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(54) **TRAIN COUPLER ADAPTER AND TRAIN**

(57) Train coupler adapter for connecting a coupler of a first geometry with a draw hook coupler, whereby the adapter has a front section with an interface suitable to couple with a coupler of a first geometry, a rear section with an opening suitable for the tip of the hook of the draw hook coupler to be inserted into, a safety bracket at the rear section that has a traversing section that is positioned beneath the opening and traverses over the opening, whereby the safety bracket has a first arm arranged on one side of the rear section, whereby a first part of the first arm is attached to the rear section in a manner that allows a second part of the first arm to swivel relative to the rear section, a second arm arranged on the oppo-

site side of the rear section relative to that side, on which the first arm is arranged, whereby a first part of the second arm is attached to the rear section in a manner that allows a second part of the second arm to swivel relative to the rear section, the traversing section being connected to the second part of the first arm and the second part of the second arm, whereby a blocking element is provided that limits the swivel angle of the first arm and limits the swivel angle of the second arm, whereby the blocking element has a first part that is connected to the traversing section and/or the second part of the first arm and/or the second part of the second arm and a second part that is connected to the front section or the rear section.

**EP 3 656 638 A1**

## Description

**[0001]** The invention relates to a train coupler adapter for connecting a coupler of a first geometry with a draw hook coupler. The invention also relates to a system of such an adapter and a draw hook coupler. The invention also relates to a train with a first car with a coupler of a first geometry and a second car with a draw hook coupler.

**[0002]** From EP 2 384 948 A1 and WO 2015/162122 A1 a train coupler adapter for connecting a coupler of a first geometry with a draw hook coupler is known, whereby the disclosed adapter has a front section with an interface suitable to couple with a coupler of a first geometry and a rear section with an opening suitable for the tip of the hook of the draw hook coupler to be inserted into and a safety bracket at the rear section that has a traversing section that is positioned between the opening and that traverses over the opening.

**[0003]** Given this background the problem to be solved by the invention was to suggest a train coupler adapter, a system of such an adapter with a draw hook coupler and a train with a first car with a coupler of a first geometry and a second car with a draw hook coupler that would allow the train coupler adapter to be connected to the hook of the draw hook coupler with handling operations that predominantly can be performed from the front.

**[0004]** This problem is solved by a train coupler adapter according to claim 1, a system according to claim 7, a train according to claim 8 and a method according to claim 9. Further embodiments of the invention are described in the subordinated claims and in the description following hereafter.

**[0005]** The invention is based on the idea of making the safety bracket swivel relative to the rear section, while at the same time providing a blocking element that limits the swiveling motion of the safety bracket. Such an arrangement allows the rear section to be attached to the hook of the draw hook coupler in an easy manner. During the attachment phase, the safety bracket preferably is allowed to swivel relative to the rear section. If the safety bracket is allowed to swivel relative to the rear section, this allows the tip of the hook to be more easily introduced into the opening of the rear section, because the safety bracket will make room for the maneuvering of the rear section relative to the hook and will not be in the way of any relative motion of the hook relative to the rear section, be at transvers movements or rotational movements. The invention does, however also provide the blocking element to limit the swivel angle of the safety bracket relative to the rear section. This allows to keep the safety bracket in a certain position/ in a certain area. This feature can, for example, be used to make sure that the safety bracket remains in a certain area once the hook has been connected to the rear section of the adapter and hence allows the safety bracket to be used as reassurance to prevent that the hook decouples from the rear section of the adapter.

**[0006]** The invention is directed to a train coupler

adapter. These adapters are used, if a car of a train, for example a passenger car of a train is to be connected to different car of a train, for example a locomotive, for example a shunting lock (shunting locomotive), which might have a coupler geometry that is not suitable to couple with the coupler geometry of the first train of the car. A train coupler adapter hence makes sure that it can be coupled to the coupler of the first car of the train as well as being coupled to the draw hook coupler of the second car of the train in such a manner that it allows towing and/or pushing forces to be transmitted from the first car of the train to the second car of the train or vice versa.

**[0007]** The adapter has a front section, this front section has an interface that is suitable to couple with a coupler of a first geometry. In a preferred embodiment, the first geometry is the geometry of a central buffer coupling (German term: "Mittelpufferkupplung"). Embodiments of the invention are feasible, where the first geometry of the coupler is a draw hook (German term: "Zughaken"), or the first geometry of the coupler is a automatic coupling, for example of the built-type "Scharfenberg" (German term: "Automatische Kupplung; Bauart Scharfenberg"), for example the couplers that have become known in the industry under the abbreviation "type 10", or the first geometry of the coupler is an automatic coupling of the type as they have become known in the industry under the names US AAR, India AAR, China type 17 or SA3, or the first geometry of the coupler is for example of a Albert coupler or of a Miller Hook and Platform coupler or of a Norwegian coupler or of a Johnston coupler or of a bell-and-hook coupler or of a Janney/MCB/ARA/AAR/APTA coupler or of a Willison/SA3 coupler or of a Westinghouse H2C coupler or of a WABCO N-Type or of a Topmlinson couler or of a ward coupler or of a shibata coupler.

**[0008]** The interface at the front section of the adapter can be of a reduced design relative to the design of a complete coupler head of the first geometry. Often, it is sufficient for the purposes of shunting cars of a train to work with reduced designs on the interface of the adapter. The interface of the adapter only needs to make sure that the adapter is attached to the coupler on the car of a train sufficiently securely for the traveling speeds of the shunting. Likewise, the interface needs to be sufficiently strong to allow the pushing forces and/or pulling forces that occur during shunting to be safely transmitted to the coupler on the car of the train. The interface for these purposes need not have to have the electronic connections or the hydraulic connections that a fully designed coupler had would normally have. In an alternative embodiment of the invention, the interface of the front section of the adapter is a coupler head that has all counter elements that a coupler head of a normal train of a car that would couple to the coupler of the car of the train would have, for example would also have the electronic connections and the hydraulic connections.

**[0009]** The adapter also has a rear section with an opening suitable for the tip of the hook of the draw hook coupler to be inserted into. The opening can be a blind-

hole in the sense that the tip of the hook of the draw hook coupler remains inside the opening, once it is inserted into the opening. In a preferred embodiment, the opening is, however, a through-opening that allows the tip of the hook to leave the opening on the opposite side to that side, on which the tip of the hook has been inserted into the opening.

**[0010]** The hook could for example be the hook of a draw hook coupler as shown in DIN 25 605 Blatt 1.

**[0011]** The adapter further has a safety bracket at the rear section. The safety bracket has a traversing section that is positioned beneath the opening. The traversing section traverses over the opening. In a preferred embodiment, the traversing section does not traverse over the opening directly at the mouth of the opening, but is arranged at a distance to the mouth of the opening. With a hook, which has been inserted with its tip into the opening, the safety bracket can be used to limit a travel of the tip of the hook out of the opening. The safety bracket hence can be used to prevent the hook from disconnecting to the adapter. The term "beneath" is considered to describe the position of the traversing section relative to the rear section in a situation, where front section and the rear section are arranged in such a manner that the front section is arranged next to the rear section, but not immediately above or immediately below the rear section.

**[0012]** According to the invention, the safety bracket has a first arm arranged on one side of the rear section. The first arm has a first part and a second part. The first part of the first arm is attached to the rear section. The attachment of the first part of the first arm to the rear section is provided in such a manner that it allows the second part of the first arm to swivel relative to the rear section. This can, for example be obtained by providing the first part of the first arm with a through hole and by a bolt that bolts the first part of the first arm to the rear section to pass through this through-hole, whereby the first part of the first arm is held to the rear section by way of the bolt sufficiently loosely to allow a swivel movement of the second part of the first arm relative to the rear section. In alternative embodiments, bearings, like bushes or ball bearings can be used as part of the connection of the first part of the first arm to the rear section.

