plates 2 are of identical design and each are provided with an opening 14 between a motor mounting region 12, in which drive motors (not visible in Fig. 14) of the weft feeder modules 3 are attached to the holding plate 2, and a guide structure mounting region 13, in which guide structures 9 of the weft feeder modules 3 are attached to the holding plate 2. The two holding plates 2 together form a split holding plate. In the embodiment shown, the two holding plates 2 have complementary notches 30 and grooves 31 at adjacent side faces allowing for a compact arrangement. In an alternative embodiment a split holding plate is used having more than two holding plates 2, for example more than two identical holding plates 2 having complementary notches 30 and grooves 31 at adjacent side faces.

[0053] In another embodiment (not shown), two holding plates are provided, which differ in design and both have an opening with an unclosed circumference, wherein the two holding plates are arranged for forming a split holding plate having one common opening with a closed circumference.

[0054] Fig. 15 shows an alternative embodiment of a device 1 for selecting and presenting weft threads to an insertion element comprising a holding plate 2 and four weft feeder modules 3. The device 1 shown in Fig. 15 is similar to the device 1 shown in Fig. 1 and for the same or similar elements, the same reference signs are used. In contrast to Fig. 1, in the embodiment of Fig. 15 the holding plate 2 with the cover 15 is arranged at another angle with respect to the insertion direction. For example, the distance perpendicular to the insertion direction between the left and the right weft feeder element 4 is almost the same in Fig. 1 and Fig. 15, so that the angle of the device 1 with respect to the insertion direction can be chosen differently.

Claims

1. Device for selecting and presenting weft threads to an insertion element of a weaving machine, the device (1) comprising a holding plate (2) and a number of weft feeder modules (3), each weft feeder module (3) comprising a weft feeder element (4) with a weft thread guide (5) at its distal end, a drive mechanism (6), a drive motor (8), which drive motor (8) is mounted to the holding plate (2) in a motor mounting region (12), and a guide structure (9) mounted to the holding plate (2) in a guide structure mounting region (13), wherein the weft feeder element (4) is connected via the drive mechanism (6) to the drive motor (8) for a movement of the weft feeder element (4) between a rest position and a presenting position, and wherein the weft feeder element (4) is guided by the guide structure (9), **characterized in that** an opening (14) is provided in the holding plate (2) between the motor mounting region (12) and the guide structure mounting region (13) allowing incidence of light to improve a visibility in a thread feeding zone.

2. The device according to claim 1, **characterized in that** each weft feeder module is mounted to the holding plate (2) via the drive motor (8) and the guide structure (9) so as to be detachable and/or attachable as a whole.

3. The device according to claim 2, **characterized in that** a fixation element (23) is provided, which is detachably mounted to the holding plate (2) in the guide structure mounting region (13), wherein the guide structure (9) is mounted to the holding plate (2) via the fixation element (23).

4. The device according to claim 3, **characterized in that** the guide structure (9) comprises a bearing bush for slidingly receiving the weft feeder element (4), wherein the bearing bush is mounted rotatably to the fixation element (2) using a pin (25) having an axis parallel to a motor axis (28) of the drive motor (8).

5. The device according to claim 2, 3 or 4, **characterized in that** the holding plate (2) is provided with a passage opening (26) for the motor axis of each weft feeder module (3), wherein the passage opening (26) is sufficiently large to allow the drive mechanism (6), in particular a crank (7) of an eccentric drive

mechanism, the weft feeder element (4), and the guide structure (9) of the assembled weft feeder module (3) to pass through the passage opening (26).

6. The device according to any one of claims 1 to 5, **characterized in that** the drive motors (8) of the weft feeder modules (3) are arranged at a backside (10) of the holding plate (2) and the weft feeder elements (4) are arranged at a frontside (11) of the holding plate (2).

7. The device according to any one of claims 1 to 6, **characterized in that** the drive mechanism (6) of at least one of the weft feeder modules (3) comprises a crank (7), wherein the holding plate (2) is provided with a clearance for a movement of the crank (7).

8. The device according to any one of claims 1 to 7, **characterized in that** the holding plate (2) is provided with a mounting structure (17) via which the holding plate (2) is mountable to a support arm (102) attached to a frame (101) of the weaving machine (100), wherein in particular the arm (102) is arranged and shaped to not impede the visibility in the thread feeding zone.

9. The device according to claim 8, **characterized in that** the holding plate (2) is provided with holes (18) allowing the holding plate (2) to be mounted to the support arm (102) in two different positions.

10. The device according to any one of claims 1 to 9, **characterized in that** the motor mounting region (12) of the holding plate (2) is covered by a cover element (15).

11. The device according to any one of claims 1 to 10, **characterized in that** a light source (16) is attached to the holding plate (2), wherein in particular the light source (16) is attached for illuminating the thread feeding zone.

12. The device according to any one of claims 1 to 11, **characterized in that** a camera (11) is attached to the holding plate (2).

13. The device according to any one of claims 1 to 12, **characterized in that** the device (1) comprises a number of weft feeder modules (3) attached in a staggered arrangement to the holding plate (2).

14. Weaving machine comprising an insertion element (103), in particular a gripper, and the device (1) for selecting and presenting weft threads to the insertion element (103) according to any one of claims 1 to 13.

15. The weaving machine according to claim 14, **characterized in that** the device (1) is detachably mounted to a cross beam (101) of the weaving machine via a support arm (102), wherein in particular the support arm (102) has a first section (104) extending upwards from the cross beam (101) and a second section (105) extending transverse to the first section (104).

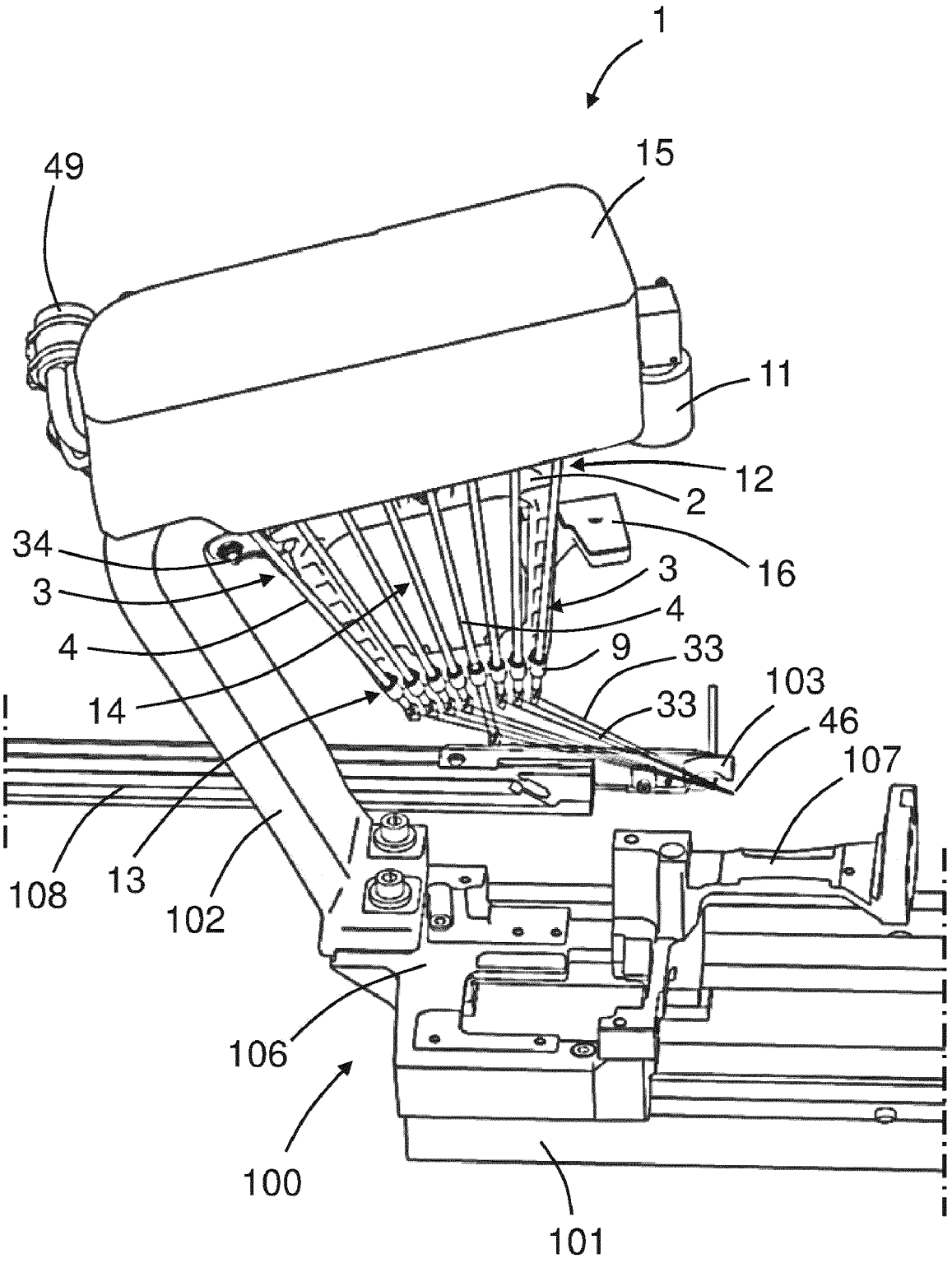
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Fig. 1

