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(54) **FAST LOCK AND RELEASE DEVICE FOR A SOIL SHIFTING MACHINE**

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Description

[0001] The present invention refers to the field of mechanical connections and relates to a fast lock and release device. In particular, the present invention relates to a fast lock and release device that can be used to lock and release a tool. In greater detail, the present invention can be advantageously applied to the field of machines for earth movement, demolitions and the like, and relates to a device quickly to lock a tool, like a bucket or the like, into, and to release it from, a working arm of a main operating machine, for example an excavator.

BACKGROUND TO THE INVENTION

[0002] In the prior art the use is well known of fast lock and release systems to connect various mechanical tools to the ends of an arm of a working machine. In this way, the machine can perform various works, for example, although without limitations, excavations, demolitions and/or load handling. The mechanical tools are usually buckets of various type and size and impact hammers, as well as fluid-dynamically operated units, for example, although without limitations, drills and the like; the known devices allow to replace one tool with another, according to the work needs, in a simple, safe and fast way.

[0003] The Applicant has filed various patents applications relating to fast lock and release systems, each of which comprises an adapting member designed to be coupled to a mechanical tool in a rigid way, and a lock and release unit designed to be coupled at the end of an arm of a working machine. The adapting member and lock and release unit can be alternatively lock together and release from each other; this makes it possible to lock the tool in, and release it from, the arm of the working machine. To this end, the adapting member has a seat to house the lock and release unit in a form-fitting manner; this seat is delimited laterally by two shoulders (transversally fastening the lock and release unit) and longitudinally by a pair of containment members. Usually, one of these containment members is an axle, provided with at least one abutment for the end of a blocking member (movable or fixed according to the cases) of the lock and release unit.

[0004] Lock and release units are known, laterally delimited by two flanks, each of which is longitudinally delimited by a coupling member shaped like a longitudinally open hook to house an axle transversally; these flanks are connected to each other by means of a crossbeam at the side of the hooks and by means of a plate at the opposite side; according to the teachings of the Italian patent applications no. RA2014A000006 and RA2014A000007 filed by the Applicant, this plate has, at the top, a pair of abutment element to hold the axle vertically, so that, when the longitudinal blocking members move forwards, the lock and release unit stably refers to the same axle and, consequently, the adapting member and the lock and release unit are stably coupled.

[0005] This kind of systems has been disclosed in a plurality of published patent applications, some of which filed by the Applicant, among which the patent application no. RA2014A000006. It discloses a fast lock and release system, wherein the seats of the axles of the adapting member are constituted by a groove open downwards, shaped to couple, in a form-fitting way, with an end portion of the longitudinal blocking member that is shaped like a flute reed and has a flat face facing upwards. Moreover, each axle has a central groove, deeper than the two side grooves, to allow the passage of an inspection tool and, if necessary, the insertion of a tool usable to release the lock and release unit from the adapting member.

[0006] In view of the above description, it is clearly apparent that each longitudinal blocking member operates exactly as a longitudinal key with respect to the respective axle, through a its surface, inclined relative to the movement direction, thus causing the correct coupling with the axle through the friction produced by the contact with the respective seat and the local deformation of the axle through the application of a transverse, and therefore bending, load.

[0007] It should be noted that each contact area between an axle and the surface delimiting internally the respective hook (provided in the corresponding flank of the lock and release unit) is arranged near the axle longitudinal ends; it should also be noted that the wider the longitudinal dimension of the axles grooves (open downwards) designed to couple through friction with the flat face (facing upwards) of the longitudinal blocking member, the more limited the longitudinal extension of this contact area. In some cases, the two grooves (open downwards) longitudinally communicate with each other, as they are part of a single longitudinal flattening, at the centre of which the central groove is provided. In these cases, the contact area between the axle peripheral portion and the respective support area provided in the hook (provided in the flank of the lock and release unit) is limited to longitudinal segments of the axle. Clearly, this structural conformation requires a significant concentration of the stresses exchanged between the hooks and the corresponding axle peripheral portions in the respective contact areas, and, as a results, the coupling wears quickly. It is clearly understood that the systems, wherein the coupling between lock and release unit and adapting member occurs through interaction between a flattening provided inferiorly in an axle and the upper face of a longitudinal blocking member, and thus in correspondence of the discontinuity point of the fibres of the material of which the axle is made, are appreciable from various points of view; however, they have criticalities in function when the load to be supported are significantly high; in this case, the axle can be deformed and hinder the release of the blocking member to free the corresponding axle or, what is worse, can fracture in correspondence of the resistant section of lower extension. In particular, taking into account that any removal of material in the

outer part of a circular cross-section significantly concentrates the stresses and consequently reduces the resistance against shearing stress of the cross-section, in case the shearing stress exerted by at least one longitudinal blocking member (static or fatiguing) becomes significantly high (for instance, in case of prolonged wearing working cycles, like when using impact hammers or Ripper saws, or in case of works on rocks or highly resistant grounds) the axle resistance against shearing stress could be jeopardized. Moreover, due to the presence of the side grooves, the contact stresses are concentrated on limited areas of the axle seats provided in the hooks (provided in the flanks of the lock and release unit); thus, the couplings between axles and hooks wear in a non-uniform way; this results in clearance between them and, therefore, they can no longer be used.

[0008] Moreover, it should be noted that, in the prior art lock and release devices, that are usually not-reversible, the coupling between lock and release unit and adapting member can be done only arranging the lock and release unit and the adapting member in a given reciprocal position, even if a greater versatility would be desirable; in particular, it would be desirable that the lock and release unit and the adapting member can be coupled together in more than one reciprocal position.

[0009] Further examples of quick coupling devices according to the prior art are known from EP 1 900 880.

SUMMARY OF THE PRESENT INVENTION

[0010] The present invention is based on the following consideration: the inconveniencies of the fast lock and release devices according to the prior art can be overcome or minimized by making the lock and release unit and/or the adapting member symmetric, thus having also the opportunity to couple them in at least two reciprocal positions, where one of them is rotated by 180°; as well as engaging the movable blocking members not in grooves of the respective fixed engagement members, but in holes or through apertures of said fixed engagement members.

[0011] In view of what stated above, according to the present invention a fast lock and release device is provided, to interface a tool with a handling member of a working machine; said device comprising an adapting member designed to be fixed to said tool and a lock and release unit designed to be fixed to said handling member and alternatively to engage, and to be released from, said adapting member so as to lock said tool in, and to release it from, said handling member; said lock and release unit being provided with at least one movable blocking member suitable to be translated along a first direction in two opposite translation directions, between a first forward, or lock, position and a second back, or releasing, position; wherein said adapting member comprises two parallel connecting axles, extending substantially perpendicular to said first direction; wherein each of said two axles comprises a through hole for coupling said movable

blocking member, extending in the respective axle according to a direction parallel to said first translation direction; and wherein said two axles are arranged and shaped so as to allow, by translating said blocking member towards said first lock position, the coupling of said blocking member in the coupling hole of one or the other axle according to the direction of said lock and release unit relative to said adapting member, the device additionally comprising the further features as recited in claim 1. According to an embodiment, said two axles are arranged and shaped in symmetric and mirror-like fashion with respect to a plane substantially perpendicular to said longitudinal direction.

[0012] According to a further embodiment, said lock and release unit comprises two movable blocking members, each of which can be translated along said first translation direction in two opposite directions between a first forward, or lock, position and a second back, or releasing, position; wherein each of said two coupling axles may comprise two through holes for coupling said two movable blocking members, each of which extends in the respective axle according to a direction parallel to said first translation direction; and wherein said two axles are arranged and shaped so as to allow, by translating said blocking members towards said first lock position, the coupling of said blocking member in the coupling holes of one or the other axle according to the direction of said lock and release unit relative to said adapting member.

[0013] If necessary, each of said blocking members may comprise a coupling head shaped like a flute reed, wherein each through hole for said one or two axles has a shape conjugated with, or corresponding to, the shape of said coupling head.

