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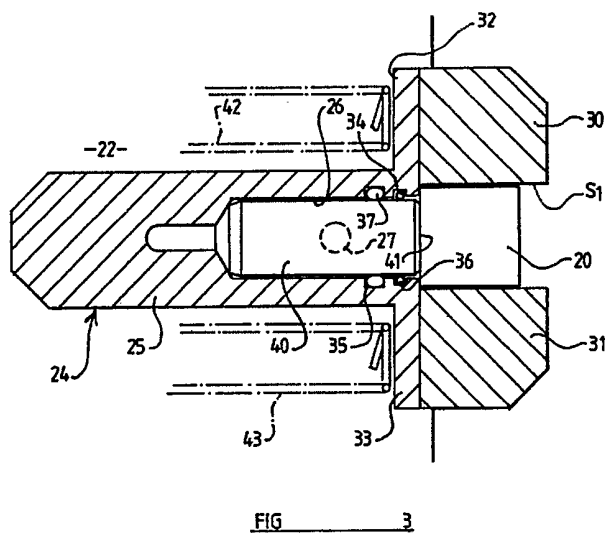
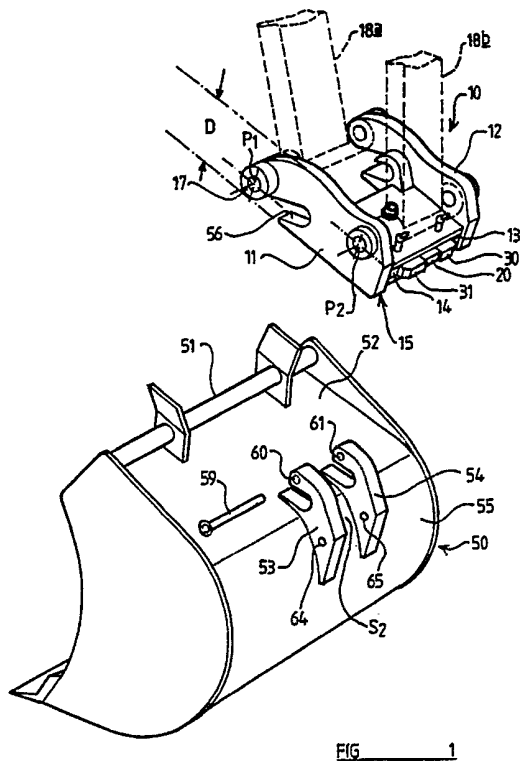
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| EP 0569026 A1 | EP 0555566 A1 | US 5147173 A |
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(54) Device for releasably mounting a working implement

(57) A device for releasably mounting a working implement (50) on a working arm (18a, 18b), the device (10) comprising a housing (15) secured to the working arm (18a, 18b), a latch member (24) linearly movable from a latched position in which the latch member (24) engages with a receiving means (53, 54) of the implement (50) to retain the implement (50) relative to the device (10) and hence to the working arm (18a, 18b), and an unlatched position in which the latch member (24) is disengaged from the receiving means (53, 54), the latch member (24) being movable by means of an actuating means (26, 40) which operates in a direction generally parallel to a direction along which the latch member (24) moves between its latched and unlatched positions. The latch is preferably T-shaped with two tongues 30, 31, is biased to the latching position and moved hydraulically by a piston 40 reacting against stop block 20 to its unlatched position.



