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(54) **DEVICE FOR THE PRODUCTION OF SLUB YARNS**

(57) The device (1) comprises a linear element (7) extending transversally to a yarn path, and a slide (9) for releasing the yarn (F), with a yarn sliding surface (9A) that extends from the linear element (7) and is inclined with respect to the linear element (7). The device comprises a cursor (11) movable with reciprocating motion parallel to the linear element (7) and configured so as to

push the yarn (F) along the inclined surface (9A) of the yarn releasing slide (9). The linear element (7) has a longitudinal groove (8) parallel to the longitudinal extension of the linear element (7). The sliding surface (9A) of the yarn releasing slide (9) extends inside the longitudinal groove (8).

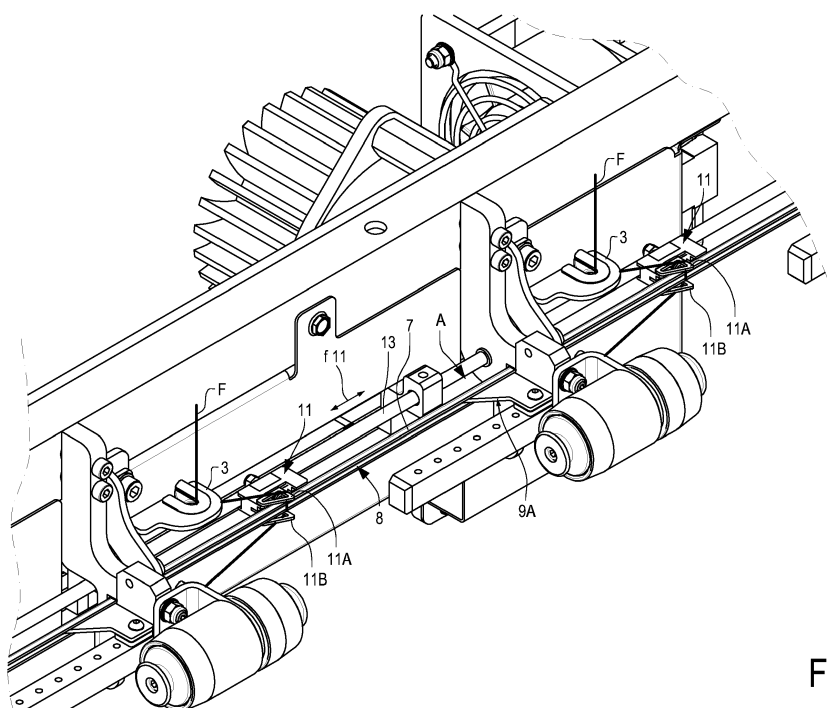


Fig.3

Description

Technical field

[0001] The present invention relates to the field of yarn production. More in particular, embodiments described herein relate to improvements to the devices for the production of slub yarns.

Background Art

[0002] In the textile industry, new yarns are continuously developed in order to achieve particular technical and aesthetical effects. In the textile technology, it is well known to produce so-called "slub" fancy yarns, i.e. yarns in which accumulation areas, i.e. irregularities in the thickness, are provided by means of a suitable slubbing device or unit. Slubbing devices are disclosed, for instance, in EP0299131, US6820405, US4368612. These devices are arranged along the yarn feeding path and periodically grab the yarn in order temporarily to modify and to lengthen the path thereof. Once the yarn path has been lengthened, the yarn is released so that it forms an accumulation generating a slub effect in the finished product.

[0003] In order to have a correct yarn feeding along the path towards a winding area, the slubbing device shall not cause feeding irregularities, for instances it shall not accidentally pinch the yarn. From this point of view, the prior art slubbing devices have proved unsatisfactory.

[0004] A particularly efficient yarn slubbing device is disclosed in WO-A-2009/033697. The device comprises a slider or cursor which is fastened to an endless belt. The endless belt moves cyclically the cursor along a closed path, having a rectilinear active portion which extends orthogonal to a yarn feeding path. The cursor is configured to catch the yarn while moving along the active portion of the trajectory and to draw the yarn sideways out of the rectilinear yarn feeding path. At an end of the rectilinear active portion of the closed path a yarn deflection member in the form of a slide is arranged. The yarn deflection member co-acts with the cursor to release the yarn from the cursor while the cursor moves past the deflection member, such that the yarn moves back in its normal rectilinear path. The deflection member has a yarn sliding surface that extends away from the cursor trajectory. While moving towards the yarn deflection member under the action of the cursor, the yarn may accidentally be caught or pinched between the endless belt and the deflection member. Yarn feeding becomes irregular or the yarn may break. Thus this slubbing device has proved unsatisfactory from the point of view of yarn feeding.

[0005] Therefore, a need still exists for improving the slubbing devices in order to make them more functional and more reliable..

Summary

[0006] In order to solve or alleviate one or more of the drawbacks of the slubbing devices of the prior art, a yarn slubbing device is provided comprising: a linear element extending transversally to a yarn path; a slide or deflecting member, for releasing the yarn, with a yarn sliding surface that extends from the linear element and is inclined with respect thereto; a cursor or slider movable, preferably with a reciprocating motion, parallel to the linear element and configured so as to push the yarn along the inclined surface of the yarn releasing slide. Advantageously, the linear element has a longitudinal groove parallel to the longitudinal extension of the linear element, and the sliding surface of the yarn releasing slide extends inside the longitudinal groove, i.e. it penetrates therein.

[0007] The yarn sliding surface is inclined with respect to the linear element forming therewith an angle which is larger than 90°, such that the yarn can ride along the yarn sliding surface and thus be pushed along the yarn sliding surface until being released from the cursor.

[0008] Generally, the linear element is a component having a longitudinal dimension which is substantially greater than the transverse dimensions, for instance a bar, a stick or a rod. Herein, the linear element will be also indicated simply with the term "rod".

[0009] In order to facilitate sliding of the yarn, the rod may be made of ceramic material, for example aluminum oxide (Al₂O₃), titanium dioxide (TiO₂), zirconium dioxide (ZrO₂).

[0010] In other embodiments, the rod may be made of special steel with a surface treatment to increase the hardness and decrease the friction coefficient thereof.

