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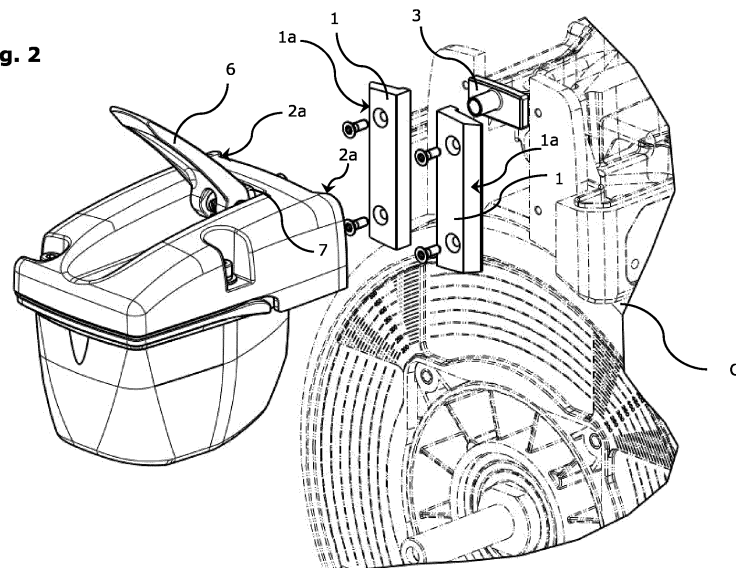
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(54) **WEFT FEEDER WITH ADJUSTABLE-DIAMETER DRUM FOR WEAVING LOOMS, COMPRISING AN ELECTROMAGNET UNIT CONTROLLING THE WEFT THREAD RELEASE EQUIPPED WITH A QUICK-RELEASE DEVICE TO ADJUST AND FIX ITS WORKING POSITION**

(57) Weft feeder for weaving looms with thread coil separation comprising a winding group (W) to wind a weft thread onto a weft feeder drum (D), and an electromagnet unit (E) to control the movement of a stop pin (P) which prevents the weft thread from being released from said drum (D), wherein said electromagnet unit (E) is movable in a radial direction with respect to an axis of the weft feeder drum (D), along a pair of guide means (1, 2) provided in the base body (C) of said weft feeder and in said electromagnet unit (E), respectively, which consist of a pair of fixed guides (1) and a pair of mobile guides (2)

symmetrically arranged with respect to an axial plane of the weft feeder passing therebetween and parallel thereto, each pair of guides having flat contact surfaces (1a, 2a) symmetrically inclined with respect to said axial plane of the weft feeder. A single locking/unlocking means (3, 4) having an axis parallel to the drum (D) axis stably fixes said electromagnet unit (E) in a predefined position and includes a pawl (3) housed in an undercut recess, provided between said pair of fixed guides (1) or in the weft feeder base body (C), and a tie-rod (4) connected to said pawl (3).

Fig. 2**EP 4 579 017 A1**

Description

FIELD OF THE INVENTION

[0001] The present invention relates to a new weft feeder for weaving looms, and particularly for air jets looms and water jet looms, which includes, in addition to the normal functions already offered by the currently available weft feeders of the known type, an electromagnet unit controlling the weft thread release, equipped with a quick-release adjustment device to obtain a precise adjustment of its working position.

PRIOR STATE OF THE ART

[0002] As is well known, weft feeders are weft thread feeding devices, interposed between the loom and the yarn spools, which feeds the loom with the weft thread by continuously accumulating it in successive coils on a cylindrical drum at as constant a speed as possible - in the clockwise or counterclockwise direction depending on the thread features - so as to create a reserve of weft thread which is subsequently extracted from the weft feeder drum in the axial direction, at variable speed, during the operation of insertion in the shed, without thus causing tension peaks in the weft thread, which would undermine both the integrity of the thread itself and the quality of the fabric.

[0003] Weft feeders are devices which have been in current use for many years in the weaving mills. Along their evolution over the years, in addition to the basic functions mentioned above, they have been enhanced with additional control functions which allow to check the weft thread constant presence at certain critical points of the weft feeder, to adjust the amount of weft thread accumulated in the reserve and the distance between the individual coils, to slow down the outgoing weft thread in order to contain the dynamic effects caused by the sudden drawing acceleration, and finally to control the weft thread release in a predetermined length for insertion in the shed formed by the warp threads.

