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(54) **QUICK COUPLER FOR COUPLING A HYDRAULICALLY OPERATED TOOL/IMPLEMENT ONTO AN EXCAVATOR AND A MECHANICAL COUPLING MEMBER**

(57) A quick coupler (**20**) for coupling a hydraulically operated tool/implement (**10**) onto an excavator boom provided with a tilt rotator (**1**) and a bucket latch (**5**), comprising a mechanical coupling member (**21**) adapted to be fixedly mounted onto the tool/implement and designed to be secured to the tilt rotator by means of the bucket latch, a first valve block (**27**) for hydraulics, the valve block being adapted to be fixedly mounted onto the tilt rotator, and a second valve block (**28**) movably mounted onto the mechanical coupling member, and arranged to be displaced by the bucket latch when the bucket latch secures the tool/implement to the tilt rotator, into contact with the first valve block, such that the two valve blocks are interconnected to allow the flow of hydraulic fluid therethrough, and a mechanical coupling member (**21**) adapted to be fixedly mounted onto the tool/implement.

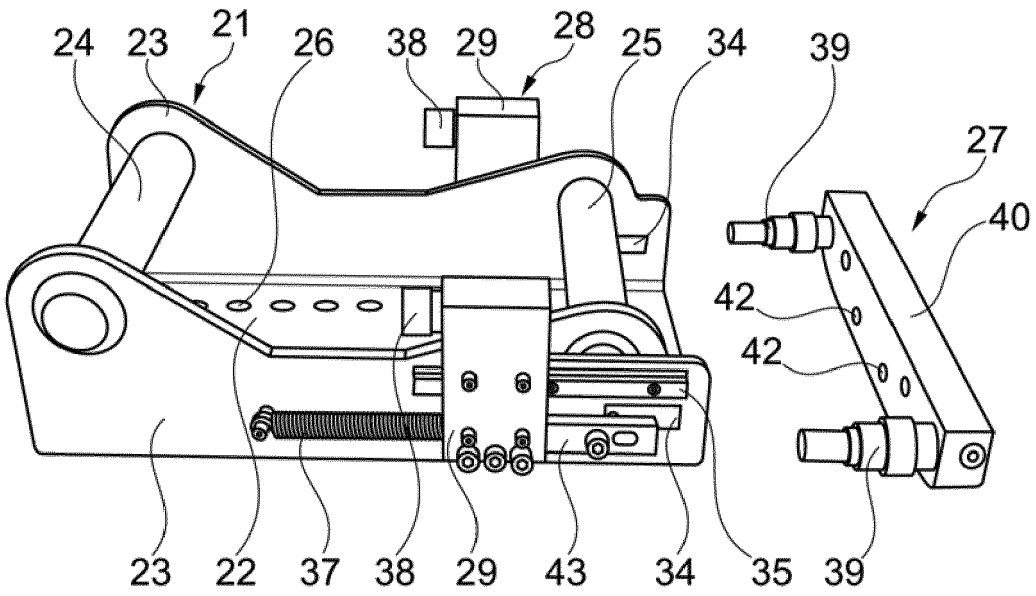

Fig. 3

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Description

TECHNICAL FIELD

[0001] The present invention relates to a quick coupler for coupling a hydraulically operated tool/implement onto a boom provided with a tilt rotator and a bucket latch of an excavator, and a mechanical coupling member adapted to be fixedly mounted onto the tool/implement.

BACKGROUND ART

[0002] There currently exist several quick couplers and other connections between machines and tools/implements for construction work within various construction operations. Most common are simple couplers, requiring the operator to exit from the machine to manually connect the tool/implement, but there are also quick couplers allowing for the operator to attach the tool/implement without having to exit from the machine; see, for example, SE 524 668, SE 535 681, SE 1150837 A1, DE 101 59 417 A1, US 6,385,872 B1, US 6,813,851 B2, US 7,464,967 B2 and US 2014/0030005 A1. Where there are quick couplers, the buyer is usually forced to choose coupler and tool/implement from the manufacturer producing the machine. Thereby, the buyer is secured into buying the coupler and tool/implement from the manufacturer of the machine, which could be a very costly investment for the purchasing company.

SUMMARY OF THE INVENTION

[0003] The main object of the present invention is to provide a quick coupler which allows the coupling of hydraulically operated products from different manufacturers.

[0004] This main object is achieved in that the quick coupler according to the present invention, as specified in the first paragraph above, comprises:

- a mechanical coupling member adapted to be fixedly mounted onto the tool/implement and designed to be secured to the tilt rotator by means of the bucket latch;
- a first valve block for hydraulics, the valve block being adapted to be fixedly mounted onto the tilt rotator; and
- a second valve block movably mounted onto the mechanical coupling member, and arranged to be displaced by the bucket latch when the bucket latch secures the tool/implement to the tilt rotator, into contact with the first valve block, such that the two valve blocks are interconnected to allow the flow of hydraulic fluid therethrough.

[0005] Such a quick coupler fits several different models/types of machines and is a universal coupler of the quick-coupler type, with which the operator does not need to exit from the cab to connect the hydraulics manually. If the tool/implement is already provided with a quick-connect coupling or similar, it can be dismounted and replaced by the quick coupler according to the invention. Furthermore, such a quick coupler offers great opportunities to fulfil an additional object of the invention, namely the possibility to manufacture the quick coupler at a low cost.

[0006] In a first embodiment, the mechanical coupling member is U-shaped in cross-section and comprises a rectangular, planar bottom plate and two side walls protruding perpendicularly from the long sides of the bottom plate, between which side walls two through-pins extend, one at each short side of the bottom plate, one of which pins being located at a greater distance from the bottom plate than the other. Thereby, a conventional bucket latch can grasp and hold the mechanical coupling member.

[0007] It is preferable for the bottom plate to be provided with a plurality of through-holes for facilitating the mounting onto the tool/implement. However, in a variant, the bottom plate can be omitted and the two side walls can be fixed to the tool/implement by means of e.g. welding.

[0008] Said second valve block is preferably divided into two valve block parts, located on the outside of a respective one of the two side walls and adjacent to the pin with which a locking tab of the bucket latch interacts, the valve block parts being interconnected by a transverse bar extending through an opening in each of the side walls and having an abutment for the bucket latch, the opening being slot-shaped to allow movement of said second valve block towards said first valve block when the tool/implement is being secured. Hereby, a hydraulic interconnection of the two valve blocks is automatically achieved when the bucket latch secures the mechanical coupling member mounted onto the tool/implement to the tilt rotator.

[0009] In order to facilitate for the bucket latch to move the second valve block towards the first valve block, the bar's vertical position is preferably located underneath the pin with which the locking tab interacts.

[0010] Furthermore, cooperating guide means are preferably arranged on each of the two valve block parts and the outside of the side walls in order to guide the movement of the second valve block towards and away from an active position where the second valve block is hydraulically interconnected with the first valve block, and an idle position where

the second valve block is hydraulically disconnected from and spaced from the first valve block. Hereby, the two valve blocks are oriented against each other in such a way that interconnection can take place.

