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FAST LOCK

(57)

A quick coupling (1) for an adapter (A) for tools provided with two axles (AX1), (AX2) ; the coupling (1) comprising a box-shaped frame (10) provided with a pair of sides (16) (16') extending along a given direction (D), each of which is delimited at the front by an abutment (12) (12') for said axles (AX1), (AX2); a locking assembly (20) being provided between the sides (16) (16') and comprising a pair of first pins (22) (22') parallel to the direction (D) and integrally coupled together by a connection member (24); each side (16) (16') having a re-

spective hook (140) (140') provided with a seat (14) for the axles (AX1), (AX2); an actuating device (26) being provided to move the first pins (22) (22') with reciprocating motion along the direction (D) between a first retracted position and an operative position (OP) facing the abutment (12); the assembly (20) comprising a safety device (200) that is suitable to lock an axle (AX1) (AX2), through mechanical interference, and can be mechanically actuated by the connection member (24).

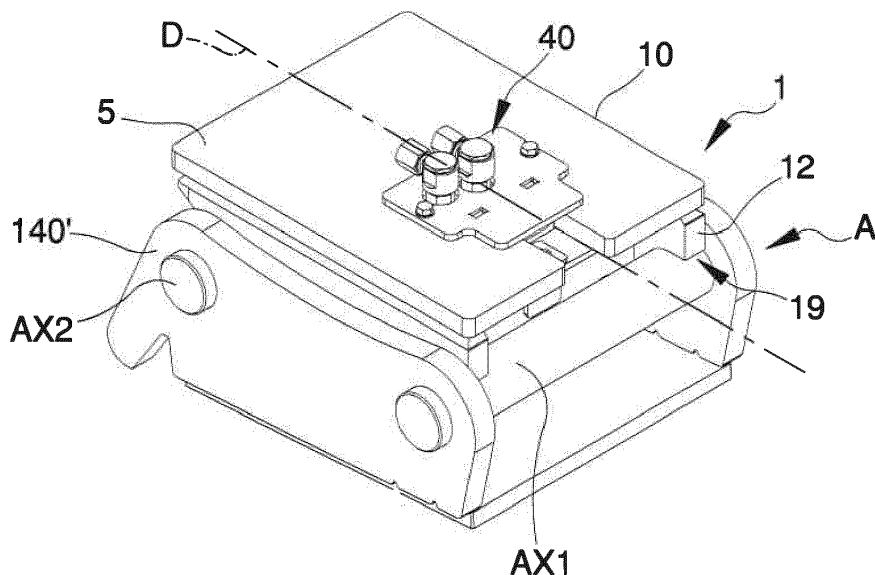


Fig.1

Description

[0001] The present invention concerns a quick coupling for coupling tools through the interposition of a respective adapter provided with two coupling axes. In particular, the present invention refers to a quick coupling for coupling tools through the interposition of a respective adapter provided with two coupling axes, the quick coupling being provided with its own actuating device. In greater detail, the present invention refers to a quick coupling for coupling tools through the interposition of a respective adapter provided with two coupling axes, the quick coupling being provided with its own actuating device and a mechanical type safety device suitable to prevent accidental detachment of the adapter.

DESCRIPTION OF THE STATE OF THE ART

[0002] In the sector of operating machines provided with mechanical arms, the use of mechanical interfaces to connect to, or rapidly detach from, the free ends of the same arms of the tools is known. Said interfaces comprise an adapter member provided in the majority of cases with two parallel axes positioned at a given distance to be compatible with a quick coupling, which consists of an equipment provided with mechanisms arranged to selectively couple with the two axes of the adapter member. Normally, the manufacturers of quick couplings provide adapter members appropriately designed to couple with their own quick couplings to make the tools interfaceable with their own quick couplings.

[0003] The quick couplings normally comprising a box-shaped frame which delimits a chamber arranged to house an operating assembly and locking members. In particular, the frame has a pair of sides connected to each other by a base plate and comprises a cover which closes the chamber at the top and is connected to the sides in a detachable manner. In addition, the sides are symmetrically shaped, and each of them develops longitudinally between a respective fork portion and a coupling portion, each of said portions being shaped to house any one of the axles. In the area of the coupling portion the frame comprises a further plate which has a pair of service holes for a longitudinal locking pin. The locking pins are located alongside each other and carried by a transverse connection member which can be longitudinally operated by a linear actuator, either of a mechanical or fluid-dynamic type. In particular, the actuator is adapted to move the connection member, and therefore the pins, between an operatively neutral retracted position and a forward position in which the heads of the pins cooperate with the coupling portions of the two sides to provide a housing for one of the axles of the adapter. The European patent no. EP 2824243 of the applicant describes a quick coupling for an adapter with two axes installable on a mechanical arm of an operating machine. Said actuator comprises a safety device provided with a further hydraulically operated linear actuator, the function of which is to move a further locking pin, the purpose of which is to interact, in use, with the upper portion of the axle which engages the sides of the adapter on the side of the fork portions in order to lock the axle contained by the latter. It should be noted that each adapter is initially approached by using the fork portions of the quick coupling to grip a first axle from the bottom and only after having completed the gripping of said first axle is the adapter lifted through said first axle to also couple the second axle using the coupling portion. The coupling is perfected using the longitudinal locking pins. When this operation has been completed, the pin of the safety device is activated through the respective hydraulic drive. According to the patent teachings, operation of the further linear actuator is functionally independent of operation of the longitudinal locking pins. For this reason, on the one hand, non-operation of said safety device downstream of operation of the two adjacent pins cannot be ruled out; on the other, there are no evident signs of said abnormal situation and consequently when said circumstance occurs, the risks of projection of the adapter and the relative tool into the surrounding space are particularly high.

[0004] Due to the above, the need is particularly felt for a quick coupling which comprises a safety device that can be mechanically operated and is arranged to come into operation controlled by the device that operates the longitudinal locking pins, after the first axle of the adapter has been loaded by the quick coupling, highlighting the impossibility of perfecting the coupling with the second axle. Said problem is currently unresolved and represents an interesting challenge for the applicant.

[0005] In view of the situation described above, it would be desirable to have a quick coupling provided with a safety device associated with the respective actuating device which, in addition to limiting and possibly overcoming the drawbacks typical of the above illustrated known state of the art, defines a new standard for said types of equipment usable for coupling tools to the mechanical arms of operating machines. Further examples of couplings according to the known art are known from the documents DE 102015210860 and US 2011/286788.

SUMMARY OF THE PRESENT INVENTION

[0006] The present invention relates to a quick coupling for coupling tools through the interposition of a respective adapter provided with two coupling axes. In particular, the present invention refers to a quick coupling for coupling tools through the interposition of a respective adapter provided with two coupling axes, the quick coupling being provided with its own actuating device. In further detail, the present invention refers to a quick coupling for coupling tools through the interposition of a respective adapter provided with two coupling axes, the quick coupling being provided with its own

actuating device and a mechanical type safety device suitable to prevent accidental detachment of the adapter.

