

(19)



(11)

EP 2 532 562 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:

12.12.2012 Bulletin 2012/50

(51) Int Cl.:

B61D 3/18 (2006.01)

(21) Application number: **12170915.8**

(22) Date of filing: **05.06.2012**

(84) Designated Contracting States:

AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR

Designated Extension States:

BA ME

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(30) Priority: **06.06.2011 PL 39513511**

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(54) **A railway wagon and a mechanism for rotating and blocking a loading floor of a railway wagon for combined transportation**

(57) A railway wagon comprising a body having end portions (6) mounted on bogies (18) and a middle portion (19) over which a loading floor (20) is horizontally rotatable around a rotation centre (10). The wagon further comprises a pair of toothed bars (3), each extending along the width of each end portion (6) next to the middle portion (19), each having a slide (4) mounted thereon

and coupled therewith via a toothed wheel (1) driven by a motor (2), and fastening means (5) for releasably fastening each slide (4) to one holder (7) of a pair of holders (7) located at each shorter edge of the loading floor (20) to enable rotation of the loading floor (20) by driving the slides (4) in opposite directions along the toothed bars (3).

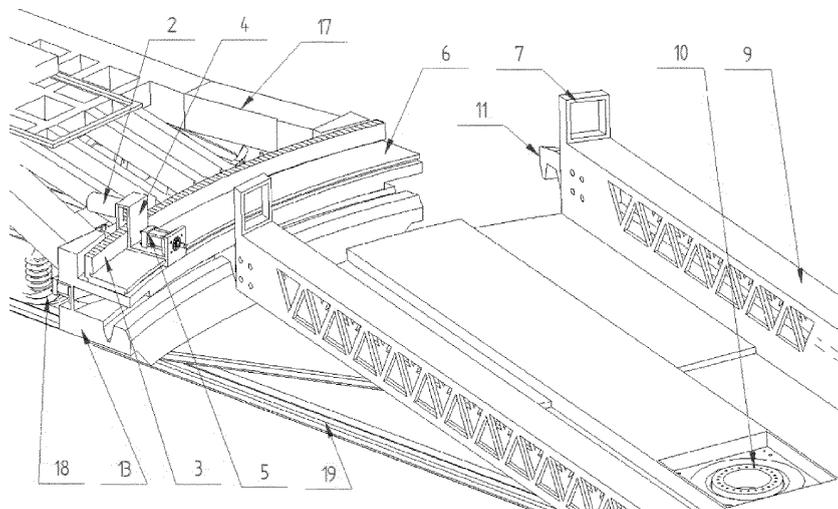


Fig. 2

EP 2 532 562 A1

Description

[0001] The present invention relates to a mechanism for rotating and blocking a loading floor of a railway wagon for combined transportation. The present invention is particularly useful when transporting load carriers, such as tractor semitrailers or trucks. Therefore, the invention relates in general to the technical field of transport and communication.

[0002] The idea of combined road and railway transportation originated in 1950s in the US, where "roadrailer" wagons were first introduced. In 1980s and 1990s it appeared in the Europe. One of popular European systems currently used to transport trucks on railway wagons is Moda Lohr, which presents some disadvantages. One of them is a complicated infrastructure, requiring high financial investment. This relates in particular to building a specific platform allowing for rotation of the movable elements of the wagon, as well as loading and unloading of the vehicles.

[0003] The complicated nature of combined transport systems results in the fact that the combined transportation is presently slow and costly. It usually requires special areas for loading and unloading of transported cargo, which certainly limits interest and investment in this type of transport.

[0004] Various attempts have been made to overcome the current disadvantages. For example, a European patent application EP2388173 presents a railway wagon comprising a body having a middle portion recessed with respect to the end portions and a loading floor horizontally rotatable above the body middle portion between a transport configuration and a loading configuration. The loading floor is rotated by means of linear actuators, connected pivotably at each longitudinal side of the body to the longitudinal side edge of the body.

[0005] The aim of the invention is to provide further improvements to railway wagons with a rotatable loading floor. In particular, the aim of the invention is to provide an alternative mechanism for rotating and blocking the rotatable loading floor.

[0006] The object of the invention is a railway wagon comprising a body having end portions mounted on bogies and a middle portion over which a loading floor is horizontally rotatable around a rotation centre, wherein the wagon further comprises a pair of toothed bars, each extending along the width of each end portion next to the middle portion, each having a slide mounted thereon and coupled therewith via a toothed wheel driven by a motor, and fastening means for releasably fastening each slide to one holder of a pair of holders located at each shorter edge of the loading floor to enable rotation of the loading floor by driving the slides in opposite directions along the toothed bars.