[0011] In order to ensure careful alignment, it is then preferable for said guide means to comprise a guide rail or a guide carrier arranged on the outside of each of the side walls, adjacent to the opening in each of the side walls, and for every valve block part, a guide follower carried by the valve block part and grasping the guide rail, or, a through channel for a guide rod carried by the valve block part and running in the through channel.

[0012] Preferably, a spring mechanism is arranged to move the second valve block towards its idle position. Thereby, there is no risk of damaging any of the valve blocks during disconnection or connection.

[0013] In order to eliminate or at least greatly reduce the risk of tilting the second valve block in relation to the mechanical coupling member during movement, it is preferable for the spring mechanism to comprise a spring for each valve block part.

[0014] These springs are then preferably located on the outside of the respective side walls, thus not risking to be damaged by the bucket latch during coupling or decoupling of the tool/implement from the tilt rotator.

[0015] To easily dimension the spring force and the working length, the springs are preferably tension springs of the helical spring type.

[0016] Preferably, one of the valve blocks comprises at least one female fluid-coupling member and the other one of the valve blocks a male fluid-coupling member matching said at least one female member, the fluid-coupling members allowing fluid flow through the valve blocks when connected, but preventing escape of hydraulic fluid when separated. Such fluid-coupling members are well-known and of conventional design, and provide the intended function at a reasonable cost.

[0017] It is preferable for said first valve block mounted onto the tilt rotator to comprise at least two male fluid-coupling members, and for said second valve block the same number of female fluid-coupling members. As a result of the protruding male members thus being carried by the tilt rotator, the risk of them being damaged over time is less than if they had been carried by the tool/implement.

[0018] It is also preferable for the two fluid-coupling members of the first valve block to be mounted in a carrier with internal channels for in- and outflow of hydraulic fluid. Thereby, a design which is easy and inexpensive to manufacture as well as easy to mount onto the tilt rotator is achieved.

SHORT DESCRIPTION OF THE ACCOMPANYING DRAWINGS

[0019] The invention will be described below, with reference to preferred embodiments and the accompanying drawings.

Figure 1	is a perspective view of a tilt rotator, onto which can be mounted a first valve block of the quick coupler according to the invention.
Figure 2	is a perspective view of a sample tool/implement, here a surface grinder, onto which can be mounted a mechanical coupling member with a movable second valve block in the quick coupler according to the invention.
Figure 3	is a perspective view of a first embodiment of the quick coupler according to the invention, with the first valve block to the right and the mechanical coupling member with the movable second valve block to the left.
Figure 4	is a side elevational view of the mechanical coupling member with the movable second valve block in the quick coupler according to Figure 3.
Figure 5	is a cross-sectional view along the line V-V in Figure 4.
Figures 6a and 6b	are an end view and a side elevational view, respectively, of a transverse bar in the mechanical coupling member, connecting two mirror-inverted valve block parts contained in the movable second valve block, and having an abutment for the bucket latch.
Figure 7	is a plan view of the mechanical coupling member.
Figures 8a and 8b	are an end view and a side elevational view, respectively, of the first valve block.
Figure 9	is a perspective view of the mechanical coupling member mounted onto a tool/implement, here a

surface grinder.

Figure 10 is a perspective view of the lower part of a tilt rotator provided with the first valve block and having engaged the mechanical coupling member (here not mounted onto a tool/implement).

Figure 11 is a perspective view similar to Figure 8, but with the mechanical coupling member secured to the tilt rotator and the two valve blocks connected to each other.

DETAILED DESCRIPTION OF THE INVENTION

[0020] In many types of work in the construction industry, it is necessary to be able to hydraulically operate, from an excavator cab, a tool/implement which is mounted on the excavator's boom and adjustable into many positions and angles. For the rotation and tilting of the tool in various directions, the boom, at its free end, carries a tilt rotator, which in turn carries the tool/implement. A tilt rotator makes it possible to dig, rotate and tilt the backhoe (or other tools intended for excavators) in one movement.

[0021] Many different tilt rotators are available on the market, Figure 1 showing one of them, a Rototilt RT20, marketed by Indexator **Rototilt Systems AB,** in Vindeln, Sweden. The bottom part **2** of the tilt rotator **1** can be rotated 360° and is provided with a so-called bucket latch **5** in the form of a hydraulic reciprocable tab, for securing the tool/implement to the tilt rotator **1.**

[0022] An example of a tool/implement **10** which can be coupled to the tilt rotator **1** by means of the bucket latch **5** is shown in Figure 2. Neither the tilt rotator **1** nor the tool/implement **10** is part of the present invention, but they are shown only as preferred examples. The tool/implement **10** shown in Figure 2 is a hydraulically driven surface grinder, YTF-420, marketed by YTF Sweden AB, in Falun, Sweden. The illustrated surface grinder **10** has a rotatable grinding disc **11** driven by a hydraulic motor **13** and with interchangeable rotatable slitting knives **12** of hard metal, its applications including the removal of tar from the outside of exterior basement walls. The surface grinder **10** is provided with a quick-connect coupling **15,** which can be grasped by the tilt rotator **1** and secured by means of the bucket latch **5** for quick securing of the surface grinder **10** to the tilt rotator **1,** but to connect the hydraulics for driving the grinding disc **11,** the excavator operator must exit his cab and connect the hydraulic hoses manually. In a first embodiment the quick-connect coupling **15** consists of a generally U-beam-shaped undercarriage **16** with a transverse rear pin **17** and a transverse front pin **18.** The tilt rotator **1** is provided with, firstly, two rearward oriented recesses **3** for initial engagement of the rear pin **17** at its rear ends, and, secondly, two downward oriented recesses **4** for subsequent engagement of the front pin **18** at its forward ends. During securing with the bucket latch, the locking tab **6** is inserted under the front pin **18,** pressing it up against the upper edge of the downward oriented recess **4.**

[0023] The main object of the present invention is to achieve a quick coupler **20** enabling the interconnection of hydraulically operated products (tools/implements **10** for tilt rotators **1** with bucket latches **5**) from different manufacturers.

[0024] This main object is accomplished by the quick coupler **20** in accordance with the present invention comprising, as shown in the accompanying drawings, maybe best in Figure 3:

- a mechanical coupling member **21** adapted to be fixedly mounted onto the tool/implement **10** and designed to be secured to the tilt rotator **1** by means of the bucket latch **5,**
- a first valve block **27** for hydraulics, the valve block being adapted to be fixedly mounted onto the tilt rotator **1,** and
- a second valve block **28** movably mounted onto the mechanical coupling member **21,** and arranged to be displaced by the bucket latch **5** when the bucket latch **5** secures the tool/implement **10** to the tilt rotator **1,** into contact with the first valve block **27,** such that the two valve blocks **27, 28** are interconnected to allow the flow of hydraulic fluid therethrough.

