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QUICK COUPLER

The invention relates to a quick coupler according to the preamble of claim 1.

Such quick couplers are used for easy and convenient changing of different attachments on construction machines. With such a quick coupler, e.g. swing
5 buckets, grabs, shears, compactors, magnets, hydraulic hammers or other attachments can be coupled or uncoupled in a few seconds and with a high safety standard from an operator's cab, e.g. on a boom of an excavator.

US 6 154 989 A discloses a generic quick coupler. This includes a carrier which has, on one side, first receptacles for holding a first coupling element provided on
10 an attachment and, on the other side, second receptacles with a locking member movable between a release position and a locking position for releasably holding a second coupling element. In order to prevent the attachments from falling and thereby possibly endangering persons in the event of an unintentional movement of the locking member into a release position, a catch unit is provided on the
15 carrier with a hook arrangement for holding a transverse bar cooperating with counter hooks on the attachment. Since the hook arrangement provided for securing is made in one piece with the carrier, damage to the hook arrangement caused by improper use will always also affect the entire carrier. Repair or replacement is therefore associated with considerable expense.

20 A quick coupler known from US 6 301 811 B1 has first slot-shaped receptacles on one side of a carrier and second receptacles on the other side of the carrier for receiving a bolt-shaped coupling element. A hook-shaped locking member, which can be pivoted about a transverse axis, is arranged on each of the first receptacle and the second receptacle for releasably holding the coupling element inserted on
25 one side or the other of an attachment part as required. The two hook-shaped locking members are urged by a torsion spring into a rearwardly rotated opening position and can be held in a forwardly rotated locking position by a spring-loaded locking pin. By means of an actuating cylinder, the spring-loaded locking pin can be moved from an extended locking position for retaining the locking element in
30 the locking position to a retracted position for releasing the locking element for movement to the open position. Thus, the hook-shaped locking members 144 and

241 constitute the locking unit for releasably retaining the coupling element and do not constitute a catch unit for preventing the implement from falling.

EP 2 159 334 A1 discloses a coupling device for tools on a carrier device. The coupling device contains a first coupling part that can be connected to the carrier device and a second coupling part that can be connected to the tool. In order to
5 increase work safety, this known coupling device is provided with a catch unit with a catch hook firmly arranged on the first coupling part and a catch holder arranged on the second coupling part. The catch unit allows the second coupling part with the tool to be caught in a catch position in the event of unintentional
10 release from the coupling position and held on the first coupling part.

It is the task of the invention to create a quick coupler of the type mentioned above, in which damage to the carrier caused by improper loading of the catch unit can be avoided.

This task is solved by a quick coupler with the features of claim 1. Practical
15 embodiments and advantageous further developments of the invention are indicated in the subclaims.

In the quick coupler according to the invention, the catch unit has at least one catch hook pivotally connected to the carrier. The pivotable arrangement allows the catch hook to yield if, for example, an operator strikes an obstacle with the catch hook
20 while handling the quick coupler, or if a catch hook is used in a non-permitted manner to support an excavator on the ground for turning or repositioning. Impacts or forces acting on the catch hook are thus not transmitted directly to the carrier due to the compliance of the catch hooks, which means that the connection to the carrier is not subjected to as much stress and the carrier is affected as little as possible. A
25 catch hook damaged by improper use can also be easily replaced without having to replace the entire carrier. It is not necessary to dismantle or replace the entire carrier. The at least one catch hook is designed to catch an attachment coupled to the quick coupler even in the event of an unintended release movement of a locking unit, thereby preventing unwanted release of the attachment from the quick coupler.
30 The catch hook is completely independent of the operator-controlled locking unit of the quick coupler and thus offers increased safety even in the event of improper

operation. The catch hook is thus designed to catch an attachment independently of the operator for additional safety.

The catch unit may comprise one or more separate or interconnected catch hooks. In a particularly practical embodiment, the catch unit can include two
5 catch hooks pivotably arranged on the first receptacles of the carrier. The catch hooks may be designed as separate and separately pivotable catch hooks. However, they can also be connected to each other.

In a robust and structurally advantageous embodiment, the catch hook can be arranged on a connecting bar of the carrier so as to be pivotable about a
10 transverse axis. For the pivotable arrangement of the catch hook, the connecting bar can have a transverse bore and the catch hook can have suitable receptacle bores for receiving the transverse axis.

It is advisable for the catch hook to be rotatably mounted on the transverse axis via bearing bushes. This ensures low-friction linkage of the catch hooks to the
15 carrier, which is well protected against wear. The transverse axis can be secured by a pin against falling out and rotation relative to the carrier.

In one possible embodiment, the connecting bar can project into an intermediate space between two rearwardly projecting legs of the catch hook. The catch hook can have an upper curvature at the ends of the legs facing the carrier and a rear
20 abutment surface for abutment against a front stop surface of the carrier.

In another possible embodiment, the connecting bar can project into a recess provided with an upper inner surface and a lower inner surface at the rear of the catch hook. Between the connecting bar and the upper or lower inner surface of the recess, there is preferably an upper and lower gap in which a damping element is arranged.

25 However, the catch hook can also be inserted via bearing pins designed in one piece with the catch hooks as transverse axes in half-shell-shaped receptacles on the carrier and held from below by a complementary part. The half-shell-shaped receptacles for rotatable mounting of the transverse axes can be arranged on the top of two spaced-apart, parallel legs on connecting bars of the carrier.

In a structurally simple embodiment, the catch hook is configured to engage around a coupling element that engages the first receptacles.

Further features and advantages of the invention will be apparent from the following description of a preferred embodiment based on the drawing. It shows:

5 **Figure 1** a first embodiment of a quick coupler with a catch hook arrangement in an initial position that is not folded up;

Figure 2 the quick coupler of Figure 1 with the catch hook arrangement in an upper folding position;

10 **Figure 3** the quick coupler of Figure 1 with a catch hook arrangement in an exploded view;

Figure 4 an enlarged detailed view A of Figure 3;

Figure 5 an enlarged perspective view of a catch hook in a lower starting position;

Figure 6 an enlarged side view of a catch hook in a lower starting position;

15 **Figure 7** an enlarged perspective view of a catch hook in a folding position;

Figure 8 an enlarged side view of a catch hook in a folding position;

Figure 9 a second embodiment of a quick coupler with a catch hook arrangement in an exploded view;

20 **Figure 10** an enlarged detailed view of a catch hook of the catch hook arrangement of Figure 9 in a non-swiveled initial position, and

Figure 11 an enlarged detail view of the catch hook of Figure 10 in a folded position;

Figure 12 a third embodiment of a quick coupler with a catch hook arrangement;

25 **Figure 13** a detailed view of a catch hook of the catch hook arrangement of Figure 12 in a folded position;

Figure 14 an exploded view of the catch hook of Figure 13 and

Figure 15 a receptacle for the catch hook of Figure 14 in a detailed view.