**[0013]** According to the invention, the safety bracket also has a second arm. The second arm is arranged on the opposite side of the rear section relative to that side, on which the first arm is arranged. The second arm has a first part and has a second part. The first part of the second arm is attached to the rear section. The attachment of the first part of the second arm to the rear section is provided in such a manner that it allows the second part of the second arm to swivel relative to the rear section. This can, for example be obtained by providing the first part of the second arm with a through hole and by a bolt that bolts the first part of the second arm to the rear section to pass through this through-hole, whereby the first part of the second arm is held to the rear section by

way of the bolt sufficiently loosely to allow a swivel movement of the second part of the second arm relative to the rear section. In alternative embodiments, bearings, like bushes or ball bearings can be used as part of the connection of the first part of the second arm to the rear section

**[0014]** In a preferred embodiment, the first arm and/or the second arm are punched parts.

**[0015]** According to the invention, the safety bracket has a traversing section that is connected to the second part of the first arm and the second part of the second arm. In a preferred embodiment, the second part of the first arm includes one end of the first arm. In a preferred embodiment, the second part of the second arm includes one end of the first arm. In a preferred embodiment, the traversing section hence connects one end of the first arm with one end of the second arm. The connection between the traversing section and the second part of the first arm and/or the connection between the traversing section and the second part of the second arm can be a fixed connection, for example a connection obtained by welding or by glueing. The connection between the traversing section and the second part of the first arm and/or the connection between the traversing section and the second part of the second arm can, however, also be a form-fit connection, for example by way of parts of the traversing section passing through openings in the second part of the first arm or the second part of the second arm. These parts can be provided with locks, for example nuts that are screwed onto external threads provided on parts on the traversing section.

**[0016]** According to the invention, the adapter has a blocking element that limits the swivel angle of the first arm and limits the swivel angle of the second arm relative to the rear section. The first part of the blocking element can be connected to the traversing section of the safety bracket alone. The first part of the blocking element can be connected to the second part of the first arm alone. The first part of the blocking element can be connected to the second part of the second arm alone. The first part of the blocking element can be connected to the traversing section and second part of the first arm. The first part of the blocking element can be connected to the traversing section and second part of the second arm. The first part of the blocking element can be connected to the traversing section and to the second part of the first arm and to the second part of the second arm.

**[0017]** The blocking element has a second part that is connected to the front section or the rear section. In the embodiment with the second part being connected to the front section, the placement and the taking-away of the blocking element can be conducted very easily from the front. Especially in situations, where the draw hook coupler is surrounded by other elements, e.g. buffers or other parts of a shunting locomotive, it might turn out difficult to access the adapter from the rear or from the sides. In such situations, it is helpful, if the placement and the taking-away of the blocking element can be conducted very

easily from the front.

**[0018]** In a preferred embodiment, the blocking element has a main body. In a preferred embodiment, the main body of the blocking element is a rigid body. One purpose of the blocking element is to prevent that the first arm and the second arm swivel relative to the rear section further than a predefined limit. In order to achieve this, a rigid main body of the blocking element is suitable as it allows to set a precise limit. At the same time it can be advantageous to have tolerances or to have damping, for example to prevent the system of safety bracket and blocking element to interlock in such a manner that it becomes difficult to dismantle the blocking element. Such an interlocking of the safety bracket and the blocking element could prevent the hook of the draw hook coupler to be detached from the adapter. Hence even though a rigged main body of the blocking element is preferred, it is at the same time preferred that the connection between the blocking element and the safety bracket and/or the connection between the blocking element and the front section or the rear section has damping elements and/or has loose tolerances.

**[0019]** In a preferred embodiment, the rear section has a first plate and has a second plate that is arranged parallel to the first plate. The first plate and/or the second plate do not need to be plane plates. It is feasible that the first plate and/or the second plate have steps, creases, kinks or bends. For example, a design is feasible, where the first plate and the second plate are connected directly to each other at a first end and then each have a bend section, which allows a mouth to be provided by the first plate and the second plate. Such an arrangement would still be considered to have the second plate arranged parallel to the first plate.

**[0020]** In a preferred embodiment, the first plate and/or the second plate has a rear end and the rear end preferably has a rounded end and not a rectangular shaped end.

**[0021]** In a preferred embodiment, a bolt passes between the first plate and the second plate. The bolt preferably is fixedly attached to the first plate and/or the second plate. The bolt can be of such a shape that it can be inserted into the mouth of the hook of the draw hook coupler.

**[0022]** In a preferred embodiment, a surface section of the first plate delimits the opening. In a preferred embodiment, a surface section of the second plate delimits the opening. In a preferred embodiment a surface section of the bolt delimits the opening.

**[0023]** In a preferred embodiment, the opening is delimited completely by a surface section of the first plate, a surface section of the second plate and a surface section of the bolt. This can be obtained by having the first plate being directly connected to the second plate, for example at a location opposite the location, where the bolt passes between the first plate and the second plate. In an alternative preferred embodiment, the opening is delimited completely by a surface section of the first plate,

a surface section of the second plate, a surface section of the bolt and a surface section of an intermediate element arranged between the first plate and the second plate opposite to the location where the bolt is arranged.

**[0024]** In a preferred embodiment, the first arm is attached to the first plate. In a preferred embodiment, the second arm is attached to the second plate.

**[0025]** In a preferred embodiment, the traversing section has an opening. In a preferred embodiment the first part of the blocking element passes through the opening. In a preferred embodiment, a first stopping element is arranged on the first part of the blocking element on one side of the traversing section, the first stopping element stopping the blocking element from being pushed further through the opening of the traversing section than the location of the first stopping element on the first part.

**[0026]** The first stopping element can be provided by a material thickening on the first part of the blocking element. The first blocking element can also be provided by a nut screwed onto an external thread on the first part of the blocking element. Or a washer that is arranged next to a nut that is screwed onto an external thread on the first part of the blocking element. The first stopping element can also be a splinter or a wedge pushed into an opening in the first part of the blocking element. The first stopping element can also be a bolt that is pushed into an opening on the first part of the blocking element. Such a bolt can again be secured in the opening on the first part of the blocking element by way of splinters.

**[0027]** In a preferred embodiment, a second stopping element is arranged on the first part of the blocking element on the opposite side of the traversing section when compared to the side of the traversing section, on which the first stopping element is arranged. The second stopping element stopping the blocking element from being pulled further through the opening of the traversing section than the location of the second stopping element on the first part.

**[0028]** The second stopping element can be provided by a material thickening on the first part of the blocking element. The second blocking element can also be provided by a nut screwed onto an external thread on the first part of the blocking element. Or a washer that is arranged next to a nut that is screwed onto an external thread on the first part of the blocking element. The second stopping element can also be a splinter or a wedge pushed into an opening in the first part of the blocking element. The second stopping element can also be a bolt that is pushed into an opening on the first part of the blocking element. Such a bolt can again be secured in the opening on the first part of the blocking element by way of splinters.

**[0029]** In a preferred embodiment, the distance along the blocking element between the first stopping element and the second stopping element is more than 1.5 times the width of the traversing section that the traversing section has in the area where the opening is provided on the traversing section for the blocking element to pass

through. Placing the first stopping element and the second stopping element a certain distance apart, allows for the traversing section to travel along the first part of the blocking element a certain distance until it either hits the first stopping element or the second stopping element. Hence, the connection between the blocking element and the traversing section includes some play, which helps to prevent the interlocking between the safety bracket and the blocking element. In a preferred embodiment, the distance along the blocking element between the first stopping element and the second stopping element is more than 2 times, preferably more than 3 times, preferably more than 4 times the width of the traversing section that the traversing section has in the area where the opening is provided on the traversing section for the blocking element to pass through.

**[0030]** In an alternative embodiment, the distance between the first stopping element on the first part of the blocking element and the second stopping element on the first part of the blocking element is arranged such that the first stopping element contacts the traversing section, while the second stopping element at the same time contacts the traversing section. In such a design, there is no play between the blocking element and the traversing section of the safety bracket.

