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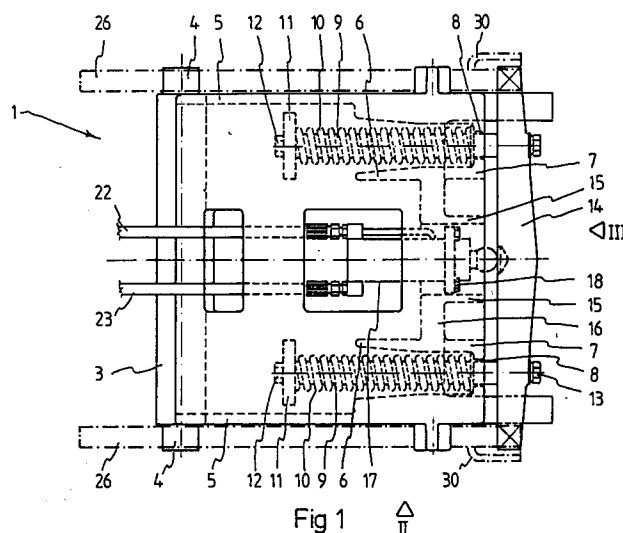
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A coupling piece.

The invention relates to a coupling piece for coupling an implement, such as e.g. an excavator bucket, to the end of a jib of an excavator or the like. The coupling piece can be pivotally connected to the jib as well as to a setting cylinder coupled to the jib. The implement is provided with two connecting plates secured to the implement, said connecting plates being provided with recesses for receiving studs forming part of the coupling piece as well as with conical recesses for receiving a clamping

wedge associated with the coupling piece. The coupling piece is also provided with spring means, which are constructed in such a manner that in the situation where the coupling piece is coupled to the implement said spring means tend to draw the clamping wedge firmly into the conical recesses. A setting cylinder is provided on the coupling piece, by means of which the clamping wedge can be moved against the action of the spring means.



The invention relates to a coupling piece for coupling an implement, such as e.g. an excavator bucket, to the end of a jib of an excavator or the like, which coupling piece can be pivotally connected to the jib as well as to a setting cylinder coupled to the jib, whereby the implement is provided with two connecting plates secured to the implement, said connecting plates being provided with recesses for receiving studs forming part of the coupling piece as well as with conical recesses for receiving a clamping wedge associated with the coupling piece.

Such a coupling piece is e.g. known from Dutch Patent Application No. 7904335. With this known construction the clamping wedge is fixed to the coupling piece and drawn into the conical recesses, so as to secure the coupling piece to the implement by means of bolts, which have to be tightened or loosened manually by the operator of the crane for coupling and/or uncoupling the implement. Said coupling and uncoupling of the implement is thus still a time-consuming job, whilst furthermore the bolts constitute vulnerable parts, which are easily damaged.

The object of the invention is to obtain a coupling piece of the above kind, wherein the above-described drawbacks can be avoided.

According to the invention this can be achieved in that the coupling piece is provided with spring means, which are constructed in such a manner that in the coupled condition of the coupling piece to the implement said spring means tend to draw the clamping wedge firmly into the conical recesses, whilst a setting cylinder is provided on the coupling piece, by means of which the clamping wedge can be moved against the action of the spring means.

Generally the setting cylinder will be a hydraulic setting cylinder, which may be connected to the hydraulic circuit of the excavator or the like, so that it can be controlled from the driver's cab of the excavator. It is also possible, however, to provide e.g. pneumatic or electric setting cylinders, which may e.g. be connected to corresponding circuits of the excavators or the like. During normal operation the spring means will take care of it that the clamping wedge remains in the position suitable for clamping down the implement to the coupling piece, so that during operation it will not be necessary to keep the setting cylinder under pressure for this purpose. This also enhances the safety during operation. According to a further aspect of the invention it also becomes possible thereby to construct the setting cylinder in such a manner that it can be adjusted into a position in which the hydraulic setting cylinder is located at some distance from the clamping wedge. Consequently it is avoided that during operation undesirable forces are

exerted on the setting cylinder via the clamping wedge, as a result of which overloading of and damage to the setting cylinder is avoided.

The invention will be explained in more detail hereafter with reference to a possible embodiment of the coupling piece according to the invention illustrated in the accompanying Figures.

Figure 1 is a plan view of a coupling piece and, illustrated in chain-dotted lines, of connecting plates secured to an implement.

Figure 2 is a side view of Figure 1, seen according to the arrow II in Figure 1, wherein some parts have been left out.