[0014] For example, said coupling head of each movable blocking member may be delimited by an outer surface comprising a substantially flat inclined or tapered portion and a substantially curved portion connected to said substantially flat portion and inclined or tapered so that said coupling head has cross-section of decreasing width towards the end thereof.

[0015] For example, said substantially curved portion can be substantially cylindrical or substantially conical. According to an embodiment, said lock and release unit comprises a fixed blocking member arranged and shaped so as to couple, according to the direction of said lock and release unit relative to said adapting member, one or the other axle, especially the axle that is not coupled by said one or two movable blocking members.

[0016] For example, said fixed blocking member may have a hook provided with a concavity designed to house at least one portion of each of said two axles, said concavity being delimited, for instance, by a substantially cylindrical respective surface portion designed to house said at least one portion of each said axle transversally.

[0017] According to an embodiment, said lock and release unit has two fixed blocking members arranged at a reciprocal distance from each other along a direction

parallel to the extension direction of said two axles.

[0018] Said lock and release unit advantageously comprises a box-shaped body, inside which an actuating unit is housed to translate said one or more movable blocking members, wherein a switching member or control for controlling said actuating unit is housed inside said box-shaped body, and wherein said switching member or control can be accessed by means of a tool from the outside of said box-shaped body.

[0019] For example, said switching member can be accessed through a hole provided in a wall of said box-shaped body.

[0020] Each of said two axles advantageously comprises a switching through hole, wherein, when said lock and release unit and said adapting member are coupled together, said hole provided in said wall of said box-shaped body is arranged in correspondence of the switching through hole of one of said axles, said switching member being therefore accessible by means of a control tool through said hole provided in said wall of said box-shaped body and said switching through hole. A further object of the invention is a heavy machine for performing excavations, demolitions and similar works, said machine comprising a handling member for a tool suitable to perform said works and a lock and release device according to the present invention.

[0021] Any further embodiment of the present invention is specified in the claims.

BRIEF DESCRIPTION OF DRAWINGS

[0022] The present invention will be illustrated by describing respective embodiments thereof, represented in the attached drawing. It should be noted that the present invention is not limited to the embodiments described below and illustrated in the drawing. On the contrary, fall into the scope of protection of the invention also all the modifications and variants of the embodiments described below and represented in the drawing, that, based on the following description, will be apparent to those skilled in the art. In particular, in the drawing:

- figure 1 is a schematic front perspective view of a lock and release device according to the invention in one condition of use;
- figure 2 is a schematic perspective view of a back portion of figure 1, in reduced scale and with some parts removed for the sake of clarity;
- figure 3 is a schematic perspective view of a portion of figure 1, in enlarged scale and with some parts removed for the sake of clarity;
- figure 4 comprises two perspective views of a portion from figure 3, with some parts removed for the sake of clarity, in two different operating configurations;
- figure 5 is a schematic perspective view based on figure 1, in enlarged scale and with some parts removed for the sake of clarity;
- figure 6 is a perspective view of a detail of figure 1,

in enlarged scale and with some parts removed for the sake of clarity:

- figure 7 is a perspective view of a detail of figure 5, in enlarged scale and with some parts removed for the sake of clarity;
- figure 8 is a front view of a detail from figure 5, in enlarged scale;
- figure 9 is a detail of a longitudinal cross-section of figure 1, in enlarged scale and with some parts removed for the sake of clarity;
- figure 10 is a variant of figure 6; and
- figure 11 is a variant of figure 8.

DETAILED DESCRIPTION OF THE PRESENT INVENTION

[0023] The present invention can be advantageously applied to the field of machines for earth movement, demolitions and the like, and relates to a device quickly to lock a tool, like a bucket or the like, into, and to release it from, a working arm or member of a main operating machine, for example, although without limitations, an excavator. The device according to the invention will be described below with particular reference to the applications thereof for working machines of the above-mentioned type. However, it should be noted that the invention applies not only to working machines for excavations, demolitions, earth movement or the like; on the contrary, the present invention applies to all the situations where there is the need alternatively to lock and release an object, especially a tool.

[0024] In figure 1, number 1 indicates a fast lock and release device that can be used to interface a tool U with a handling member A (schematically illustrated) of a heavy machine B, of which only the handling member A is illustrated in figure 1 for the sake of practicality. Obviously, even if the device 1 according to the invention is illustrated through the present detailed description and the respective embodiments with reference to the attached drawing, the device is not limited to these embodiments. On the contrary, fall into the scope of protection of the invention also all the modifications and/or variants of the embodiments described and represented herein, that, based on the description above, will be apparent to those skilled in the art. The scope of the present invention is defined by the claims.

[0025] With reference to figure 1 again, the device 1 comprises an adapting member 10 designed to be stably (and in releasable fashion, if necessary) coupled to a tool U, and a lock and release unit 20 designed to be stably (and in releasable fashion, if necessary) fixed to the handling member A and to engage, in use, the adapting member 10 in a respective central housing 11. The housing 11 is delimited laterally by a pair of shoulders 12 extending along a given direction D, and transversally by at least one axle 14 connecting the two shoulders 12 together firmly. With particular reference to figure 4, the lock and release unit 20 is provided with at least one longitudinal

blocking member 22 that extends transversally to each axle 14 along the given direction D and can be translated in a direction parallel to the direction D in two opposite translation directions (see the description below). With particular reference to figure 6, each blocking member 22 has a tapered head 220 with increasing cross-section starting from a respective end 221.

[0026] Each axle 14 has at least one respective seat 140 (essentially a through hole or a blind hole, according to the needs and/or circumstances), which extends along the given direction D (it extends deeply in the axle 14 parallel to the direction D) and is aligned with the blocking member 22 for reciprocal coupling. With particular reference to figures from 3 to 7, each seat 140 is arranged in front of the respective blocking member 22 and is delimited by a surface S (that can be closed or open, depending on whether it is through or blind), which is configured to house the end or coupling head 220 of the blocking member 22, completely surrounding it from the outside. The lock and release unit 20 can be mechanical, actuated by means of a lever, or fluid-dynamic, comprising, for example although without limitations, a single-piece device already described with reference to the Italian patent application no. RA2014A00005 of the same Applicant. For the sake of practicality, the invention will be described herein with reference to this single-piece device, that will be briefly described below. With reference to figure 1 again, the lock and release unit 20 has a pair of flanks 202, each of which is designed to be arranged, in use, at the side of one shoulder 12, especially inside the space reciprocally delimited by the two shoulders 12. Each flank 202 has a hook 204 (better shown in figures 4a and 4b) provided with a longitudinally open concavity 205 designed to house an axle 14 (a transverse portion of the axle 14, see the description below) and delimited by a curved (for example substantially cylindrical, as shown) bottom surface portion 206, whose approximate angular extension corresponds to 180° and whose radius corresponds to, or is slightly greater than, the radial dimension of the axle 14. With particular reference to figures 4a and 4b, the lock and release unit 20 comprises a box-shaped body 200 (better shown in figure 4a) delimited by the flanks 202 and by a plate 26 arranged at opposite side from the box-shaped body 200 with respect to the hooks 204. This plate 26 is delimited, towards the outside of the box-shaped body 200, by a substantially flat face or surface 26', and is provided with a through service hole 260 for each movable blocking member 22, wherein, when this blocking member is in forward, or lock, position P2 of figure 4b and engages the respective seat 140, the end or coupling head 220 of the blocking member 22 extends inside the box-shaped body 200 and through the respective through service hole 260, while, when the blocking member 22 is in back, or release, position P1 (figure 4a) and is released from the respective seat 140, the end or coupling head 220 of the blocking member 22 is housed substantially inside the box-shaped body 200. With reference to figures from 1 to 3, the lock and release

