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(54) DEVICE FOR MOVING THE OSCILLATING ARMS OF THE SUSPENSION SYSTEM OF VEHICLES

(57) A device (1) for moving the oscillating arms (101) of the suspension system of vehicles (100), of the type comprising for each wheel of a same axle (A) a wheel knuckle (103) associated with an oscillating arm (101) pivoted to the chassis (102) of the vehicle; the device (1) comprises a cross-member (2) that supports abutment means (3) adapted to be arranged below the chassis (102) of a vehicle and two assemblies (4), each for moving a corresponding oscillating arm (101) with respect to the chassis (102), which are associated on opposite sides of the cross-member (2); each movement assembly (4) comprises a lever (5) that is associated with the cross-member (2) in an articulated manner, connection means (6) that can be associated with the corresponding oscillating arm (101) and are associated with the lever (5) and means (7) for rotational actuation of the lever (5) with respect to the cross-member (2)

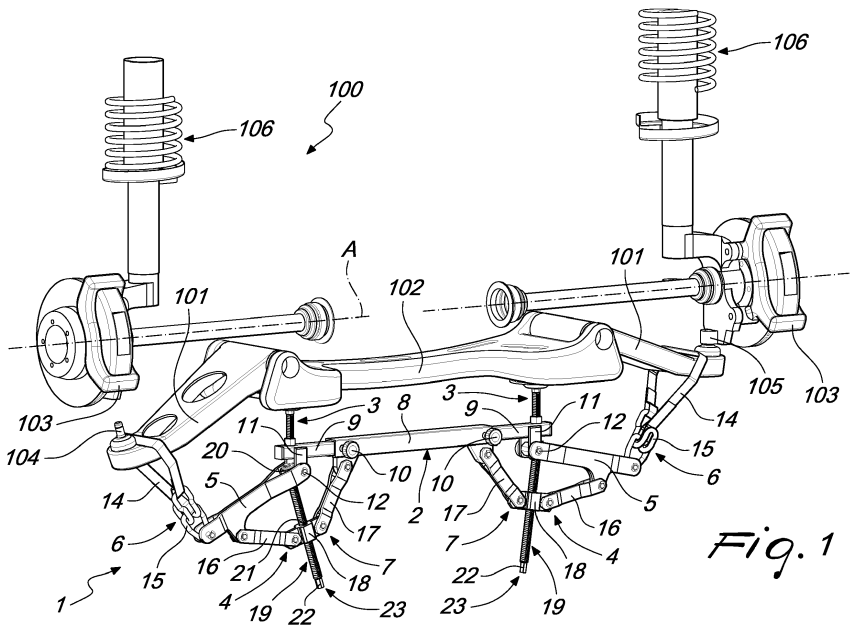


Fig. 1

EP 3 095 560 A1

Description

[0001] The present invention relates to a device for moving the oscillating arms of the suspension system of vehicles.

[0002] Vehicle suspension systems are known which consist of a set of components by means of which the wheels are connected to the chassis and which are capable of absorbing the stresses caused by imperfections of the ground and therefore ensure stability, road holding and comfort to such vehicle.

[0003] In particular, suspension systems for independent wheels with oscillating arms are known which have, for each wheel, an arm that has an end that is pivoted to the chassis of the vehicle and the opposite end connected in a downward region to the wheel knuckle by means of a conical centering head, a shock absorber with a corresponding spring being further interposed between the wheel knuckle and the chassis.

[0004] In order to perform various interventions to repair a vehicle on components of the axle shafts or of the suspension system proper, such as for example the replacement of bearings, cuffs, shock absorbers, etc., it is necessary to disengage the corresponding oscillating arm from the corresponding wheel knuckle, turning the arm downward with respect to the chassis.

[0005] To perform this intervention, EP 1,479,482 B1 discloses a device for moving individual oscillating arms that consists substantially of a cross-member that can be arranged below the chassis of the vehicle and is provided at a first end with means for anchoring to the chassis and at the second end, which lies opposite the first one, with an element for abutment below such chassis. A lever is pivoted to the first end of the cross-member, supports means for connection to the oscillating arm to be moved, and is connected to the cross-member by means of a rod of adjustable length that actuates its rotation with respect to such cross-member. The rotation of the lever actuates the movement of the oscillating arm, and therefore by acting on the lever by means of the adjustable rod it is possible to disengage the oscillating arm from the wheel knuckle and couple it again once the intervention has ended.