[0007] Preferably, the fastening means comprise a hydraulic-actuated pin for engaging with the holder.

[0008] Preferably, the loading floor comprises a pair of hooks protruding from the corners of each shorter edge

of the loading floor and the body end portions comprise guides on which at least one of the hooks is slidably supported during rotation of the loading floor.

[0009] Preferably, the body end portions comprise fastening means for releasably fastening the body end portion with the hook to block the loading floor from rotation.

[0010] Preferably, the fastening means comprise a motor-driven pin for engaging with a recess in the hook.

[0011] The object of the invention is also a mechanism for rotating the platform of a railway wagon chassis, wherein the mechanism comprises a toothed wheel mounted on a shaft of a motor and coupled with a toothed bar via a housing of a slide, the slide provided with a hydraulic actuator, wherein the toothed bar can be integrated with the chassis body mounted over bogies or can be attached thereto by screws, rivets or by welding, wherein the holder of the side of the wagon chassis is located on a top surface of a reinforced side of the platform; during rotation of the platform, the slide housings are moved to end positions of the toothed bars, wherein the pins of the hydraulic motors are extended and fastened with the holder of the side of the wagon chassis body, and by rotation of the motors and transmission of the drive via toothed wheels and toothed bars, the slide housings are moved to opposite positions at the toothed bars, which results in rotation of the platform with respect to the rotation center.

[0012] The present invention is shown by means of exemplary embodiments in a drawing, in which:

Figs. 1A-1C show schematically the concept underlying the present invention,

Fig. 2 shows a detailed view of a section of the railway wagon, where the loading floor is partially rotated and the slide is not coupled with the holder of the loading floor (to improve the clarity of the drawing).

Fig. 3 shows an enlarged view of the mechanism to indicate the elements related to rotation,

Fig. 4 shows an enlarged view of the mechanism to indicate the elements related to blocking the floor.

[0013] Figs. 1A-1C show schematically the concept underlying the present invention. The railway wagon comprises a body having end portions 6 mounted on bogies 18 and a middle portion 19 over which a loading floor 20 is horizontally rotatable around a rotation centre 10. Preferably, the middle portion 19 is recessed with respect to the end portions 6, to lower the position of the loading floor, thereby enabling transportation of high vehicles on low gauges, such as GB1 gauge (which is only 4320mm high). The wagon comprises a pair of toothed bars 3, each extending along the width of each end portion 6 next to the middle portion 19 and each having a slide 4 mounted thereon and coupled therewith via a toothed wheel 1 driven by a motor 2. There is a pair of holders 7 located at each shorter edge of the loading floor 20. The slides 4 can be releasably fastened to one of the holders 7 by fastening means 5. When the wagon

is in a transport configuration, wherein the longitudinal axis of the loading floor 20 overlaps the longitudinal axis of the wagon body, as shown in Fig. 1A, the slides 4 are driven along the toothed bars 3 to diagonally opposite holders 7 of the loading floor 20. Then, the fastening means 5 are used to fasten the slides 4 to the holders 7. Next, the motors 2 are activated to drive the slides 4 along the toothed bars 3 in opposite directions to the ends of the toothed bars 3 in order to rotate the loading floor 20 around the centre 10, as shown in Fig. 1B. This moves the floor to a loading configuration, in which the longitudinal axis of the loading floor is inclined with respect to the longitudinal axis of the wagon body. In order to rotate the loading floor from the transport configuration to the loading configuration in opposite direction, as shown in Fig. 1C, the slides 4 should be coupled to the other diagonally opposite pair of holders 7 of the loading floor 20.

[0014] Figs. 2-4 show an exemplary detailed embodiment of the invention.

[0015] The toothed bar 3 may be integrally formed with the body chassis end portion 6, or can be attached thereto by screws, rivets or by welding.

[0016] The toothed wheel 1 can be mounted on a shaft of an electric, hydraulic or pneumatic motor 2 that drives the toothed wheel 1.

[0017] The fastening means 5 may comprise a hydraulic actuator with an extensible pin for engaging with the holder 7 of the loading floor. The holder 7 is shown in Figs. 2-4 schematically only. The pin has preferably a shape adapted to facilitate coupling with the holder 7. The holders 7 are preferably mounted on reinforced sides 9 of the loading floor 20.