unit 20 comprises an actuating unit 24, for example fluid-dynamic, housed inside the box-shaped body 200 between the flanks 202 and the plate 26, to translate each blocking member 22 longitudinally between the back position P1 (figure 4a), where it is released from the corresponding axle 14, and the forward position P2 (figure 4b) where it locks the respective seat 140, through the respective service hole 260 of the plate 26. With reference to figures 4a and 4b again, the actuating unit 24 comprises a respective fluid-dynamic actuating member 241 (for example a valve) designed to control the movement of each blocking member 22 between the back position P1 and the lock position P2. Moreover, the actuating unit 24 of the lock and release unit 20 has centrally, in correspondence of the plate 26, one more hole 263 engaged by a switching member 261 to switch the actuating member 241 (for example a release valve, known and not shown, for lock and release the fluid-dynamic actuating unit 24). This switching member 261, whose purpose is to switch the actuating member 241 (for example, to open the release valve), may be shaped similarly to a nut or in any other manner so that it can be driven into rotation or by thrust by means of an elongated tool, for instance a socket wrench, in case the fast and release unit 20 is in blocked condition, with the blocking members 22 engaging the seats 140 stably and the actuating unit 24 not working under the normal control, i.e. when the function is blocked. The hole 142 allows, therefore, to access the control or switching member 261 and a rotation or a pressure or a traction applied, singularly or in combination (according to the respective mode of use) on the switching member 261 allows to release the actuating unit 24 and allows, in sequence, the blocking members 22 to elastically returned (in a known manner) to the respective positions P2 (figure 4a). After this step, it is possible to separate the adapting member, or fast coupling, 10 from the lock and release unit 20, and therefore to release the tool U from the handling member A of the heavy machine B. Therefore, acting on the switching member 261 prevents an irreversible intervention on the fast lock and release unit 20.

[0027] With particular reference to figure 5, the adapting member 10 has two axles 14 that firmly connect the shoulders 12 together transversally and are arranged symmetrically and in a mirror-like fashion with respect to a transverse median plane M (figure 3) of the adapting member 10 to make it reversible and to contain the corresponding lock and release unit stably. In particular, with reference to figure 5 again, each axle 14 has a pair of seats 140 arranged symmetrically at opposite sides with respect to a central service hole 142 provided in each axle 14 in a position facing the hole 263 of the plate 26 (housing the switching member 261). Each hole 142 allows the passage of a tool or a control or switching instrument (like a socket wrench) for the switching member 261 or an inspection member.

[0028] The fact that, in the device 1, this function is performed through the hole 142 instead of through a

groove, allows a greater guide for the tool that shall be used to solve the blocking situation. In view of the description above, and with special reference to figures 8 and 9, each axle 14 has, at the bottom, a continuous longitudinal portion 143 extending continuously between the shoulder 12 transversally to each seat 140, to couple with the surface portion 206 of the hook 204 in longitudinally continuous fashion, thus allowing to maximize the area of contact and force exchange between the axle 14 coupled to the flanks 202. In view of the above description it is possible to state that the continuous longitudinal portion 143 acts as a contrast member for the deformation of the axle 14 due to shearing stress, considering the axle 14 a beam fixed to the shoulders 12 at end positions.

[0029] With particular reference to figures 7 and 8, the surface S of each seat 140 has a substantially flat upper portion S1 inclined downwards and a substantially cylindrical lower portion S2 facing the upper portion S1 and directed parallel to the direction D so that the surface S has cross-section of decreasing width towards the outside. Figure 9 shows a detail of a longitudinal section of figure 1, in correspondence of one of the hooks 204, where it can be seen that the lower portion S2 can be slightly flared towards the exit.

[0030] With reference to figure 6 again, the head 220 is delimited by a substantially flat first face 222, designed to couple to the upper portion S1 in a form-fitting and substantially matching manner, and by a substantially cylindrical second face 224, designed to couple to the lower portion S2. It should be noted that the coupling can be partial or form-fitting, according to the project specifications, obviously connected to the use of the device 1 and, anyway, always in order to allow the blocking members 22 to be extracted from the seat 140 by means of elastic, hydraulic or mechanical means, according to the nature of the lock and release unit 20. In view of the above description, it should be, however, stated that each head 220 is shaped like a flute reed.

[0031] The use of the lock and release device 1 can be easily understood from the description above. However, it should be useful to specify what follows, for the sake of clarity. During a first function, the hooks 204 are engaged on one axle so that longitudinal portions of the axle 14 are housed in the cavities 205 of the hooks 204.

[0032] Then, when the blocking members 22 are in back position P1 (figure 4a), the lock and release unit 20 rotates relative to the adapting member 10 (wherein the axle 14 acts as pivot) until the box-shaped body 200 of the lock and release unit 20 has been brought inside the space of the adapting member 10 defined by the shoulders 12, in particular until the holes 222 of the plate 26 have been brought in correspondence of the seats 140 of the second axle 14; in this way, the blocking members 22 are brought in correspondence of the engaging seat 140.

[0033] It should be noted that, when the through holes 222 and the blocking members 22 (the coupling heads thereof) are in correspondence of the coupling seats 140,

also the hole 263 of the plate 26 and the central hole 142 of the axle 14 are in correspondence of each other.

[0034] Lastly, the blocking members 22 are switched, so as to translate from the back position P1 (figure 4a) to the forward position P2 (figure 4b), in particular until the coupling heads or ends of the blocking members 22 engage the respective seats 140 of the axle 14.

[0035] The release of the lock and release unit 20 from the adapting member 10 are essentially performed in reverse order with respect to the lock steps described above; therefore, they will be not described in detail for the sake of brevity. However, it should be noted that, when the lock and release unit 20 is coupled to the adapting member 10, in case of failures or malfunctions or other troubles, it is possible to move the blocking members 22 backwards according to the traditional modes of use of the device 1 (for instance, elastic return), acting, to this end, on the switching member 261 through the holes 263 and 142.

[0036] In view of the above description it is easily understood that the fast lock and release device 1 solves the criticalities in operation of the known devices, making them more long-lasting and more practical to be used.

[0037] In fact, as the device is equipped with axles, whose coupling seats 140 for the heads 220 of the blocking members 22 are closed, increases the extension of the contact area with the heads 220. This significantly reduces the local stresses under use and therefore limits the risk of tapping the reciprocally contacting surfaces and allows to switch more easily the blocking members 22 between the respective operating positions P1 and P2.

[0038] Moreover, the fact that the fibres of the material of the axle 14 arranged in the plane of maximal shearing stress are continuous in correspondence of the respective diameter areas, in positions transverse to the directions of extension of the seats 140 due to the presence of the continuous longitudinal portion 143, allows to have axles 14 of greater strength and more resistant to shearing stresses above those normal during operation or following to technical failures of the actuating unit 24 of the longitudinal blocking members 22. Moreover, the fact that there are no surface discontinuities in each axle 14 also in the respective end areas near the shoulders 12 for the contact with the surface portions 206 of the hooks 204 of the lock and release unit 20, allows to maximize the longitudinal extension of the reciprocal contact areas (axle 14/surface portions 206) achieving all the extension of the surface portions 206 transversally to the corresponding flanks 202. It can be easily understood that this solution consequently reduces the entity of the surface stresses locally exchanged between each axle 14 and each surface portion 206 and the wear of the couplings between each axle 14 and the hooks 204.

[0039] Lastly, as the axles are arranged and configured in symmetric and mirror-like fashion with respect to a reference plane, the device 1 is easily reversible and, thus, particularly versatile.

[0040] Even if the device according to the invention has been explained by means of the detailed description above of the embodiments illustrated in the drawings, the device 1 according to the invention is not limited to the embodiments described above and illustrated in the drawing.

[0041] For example, with particular reference to figures 10 and 11, it should be noted that each blocking member 22 can be modified together with the respective seat 140 and replaced with a blocking member 22' and the respective seat 140' of conjugated shape in the length direction, for example giving the respective surfaces S1' and tapered head 220', originating from a respective end 221', a substantially identical conical shape, whose the respective longitudinal axis substantially parallel to the given direction D. Therefore, the conical surfaces S' and 225 are into reciprocal continuous conjugated contact.

