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(54) FIXTURE FOR SUPPORTING THE MOTOR OF A VEHICLE WITH INCREASED FLEXIBILITY

(57) A fixture (1) for supporting the motor of a vehicle with increased flexibility, comprising a supporting crossmember (2), means (3) for supporting from below the motor of a vehicle which are associated with a first end (4) of the crossmember (2), stabilization means (5) which are associated with a second end (6) of the crossmember (2), which is arranged opposite the first, and which are adapted to abut in a lower region against the chassis of the vehicle, and means (7) for anchoring to the chassis which are arranged along the cross-member (2); the stabilization means (5) comprise at least two bars (8) which are pivoted to the second end (6) and which support respective abutment elements (9) under the chassis; the bars (8) are pivoted to the crossmember (2) about a single rotation axis (A) which is substantially perpendicular to the axes of longitudinal extension of the crossmember and of the bars.

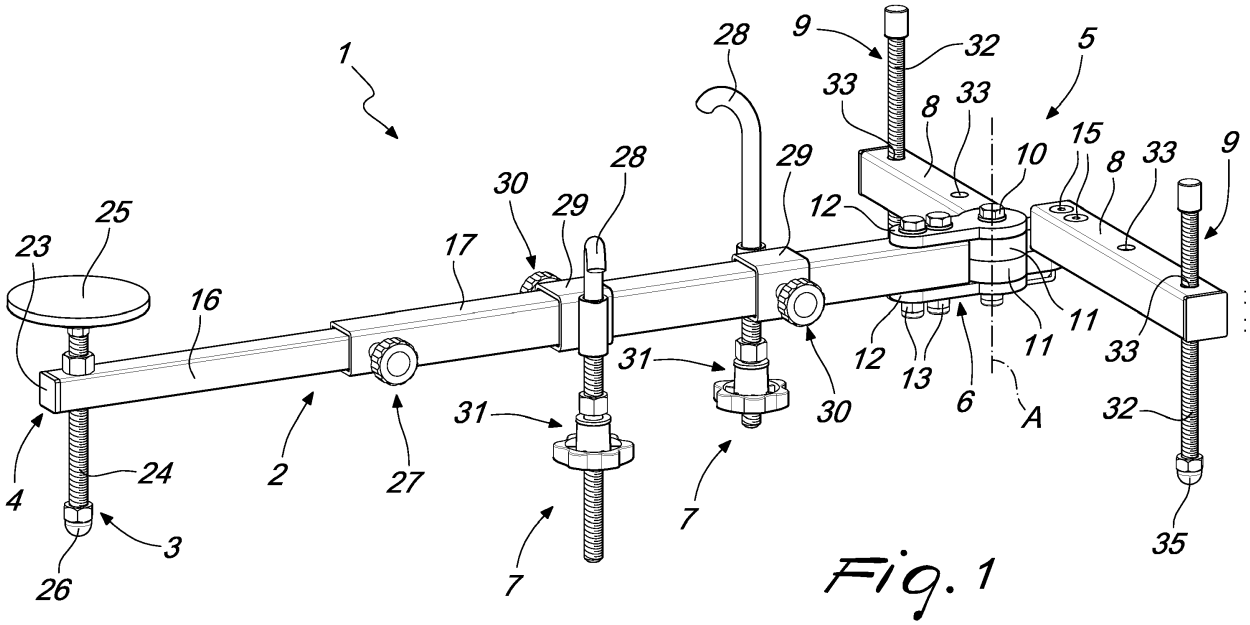

Fig. 1

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Description

[0001] The present invention relates to a fixture for supporting the motor of a vehicle with increased flexibility.

[0002] In the sector of equipment for motor vehicle repair workshops, fixtures are known for supporting the motor of a vehicle from below, which make it possible to keep the motor in position while detached from the associated supports in order to carry out, for example, operations on the timing belt, the water pump or other adjacent components.

[0003] Such fixtures make it possible to keep access free from above to the area of interest, by avoiding the use of elements for suspending the motor, and they consist substantially of a supporting crossmember which at one end has means of supporting the motor and at the opposite end has a stabilizer bar provided with abutment elements under the chassis of the vehicle, the crossmember being provided with means of anchoring to such chassis.

[0004] In a first known embodiment, the stabilizer bar is rigidly fixed to the end of the supporting crossmember, forming a T-shaped structure, and the abutment elements are inserted in a fixed position along respective arms of such bar.

[0005] Such solution, while being functional for the purpose, allows only a single positioning of the abutment elements and, therefore, it does not ensure that an optimal stability will be obtained with the variation of the shape structure of the lower part of the chassis of the vehicle.

[0006] Furthermore, such fixture is cumbersome to stow when not in use, owing to the transverse space occupation of the stabilizer bar.

[0007] In order to overcome these drawbacks, further solutions have been developed in which the stabilizer bar can move with respect to the supporting crossmember.

[0008] From EP 2,072,452 B1, for example, a version of a fixture is known in which the stabilizer bar is inserted slideably in a guide which is pivoted to the end of the supporting crossmember.

[0009] In this manner, by rotating the stabilizer bar with respect to the supporting crossmember and actuating the sliding thereof along the guide, it is possible to increase the flexibility of use of the fixture and optimize the stability thereof in use.

[0010] Furthermore, in conditions of non-use the stabilizer bar can be rotated so as to bring one end closer to the supporting crossmember, while the other end remains protruding longitudinally.

[0011] Alternatively, from German utility model DE 20 2010 002 330 U1 a fixture is known in which the stabilizer bar is constituted by two portions which are pivoted to the supporting crossmember about respective axes which are aligned transversely with the longitudinal extension of such crossmember and along which corresponding abutment elements are associated so that they can slide.

[0012] In this case, by rotating the portions of the stabilizer bar and by sliding the corresponding abutment elements along them, it is possible to obtain an even greater variety of possible configurations of use of the fixture.

[0013] In conditions of non-use, the portions of the stabilizer bar can be rotated so as to bring them closer to the supporting crossmember; however, at one end the fixture is far more cumbersome than at the other end.

[0014] These known fixture versions are also not devoid of drawbacks, among which is the fact that they do not allow the abutment elements to reach some positions that are very close together, or which are proximate to the position of the supporting crossmember, and therefore, in some situations they do not make it possible to install the fixture in conditions of optimal stability for the operation to succeed.

[0015] Furthermore, in conditions of non-use even these fixtures have non-negligible encumbrances, both longitudinally and transversely.

[0016] The aim of the present invention is to eliminate the above mentioned drawbacks in the background art by providing a fixture for supporting the motor of a vehicle with increased flexibility which makes it possible to obtain a correct positioning for any type of vehicle, so as to ensure adequate support of the motor and a good result of the operation.

[0017] Within this technical aim, another object of the present invention is to ensure the integrity of the components that are the focus of the operation and to allow the technicians to work in conditions of total safety.

[0018] Another object of the present invention is to minimize the space occupation thereof in conditions of non-use, so that it can be stowed in reduced spaces.

[0019] Another object of the present invention is to provide a simple structure that is easy and practical to implement, safe in use and effective in operation, and low cost.

[0020] This aim and these objects are achieved by the present fixture for supporting the motor of a vehicle with increased flexibility, comprising a supporting crossmember, means for supporting from below the motor of a vehicle which are associated with a first end of said crossmember, stabilization means which are associated with a second end of said crossmember, which is arranged opposite the first, and which are adapted to abut in a lower region against the chassis of said vehicle, and means for anchoring to said chassis which are arranged along said cross-member, the stabilization means comprising at least two bars which are pivoted to said second end and which support respective abutment elements under the chassis, characterized in that said bars are pivoted to said supporting crossmember about a single rotation axis which is substantially perpendicular to the axes of longitudinal extension of said crossmember and of said bars.