[0018] The loading floor 20 may comprise a pair of hooks 11 protruding from the corners of each shorter edge of the loading floor 20. The body end portions 6 may comprise guides 13, located preferably below the toothed bars 3. When the loading floor 20 is in the transport configuration, as shown in Fig. 1A, both hooks 11 are supported on the guide 13. When the loading floor 20 rotates, at least one of the hooks 11 is always slidably supported on the guide 13, thereby providing stable support for the floor at its diagonally opposite corners.

[0019] Each hook 13 may have a recess 14 formed therein. Fastening means, such as a pin 15 driven by a hydraulic motor 16 may be provided at the ends of the guides 13, in order to fasten the body end portion 6 with the hook 11 to block the loading floor 20 from rotation either in the transport configuration or in the loading configuration. The pin 15 and the recess 14 may be wedge-shaped to facilitate their coupling.

[0020] The mechanism according to the invention allows rotating and blocking of the loading floor. It is highly functional, damage-resistant and easy to use. It allows quick change from a transport to a loading configuration, which is particularly useful when transporting vehicles. The wagon according to the invention does not require specialized platforms.

Claims

1. A railway wagon comprising a body having end portions (6) mounted on bogies (18) and a middle portion (19) over which a loading floor (20) is horizontally rotatable around a rotation centre (10), **characterized in that** the wagon further comprises:
 - a pair of toothed bars (3), each extending along the width of each end portion (6) next to the middle portion (19), each having a slide (4) mounted thereon and coupled therewith via a toothed wheel (1) driven by a motor (2),
 - and fastening means (5) for releasably fastening each slide (4) to one holder (7) of a pair of holders (7) located at each shorter edge of the loading floor (20) to enable rotation of the loading floor (20) by driving the slides (4) in opposite directions along the toothed bars (3).
2. The railway wagon according to claim 1, wherein the fastening means (5) comprise a hydraulic-actuated pin for engaging with the holder (7).
3. The railway wagon according to claim 1, wherein the loading floor (20) comprises a pair of hooks (11) protruding from the corners of each shorter edge of the loading floor (20) and the body end portions (6) comprise guides (13) on which at least one of the hooks (11) is slidably supported during rotation of the loading floor (20).
4. The railway wagon according to claim 3, wherein the body end portions (6) comprise fastening means (16) for releasably fastening the body end portion (6) with the hook (11) to block the loading floor (20) from rotation.
5. The railway wagon according to claim 3, wherein the fastening means (16) comprise a motor-driven pin (15) for engaging with a recess (14) in the hook (11).
6. A mechanism for rotating the platform of a railway wagon chassis, **characterized in that** it comprises a toothed wheel (1) mounted on a shaft of a motor (2) and coupled with a toothed bar (3) via a housing of a slide (4), the slide (4) provided with a hydraulic actuator (5), wherein the toothed bar (3) can be integrated with the chassis body (6) mounted over bogies or can be attached thereto by screws, rivets or by welding, wherein the holder (7) of the side of the wagon chassis (8) is located on a top surface of a reinforced side of the platform (9); during rotation of the platform, the slide housings (4) are moved to end positions of the toothed bars (3), wherein the pins of the hydraulic motors (5) are extended and fastened with the holder (7) of the side of the wagon chassis body (8), and by rotation of the motors (2) and trans-

mission of the drive via toothed wheels (1) and toothed bars (3), the slide housings (4) are moved to opposite positions at the toothed bars (3), which results in rotation of the platform with respect to the rotation center (10).

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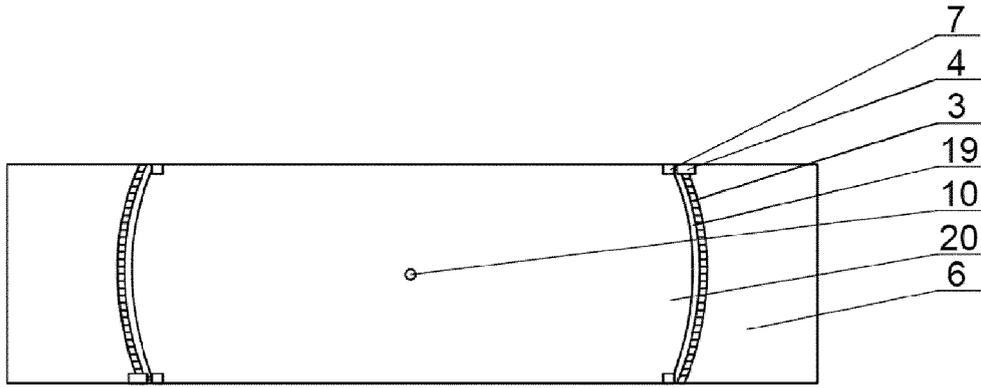