Figure 3 is a view of Figure 1, seen in the direction indicated by the arrow III in Figure 1.

Figure 4 is a sectional view of Figure 1, at the location of the setting cylinders.

Figure 5 is a sectional view of Figure 1, at the location of a spring.

The coupling piece illustrated in the Figures comprises a bent plate-shaped part 2, to one end of which a shaft 3 is connected. The ends of the shaft 3 form studs 4, whose diameter is slightly smaller than that of the other part of the shaft 3.

At the sides of the part of the plate 2 that includes an angle with the part to which the shaft 3 is secured reinforcing ribs 5 are secured to the plate, said reinforcing ribs extending perpendicularly to said part of the plate. Furthermore reinforcing ribs 6 extending parallel to the reinforcing ribs 5 are provided near the end of the plate 2 remote from the shaft 3, said reinforcing ribs 6 with one end being connected to the ends of the reinforcing ribs 5 by means of plate-shaped parts 7 extending perpendicularly to the reinforcing ribs. In said plate-shaped parts 7 holes 8 are provided, through which pins 9 are passed. Said pins 9 are surrounded by compression springs, which are confined between the plates 7 and further supporting plates 11, which are secured to the pins 9 by means of bolts 12. The other ends of the pins 9 are secured, by means of bolts 13, to a clamping wedge 14 extending perpendicularly to the bolts 10.

Between the reinforcing ribs 6 further reinforcing ribs 15 are secured to the plate 2, whereby said ribs 15 are connected to the ribs 6 by means of a transverse rib 16, in which a hole is provided for passing a cylinder housing 17 of a hydraulic setting cylinder, which is secured to the reinforcing ribs 16 by means of bolts 18.

The housing 17 of the setting cylinder accommodates a piston, which is connected to a piston rod 19, said piston rod with one end projecting beyond the housing 17 and at this end being provided with a spherical head 20. The spherical head 20 lies opposite a conical recess 21, which is provided in a surface of the clamping wedge 14 facing the setting cylinder.

Lines 22 and 23 are connected to the setting cylinder for the supply and discharge of pressurized fluid, whereby said lines may be connected to the hydraulic circuit of an excavator or the like in a manner known per se.

Projecting ears 24 are secured to the plate 2 at the side of the plate 2 remote from the setting cylinder, said ears being provided with holes 25 for coupling the coupling piece to the jib of an excavator or the like in a manner known per se.

The above-described coupling piece, which during operation will be coupled to the end of the jib of an excavator or the like as well as to a setting cylinder provided on said jib, so that the coupling piece can be pivoted with respect to the jib by means of the setting cylinder, is intended for coupling implements to the jib. Such implements, such as e.g. an excavator bucket, will thereby be provided in a usual manner with two connecting plates 26 secured to the implement, said connecting plates being provided with hook-shaped parts 27 for receiving the studs 4. Furthermore the plates are provided, in a manner known per se, with conical recesses for receiving the correspondingly shaped ends of the clamping wedge 14, all this in such a manner that the clamping wedge 14 will be drawn firmly into the recesses, towards the left, when seen in Figure 2, under the influence of the compression springs 10. The angle of the wedge-shaped parts of the wedge and the correspondingly shaped recesses in the plates has been chosen such that the ends of the clamping wedge are accommodated in the respective recesses in a self-gripping manner, so that the wedge will not tend to work itself loose from the coupled position shown in the Figures. Besides that any tendency of the clamping wedge 14 to work itself loose from the coupled position shown in the Figures is opposed by the springs 10, which draw the clamping wedge into the recesses.

As will furthermore be apparent from Figure 1, the sphere 20 secured to the end of the piston rod 19 is spaced by some distance from the boundary face of the recess 21 provided in the wedge, so that the forces exerted on the wedge will not be transmitted to the setting cylinder of which the piston rod 19 forms part.

In order to uncouple the coupling piece from the implement the piston rod 19 can be moved towards the right, when seen in Figure 1, by supplying pressurized fluid to the setting cylinder, so that the sphere 20 is pressed into the recess 21 provided in the clamping wedge and the clamping wedge 14 is moved towards the right, when seen in Figure 1, into a position in which the wedge-shaped ends of the clamping wedge 14 are removed from the recesses in the plates 26. Due to the two compression springs acting on the clamping wedge

said clamping wedge is moved evenly and it is avoided that the wedge is pressed out of alignment, which may lead to the wedge becoming jammed. After the wedge 14 has been removed from the recesses 26 the coupling piece can be uncoupled by suitably manipulating the connecting plates and the implement equipped therewith, in order to be coupled to another implement provided with similar connecting plates again.