GB 2286382 A

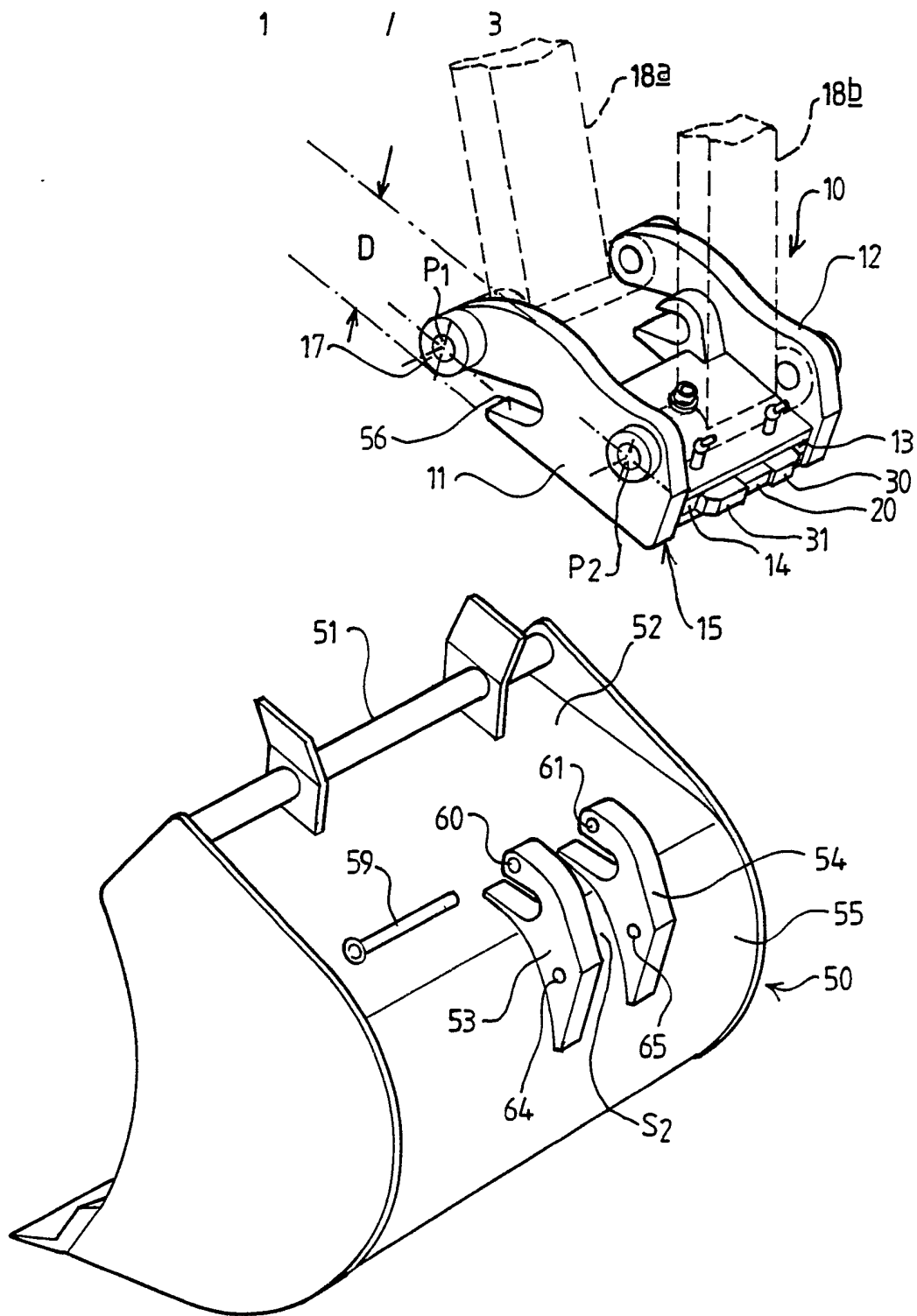