[0025] Such a quick coupler **20** fits several different models/types of machines and is a universal coupler of the quick-coupler type, with which the operator does not need to exit from the cab to connect the hydraulics manually. If the tool/implement **10** is already provided with a quick-connect coupling **15** or similar, it can be dismounted and replaced by the quick coupler **20** according to the invention. Furthermore, such a quick coupler offers great opportunities to fulfil an additional object of the invention, namely the possibility to manufacture the quick coupler **20** at a low cost.

[0026] As is best illustrated in Figure 5, the mechanical coupling member **21** has a substantially U-shaped cross-section and comprises a rectangular, planar bottom plate **22** and two side walls **23** protruding perpendicularly from the long sides of the bottom plate **22.** Between the side walls **23** two through-pins extends, namely a rear through-pin **24** at the rear short side of the bottom plate **22,** and a front through-pin **25** at the front short side of the bottom plate **22,** said rear pin **24** being located at a greater distance from the bottom plate **22** than the other **25.** Thereby, a conventional bucket latch **5** can grasp and hold the mechanical coupling member **21,** and the engagement of the rear pin **24** in the rearward oriented recesses **3** of the tilt rotator **1** is facilitated.

[0027] As shown in Figure 3, it is preferable for the bottom plate **22** to be provided with a plurality of through-holes **26** for facilitating the mounting of the mechanical coupling member **21** onto the tool/implement **10.** The hole pattern must of course be adapted to the make of the tool/implement **10** to which the mechanical coupling member **21** is to be attached.

[0028] In the first embodiment said second valve block **28** is, as best shown in Figure 5, preferably divided into two mirror-inverted valve block parts **29,** located on the outside of a respective one of the two side walls **23** and adjacent to the transverse front pin **25,** which is closest to the bottom plate **22.** These valve block parts **29** are rigidly interconnected by a transverse bar **30** extending through an opening **34** in each of the side walls **23.** Each valve block part **29** also comprises a screwed-on arm **43,** shown in Figures 3-5, extending substantially parallel to the bottom plate **22** and along the adjacent side wall **23,** connecting the transverse bar **30** transmitting the force with the valve block part **29.**

[0029] As best shown in Figures 6a and 6b, the bar **30** is preferably composed of two flat bars screwed together, one **31** with its greatest width in the horizontal plane to resist deformation in that plane, and one **32** with its greatest width in the vertical plane to provide an abutment **33** for locking tabs **6** of different designs. The bar **30** is preferably located vertically between the bottom plate **22** and the bottom of the front pin **25,** and the abutment **33** preferably has a height such that it extends from the lower edge of the front pin **25** down to the bottom plate **22.** The opening **34** in every side wall **23** is slot-shaped to allow movement of said second valve block **28** towards said first valve block **27,** when, as the tool/implement **10** is secured to the tilt rotator **1,** the locking tab **6** is inserted under the front pin **25,** pressing it up against the upper edge of the downward oriented recess **4** in the lower part **2** of the tilt rotator **1.** When the locking tab **6** secures the mechanical coupler member **21** mounted onto the tool/implement **10** to the tilt rotator **1,** at the same time and automatically a hydraulic interconnection of the two valve blocks **27** and **28** is accomplished, as shown in Figure 11.

[0030] Furthermore, as best shown in Figures 4 and 5, cooperating guide means **35, 36** are preferably arranged on each of the two valve block parts **29** and the outside of the side walls **23** in order to guide the movement of the second valve block **28** towards and away from an active position, where the second valve block **28** is hydraulically interconnected with the first valve block **27,** and an idle position, where the second valve block **28** is hydraulically disconnected and spaced from the first valve block **27.** Hereby, the two valve blocks **27, 28** are oriented against each other in such a way that interconnection can take place.

[0031] In order to ensure precise alignment, it is then preferable for said guide means, as shown in Figures 3-5, to comprise a guide rail **35** arranged on the outside of each of the side walls **23,** the guide rail **35** being parallel to the bottom plate **22** and located adjacent to the opening **34** in each of the side walls **23,** and for every valve block part **29,** a guide follower **36** mounted in a recess of the valve block part, for example, and grasping the guide rail **35,** which is likewise preferably screwed-on. The guide follower **36** may be comprised of, for example, a saddle, slide or carriage with wheels, and if desired, the guide rail **35** may be provided with longitudinal grooves, not shown, for the guide follower **36.**

[0032] Preferably, a spring mechanism **37,** shown in Figures 3, 4 and 7, is arranged to move the second valve block **28** towards its idle position. Thereby, there is no risk of damaging any of the valve blocks **27, 28** during disconnection or connection. In order to eliminate or at least greatly reduce the risk of tilting the second valve block **28** in relation to the mechanical coupling member **21** during movement, it is preferable for the spring mechanism to comprise a spring **37** for each valve block part **29.** These springs **37** are then preferably located on the outside of the respective side walls **23,** thus not risking to be damaged by the reciprocable locking tab **6** during coupling or decoupling of the tool/implement **10** from the tilt rotator **1.** To easily dimension the spring force and the working length, the springs are preferably tension springs **37** of the helical spring type.

[0033] Preferably, one of the valve blocks **27, 28** comprises at least one female fluid-coupling member **38** and the other one of the valve blocks a male fluid-coupling member **39** matching said at least one female member **38,** the fluid-coupling members **38, 39** allowing fluid flow through the valve blocks **27, 28** when connected, but preventing escape of hydraulic fluid when separated. Such fluid-coupling members **38, 39** are well-known and of conventional design, and provide the intended function at a reasonable cost.

[0034] As shown in Figures 3-8b, it is preferable for said first valve block **27** mounted onto the tilt rotator **1** to comprise at least two male fluid-coupling members **39,** and for said second valve block **28** the same number of female fluid-coupling members **38.** As a result of the protruding male members **39** thus being carried by the tilt rotator **1,** the risk of them being damaged over time is less than if they had been carried by the tool/implement **10.**

[0035] It is also preferable for the two fluid-coupling members **39** of the first valve block **27,** as shown in Figures 8a and 8b, to be mounted in a carrier **40** with internal channels **41** with connections **42** for in- and outflow of hydraulic fluid. The connections **42** are coupled to the corresponding connections on the tilt rotator **1** with hoses or pipes. Thereby, a design which is easy and inexpensive to manufacture as well as easy to mount onto the tilt rotator **1** is achieved.

[0036] Each one of the two mirror-inverted valve block parts **29** comprises a continuous channel **44,** best shown in Figure 4, into one end of which a female fluid-coupling member **38** is screwed in, and the other end of which is designed to receive a male fluid-coupling member **39.**

[0037] Figure 9 shows the mechanical coupling member **21** mounted onto a tool/implement, here a surface grinder **10.** From the female fluid-coupling members **38,** hydraulic hoses **14** (one shown) lead to the hydraulic motor **13** of the surface grinder for driving the rotatable grinding disc.