[0021] Further characteristics and advantages of the present invention will become better apparent from the detailed description of some preferred, but not exclusive,

embodiments of a fixture for supporting the motor of a vehicle with increased flexibility, which are illustrated for the purposes of non-limiting example in the accompanying drawings wherein:

Figure 1 is a perspective view of a first embodiment of a fixture for supporting the motor of a vehicle with increased flexibility, according to the invention;
Figure 2 is an exploded view of the fixture in Figure 1;
Figure 3 is a plan view from above of the fixture in Figure 1, with the supporting crossmember in the closed configuration;
Figure 4 is a cross-sectional view taken along the line IV-IV in Figure 3;
Figure 5 is a cross-sectional view like Figure 4, but with the supporting crossmember in the extended configuration;
Figure 6 is a perspective view of a second embodiment of the fixture according to the invention;
Figure 7 is a front elevation view of a possible embodiment of an abutment element of the fixture according to the invention;
Figure 8 is a front elevation view of a possible embodiment of the means for supporting the fixture according to the invention;
Figure 9 is a perspective view of a third embodiment of the fixture according to the invention;
Figure 10 is an exploded view of a portion of the fixture in Figure 9 containing the corresponding stabilization means;
Figure 11 is a perspective view of a fourth embodiment of the fixture according to the invention;
Figure 12 is an exploded view of a portion of the fixture in Figure 10 containing the corresponding stabilization means.

[0022] With particular reference to the figures, the reference numeral 1 generally designates a fixture for supporting the motor of a vehicle with increased flexibility.

[0023] The fixture 1 comprises a supporting crossmember 2 with a substantially linear extension, means 3 for supporting from below the motor of a vehicle which are associated with the first end 4 of the crossmember 2, and stabilization means 5 which are associated with the second end 6, which is arranged opposite the first, of the crossmember, which are adapted in use to abut in a lower region against the chassis of the vehicle, and means 7 for anchoring to the chassis proper.

[0024] In fact, in use the fixture 1 is kept suspended below the chassis of the vehicle by way of the anchoring means 7, while the supporting means 3 are positioned in a lower region in contact with the motor, and the stabilization means 5 abut in a lower region against the chassis so as to support the weight of the motor while detached from the associated supports during the carrying out of the operation.

[0025] In more detail, the stabilization means 5 comprise at least two bars 8 which are arranged on planes parallel to that of the crossmember 2. Such bars 8 are pivoted to the second end 6 of the crossmember 2 and carry respective abutment elements 9 under the chassis of the vehicle.

[0026] The bars 8 are pivoted to the crossmember 2 about a single rotation axis A which is substantially perpendicular to the axes of longitudinal extension of the bars 8 and of the crossmember 2.

[0027] In the embodiments shown, there are two bars 8 which protrude on opposite sides of the crossmember 2, but the possibility is not ruled out that there can be more than two bars 8 which are in any case pivoted about a single rotation axis A.

[0028] In particular, there is a pivot 10 for pivoting the bars 8, which lies on the rotation axis A and is associated with the second end 6 of the crossmember 2, and two plates 11 which are pivoted about the pivot 10 and are arranged offset along the rotation axis A, each one of which is connected to a respective bar 8.

[0029] The pivot 10 is connected to the second end 6 of the crossmember 2 by way of two supporting pans 12 which are connected to the crossmember by way of threaded elements 13 which are inserted so as to pass through and which protrude with respect thereto. The plates 11 are arranged between the pans 12 and each one of them has an appendage 14 for connection to the respective bar 8 by way of threaded elements 15. The appendages 14 of the two plates 11 protrude on opposite sides with respect to the longitudinal axis of extension of the crossmember 2.

[0030] In this manner the bars 8 can rotate through a complete revolution, except for the transverse space occupation of the crossmember 2, even reaching positions that are very close to each other or to the position of the crossmember. In conditions of non-use, the bars 8 can be brought closer to the crossmember 2, minimizing the space occupation of the fixture 1 to be stowed.

[0031] Preferably, the crossmember 2 is telescopic and has at least one first portion and one second portion, respectively, 16 and 17 which are mutually coupled with mutual longitudinal sliding. The first portion 16 defines the first end 4 and is associated with the supporting means 3, while the second portion 17 defines the second end 6 and is associated with the pivot 10.

[0032] The portions 16 and 17 are constituted by respective hollow profiles with a square cross-section, the first portion 16 having a smaller cross-section than that of the second portion 17 and being inserted so that it can slide therein between a closed configuration (Figure 4) and an extended configuration (Figure 5).

[0033] Accommodated inside the first portion 16 is a strengthening insert 18 which is tubular.

[0034] Furthermore, stroke limiting means 19 are interposed between the portions 16 and 17 and act in the direction of mutual spacing apart, in order to prevent the separation of the portions.

[0035] Such stroke limiting means 19 comprise a rod 20 which is inserted longitudinally inside the second por-

tion 17 and also partially inside the first portion 16, and which has one end integral with the second end 6 and the end arranged opposite positioned along the first portion 16 and associated with a bulge 21.

[0036] The first portion 16 has the end inserted so that it can slide along the second portion 17 closed by a perforated cap 22 into which the rod 20 is inserted so that it passes through and against which the bulge 21 abuts in the direction of spacing apart of the portions 16 and 17 in order to prevent the extraction thereof and the opposite end, which defines the first end 4, closed by a cap 23.

[0037] Furthermore, reversible means 27 are provided for locking the mutual sliding of the portions 16 and 17, and are constituted by a screw with a knob which is inserted laterally through the second portion 17 so as to abut with the shank against the first portion 16.

[0038] The supporting means 3 are constituted by a threaded shank 24, which lies parallel to the rotation axis A and support in an upper region a head 25, preferably articulated. The shank 24 is inserted so that it passes through the first portion 16 proximate to the first end 4 and is engaged in a pair of nuts 26.

[0039] The anchoring means 7 are preferably associated so that they can slide along the crossmember 2.

[0040] In more detail, the anchoring means 7 can have one or more hooks 28 which are associated so that they can slide along the second portion 17.

[0041] In the embodiments shown, there are two hooks 28 which are associated with respective bands 29 which are fitted so that they can slide over the second portion 17 and are provided with respective reversible means 30 for locking the sliding, of the type described above.

[0042] The shank of the hooks 28 is threaded and is coupled to respective threaded elements 31 which can be arranged along the shanks in order to determine the protrusion of the hooks 28 above the crossmember 2 in conditions of use.

[0043] However, different embodiments of the anchoring means 7 as a function of the type of vehicle on which intervention is necessary are not ruled out.

[0044] With regard to the stabilization means 5, each abutment element 9 has a respective threaded stem 32 which is substantially parallel to the rotation axis A and is engaged in a corresponding internally threaded seat 33 which is associated with the corresponding bar 8. Each stem 32 can therefore be screwed into or unscrewed from the corresponding seat 33 so as to be able to vary its axial positioning.

[0045] Furthermore, there are threaded elements 35 which prevent the abutment elements 9 from coming out from their seats 33.

[0046] Figures 1-5 show a first embodiment of the fixture 1 in which the seats 33 are constituted by respective threaded holes that are defined directly on the bars 8.

[0047] Preferably there are two or more holes 33 on each bar 8, in which the corresponding stem 32 can be coupled alternately.

[0048] Figure 6 shows a second embodiment of the fixture 1 which constitutes a variation of the previous embodiment in that each abutment element 9 has an articulated head 34 which is connected to the respective stem 32 in an upper region.

[0049] Figures 9 and 10 show a third embodiment of the fixture 1 in which the stabilization means 5 have a longitudinal slot 36 which is defined on each bar 8 and in which the corresponding abutment element 9 is accommodated so that it can move and reversible means 37 are provided for locking the sliding of that element.

[0050] In more detail, a female thread element 38 is accommodated so that it can slide along each slot 36, which defines the seat 33 in which the stem 32 of the corresponding abutment element 9 is engaged.

[0051] The reversible means 37 for locking have a threaded knob coupled on each stem 32 and adapted to be tightened onto the corresponding bar 8.

[0052] Figures 11 and 12 show a fourth embodiment of the fixture 1 in which each bar 8 is telescopic and the corresponding abutment element 9 is coupled to the movable end thereof.

[0053] In more detail, each bar 8 is composed of a first and a second portion, respectively, 39 and 40, which can slide mutually, of which the first portion 39 is coupled to the pivot 10 and the second portion 40 is supporting the respective abutment element 9, between which stroke limiting means 41 in the direction of spacing apart, of the type described above for the crossmember 2, are interposed.