[0042] It should be noted that figure 10 shows a rectangular track highlighting the presence of a front flattening provided in the axle 14 transversally to the given direction D. This flattening, graphically represented by means of a rectangular perimeter for the sake of drawing economy, has no reference number, as it has no utility for the understanding of the present invention.

[0043] The scope of the present invention is defined by the claims.

Claims

1. A fast lock and release device (1) to interface a tool (U) with a handling member (A) of a soil shifting machine (B); said device (1) comprising an adapting member (10) designed to be fixed to said tool (U) and a lock and release unit (20) designed to be fixed to said handling member (A) and alternatively to engage, and to be released from, said adapting member (10) so as to lock said tool (U) in, and to release it from, said handling member (A); said lock and release unit (20) being provided with at least one movable blocking member (22) (22') suitable to be translated along a first direction (D) in two opposite translation directions, between a first forward, or lock, position (P2) and a second back, or releasing, position (P1); wherein said adapting member (10) comprises two parallel axles (14), each extending along a second direction transversally to said first direction (D); **characterized in that** each of said two axles (14) comprises a coupling seat (140) (140') for said movable blocking member (22) (22') constituted by a hole extending through said axle (14) parallel to said first direction (D) and perpendicularly to said second direction; and **in that** said two axles (14) are arranged and shaped so as to allow, by translating said blocking member (22) (22') towards said first forward position (P2), the coupling of said blocking member (22) (22') in the respective seat (140) (140') of one or the other axle according to the direction of said lock and

release unit (20) relative to said adapting member (10).

2. Device according to claim 1, **characterized in that** said two axles (14) are arranged and shaped in symmetric and mirror-like fashion with respect to a plane (M) substantially perpendicular to said first direction (D).
3. Device according to claim 1 or 2, **characterized in that** said lock and release unit (20) comprises two movable blocking members (22) (22'), each of which can be translated along said first direction (D) in two opposite directions between a first forward, or lock, position (P2) and a second back, or releasing, position (P1); and **in that** each of said two axles (14) comprises two coupling seats (140) (140') for said two movable blocking members (22, 22') extending along a direction parallel to said first direction (D), and **in that** said two axles (14) are arranged and shaped so as to allow, by translating said blocking member (22, 22') towards said first lock position, the coupling of said blocking members in the respective seats of one or the other axle (14) according to the direction of said lock and release unit (20) relative to said adapting member (10).
4. Device according to any one of claims from 1 to 3, **characterized in that** each blocking member (22) (22') comprises a coupling head (220) shaped like a flute reed, and **in that** each coupling seat (140) (140') for said one or two axles (14) has a shape conjugated with, or corresponding to, the shape of said coupling head (220) (220').
5. Device according to claim 4, **characterized in that** said coupling head (220) (220') of each movable blocking member (22) is delimited by an outer surface comprising a substantially flat inclined or tapered portion (S1) and a substantially curved portion (S2) connected to said substantially flat portion (S1) and inclined or tapered so that said coupling head (220) (220') has cross-section of decreasing width towards the end thereof.
6. Device according to claim 5, **characterized in that** said substantially curved portion (S2) is substantially cylindrical.
7. Device according to claim 5, **characterized in that** said substantially curved portion (S2) is substantially conical.
8. Device according to any one of claims from 1 to 7, **characterized in that** said lock and release unit (20) comprises a fixed blocking member (204) arranged and shaped so as to couple, according to the direction of said lock and release unit (20) relative to said

adapting member (10), one or the other axle (14), especially the axle that is not coupled by said one or two movable blocking members (22) (22').

9. Device according to claim 7, **characterized in that** said fixed blocking member (204) has a hook (204) provided with a concavity (205) designed to house at least one portion of each of said two axles (14). 5
10. Device according to claim 9, **characterized in that** said concavity (205) is delimited by a substantially cylindrical respective surface portion (206) designed to house said at least one portion of each of said two axles (14) transversally. 10
11. Device according to claim 10, **characterized in that** said lock and release unit (20) has two fixed blocking members (204) arranged at a reciprocal distance from each other along a direction parallel to the extension direction of said two axles (14). 15
12. Device according to any one of claims from 1 to 11, **characterized in that** said lock and release unit (20) comprises a box-shaped body (200), inside which an actuating unit (24) is housed to translate said one or more movable blocking members (22) (22'), **in that** a switching member (261) or control for controlling said actuating unit is housed inside said box-shaped body (200), and **in that** said switching member (261) or control can be accessed by means of a tool from the outside of said box-shaped body (200). 20
13. Device according to claim 12, **characterized in that** said switching member (261) can be accessed through a hole (263) provided in a wall (26) of said box-shaped body (200). 25
14. Device according to claim 13, **characterized in that** each of said two axles (14) comprises a switching through hole (142), **in that**, in use, when said lock and release unit (20) and said adapting member (10) are coupled together, said hole (263) provided in said wall (26) of said box-shaped body (200) is arranged in correspondence of the switching through hole (142) of one of said axles, said switching member (261) being therefore accessible by means of a control tool through said hole (263) provided in said wall (26) of said box-shaped body (200) and said switching through hole (142). 30
15. Device according to any one of claims from 1 to 14, **characterized in that** the hole of one or both the coupling seats (140) of one or both said axles (14) is a blind hole. 35
16. Device according to any one of claims from 1 to 14, **characterized in that** the hole of one or both the coupling seats (140) of one or both said axles (14) 40

is a through hole.

17. Soil shifting machine (B) for digging excavations or similar works, said soil shifting machine (B) comprising a handling member (A) for a tool (U) designed to perform said works, **characterized in that** said soil shifting machine (B) is equipped with a lock and release device (1) according to any one of claims from 1 to 16. 45

Patentansprüche

1. Schnellverschluss- und -lösevorrichtung (1) zum Verbinden eines Werkzeugs (U) mit einem Handhabungsglied (A) einer Erdbewegungsmaschine (B); die Vorrichtung (1) umfassend ein Anpassglied (10), das zur Befestigung am Werkzeug (U) gestaltet ist, und eine Verschluss- und Löseeinheit (20), die zur Befestigung am Handhabungsglied (A) und alternativ zur Ineingriffnahme des Anpassglieds (10) und zur Lösung davon gestaltet ist, um das Werkzeug (U) im Handhabungsglied (A) zu verriegeln und es davon zu lösen; wobei die Verschluss- und Löseeinheit (20) mit zumindest einem beweglichen Blockierglied (22) (22') versehen ist, das dazu geeignet ist, entlang einer ersten Richtung (D) in zwei entgegengesetzten Überführungsrichtungen überführt zu werden, zwischen einer ersten vorderen oder Verschlussposition (P2) und einer zweiten rückwärtigen oder Löseposition (P1); wobei das Anpassglied (10) zwei parallele Achsen (14) umfasst, die jede entlang einer zweiten Richtung verlaufen, welche schräg zur ersten Richtung (D) verläuft; **dadurch gekennzeichnet, dass** jede der zwei Achsen (14) einen Kupplungssitz (140) (140') für das bewegliche Blockierglied (22) (22') umfasst, der durch ein Loch gebildet ist, welches parallel zur ersten Richtung (D) und senkrecht zur zweiten Richtung durch die Achse (14) verläuft; und dass die zwei Achsen (14) derart angeordnet und geformt sind, dass sie, durch Überführen des Blockierglieds (22) (22') zur ersten vorderen Position (P2) hin, das Ankuppeln des Blockierglieds (22) (22') im jeweiligen Sitz (140) (140') von einer oder der anderen Achse gemäß der Richtung der Verschluss- und Löseeinheit (20) bezüglich des Anpassglieds (10) ermöglichen. 50
2. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** die zwei Achsen (14) bezüglich einer Ebene (M), die im Wesentlichen senkrecht zur ersten Richtung (D) verläuft, symmetrisch und spiegelbildlich angeordnet und geformt sind. 55
3. Vorrichtung nach einem der Ansprüche 1 oder 2, **dadurch gekennzeichnet, dass** die Verschluss- und Löseeinheit (20) zwei bewegliche Blockierglieder (22) (22') umfasst, die jedes entlang der ersten Rich-