It will be apparent that when a coupling piece according to the invention as described above is used, the coupling and uncoupling of the coupling piece can be carried out simply and quickly, without the operator of the excavator or the like having to leave the excavator.

A further advantage of the construction according to the invention is that the same coupling piece is suitable for remote control by means of a hydraulic cylinder as described above, as well as for a mechanical connection, in which case the setting cylinder may be left out and the clamping wedge may be fixed in the usual manner by means of bolts. A construction originally made for mechanical connection may thus be adapted for remote control at a later stage, e.g. by simply providing the setting cylinder.

When the energizing of the setting cylinder drops out it is still possible to uncouple the clamping wedge by loosening the bolts 13.

As is furthermore illustrated in the Figures, protecting hoods 30 may furthermore be secured to the ends of the connecting plates in which the recess for receiving the wedge-shaped ends of the clamping wedge 14 are provided, said protecting hoods constituting a protection for the ends of the clamping wedge 14 as well as for the recesses receiving said ends, and at the same time form an additional reinforcement of the connecting plates, so as to oppose undesirable bending of the connecting plates near the recesses receiving the ends of the clamping wedge 14.

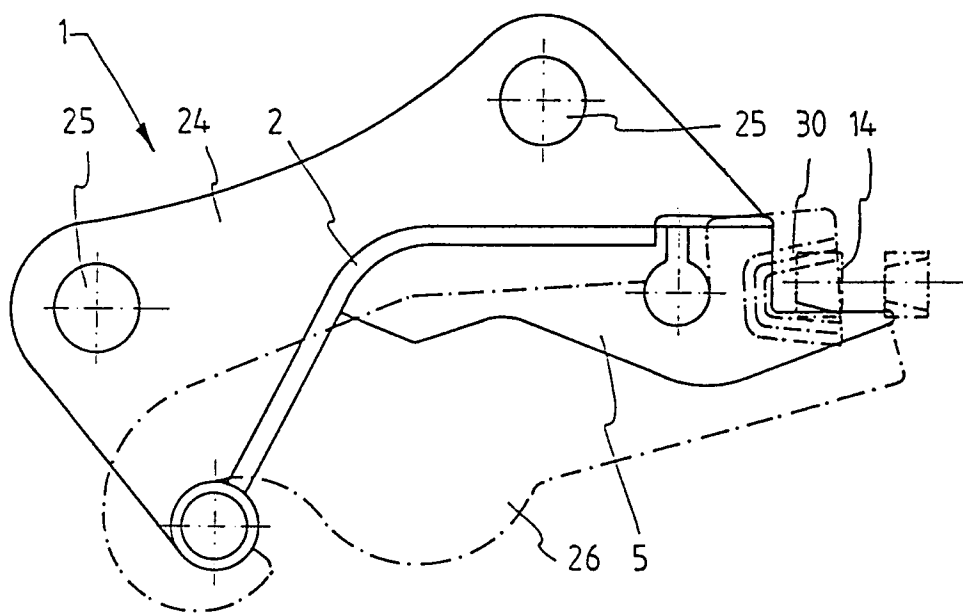
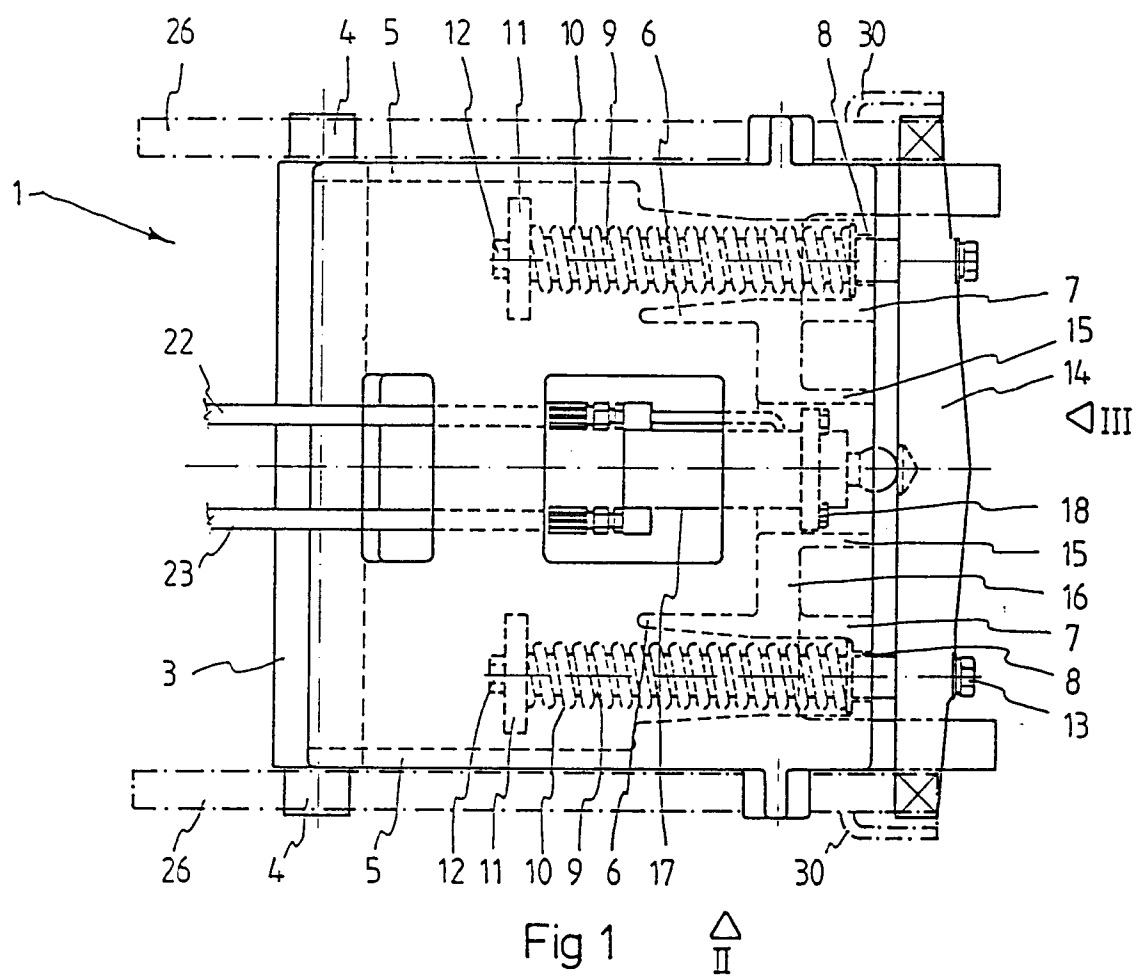
Claims