[0054] In practice it has been found that the invention as described achieves the intended aim and objects and, in particular, attention is drawn to the fact that thanks to the method of pivoting the bars to the crossmember it is possible to increase the flexibility of use of the fixture in that there is an increased variety of possible arrangements of the abutment elements under the chassis of the vehicle. In this manner it is possible to optimize the reliability of the fixture and reduce its space occupation in conditions of non-use.

[0055] The flexibility of use is further increased by the versions with slots along the bars or with telescopic bars.

[0056] The invention, thus conceived, is susceptible of numerous modifications and variations, all of which are within the scope of the appended claims.

[0057] Moreover, all the details may be substituted by other, technically equivalent elements.

[0058] In practice the materials employed, as well as the contingent dimensions and shapes, may be any according to requirements without for this reason departing from the scope of protection claimed herein.

[0059] The content of Italian patent application no. MO2015A000081 (102015902344698), the priority of which is claimed in the present application, is incorporated as a reference.

[0060] Where the technical features mentioned in any claim are followed by reference numerals and/or signs, those reference numerals and/or signs have been included for the sole purpose of increasing the intelligibility of

the claims and accordingly, such reference numerals and/or signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference numerals and/or signs.

Claims

1. A fixture (1) for supporting the motor of a vehicle with increased flexibility, comprising a supporting crossmember (2), means (3) for supporting from below the motor of a vehicle which are associated with a first end (4) of said crossmember (2), stabilization means (5) which are associated with a second end (6) of said crossmember (2), which is arranged opposite the first, and which are adapted to abut in a lower region against the chassis of said vehicle, and means (7) for anchoring to said chassis which are arranged along said cross-member (2), the stabilization means (5) comprising at least two bars (8) which are pivoted to said second end (6) and which support respective abutment elements (9) under the chassis, **characterized in that** said bars (8) are pivoted to said crossmember (2) about a single rotation axis (A) which is substantially perpendicular to the axes of longitudinal extension of said crossmember and of said bars.

2. The fixture (1) according to claim 1, **characterized in that** it comprises a pivot (10) for pivoting said bars (8) which lies along said rotation axis (A) and is associated with said second end (6), and two connecting plates (11) which are pivoted around said pivot (10) and are arranged offset along said rotation axis (A), each one of which is connected to a respective bar (8).

3. The fixture (1) according to claim 1 or 2, **characterized in that** each one of said abutment elements (9) comprises a respective threaded stem (32) which is substantially parallel to said rotation axis (A) and is engaged in a corresponding internally threaded seat (33) which is associated with the corresponding bar (8) for the adjustment of its own axial position.

4. The fixture (1) according to claim 3, **characterized in that** each one of said abutment elements (9) comprises a respective articulated head (34) which is associated in an upper region with the corresponding stem (32).

5. The fixture (1) according to claim 3 or 4, **characterized in that** each one of said bars (8) comprises at least one threaded hole that defines the coupling seat (33) of the stem (32) of the corresponding abutment element (9).

6. The fixture (1) according to claim 5, **characterized in that** each one of said bars (8) comprises at least two of said threaded holes (33) in which the stem (32) of the corresponding abutment element (9) can be alternately coupled.

7. The fixture (1) according to one or more of claims 1 to 4, **characterized in that** said stabilization means (5) comprise a longitudinal slot (36) which is associated with each one of said bars (8) and accommodates, so that it can move in a longitudinal direction, the corresponding abutment element (9), reversible means (37) also being provided for locking the sliding of said element along the corresponding slot (36).

8. The fixture (1) according to claims 3 or 4 and 7, **characterized in that** it comprises a female thread element (38) which defines the seat (33) for engaging the stem (32) of the respective abutment element (9) which is accommodated so that it can move along each one of said slots (36).

9. The fixture (1) according to one or more of claims 1 to 4, **characterized in that** each one of said bars (8) is telescopic and the corresponding abutment element (9) is associated with the movable end of said bar.

10. The fixture (1) according to one or more of the preceding claims, **characterized in that** said crossmember (2) is telescopic and comprises at least one first portion and one second portion (16, 17), which are mutually coupled with mutual sliding and are associated respectively with said supporting means (3) and with said pivoting pivot (10).

11. The fixture (1) according to claim 10, **characterized in that** it comprises stroke limiting means (19) which are interposed between said first and said second portions (16, 17) and act in the direction of mutual spacing apart.

12. The fixture (1) according to one or more of the preceding claims, **characterized in that** said anchoring means (7) are associated so that they can slide along said crossmember (2).

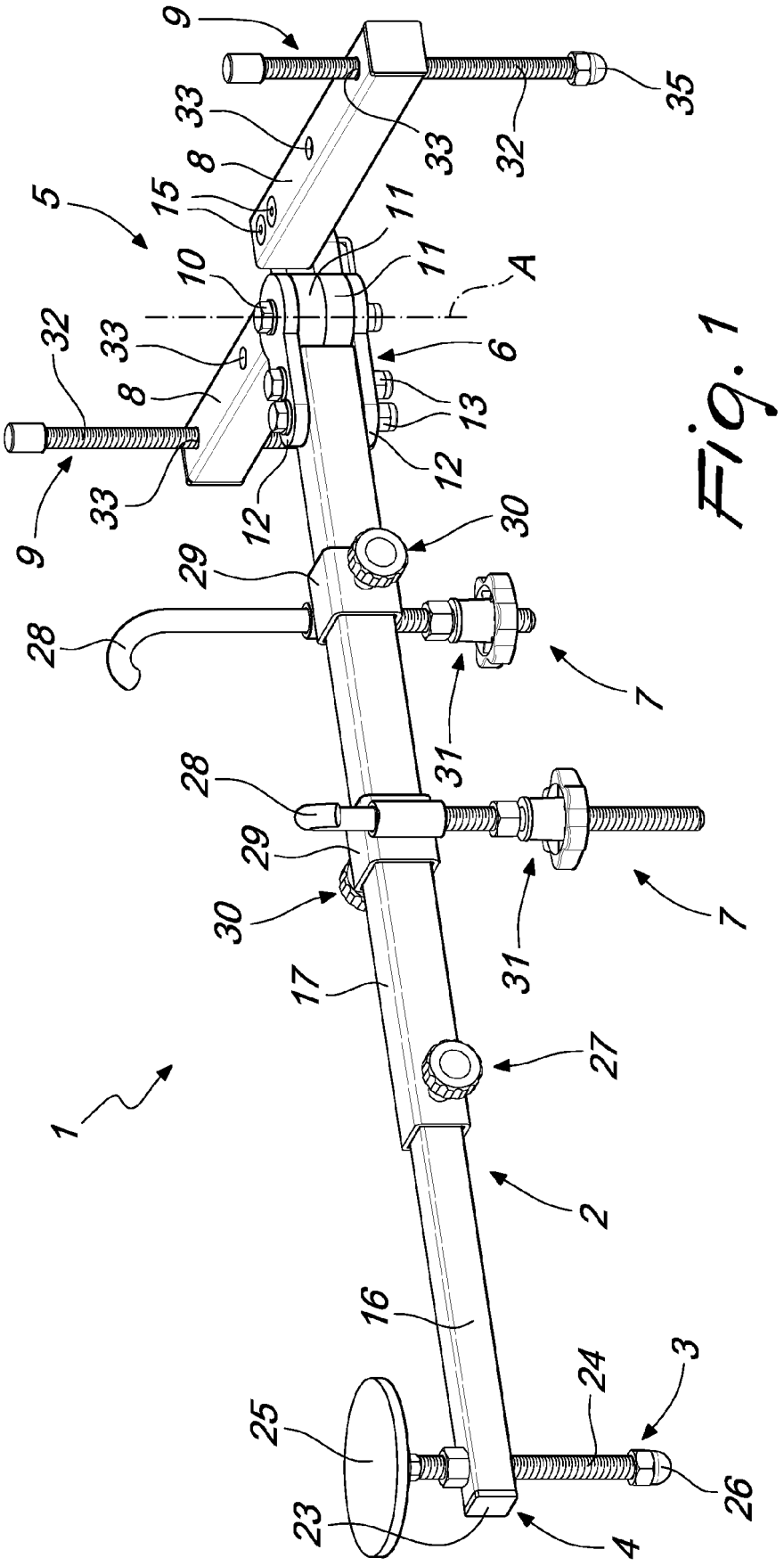
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Fig. 1