[0004] To be able to correctly carry out the above functions, the weft feeder (Fig. 1) is equipped with an optical unit and an electromagnet unit E (hereinafter also referred to as "ELM unit"). The optical unit includes one or more optical sensors and performs the function of monitoring the weft thread winding on the drum D by a winding group W which is integral with the weft feeder hollow shaft A, by retroactively controlling the weft feeder electric engine which controls the hollow shaft A rotation and therefore the deposition of new coils of weft thread on the drum D, as well as the function of counting the number of coils released from drum D to the weft insertion devices. The ELM unit controls the rectilinear movement of a weft thread stop pin P between an advanced position, wherein its free end is inserted into a corresponding seat provided in the drum D, thus preventing the weft thread from being released from the weft feeder drum, and a retracted

position which allows instead the weft thread to be released. Thanks to the combined action of the optical unit and the ELM unit the weft thread may thus be drawn from the loom in a predefined number of coils, corresponding to the desired length of weft thread to be inserted in the shed.

[0005] For a correct operation of the optical unit and the ELM unit, the distance between the ELM unit and the drum D shall be determined with such a precision as to allow the optical unit sensors to correctly detect the passage of the weft thread, and the stop pin P of the ELM unit to sufficiently enter the corresponding seat of the drum D to hold the weft thread coils on the drum D.

[0006] In weft feeders with adjustable-diameter drum, to which the present invention is addressed, the drum D working diameter may be modified in every single processing, in order to change the length of the weft thread section fed to the loom, and it is then necessary that the position of the whole ELM unit, mounted directly on the weft feeder base body C, is adjusted as quickly and stably as possible, to chase the new position of the drum D and then stably maintain a predetermined optimal working distance from the same.

[0007] Currently, the ELM unit slides along a pair of guide means, respectively provided in the weft feeder base body C and in the ELM unit itself, and having a radial direction with respect to the weft feeder drum D. The ELM unit is then fixed in a desired position by a pawl which slides within the guide means provided in the base body. Said pawl is in fact secured to the ELM unit via the engagement with a screw passing through the same, in the parallel direction to the drum D axis, and may be therefore locked in position by acting on said screw to pull the pawl into abutment against said guide means. In this way, the ELM unit sliding may be stopped at any desired position along said guide means.

[0008] However, the ELM unit support and locking device described above shows two main drawbacks:

- the screw/pawl assembly has inherent plays which do not allow a precisely repeatable adjustment of the ELM unit position. In particular, the ELM unit remains partially free to swing about the screw/pawl assembly axis, which can make it difficult to maintain a correct parallelism of the ELM unit lower plane, where the optical sensors and the stop pin P are located, with the reference sector of the weft feeder drum D, as well as a correct centering of the stop pin P with the respective seat provided on the drum D;
- due to the loosening of the screw/pawl assembly, which necessarily precedes the adjusting step of the ELM unit position, the ELM unit ends to be in said adjusting step in a slightly different position from the working one. This means that during the step of tightening the pawl, a small displacement of the ELM unit with respect to the last set adjustment position is determined. For this reason, the adjustment and fixing procedure needs to be repeated to

accurately define a desired final position of the ELM unit.

[0009] The technical problem addressed by the present invention is therefore to provide a weft feeder with adjustable-diameter drum wherein the ELM unit working position may be fast adjusted and thus the ELM unit may be fixed in such a position with high precision and repeatability.

[0010] In the context of this technical problem, a first object of the present invention is to provide an ELM unit equipped with an adjustment and fixing device of its working position, suitable to ensure a constant parallelism of the ELM unit lower plane with the reference sector of the weft feeder drum D, as well as a correct centering of the stop pin P with the corresponding seat provided in the drum D.

[0011] A second object of the present invention is then to provide an ELM unit wherein said adjustment and fixing device may be quickly operated, preferably without the use of tools.

[0012] Finally, a third object of the present invention is to provide an ELM unit, the adjustment and fixing device of which maintains a stable and unchanged ELM unit working position even during the adjustment and fixing operation.