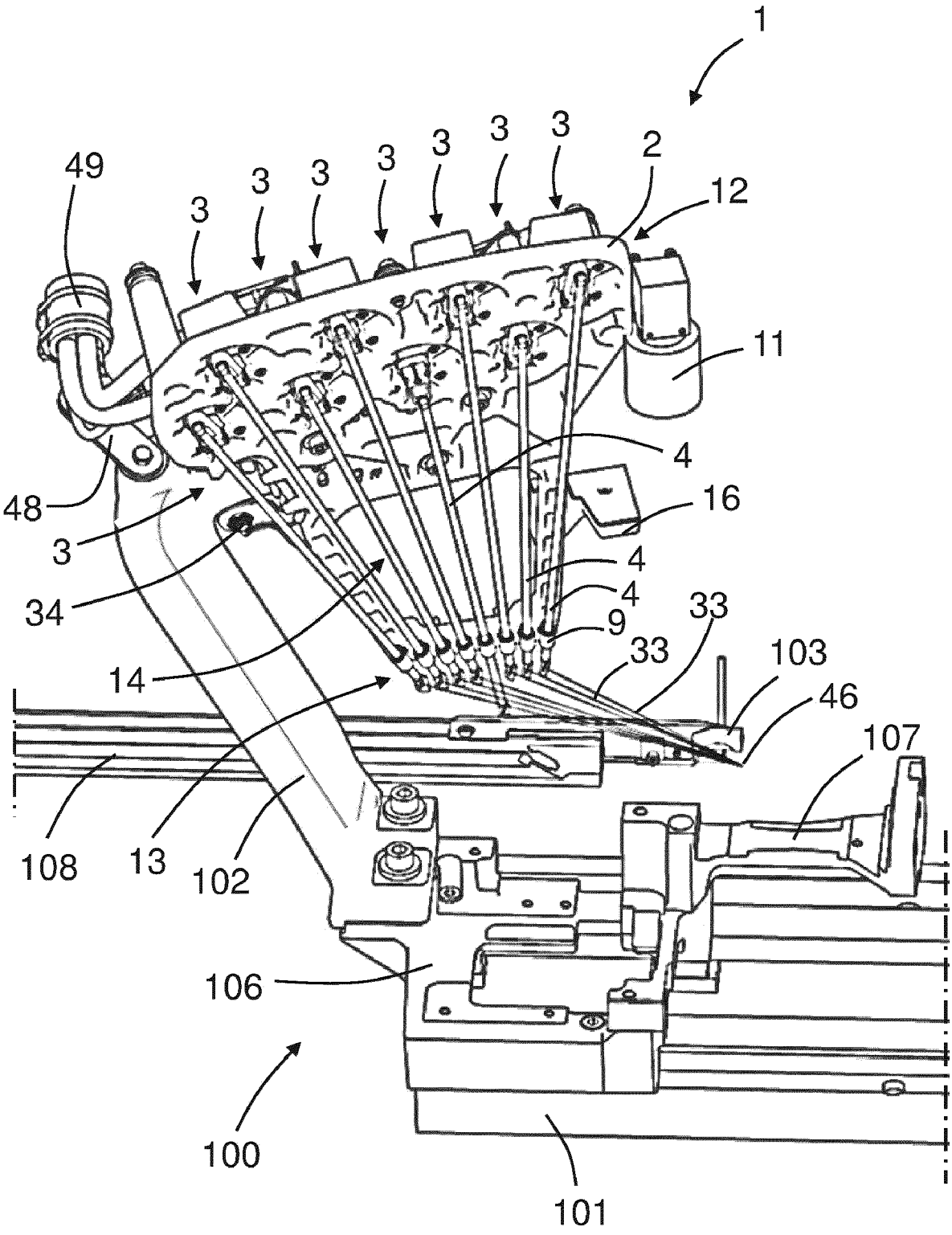
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Fig. 2

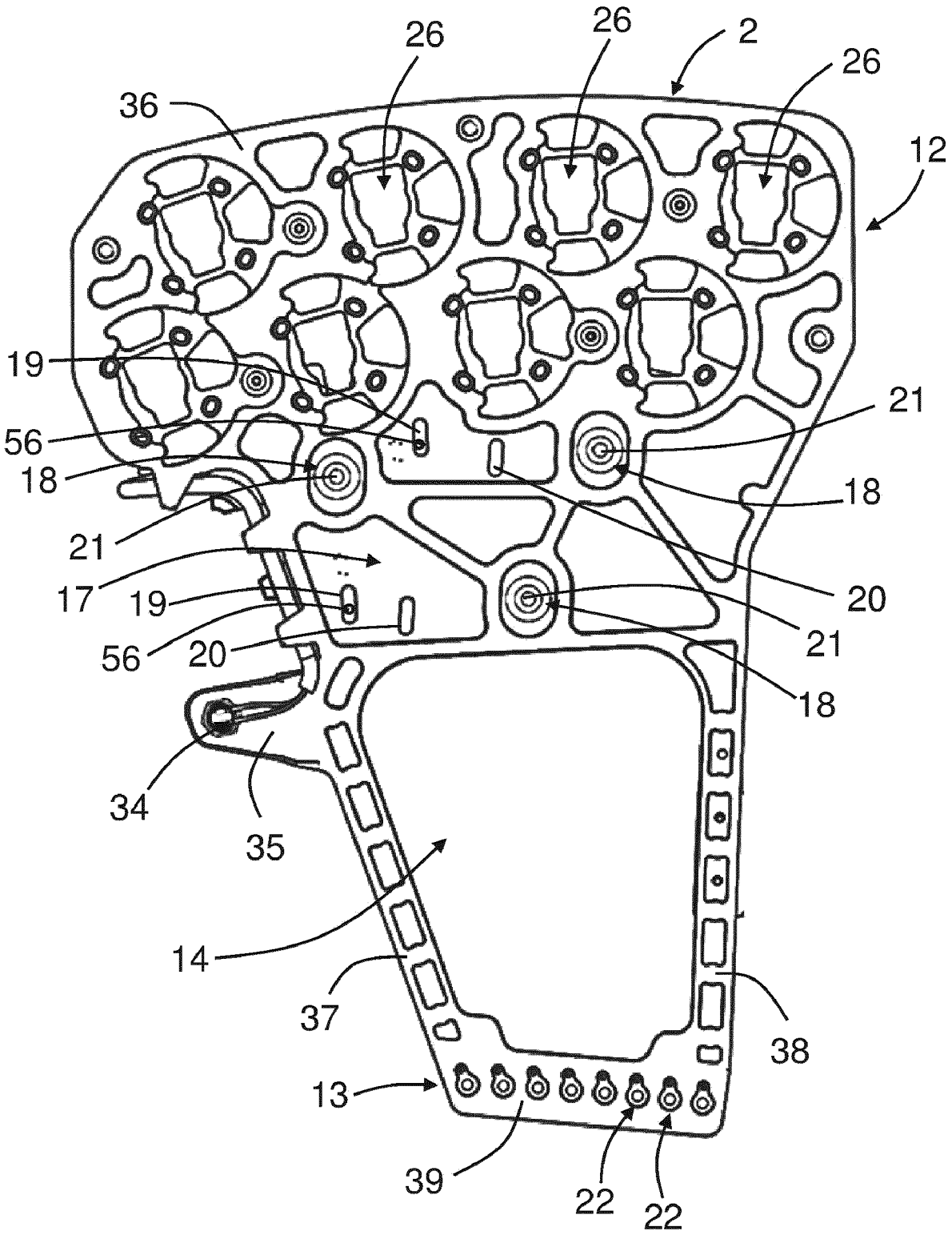
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Fig. 3