Figure 1 shows a quick coupler 1 for easy and convenient changing of different attachments on construction machines, in particular excavators. Such a quick
5 coupler can be used, for example, to easily and conveniently couple or uncouple buckets, grabs, shears, magnets, compactors, hydraulic hammers or other mechanical or hydraulic attachments to or from a boom or other attachment of an excavator or other construction vehicle from an operator's cab.

The quick coupler 1 shown contains a carrier 2 designed as a welded or cast part,
10 which contains first receptacles 3 open to the front on one side for receiving and holding a first bolt-shaped coupling element and second receptacles 4 open to the bottom on the other side for receiving a second bolt-shaped coupling element. The first receptacles 3, which are open towards the front, are claw- or fork-shaped. The downwardly open receptacles 4 have a curved lower abutment surface 5 for abutment
15 of the second bolt-shaped coupling element. The carrier 2 includes a locking unit which, in the embodiments described in more detail below, comprises bolt-shaped locking members which are movable between a retracted release position and an extended locking position and are not shown here. The bolt-shaped locking members are guided axially displaceably in horizontal guide bores inside the carrier 2 and can
20 be moved hydraulically between the retracted release position and the extended locking position by means of a piston. In the extended locking position, the downwardly open second receptacles 4 are closed at the bottom by the locking elements displaceably arranged in the carrier 2, so that the second bolt-shaped coupling element is engaged underneath by the locking element.

25 In the embodiment shown, the carrier 2 includes two claw-shaped first receptacles 3 for a first coupling element on one side and two receptacles 4 for a second coupling element on the other side. On two parallel side parts 6 arranged on the upper side of the carrier 2, continuous receiving openings 7 for not shown fastening bolts for fastening the quick coupler 1 to a boom of an excavator or a
30 connecting part of another construction vehicle are also provided.

In order to couple an attachment with the aid of the quick coupler 1, the quick coupler 1, which is usually arranged on a boom of an excavator, is first moved in such a way that a first coupling element arranged, for example, on an adapter or on the attachment is retracted into the claw-shaped receptacles 3 on one side of the quick coupler 1. Then, with the locking bolts still retracted, the quick coupler 1 is pivoted around the first bolt-shaped coupling element in such a way that a second coupling element on the adapter or attachment comes to rest against the abutment surfaces 5 of the downwardly open receptacles 4 on the other side of the quick coupler 1. Subsequently, the locking pins displaceably arranged in the guide bores in the carrier 2 of the quick coupler 1 can be extended hydraulically so that the second pin-shaped coupling element is engaged underneath by the two locking pins on the quick coupler 2 and the attachment is thus held on the quick coupler 1.

In order to prevent an attachment coupled to the quick coupler 1 from disengaging from the quick coupler in the event of an unintentional disengaging movement of the locking member caused by incorrect operation or malfunctions and then possibly falling down in a raised position of the quick coupler, an additional catch unit 8 shown in Figure 1 is provided on the carrier 2. The catch unit 8 is designed to grip around the coupling element arranged on an adapter or attachment and engaging with the first receptacles 3. The catch unit 8 is designed in such a way that, in the event of unintentional release from the coupling position, an attachment is caught in a catch position by engagement of the coupling element on the catch hook arrangement and is thereby held on the quick coupler.

In the embodiment shown, the catch unit 8 comprises two separate catch hooks 9, which are not rigidly arranged on the carrier 2 of the quick coupler 1, but are connected to the carrier 1 so as to be pivotable about a transverse axis 10 via a kind of hinge. The two catch hooks 9 are designed in such a way that they grip around a coupling element, for example in the form of a bolt, on an attachment and catch the attachment in a catch position in the event of unintentional release of the quick coupler 1 by engagement of the coupling element on the catch hooks 9. The pivotable arrangement allows the catch hooks 9 to move between a lower initial position shown in Figure 1 and an upper folding position shown in Figure 2.

As can be seen from Figures 3 and 4, the carrier 2 has forwardly projecting connecting bars 11 with a continuous transverse bore 12 for connecting the catch hooks 9. The connecting bars 11 projecting forward on the carrier 2 below the first receptacles 3 project into an intermediate space 13 between two rearwardly projecting legs 14 on the connecting part of the catch hook 9 facing the carrier 2. In the two legs 14 of the catch hook 9 there are aligned receiving bores 15 which, in the assembled position of the catch hook 9, are coaxial with the transverse bore 12 in the connecting bar 11. The horizontal transverse axis 10 is inserted into the transverse bore 12 of the connecting bar 11 and secured against falling out and rotating by a pin 16.

Figure 4 shows that the transverse axis 10 has two bearing areas 17 with a reduced diameter at both ends. The transverse axis 10 is mounted in the connecting bar 11 in such a way that the two slimmer bearing areas 17 protrude on both sides in relation to the connecting bar 11. The catch hook 9 is rotatably mounted on the two laterally projecting bearing areas 17 of the transverse axis 10 via two bearing bushes 18.

To mount the catch hooks 9, they are first placed on the associated connecting bar 11 of the carrier 2 so that the receiving bores 15 are aligned with the transverse bore 12. Then the transverse axis 10 is inserted into the transverse bore 12 in such a way that the two end bearing areas 17 of the transverse axis 10 project evenly to both sides of the connecting bar 11. The transverse axis 10 is then fixed in this position relative to the connecting bar 11 by means of the pin 16. For this purpose, the transverse axis 10 has a transverse bore 19 in the center, shown in Figure 4, for receptacle of the pin 16. Finally, the two bearing bushes 18 can then be pushed onto the two bearing areas 17 of the transverse axis 10 and pressed into the receiving bores 15 in the legs 14 of the catch hook 9.