1. A coupling piece for coupling an implement, such as e.g. an excavator bucket, to the end of a jib of an excavator or the like, which coupling piece can be pivotally connected to the jib as well as to a setting cylinder coupled to the jib, whereby the implement is provided with two connecting plates secured to the implement, said connecting plates being provided with recesses for receiving studs forming part of the coupling piece as well as with conical recesses for receiving a clamping wedge associated with the coupling piece, characterized in that the coupling piece is provided with spring means, which are constructed in such a man-

ner that in the situation where the coupling piece is coupled to the implement said spring means tend to draw the clamping wedge firmly into the conical recesses, whilst a setting cylinder is provided on the coupling piece, by means of which the clamping wedge can be moved against the action of the spring means.

mote from each other.

2. A coupling piece according to claim 1, characterized in that said hydraulic setting cylinder can be adjusted into a position, in which the hydraulic setting cylinder is located at some distance from the clamping wedge. 5 10
3. A coupling piece according to claim 1 or 2, characterized in that a cylinder housing of the hydraulic setting cylinder is fixedly connected to the coupling piece and that one end of a piston rod projecting beyond the cylinder housing can be moved from a position in which said end is spaced from the clamping wedge by some distance to a position in which said end abuts against the clamping wedge, and can then be moved further, so as to move the clamping wedge against the action of the spring means, parallel to the longitudinal direction of the setting cylinder. 15 20 25
4. A coupling piece according to claim 4, characterized in that a spherical body is secured to the end of the piston rod and that opposite said spherical body a conical recess is provided in the clamping wedge. 30
5. A coupling piece according to any one of the preceding claims, characterized in that two rods, which extend parallel to each other and perpendicularly to the longitudinal direction of the clamping wedge, are connected to the clamping wedge, said rods being surrounded by compression springs, which are confined between the stops secured to the coupling piece and stops secured to the ends of the rods remote from the clamping wedge. 35 40 45
6. A coupling piece according to claim 5, characterized in that the rods connected to the clamping wedge are arranged on either side of the setting cylinder, symmetrically with respect thereto. 50
7. An implement provided with connecting plates for being coupled to a coupling piece, wherein conical recesses are provided in ends of the connecting plates so as to receive a clamping wedge, characterized in that hood-shaped reinforcing pieces are provided near the recesses at the sides of the connecting plates re- 55