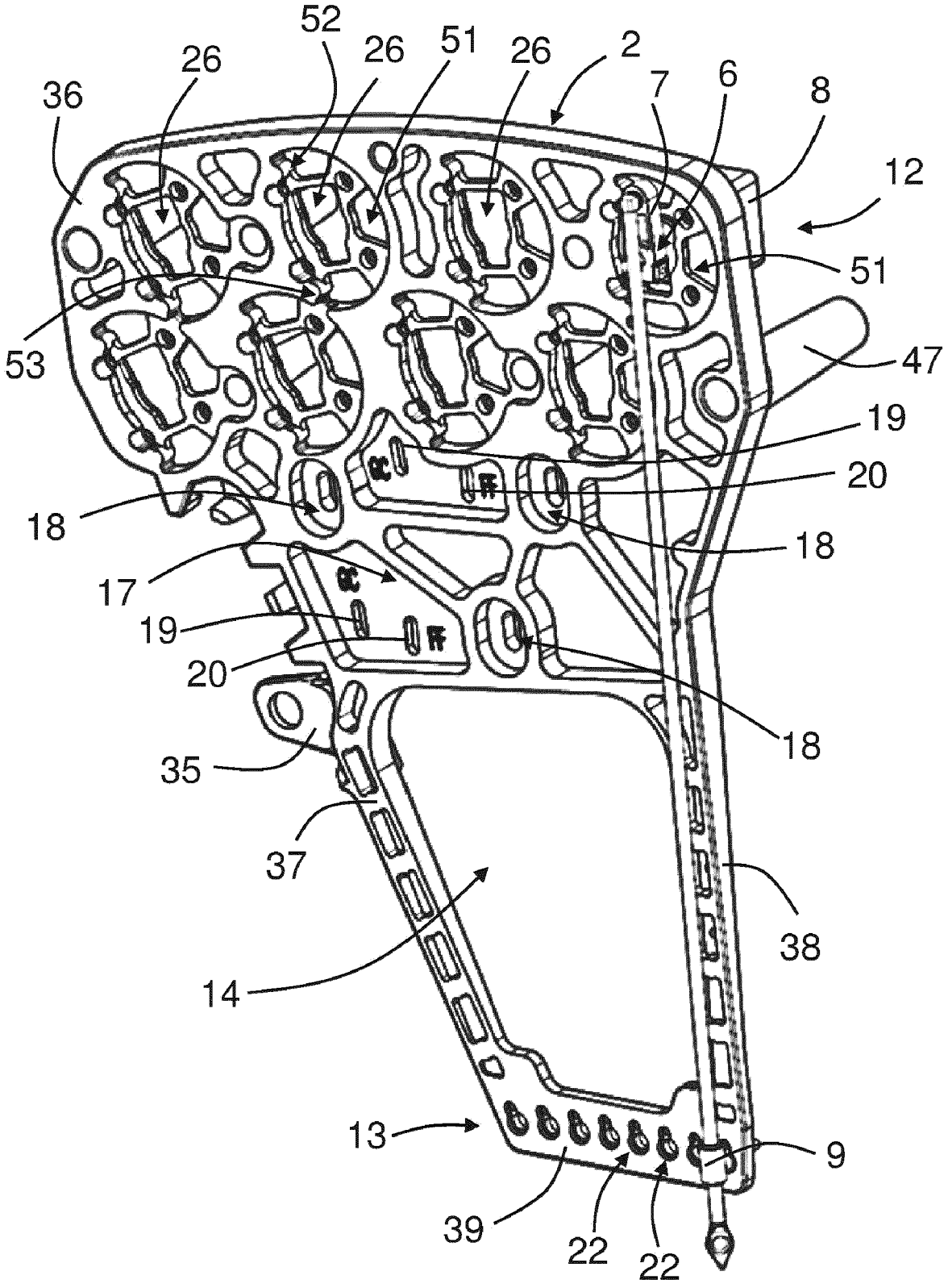
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Fig. 4