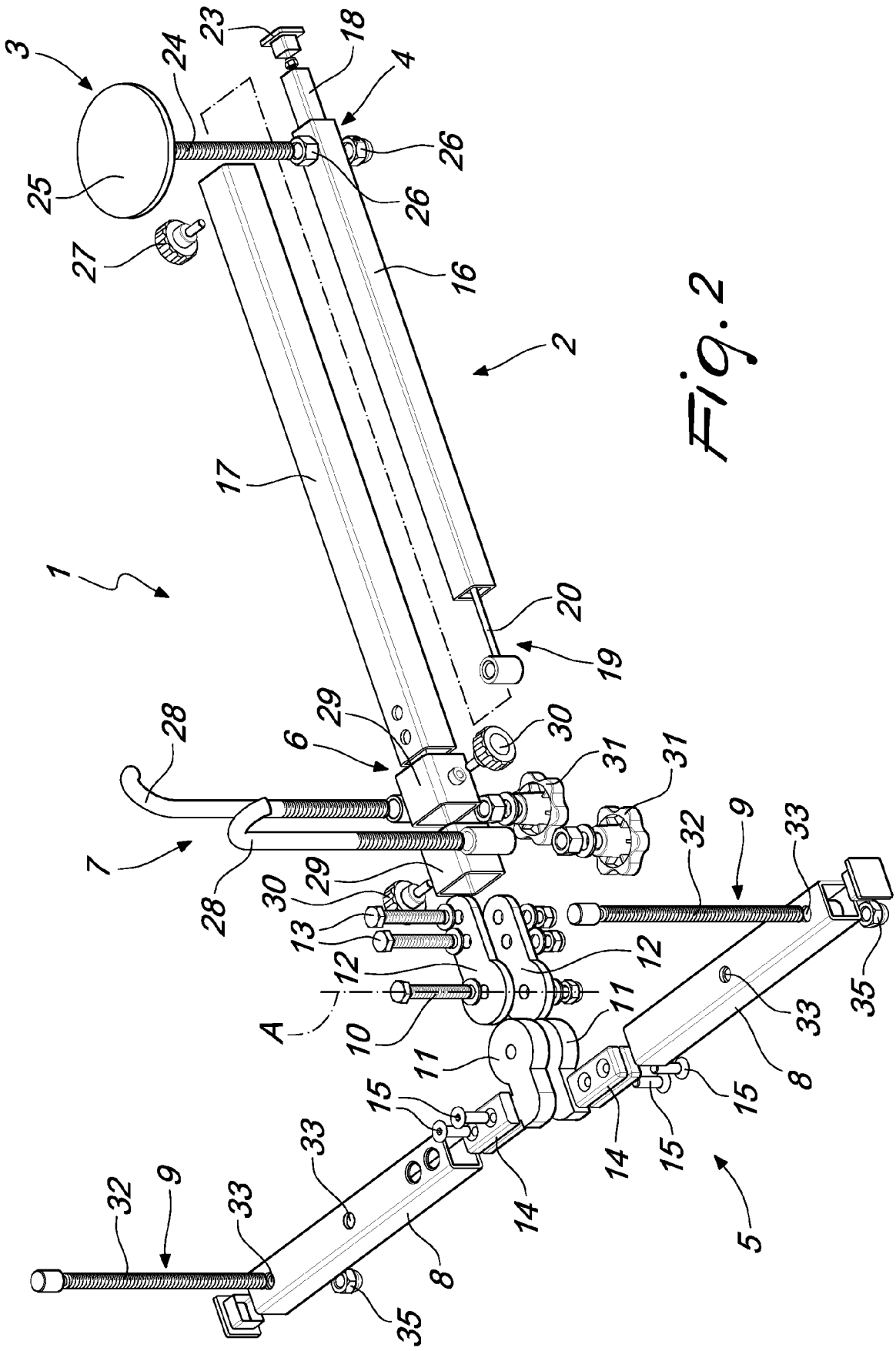
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Fig. 2

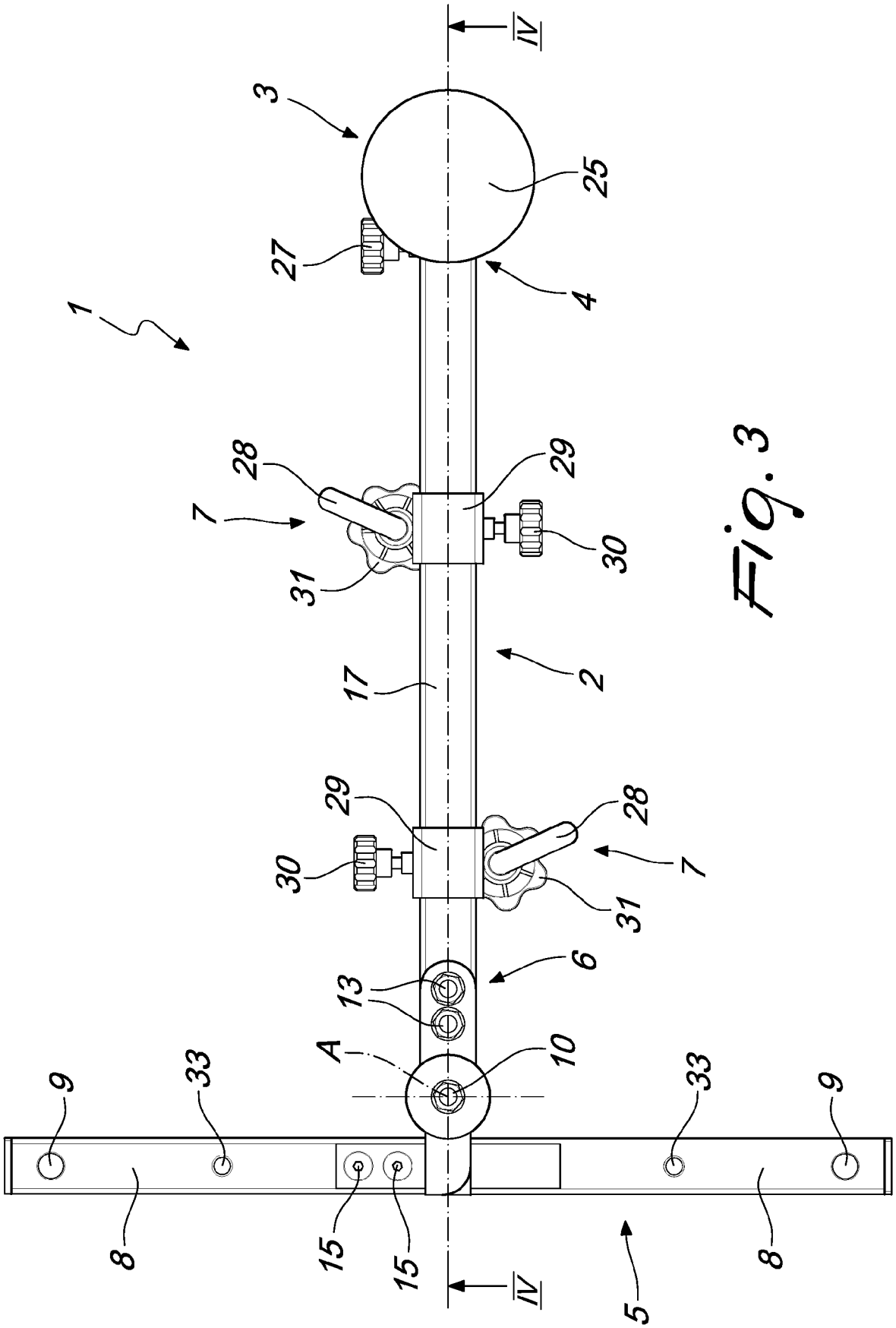
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Fig. 3