[0038] Figure 10 shows the lower part of a tilt rotator **1,** which is provided with the first valve block **27** with the male fluid-coupling members **39** and has engaged the transverse rear pin **24** on the mechanical coupling member **21** (here not yet mounted onto a tool/implement **10**). During further rearward tilt of the tilt rotator **1,** the lower end of the mechanical coupling member **21** will, by means of the gravity acting on the tool/implement **10,** pivot the first valve block **27,** such that the transverse rear pin **24** is inserted into the downward oriented recesses **4** of the tilt rotator **1.** Thereafter, the tool/implement **10** can be secured by the bucket latch **5,** which then also protrudes the movable second valve block **28** for interconnection with the first valve block **27,** and consequently, hydraulic interconnection of the tilt rotator **1** with the tool/implement **10.** Figure 11 shows the state when the mechanical coupling member **21** is secured to the tilt rotator 1 and the two valve blocks **27** and **28** are connected to each other.

[0039] A preferred embodiment shall now be described. In the preferred embodiment it is mainly the construction of the two valve parts and the cooperating guide means which are arranged outside the side walls that are different from the embodiment already described. As far as other parts of the quick-coupler **20** are arranged as described in connection with the first embodiment, it will not be repeated here. In the following description, only one set of cooperating guide means are described unless otherwise required in order to understand the invention. A side view of the preferred embodiment is shown in Figure 12.

[0040] In the preferred embodiment, the cooperating guide means comprise two opposite guide bearing blocks **35'** fixed, preferably by screws at its' lower part, on the outside of the side walls **23.** The guide bearing blocks **35'** comprise a through hole in their upper ends for a respective guide pipe **36'** which are movable in the axial direction of the through hole. The through hole has a diameter that is somewhat wider than the diameter of the guide pipe **36'** in order to allow the guide pipe **36'** to run through the hole with minimal resistance. In order to keep the guide pipe **36'** aligned in the hole and to prevent particles from entering the space between the guide pipe **36'** and the inner wall of the through hole, a bushing is preferably arranged in the forward and rearward opening. Hereby it is also possible in a manner known per se to inject fluid of suitable type to lubricate the passage and to increase the dirt protection.

[0041] The respective guide pipe **36'** has an extension in axial direction that is longer than the extension in the same direction of the guide bearing block **35',** and has a rearward portion **50** which extends outside a rearward face **52** of the guide bearing block **35'** and a forward portion **51** that extends outside a forward face **53** of the guide bearing block **35'.** A compression spring **37'** of helical spring type is arranged around the rearward portion **50** and is further arranged to act against the rearward face **52** of the guide bearing block **35'** in order to move the second valve block **28** towards its idle position. A spring stop for the spring to act upon, e.g. a nut, is arranged at the guide pipe's end. A gaiter is preferably arranged around the spring and rearward portion of the guide pipe **36'.**

[0042] In order to move the second valve block **28** towards its active position, the forward portion **51** of the guide pipe **36'** is attached to the valve block part **29.** In the preferred embodiment the screwed-on arm **43** is not required in order to attach the bar **30** to the valve block part **29.** Instead, the valve block part **29** is directly interconnected with the transverse bar **30,** e.g. fixed by screws, against the transverse bar's end outside the side walls **23.** The valve block part **29** comprise a carrier **29'** that extend upwards, in parallel with the side wall **23.** The carrier's upper end is provided with attachment means for the forward end of a guide pipe **36'.** The attachment means comprises a portion extending perpendicularly against the side wall **23** and having a through hole **60** for the guide pipe **36'.** The forward end of the guide pipe **36'** further comprises a threaded nipple which extends outside the forward face **54** of the attachment means. Fixing means **61,** here a nut, is arranged on the threaded nipple to secure the guide pipe **36'** against the carrier **29'**. A male fluid-coupling member **39** is arranged inside the guide pipe **36',** at its forward end. Through a centre hole in the nipple and the nut **61,** the male fluid-coupling member **39** protrudes. Thus, in this preferred embodiment, the female and male fluid-coupling members **38, 39** are reverse from the first embodiment described above but the male fluid-coupling member **39** is hydraulically interconnected and disconnected with a corresponding female fluid-coupling member **38** in the first valve block **27** in the active position according to the same principle as described above. In the guide pipe's **36'** rearward end means are arranged for attachment of hydraulic tubes.

[0043] During manoeuvring of the second valve block **29** towards and away from an active position, a rearward side **62** of the nut **61** and the forward face **54** of the carrier **29'** is arranged to interact via pushing forces in opposite directions. For this reason, the nut **61** has a relatively wide extension in transversal direction such that the rearward side **62** provides a press surface **62** which is approximately as wide as the opposing forward face **54** of the carrier **29'.** When the locking tab **6** pushes the bar **30** forward, the force is transmitted to the carrier **29'** and a pushing force in the forward direction is exerted by the carrier **29'** on the locking nut **61.** Upon retraction of the locking tab **6,** the spring **37'** will move the guide pipe **36'** rearwards and the locking nut **61** will act upon the forward face **54** of the carrier **29'** and pull the carrier **29'** and the bar **30** rearwards at the same time as the fluid coupling members **38, 39** are hydraulically disconnected and spaced apart.

ALTERNATIVE EMBODIMENTS

[0044] The invention is not limited to the embodiments of the quick coupler as described and shown in the drawings,

but can be varied within the scope of the appended claims. The design may need slight modification for adaptation to different tilt rotators. If desired, as shown in Figures 3 and 10, the top surface of the transverse front pin **25** may be provided with a pair of recesses, which are transverse in relation to the pin and the surface of which forms part of a substantially cylindrical interior surface.

[0045] In a variant, the bottom plate can be omitted and the two side walls can be fixed to the tool/implement by means of e.g. welding. In this variant is shall be understood that the bar's vertical position is located closely underneath the pin **25** with which the locking tab **6** interacts, in the space between the pin and the upper side of the tool/implement.

INDUSTRIAL APPLICATION

[0046] The invention should find use primarily with contractors owning excavators, and with companies offering construction equipment for rent, in order to enable them to connect hydraulically operated products such as various tools/implements for tilt rotators provided with bucket latches from different manufacturers. It shall be understood that it may be sufficient to obtain several extra coupling members **21** to be mounted on different tools/implements but to obtain only one set of the first valve block **27** as the same excavator may be used with various tools/implements. It shall therefor be understood that these parts may be sold separately.

Claims

1. A quick coupler **(20)** for connection of a hydraulically operated tool/implement **(10)** onto an excavator boom provided with a tilt rotator **(1)** and a bucket latch **(5),** the quick coupler **(20)** comprising

- a mechanical coupling member **(21)** adapted to be fixedly mounted onto the tool/implement **(10)** and designed to be secured to the tilt rotator **(1)** by means of the bucket latch **(5);**
- a first valve block **(27)** for hydraulics, the valve block **(27)** being adapted to be fixedly mounted onto the tilt rotator **(1);** and
- a second valve block **(28)** movably mounted onto the mechanical coupling member **(21),** and arranged to be displaced by the bucket latch **(5)** when the bucket latch **(5)** secures the tool/implement **(10)** to the tilt rotator **1,** into contact with the first valve block **(27),** such that the two valve blocks **(27, 28)** are interconnected to allow the flow of hydraulic fluid therethrough.

characterised in that

- the mechanical coupling member **(21)** comprising two opposite side walls **(23)** between which side walls **(23)** two through-pins **(24, 25)** extend, one at each end of the side walls **(23),**
- the movable second valve block **(28)** being divided into two valve block parts **(29),** located on the outside of a respective one of the two side walls **(23)** and adjacent to the pin **(25)** with which a locking tab **(6)** of the bucket latch **(5)** interacts, the valve block parts **(29)** comprising manoeuvring means **(30)** having an abutment **(33)** for the locking tab **(6).**

2. The quick coupler according to claim 1, **characterised in that** the valve block parts **(29)** is interconnected by the manoeuvring means **(30)** which comprises a transverse bar **(30),** said bar's **(30)** vertical position being located underneath the pin **(25)** with which the locking tab **(6)** interacts.