SUMMARY OF THE INVENTION

[0013] This problem is solved, and these objects achieved, by means of a weft feeder with adjustable-diameter drum for weaving looms comprising a weft feeder electromagnet unit which controls the release of the weft thread, having the features defined in the independent claim 1. Other preferred features of such weft feeder are defined in the secondary claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] Further features and advantages of the weft feeder with adjustable-diameter drum comprising an electromagnet unit which controls the release of the weft thread according to the present invention will however become more evident from the following detailed description of a preferred embodiment of the same, given by mere way of non-limiting example and illustrated in the accompanying drawings, wherein:

Fig. 1 is an axial sectional view of a weft feeder incorporating the electromagnet unit of the present invention;

Fig. 2 is a partially exploded perspective view illustrating the adjustment and fixing device of the ELM unit working position according to the present invention; and

Fig. 3 is an exploded view of the ELM unit of Fig. 2 seen from an opposite direction.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0015] According to the present invention, in order to solve the problem highlighted above by means of a simply and quickly operable innovative solution, the ELM unit is fixed to the weft feeder base body C by means of an adjustment and fixing device consisting of a pair of fixed guides 1 provided in the weft feeder base body C, and a corresponding pair of mobile guides 2 provided in the ELM unit, said fixed guides 1 and mobile guides 2 being parallel and mutually coupled, and preferably symmetrically arranged with respect to an axial plane of the weft feeder passing therebetween and parallel thereto. The longitudinal direction of the fixed guides 1 and the mobile guides 2 is a radial direction with respect to the weft feeder drum D, a direction along which the ELM unit should in fact be able to move, during the adjustment step of its position, to adapt to a new diameter of the weft feeder drum D. The fixed guides 1 and/or the mobile guides 2 are preferably made of a self-lubricating material.

[0016] According to a main feature of the invention, and as clearly illustrated in Figs. 2 and 3, the fixed guides 1 and the mobile guides 2 are sized in such a way that, when they are coupled together, the only surfaces in contact exclusively consist of flat contact surfaces 1a and 2a of the fixed guides 1 and the mobile guides 2, respectively. At least one of said flat contact surfaces 1a of the fixed guides 1 and the corresponding flat surface 2a of the mobile guides 2, and preferably both, are inclined with respect to the weft feeder axis. When both said flat contact surfaces 1a are inclined, they preferably are symmetrically arranged with respect to an axial plane passing therebetween and parallel thereto. The length of the inclined flat surfaces 1a, 2a is sufficient to ensure adjustable positioning of the ELM unit, parallelly to the longitudinal direction of said guides, for every diameter of the weft feeder.

[0017] The fixed guides 1 are mounted in their seat on the weft feeder base body C in such a way to form an undercut recess between them or in the same base body C, inside which a retaining pawl 3 of the whole ELM unit slides. The pawl 3 is then fixed - by means of a tie-rod 4 of predetermined length, which length being adjustable during manufacturing or calibration - to a quick-release locking/unlocking device integral with the ELM unit body 5. The quick-release locking/unlocking device preferably consists of a manually operated eccentric lever 6, hinged to the ELM unit body 5 and apt to impart to the tie-rod 4 a sufficiently wide movement to cause the locking/unlocking of the ELM unit, upon rotation of the eccentric lever 6 of about 90°. Thanks to this solution, the adjustment of the ELM unit position in a radial direction with respect to the weft feeder drum may be carried out extremely quickly and without use of additional manual tools.

[0018] When the eccentric lever 6 is in the open position, in fact, the ELM unit is free to move along the guides

1, 2 until being positioned at the desired height with respect to the weft feeder drum. Conversely, when the eccentric lever is in the closed position the ELM unit remains perfectly locked in the desired position. Furthermore, thanks to the particular mechanical solution used for the construction of the guides 1 and 2 - namely the use of contact walls consisting of inclined flat surfaces 1a and 2a having symmetrical inclination with respect to an axial plane of the weft feeder passing therebetween - the ELM unit locking/unlocking device is imparted with a feature of automatic centering of the ELM unit position with respect to said axial plane, and is therefore able to ensure a constant repeatability of the position of the ELM unit with respect to the weft feeder base body C at each subsequent adjustment of said position, while also removing any possible rotary oscillation of the ELM unit about the axis of the locking/unlocking device consisting of the pawl 3 and the tie-rod 4.