[0011] Further features and embodiments of the yarn slubbing device according to the present invention will be described hereunder and in the attached claims, which form an integral part of the present description.

Brief description of the drawings

[0012] The invention will be better understood by perusal of the description and the accompanying drawing, which shows non-limiting practical embodiments of the invention. More particularly, in the drawing:

Fig. 1 is a front view of a yarn slubbing device in a possible embodiment;

Fig. 2 is a plan view according to the line II-II of Fig. 1;

Fig. 3 is an axonometric view of the device of Figs. 1 and 2;

Fig. 3A is an enlargement of the detail indicated with A in Fig. 3;

Fig. 4 is a front view, similar to that of Fig. 1, of a yarn slubbing device in a further embodiment;

Fig. 5 is a plan view according to the line V-V of Fig. 4;

Fig. 6 is an axonometric view of the device of Figs. 4 and 5;

Fig. 6A is an enlargement of the detail indicated with

A in Fig. 6.

Detailed description of embodiments

[0013] The following detailed description of the exemplary embodiments refers to the accompanying drawings. The same reference numbers in different drawings identify the same or similar elements. Additionally, the drawings are not necessarily drawn to scale. Also, the following detailed description does not limit the invention. Instead, the scope of the invention is defined by the appended claims.

[0014] Reference throughout the specification to "one embodiment" or "an embodiment" or "some embodiments" means that the particular feature, structure or characteristic described in connection with an embodiment is included in at least one embodiment of the subject matter disclosed. Thus, the appearance of the phrase "in one embodiment" or "in an embodiment" or "in some embodiments" in various places throughout the specification is not necessarily referring to the same embodiment(s). Further, the particular features, structures or characteristics may be combined in any suitable manner in one or more embodiments.

[0015] With initial reference to Figs. 1-3 and 3A, a first embodiment is described of the yarn slubbing device, indicated as a whole with number 1. The yarn slubbing device 1 may be multiple, i.e. it may comprise a plurality of equal sections arranged in sequence, so as to process yarns fed in parallel. Below, only one section of the slubbing device 1 will be described.

[0016] The slubbing device 1 comprises a pair of thread guides 3, 5, which are substantially coaxial to each other and through which a yarn F is guided. A linear element 7 is associated with the thread guides 3, 5, the linear element being in the form of a rod or a bar and extending approximately orthogonally to the path of the yarn F defined by the two coaxial thread guides 3, 5. The linear element 7 will be briefly indicated below as "rod 7".

[0017] The rod 7 has a longitudinal groove 8. In the illustrated embodiment, the longitudinal groove 8 extends according to the greater dimension of the rod 7 for the whole length of the rod 7. In other embodiments, the longitudinal groove 8 may extend only for a part of the length of the rod 7, as it will be clearly apparent from the following description.

[0018] The rod 7 extends between the thread guides 3, 5 and a slide 9, which is provided with an edge 9A forming a sliding surface for the yarn F, for purposes that will be explained below. As shown in particular in the enlargement of Fig. 3A, the slide 9 is arranged so that the sliding surface 9A for the yarn F is inclined with respect to the longitudinal extension of the rod 7, forming therewith an angle α (Fig. 2) greater than 90° . Moreover, the sliding surface 9A extends inside the groove 8. The groove 8 may have a length smaller than the longitudinal extension of the rod 7, as it is sufficient that the slide 9 can project in the groove, as shown in the drawing.

[0019] A cursor, i.e. a slider, 11 is associated with the rod 7, the cursor being provided with a reciprocating rectilinear motion according to the double arrow f11, parallel to the longitudinal extension of the rod 7. The cursor or slider 11 can be connected to an actuator member, which imparts a reciprocating movement to the slider 11. According to some embodiments, the slider 11 can for instance be fastened on a bar 13 provided with a reciprocating motion according to f11, controlled for example by an electric motor, in order to move the cursor 11. In case of a multiple device, the same bar 13 may support a plurality of cursors 11.

[0020] The bar 13 can be parallel to the rod 7.

[0021] In other embodiments, the cursor or slider 11 may be connected to a flexible member, for instance a belt or a chain, such as an endless belt or chain. The flexible member can be controlled by a motor that imparts a reciprocating motion thereto. In yet further embodiments, the actuator member may impart a continuous motion to the slider or cursor 11, along a closed trajectory. The closed trajectory may have a rectilinear active portion and a return portion. The rectilinear active portion may be parallel to the rod 7. The slide 9 and the two thread guides 3, 5 can be arranged at or near the ends of the rectilinear active portion of the closed trajectory along which the slider or cursor 11 is moved.

[0022] In the illustrated embodiment, the cursor 11 comprises two members 11A, 11B for engaging the yarn F. One of the two yarn engaging members is arranged above the rod 7 and the other one is arranged below the rod 7.

[0023] As shown in Figs. 1 and 2, a single cursor 11 is associated with each pair of thread guides 3, 5 and with the respective slide 9. In Figs. 1-3, the cursor 11 is shown in an intermediate position along its stroke parallel to the rod 7. Practically, the cursor 11 moves with reciprocating motion from a first position on the left side (in the Figures) of the pair of thread guides 3, 5, to a second position above the slide 9, as shown in Fig. 3A. The cursor 11 projects orthogonally to the rod 7 towards the path of the yarn F defined by the thread guides 3, 5. In this way, when the cursor 11 moves from the first position towards the second position, the yarn F fed through the thread guides 3, 5 is engaged by the cursor 11 that draws the yarn towards the slide 9. In this way, the path of the yarn F is lengthened. The yarn F rests on the two yarn engaging members 11A, 11B and is pulled towards the yarn deflection member formed by the slide 9. During this movement, the yarn comprised between the two yarn engaging members 11A, 11B can slide along the rod 7 while moving towards the slide 9. The material whereof the rod 7 is made has a low coefficient of friction (ceramic or special steel), so that the yarn can slide thereon more easily.