3. The quick coupler according to claim 2, **characterised in that** the transverse bar **(30)** extends through an opening **(34)** in each of the side walls **(23),** the opening **(34)** being slot-shaped to allow movement of the second valve block **(28)** towards the first valve block **(27)** when the tool/implement **(10)** is being secured.

4. The quick coupler according to claim 1, **characterised in that** cooperating guide means **(35, 36)** are arranged outside the side walls **(23)** in order to guide the movement of the second valve block **(28)** towards and away from an active position, where the second valve block **(28)** is hydraulically interconnected with the first valve block **(27),** and an idle position, where the second valve block **(28)** is hydraulically disconnected and spaced from the first valve block **(27).**

5. The quick coupler according to claim 4, **characterised in that** said guide means **(35, 35', 36, 36')** comprise any of a guide rail **(35)** and a guide bearing block **(35')** arranged on the outside of each of the side walls adjacent to the opening **(34)** in each of the side walls **(23),**

6. The quick coupler according to claim 5, **characterised in that** said guide rail **(35)** is located adjacent to the opening

(34) in each of the side walls **(23)** and comprises a guide follower **(36)** carried by the valve block part **(29)** and grasping the guide rail **(35).**

7. The quick coupler according to claim 6, **characterised in that** said guide bearing block **(35')** is located adjacent to the opening **(34)** in each of the side walls **(23),** and comprises a through channel **(60)** for a guide pipe **(36').**

8. The quick coupler according to claim 7, **characterised in that** said guide pipe **(36')** has a forward end extending outside a forward face **(54)** of the carrier **(29'),** said forward end comprising a threaded nipple for a locking nut **(61),** a rearward side **(62)** of said locking nut **(62)** and said forward face **(54)** of said carrier **(29')** being arranged to interact via pushing forces in opposite directions during movement of the second valve block **(28)** towards and away from an active position.

9. The quick coupler according to any of claim 4 - 7, **characterised in that** a spring mechanism **(37)** is arranged to move the second valve block **(28)** towards its idle position.

10. The quick coupler according to claim 9, **characterised in that** the spring mechanism comprises a spring **(37, 37')** for every valve block part **(29),** said springs **(37, 37')** being any of tension springs **(37)** or compression springs **(37')** of the helical spring type.

11. The quick coupler according to claim 9, **characterised in that** said guide pipe **(36')** has a rearward portion **(50)** which extends outside a rearward face **(52)** of said guide bearing block **(35'),** said spring **(37')** being arranged around said rearward portion **(50)** and further arranged to act against the guide bearing block **(35').**

12. The quick coupler according to any one of claims 1-1, **characterised in that** one of the valve blocks **(27, 28)** comprises at least one female fluid-coupling member **(38)** and the other one of the valve blocks **(27, 28)** a male fluid-coupling member **(39)** matching the female member **(38),** the fluid-coupling members **(38, 39)** allowing fluid flow through the valve blocks **(27, 28)** when connected, but preventing escape of hydraulic fluid when separated.

13. The quick coupler according to claim 12, **characterised in that** the male fluid-coupling member **(39)** is arranged inside the forward end of the guide pipe **(36)** and extend outside the locking nut **(61).**

14. The quick coupler according to claim 1, **characterised in that** the mechanical coupling member **(21)** has a substantially U-shaped cross-section and comprises a rectangular, planar bottom plate **(22),** said side walls **(23)** protruding perpendicularly from the long sides of the bottom plate **(22).**

15. A mechanical coupling member **(21)** adapted to be fixedly mounted onto the tool/implement **(10)** and designed to be secured to an excavator boom provided with a tilt rotator **(1)** and a bucket latch **(5),** by means of said bucket latch **(5),** said mechanical coupling member (21) comprising

- a second valve block **(28)** movably mounted onto the mechanical coupling member **(21),** and arranged to be displaced by the bucket latch **(5)** when the bucket latch **(5)** secures the tool/implement **(10)** to the tilt rotator **(1), characterised in that**
- the mechanical coupling member **(21)** comprising two opposite side walls **(23)** between which side walls **(23)** two through-pins **(24, 25)** extend, one at each end of the side walls **(23),**
- the movable second valve block **(28)** being divided into two valve block parts **(29),** located on the outside of a respective one of the two side walls **(23)** and adjacent to the pin **(25)** with which a locking tab **(6)** of the bucket latch **(5)** interacts, the valve block parts **(29)** comprising manoeuvring means **(30)** having an abutment **(33)** for the locking tab **(6).**