The pivoting or folding arrangement allows the catch hooks 9 to move between an initial position shown in Figures 5 and 6 and a folded position shown in Figures 7 and 8. For example, if an operator bumps into an obstacle while handling the quick coupler 1 with the catch hook 9 or uses the catch hooks 9 in a non-permissible manner to support the excavator on the ground for turning or repositioning, the catch hooks 9 can fold in so that the connection to the carrier 2 is not subjected to

as much stress and the carrier is thus affected as little as possible. In addition, if the catch hook 9 is damaged, it can be easily replaced if necessary.

As can be seen from Figures 5 to 8, the catch hooks 9 have an upper curvature 19 at the rear ends of the legs 14 facing the carrier 2 and a rear abutment surface 20 for abutment against a front stop surface 21 of the carrier 2. In the lower initial position, the catch hook 9 rests with its rear abutment surfaces 20 against the stop surface 21 of the carrier 2, so that the catch hook 9 is held in this catch position. When a corresponding load is applied from below, the catch hook 9 can rotate about the transverse axis 10 due to the curvature 19 and reach an upper folding position. Both in the lower initial position and in the upper folding position, the receptacles 3 are closed forward by the catch hooks 9 so that an attachment can be safely caught and held in the event of an unintentional release of the locking mechanism. A return of the catch hooks 9 from the folding position to the initial position can be effected by gravity or by a return spring not shown.

Figures 9 to 11 show a second embodiment of a quick coupler 1 according to the invention with a catch unit 8. In this embodiment, too, the catch unit 8 comprises two separate catch hooks 9, which are not rigidly but pivotably arranged on the carrier 2 of the quick coupler 1. Here, too, the two catch hooks 9 are hinged to connecting bars 11 of the carrier 2 so as to be pivotable about a transverse axis 10. For this purpose, the connecting bars 11 have a transverse bore 12 and the catch hooks 9 have corresponding receiving bores 15 for receiving the transverse axis 10.

On their rear side facing the carrier 2, the catch hooks 9 have a recess 22, which can be seen in Figures 10 and 11, with an upper and lower inner surface 23 and 24, respectively. The recess 22 in catch hook 2 has a somewhat greater height than the connecting bar 11, which is block-shaped here, so that there is an upper and lower gap 25 and 26, respectively, between the connecting bar 11 and the upper and lower inner surfaces 23 and 24, respectively, of the recess 22. A damping element 27 made of rubber or other elastic material is inserted in each of the upper and lower gaps 25 and 26, respectively. In this embodiment, too, the catch hook 9 can be pivoted relative to the carrier 2. However, here the pivoting or folding movement is limited by the size of the gap 25 or 26 and the resilience of the damping element 27. In contrast to the first embodiment, however, the catch hooks 9 can move here not only upwards but

also downwards without deformation of the catch hook. The catch hooks 9 are thus hinged to the carrier 2 in an upward and downward yielding manner.

Figures 12 to 15 show a third embodiment of a quick coupler 1 according to the invention with a catch unit 8. In this embodiment, too, the catch unit 8 comprises
5 two separate catch hooks 9, which are not rigidly but pivotably arranged on the carrier 2 of the quick coupler 1. Here, the two catch hooks 9 are also hinged to connecting bars 11 of the carrier 2 so as to be pivotable about transverse axes 10. In this design, however, the transverse axes 10 are not separate bolts or pins inserted into corresponding transverse and receiving bores, but rather bearing
10 pins made in one piece with the catch hooks 9, via which the catch hooks 9 are inserted into half-shell-shaped receptacles 28 on the connecting bars 11 and held from below by a complementary part 29.

As can be seen in Figure 14, the two laterally projecting transverse axes 10 formed as bearing pins are formed by lateral milled-of areas 30 on the catch hook
15 9. On its underside, the catch hook contains a bar 31 with transverse bores 32 for two heavy-duty spring pins 33 and 34, through which the complementary part 29 for holding the catch hook 9 is attached to the connecting bar 11. The complementary part 29 prevents the catch hook 9 from sliding upwards with its transverse axes 10 out of the bearing shell-shaped receptacles 28.

20 In Figure 15 it can be seen that the connecting bars 11 in the version shown in Figure 12 have two parallel legs 35 spaced apart from each other. The half-shell-shaped receptacles 28 for rotatable mounting of the transverse axes 10 are arranged on the upper side of the two legs 35 separated from each other by an intermediate space 36. A catch hook 9 projecting into the intermediate space 36
25 is inserted into the receptacles 28 with its two laterally projecting transverse axes 10 and secured by the complementary part 29.

In the embodiment shown in Figures 12 to 15, an attachment can also be caught in a catch position by the catch hooks 9 in the event of unintentional release from the coupling position and thus be held securely on the quick coupler.

List of reference signs

	1	Quick coupler
	2	Carrier
	3	First receptacle
5	4	Second receptacle
	5	Abutment surface
	6	Side part
	7	Receiving opening
	8	Catch unit
10	9	Catch hook
	10	Transverse axis
	11	Connecting bar
	12	Transverse bore
	13	Intermediate space
15	14	Leg
	15	Receiving bore
	16	Pin
	17	Bearing area
	18	Bearing bush
20	19	Curvature
	20	Abutment surface

	21	Stop surface
	22	Recess
	23	Upper inner surface
	24	Lower inner surface
5	25	Upper gap
	26	Lower gap
	27	Damping element
	28	Receptacle
	29	Complementary part
10	30	Milled-of area
	31	Bar
	32	Transverse bore
	33	Heavy-duty spring pin
	34	Heavy-duty spring pin
15	35	Leg
	36	Intermediate space