[0006] The adjustment of the length of the rod is performed manually by turning a threaded sleeve that is coupled to threaded elements.

[0007] These devices of a known type are not devoid of drawbacks, which include the fact that if it is necessary to act on both oscillating arms of the axle of the vehicle the device must be arranged so as to perform the intervention on each arm, with a consequent increase in times and costs for execution.

[0008] Furthermore, the rotation imparted to the oscillating arm by means of the adjustable rod is rather slow and requires a certain effort on the part of the assigned operators, who have to act manually on the threaded sleeve.

[0009] The aim of the present invention is to eliminate the drawbacks noted above of the background art by providing a device for moving the oscillating arms of the suspension system of vehicles that allows to act on both oscillating arms of the front axle without the need to reposition the tool and optionally simultaneously, with a considerable saving in time and costs for execution of the intervention.

[0010] Within this aim, an object of the present invention is to facilitate the intervention of the assigned operators and minimize the effort required.

[0011] Another object of the present invention is to be flexible in use, allowing to adapt its shape as a function of the structural characteristics of different types of vehicle.

[0012] A further object of the present invention is to have a structure that is simple, relatively easy to provide in practice, safe in use, effective in operation and relatively low in cost.

[0013] This aim and these objects are all achieved by the present device for moving the oscillating arms of the suspension system of vehicles, of the type comprising for each wheel of a same axle a wheel knuckle associated with an oscillating arm pivoted to the chassis of the vehicle, comprising a cross-member supporting abutment means adapted to be arranged below the chassis of a vehicle and at least one assembly for moving a corresponding oscillating arm with respect to the chassis, which comprises a lever that is associated in an articulated manner with such cross-member, connection means that can be associated with such arm and are associated with such lever and means for rotational actuation of such lever with respect to such cross-member, characterized in that it comprises two of such assemblies each for moving a corresponding oscillating arm with respect to the chassis, which are associated on opposite sides of said cross-member.

[0014] Further characteristics and advantages of the present invention will become better apparent from the detailed description of a preferred but not exclusive embodiment of a device for moving the oscillating arms of the suspension system of vehicles, illustrated by way of nonlimiting example in the accompanying drawings, wherein:

Figure 1 is a schematic perspective view of a device for moving the oscillating arms of the suspension system of vehicles, according to the invention, during the disengagement of one of the oscillating arms of the axle from the corresponding wheel knuckle;

Figure 2 is a schematic perspective view of the device according to the invention;

Figure 3 is a schematic front elevation view of the device according to the invention.

[0015] With reference to the figures, the numeral 1 generally designates a device for moving the oscillating arms of the suspension system of vehicles.

[0016] The device 1 can be used to act on conventional

suspension systems 100 for vehicles provided, for each wheel of a same axle A, with an oscillating arm 101 in which one end is pivoted to the chassis 102 of the vehicle and the opposite end is coupled to the wheel knuckle 103 by means of a conical reference head 104 that is inserted in a corresponding seat 105 associated in a lower region with said knuckle. The wheel knuckle 103 also supports a shock absorber with a corresponding spring 106.

[0017] The device 1 comprises a cross-member 2 that supports abutment means 3 that are adapted to be arranged below the chassis 102.

[0018] Furthermore, the device 1 comprises a movement assembly 4 that can be associated with each oscillating arm 101 in order to actuate its rotation with respect to the chassis 102 so as to uncouple it from the corresponding wheel knuckle 103 and then restore the coupling of the head 104 in the seat 105.

[0019] Figure 1 shows the device 1 applied to the suspension system 100 of a vehicle, which is shown only partially, with the oscillating arm 101 on the left uncoupled from the corresponding wheel knuckle 103 and with the arm on the right still in position.

[0020] Advantageously, the device 1 allows to act on both oscillating arms 101 of an axle A without the need to reposition the equipment. Furthermore, as will become apparent from the description that follows, if two operators are available it is possible to act simultaneously on the two oscillating arms 101.