[0024] When the cursor 11 arrives near the second position (Fig. 3A), the segment of yarn F comprised between the two yarn engaging members 11A, 11B enters into contact with the inclined surface 9A defined by the slide

9. As the cursor 11 continues to move towards the slide 9, the yarn F is pushed so as to slide along the yarn sliding surface 9A, thus moving away from the rod 7. The travel of the cursor 11, the extension of the yarn sliding surface 9A, and the dimension of the two yarn engaging members 11A, 11B are such that, due to the effect of the sliding, the yarn F is released from the yarn engaging members 11A, 11B. In practice, the yarn sliding surface 9A of the slide or yarn deflector 9 extends away from the rod 7 more than the cursor 11, such that the yarn sliding along the yarn sliding surface 9A under the action of the cursor 11 will eventually be moved away from the rod 7 by an extent which exceeds the length by which the cursor 11 projects from the rod 7. Once it has been released from the cursor 11, the yarn F returns to the original position, defining a rectilinear segment between the thread guides 3, 5.

[0025] The cursor 11 moves then back to the first position in order to repeat the operation described above. The two members 11A, 11B of the cursor 11 have edges inclined with respect to the direction f11, so that they can move beyond the position of the yarn F when the yarn extends rectilinearly between the thread guides 3, 5.

[0026] With this reciprocating rectilinear movement of the cursor 11, the yarn is repeatedly subjected to elongation of the yarn path, and this generates slubbing on the yarn downstream of the slubbing device 1, in a known manner.

[0027] A further embodiment is illustrated in Figs. 4-6, 6A. The same reference numbers indicate the same or equivalent parts as described with reference to Figs. 1 to 3. In Figs. 4-6, the cursor 11 or slide is symmetrical and moves between two slides 9X, 9Y symmetrical to each other and spaced from each other along the extension of the rod 7. The two thread guides 3, 5 are arranged in an intermediate position, substantially equidistant from the two slides 9X, 9Y.

[0028] The cursor 11 moves according to the double arrow f11 from a first position, in correspondence of the slide 9X, to a second position in correspondence of the slide 9Y (see Fig. 6A). At every travel, the cursor 11 grabs the yarn F tensioned between the thread guides 3, 5 and draws it alternatively towards the slide 9X and towards the slide 9Y.

[0029] In both the described embodiments, the arrangement of the slide 9, 9X, 9Y, with the sliding surface 9A penetrating in the groove 8 of the rod 7, prevents the yarn F from remaining pinched or entangled between the rod 7 and the cursor 11, thus making the operation of the device 1 more regular. To this end, in both configurations it is sufficient that the groove 8 extends from the slide towards the area along which the cursor 11 moves; it is not necessary for the groove to extend for the whole length of the rod 7. In the double configuration, i.e. the configuration with two slides 9X, 9Y arranged in a mirror-like manner, the groove 8 may comprise two groove portions, at the level of the slides, while the central portion of the rod 7 may have no groove. However, producing a

rod 7 with constant cross-section, and therefore with a groove 8 which extends for the whole length of the rod 7, may have constructive advantages.

[0030] As a matter of fact, by arranging the sliding surface 9A of the slide (yarn deflector) 9 such that it partly extends inside the groove 8 of the rod 7, a continuous yarn sliding surface is formed, with no entanglement points where the yarn may get caught, pinched or clamped. Feeding of the yarn becomes smoother.

[0031] In order to have irregular slub effects on the yarn, the cursor 11 may move with non-periodical motion, i.e. it is possible to change the speed thereof. To this end, the distance between the thread guides 3, 5 may be also changed.

Claims

1. A device (1) for slubbing yarns (F) comprising:

- a linear element (7), extending transversally to a yarn path;
- at least one yarn releasing slide (9; 9X; 9Y) for releasing the yarn (F), the yarn releasing slide having a yarn sliding surface (9A) that extends from the linear element (7) and is inclined with respect to the linear element (7);
- a cursor (11) movable parallel to the linear element (7) and configured so as to push the yarn (F) along the inclined surface (9A) of the yarn releasing slide (9; 9X; 9Y);

wherein the linear element (7) has a longitudinal groove (8) parallel to the longitudinal extension of the linear element (7), and wherein the sliding surface (9A) of the yarn releasing slide (9) extends inside the longitudinal groove (8).

2. The device of claim 1, wherein the cursor (11) moves with a reciprocating motion parallel to the linear element (7).
3. The device of claim 1 or 2, wherein the cursor (11) is connected to an actuator member which is adapted to impart the movement to the cursor (11).
4. The device of claim 3, wherein the actuator member comprises a bar (13), whereto the cursor 11 is fastened, said bar moving reciprocatingly parallel to the linear element (7).
5. Device according to one or more of the previous claims, wherein the linear element (7) is made of ceramic material.
6. Device according to claim 5, wherein the linear element is made of a material selected from the group consisting of: alumina (Al₂O₃), titanium dioxide

(TiO₂), zirconium dioxide (ZrO₂).