PATENTKRAV

1. Hurtigskifter (1) til skift af udstyr på en entreprenørmaskine, hvilken hurtigskifter omfatter en holder (2), første modtageanordninger (3) anbragt på holderens (2) ene side til modtagelse af et første koblingselement, andre
5 modtageanordninger (4) anbragt på holderens (2) anden side til modtagelse af et andet koblingselement, en udløselig låseanordning til fastholdelse af det andet koblingselement, og en gribeanordning (8) anbragt på holderen (2) til at gribe udstyret, **kendetegnet ved, at** låseanordningen omfatter boltformede låseelementer, der kan bevæges mellem en tilbagetrukket udløsningsstilling og en
10 udtrukket låsestilling, og **ved, at** gribeanordningen (8) indeholder mindst én gribekrog (9), der er drejeligt anbragt på holderen (2) på en sådan måde, at den forhindrer, at udstyret skifter til udløsningsstillingen i tilfælde af låseelementernes utilsigtede bevægelse som følge af fejlbetjening eller funktionsfejl.
2. Hurtigskifter (1) ifølge krav 1, **kendetegnet ved, at** gribeanordningen (8)
15 har to gribekroge (9), der er drejeligt anbragt på holderens (2) første modtageanordninger (3).
3. Hurtigskifter (1) ifølge krav 1 eller 2, **kendetegnet ved, at** gribekrogen (9) er anbragt på en forbindelsesstang (11) på holderen (2) på en sådan måde, at den kan dreje om en tværgående aksel (10).
- 20 4. Hurtigskifter (1) ifølge krav 3, **kendetegnet ved, at** forbindelsesstangen (11) omfatter et tværgående hul (12), og gribekrogen (9) omfatter modtageborehuller (15) til modtagelse af den tværgående aksel (10).
5. Hurtigskifter (1) ifølge krav 3 eller 4, **kendetegnet ved, at** gribekrogen (9) er drejeligt monteret på den tværgående aksel (10) via legebøsninger (18).
- 25 6. Hurtigskifter (1) ifølge et hvilket som helst af krav 3 til 5, **kendetegnet ved, at** den tværgående aksel (10) er sikret mod at falde ud og dreje i forhold til holderen (2) ved hjælp af en split (16).
7. Hurtigskifter (1) ifølge et hvilket som helst af krav 3 til 5, **kendetegnet ved, at** forbindelsesstangen (11) rager ud i et mellemliggende
30 område (13) mellem to bagudrettede ben (14) på gribekrogen (9).

8. Hurtigskifter (1) ifølge krav 7, **kendetegnet ved, at** gribekrogen (9) omfatter en øvre runding (19) på de ender af benene (14), der vender mod holderen (2), og en bageste støtteflade (20) til støtte mod en forreste anlægsflade (21) på holderen (2).
- 5 9. Hurtigskifter (1) ifølge et hvilket som helst af krav 3 til 5, **kendetegnet ved, at** forbindelsesstangen (11) rager ind i en fordybning (22), der har en øvre inderside (23) og en nedre inderside (24), på gribekrogens (9) bagside.
- 10 10. Hurtigskifter (1) ifølge krav 9, **kendetegnet ved** en øvre og en nedre spalte (25, 26) mellem forbindelsesstangen (11) og fordybningens (22) øvre eller nedre inderside (23, 24).
11. Hurtigskifter (1) ifølge krav 10, **kendetegnet ved, at** et dæmpeelement (27) er indsat i den øvre spalte og i de nedre spalter (25, 26).
- 15 12. Hurtigskifter (1) ifølge krav 3, **kendetegnet ved, at** de tværgående aksler (10) er lejetapper udført i ét stykke med gribekrogene (9), via hvilke lejetapper gribekrogene (9) er indsat i halvskålformede modtageanordninger (28) på holderen (2) og er fastholdt nedefra ved hjælp af en supplerende del (29).
- 20 13. Hurtigskifter (1) ifølge krav 12, **kendetegnet ved, at** de halvskålformede modtageanordninger (28) til drejelig lejring af de tværgående aksler (10) er anbragt på den øvre side af to adskilte, parallelle ben (35) på forbindelsesstænger (11) på holderen (2).
- 25 14. Hurtigskifter (1) ifølge et hvilket som helst af krav 1 til 13, **kendetegnet ved, at** den mindst ene gribekrog (9) er udformet på en sådan måde, at den griber om et koblingselement, der går i indgreb med de første modtageanordninger (3).