**[0031]** In a preferred embodiment, splinters or any other detachable part that is used for the connection between the blocking element and the traversing section have chains attached to them, which at their other ends are connected to a further part of the adapter thereby preventing these elements to be lost.

**[0032]** In a preferred embodiment, where bolts passing through holes in the first part of the blocking element are used as first stopping element or second stopping element, several holes arranged next to each other are provided on the first part of the blocking element in order to allow an easy adaptation of the placement of the first stopping element and/or the second stopping element to the specific needs of a specific connection situation.

**[0033]** In an alternative to the traversing section having an opening, the traversing section can be a solid bar and the first part of the blocking element can have an opening with the traversing section being passed through the opening or can have a u-shaped section that grips around the traversing section.

**[0034]** In a preferred embodiment, the adapter has a holder that holds the second part of the blocking element. In a preferred embodiment, the holder has an opening and the second part of the blocking element passes through the opening.

**[0035]** In a preferred embodiment, a first holder stopping element is arranged on the second part of the blocking element on one side of the holder, the first holder stopping element stopping the blocking element from being pushed further through the opening of the holder than the location of the first holder stopping element on the second part.

**[0036]** The first holder stopping element can be pro-

vided by a material thickening on the second part of the blocking element. The first blocking element can also be provided by a nut screwed onto an external thread on the second part of the blocking element. Or a washer that is arranged next to a nut that is screwed onto an external thread on the second part of the blocking element. The first holder stopping element can also be a splinter or a wedge pushed into an opening in the second part of the blocking element. The first holder stopping element can also be a bolt that is pushed into an opening on the second part of the blocking element. Such a bolt can again be secured in the opening on the second part of the blocking element by way of splinters.

**[0037]** In a preferred embodiment, a second holder stopping element is arranged on the second part of the blocking element on the opposite side of the holder when compared to the side of the holder, on which the first holder stopping element is arranged. The second holder stopping element stopping the blocking element from being pulled further through the opening of the holder than the location of the second holder stopping element on the second part.

**[0038]** The second holder stopping element can be provided by a material thickening on the second part of the blocking element. The second blocking element can also be provided by a nut screwed onto an external thread on the second part of the blocking element. Or a washer that is arranged next to a nut that is screwed onto an external thread on the second part of the blocking element. The second holder stopping element can also be a splinter or a wedge pushed into an opening in the second part of the blocking element. The second holder stopping element can also be a bolt that is pushed into an opening on the second part of the blocking element. Such a bolt can again be secured in the opening on the second part of the blocking element by way of splinters.

**[0039]** In a preferred embodiment, the distance along the blocking element between the first holder stopping element and the second holder stopping element is more than 1.5 times the width of the holder that the holder has in the area where the opening is provided on the holder for the blocking element to pass through. Placing the first holder stopping element and the second holder stopping element a certain distance apart, allows for the holder to travel along the second part of the blocking element a certain distance until it either hits the first holder stopping element or the second stopping element. Hence, the connection between the blocking element and the holder includes some play, which helps to prevent the interlocking between the safety bracket and the blocking element. In a preferred embodiment, the distance along the blocking element between the first holder stopping element and the second holder stopping element is more than 2 times, preferably more than 3 times, preferably more than 4 times the width of the holder that the holder has in the area where the opening is provided on the holder for the blocking element to pass through.

**[0040]** In an alternative embodiment, the distance be-

tween the first holder stopping element on the second part of the blocking element and the second holder stopping element on the second part of the blocking element is arranged such that the first holder stopping element contacts the holder, while the second holder stopping element at the same time contacts the holder. In such a design, there is no play between the blocking element and the holder of the safety bracket.

**[0041]** In a preferred embodiment, where bolts passing through holes in the second part of the blocking element are used as first holder stopping element or second holder stopping element, several holes arranged next to each other are provided on the second part of the blocking element in order to allow an easy adaptation of the placement of the first holder stopping element and/or the second holder stopping element to the specific needs of a specific connection situation.

**[0042]** In a preferred embodiment, the blocking element has a main body. The main body has a first section and a second section. In a preferred embodiment, the first part of the blocking element is part of the first section of the main body, while the second part of the blocking element preferably is part of the second section of the main body. In a preferred embodiment, the first section is detachably connected to the second section. In a preferred embodiment, the first section has an external thread and the second section has an internal thread that can be threaded onto the external thread of the first section. In an alternative preferred embodiment, the second section has an external thread and the first section has an internal thread that can be threaded onto the external thread of the second section.

**[0043]** In a preferred embodiment, splinters or any other detachable part that is used for the connection between the blocking element and holder have chains attached to them, which at their other ends are connected to a further part of the adapter thereby preventing these elements to be lost.

**[0044]** The system according to the invention has an adapter according to the invention and has a draw hook coupler, whereby the tip of the hook of the draw hook coupler has been inserted into the opening of the adapter.

**[0045]** In a preferred embodiment, the traversing section of the safety bracket is arranged beneath the hook of the draw hook coupler.

**[0046]** The train according to the invention has a first car with a coupler of a first geometry. The train according to the invention also has a second car with a draw hook coupler. According to the invention, the train is provided with an adapter according to the invention, whereby the tip of the hook of the draw hook coupler has been inserted into the opening of the adapter and the interface of the adapter has been coupled to the coupler.

**[0047]** In a preferred embodiment, the car of the train that has a draw hook coupler is a shunting locomotive.

**[0048]** According to the method of the invention, the adapter according to the invention is connected to the hook of the draw hook coupler. In a first step the tip of

the hook of the draw hook coupler is inserted into the opening. In a second step

- the first part of the blocking element is connected to the traversing section and/or the second part of the first arm and/or the second part of the second arm and/or
- the second part of the blocking element is connected to the front section or the rear section.

**[0049]** During the first step, the safe first part of the blocking element is not connected to the traversing section and/or the second part of the blocking part is not connected to the front section or the rear section. The safety bracket hence is free to swivel relative to the rear section. This allows for the safety bracket to be swiveled out of the way in order to facilitate the insertion of the tip of the hook into the opening. In the second step, the placement of the blocking element will be either be made for the first time, namely in those embodiments, where in the second step the first part of the blocking element is connected to the traversing section and/or the second end of the first arm and/or the second part of the second arm, while also the second part of the blocking element is connected to the front section or the rear section. Or in the second step, the initially only partial placement of the blocking element is completed, namely for those embodiments, where the first part of the blocking element has already been connected to the traversing section and/or the second part of the first arm and/or the second part of the second arm, but the second part of the blocking element had not been connected to the front section or the rear section yet. Or for those embodiments, where during the first step, the second part of the blocking element had already been connected to the front section or the rear section, but the first part of the blocking element had not been connected to the traversing section and/or the second part of the first arm and/or the second part of the second arm yet. In an alternative to the second step, the blocking element has a first section and a second section, the first section being detachably connected to the second section, whereby in this alternative of the method, during the first step, the first part of the blocking element is connected to the traversing section and/or the second part of the first arm and/or the second part of the second arm, while the second part of the blocking element is also connected to the front section or the rear section, but the first section of the main body of the blocking element has been detached from the second section of the main body. In such an alternative of the method, during the second step, the first section of the main body of the blocking element would be connected to the second section of the blocking element in order to complete the placement of the blocking element.

**[0050]** Below, the invention will be described by reference to figures that only show embodiments of the invention. They show:

- Fig. 1 A perspective view onto the train coupler adapter of the invention from behind;
- Fig. 2 A perspective view of the train coupler adapter of Fig. 1 from a different perspective, namely from behind and the top;
- Fig. 3 A side view onto the adapter of Fig. 1;
- Fig. 4 A front view as indicated by the lines A-A in Fig. 3 onto the front of the adapter of Fig. 1;
- Fig. 5 A top view onto the adapter of Fig. 1;
- Fig. 6 A perspective view from the front and top onto a train coupler adapter according to a second embodiment of the invention;
- Fig. 7 A perspective view from the side onto a detail of the adapter according to Fig. 5 and
- Fig. 8 A possible further design of a blocking element that could be used with the embodiment of Fig. 1 to 5.