7. Device according to one or more of claims 1 to 4, wherein the linear element (7) is made of special steel with a surface treatment to increase the hardness and decrease the friction coefficient thereof. 5
8. Device according to one or more of the previous claims, wherein the cursor (11) comprises two members (11A, 11B) for engaging the yarn (F) that are arranged on opposite sides of the linear element (7), with the longitudinal groove (8) arranged in intermediate position between said two members (11A, 11B) for engaging the yarn (F). 10
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9. Device according to one or more of the previous claims, wherein the longitudinal groove (8) extends for the whole length of the linear element (7).
10. Device according to one or more of the previous claims, comprising two yarn releasing slides (9X; 9Y), each of which is provided with a yarn sliding surface (9A), the two yarn releasing slides (9X, 9Y) being arranged in mirror-like positions spaced from one another along the linear element (7); each yarn releasing slide extending inside the longitudinal groove (8); and the cursor (11) moving with reciprocating motion from one to the other of said two yarn releasing slides. 20
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11. Device according to one or more of the previous claims, wherein a pair of substantially coaxial thread guides (3, 5) are arranged to define a yarn path substantially orthogonal to the linear element (7). 35
12. The device of claim 10, wherein a pair of substantially coaxial thread guides (3, 5) are arranged to define a yarn path substantially orthogonal to the linear element (7), said pair of thread guides (3, 5) being arranged in an intermediate position between the two yarn releasing slides (9X, 9Y). 40
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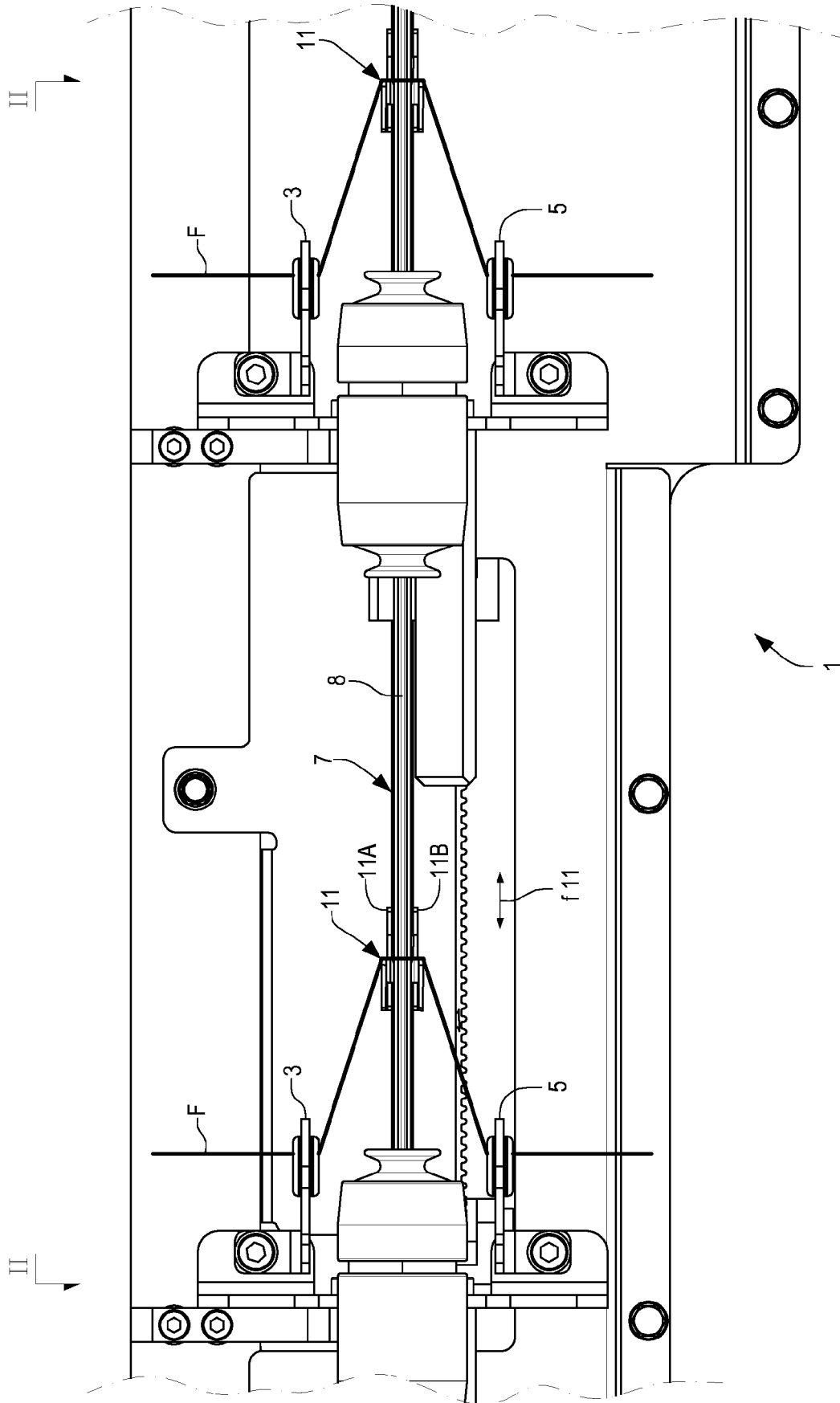
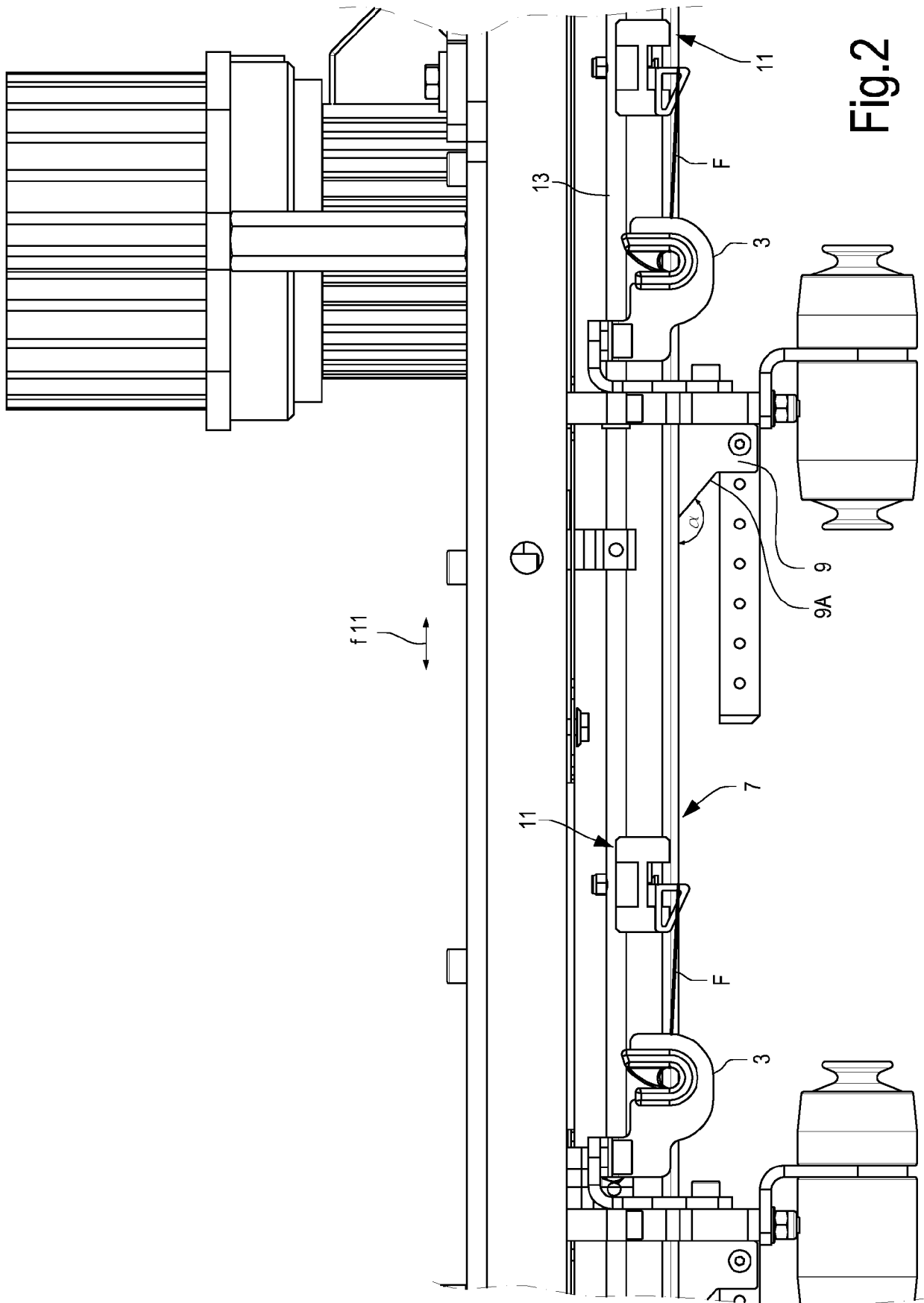