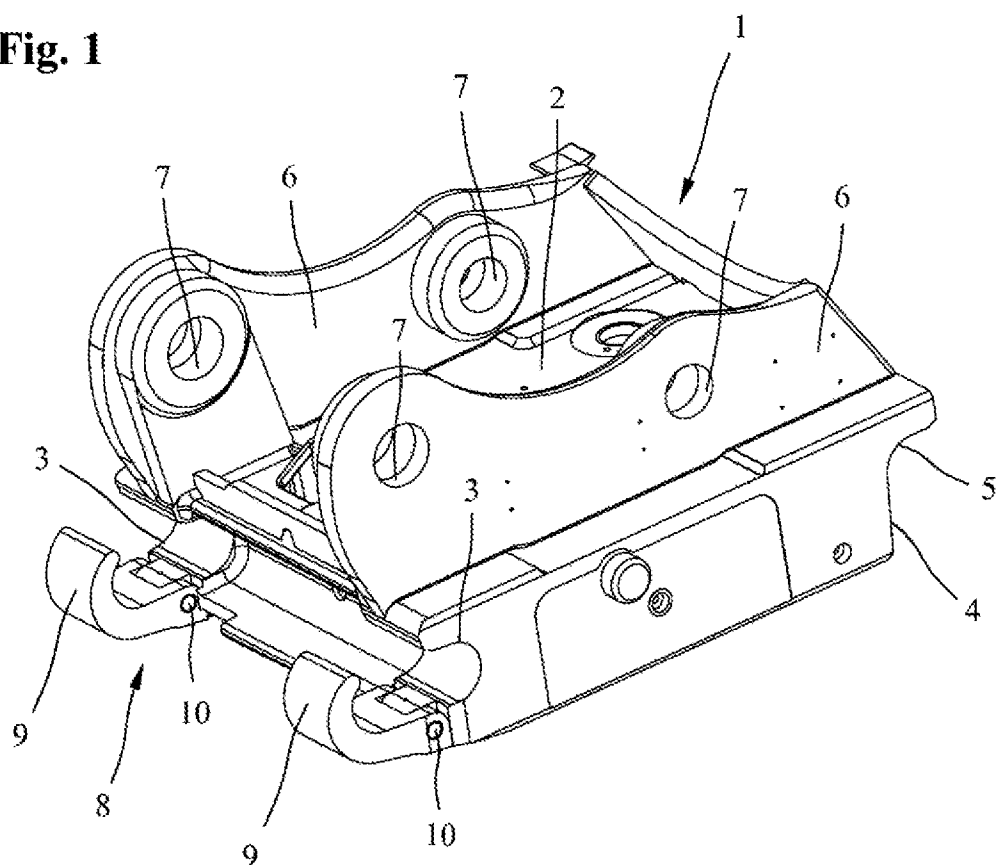
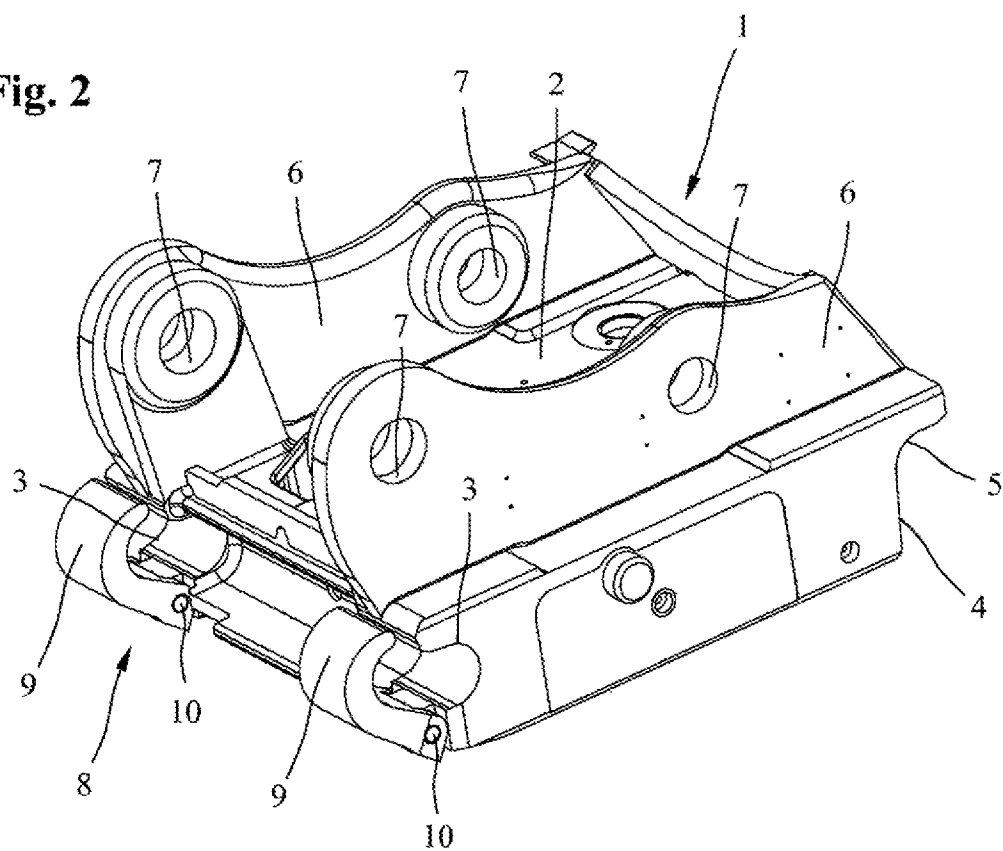
Fig. 1**Fig. 2**

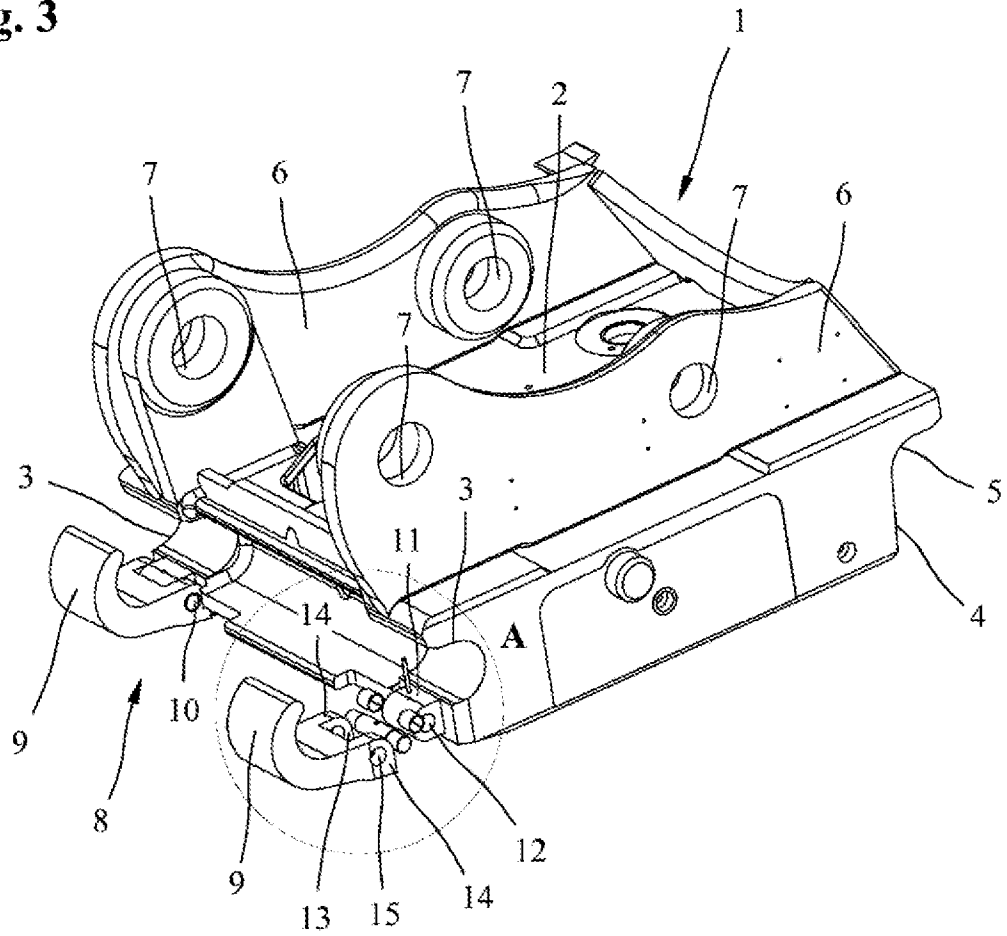
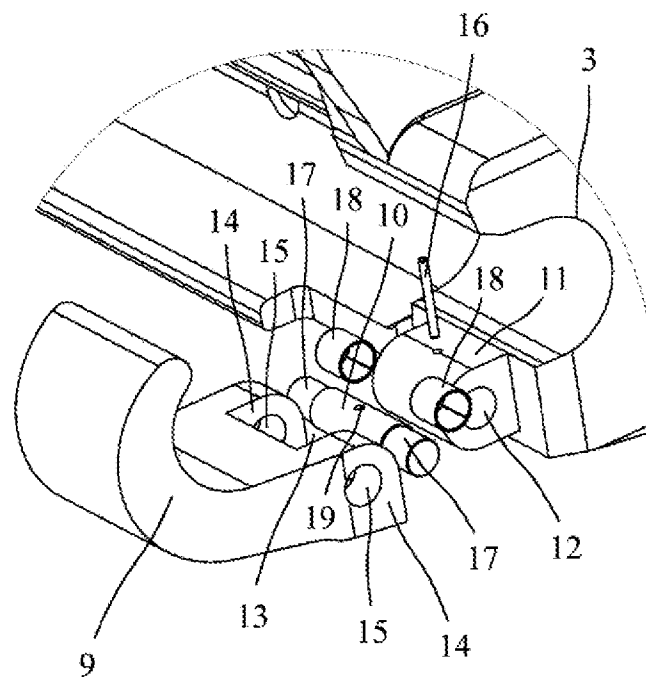
Fig. 3**Fig. 4**