- tung (D) in zwei entgegengesetzte Richtungen zwischen einer ersten vorderen oder Verschlussposition (P2) und einer zweiten rückwärtigen oder Löseposition (P1) überführt werden können; und dass jede der zwei Achsen (14) zwei Kupplungssitze (140) (140') für die zwei beweglichen Blockierglieder (22) (22') umfasst, die entlang einer Richtung parallel zur ersten Richtung (D) verlaufen, und dass die zwei Achsen (14) derart angeordnet und geformt sind, dass sie, durch Überführen des Blockierglieds (22) (22') zur ersten vorderen Position hin, das Ankuppeln der Blockierglieder in den jeweiligen Sitzen von einer oder der anderen Achse (14) gemäß der Richtung der Verschluss- und Löseeinheit (20) bezüglich des Anpassglieds (10) ermöglichen.
4. Vorrichtung nach einem der Ansprüche 1 bis 3, **dadurch gekennzeichnet, dass** jedes Blockierglied (22) (22') einen Kupplungskopf (220) umfasst, der wie ein Flötenblättchen geformt ist, und dass jeder Kupplungssitz (140) (140') für die eine oder zwei Achsen (14) eine Form aufweist, die mit der Form des Kupplungskopfes (220) (220') konjugiert ist oder dieser entspricht.
5. Vorrichtung nach Anspruch 4, **dadurch gekennzeichnet, dass** der Kupplungskopf (220) (220') von jedem beweglichen Blockierglied (22) durch eine Außenfläche begrenzt ist, die einen im Wesentlichen flachen geneigten oder sich verjüngenden Abschnitt (S1) und einen im Wesentlichen gekrümmten Abschnitt (S2) umfasst, der mit dem im Wesentlichen flachen Abschnitt (S1) verbunden ist und geneigt ist oder sich verjüngt, sodass der Kupplungskopf (220) (220') einen Querschnitt mit abnehmender Breite zum Ende davon hin aufweist.
6. Vorrichtung nach Anspruch 5, **dadurch gekennzeichnet, dass** der im Wesentlichen gekrümmte Abschnitt (S2) im Wesentlichen zylindrisch ist.
7. Vorrichtung nach Anspruch 5, **dadurch gekennzeichnet, dass** der im Wesentlichen gekrümmte Abschnitt (S2) im Wesentlichen konisch ist.
8. Vorrichtung nach einem der Ansprüche 1 bis 7, **dadurch gekennzeichnet, dass** die Verschluss- und Löseeinheit (20) ein starres Blockierglied (204) umfasst, das zum Ankuppeln, gemäß der Richtung der Verschluss- und Löseeinheit (20) bezüglich des Anpassglieds (10), von einer oder der anderen Achse (14), insbesondere der Achse, die nicht durch das eine oder die zwei Blockierglieder (22) (22') angekuppelt ist, angeordnet und geformt ist.
9. Vorrichtung nach Anspruch 7, **dadurch gekennzeichnet, dass** das starre Blockierglied (204) einen Haken (204) aufweist, der mit einer Austiefung (205)
- versehen ist, die zum Einfassen von zumindest einem Abschnitt von jeder der zwei Achsen (14) gestaltet ist.
10. Vorrichtung nach Anspruch 9, **dadurch gekennzeichnet, dass** die Austiefung (205) durch einen jeweiligen, im Wesentlichen zylindrischen Oberflächenabschnitt (206) begrenzt ist, der zum schrägen Einfassen von dem zumindest einen Abschnitt von jeder der zwei Achsen (14) gestaltet ist.
11. Vorrichtung nach Anspruch 10, **dadurch gekennzeichnet, dass** die Verschluss- und Löseeinheit (20) zwei starre Blockierglieder (204) aufweist, die in einem wechselseitigen Abstand zueinander entlang einer Richtung parallel zur Ausdehnungsrichtung der zwei Achsen (14) angeordnet sind.
12. Vorrichtung nach einem der Ansprüche 1 bis 11, **dadurch gekennzeichnet, dass** die Verschluss- und Löseeinheit (20) einen kastenförmigen Körper (200) umfasst, in dem eine Betätigungseinheit (24) zum Überführen des einen oder mehr beweglichen Blockierglieder (22) (22') eingefasst ist, dass ein Schaltglied (261) oder eine Steuerung zum Steuern des Betätigungsglieds innerhalb des kastenförmigen Körpers (200) eingefasst ist, und dass auf das Schaltglied (261) oder die Steuerung mittels eines Werkzeugs von der Außenseite des kastenförmigen Körpers (200) her zugegriffen werden kann.
13. Vorrichtung nach Anspruch 12, **dadurch gekennzeichnet, dass** auf das Schaltglied (261) durch ein Loch (263) zugegriffen werden kann, das in einer Wand (26) des kastenförmigen Körpers (200) vorgesehen ist.
14. Vorrichtung nach Anspruch 13, **dadurch gekennzeichnet, dass** jede Achse (14) ein Schaltdurchgangsloch (142) umfasst, dass, im Gebrauch, wenn die Verschluss- und Löseeinheit (20) und das Anpassglied (10) miteinander verkuppelt sind, das Loch (263), das in der Wand (26) des kastenförmigen Körpers (200) vorgesehen ist, in Entsprechung mit dem Schaltdurchgangsloch (142) von einer der Achsen angeordnet ist, wobei das Schaltglied (261) daher mittels eines Steuerwerkzeugs durch das Loch (263), das in der Wand (26) des kastenförmigen Körpers (200) vorgesehen ist, und das Schaltdurchgangsloch (142) zugänglich ist.
15. Vorrichtung nach einem der Ansprüche 1 bis 14, **dadurch gekennzeichnet, dass** das Loch von einem oder beiden der Kupplungssitze (140) von einer oder beiden der Achsen (14) ein Sackloch ist.
16. Vorrichtung nach einem der Ansprüche 1 bis 14, **dadurch gekennzeichnet, dass** das Loch von einem

der beiden Kupplungssitzen (140) von einer oder beiden der Achsen (14) ein Durchgangsloch ist.

17. Erdbewegungsmaschine (B) zum Graben von Erdaushüben oder ähnlichen Arbeiten, wobei die Erdbewegungsmaschine (B) ein Handhabungsglied (A) für ein Werkzeug (U) umfasst, das zum Ausführen dieser Arbeiten gestaltet ist, **dadurch gekennzeichnet, dass** die Erdbewegungsmaschine (B) mit einer Verschluss- und Lösevorrichtung (1) gemäß einem der Ansprüche 1 bis 16 ausgestattet ist.

Revendications

1. Raccord rapide (1) pour servir d'interface entre un outil (U) et un élément de manipulation (A) d'un engin de terrassement (B) ; ledit raccord (1) comprenant un élément d'adaptation (10) agencé pour être fixé audit outil (U) et une unité de raccordement rapide (20) agencée pour être fixée audit élément de manipulation (A) et de manière alternée engager ledit élément d'adaptation (10) et être séparée de celui-ci, de façon à verrouiller ledit outil (U) dans ledit élément de manipulation (A) et le libérer de celui-ci ; ladite unité de raccordement rapide (20) comportant au moins un élément de blocage mobile (22) (22') apte à être déplacé en translation le long d'une première direction (D) dans deux sens de translation opposés, entre une première position vers l'avant, ou de verrouillage, (P2) et une seconde position vers l'arrière, ou de libération, (P1) ; ledit élément d'adaptation (10) comprenant deux essieux parallèles (14), chacun s'étendant le long d'une seconde direction transversalement à ladite première direction (D) ; **caractérisé par le fait que** chacun desdits deux essieux (14) comprend un siège de couplage (140) (140') pour ledit élément de blocage mobile (22) (22') constitué d'un trou s'étendant à travers ledit essieu (14) parallèlement à ladite première direction (D) et perpendiculairement à ladite seconde direction ; et **par le fait que** lesdits deux essieux (14) sont disposés et formés de façon à permettre, par translation dudit élément de blocage (22) (22') vers ladite première position vers l'avant (P2), le couplage dudit élément de blocage (22) (22') dans le siège respectif (140) (140') de l'un ou l'autre essieu en fonction de la direction de ladite unité de raccordement rapide (20) par rapport audit élément d'adaptation (10).
2. Dispositif selon la revendication 1, **caractérisé par le fait que** lesdits deux essieux (14) sont disposés et formés de manière symétrique et en miroir par rapport à un plan (M) sensiblement perpendiculaire à ladite première direction (D).
3. Dispositif selon la revendication 1 ou 2, **caractérisé par le fait que** ladite unité de raccordement rapide