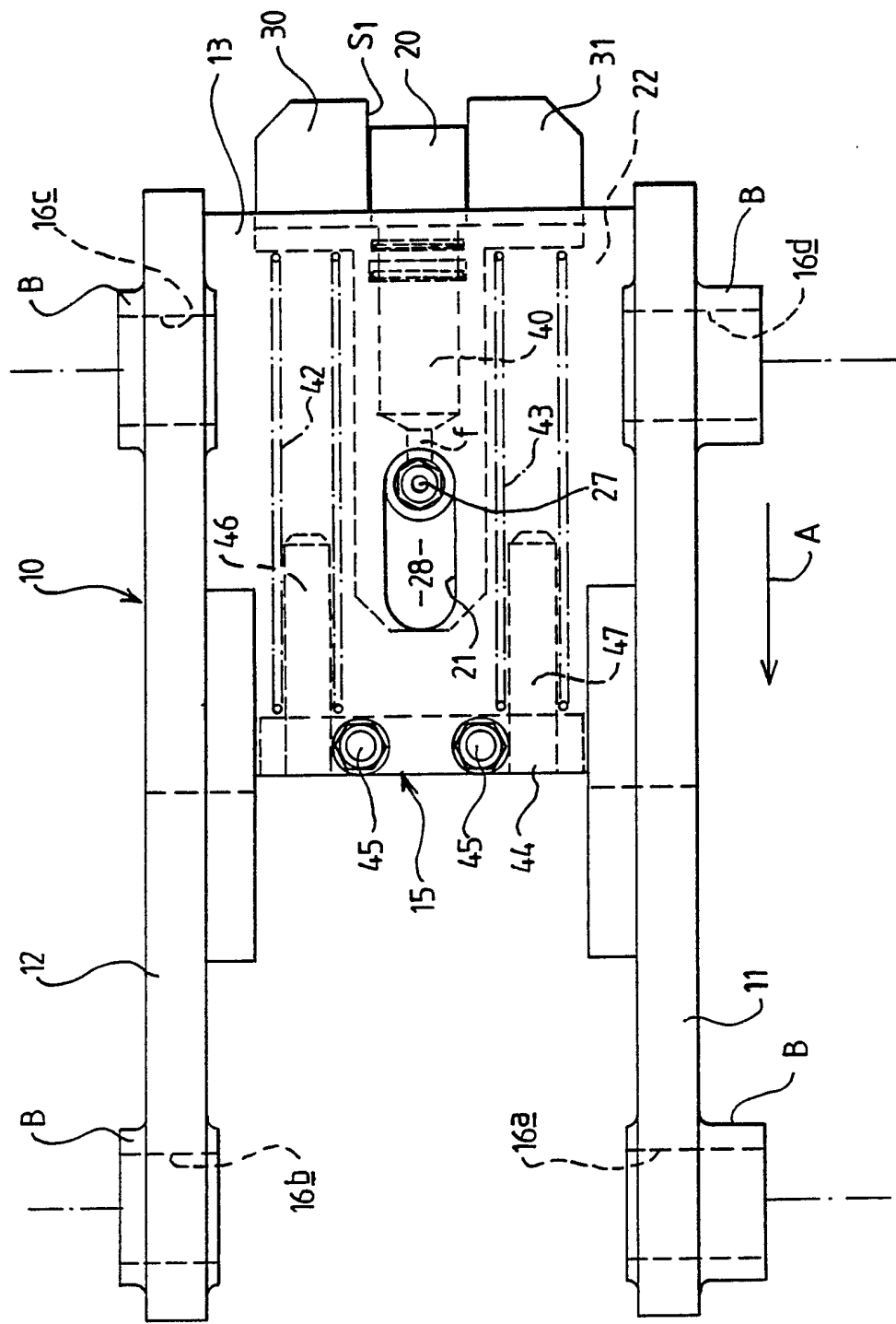