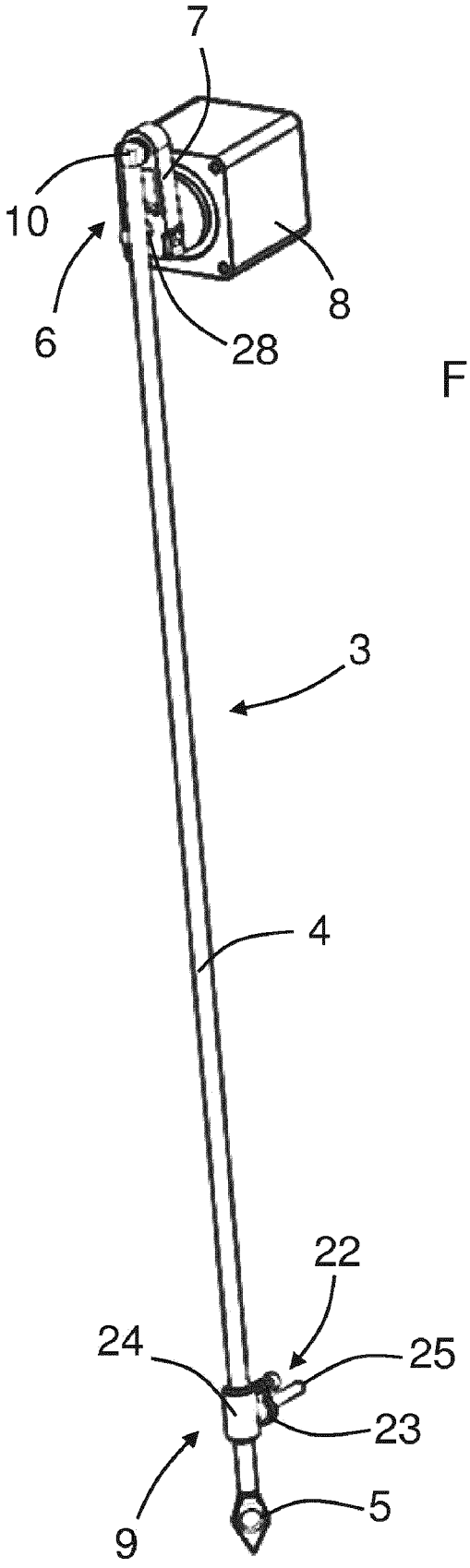
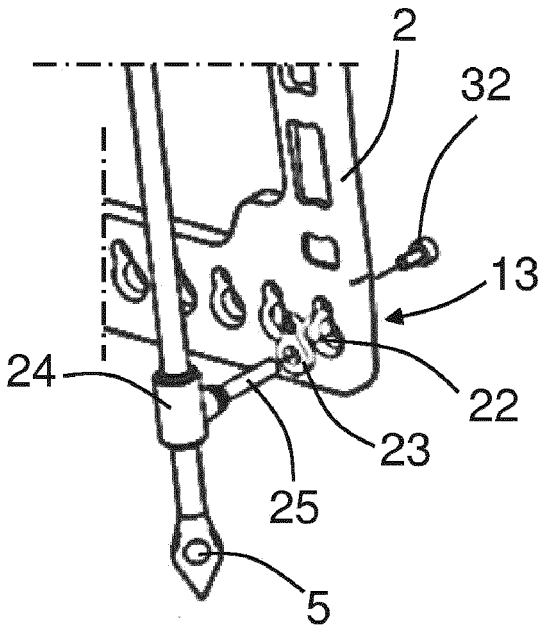