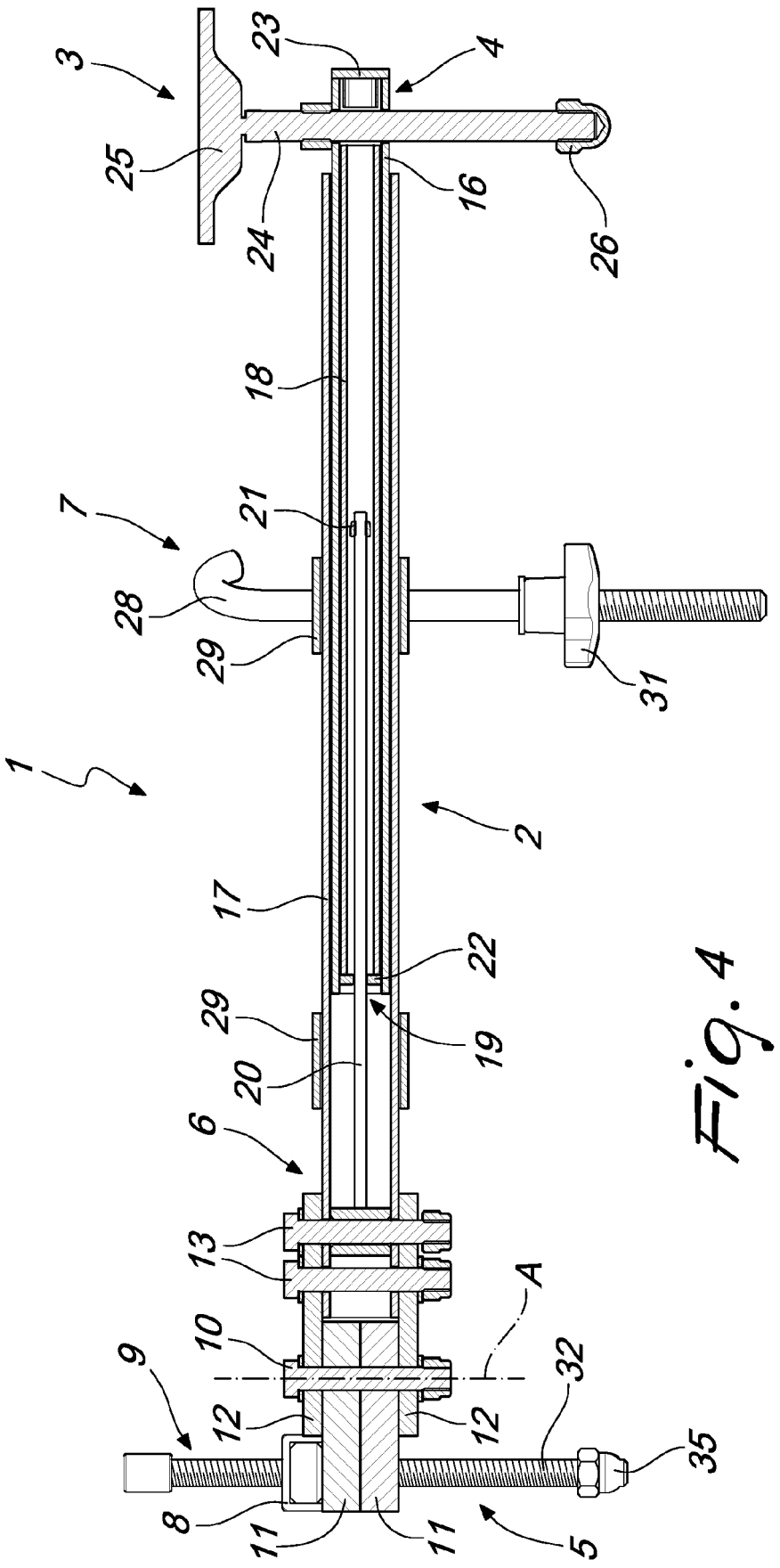
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Fig. 4

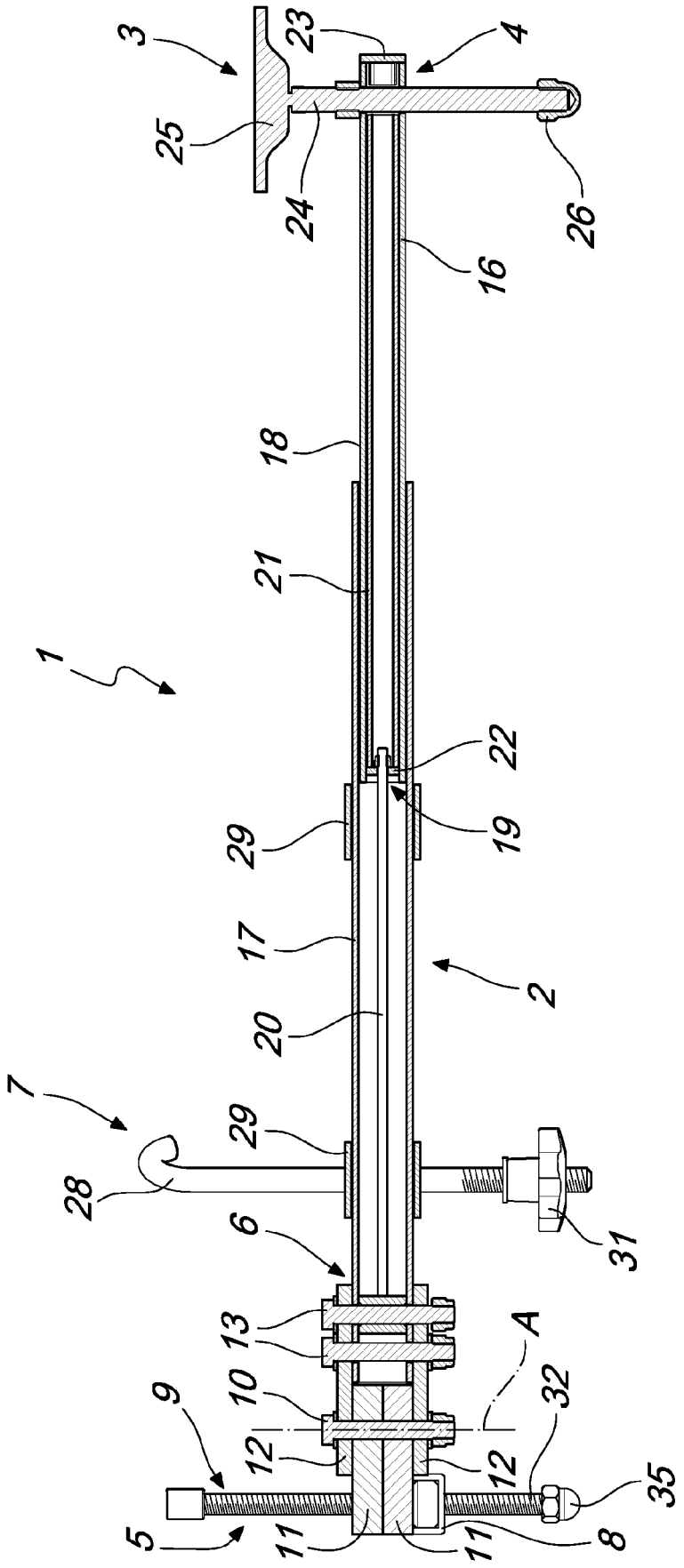
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Fig. 5