[0007] The problems described above are solved by means of a quick coupling according to the present invention according to at least one of the following claims.

[0008] According to some embodiments a quick coupling is provided for an adapter for tools provided with two axles; said coupling comprising a box-shaped frame provided with a pair of sides extending along a given direction, each of which is delimited at the front by an abutment for said axles; a locking assembly being arranged between said sides and comprising a pair of first pins parallel to said direction and integrally coupled by a connection member; each said side ending at the back in a respective hook provided with a seat for said axles; an actuating device being provided to move them with reciprocating motion in said direction between a first retracted position and an operative position facing said abutment; characterized in that said assembly comprises a safety device suitable to lock a said axle by mechanical interference and mechanically operated by said connection member.

[0009] In some embodiments, said safety device comprises a tappet carried in a rotatable manner by said frame from and towards an engagement position of said seat and has a head portion shaped to be arranged at a substantially diametral distance from said hook.

[0010] In some cases, said tappet is carried in a rotatable manner by said frame around a second pin transverse to said direction; said safety device comprising a cam integral with said connection member and mechanically coupled with said tappet by means of a respective third pivot pin parallel to said second pin to move said tappet alternately from said engagement position to a said disengagement position of said seat in which said tappet is positioned over said connection member.

[0011] According to a possible construction variation, said cam has a slot engaged by said third pin to couple said tappet to said cam bilaterally; said tappet having a curved portion concentric to said axis angularly delimited by said head portion.

[0012] In some cases, said tappet comprises a crank opposite said head portion and a connecting rod pivoted about said connection member by means of a pin.

[0013] If deemed expedient, the quick coupling comprises signalling means suitable to indicate whether said tappet is in said engagement position of said seat or in said disengagement position.

[0014] In other cases, said signalling assembly is of the visual type. According to a construction variation, said safety device is provided with a signalling assembly for signalling an operative condition of said safety device visible at the back.

[0015] In some cases, it may be expedient for said signalling assembly to be associated with a covering element carried integrally by said frame above said assembly; said signalling means comprising a pair of signs in contrasting colours provided in the covering element.

[0016] According to a further variation, a first sign of said pair of signs is located in said covering element facing said seat so as to be covered by said head portion when, in use, said tappet is in said engagement position of said seat; a second sign of said pair of signs being located beside said first sign so as to be covered by said head portion when, in use, said tappet is arranged in said disengagement position of said seat.

[0017] In some cases, said first sign is circular-shaped and red; said second sign being circular-shaped and green.

[0018] In other cases, said head portion projects radially from said curved surface.

[0019] If deemed expedient, each said first pin has a duckbill-shaped free end on the side of said abutments to selectively define a housing for said axles together with said abutments.

BRIEF DESCRIPTION OF THE FIGURES

[0020] Further characteristics and advantages of the quick coupling according to the present invention will appear clearer from the following description of the embodiments of the present invention shown in the drawings, in which identical or corresponding parts of the device shown therein are identified by the same reference numbers, where the present invention is not limited to the embodiments described below and shown in the drawings, in which, in particular:

- figure 1 is a three-dimensional schematic view of a quick coupling according to a first preferred embodiment of the present invention coupled with an adapter for a tool with which it is possible to equip a mechanical arm of an operating machine;
- figure 2 is a first view on an enlarged scale and with parts removed for clarity of figure 1 in a first operative position;
- figure 3 is a second view on an enlarged scale and with parts removed for clarity of figure 1 in a second operative position;
- figure 4 is a plan view of figure 2;
- figure 5 is a longitudinal section view of figure 4;
- figure 6 is a plan view of figure 3;
- figure 7 is a longitudinal section view of figure 6;
- figure 8 is a bottom view on a reduced scale of the longitudinal section of figure 2;

- figure 9 is a bottom view on a reduced scale of the longitudinal section of figure 3;
- figure 10 is a plan view with parts removed for clarity of a second preferred embodiment of the present invention in a first operative position; and
- figure 11 is a plan view with parts removed for clarity of figure 10 in a second operative position.

DETAILED DISCLOSURE OF THE PRESENT INVENTION

[0021] In figure 1, the number 1 indicates overall a quick coupling 1 for an adapter A for tools, generally but not limited to an excavation tool. Said adapter A is normally used to equip a mechanical arm, known and not illustrated for the sake of economy of drawing, of an operating machine and, in the case illustrated in the attached figures, is of the type provided with two parallel axles AX1 and AX2 arranged transversally to a longitudinal direction D for the set composed of coupling 1 and adapter A. Here and below the terms front and back are respectively used to distinguish the right-hand and left-hand parts of the figures 1-7 and left and right respectively of the figures 8 and 9, without limiting the scope of the present invention, since both the coupling 1 and the adapter A are of the reversible type as can be easily understood from the description and illustrations of the attached figures.

[0022] With particular reference to figures 2 and 3, the coupling 1 comprises a box-shaped frame 10 provided with a cover 5, a pair of parallel sides 16 and 16', which extend along the direction D, each of which ends at the front in an abutment 12/12' for the axles AX1 and AX2 and at the back in a hook 140/140'. The set of the two abutments 12 and 12' defines a front supporting portion for the axles AX1 and AX2, at respective edge portions, and the set of the two hooks 140 and 140' defines at the back a seat 14 for the axles AX1 and AX2. In particular, said seat 14 is substantially cylindrical, open at the back to allow access and exit of the axles AX1/AX2 and measures substantially a length equal to a diameter of the axles AX1/AX2. In particular, each hook 140/140' has two adjacent concave portions 142 and 144 (figures 5 and 7), each of which is delimited by a cylindrical surface 1420 and 1440, the outermost one of which has a width smaller than 135°, to act as a lead and first support for the axles AX1 and AX2, and the innermost one of which has a width that approximates 240°, to axially centre the position of said axles AX1 and AX2 relative to the coupling 1. The two sides 16 and 16' laterally limit a chamber 100 which is longitudinally delimited by a first front wall 101 arranged transversally to the direction D and at the back by a second rear wall 102, substantially parallel to the first wall 101, which delimits at the front the seat 14.

[0023] Again, with reference to figures 2 and 3, the frame 10 carries a locking assembly 20 inside the chamber 100. Figures 1-7 show a hydraulic supply unit 40 of known type coupled with the locking assembly 20; said unit 40 will not be described for the sake of economy of text.