Fig.1



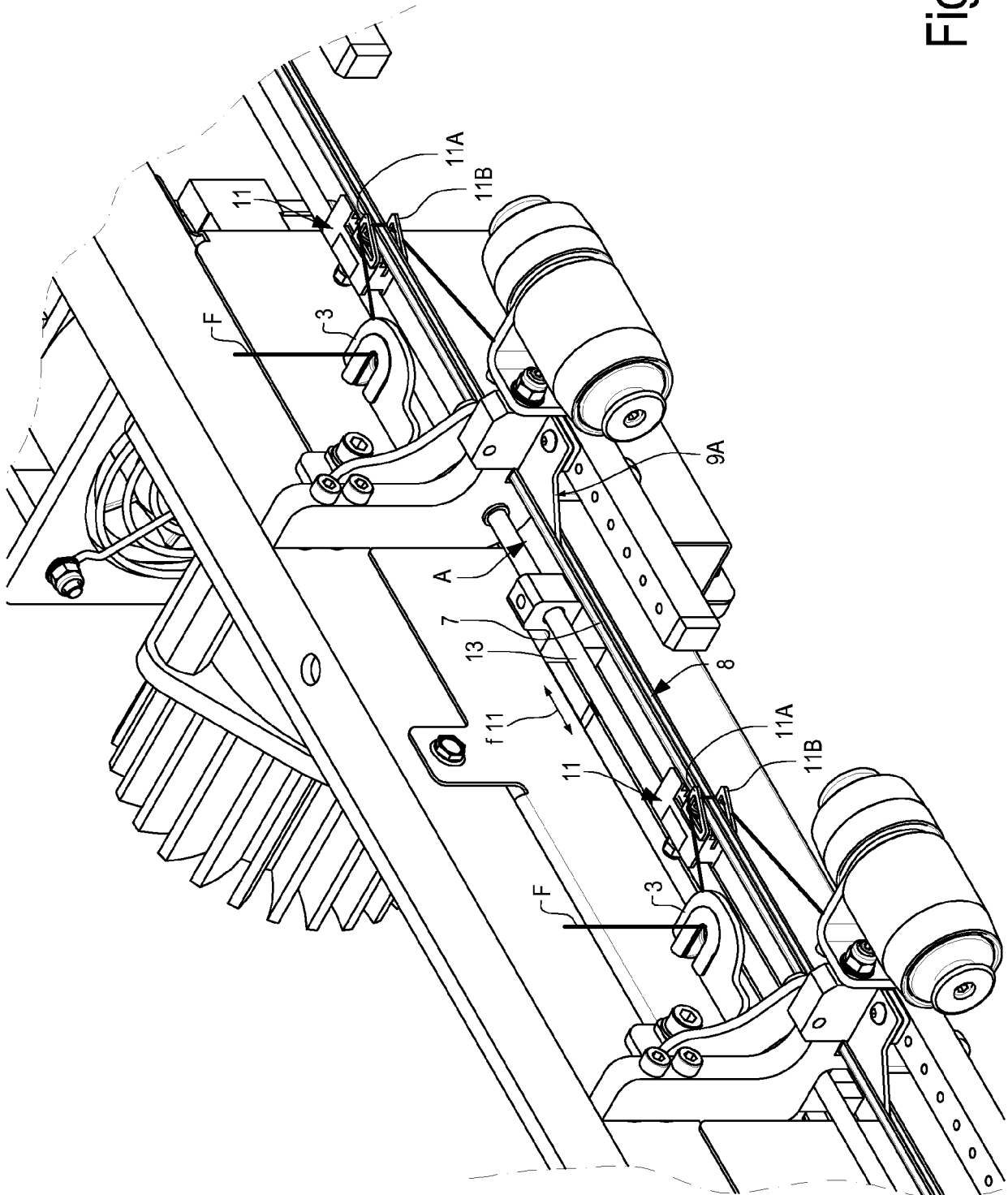


Fig.3

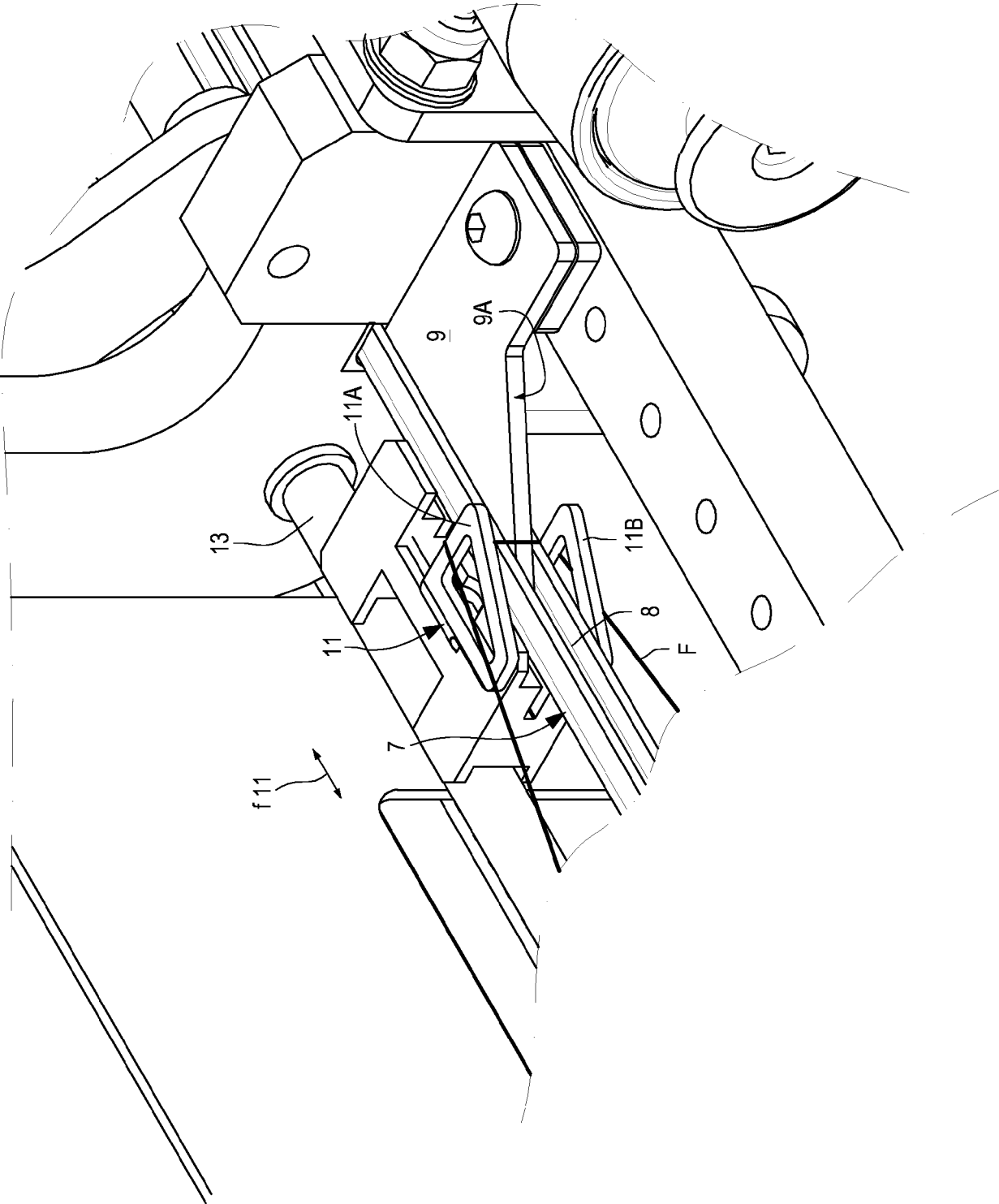


Fig.3A

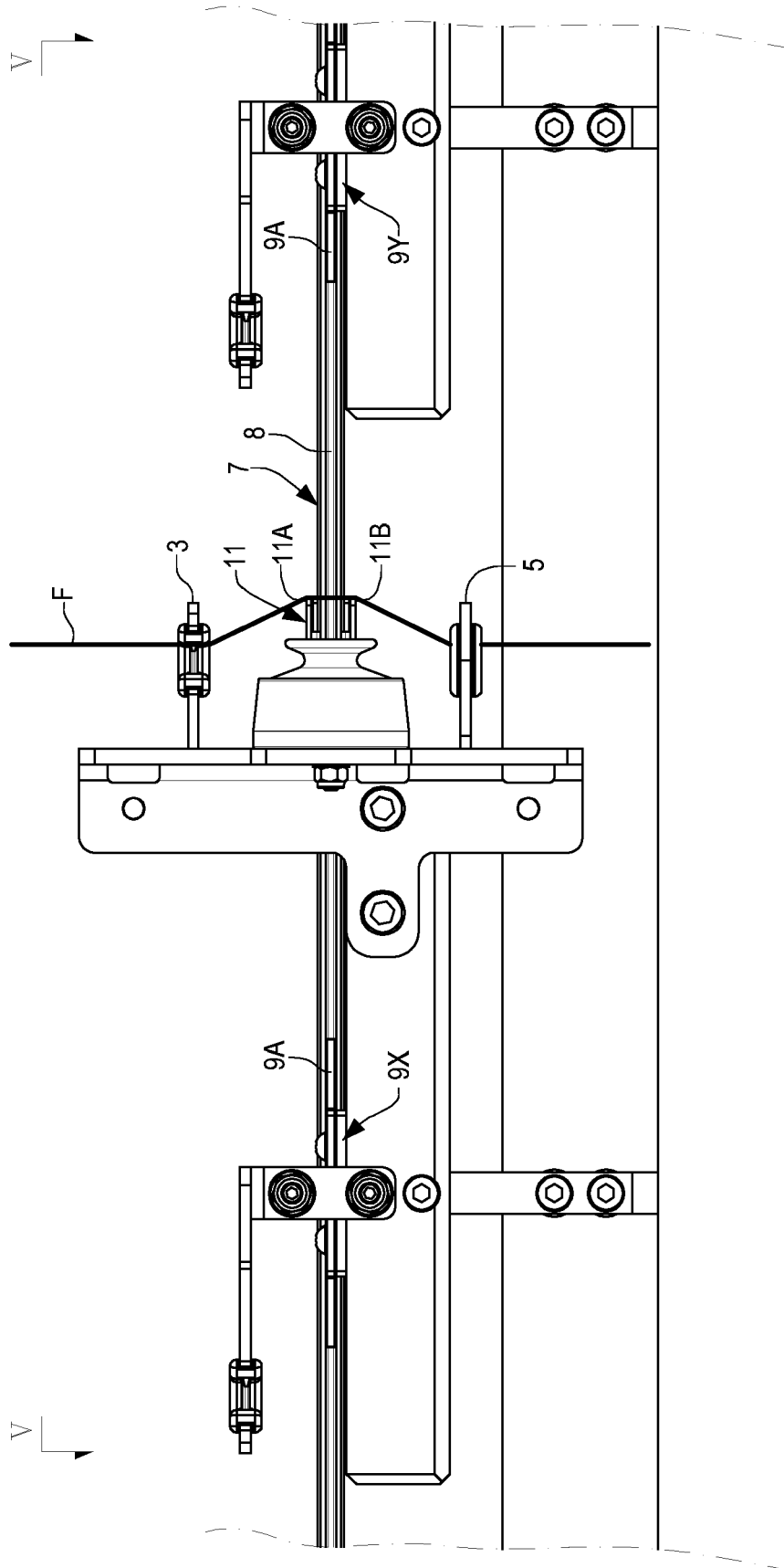


Fig.4