[0021] Each movement assembly 4 is arranged at a corresponding end of the cross-member 2 and comprises a lever 5 that is associated and articulated to such cross-member, means 6 for connection to the corresponding oscillating arm 101, which are associated with the lever 5, and means 7 for actuating the lever 6 rotationally with respect to the cross-member 2.

[0022] The connection means 6 of each movement assembly 4 consist of a flexible element that is adapted to surround the corresponding oscillating arm 101 and is associated with the end of the corresponding lever 5 that lies opposite the one articulated to the cross-member 2.

[0023] In the illustrated embodiment, the connection means 6 consist of an adjustable band 14 that is associated with a ring 15 that is pivoted to the lever 5; however, alternative embodiments are not excluded.

[0024] Advantageously, the cross-member 2 has an adjustable length so as to be able to adapt as a function of the structure and size of the chassis of 2 of the vehicle on which it is necessary to intervene, placing correctly the abutment means 3. In particular, the cross-member 2 comprises a central portion 8, with the ends of which respective sliding portions 9 are associated. The portion 8 is constituted by a tubular profile having a quadrangular cross-section and the portions 9 consist of bars having a quadrangular cross-section that are inserted so that they can slide from opposite sides of such portion.

[0025] Means 10 are provided for locking temporarily the sliding of each portion 9 with respect to the portion 8 and are constituted by a locking screw that is inserted so as to pass through such portion so as to press on the portion 9 with the corresponding stem and prevent its sliding.

[0026] In order to adjust the length of the cross-member 2, the screws 10 are loosened and then tightened on the corresponding portions 9 once the desired configuration has been achieved.

[0027] Each lever 5 is associated in an articulated manner with a corresponding portion 9. In greater detail, for each lever 5 there are two plates 11 that are welded on opposite sides of the corresponding portion 9 which support the pivot 12 for the articulation of such lever.

[0028] Furthermore, the abutment means 3 comprise at least one support 13 adapted to abut in a lower region against the chassis 102. In order to optimize the stability of the device 1 and reduce the effort required to move the oscillating arms 101, there are two supports 13, each of which is associated with the free end of a corresponding portion 9.

[0029] The supports 13 are adjustable in height.

[0030] The actuation means 7 of each movement assembly 4 comprise a pair of rods 16 and 17 that are mutually articulated by way of the interposition of a pivoting element 18 and are interposed between the lever 5 and the cross-member 2.

[0031] In greater detail, the corresponding opposite ends of the rod 16 are pivoted respectively to the lever 5 and to the pivoting element 18 and the rod 17 has corresponding opposite ends that are pivoted respectively to the pivoting element proper and to the portion 8 of the cross-member 2.

[0032] In this manner, the cross-member 2, the lever 5 and the rods 16 and 17 define an articulated quadrilateral in which the cross-member 2 acts as a chassis.

[0033] Furthermore, the actuation means 7 of each movement assembly 4 comprise a threaded stem 19 that is coupled to a supporting element 20 that is associated with the lever 5 at the region for pivoting with the corresponding portion 9 and is engaged in a female thread 21 that is associated with the pivoting element 18.

[0034] At the end that is pivoted to the corresponding portion 9, each lever 5 is fork-shaped, the supporting element 20 being interposed between the prongs of such fork.

[0035] Each stem 19 is supported axially by the corresponding supporting element 20 and rotates freely with respect to it.

[0036] In each movement assembly 4 the rotation of the stem 19 in either direction actuates the sliding of the female thread 21 along it and therefore the rotation of the lever 5 with respect to the cross-member 2 in the direction for coupling/uncoupling the head 104 of the corresponding oscillating arm 101 with respect to the corresponding seat 105.

[0037] Each stem 19 has a maneuvering end 22 that protrudes below the rods 16 and 17 and can be accessed by an operator in order to turn it.

[0038] Usefully, the maneuvering end 22 is provided

with means 23 for coupling to a motorized spindle, such as a conventional drill, for the rotary actuation of such stems.

[0039] In this manner, the movement assemblies 4 can actuate the rotation of the oscillating arms 101 with the aid of motorized tools, reducing the effort required to operators and speeding up the intervention.

[0040] Operation of the present invention is as follows.

[0041] After adjusting the length of the cross-member 2 as a function of the characteristics of the vehicle on which the intervention is to be performed, the device 1 is arranged below the chassis 2, applying the bands 14 to the oscillating arms 101 and arranging the supports 13 in contact with the chassis 102, as shown in the figure.