(20) comprend deux éléments de blocage mobiles (22) (22'), chacun desquels pouvant être déplacé en translation le long de ladite première direction (D) dans deux sens opposés entre une première position vers l'avant, ou de verrouillage, (P2) et une seconde position vers l'arrière, ou de libération, (P1) ; et **par le fait que** chacun desdits deux essieux (14) comprend deux sièges de couplage (140) (140') pour lesdits deux éléments de blocage mobiles (22, 22') s'étendant le long d'une direction parallèle à ladite première direction (D), et **par le fait que** lesdits deux essieux (14) sont disposés et formés de façon à permettre, par translation dudit élément de blocage (22, 22') vers ladite première position de verrouillage, le couplage desdits éléments de blocage dans les sièges respectifs de l'un ou l'autre essieu (14) en fonction de la direction de ladite unité de raccordement rapide (20) par rapport audit élément d'adaptation (10).

4. Dispositif selon l'une quelconque des revendications 1 à 3, **caractérisé par le fait que** chaque élément de blocage (22) (22') comprend une tête de couplage (220) en forme d'anche de flûte, et **par le fait que** chaque siège de couplage (140) (140') pour le ou les deux essieux précités (14) a une forme conjuguée ou correspondant à la forme de ladite tête de couplage (220) (220').
5. Dispositif selon la revendication 4, **caractérisé par le fait que** ladite tête de couplage (220) (220') de chaque élément de blocage mobile (22) est délimitée par une surface externe comprenant une partie sensiblement plate inclinée ou effilée (S1) et une partie sensiblement incurvée (S2) reliée à ladite partie sensiblement plate (S1) et inclinée ou effilée de telle sorte que ladite tête de couplage (220)(220') a une section transversale de largeur décroissante vers son extrémité.
6. Dispositif selon la revendication 5, **caractérisé par le fait que** ladite partie sensiblement incurvée (S2) est sensiblement cylindrique.
7. Dispositif selon la revendication 5, **caractérisé par le fait que** ladite partie sensiblement incurvée (S2) est sensiblement conique.
8. Dispositif selon l'une quelconque des revendications 1 à 7, **caractérisé par le fait que** ladite unité de raccordement rapide (20) comprend un élément de blocage fixe (204) disposé et formé de façon à coupler, en fonction de la direction de ladite unité de raccordement rapide (20) par rapport audit élément d'adaptation (10), l'un ou l'autre essieu (14), en particulier l'essieu qui n'est pas couplé par le ou les deux éléments de blocage mobiles précités (22) (22').

9. Dispositif selon la revendication 7, **caractérisé par le fait que** ledit élément de blocage fixe (204) a un crochet (204) muni d'une concavité (205) agencée pour recevoir au moins une partie de chacun desdits deux essieux (14). 5
10. Dispositif selon la revendication 9, **caractérisé par le fait que** ladite concavité (205) est délimitée par une partie de surface respective sensiblement cylindrique (206) agencée pour recevoir ladite au moins une partie de chacun desdits deux essieux (14) de manière transversale. 10
11. Dispositif selon la revendication 10, **caractérisé par le fait que** ladite unité de raccordement rapide (20) a deux éléments de blocage fixes (204) disposés à une distance mutuelle l'un de l'autre le long d'une direction parallèle à la direction d'extension desdits deux essieux (14). 15
12. Dispositif selon l'une quelconque des revendications 1 à 11, **caractérisé par le fait que** ladite unité de raccordement rapide (20) comprend un corps en forme de boîte (200) à l'intérieur duquel une unité d'actionnement (24) est reçue pour déplacer en translation ledit ou lesdits éléments de blocage mobiles (22) (22'), **par le fait qu'un** élément de commutation (261) ou une commande pour commander ladite unité d'actionnement est reçu à l'intérieur dudit corps en forme de boîte (200), et **par le fait que** ledit élément de commutation (261) ou ladite commande est accessible au moyen d'un outil depuis l'extérieur dudit corps en forme de boîte (200). 20
13. Dispositif selon la revendication 12, **caractérisé par le fait que** ledit élément de commutation (261) est accessible à travers un trou (263) prévu dans une paroi (26) dudit corps en forme de boîte (200). 25
14. Dispositif selon la revendication 13, **caractérisé par le fait que** chacun desdits deux essieux (14) comprend un trou traversant de commutation (142), et **par le fait qu'en** utilisation, lorsque ladite unité de raccordement rapide (20) et ledit élément d'adaptation (10) sont couplés ensemble, ledit trou (263) prévu dans ladite paroi (26) dudit corps en forme de boîte (100) est disposé en correspondance du trou traversant de commutation (142) de l'un desdits essieux, ledit élément de commutation (261) étant par conséquent accessible au moyen d'un outil de commande à travers ledit trou (263) prévu dans ladite paroi (26) dudit corps en forme de boîte (200) et à travers ledit trou traversant de commutation (142). 30
15. Dispositif selon l'une quelconque des revendications 1 à 14, **caractérisé par le fait que** le trou de l'un ou des deux sièges de couplage (140) de l'un ou des deux essieux (14) est un trou borgne. 35
16. Dispositif selon l'une quelconque des revendications 1 à 14, **caractérisé par le fait que** le trou de l'un ou des deux sièges de couplage (140) de l'un ou des deux essieux (14) est un trou traversant. 40
17. Engin de terrassement (B) pour creuser des excavations ou des travaux similaires, ledit engin de terrassement (B) comprenant un élément de manipulation (A) pour un outil (U) agencé pour réaliser lesdits travaux, **caractérisé par le fait que** ledit engin de terrassement (B) est équipé d'un raccord rapide (1) selon l'une quelconque des revendications 1 à 16. 45