Fig. 1A

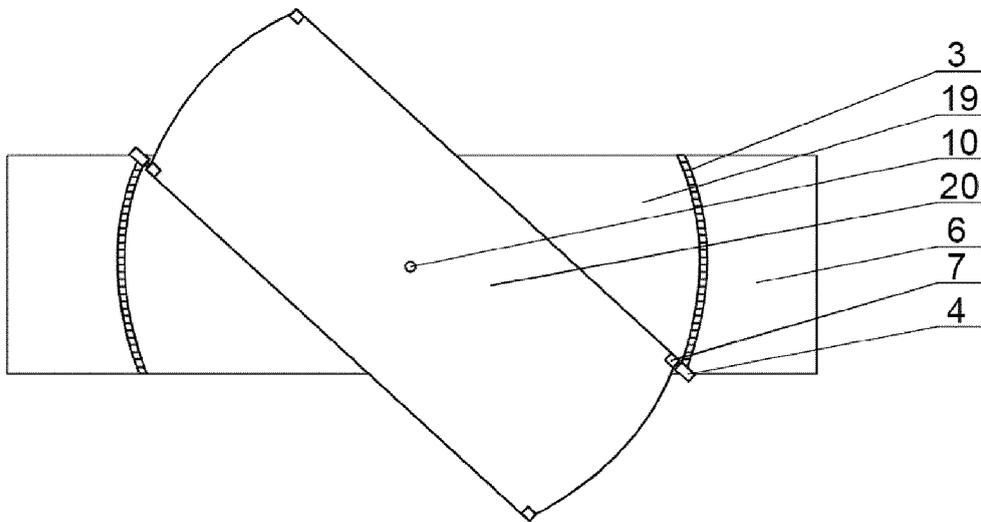


Fig. 1B

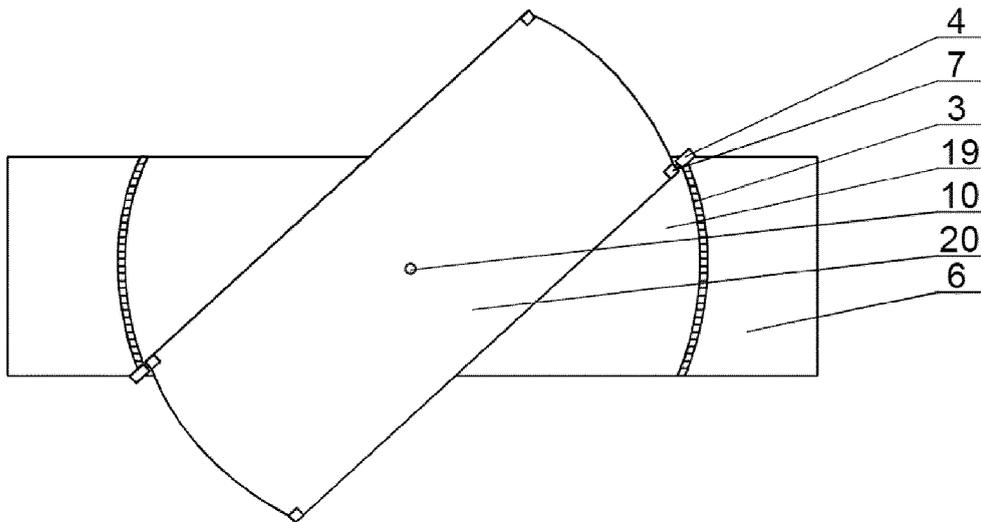


Fig. 1C

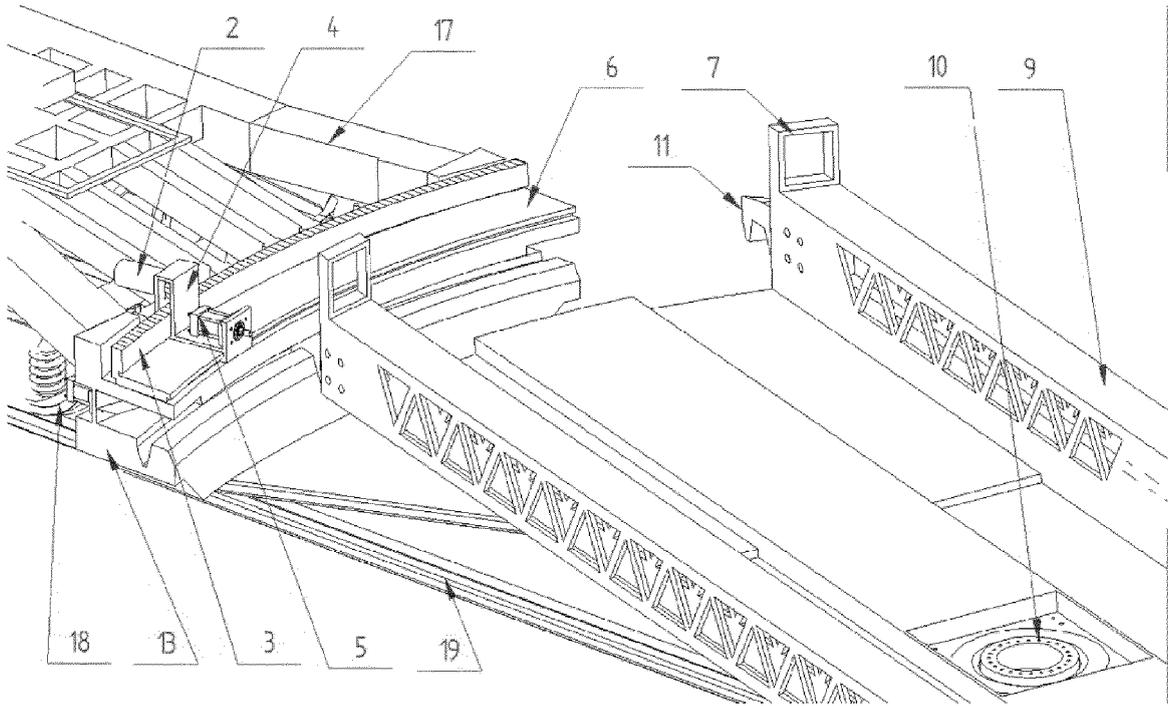


Fig. 2

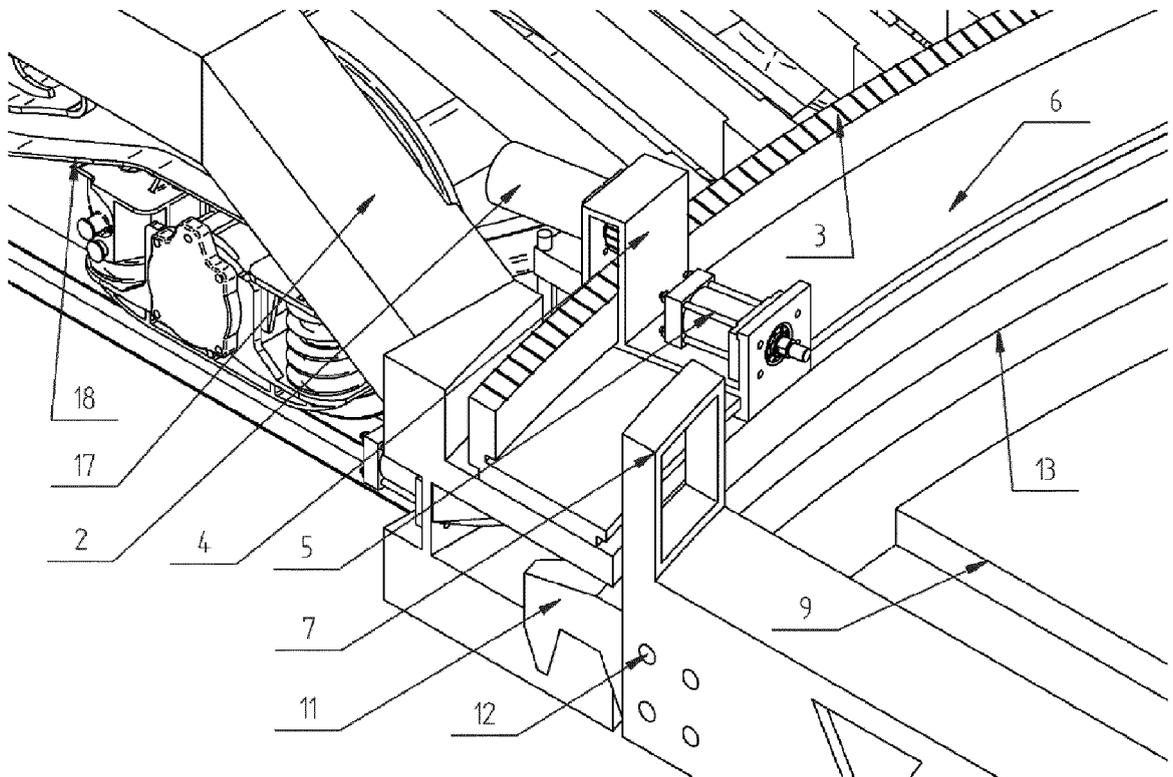


Fig. 3

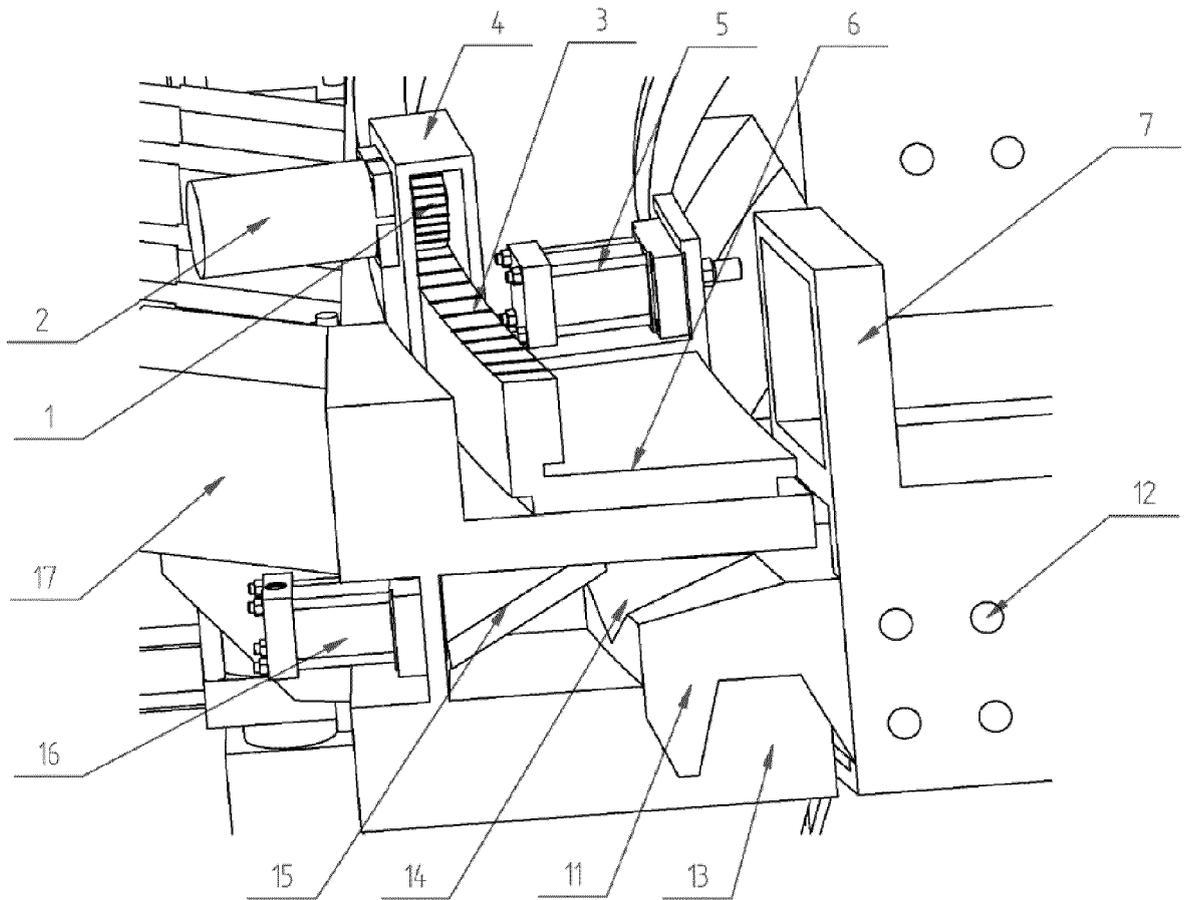


Fig. 4



EUROPEAN SEARCH REPORT

Application Number
EP 12 17 0915

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 0 208 228 A2 (WALDA FEDDE [NL]; WALDA NANNE MARCEL [NL]; WALDA BENNO FEDDE [NL]) 14 January 1987 (1987-01-14) * figures 1-3 *	1	INV. B61D3/18
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			TECHNICAL FIELDS SEARCHED (IPC)
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 12 September 2012	Examiner Lorandi, Lorenzo
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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