**[0051]** The adapter 1 according to the invention as shown in Fig. 1 to 7 are suitable for connecting a coupler of a first geometry that is attached to a car of a train with a draw hook coupler that is attached to a second car of a train, preferably a shunting locomotive. The adapters 1 have a front section 2. The front section has an interface 3 that is suitable to couple with the coupler of the first geometry that is attached to the first car of the train (not shown). The adapters 1 also have a rear section 4. The rear section has an opening 5 that is suitable for the tip 6 of the hook 7 of the draw hook coupler to be inserted into this opening 5.

**[0052]** The adapters 1 are provided with safety brackets 8, 28. The safety brackets 8, 28 are arranged at the rear section 4. The safety brackets 8, 28 have a traversing section 9, 29. As can be seen in the Fig. 1, 2, 3, 6, 7 the traversing section 9, 29 is positioned beneath the opening 5. The traversing section 9, 29 traverses over the opening 5. As can be seen from Fig. 1, 2, 3, 6, 7, however, the traversing section 9, 29 is arranged distanced from the opening 5.

**[0053]** The safety bracket 8, 28 has a first arm 10, 30. The first arm 10, 30 is arranged on one side of the rear section 4. A first part 11, 31 of the first arm 10, 30 is attached to the rear section 4 in a manner that allows a second part 12, 32 of the first arm 10, 30 to swivel relative to the rear section 4.

**[0054]** The safety bracket 8, 28 has a second arm 13, 33. The second arm 13, 33 is arranged on one side of the rear section 4, namely on the side opposite to the side on which the first arm 10, 30 is arranged. A first part 14 of the second arm 13, 33 is attached to the rear section 4 in a manner that allows a second part 15, 35 of the second arm 13, 33 to swivel relative to the rear section 4.

**[0055]** The traversing section 9, 29 is connected to the second part 12, 32 of the first arm 10, 30 and the second part 15, 35 of the second arm 13, 33.

**[0056]** The adapter according to the invention also has a blocking element 16, 36. The blocking element 16, 36 limits the swivel angle of the first arm 10, 30 and limits

the swivel angle of the second arm 13, 33 relative to the rear section 4. The blocking element 16, 36 has a first part 17, 37 that is connected to the traversing section 9, 29. The blocking element 16, 36 also has a second part 18, 38 that is connected to a holder 19, 39 that forms part of the front section 2.

**[0057]** The rear section 4 has a first plate 20, 40 and a second plate 21, 41 that is arranged parallel to the first plate 20, 40. A bolt 22, 42 passes between the first plate 20, 40 and the second plate 21, 41. A surface section of the first plate 20, 21 delimits the opening 5. A surface section of the second plate 21, 41 delimits the opening 5 and a surface section of the bolt 22, 42 delimits the opening 5. The opening 5 is also delimited by a surface section of an intermediate element 23 arranged between the first plate 20, 40 and the second plate 21, 41.

**[0058]** The first arm 10, 30 is attached to the first plate 20, 40. The second arm 11, 31 is attached to the second plate 21, 41.

**[0059]** The traversing section 9, 29 has an opening 24, 44. The first part 17, 37 of the blocking element 16, 36 passes through the opening 24, 44. A first stopping element 25, 45 is arranged on the first part 17, 37 of the blocking element 16, 36 on one side of the traversing section 9, 29. The first stopping element 25, 45 stops the blocking element 16, 36 from being pushed further through the opening 24, 44 of the traversing section 9, 29 than the location of the first stopping element 25, 45 on the first part 17, 37.

**[0060]** A second stopping element 26, 46 is arranged on the first part 17, 37 of the blocking element 16, 36 on one side of the traversing section 9, 29, namely on the side opposite to that side on which the first stopping element 25, 45 is arranged. The second stopping element 26, 46 stops the blocking element 16, 36 from being pulled further through the opening 24, 44 of the traversing section 9, 29 than the location of the second stopping element 26, 46 on the first part 17, 37.

**[0061]** The embodiments shown in Fig. 1 to 5, the first stopping element 25 and the second stopping element 26 are provided by bolts that travers a hole in the first part 17 of the blocking element 16. The bolt inserted into the opening is secured by a splinter on one side. As can be seen from Fig. 1, 2, 3 the first part 17 of the blocking element 16 has several holes through which the bolts could be placed. This allows the arrangement of the first part 17 of the blocking element 16 relative to the traversing section 9 to be adapted.

**[0062]** As can best be seen from Fig. 7, the first stopping element of the second alternative (Fig. 6, 7) is provided by way of a nut that is threaded onto an outer thread provided on the first part 37 of the blocking element 36. Likewise the second stopping element 46 is provided by a nut threaded onto the same outer thread provided on the first part 37 of the blocking element 36.

**[0063]** The holder 19, 39 is provided with an opening 27, 47. The second part 18, 38 of the blocking element 16, 36 passes through the opening 27, 47. A first holder

stopping element 58, 48 is arranged on the second part 18, 38 of the blocking element 16, 36 on one side of the holder 19, 39. The first holder stopping element 58, 48 stops the blocking element 16, 36 from being pushed further through the opening 27, 47 of the holder 19, 39 than the location of the first holder stopping element 58, 48 on the second part 18, 38.

**[0064]** A second holder stopping element 59, 49 is arranged on the second part 18, 38 of the blocking element 16, 36 on one side of the holder 19, 39, namely on the side opposite to that side on which the first holder stopping element 58, 48 is arranged. The second holder stopping element 59, 49 stops the blocking element 16, 36 from being pulled further through the opening 27, 47 of the holder 19, 39 than the location of the second holder stopping element 59, 49 on the second part 18, 38.

**[0065]** The blocking element 16 has a main body 60, 50. The main body 60, 50 is made up of a first section 61, 51 and a second section 62, 52. The first section, 61, 51 is detachably connected to the second section 62, 52 by way of a threaded connection.

**[0066]** The design shown in Fig. 1 to 5 and also in the design shown in Fig. 6 and 7, the first holder stopping element 58, 48 and the second holder stopping element 59, 49 are both made up as splinters. The embodiment shown in Fig. 1 to 5 shows the splinters to be secured by chains to the adapter 1.

**[0067]** In order to connect the adapter 1 to the hook 7 of the draw hook coupler, the adapter 1 is taken only with the first section 61, 51 of the main body 60, 50 being attached to the traversing section 9. The second section 62, 52 of the main body 60, 50 is detached from the first section 61, 51. In this arrangement, the safety bracket 8, 28 can swivel about the rear section and can especially swivel forward towards the front section. Such a swivel movement clears the space below the rear section and facilitates the insertion of the tip 6 of the hook 7 into the opening 5. After the tip 6 of the hook 7 into the opening 5 has been inserted, the safety bracket 8, 28 is swiveled back. The second section 62, 52 of the main body 60, 50 is connected to the first section 61, 51. The second part 18, 38 of the blocking element 16 is passed through the opening 27, 47 of the holder 19, 39. The first holder stopping element 58, 48 and the second holder stopping element 59, 49 are put into place and hence prevent the second part 18, 38 of the blocking element 16, 36 to be pulled out of the opening 27, 47 of the holder 19, 39. In this arrangement, the blocking element 16, 36 limits the swivel angle of the first arm 10, 30 and the second arm 13, 33.

**[0068]** Fig. 8 shows a further embodiment of a blocking element 16 that could be used in the design of Fig. 1 to 5. In this embodiment, the traversing section 9 is a solid bar that is connected to the second part 12 of the first arm 10 and the second part 15 of the second arm 13. A u-shaped gripping element 70 grips around the traversing section 9. Splinters 71 prevent the traversing section 9 to be pulled out of the gripping element 70.