Fig. 5

Fig. 6



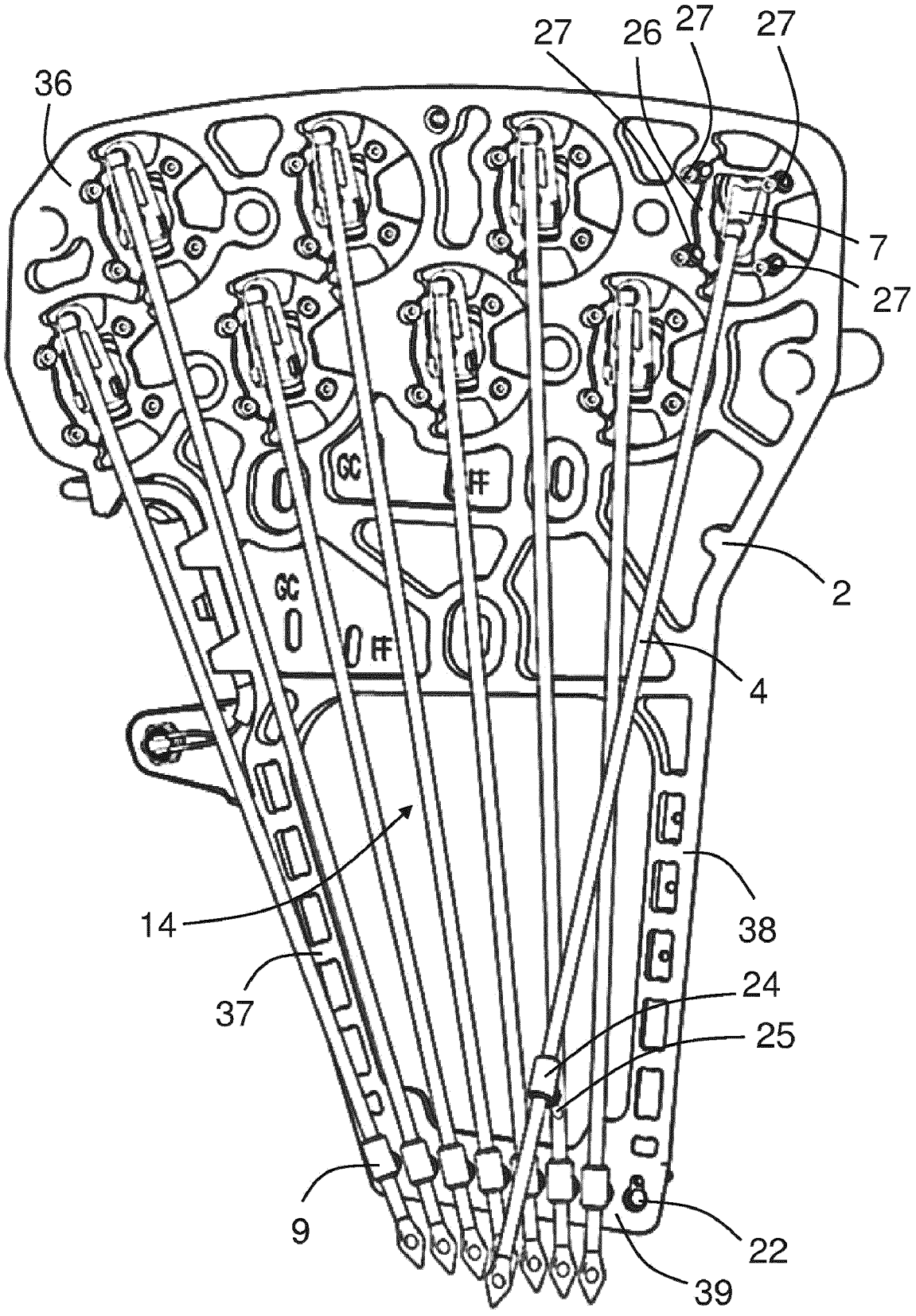


Fig. 7

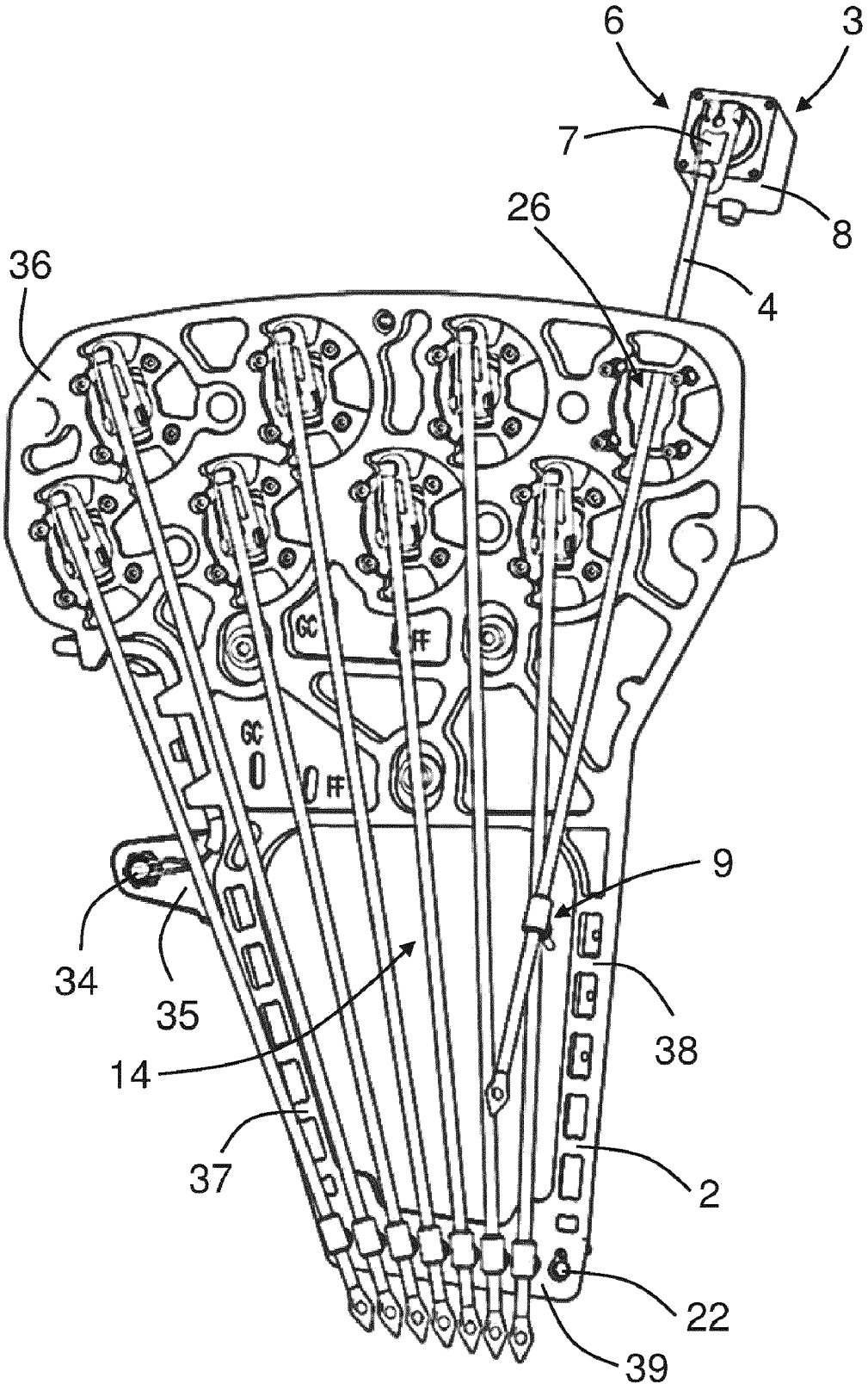


Fig. 8

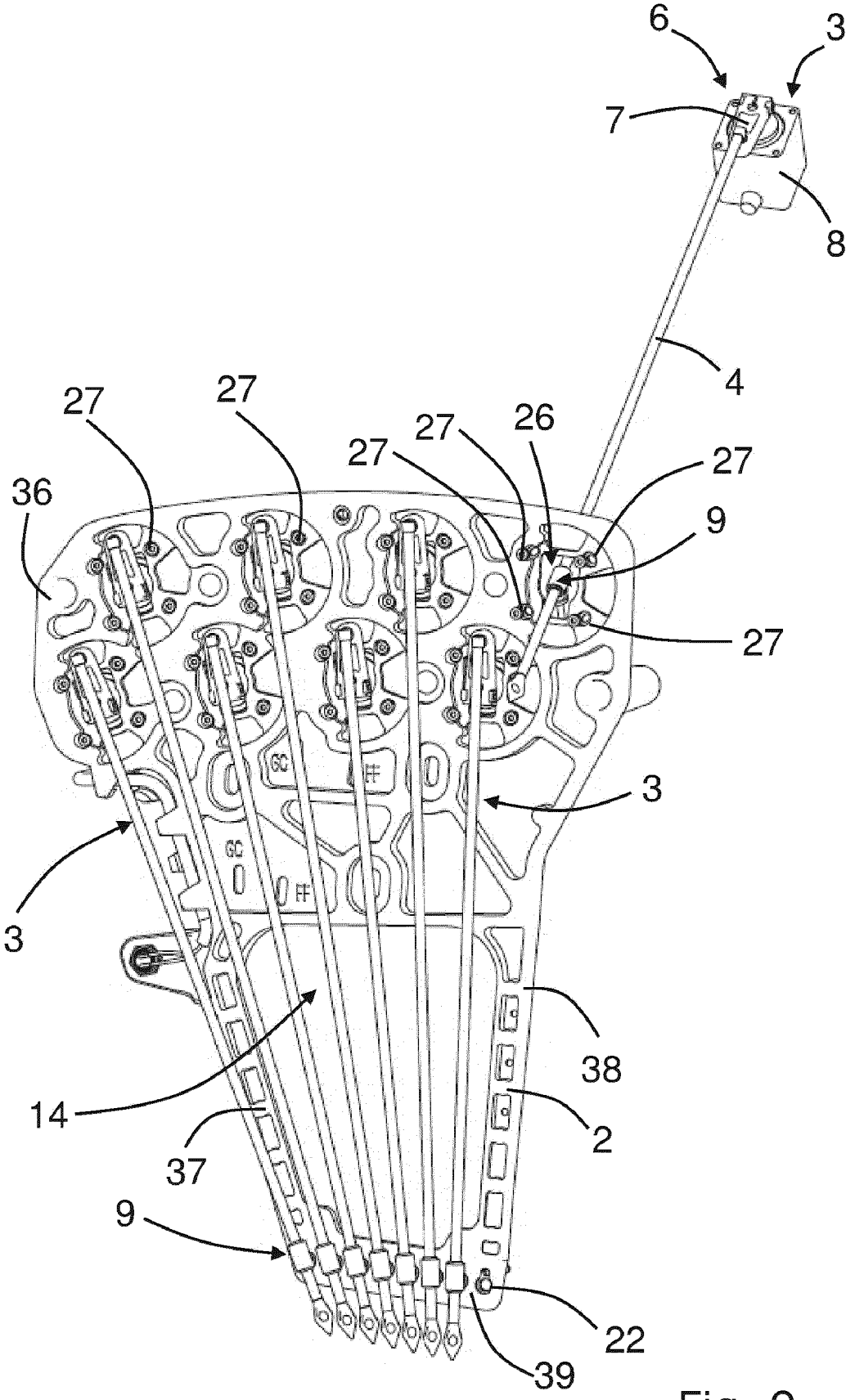


Fig. 9

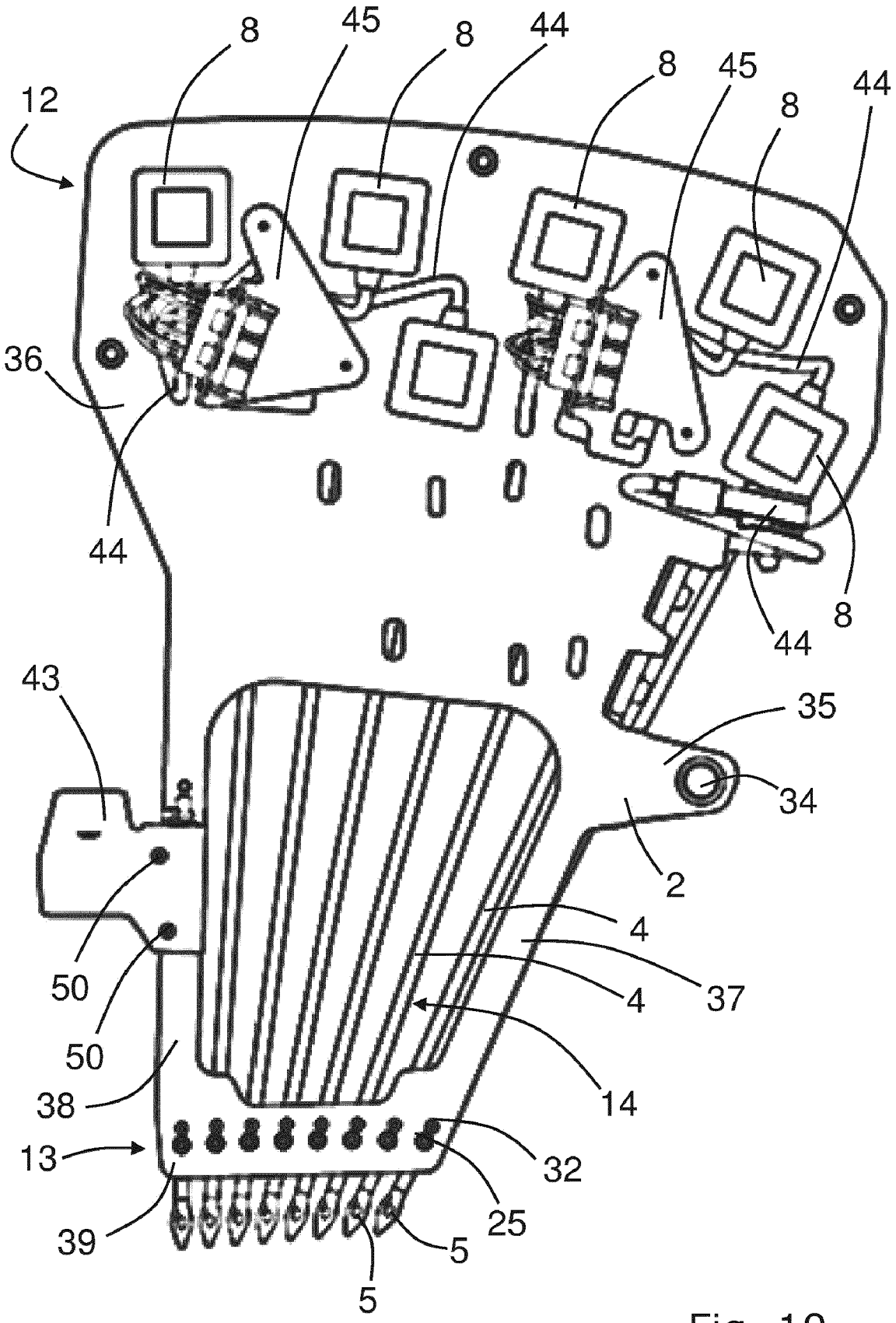

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Fig. 10

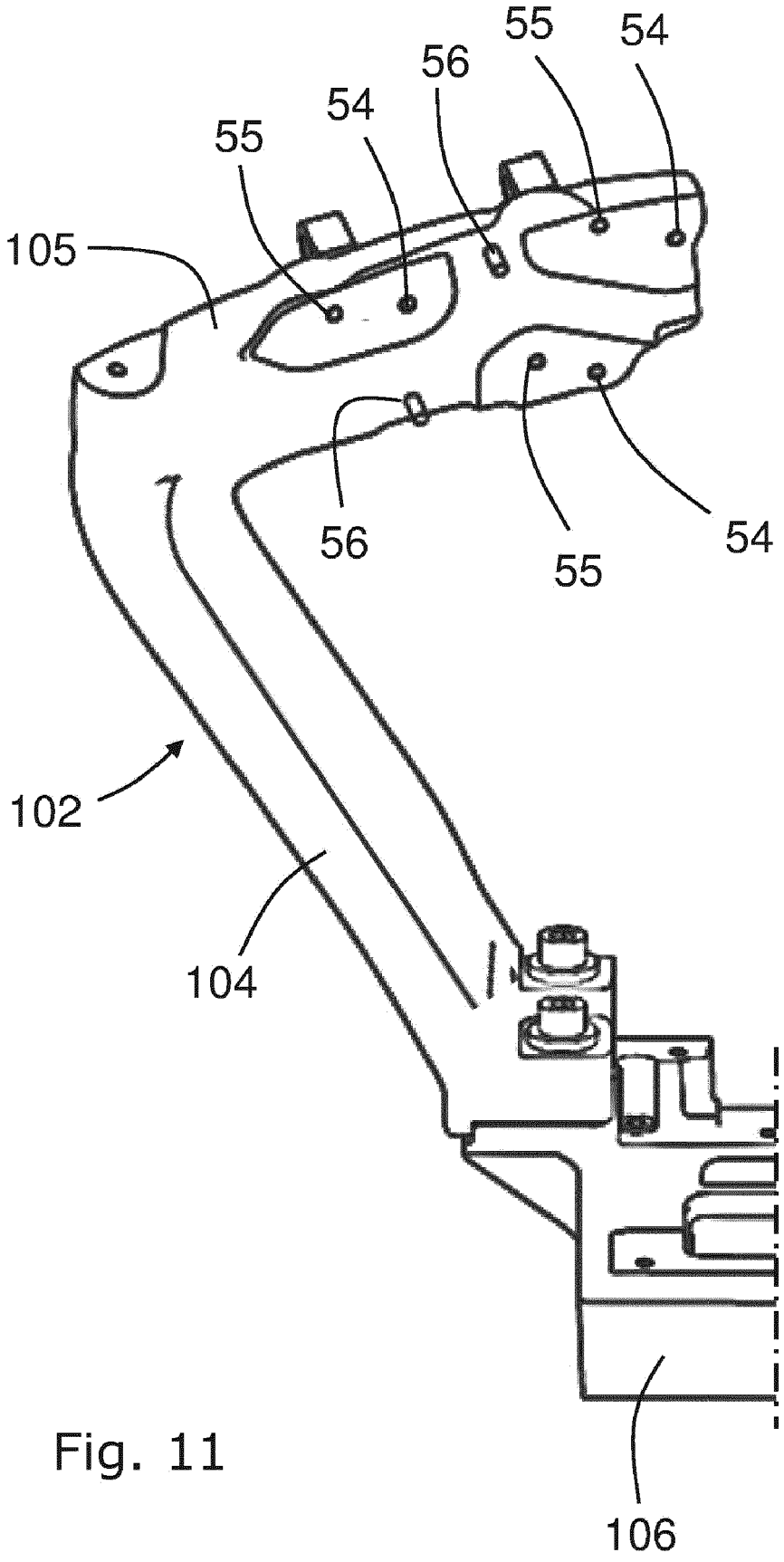

Fig. 11

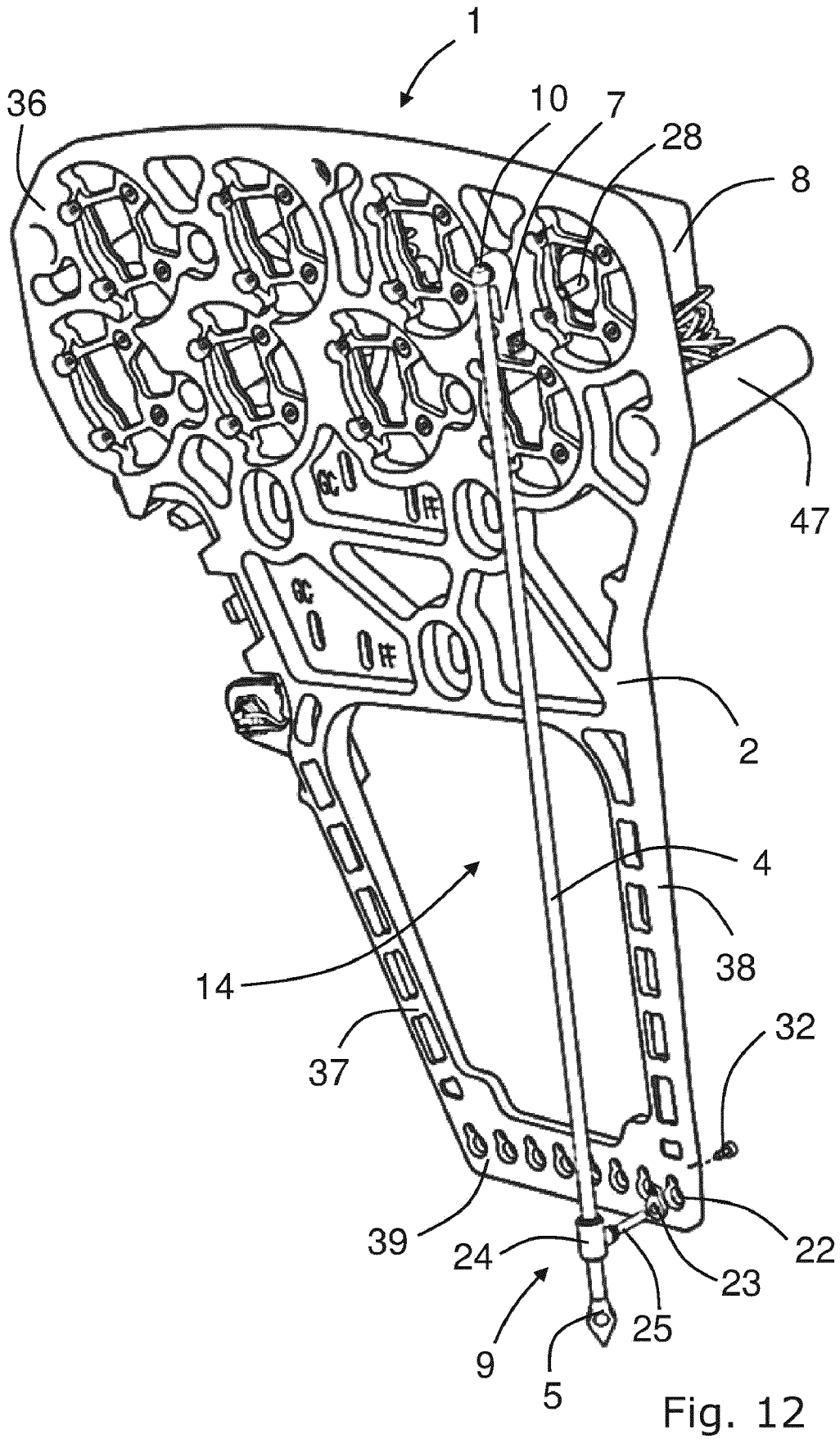

Fig. 12