[0024] The assembly 20 comprises a pair of longitudinal pins 22 and 22' which are substantially equal, without said characteristic being interpreted as a limitation of the scope of the present invention. Said pins 22 and 22' are parallel to the direction D and coupled integrally by a connection member 24, which develops transversally to the direction D. Each longitudinal pin 22/22' has a duckbill-shaped free end 220/220' on the side of the abutments 12/12' to selectively define a housing 19 for the axles (AX1) (AX2) together with the abutments 12/12 as will be described in further detail below. Furthermore, the first wall 101 has a pair of service holes 103/103', each of which is coaxial to a respective longitudinal pin 22/22' and has a diameter which approximates by excess a diameter of said longitudinal pin 22/22'. The coupling 1 further comprises an actuating device 26 which is contained inside the chamber 100 and comprises a linear actuator 260, the armature 261 of which is arranged longitudinally between the longitudinal pins 22/22', without said characteristic being interpreted as a limitation of the scope of the present invention. Said actuator 260, which could also be positioned outside the space delimited by the two pins 22 and 22' or in another position without affecting operation of the actuator 1, is provided with a shaft 262 integrally coupled with the connection member 24 to move each pin 22/22' with reciprocating motion along the direction D between a retracted position and an operative position OP facing a respective abutment 12. Said position can be seen in figure 7.

[0025] Again, with reference to figures 2, 3, 4 and 6 the assembly 20 comprises a safety device 200 provided with a tappet 202 which has a fan portion 2021 at the base of which a fork stem 2022 is obtained. Said tappet 202 is carried in a rotatable manner by the frame 10 around a first pin 17 at the intersection between the fan portion 2021 and the stem 2022 from and towards an engagement position P1 of the seat 14 (figures 6, 7 and 11). The fan portion 2021 has a substantially flat face 2023 (figures 5 and 7) facing the seat 14 which is substantially spaced equal to the distance of a diameter of an axle AX1/AX2 from the bottom of the cylindrical surface 1440 of a hook 140/140' when the tappet 202 is in the engagement position P1. In said position, the tappet 202, and in particular the respective face 2023, engages the seat 14 at a substantially diametral distance of an axle AX1/AX2 and, therefore, is adapted to maintain an axle AX1/AX2 housed coincidentally in the seat 14 and to prevent said axle AX1/AX2 from moving from said position. Said first pin 17 is housed at the base of the stem 2022 and is oriented transversally to the direction D. In said regard, the fan portion 2021 has a head portion 204 which can consist of a substantially C-shaped plate. In particular, the fan portion 2021 has a curved surface 20210 concentric to the first pin 17 which carries externally the head portion 204, which projects radially from the curved surface 20210, as can be seen in figures 8 and 9.

[0026] With particular reference to figures 4 and 6, the safety device 200 further comprises a cam 206 carried integral and projecting from the connection member 24, therefore moving with a longitudinal translatory motion in the direction D, and mechanically coupled to the stem 2022 of the tappet 202 by means of a respective second pivot pin 2020 which is parallel to the first pin 17. Therefore the second pin 2020 has the function of alternately rotating the tappet 202 around the axis of the first pin 17 between the engagement position P1 and a disengagement position P2 (figures 4, 5 and 10) of the seat 14, in which the tappet 202 is positioned substantially over the connection member 24, controlled by the linear actuator 260, the shaft 262 of which is completely extracted to maintain the first longitudinal pins 22/22' in the respective retracted position which can be seen in figure 4. With particular reference to figures 4 and 6, the cam 206 has a curved slot 208, the respective concavity of which faces the first pin 17. Said slot 208 is engaged by the second pin 2020 to couple the tappet 202 to the cam 206 bilaterally. As can be seen in figure 7, the cam 206 engages a longitudinal cavity of the stem 2022.

[0027] As described above, the safety device 200 operates by mechanical interference and is a cam-tappet mechanism that can be mechanically operated by the connection member 24, therefore directly by the locking assembly 20.

[0028] With particular reference to figures 2, 3, 8 and 9, the safety device 200 comprises a signalling assembly 30 positioned at the back (on the left in figures 2, 3, 4, 6) therefore facing an operator who occupies the cab of the operating machine known and not illustrated, on the arm of which, known and not illustrated, the quick coupling 1 has been installed by means of the adapter A. Said signalling assembly 30 comprises a covering element 18 (illustrated by a continuous line in figures 2, 3, 5 and 7 and by a broken line in figures 4 and 6) carried integrally by the frame 10 between the sides 16/16' above the second wall 102 and, therefore, below the cover 5 and above the assembly 20 positioned partially over the seat 14. The signalling assembly 30 comprises a pair of signs 32 and 34 in contrasting colours provided in the element 18 facing the seat 14. In particular, a first sign 32 of the pair of signs 32/34 is located in the element 18 facing the seat 14 so as to be covered by the head portion 204 when, in use, the tappet 202 is in the engagement position P1 locking an axle AX1/AX2 housed in the seat 14. Furthermore, a second sign 34 of the pair of signs 32/34 is located beside the first sign 32 so as to be covered by the head portion 204 when, in use, the tappet 202 is arranged in the disengagement position P2 of the seat 14. In said condition the coupling 1 ensures the safety of the adapter A and any tools associated with it. It may be useful to specify, without limiting the scope of the present invention, that the first sign 32 is in the form of a red circle, while the second sign 34 is in the form of a green circle. Therefore, when the first sign 32 can be seen (by an operator in a position lower than the coupling 1) then the tappet 202/the head 204 is in the disengagement position P2. On the other hand, when the second sign 34 can be seen (by an operator in a position lower than the coupling 1) then it means that the tappet 202 has the respective head 204 in the engagement position P1 of the seat 14. If the operator is positioned higher than the two signs 32 and 34, it will be sufficient to rotate the adapter 1 by operating the mechanical arm that carries the adapter so that the face 2023 of the tappet 202 becomes visible to the operator.

[0029] The use of the coupling 1 described above can be easily understood from the above description.