## Claims

1. Train coupler adapter (1) for connecting a coupler of a first geometry with a draw hook coupler, whereby the adapter (1) has

- a front section (2) with an interface (3) suitable to couple with a coupler of a first geometry,
- a rear section (4) with an opening (5) suitable for the tip (6) of the hook (7) of the draw hook coupler to be inserted into,
- a safety bracket (8,28) at the rear section (4) that has a traversing section (9, 29) that is positioned beneath the opening (5) and traverses over the opening (5),

### characterized in that

the safety bracket (8,28) has

- a first arm (10,30) arranged on one side of the rear section (4), whereby a first part (11,31) of the first arm (10,30) is attached to the rear section (4) in a manner that allows a second part (12,32) of the first arm (10,30) to swivel relative to the rear section (4),
- a second arm (13,33) arranged on the opposite side of the rear section (4) relative to that side, on which the first arm (10,30) is arranged, whereby a first part (14) of the second arm (13,33) is attached to the rear section (4) in a manner that allows a second part (15,35) of the second arm (13,33) to swivel relative to the rear section (4),
- the traversing section (9, 29) being connected to the second part (12, 32) of the first arm (10,30) and the second part (15,35) of the second arm (13,33),

whereby a blocking element (16,36) is provided that limits the swivel angle of the first arm (10,30) and limits the swivel angle of the second arm (13,33), whereby the blocking element (16,36) has

- a first part (17,37) that is connected to the traversing section (9, 29) and/or the second part (12,32) of the first arm (10,30) and/or the second part (15,35) of the second arm (13,33) and
- a second part (18,38) that is connected to the front section (2) or the rear section (4).

2. Adapter according to claim 1, **characterized in that** the rear section (4) has a first plate (20,40) and a second plate (21,41) that is arranged parallel to the first plate (20,40), whereby a bolt (22,42) passes between the first plate (20,40) and the second plate (21,41), a surface section of the first plate (20,40) delimiting the opening (5), a surface section of the second plate (21,41) delimiting the opening (5) and



a surface section of the bolt (22,42) delimiting the opening (5).

3. Adapter according to claim 2, **characterized in that** the first arm (10,30) is attached to the first plate (20,40) and the second arm (13,33) is attached to the second plate (21,41).

4. Adapter according to any one of claims 1 to 3, **characterized in that** the traversing section (9,29) has an opening (24,44), whereby the first part (17,37) of the blocking element (16,36) passes through the opening (24,44), whereby

- a first stopping element (25,45) is arranged on the first part (17,37) of the blocking element (16,36) on one side of the traversing section (9,29), the first stopping element (25,45) stopping the blocking element (16,36) from being pushed further through the opening (24,44) of the traversing section (9,29) than the location of the first stopping element (25,45) on the first part (17,37),

- a second stopping element (26,46) is arranged on the first part (17,37) of the blocking element (16,36) on the opposite side of the traversing section (9,29), opposite to the arrangement of the first stopping element (25,45), the second stopping element (26,46) stopping the blocking element (16,36) from being pulled further through the opening (24,44) of the traversing section (9,29) than the location of the second stopping element (26,46) on the first part (17,37).

5. Adapter according to any one of claims 1 to 4, **characterized by** a holder (19,39) that holds the second part (18,38) of the blocking element (16,36), whereby the holder (19,39) has an opening (27,47) and the second part (18,38) of the blocking element (16,36) passes through the opening (27,47), whereby

- a first holder stopping element (58,48) is arranged on the second part (18,38) on one side of the holder (19,39), the first holder stopping element (58,48) stopping the blocking element (16,36) from being pushed further through the opening (27,47) of the holder (19,39) than the location of the first holder stopping element (58,48) on the second part (18,38),

- a second holder stopping element (59,49) is arranged on the second part (18,38) of the blocking element (16,36) on opposite side of the holder (19,39), opposite to the arrangement of the first holder stopping element (58,48), the second holder stopping element (59,49) stopping the blocking element (16,36) from being pulled further through the opening (27,47) of the holder

(19,39) than the location of the second holder stopping element (59,49) on the second part (18,38).

6. Adapter according to any one of claims 1 to 5, **characterized in that** the blocking element (16,36) has a main body (60,50), whereby the main body (60,50) has a first section (61,51) and a second section (62,52), the first section (61,51) being detachably connected to the second section (62,52).

7. System of an adapter according to any one of claims 1 to 6 and a draw hook coupler, whereby the tip (6) of the hook (7) of the draw hook coupler has been inserted into the opening (5) of the adapter (1).

8. Train with a first car with a coupler of a first geometry and a second car with a draw hook coupler, **characterized in that** an adapter (1) according to any one of claims 1 to 6 is provided, whereby the tip (6) of the hook (7) of the draw hook coupler has been inserted into the opening (5) of the adapter (1) and the interface (3) of the adapter (1) has been coupled to the coupler.

9. Method for connecting an adapter according to any one of claims 1 to 6 with a hook (7) of a draw hook coupler, whereby in a first step the tip (6) of the hook (7) of the draw hook coupler is inserted into the opening (5) and in a second step

- the first part (17,37) of the blocking element (16,36) is connected the traversing section (9,29) and/or the second part (12,32) of the first arm (10,30) and/or the second part (15,35) of the second arm (13,33) and/or

- the second part (18,38) of the blocking element (16,36) is connected to the front section (2) or the rear section (4).