FIG 1

FIG 2



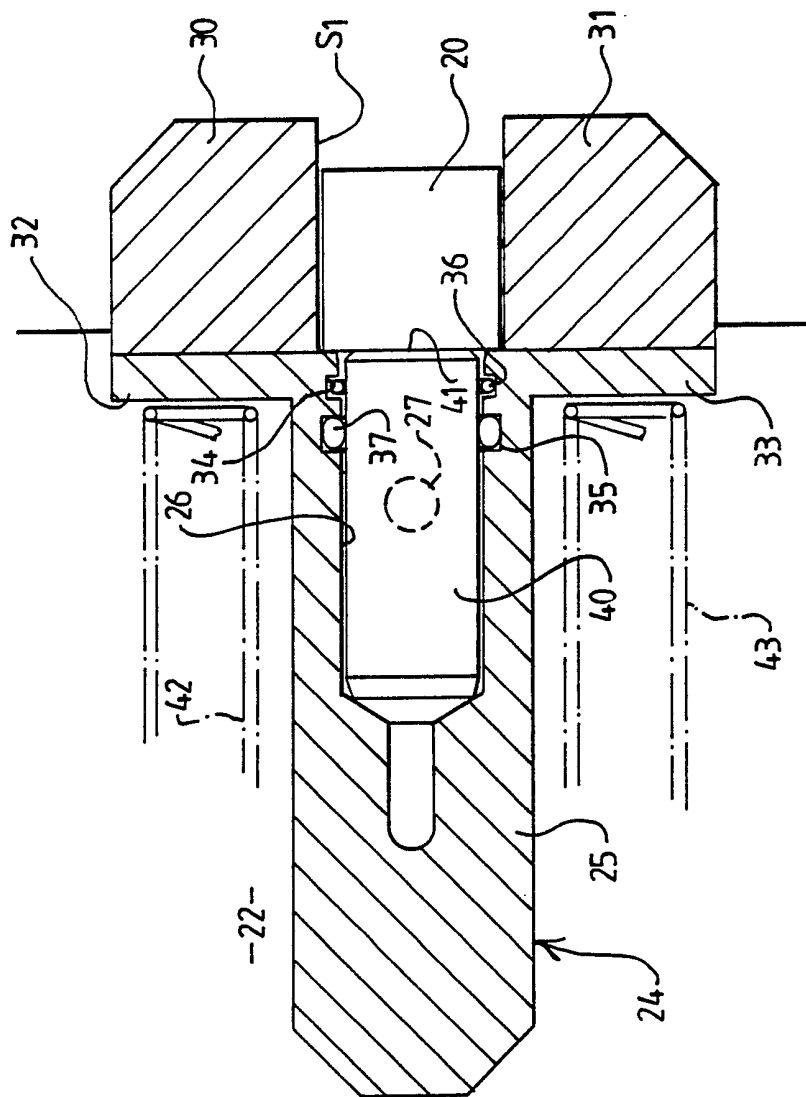


FIG 3

Title: Device for releasably mounting a working implement**Description of Invention**

This invention relates to a device for releasably mounting a working implement on a working arm.

Such device is disclosed in our previous patent GB 2177674.

A problem encountered with previous devices has been that in order to accommodate a latching/unlatching mechanism, the device has necessarily had a large depth dimension such that the working implement has been spaced significantly from the end of the working arm to which the device is attached.

Where the working implement is an excavating bucket, this has the effect of de-rating the bucket by which we mean that the tear-out design strengths of the working arm/bucket combination cannot be achieved.

According to a first aspect of the invention we provide a device for releasably mounting a working implement on a working arm, the device comprising a housing secured to the working arm, a latch member linearly movable from a latched position in which the latch member engages with a receiving means of the implement to retain the implement relative to the device and hence to the working arm, and an unlatched position in which the latch member is disengaged from the receiving means, the latch member being movable by means of an actuating means which operates in a direction generally parallel to a direction along which the latch member moves between its latched and unlatched positions.

Utilising the present invention, the depth dimension of the device can be minimised and hence there is no significant de-rating of the bucket or other working implement.

The housing may comprise a pair of spaced side plates having openings therein to receive connecting elements such as pins by which the device may be secured to the working arm.

A plane containing the centres of the openings may be spaced a minimum distance from the latch member.

The housing may comprise a recess to receive a projecting formation, typically a mounting bar, of the working implement, the projecting formation being spaced from the receiving means for the latch member.

The recess of the housing preferably opens in a direction facing generally away from the latch member.

The latch member is preferably slidable in the housing between its latched and unlatched positions, and is preferably resiliently biased by means of, for example, one or more springs, to its latched position. Thus the actuating means may be a single-way actuator which moves the latch member against the force of the resilient biasing means to its unlatched position, the springs or other resilient biasing means being effective to return the latch member to its latched position.

The actuating means is preferably fluid actuated and in a preferred arrangement comprises a piston and cylinder arrangement. The cylinder may be provided by a bore in the latch member and the piston may comprise a pin or rod in sealing engagement with the cylinder, relative movement between the piston and cylinder being achieved when fluid is introduced into the cylinder. The pin is preferably immovable relative to the housing such that the cylinder and hence the latch member moves relative to the housing when fluid is introduced into the cylinder, thus to move the latch member to its unlatched position.

When in its latched position, preferably one or more tongue parts of the latch member project from the housing and when the latch member is in its unlatched position, the previously projecting tongue parts are retracted inwardly of the housing.

In a preferred arrangement, the receiving formation of the working implement comprises a pair of hook formations each of which receives one of the projecting tongue parts.

If desired, between the projecting tongue parts of the latch member, there is a space in which a stop member of the housing is received, the piston preferably bearing on the stop member at least as the latch member is moved by the actuating means towards the unlatched position.

Where the receiving means comprises a pair of hook formations, a passageway may be provided therebetween to receive a mechanical locking pin, the pin in use engaging with the stop member so that the working implement is retained relative to the device even if the latch member is moved to its unlatched position.

According to a second aspect of the invention we provide in combination a device according to the first aspect of the invention and a working implement.

According to a third aspect of the invention we provide a loading and/or excavating machine having at least one working arm, and an implement secured to the working arm by a device according to the first aspect of the invention.

According to a fourth aspect of the invention, we provide a working implement adapted to be retained relative to a mounting device according to the first aspect of the invention.

The invention will now be described with reference to the accompanying drawings in which

Figure 1 is a perspective illustrative view from the rear of a mounting device in accordance with the invention, separate from a corresponding working implement;

Figure 2 is a plan view of the mounting device of Figure 1 in an assembled condition; and

Figure 3 is a cross section along the line 3-3 of Figure 1 of part only of the device.