Fig. 3

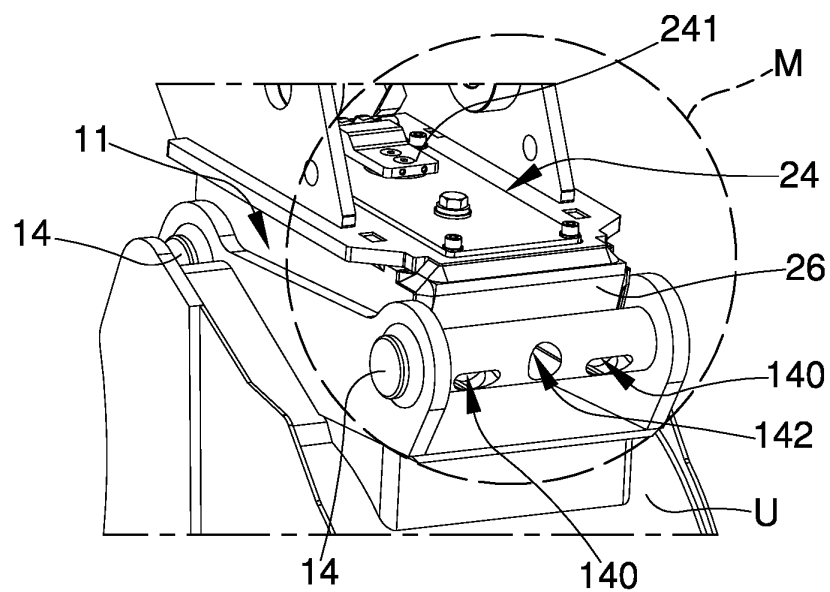


Fig. 4a

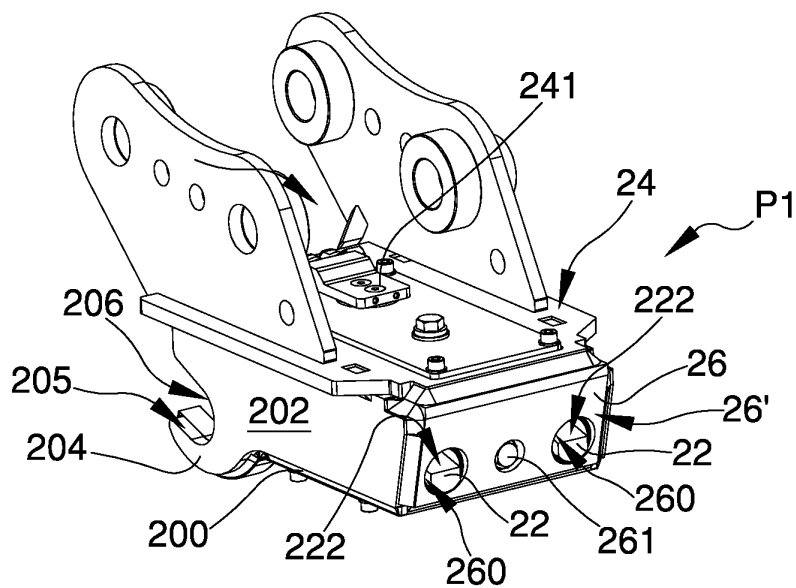
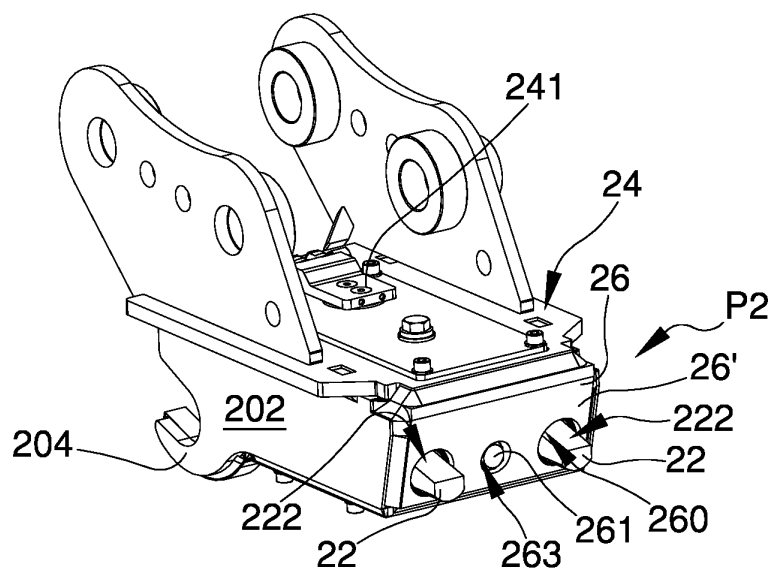


Fig. 4b



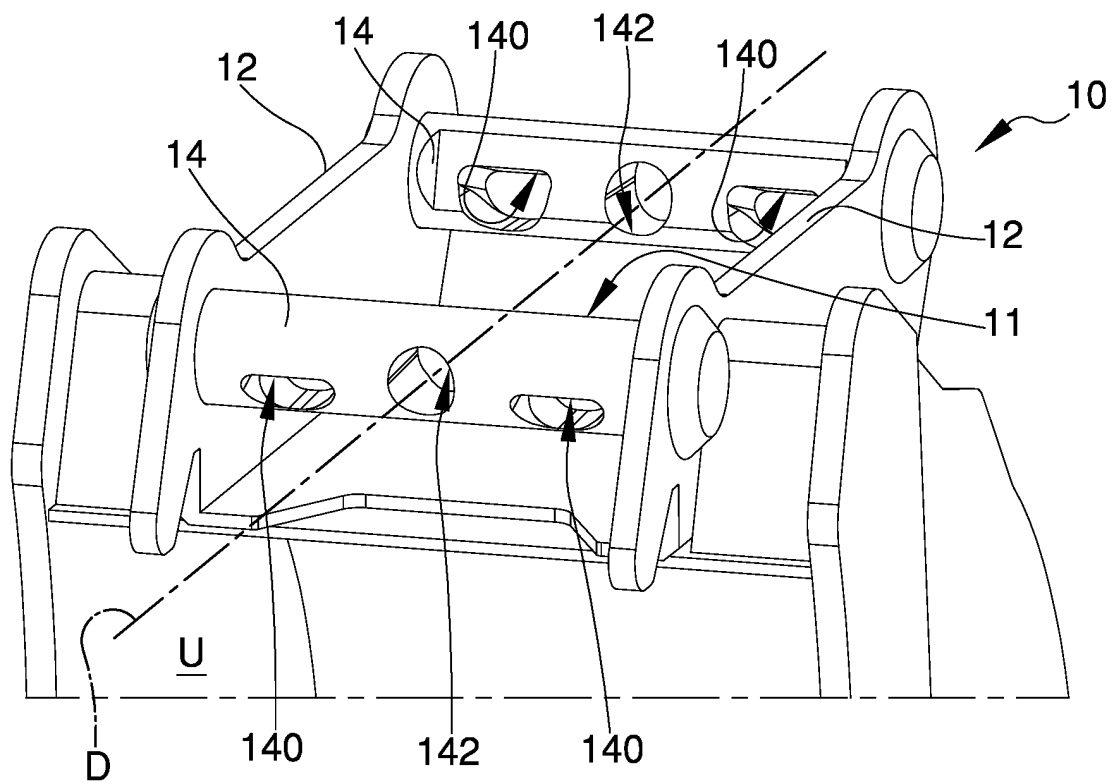


Fig. 5

Fig. 6

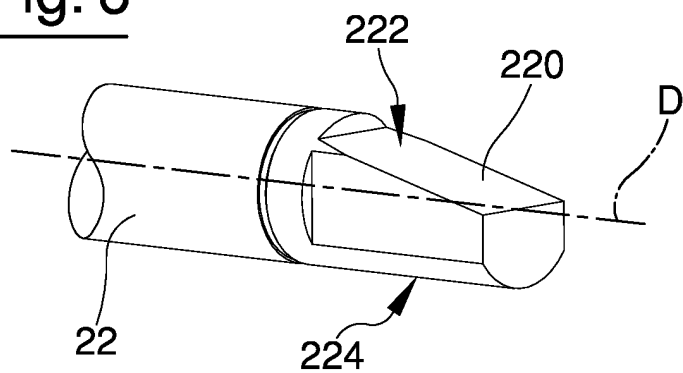
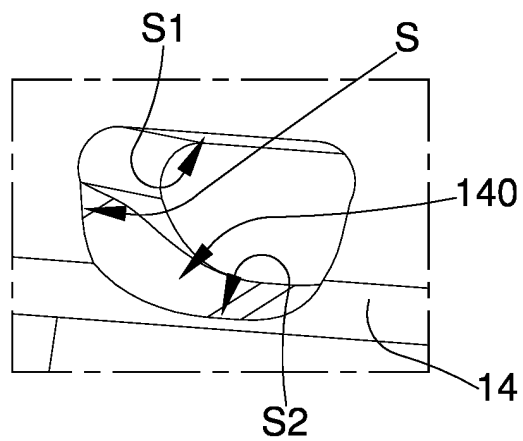