[0019] Finally, the ELM unit quick-release locking/unlocking device according to the invention also allows a tie-rod 4 desired preload force to be set during manufacturing, by inserting a suitable elastic means, so that even in the unlocked position the ELM unit is held in position against the guides 1 by an adequate preload force. In the illustrated embodiment, said elastic means is a small block 7, made of rubber or other elastic material, interposed between the eccentric lever 6 and an abutment surface of the body 5, as clearly shown in Figs. 2 and 3. In particular, said preload force shall be high enough to prevent the ELM unit from moving under the sole action of its own weight, and said preload force shall be low enough to allow the ELM unit movement along the guides 1, when a suitable force is manually applied thereon in such a direction. This solution ensures a greater precision of the position of the ELM unit, both because the ELM unit remains stationary in the adjustment positions set from time to time while the eccentric lever 6 is in the unlocked position, and because, when acting on said eccentric lever 6 to lock the ELM unit, no change in the ELM unit position occurs as a result of the pawl 3 tightening against the guides 1, precisely thanks to the preload force exerted by the small block 7, and therefore the ELM unit adjustment position and locking position are perfectly coincident.

[0020] From the preceding description it is evident how the present invention has fully achieved the intended objects. In fact, the pairs of guides with opposite inclined surfaces 1a and 2a allow to maintain the ELM unit lower plane constantly parallel to the reference sector of the weft feeder drum D, and the stop pin P correctly centered on the respective seat formed on the drum D.

[0021] Furthermore, thanks to the quick-release locking/unlocking device, the adjustment and fixing device of the invention may be quickly operated manually and therefore without use of tools.

[0022] Finally, thanks to the ability of setting a desired preload force to the locking/unlocking device when the same is in the unlocked position, the adjustment and

fixing device of the invention maintains the ELM unit in a stable and unchanged working position even during the adjustment and fixing steps.

[0023] However, it is understood that the invention should not be considered as limited to the specific arrangements illustrated above, which are only exemplary embodiments thereof, but that different variants are possible, all within the reach of a skilled person in the art, without thereby departing from the scope of protection of the invention, which is only defined by the following claims.

Reference list

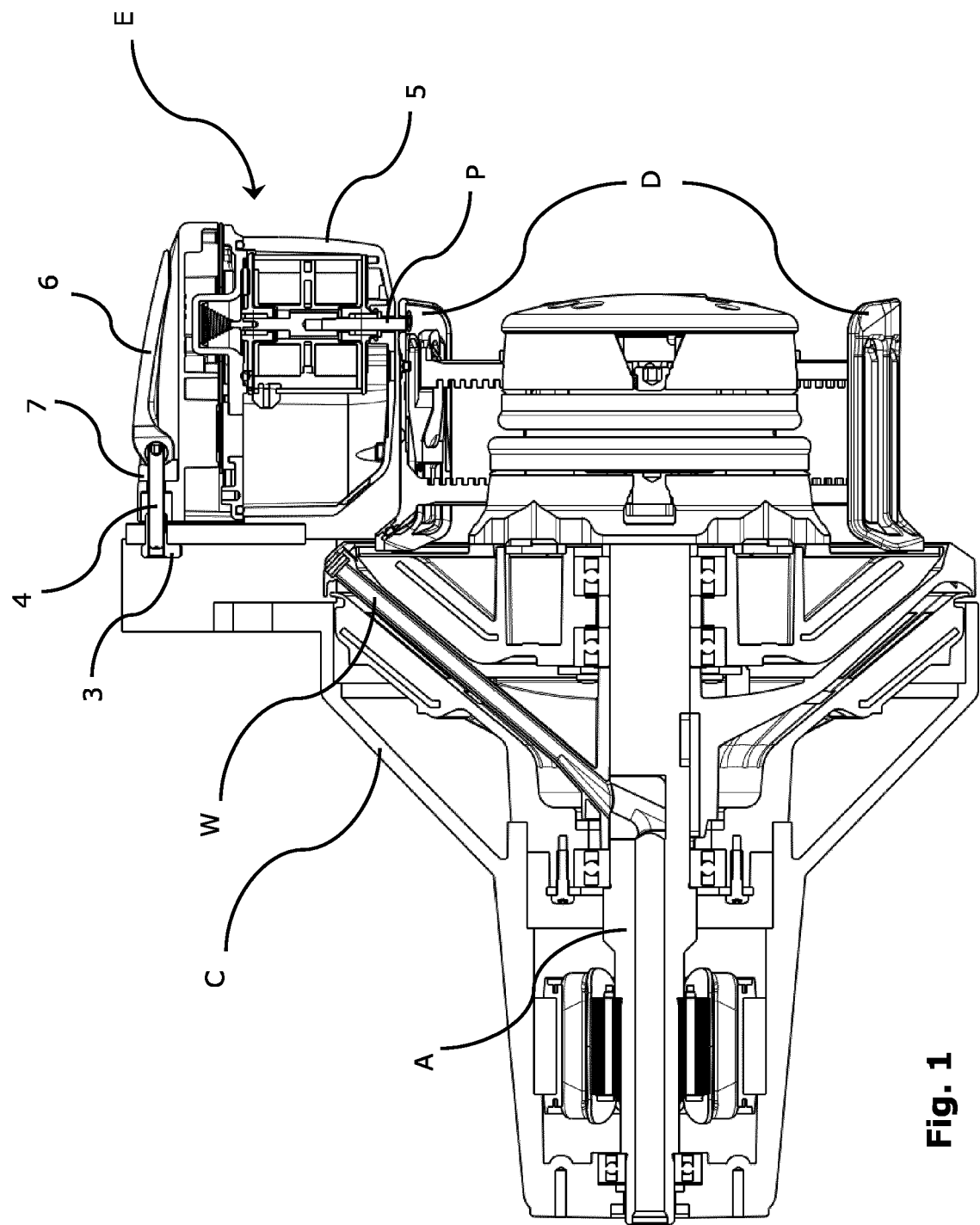
[0024]