Referring to the drawings there is shown a mounting device 10 having a pair of side plates 11 and 12 and top and bottom body plates 13, 14 which together provide a body 15.

The side plates 11, 12 are apertured as indicated at 16a, 16b and at 17a, 17b to receive respective pins P1 P2 by which the device 10 can be secured to a lifting/excavating arm, positions of which are shown at 18a and 18b of a loading/excavating machine.

In this case, the apertures 16, 17 include greased bearings B and the respective pins P1, P2 are thus freely able to rotate relative to the body 15 of the device 10.

In an alternative construction, the pins may be bolted rigidly relative to the mounting device 10 so that relative rotation between the mounting device and the lifting/excavating arm 18a or 18b is prevented.

A stop member 20 comprising a block is provided, which is secured between the top and the bottom plates 13, 14 generally centrally of a chamber 22 defined by the top and bottom plates 13, 14 and the side plates 11, 12. Top body plate 13 has a slot 21 provided therein, for a purpose hereinafter explained.

A latch member 24 is provided which is slidable in the chamber 22. The latch member 24 is generally T-shaped, a central stem 25 thereof having provided axially in it, a generally cylindrical opening 26, which is connected by a thin region f to a transversely extending passage 27 which extends to a top surface 28 of the latch member 24.

The latch member 24 further comprises a pair of tongue formations 30, 31 preferably integrally provided with respective cross parts 32 and 33 of the T-shaped latch member 24. The tongue formations 30 and 31 provide between them axially of the block member 24, a space S1.

The cylindrical opening 26 has adjacent an open end of the cylindrical opening 26 a pair of machined grooves 34 and 35 each of which receives in use, a sealing gasket 36, 37.

Received within the generally cylindrical opening 26 is a cylindrical pin 40, the gaskets 36, 37 engaging with the pin 40 to provide for fluid tightness between the pin 40, and the cylinder 26 provided by the opening 26.

In use, the pin 40 bears at its outer end 41 on the stop block 20 which is received within the space S1 between the tongue formations 30 and 31, whilst the tongue formations 30 and 31 themselves project out of the one end of the body 15 of the assembly 10.

The tongue formations 30, 31 can be retracted into the body 15 as hereinafter explained, against the force of respective spring members comprising in this example, a pair of coil springs 42 and 43. The springs 42, 43 bear at their one ends on the insides of the cross parts 32, 33 of the T-shaped latch member 24, and at their other ends, on a bar 44 which is secured by fasteners such as bolts 45 between the top and bottom body plates 13, 14 at a position of chamber 22 opposite to the stop 20.

The bar 44 carries a pair of pins 46, 47 which are received in respective coil springs 42, 43 to ensure that the block member 24 slides evenly in the body 15, but these may be omitted if not required.

The transversely extending passageway 27 is accessible through the slot 21 in the top plate member 13 both when the tongue formations 30, 31 are retracted into the body 15 and when they project from the body 15.

The transversely extending passageway 27 is adapted to be connected via slot 21 to a source of pressurised fluid, preferably hydraulic fluid.

Starting with the latch member 24 in the position shown in Figure 2, it will be appreciated that such fluid introduced through passageway 27 will pass into the cylindrical opening 26 of the latch member 24 and thus will bear on and tend to urge the pin 40 from the opening 26. However the pin 40 is immovable relative to the body 15 in response, by virtue of bearing on the stop 20. Hence as a result, the latch member 24 which is not constrained relative to the body 15, will slide in the chamber 22 in direction A against the force of the springs 42, 43

which as a result, will compress. Thus the tongue formations 30 and 31 will be retracted into the body 15.

Of course, once the source of pressurised fluid is removed from the transversely extending passageway 27, the coil springs 42 and 43 will tend to return the T-shaped latch member 24 to its original position and the tongue formations 30 and 31 will be projected out of the body 15. Hydraulic fluid will be ejected from the opening 26 and, returned to a hydraulic reservoir if permitted by a hydraulic system, or otherwise disposed of.

In Figure 1 it can be seen that the assembly 15 is adapted to be used in conjunction with a working implement such as for example, a bucket 50 which has a projecting formation comprising a bar 51 provided on an outer top surface part 52 of the bucket 50, and a receiving formation provided by a pair of hook formations 53 and 54 which are provided on a rear outer surface part 55 of the bucket 50.