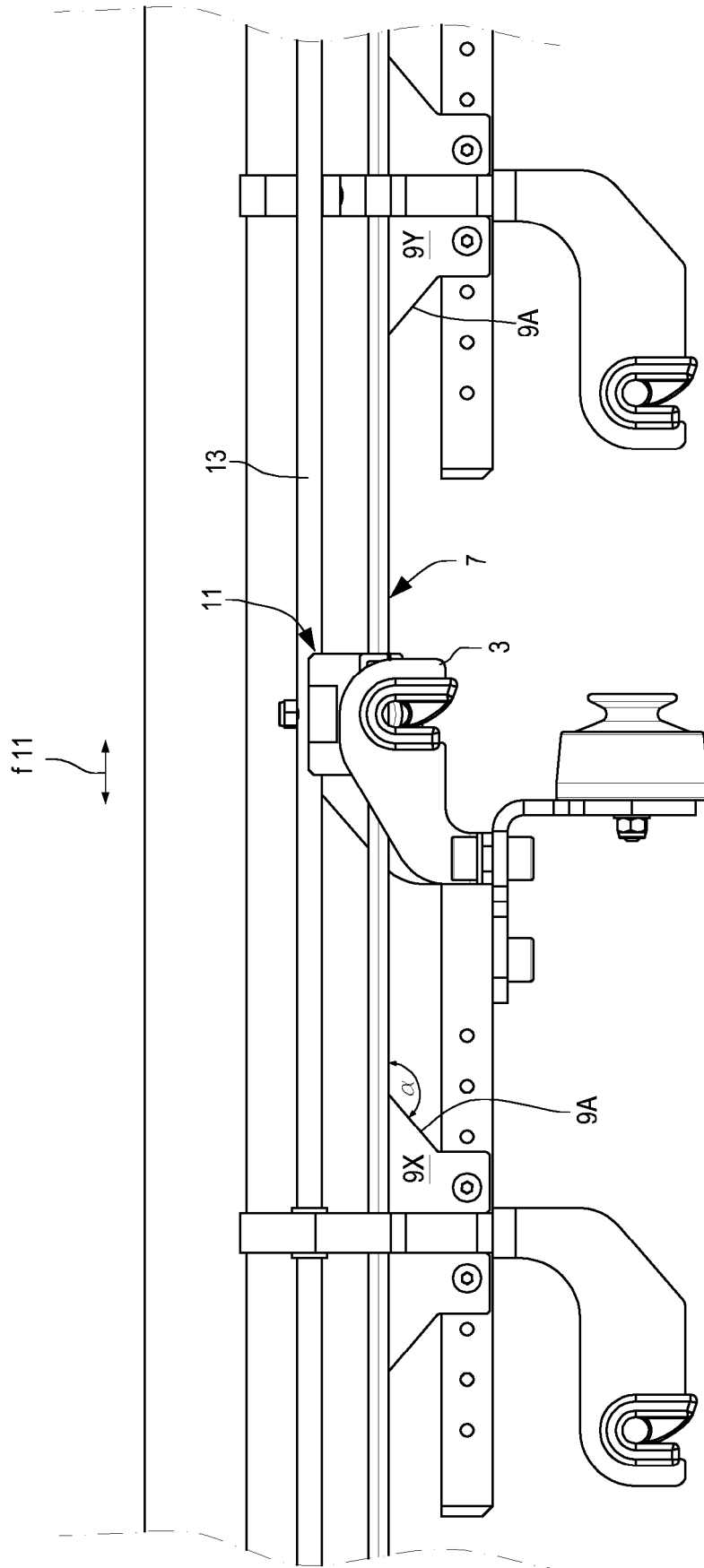


Fig. 5

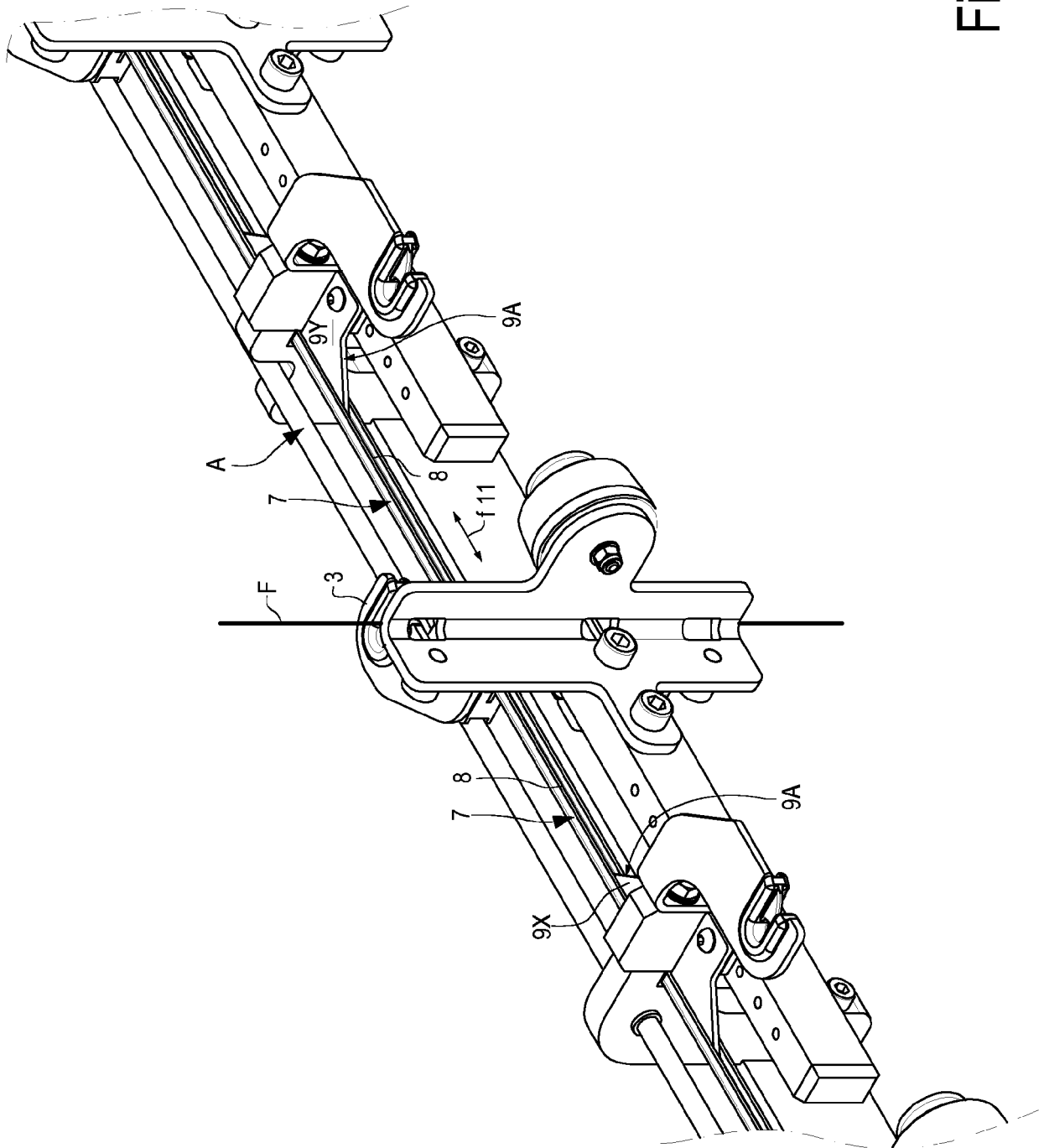
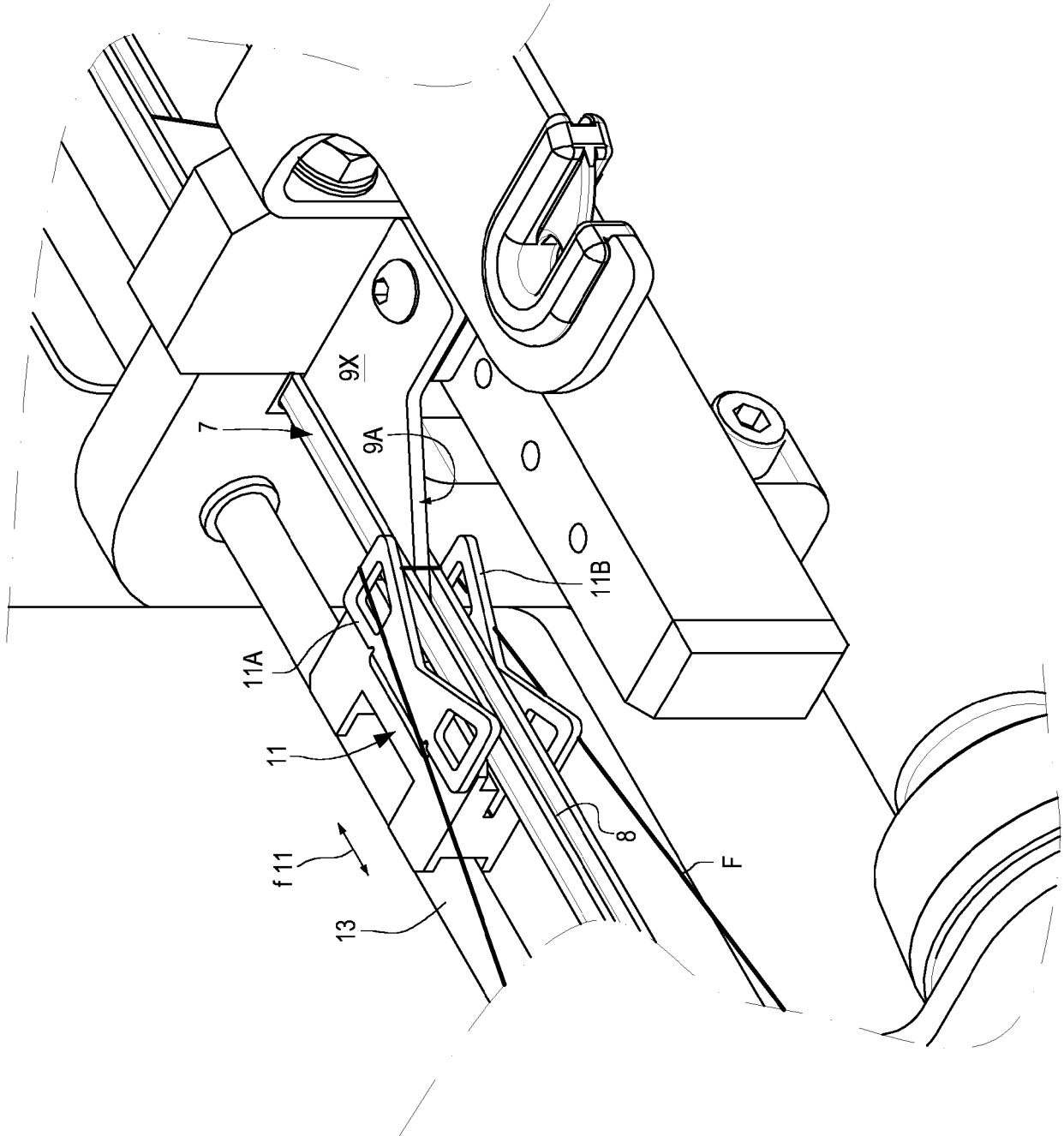


Fig. 6





EUROPEAN SEARCH REPORT

Application Number
EP 17 16 9570

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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 22 May 2017	Examiner Barathe, Rainier
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 17 16 9570

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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