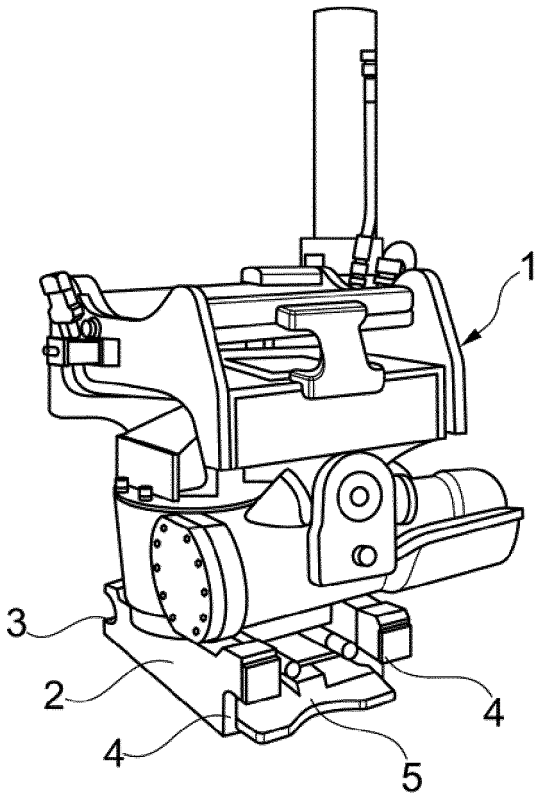

Fig. 1

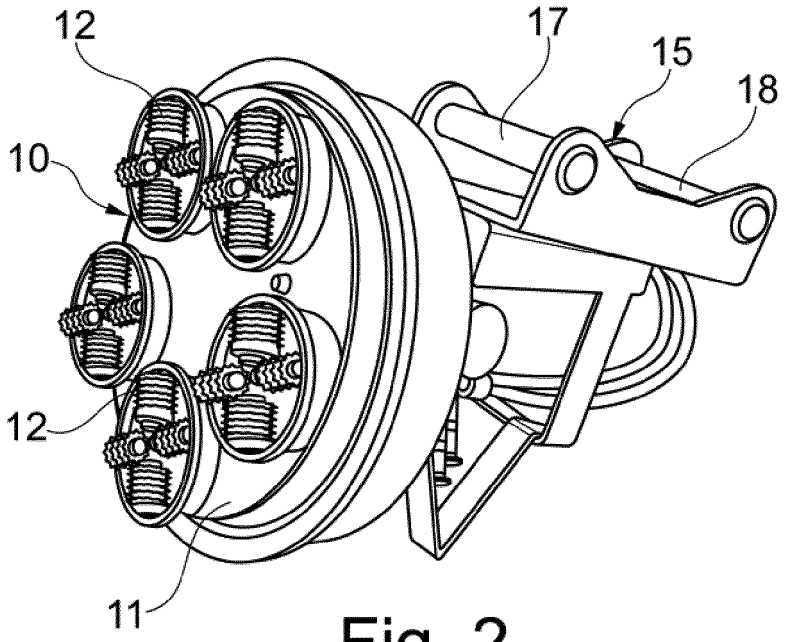

Fig. 2

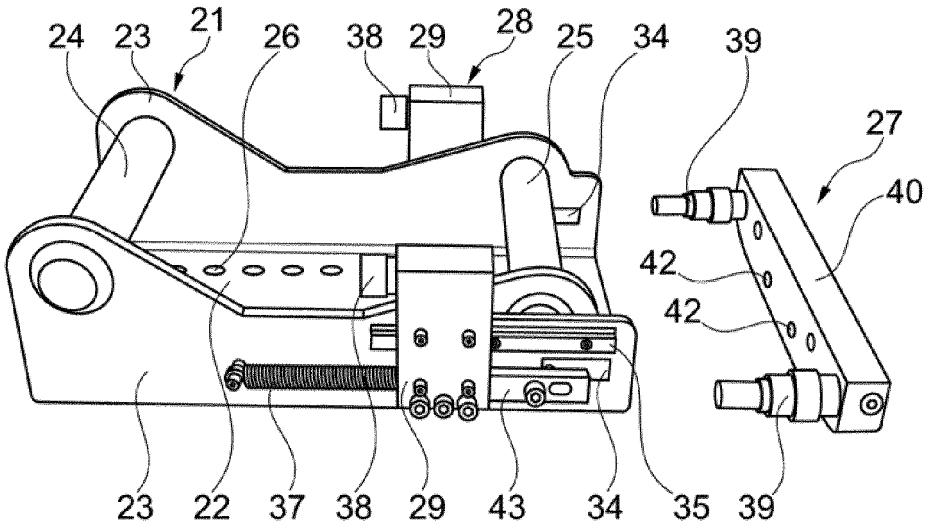

Fig. 3

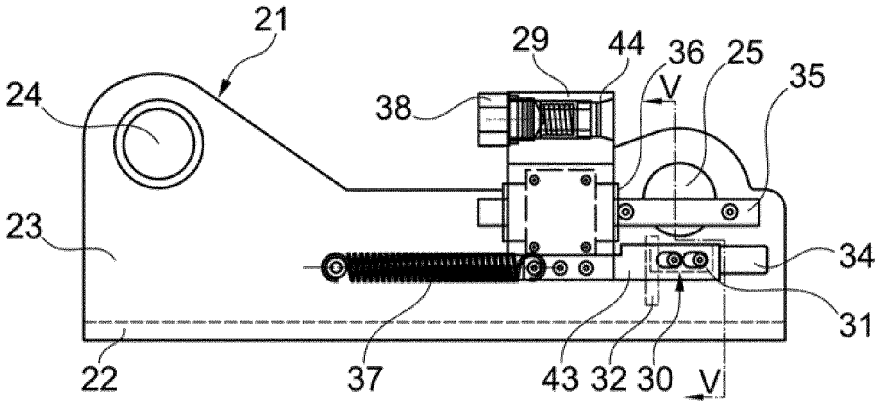

Fig. 4

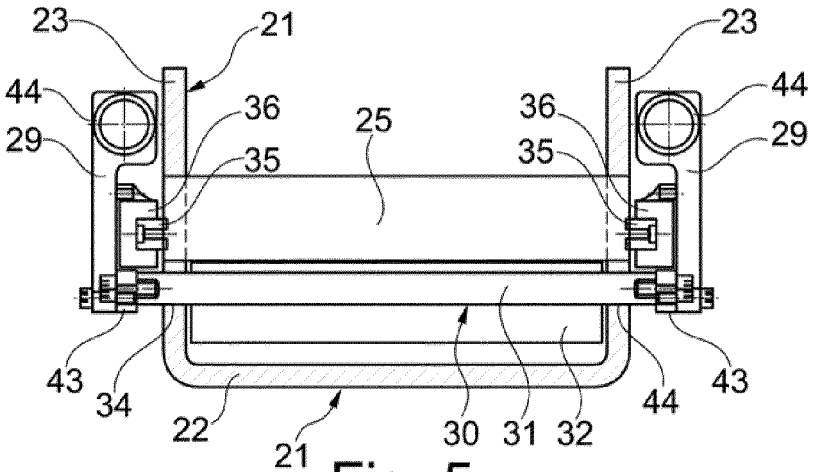

Fig. 5

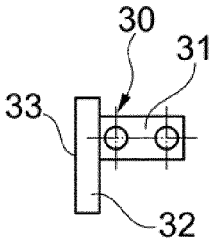

Fig. 6a

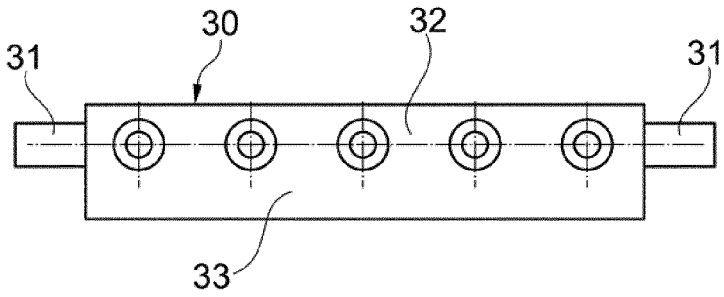

Fig. 6b

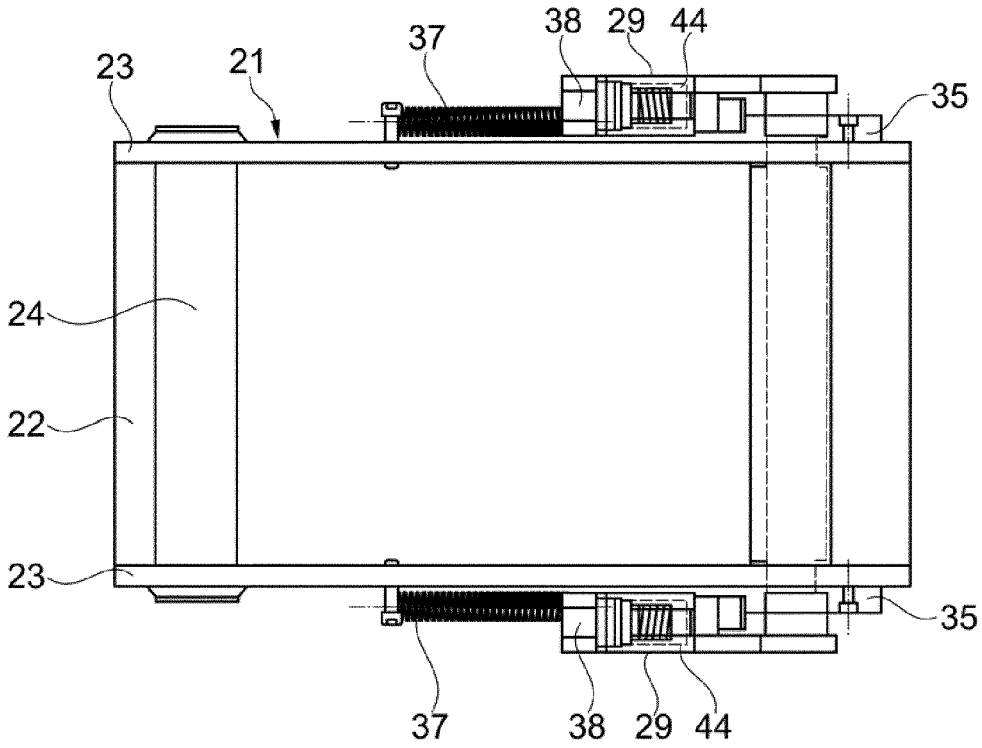

Fig. 7

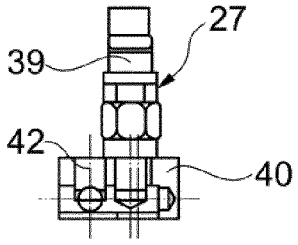

Fig. 8a

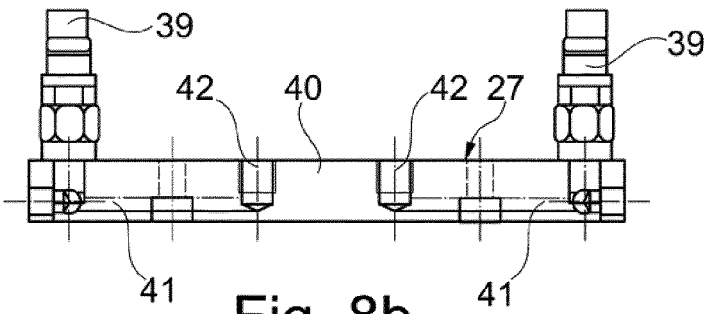

Fig. 8b

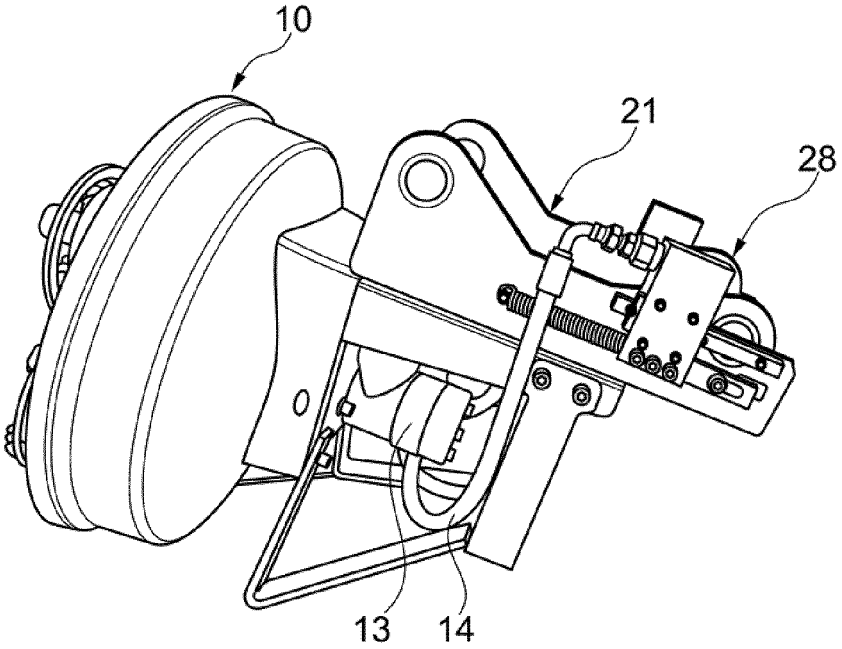

Fig. 9