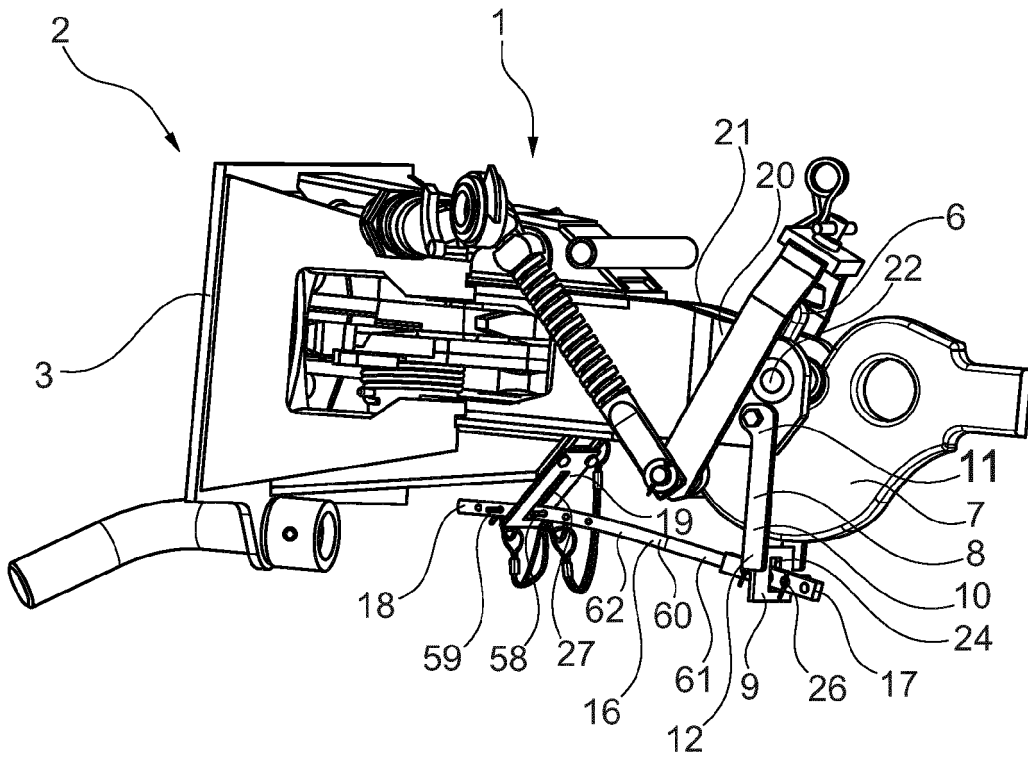


Fig. 1

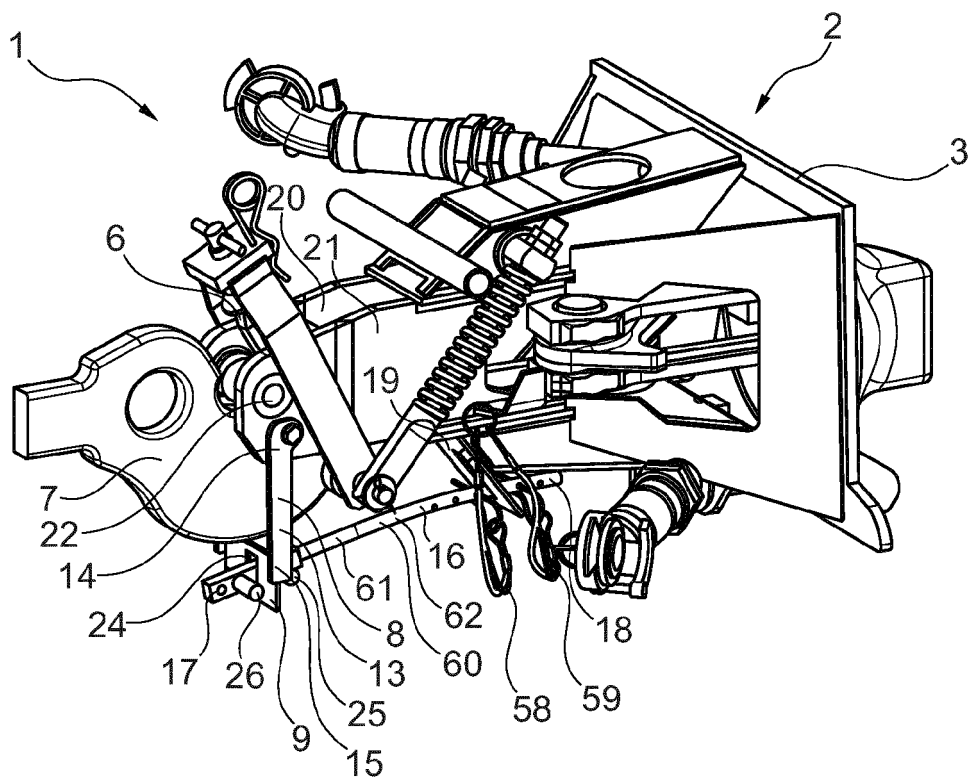


Fig. 2

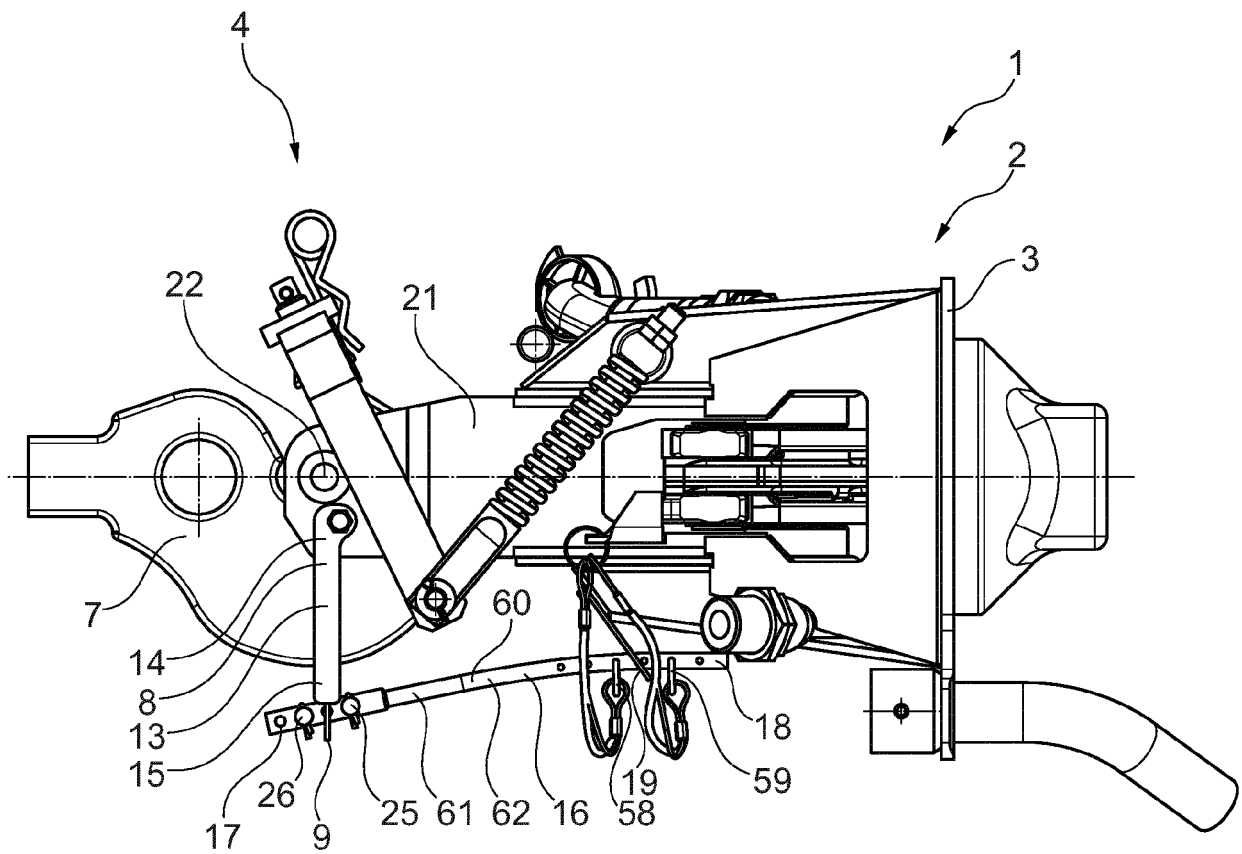


Fig. 3

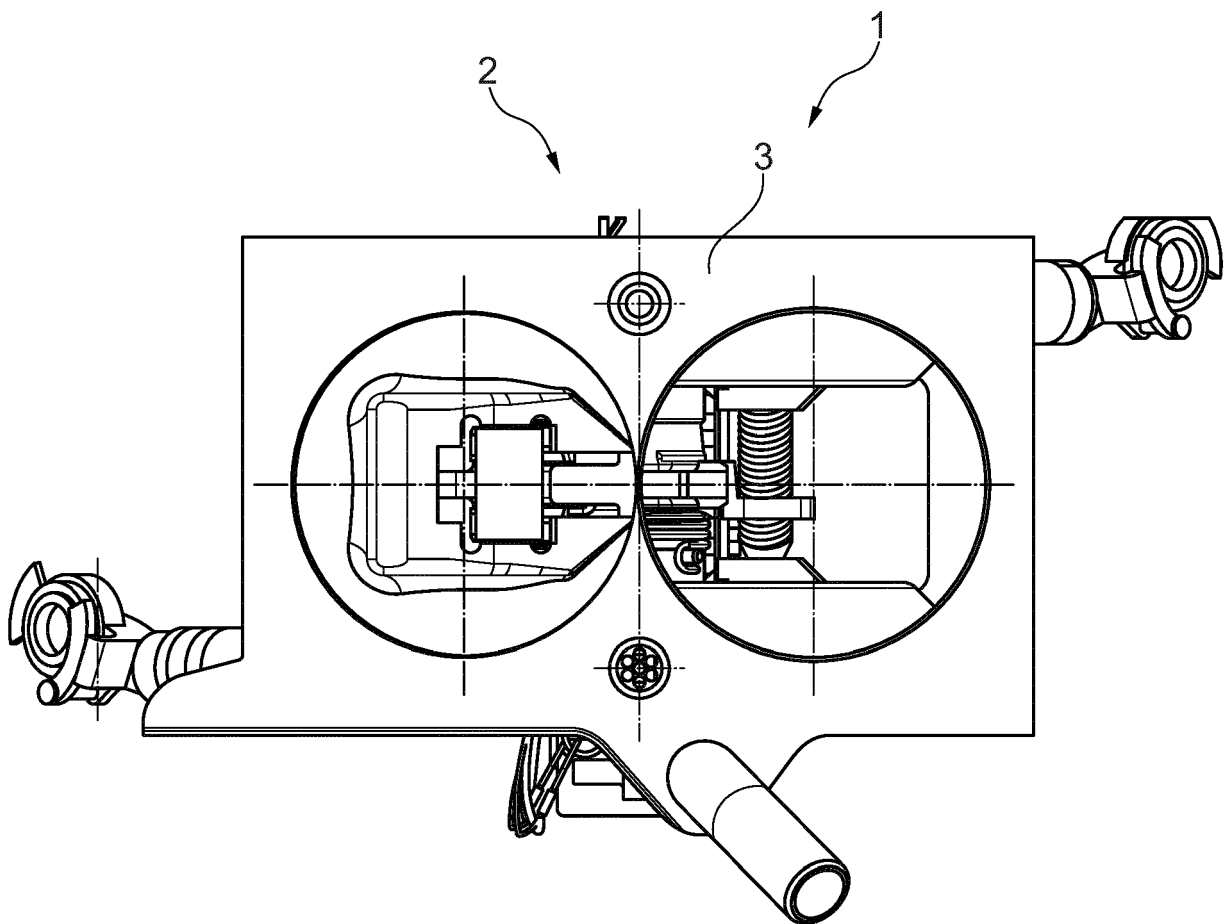


Fig. 4

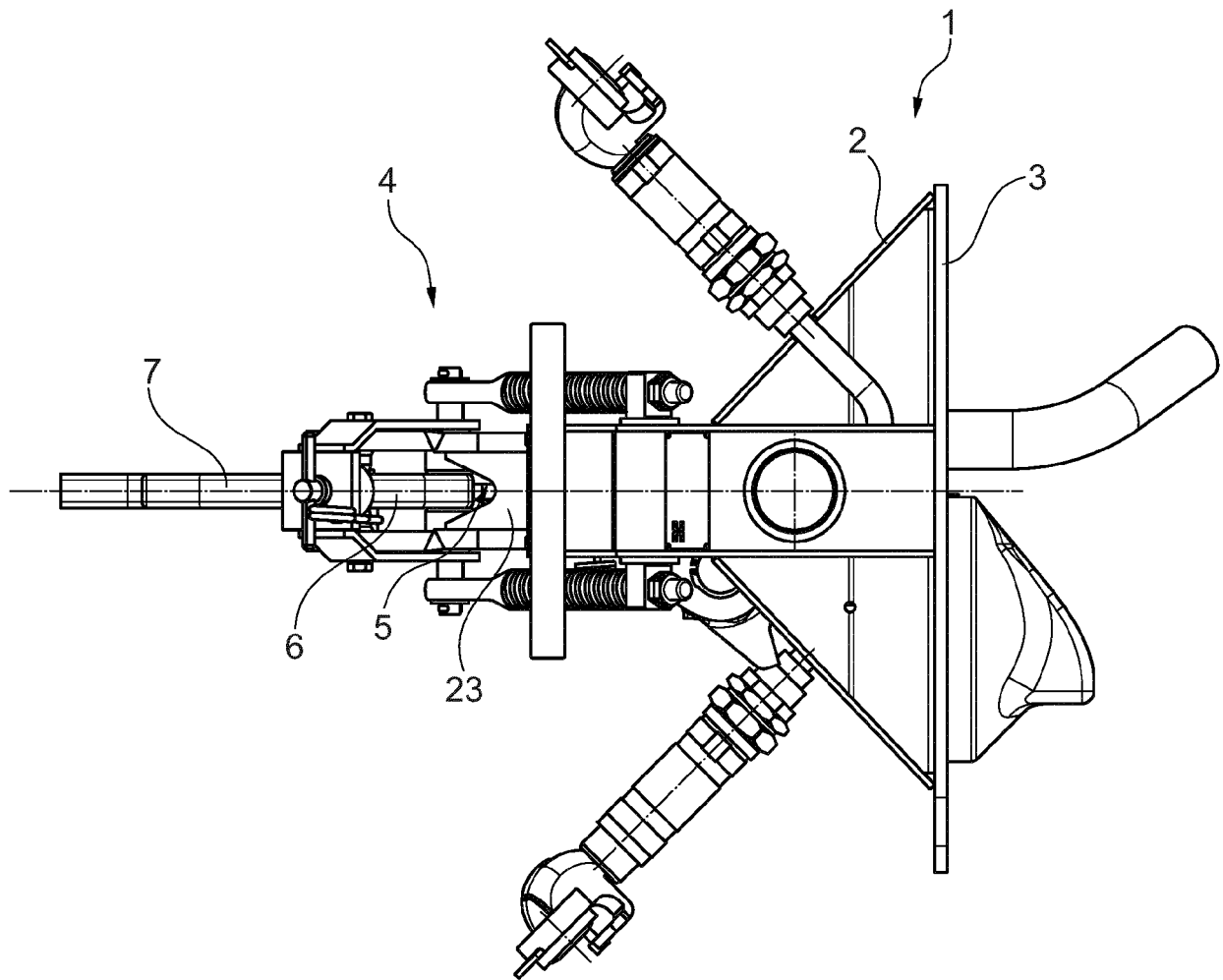


Fig. 5

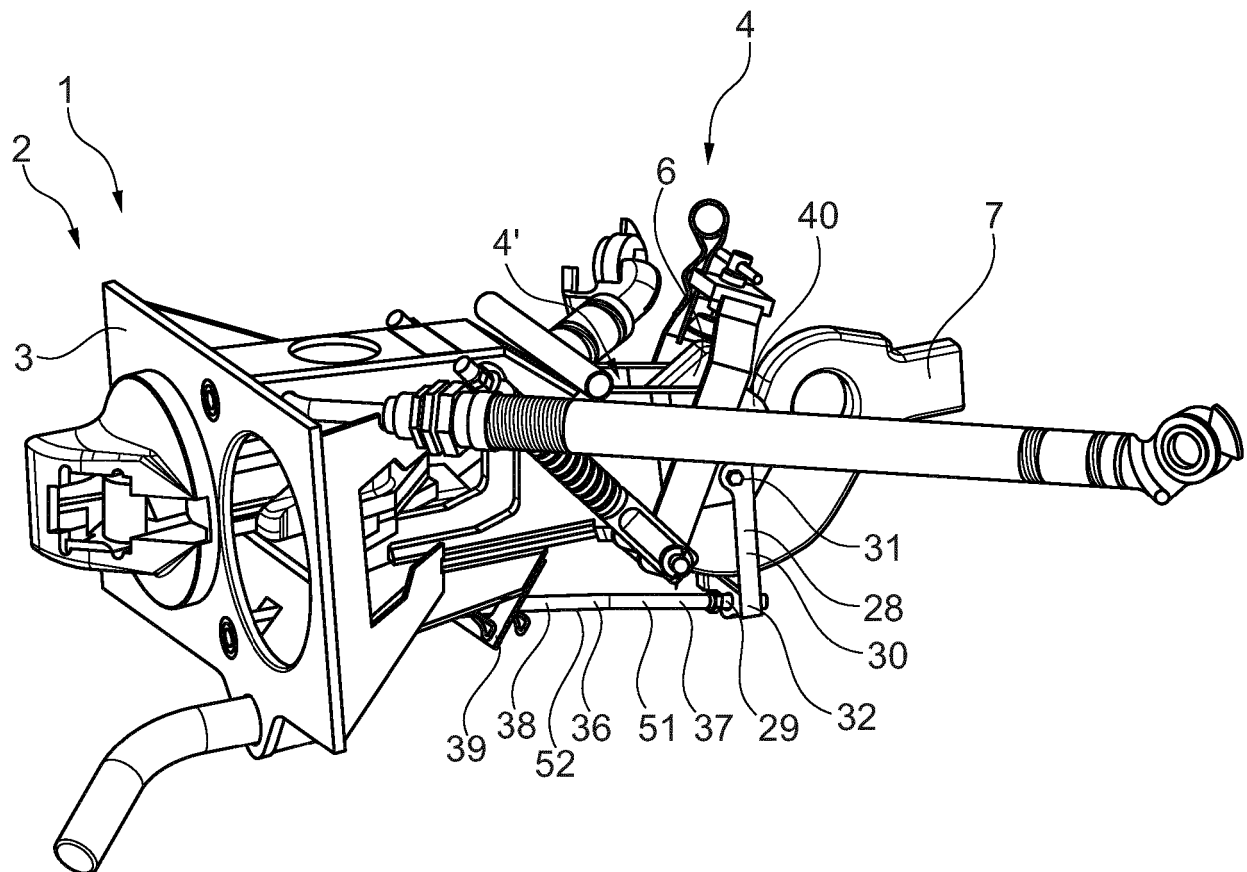