[0030] On the other hand, it may be useful to specify that the coupling 1 is shaped to be used in a reversible manner. Furthermore, it is expedient to consider that when the shaft 262 of the linear actuator 260 is fully extracted from the respective armature 261, then the pins 22/22' are kept in the respective retracted position visible in figure 4 from the connection member 24, and the tappet 202 is arranged in the position P2 with the respective stem 2022 substantially transverse to the direction D, therefore parallel to the second wall 102; the respective fan portion 2021 is contained for the most part inside the chamber 100 and the respective head 204 faces a front portion of the seat 14, on the side of the wall 102. In said configuration the tappet 202 is functionally in a neutral position, unable to interact with an axle AX1 or AX2 that may be contained in the seat 14 to retain it internally. When, on the other hand, as in figure 6, the tappet 202 is in the respective position P1, over an axle AX1 or AX2 that may be contained in the seat 14, the same tappet 202 is functionally able to maintain the axle AX1/AX2 locked in the seat 14 or, in the absence of said axle AX1/AX2, the seat 14 is inaccessible to an axle AX1/AX2. If the seat 14 were engaged by the axle AX1/AX2 and the housing 19 were partially engaged by the axle AX2/AX1 not yet fully stopped against the abutments 12, then the free ends 220/220' of the longitudinal pins 22/22' would face the axle AX2/AX1, and therefore be prevented from moving forward to position the longitudinal pins 22/22' in the respective operative position OP. Obviously it would not be easy for an operator occupying the control cab of the operating machine to visually verify this circumstance. The impossibility of completing the action correlated with the movement of the shaft 262 in the respective retracted position would prevent the connection member 24 from operating the tappet 202 until it is positioned over the seat 14. Therefore, the head 204 would be in a position at some distance from the first sign 32 in the form of a red circle which would be visible at the back. Therefore, an operator located in the cab, facing the back portion of the quick coupling 1, would be promptly visually informed of the occurrence of a potentially dangerous situation, in which every movement of the coupling 1 exerted by a movement of the arm that carries the quick coupling 1 could cause projection of the adapter and the elements connected to it.

[0031] On the other hand, if the seat 14 were engaged by an axle AX2/AX1 and the second sign 34 in the form of a green circle were visible, the operator would be informed that the axle AX1/AX2 regularly engages the housing 19 and that the tappet 202 of the safety device 200 is correctly positioned over the axle AX2/AX1 located in the seat 14. Therefore,

an operator in the cab would be informed that the adapter A is safely connected to the coupling 1 and that therefore work can be started.

[0032] In addition, it may be useful to specify that the element 18 is not essential for operation of the coupling 1. In particular, if it is useful to eliminate it, for example to limit the mass of the coupling 1, the pair of signs 32 and 34 with contrasting colours could be applied in the top of the cover 5 of the frame 10, particularly in the face of the cover 5 facing the tappet 202 and, particularly in the head portion 204 without modifying the scope of the present invention. Therefore, here and below, the expression "covering element" may indicate the element 18 or the cover 5.

[0033] Lastly it is clear that modifications and variations can be made to the coupling 1 described and illustrated here without departing from the protective scope of the present invention. For example, with reference to figures 10 and 11 a variation 200' of the safety device 200 is illustrated in which operation of the tappet 202 that determines transformation of the translatory movement given by the reciprocating motion imparted by the shaft 262 of the actuator 260 to the connection member 24 is determined by a thrust mechanism. In said mechanism the crank consists of the stem 2022 of the tappet 202 and the connecting rod consists of a connecting rod 209 pivoted to the connection member 24 by means of a pin 210. To implement said mechanism the actuator 260 is mounted inside the chamber 100 with the armature 261 fixed to the frame 10 on the side of the second wall 102 instead of on the side of the first wall 101.

[0034] As described above, the present invention concerns a mechanical type quick coupling provided with a hydraulically or mechanically operated mechanical interference safety device in which the locking device that operates the longitudinal locking pins is designed to operate the same safety device, after the first axle of the adapter has been loaded by the quick coupling, in addition to highlighting the successful coupling of the second axle or the impossibility of perfecting said coupling.

[0035] Therefore, the invention described above fully solves the problem encountered in the known art.

List of references and components

A	Adapter
AX1/AX2	Axle
D	Longitudinal direction
OP	Operative position of 22/22'
P1	Engagement position of the head 204
P2	Disengagement position of the head 204
1	Quick coupling
5	Cover of 10
10	Box-shaped frame
100	Chamber
101	First wall (front)
102	Second wall (back)
103/103'	Service hole
12/12'	Abutment of 16
14	Seat of 16
140/140'	Hook
142	Concave portion of 140/140'
144	Concave portion of 140/140'
1420	Cylindrical surface of 142
1440	Cylindrical surface of 144
16/16'	Side of 10
17	First pin
18	Covering element
19	Housing of 1

(continued)

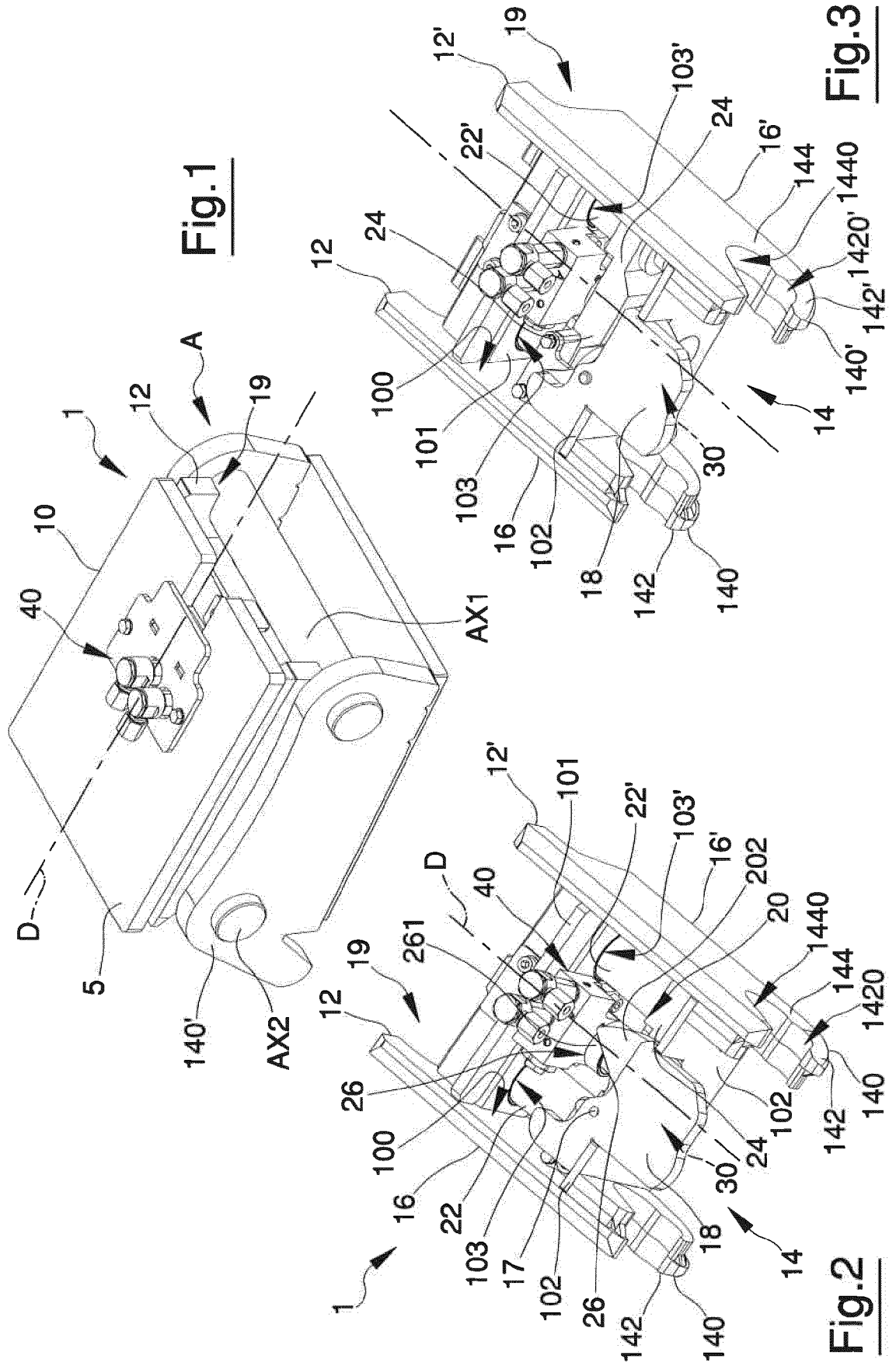
20	Locking assembly of 1
200	Cam-tappet safety device
200'	Thrust mechanism safety device
202	Tappet of 200
2020	Second pivot pin (for 208)
2021	Fan portion of 202
20210	Curved surface of 2021
2022	Stem of 202
2023	Face of 202
204	Head of 2021
206	Cam of 200
22/22'	First pins of 20
220/220'	Free end of 22/22'
24	Connection member of 20
26	Actuating device
260	Linear actuator
261	Armature of 260
262	shaft of 260
208	Slot of 206
209	Connecting rod
210	Pin 24-209
30	Signalling assembly of 20
32	Sign of 30
34	Sign of 30