A -	<u>hollow shaft</u>
C -	<u>base body</u>
D -	<u>drum</u>
E -	<u>electromagnet unit (or ELM unit)</u>
P -	<u>stop pin</u>
W -	<u>winding group</u>
1 -	<u>fixed guides</u>
1a -	<u>inclined surfaces of fixed guides</u>
2 -	<u>mobile guides</u>
2a -	<u>inclined surfaces of mobile guides</u>
3 -	<u>pawl</u>
4 -	<u>adjustable tie-rod</u>
5 -	<u>ELM unit body</u>
6 -	<u>eccentric lever</u>
7 -	<u>small block made of rubber</u>

Claims

1. Weft feeder for weaving looms with thread coil separation, comprising a winding group (W) to wind a weft thread on a drum (D) of the weft feeder, and an electromagnet unit (E) to control the movement of a stop pin (P) which prevents the weft thread from being released from said drum (D), wherein said electromagnet unit (E) is movable in a radial direction with respect to an axis of the weft feeder drum (D), along guide means (1, 2) provided in the base body (C) of said weft feeder and in said electromagnet unit (E), respectively, and wherein said guide means (1, 2) consist of a pair of fixed guides (1) and a pair of mobile guides (2), both parallel to said radial direction and mutually coupled, at least one of said fixed guides (1) and a mobile guide (2) coupled therewith having flat contact surfaces (1a, 2a) inclined with respect to the weft feeder axis, **characterized in that** a single locking/unlocking means (3, 4) is also included, having an axis parallel to the drum (D) axis, for stably fixing said electromagnet unit (E) in a predefined position along said guide means (1, 2), so that upon tightening said single locking/unlocking means (3, 4) said guide means (1, 2) automatically cause centering of the electromagnet unit (E) with