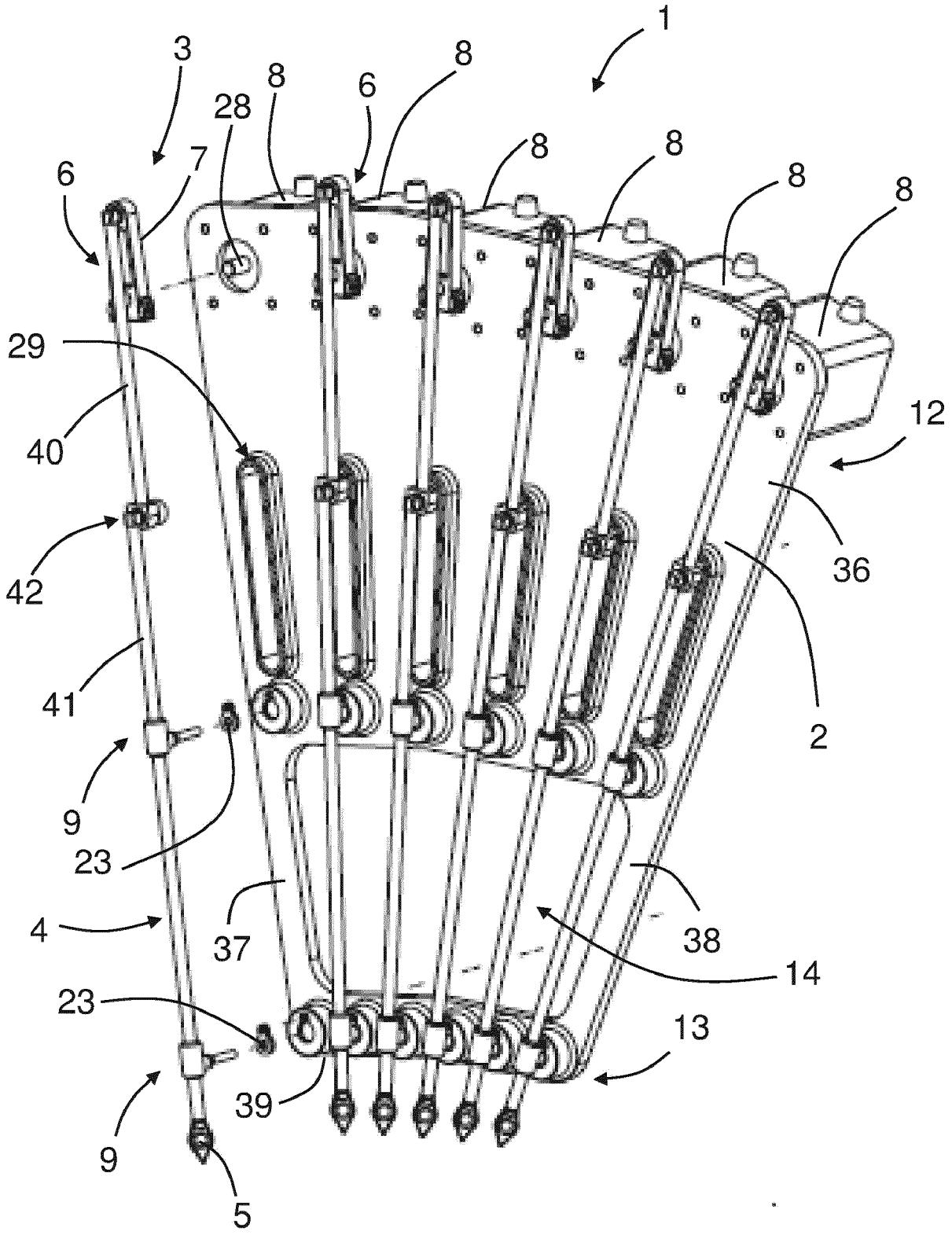

Fig. 13

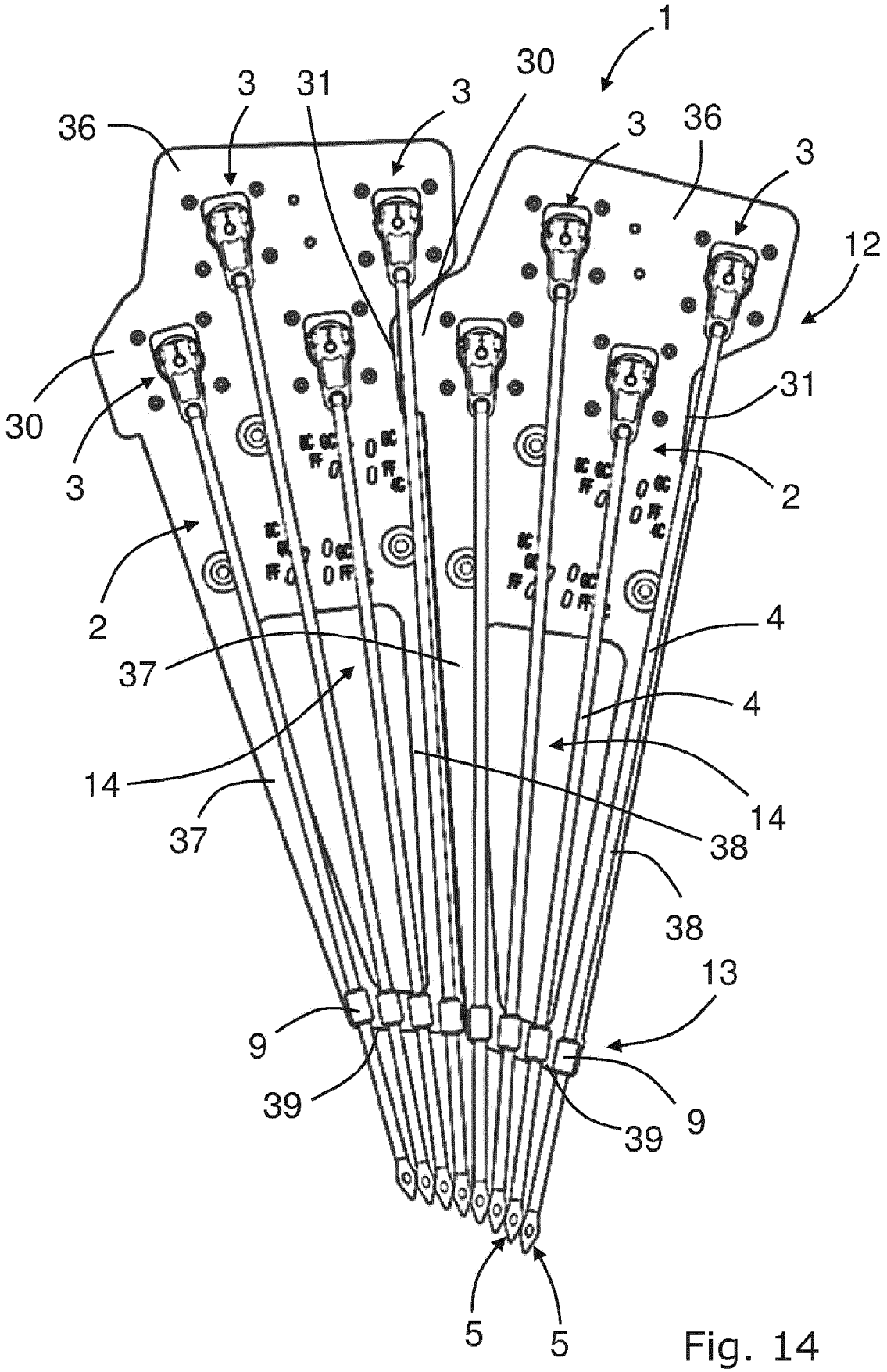

Fig. 14

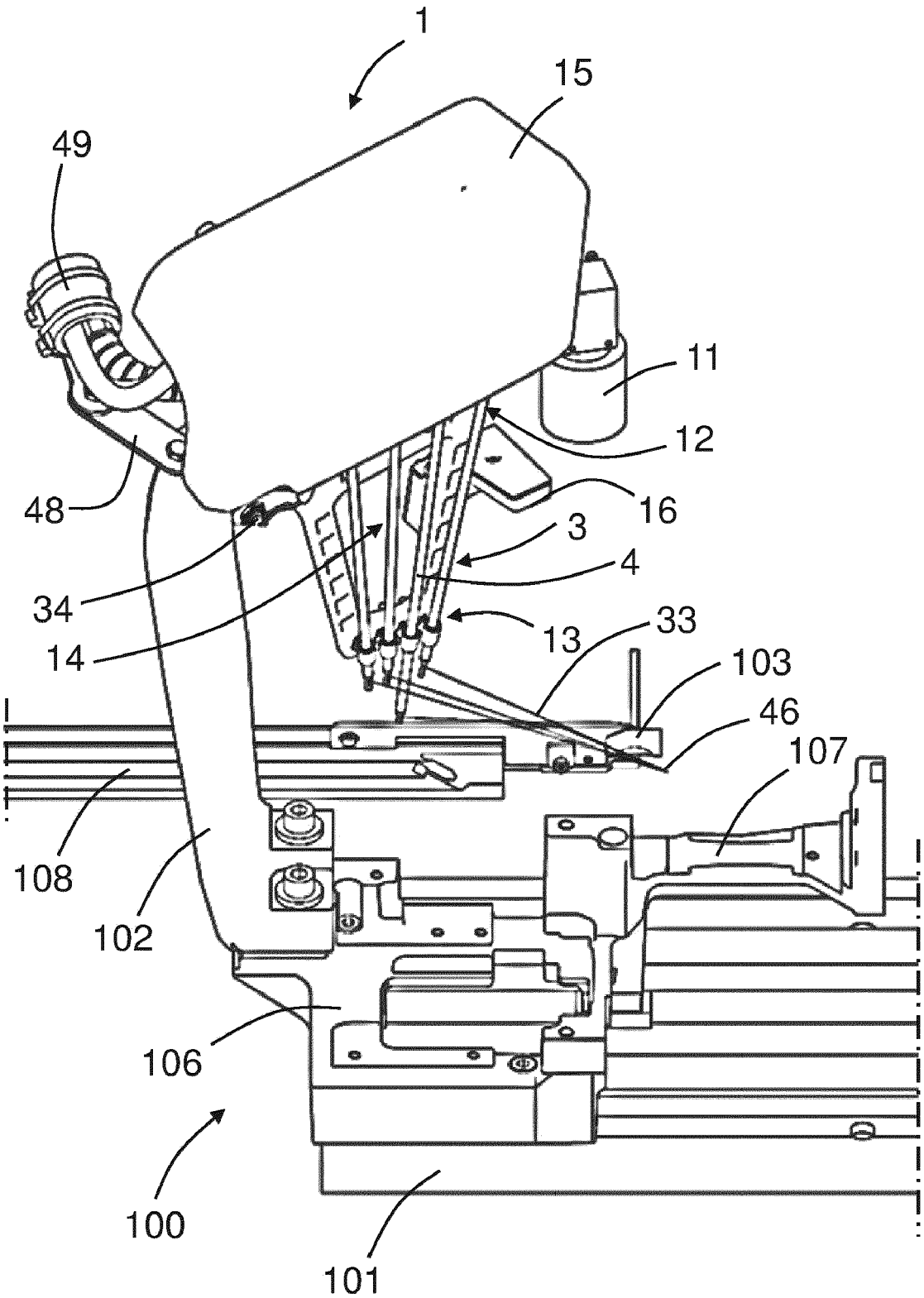

Fig. 15

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EUROPEAN SEARCH REPORT

Application Number
EP 22 18 5743

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,D	EP 0 896 075 B1 (PROMATECH SPA [IT]) 1 October 2003 (2003-10-01) * paragraphs [0017], [0018], [0025]; figures 1-5 *	1-15	INV. D03D47/38
A	EP 0 362 089 A1 (MARSANDE PETRUS) 4 April 1990 (1990-04-04) * column 2, line 35 - column 3, line 10; figures 1,2 *	1-15	

TECHNICAL FIELDS SEARCHED (IPC)

D03D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	19 December 2022	Louter, Petrus

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19-12-2022

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0896075 B1	01-10-2003	DE 69818588 T2	05-08-2004
		EP 0896075 A2	10-02-1999
		ES 2209013 T3	16-06-2004
		IT MI971900 A1	07-02-1999
EP 0362089 A1	04-04-1990	EP 0362089 A1	04-04-1990
		FR 2636979 A1	30-03-1990

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Patent documents cited in the description

- US 5400834 A **[0002]**
- EP 2893067 B1 **[0002]**
- EP 0896075 A2 **[0003]**