Claims

1. A quick coupling (1) for an adapter (A) for tools provided with two axles (AX1), (AX2); said quick coupling (1) comprising a box-shaped frame (10) provided with a pair of sides (16) (16') extending along a given direction (D), each of which is delimited at the front by an abutment (12) (12') for said axles (AX1), (AX2); a locking assembly (20) being arranged between said sides (16) (16') and comprising a pair of first pins (22) (22') parallel to said direction (D) and integrally coupled together by a connection member (24) ; each said side (16) (16') ending at the back in a respective hook (140) (140') provided with a seat (14) for said axles (AX1), (AX2); an actuating device (26) being provided to move said first pins (22) (22') with reciprocating motion along said direction (D) between a first retracted position and an operative position (OP) facing said abutment (12); **characterized in that** said assembly (20) comprises a safety device (200) that is suitable to lock, through mechanical interference, a said axle (AX1) (AX2) in said seat (14) and can be mechanically actuated by said connection member (24), **in that** said safety device (200) comprises a tappet (202) carried in a rotatable manner by said frame (10) from and towards an engagement position (P1) of said seat (14) and has a face (2023) suitable to engage said seat (14) at a substantially diametrical distance from said hook (140) (140'), and **in that** said tappet (202) is carried in a rotatable manner by said frame (10) around a second pin (17) transverse to said direction (D).
2. The coupling according to claim 1, **characterized in that** said safety device (200) comprising a cam (206) integral with said connection member (24) and mechanically coupled to said tappet (202) by a respective third pivot pin (2020) parallel to said second pin (17) to move said tappet (202) alternately from said engagement position (P1) to

said release position (P2) of said seat (14) and where said tappet (202) is positioned over said connection member (24).

- 5 **3.** The coupling according to claim 2, **characterized in that** said cam (206) has a slot (208) engaged by said third pin (2020) to couple said tappet (202) to said cam (206) bilaterally; said tappet (202) having a curved surface (20210) concentric with said axis (17) and angularly delimited by said head portion (204).
- 10 **4.** The coupling according to claim 3, **characterized in that** said tappet (202) comprises a crank (2022) opposite to said head portion (204) and a connecting rod (209) pivoted to said connection member (24) by means of a pin (210).
- 15 **5.** The coupling according to any one of the previous claims, **characterized by** comprising signalling means (30) suitable to indicate whether said tappet (202) is in said engagement position (P1) of said seat (14) or in said release position (P2) .
- 20 **6.** The coupling according to claim 5, **characterized in that** said signalling assembly (30) is of the visual type.
- 25 **7.** The coupling according to claim 6, **characterized in that** said safety device (200) is provided with a signalling assembly (30) for signalling an operative condition of said safety device (200) visible at the back thereof.
- 30 **8.** The coupling according to claim 7, **characterized in that** said signalling assembly (30) is associated with a covering element (18) (5) integrally carried by said frame (10) above said assembly (20); said signalling means (30) comprising a pair of signs (32) (34) of contrasting colours provided in the covering element (18) (5).
- 35 **9.** The coupling according to claim 8, **characterized in that** a first sign (32) of said pair of signs (32) (34) is arranged in said covering element (18) (5) facing said seat (14) so as to be covered by said head portion (204) when, in use, said tappet (202) is in said engagement position (P1) of said seat (14); a second sign (34) of said pair of signs (32) (34) being arranged beside said first sign (32) so as to be covered by said head portion (204) when, in use, said tappet (202) is in said release position (P2) of said seat (14).
- 40 **10.** The coupling according to claim 9, **characterized in that** said first sign (32) is circular-shaped and red; said second sign (34) being circular-shaped and green.
- 45 **11.** The coupling according to any one of the claims 3 to 10, **characterized in that** said head portion (204) radially projects from said curved surface (20210).
- 50 **12.** The coupling according to any one of the previous claims, **characterized in that** each said first pin (22) (22') has a duckbill-shaped free end (220) (220') on the side of said abutments (12) (12') so as selectively to define a housing (19) for said axles (AX1) (AX2) together with said abutments (12) (12').