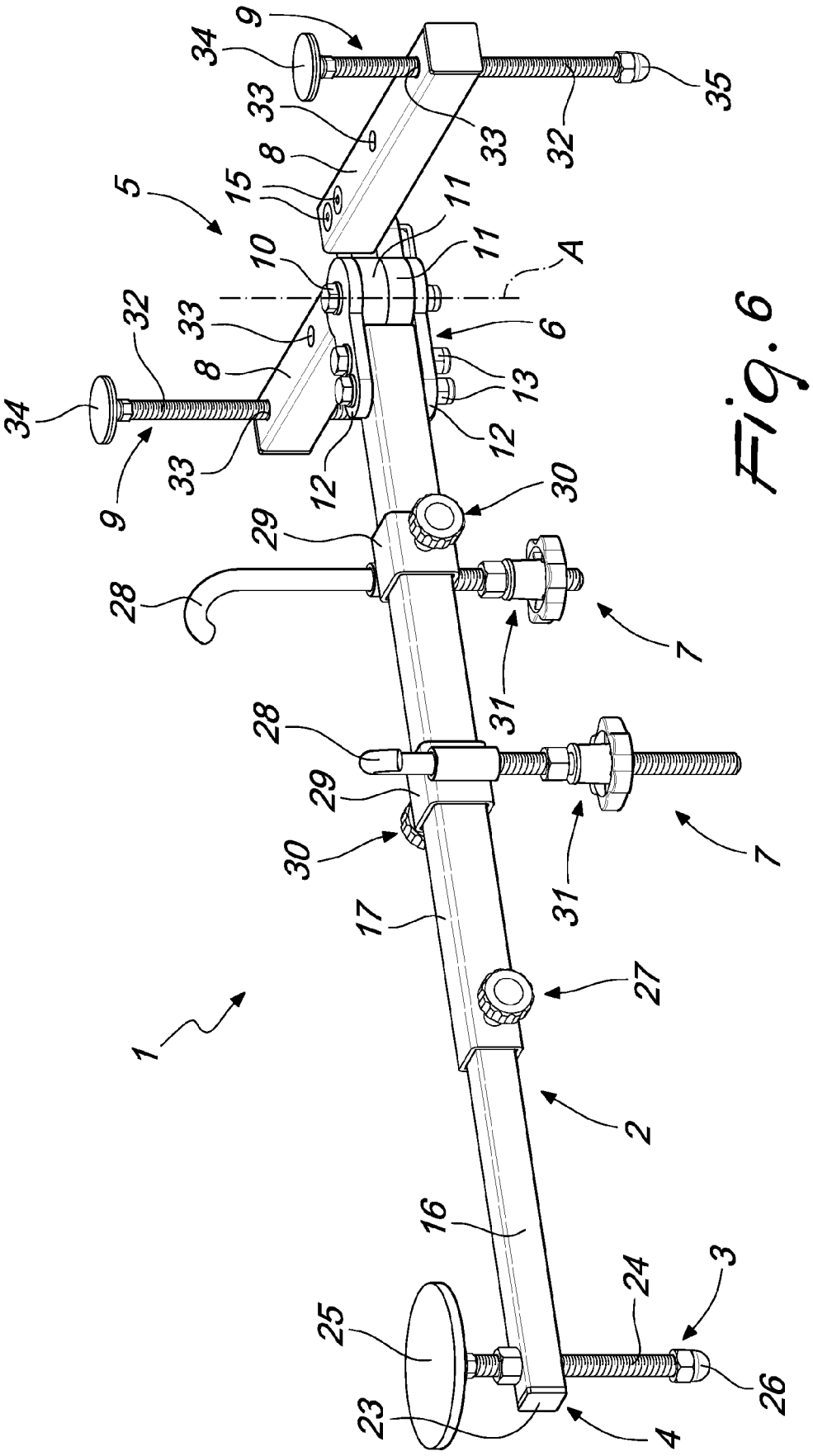
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Fig. 6