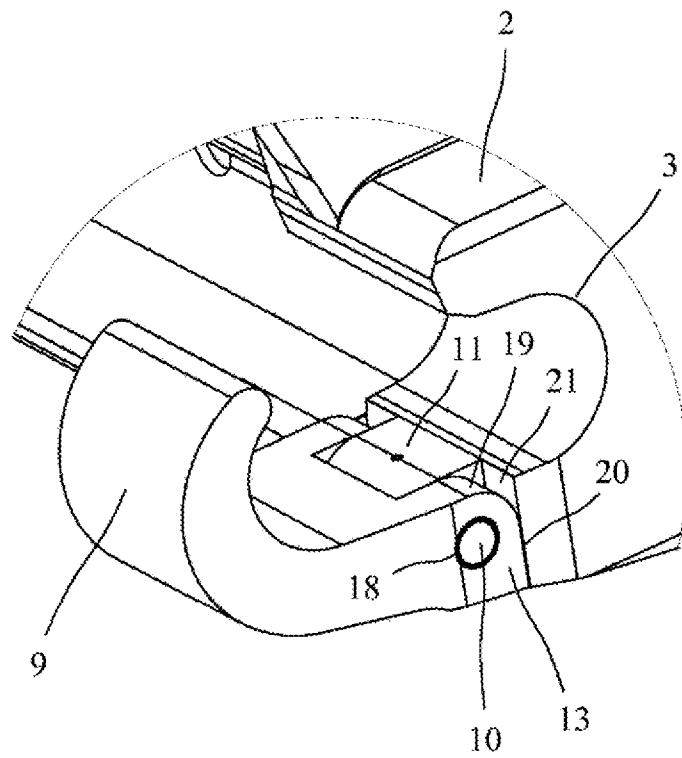
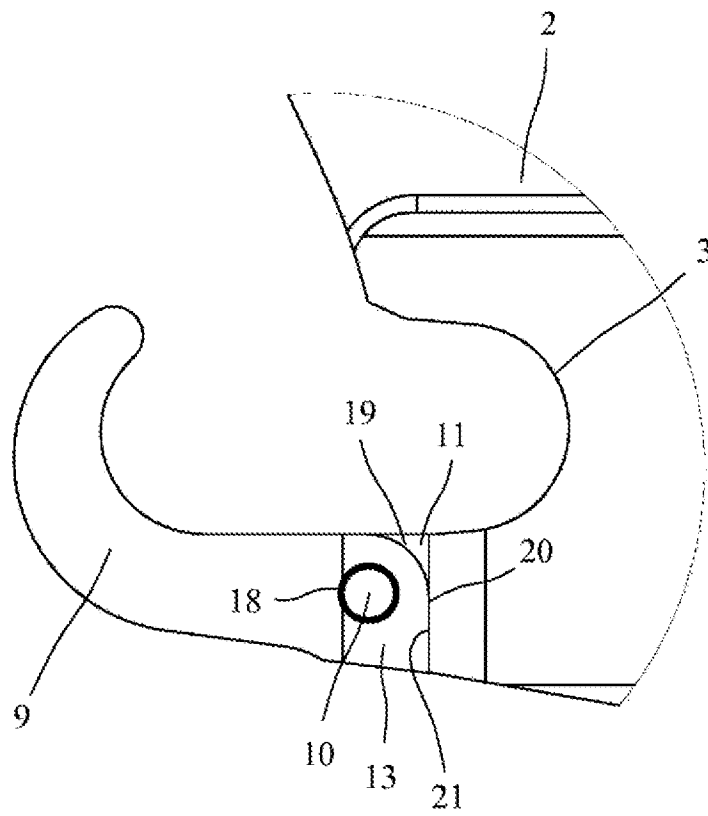
Fig. 5**Fig. 6**