- respect to the weft feeder axis, and prevent its rotation about the axis of said locking/unlocking means (3, 4), wherein said single locking/unlocking means (3, 4) includes a pawl (3) housed in an undercut recess provided between said pair of fixed guides (1) or in the weft feeder base body (C), and a tie-rod (4) connected to said pawl (3). 5
2. Weft feeder for weaving looms with thread coil separation as in claim 1, wherein said tie-rod (4) is a screw engaged with said pawl (3). 10
 3. Weft feeder for weaving looms with thread coil separation as in claim 1, wherein said tie-rod (4) has a predetermined length and is connected to said pawl (3) at one end and to a quick-release locking/unlocking device at its opposite end. 15
 4. Weft feeder for weaving looms with thread coil separation as in claim 3, wherein said quick-release locking/unlocking device includes a manually operated eccentric lever (6) hinged to the body (5) of said electromagnet unit. 20
 5. Weft feeder for weaving looms with thread coil separation as in claims 3 or 4, wherein the predetermined length of said tie-rod (4) is adjustable during manufacturing or calibration. 25
 6. Weft feeder for weaving looms with thread coil separation as in claim 5, further comprising an elastic means applying a preload force on said pawl (3) in the unlocked position of the locking/unlocking device. 30
35
 7. Weft feeder for weaving looms with thread coil separation as in claim 6, wherein said elastic means consists of a small block (7), made of rubber or other elastic material, interposed between the eccentric lever (6) and an abutment surface of the electromagnet unit body (5). 40
 8. Weft feeder for weaving looms with thread coil separation as in claim 6, wherein said preload force is high enough to prevent the ELECTROMAGNET unit from moving under the sole action of its own weight, and wherein said preload force is low enough to allow the ELECTROMAGNET unit movement along the pair of fixed guides (1) when a suitable force is applied thereon in such a direction. 45
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 9. Weft feeder for weaving looms with thread coil separation as in any one of the preceding claims, wherein at least one between said pair of fixed guides (1) and said pair of mobile guides (2) is made of a self-lubricating material. 55