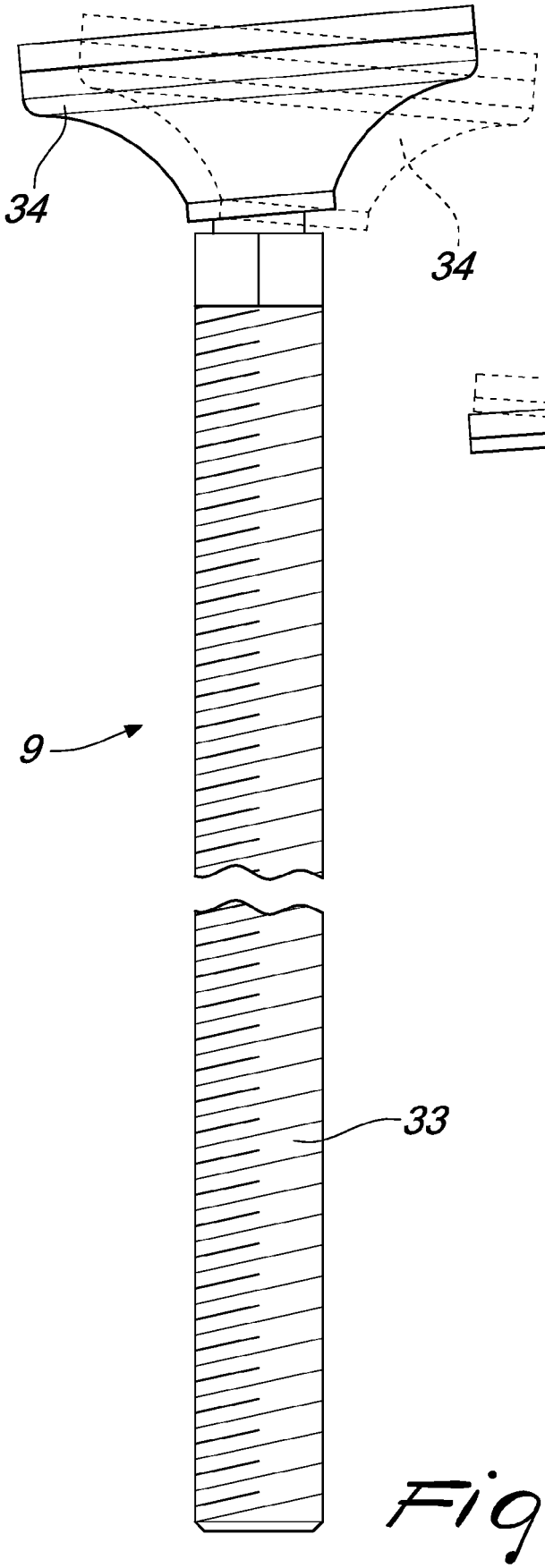

Fig. 7

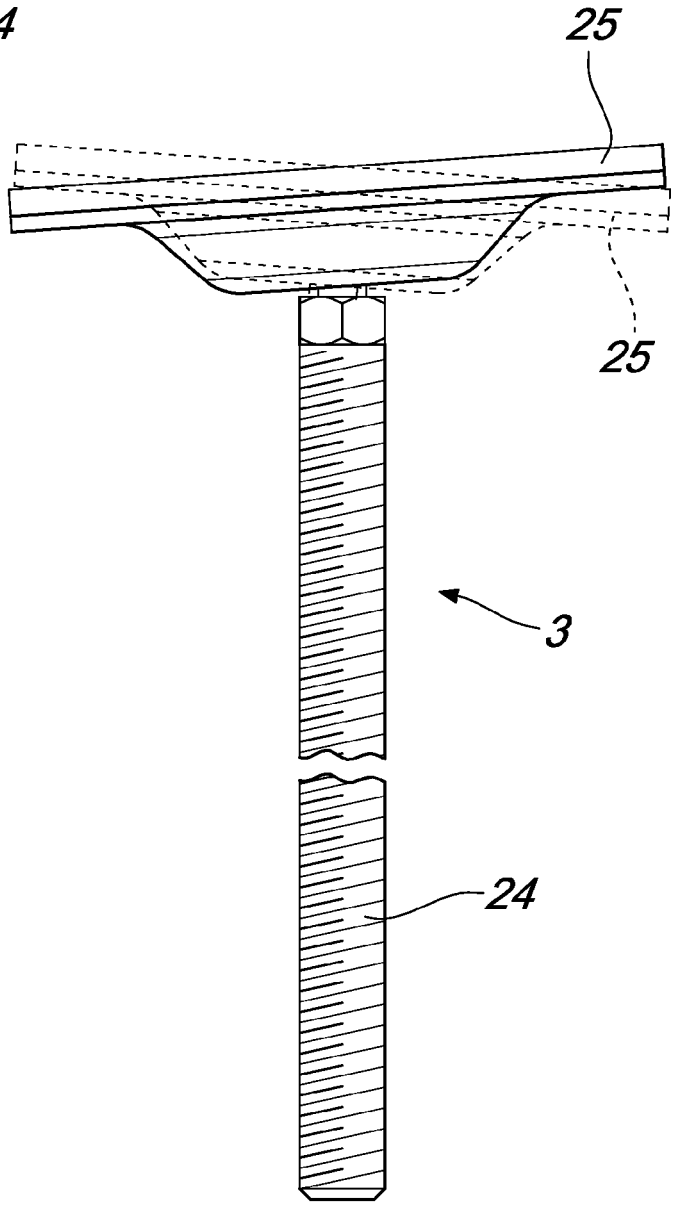

Fig. 8

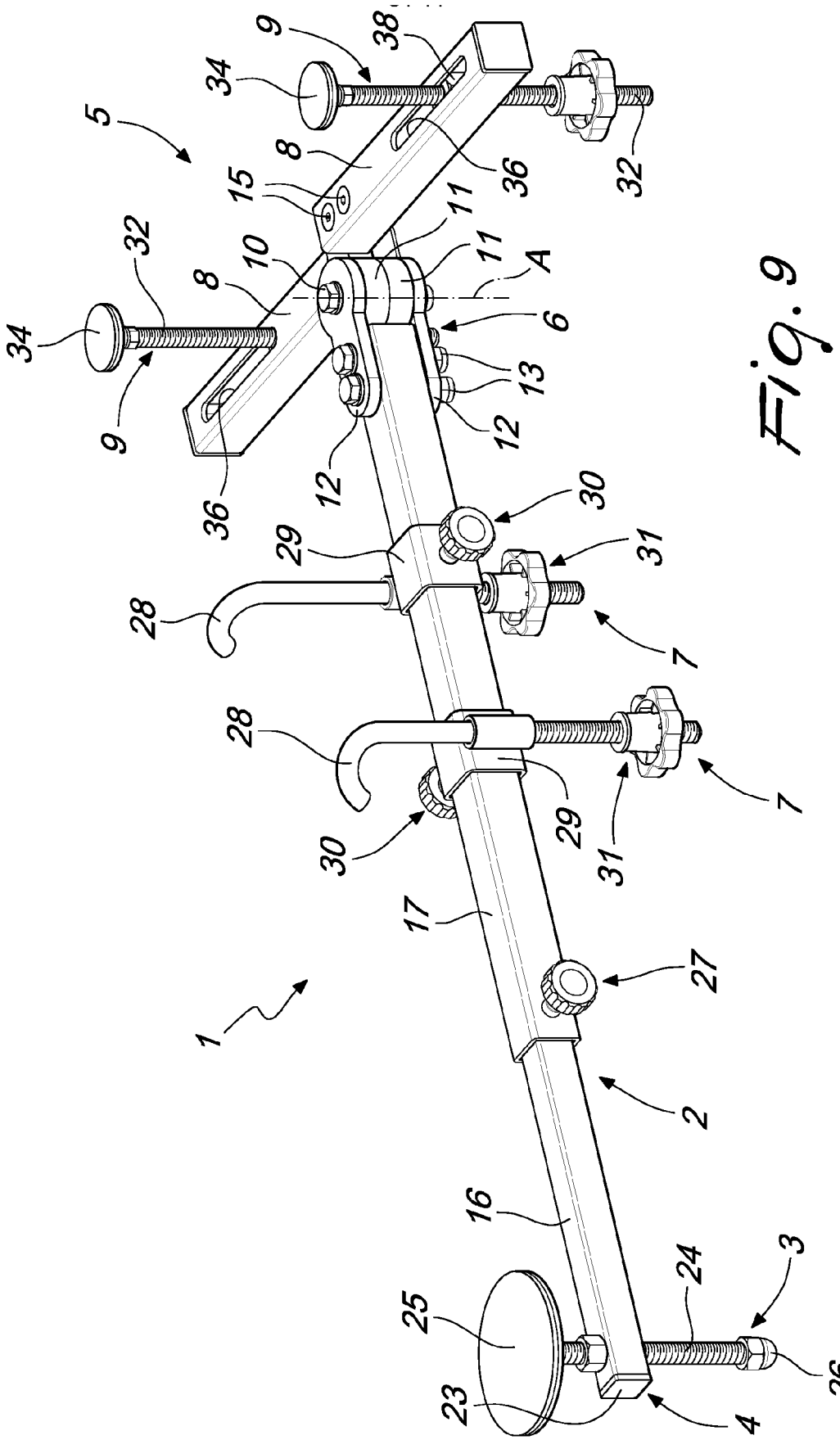
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Fig. 9