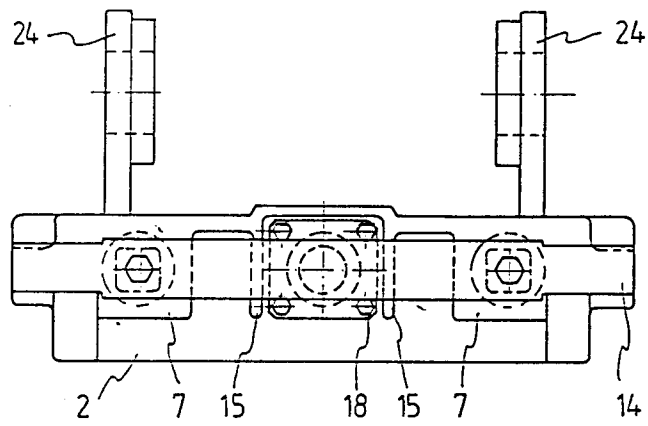


Fig 3

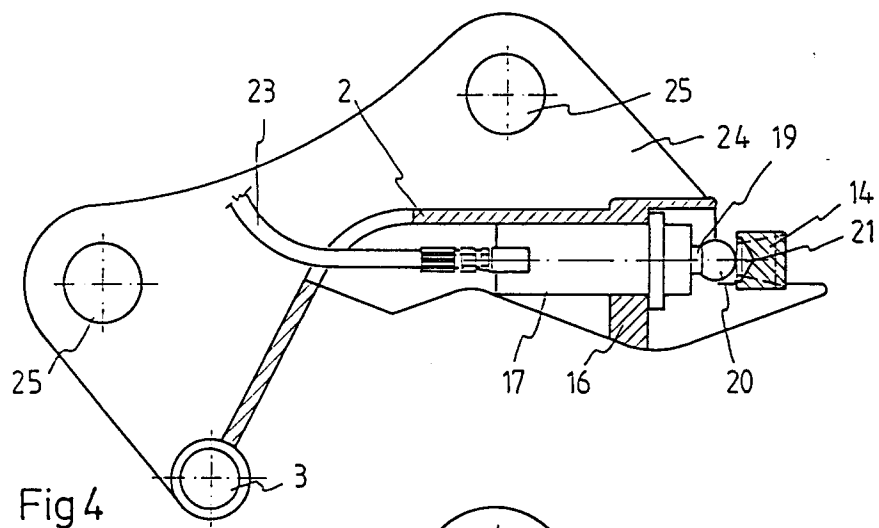


Fig 4

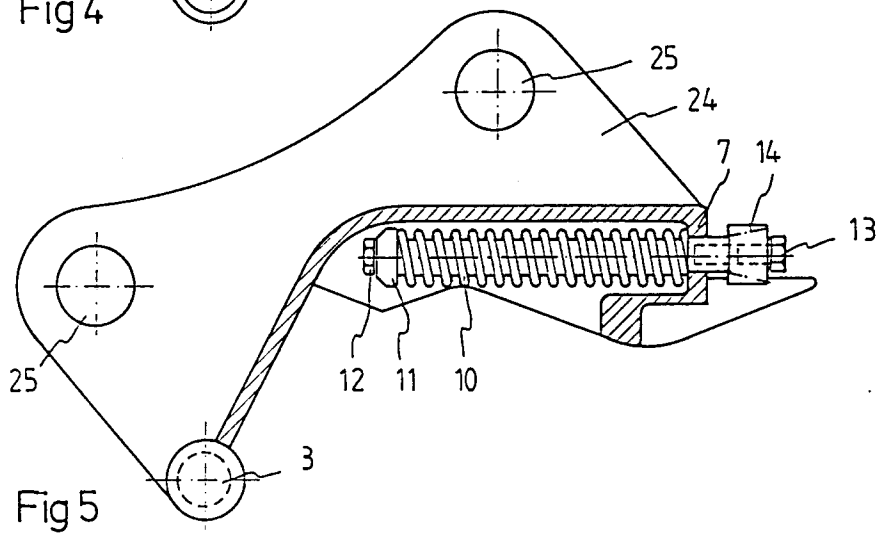


Fig 5