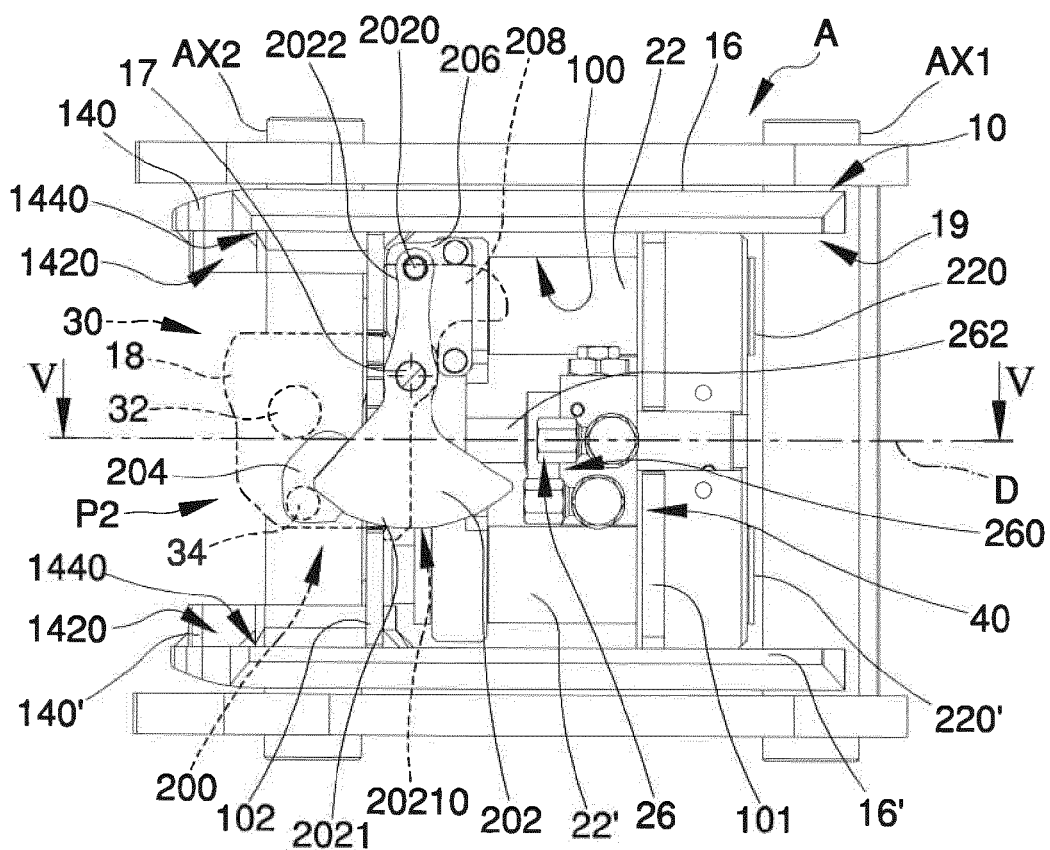


Fig.4

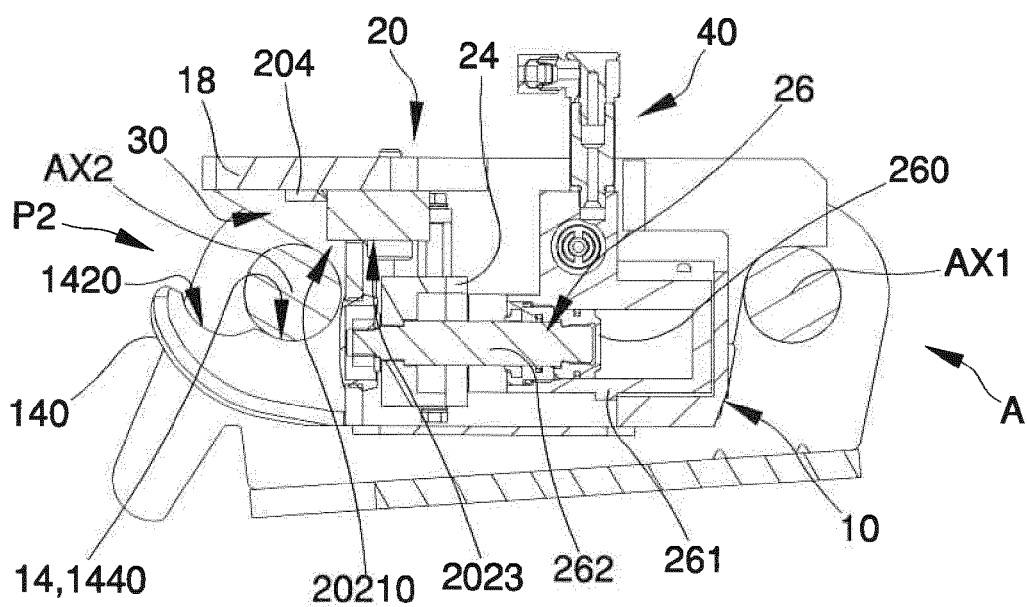