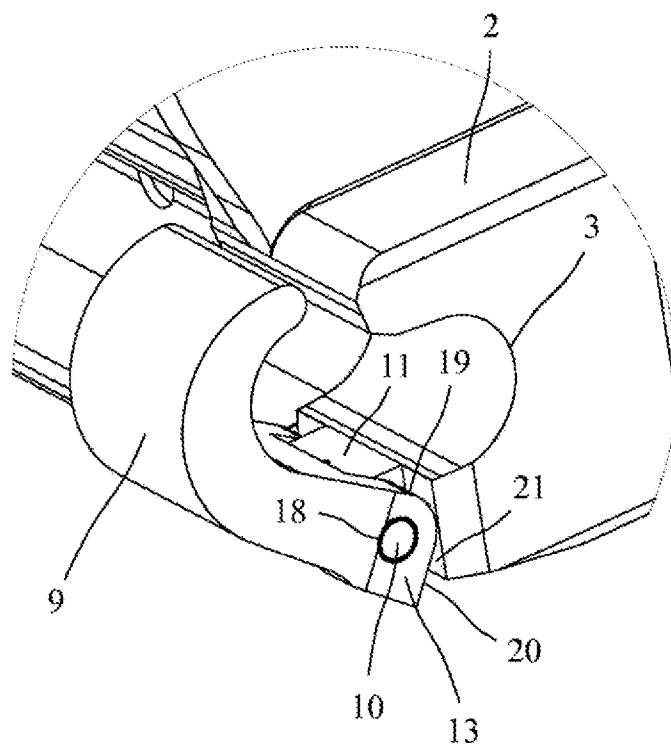
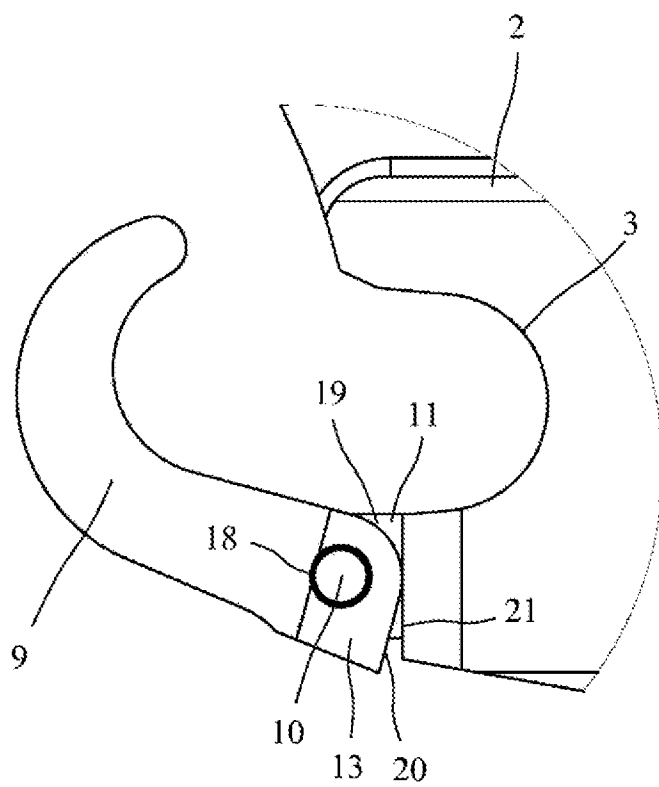
Fig. 7**Fig. 8**

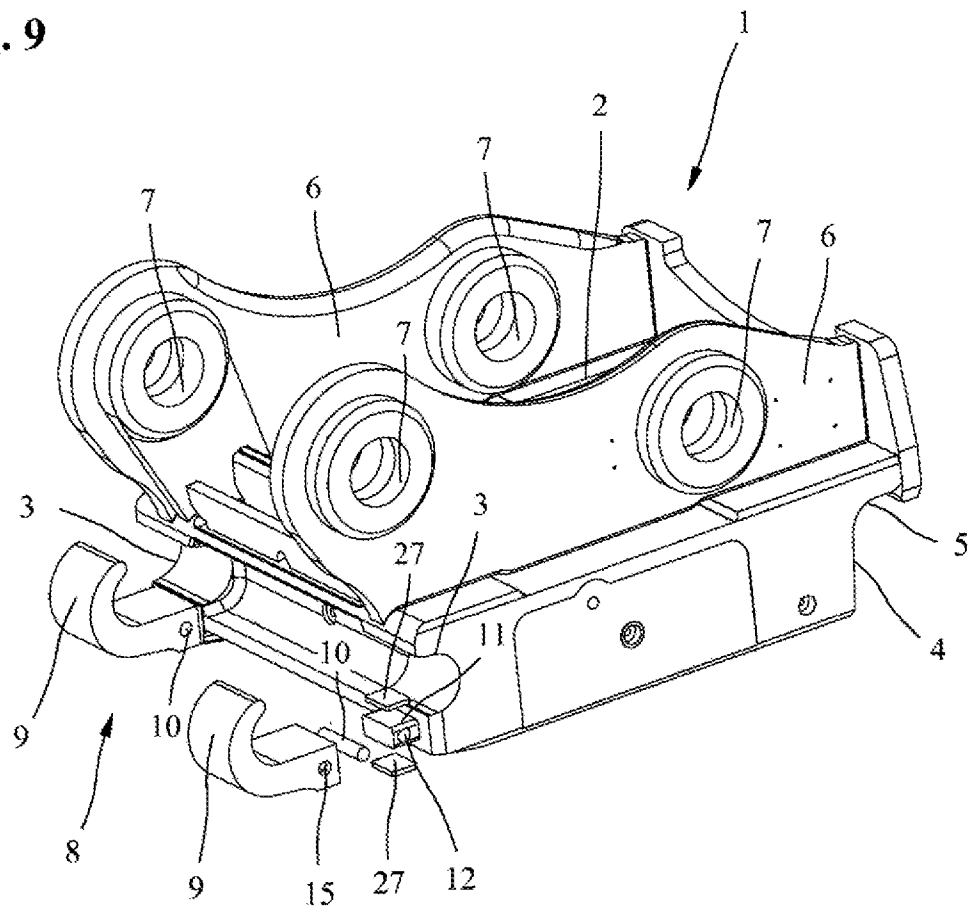
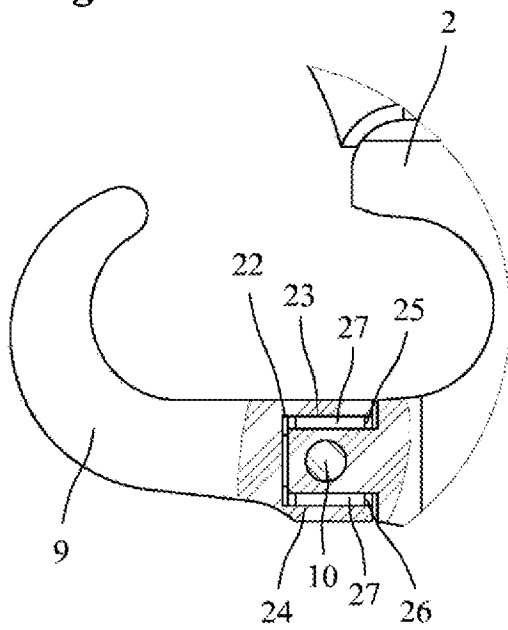
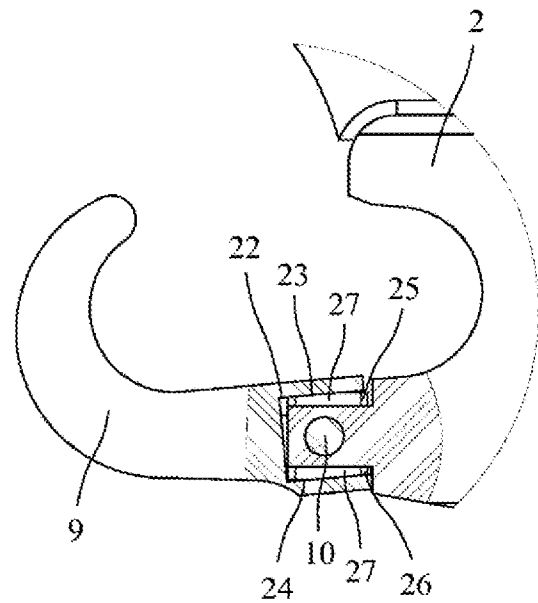
Fig. 9**Fig. 10****Fig. 11**