Fig. 7



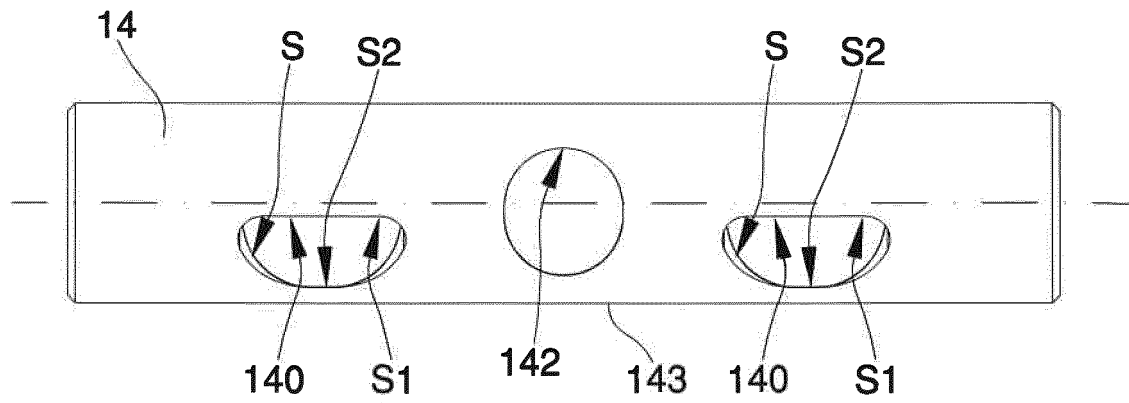


Fig. 8

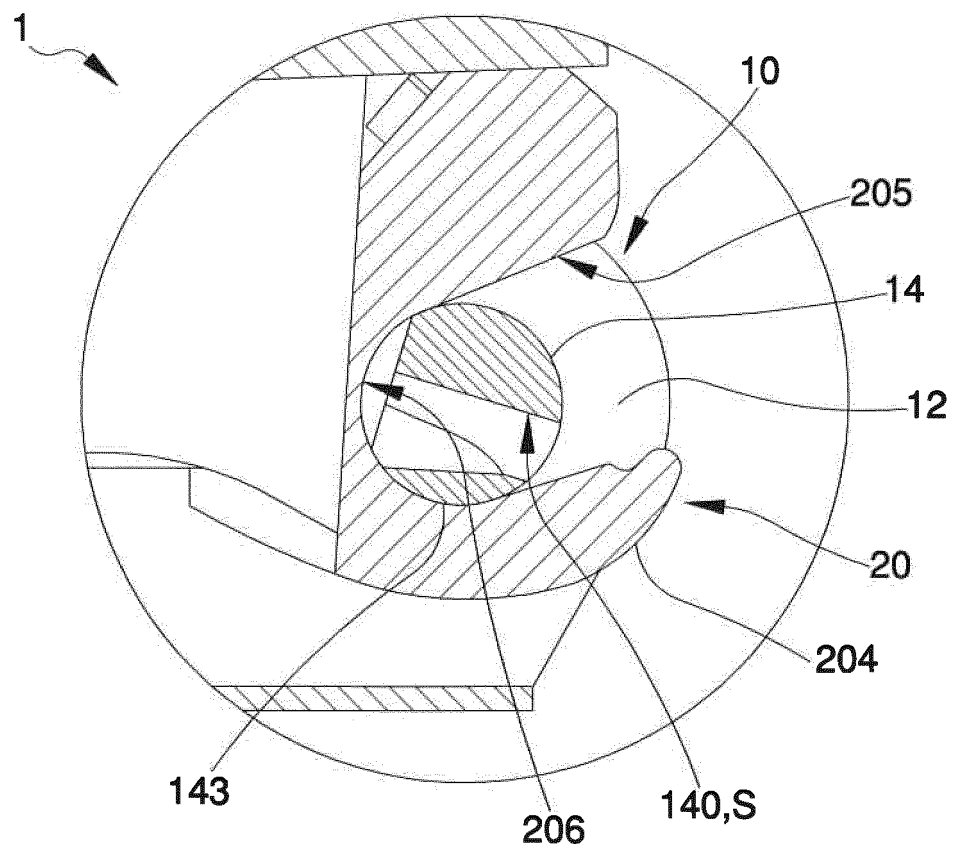


Fig. 9

Fig. 10

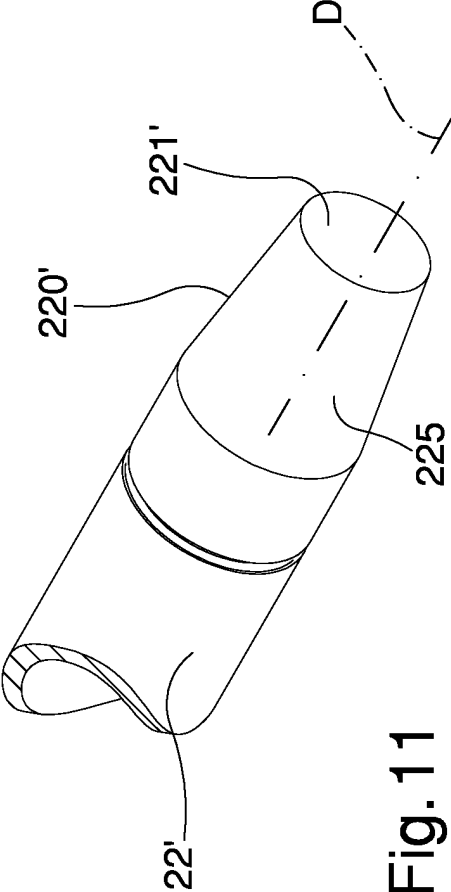
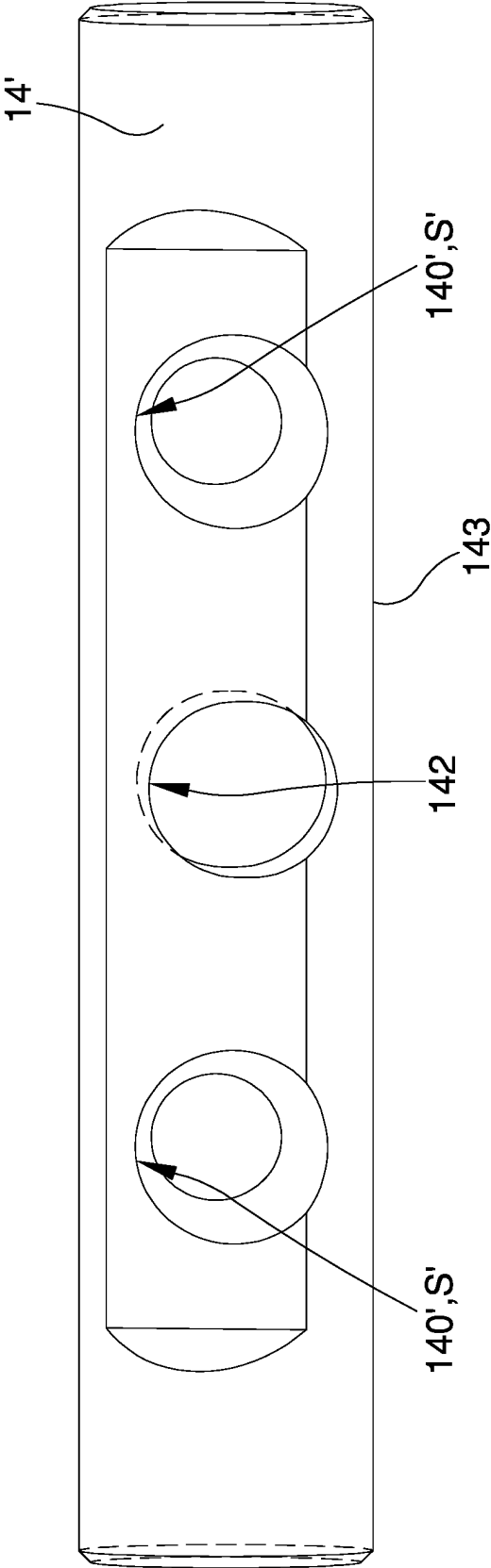


Fig. 11

REFERENCES CITED IN THE DESCRIPTION

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