Fig.5

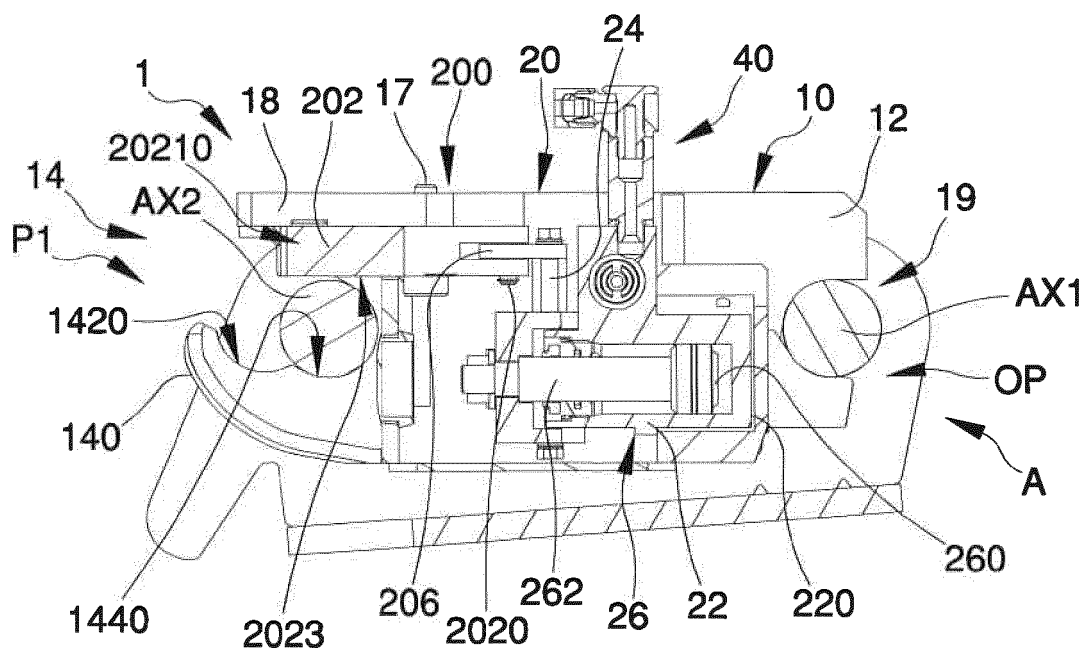
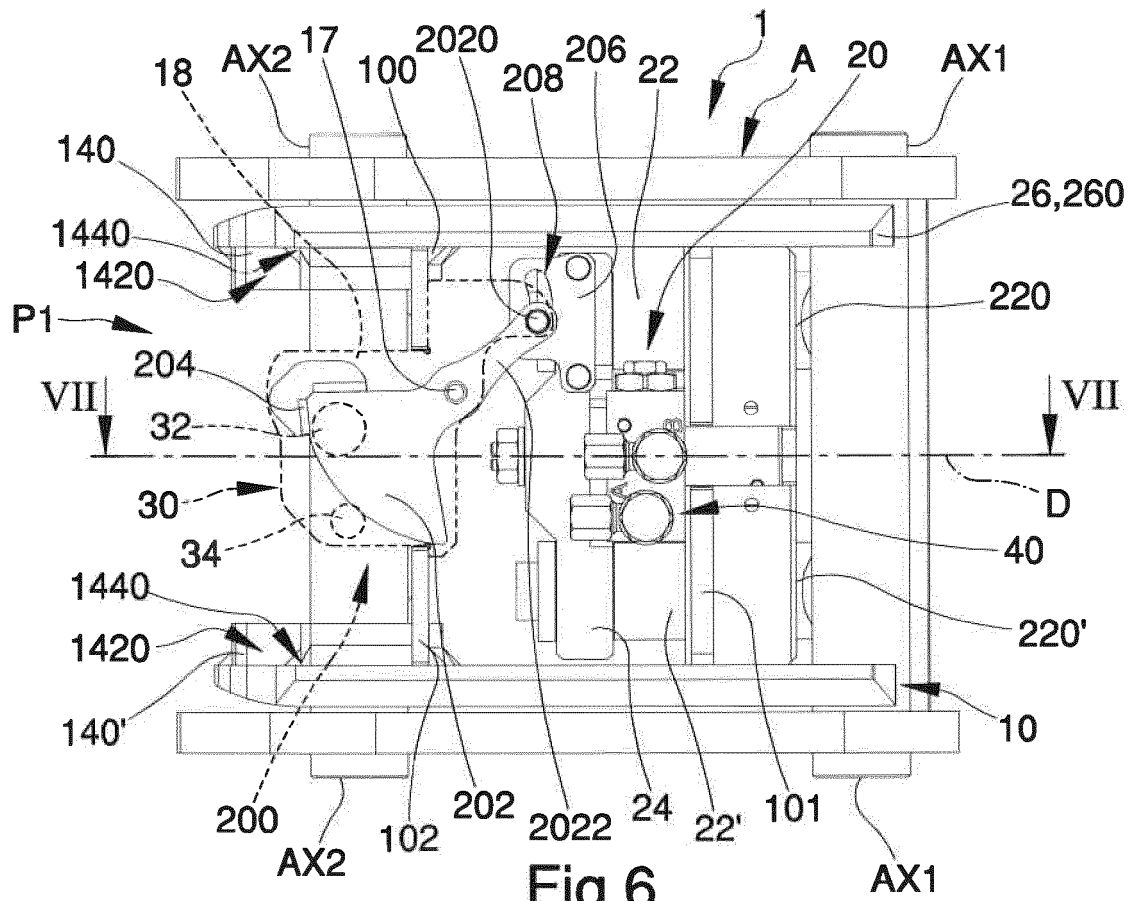