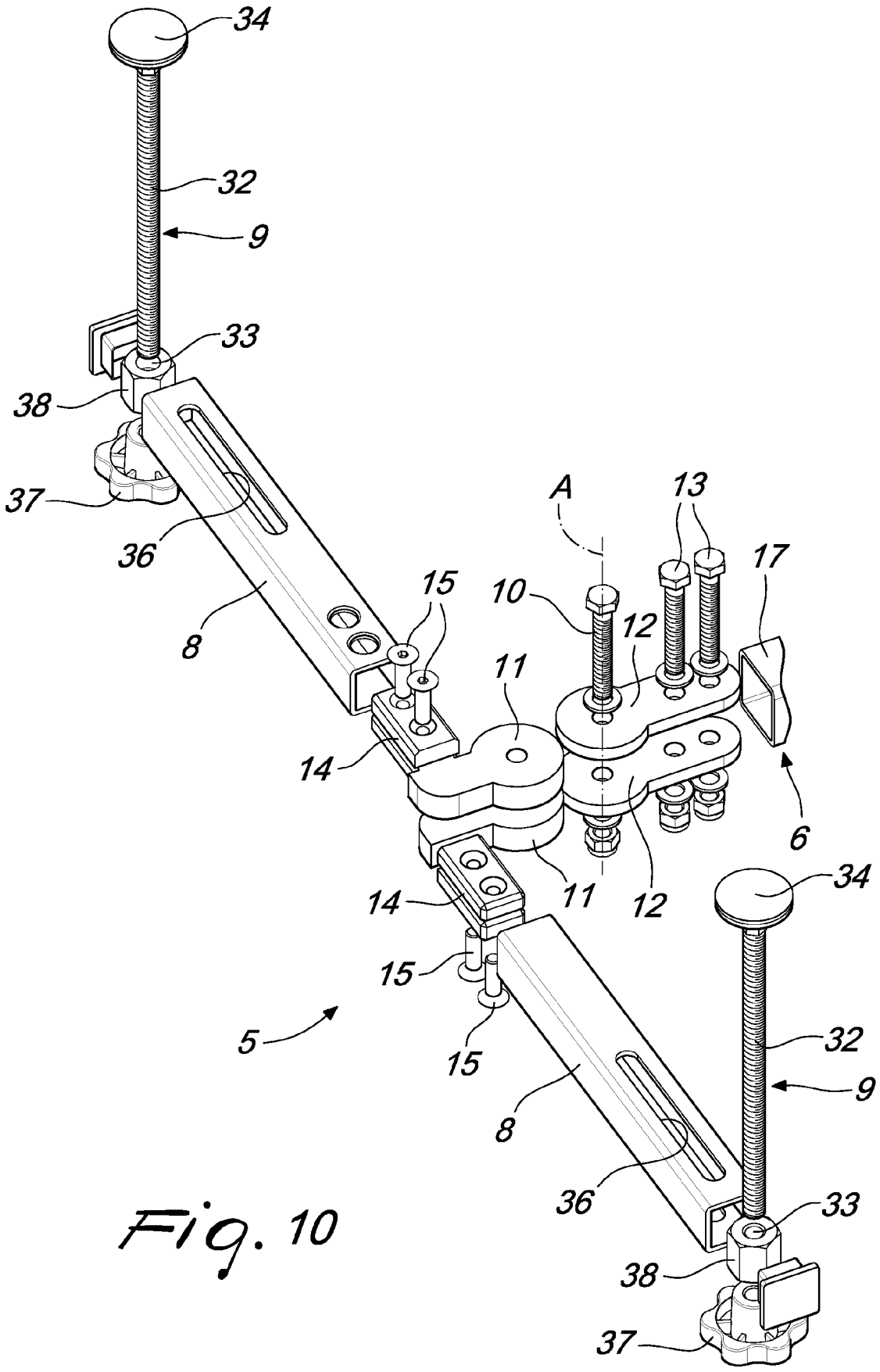

Fig. 10

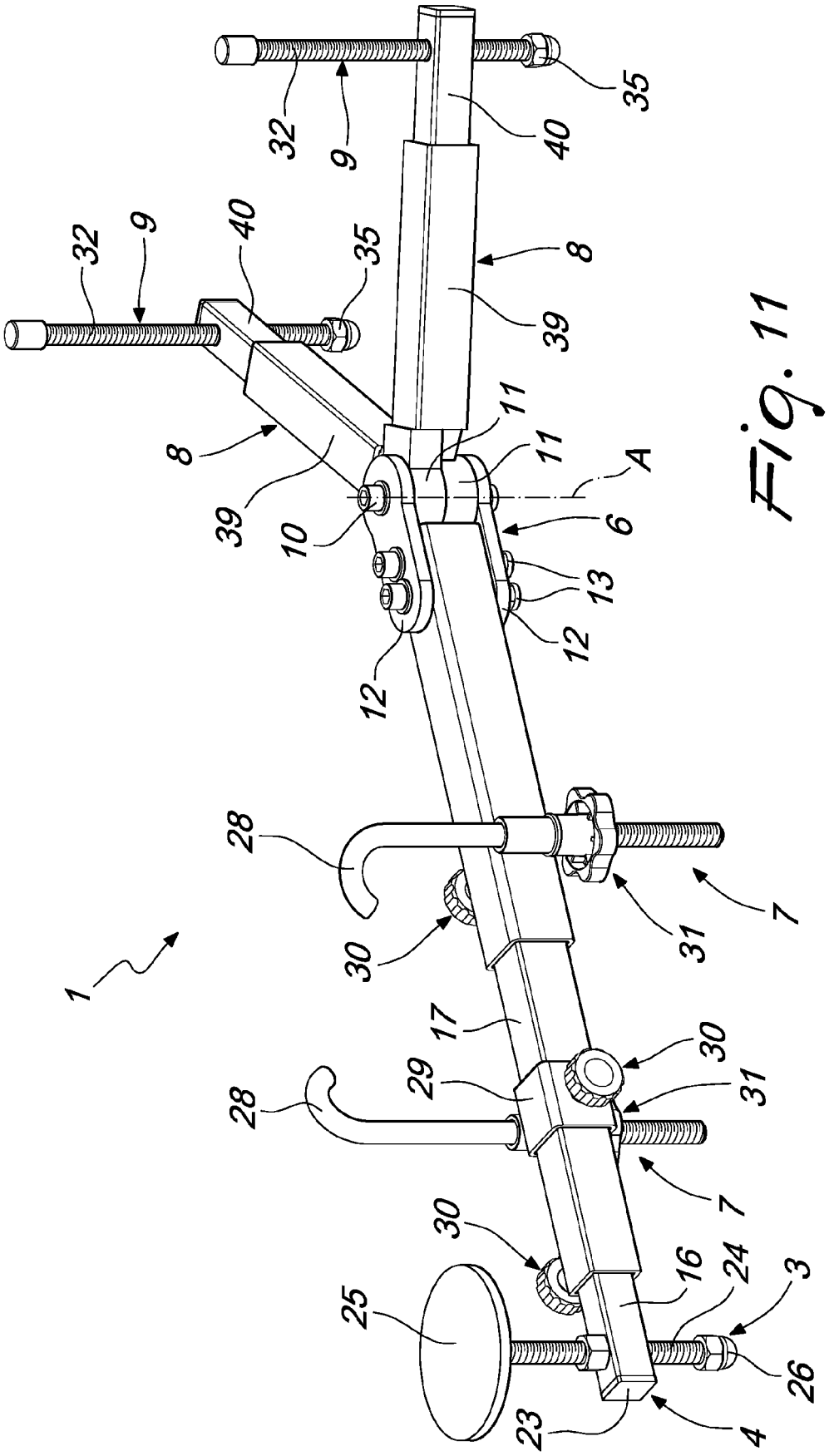

Fig. 11

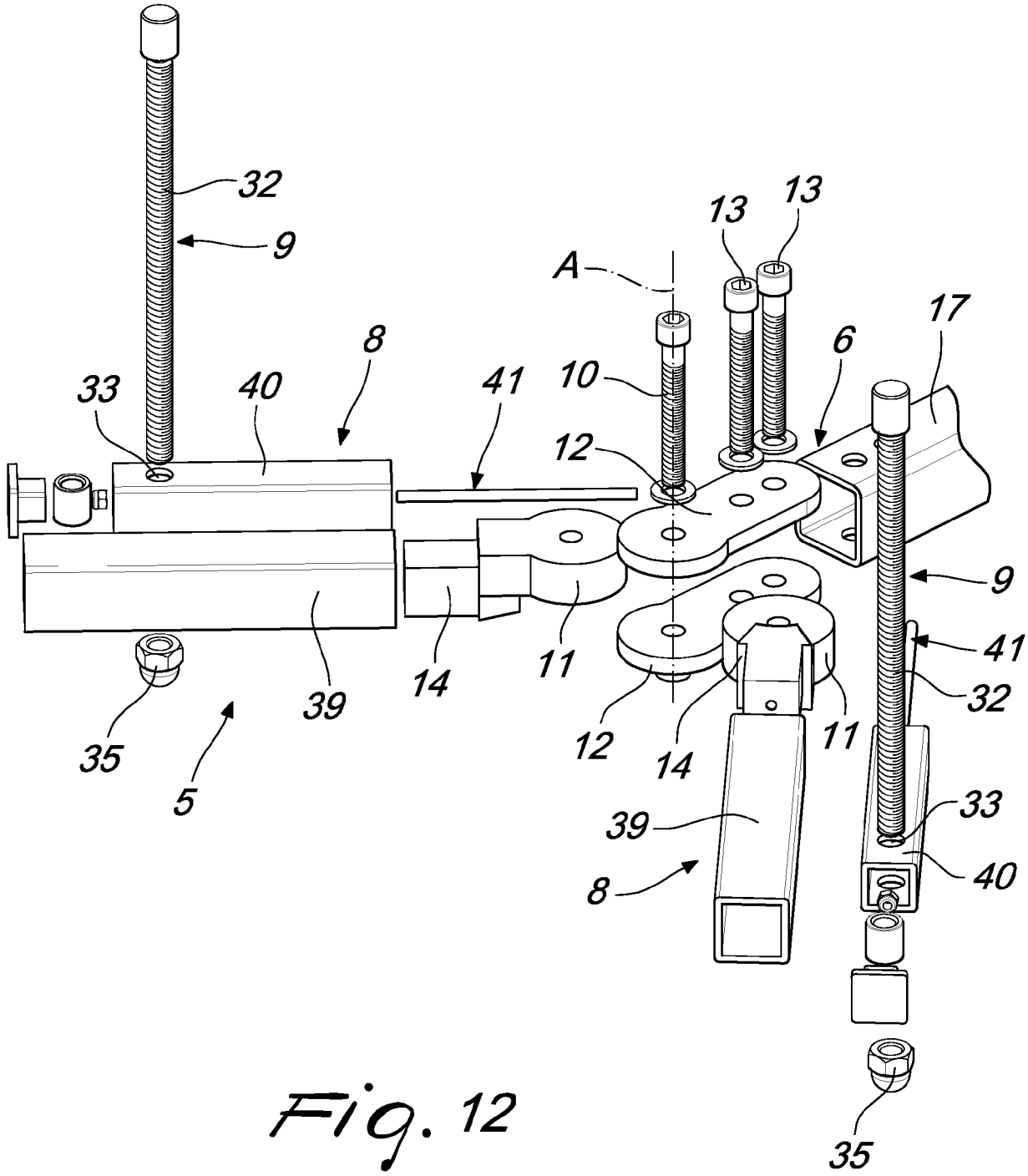
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Fig. 12

Europäisches Patentamt
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EUROPEAN SEARCH REPORT

Application Number
EP 16 16 5155

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y,D	DE 20 2010 002330 U1 (HOFMEISTER LOTHAR [DE]) 24 June 2010 (2010-06-24) * the whole document *	1-12	INV. B25H1/00 B60S5/00 B66C1/10
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