[0042] By acting on the stems 19, the rotation of the oscillating arms 101 in the desired direction is actuated as described above.

[0043] If necessary, two operators can act simultaneously on the oscillating arms 101 of such axle A by acting on separate stems 19.

[0044] In practice it has been found that the described invention achieves the proposed aim and objects, and in particular the fact is stressed that the device according to the invention allows to act on both oscillating arms of a same axle, even simultaneously if necessary, with a single placement of such device.

[0045] Furthermore, the device according to the invention facilitates the task of the assigned operators and reduces the intervention time.

[0046] Not least, the device according to the invention is flexible and versatile in use and can adapt to different vehicle configurations.

[0047] The invention thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the appended claims.

[0048] All the details may further be replaced with other technically equivalent elements.

[0049] In practice, the materials used, as well as the contingent shapes and dimensions, may be any according to requirements without thereby abandoning the protective scope of the appended claims.

[0050] The disclosures in Italian Patent Application no. 102015000015759 (UB2015A000875), from which this application claims priority, are incorporated herein by reference.

[0051] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

1. A device (1) for moving the oscillating arms (101) of the suspension system of vehicles (100), of the type comprising for each wheel of a same axle (A) a wheel knuckle (103) associated with an oscillating arm (101) pivoted to the chassis (102) of the vehicle, comprising a cross-member (2) supporting abutment means (3) adapted to be arranged below the chassis (102) of a vehicle and at least one assembly (4) for moving a corresponding oscillating arm (101) with respect to the chassis (102), which comprises a lever (5) that is associated in an articulated manner with said cross-member (2), connection means (6) that can be associated with said arm and are associated with said lever (5) and means (7) for rotational actuation of said lever (5) with respect to said cross-member (2), **characterized in that** it comprises two of said assemblies (4) each for moving a corresponding oscillating arm (101) with respect to the chassis (102), which are associated on opposite sides of said cross-member (2).

2. The device (1) according to claim 1, **characterized in that** said cross-member (2) has an adjustable length.

3. The device (1) according to claim 2, **characterized in that** said cross-member (2) comprises a central portion (8) with the ends of which respective sliding portions (9) are associated, respective means (10) for temporary locking of the sliding of each portion (9) with respect to the central portion (8) being further provided.

4. The device (1) according to claim 3, **characterized in that** the lever (5) of each one of said movement assemblies (4) is associated in an articulated manner with a respective sliding portion (9).

5. The device (1) according to one or more of the preceding claims, **characterized in that** said abutment means (3) comprise at least one support (13) adapted to abut in a lower region with respect to said chassis (102).

6. The device (1) according to claim 5, **characterized in that** said abutment means (3) comprise two of said supports (13), each of which is associated with the free end of one of said portions (9).

7. The device (1) according to one or more of the preceding claims, **characterized in that** the actuation means (7) of each one of said movement assemblies (4) comprise a pair of rods (16, 17) which are mutually articulated by interposition of a pivoting element (18) and are interposed between said lever (5) and said cross-member (2) so as to define an articulated quadrilateral (2, 5, 16, 17) and a threaded stem (19) that is coupled to an axial supporting element (20) associated with said lever (5) at the region for pivoting to said cross-member (2) and is engaged in a

female thread (21) associated with said pivoting element (18), the rotation of the stem (19) being adapted to actuate the sliding along it of said female thread (21) and the consequent rotation of said lever (5).

8. The device (1) according to claim 7, **characterized in that** said stem (19) has an actuation end (22) that protrudes in a lower region with respect to said rods (16, 17).

9. The device (1) according to claim 8, **characterized in that** said actuation end (22) comprises means (23) for coupling to a motorized spindle.

10. The device (1) according to one or more of the preceding claims, **characterized in that** the connection means (6) of each one of said movement assemblies (4) comprise a flexible element (14) adapted to surround the corresponding oscillating arm (101).