Fig.7

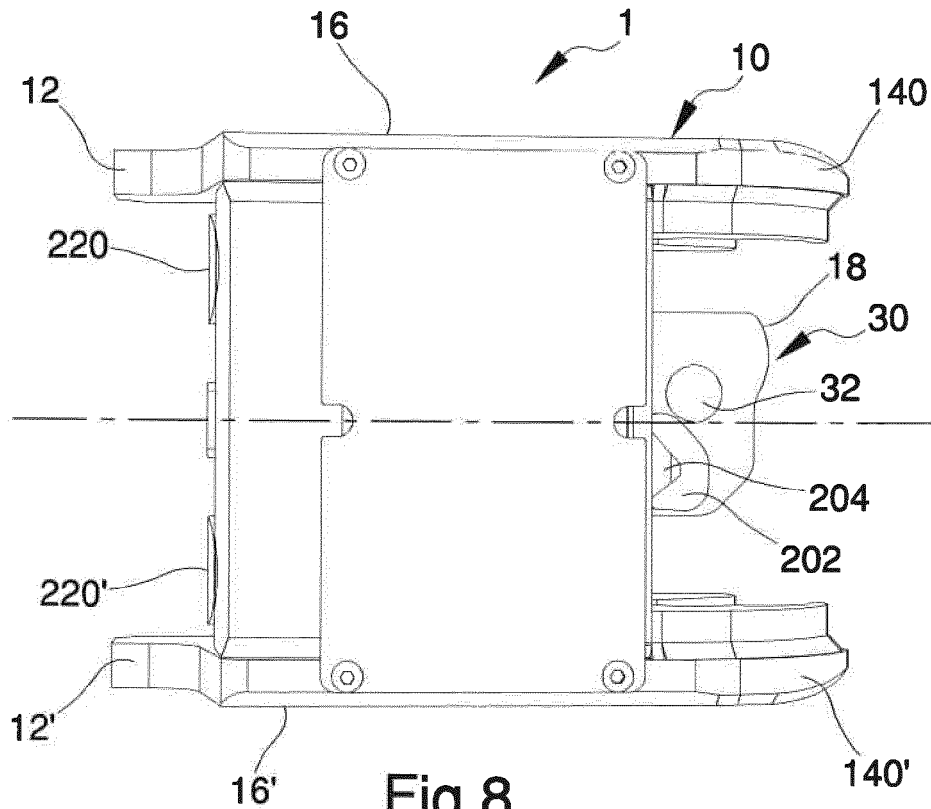


Fig.8

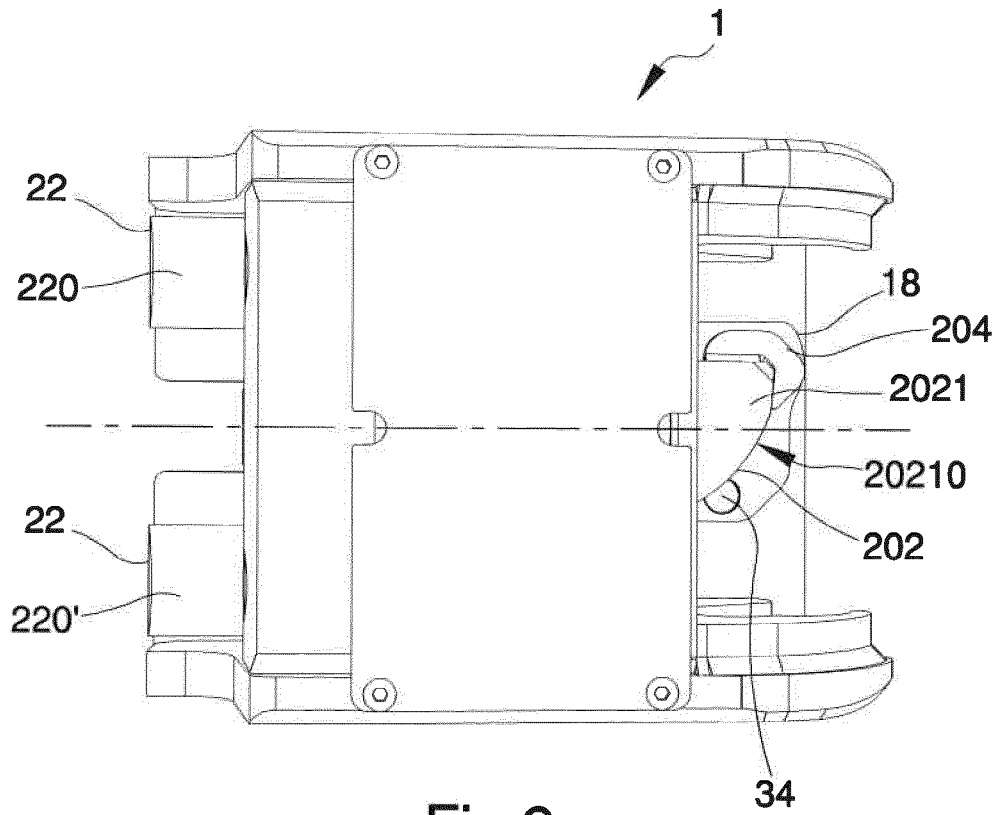


Fig.9

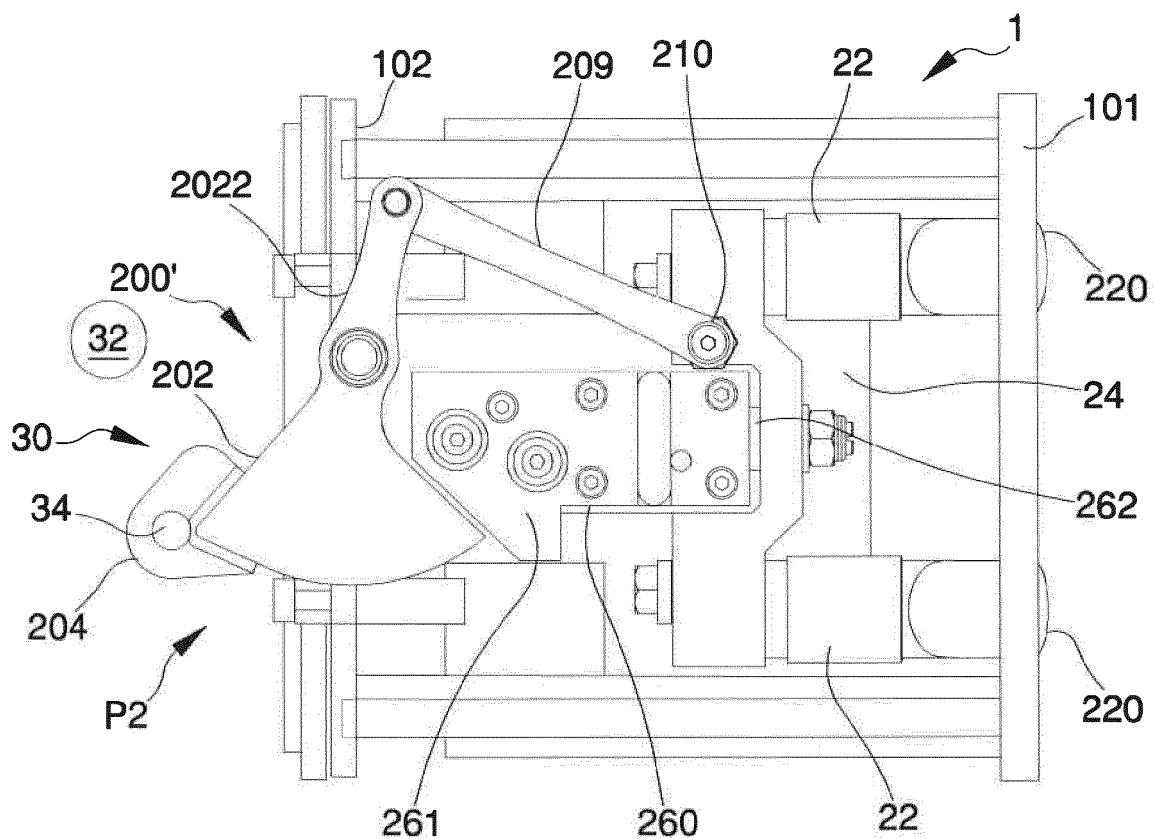


Fig.10

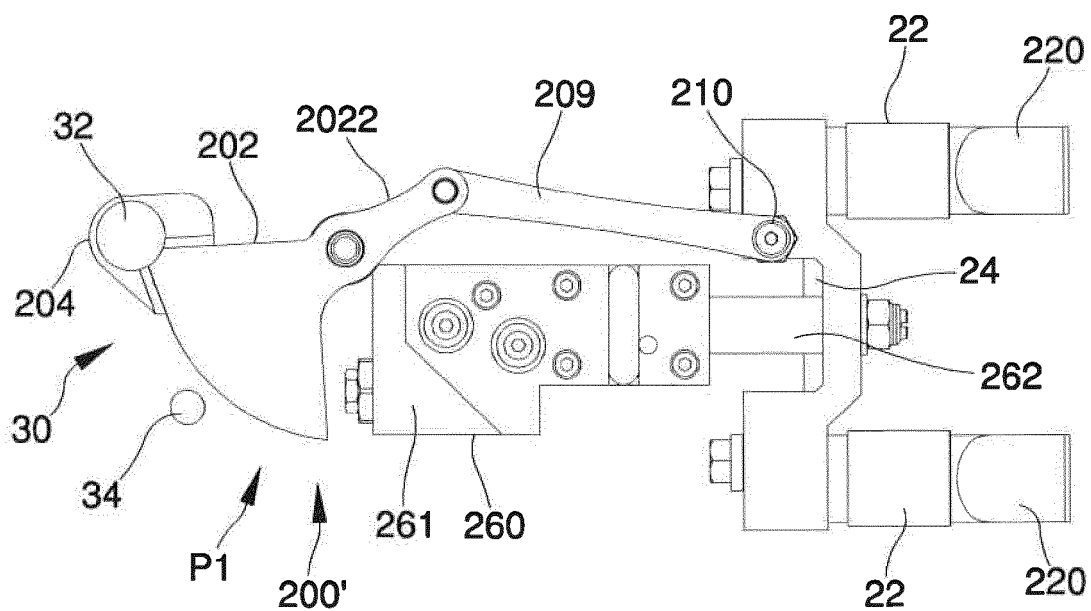


Fig.11



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