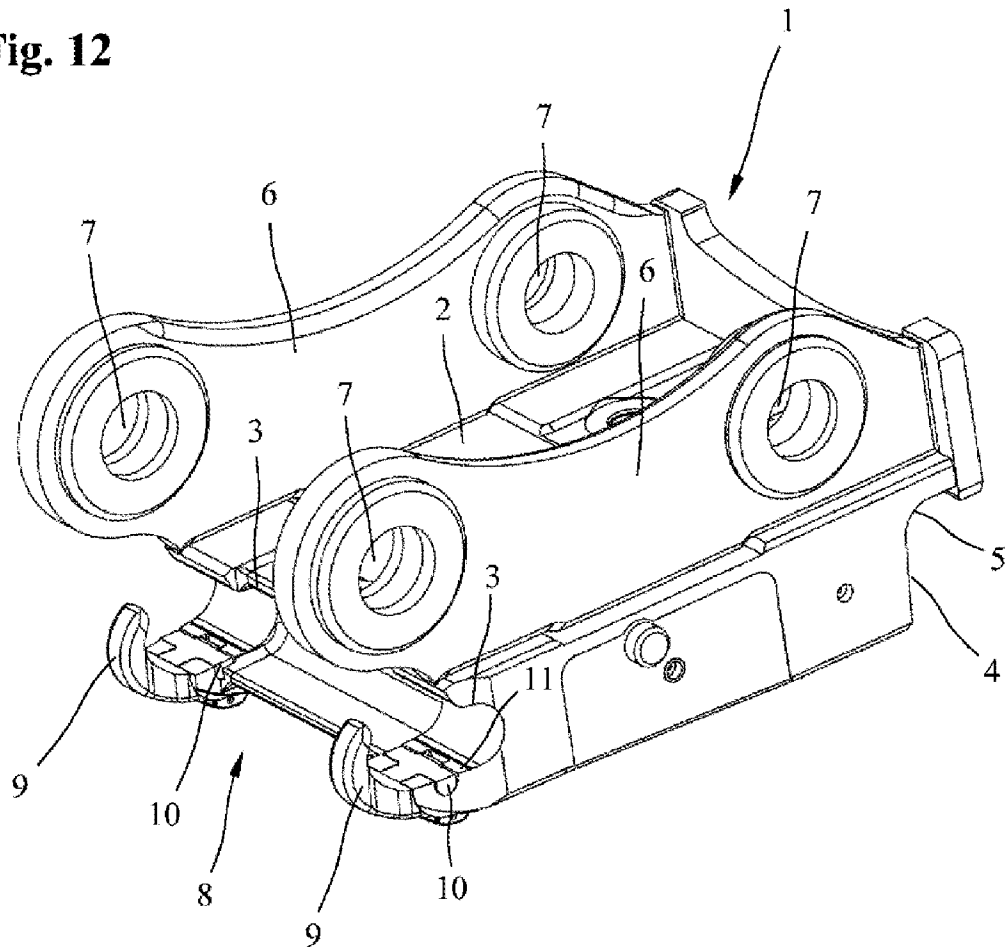
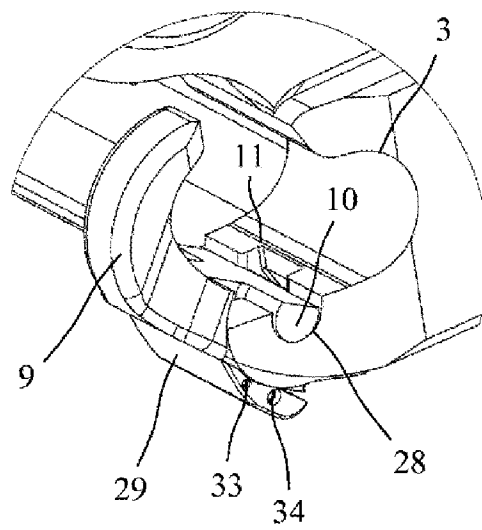
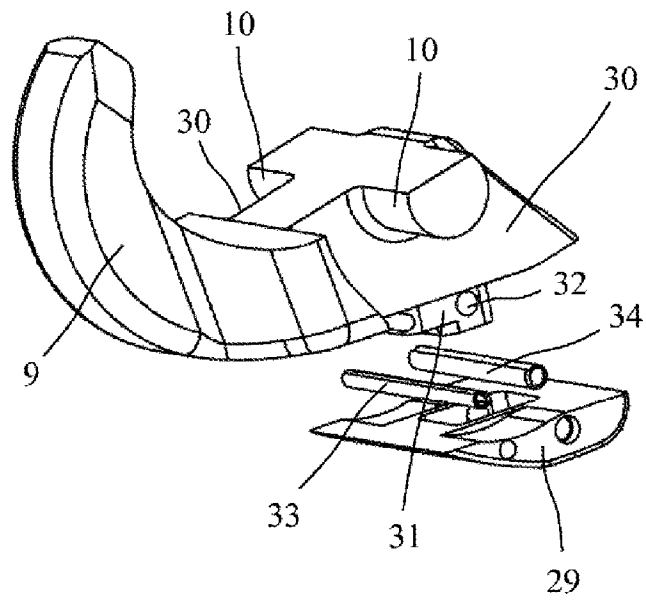
Fig. 12**Fig. 13**

Fig. 14**Fig. 15**