Fig. 6

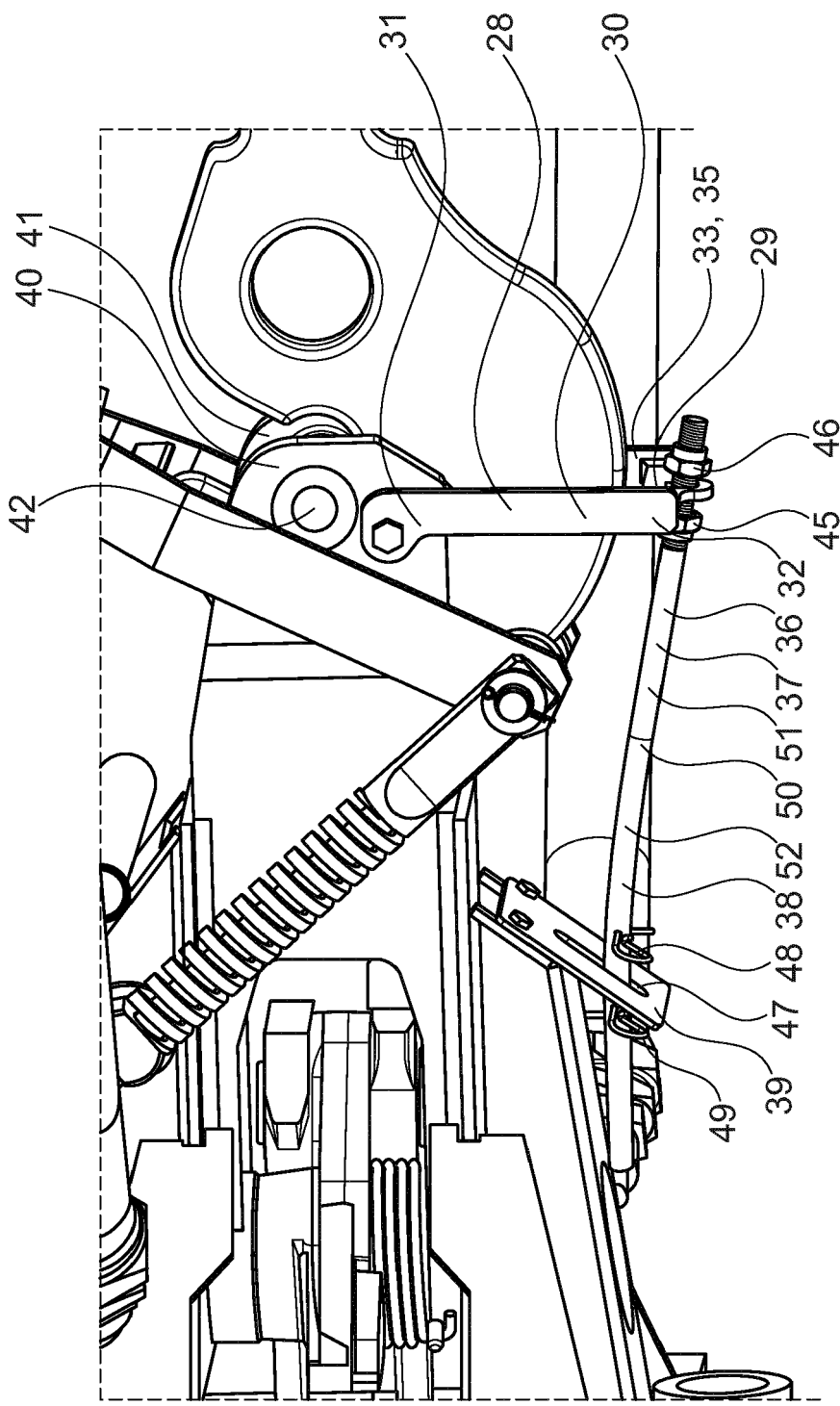


Fig. 7

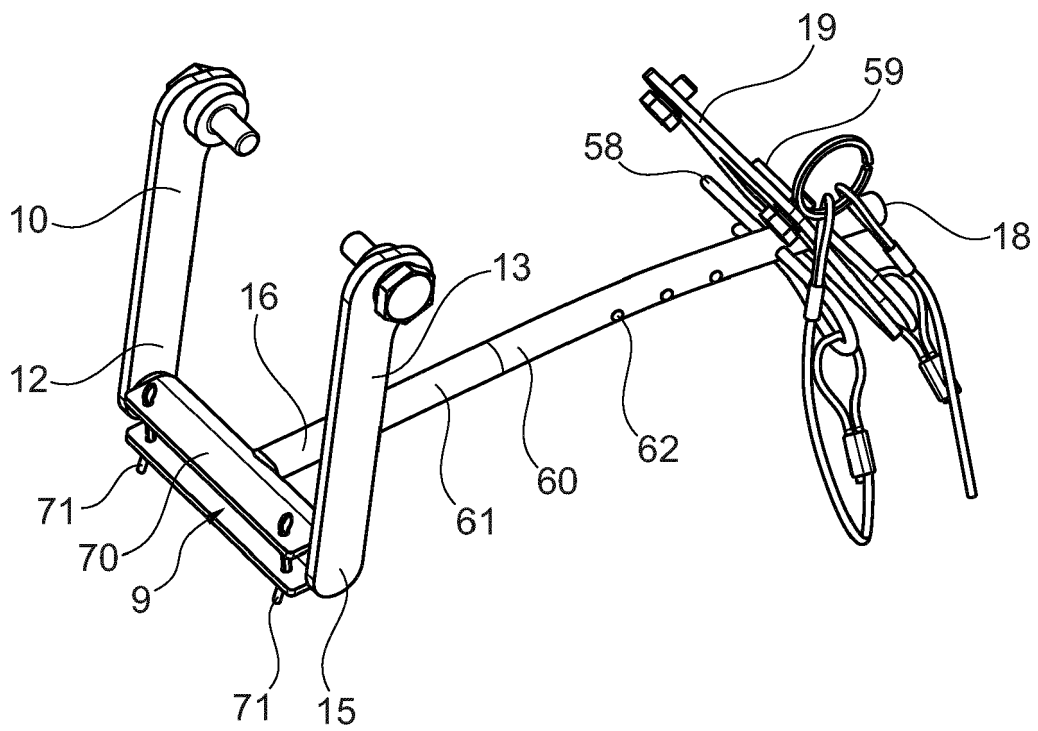


Fig. 8





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			TECHNICAL FIELDS SEARCHED (IPC)
			B61G
The present search report has been drawn up for all claims			
Place of search <b>Munich</b>		Date of completion of the search <b>15 May 2019</b>	Examiner <b>Schultze, Yves</b>
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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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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