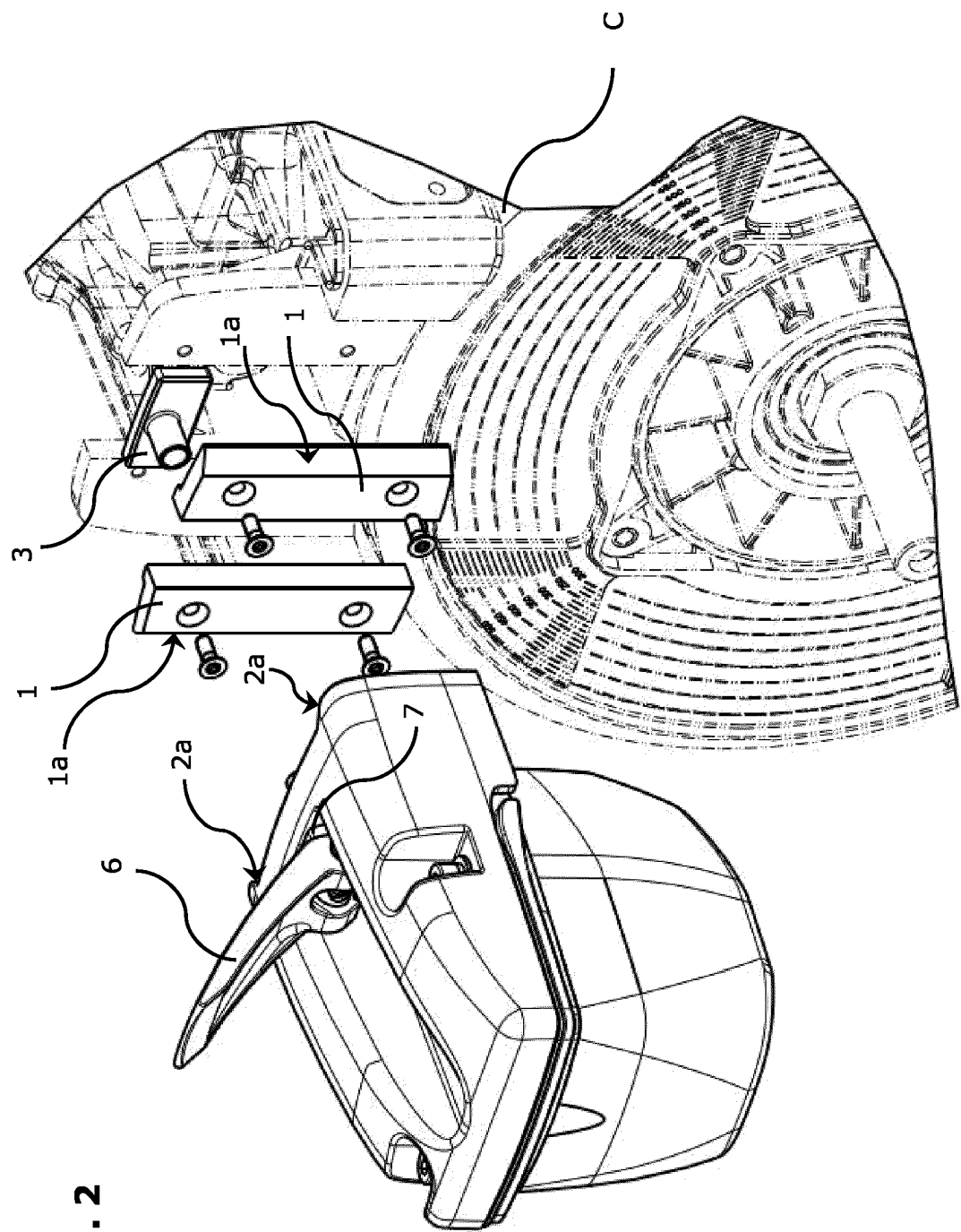


Fig. 2

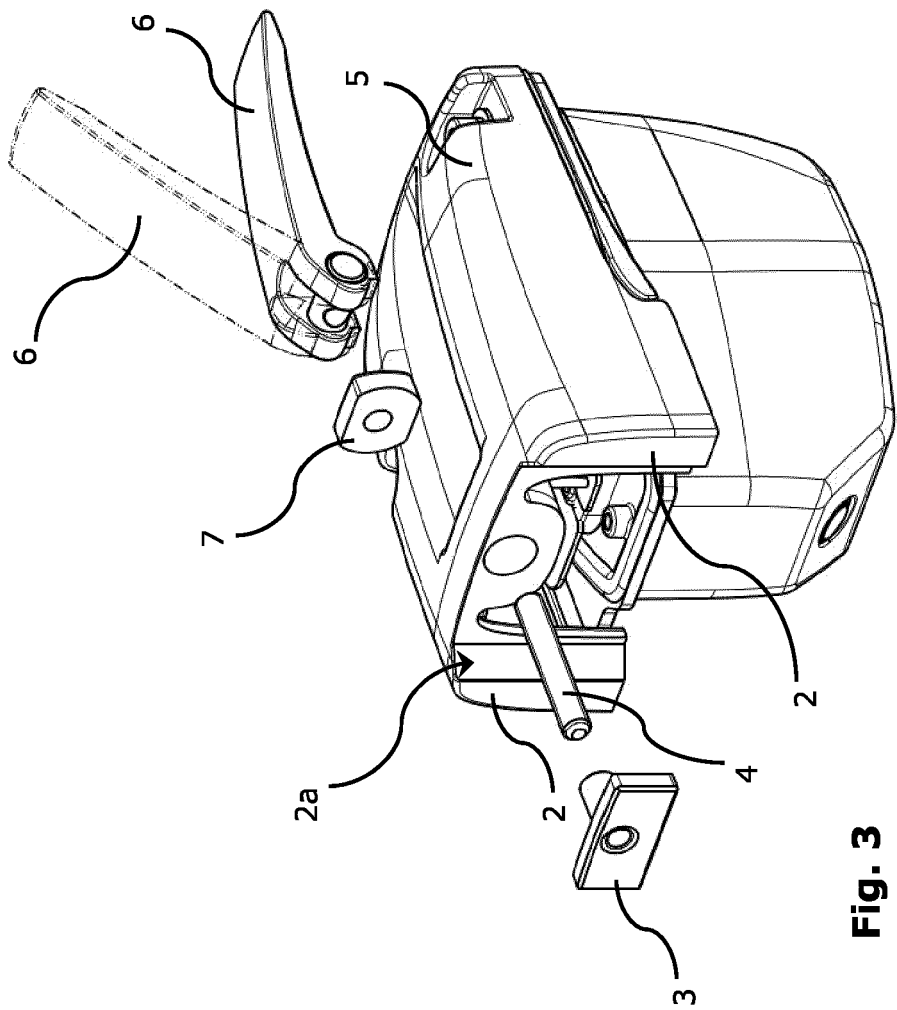


Fig. 3



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Application Number

EP 24 21 8332

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The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
Munich		2 May 2025	Hausding, Jan
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