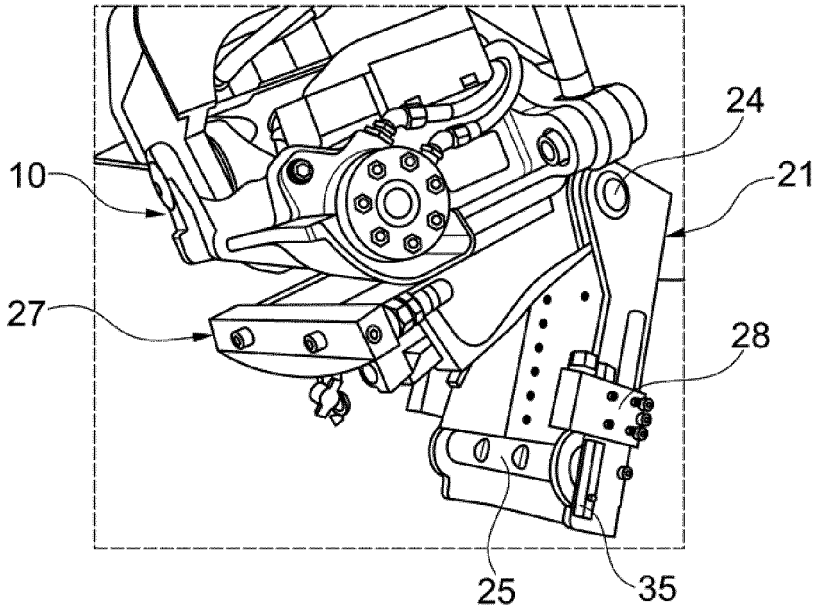

Fig. 10

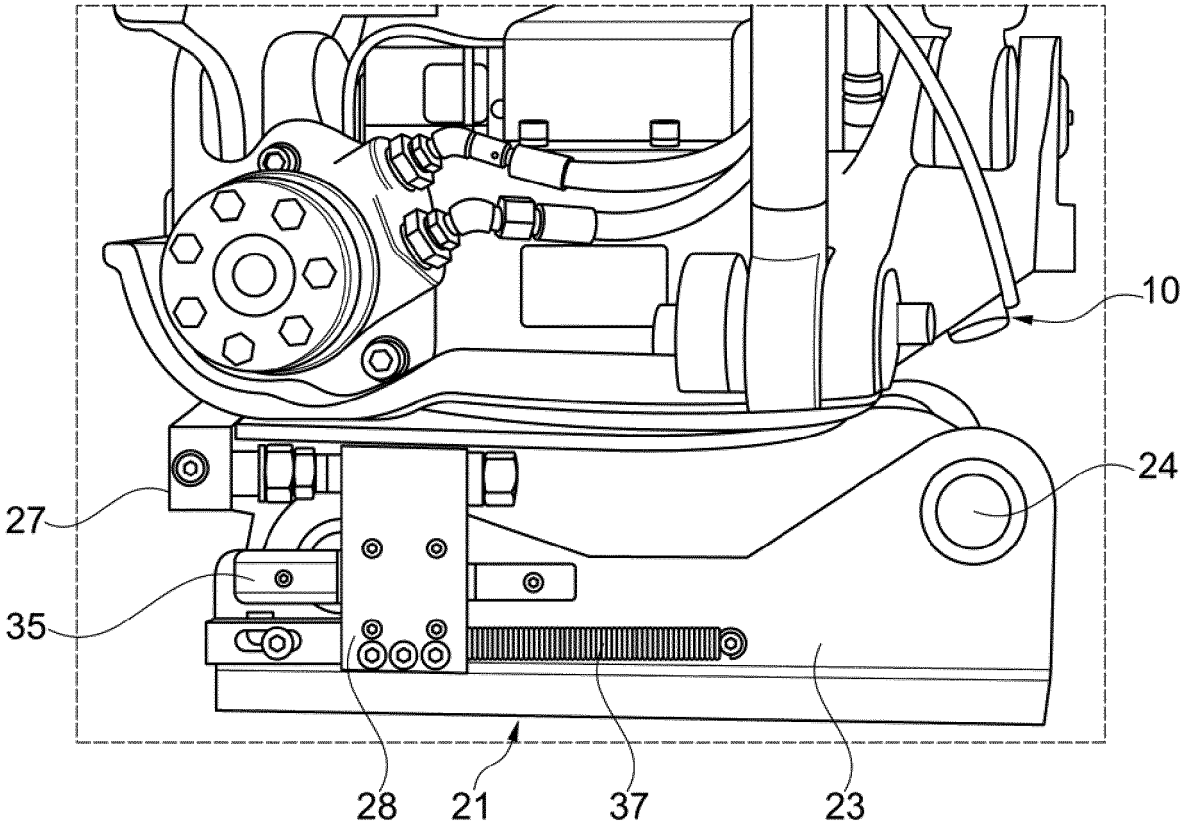

Fig. 11

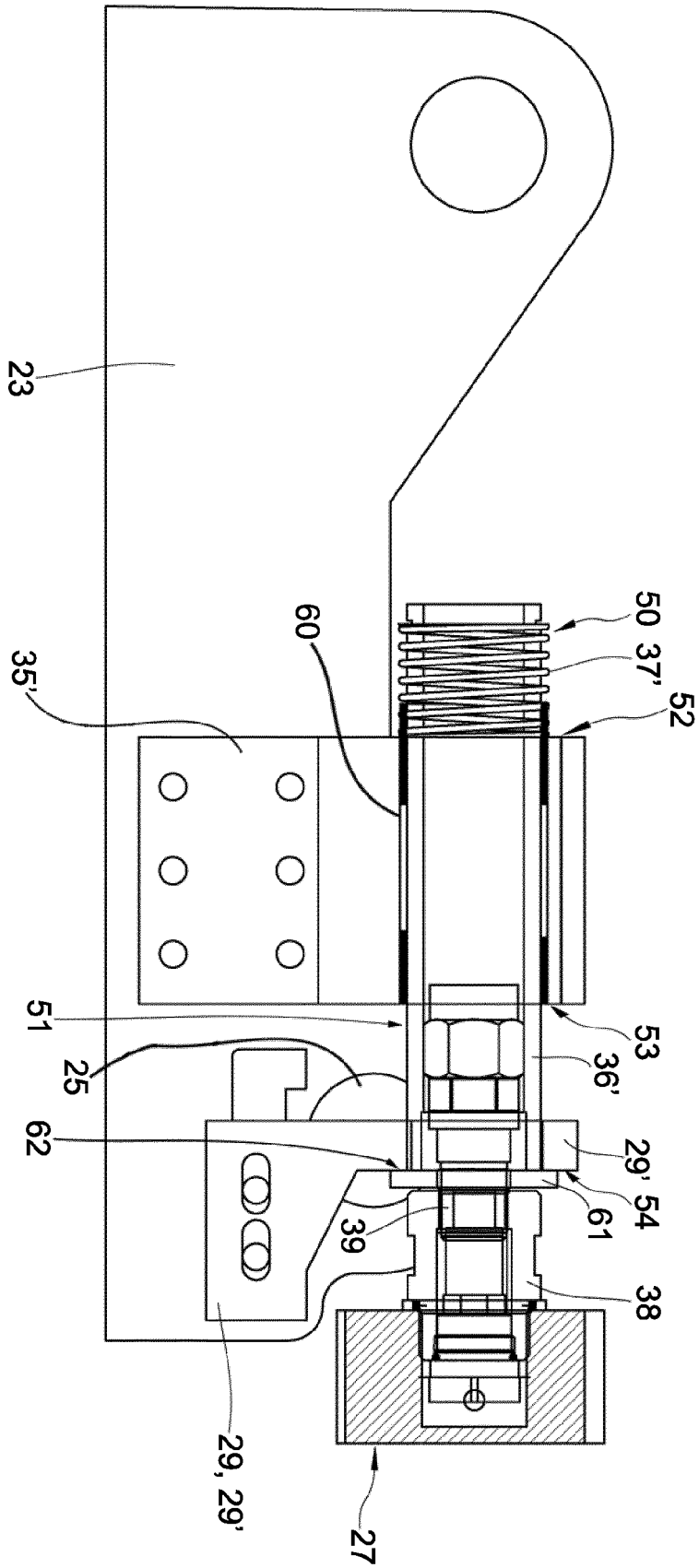

Fig. 12

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EUROPEAN SEARCH REPORT

Application Number
EP 15 18 3694

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	WO 2004/072387 A1 (OILQUICK AB [SE]; SONERUD AAKE [SE]) 26 August 2004 (2004-08-26) * the whole document *	1-15	INV. E02F3/36
A	EP 1 580 329 A1 (STIG ENGSTROEM [SE]) 28 September 2005 (2005-09-28) * abstract; figures 1-13 *	1-15	
A	WO 2007/131800 A1 (LEHNHOFF HARTSTAHL GMBH & CO K [DE]; MUELLER PETER [FR]) 22 November 2007 (2007-11-22) * the whole document *	1-15	
			TECHNICAL FIELDS SEARCHED (IPC)
			E02F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	9 February 2016	Faymann, L

CATEGORY OF CITED DOCUMENTS

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L : document cited for other reasons

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EPO FORM 1503 03.82 (P04C01)

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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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