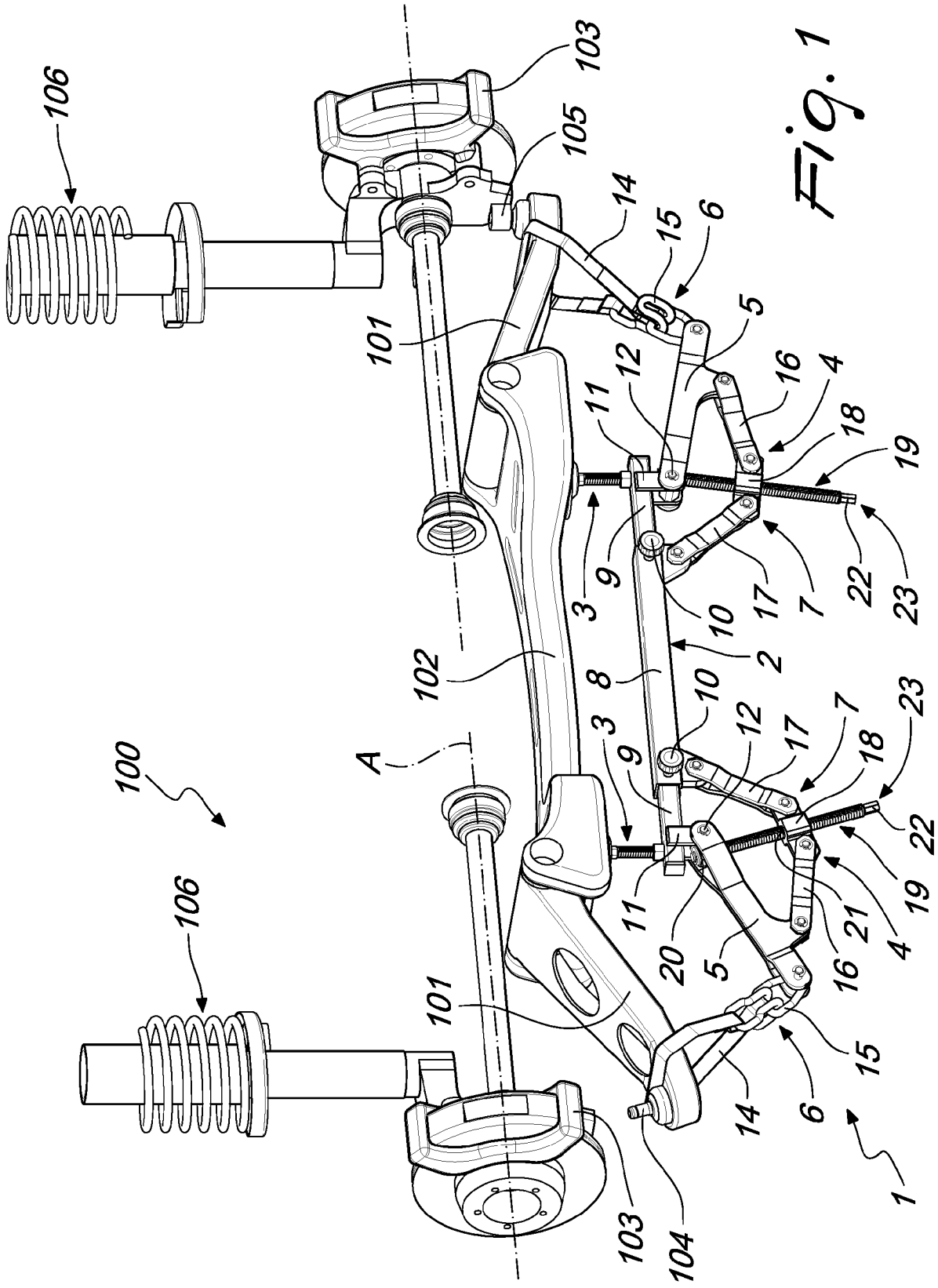

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Fig. 1

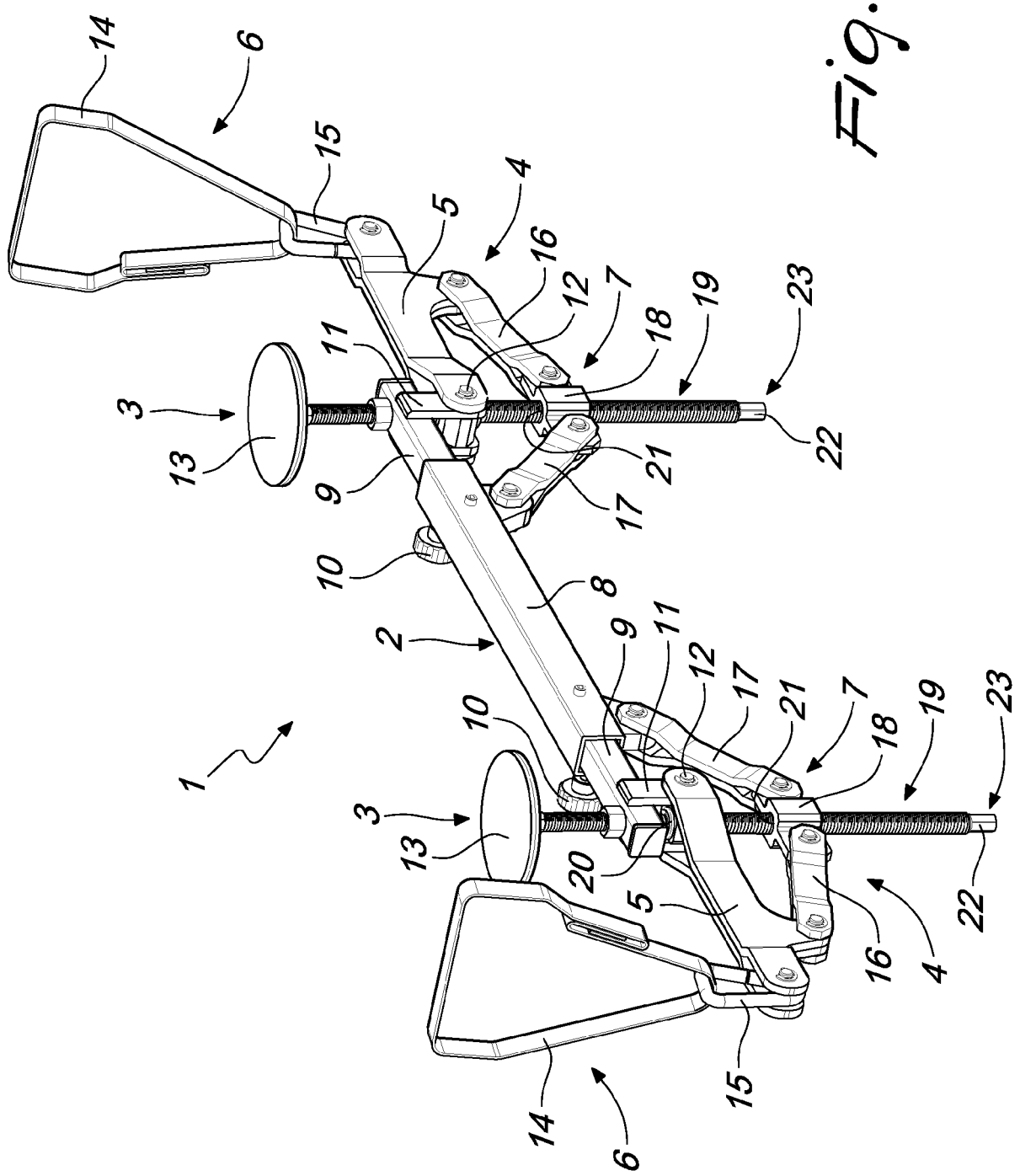


Fig. 2

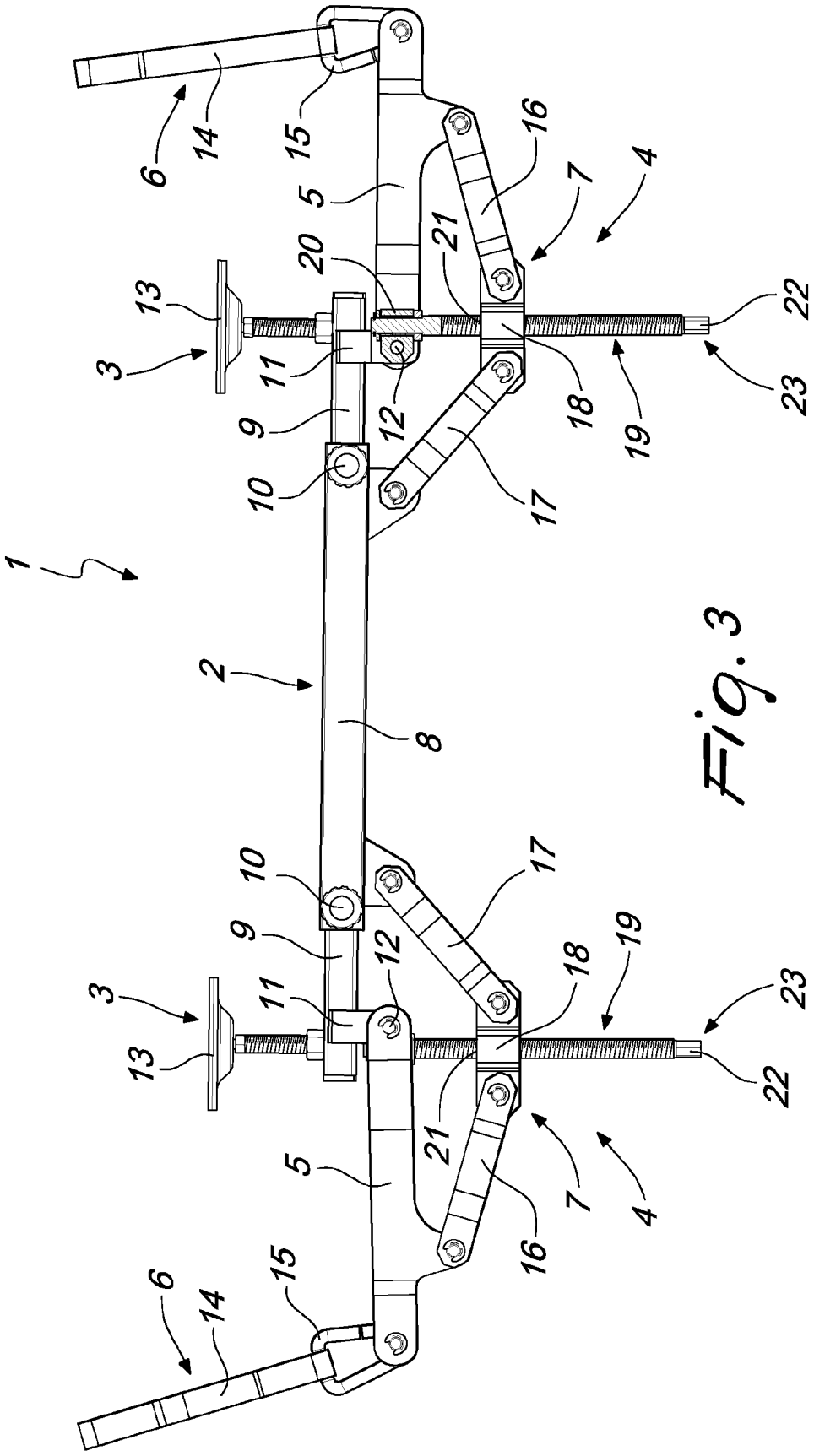


Fig. 3

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EUROPEAN SEARCH REPORT

Application Number
EP 16 16 9200

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	EP 1 479 482 A1 (CREASI DI FRIGNANI ALBERTO [IT]) 24 November 2004 (2004-11-24) * figures 1,2 *	1-10	INV. B25B27/00 ADD. B25B5/14 B25B5/16
A	DE 41 27 773 A1 (NIGG REINHARD [DE]) 25 February 1993 (1993-02-25) * fig. 1; col. 4, ll. 4-6 *	1-10	
A	DE 90 12 800 U1 (PASCHKE WERNER) 20 December 1990 (1990-12-20) * fig. 1; claim 4 *	1-10	
A	DE 37 32 837 A1 (DAIMLER BENZ AG [DE]) 13 April 1989 (1989-04-13) * fig. 2 *	1-10	

TECHNICAL FIELDS SEARCHED (IPC)

B25B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	11 October 2016	Hartnack, Kai

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 16 16 9200

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11-10-2016

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EP 1479482 A1	24-11-2004	AT 341424 T	15-10-2006
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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- EP 1479482 B1 **[0005]**
- IT 102015000015759 **[0050]**
- IT UB2015000875 A **[0050]**