The device 10 thus has a cut-out 56 in each side plate 11, 12 of a configuration adapted to receive the bar 51 of the bucket 50. The stop 20 of the body 15 is adapted to be received in a space S2 between the hook formations 53 and 54, and the tongue formations 30, 31 are each adapted to be received by a respective hook formation 53, 54. The spacing between the bar 51 and hook formations 53, 54 is such that when the tongue formations 30, 31 are retracted into the body 15, they can be located adjacent hook formations 53, 54, and when the pressure of hydraulic fluid to the transversely extending passageway 27 is released, and the coil springs 42, 43 cause the latch member 24 to slide in the chamber 22 back to its original Figure 2 position, when the tongue formations 30, 31 will be received by their respective hook formations 53, 54. Thus the bucket 50 will be rigidly and securely attached to the device 10, and can only be released by retracting the tongue formations 30, 31 again into the body 15.

Referring again to Figure 1, a mechanical locking pin 59 is provided which in use is received in a passageway provided by and between respective openings 60, 61 in the hook formations 53, 54. The pin 59 will in use, extend

along the top of the stop 20 so that even in the event that the tongue formations 30, 31 are inadvertently retracted into the body 15, the bucket 50 will not become detached from the hitch assembly 10 until the pin 59 is withdrawn. The locking pin 59 may be stowed in another pair of openings 64, 65 of the hook formations 53, 54 spaced from the parts of the formations 53, 54 which receive the tongue formations 30, 31.

It can be seen that the pin 40 and T-shaped latch member 24 which together provide an actuating means, relatively linearly slide in a direction generally parallel to the direction of sliding of the latch member 24 in the body 15. Hence the overall depth D of the device 10 can be maintained very small indeed compared with known quick hitch devices i.e. the distance between a plane P containing the centres of the openings 16, 17, to the bar 51 of the bucket 50 is negligible. Hence the device 10 does not seriously de-rate the bucket 50 from the rating which it would otherwise achieve if the bucket 50 were connected directly to a lift/excavating arm 18a, 18b.

Further, the device 10 has a minimal number of components and is thus simple to manufacture and maintain. It is not necessary for the generally cylindrical opening 26 in member 24 accurately to be machined because the sealing rings 36, 37 provide for efficient sealing with the pin 40. Also, the overall depth D of the device 10 can be kept to a minimum because the generally cylindrical opening 26 in the latch member 24 needs only to be of a diameter necessary for the hydraulic fluid to exert a sufficient force on the full end surface area of the pin 40. In known devices which utilise conventional hydraulic actuators hydraulic fluid bears on an area of a piston surrounding the usual piston rod, to move the piston rod into the cylinder. Hence less pin diameter is required in the arrangement of the invention because of the piston i.e. pin 40 not having to have an increased overall diameter to accommodate the loss of effective surface area due to a piston rod.

Various modifications are possible without departing from the scope of the invention.

For example, in the example described, a pair of coil springs 42, 43 are described to return the latch member 24 to the position shown in Figure 2. In another arrangement, a single spring or any other suitable resilient biasing means may be provided as desired.

In another arrangement, instead of there being a single pin 40 and a pair of tongue formations 30, 31, a pair of pins each received in respective openings of the latch member 24 may be provided, there being only a central tongue which engages with a single hook receiving means of the implement 50.

The dimensions of the device 10 can be changed to suit different applications.

Instead of the implement comprising a bucket 50, the invention may be applied to attaching any other working implement to the end of a lift/excavating arm 18a, 18b. Of course, the actual configuration of the device 10 may be adapted for appropriate applications.

The features disclosed in the foregoing description, or the following claims, or the accompanying drawings, expressed in their specific forms or in terms of a means for performing the disclosed function, or a method or process for attaining the disclosed result, as appropriate, may, separately or in any combination of such features, be utilised for realising the invention in diverse forms thereof.

CLAIMS

1. A device for releasably mounting a working implement on a working arm, the device comprising a housing secured to the working arm, a latch member linearly movable from a latched position in which the latch member engages with a receiving means of the implement to retain the implement relative to the device and hence to the working arm, and an unlatched position in which the latch member is disengaged from the receiving means, the latch member being movable by means of an actuating means which operates in a direction generally parallel to a direction along which the latch member moves between its latched and unlatched positions.
2. A device according to claim 1 wherein the housing comprises a pair of spaced side plates having openings therein to receive connecting elements by which the device may be secured to the working arm.
3. A device according to claim 2 wherein a plane containing the centres of the openings may be spaced a minimum distance from the latch member.
4. A device according to any one of the preceding claims wherein the housing comprises a recess to receive a projecting formation of the working implement, the projecting formation being spaced from the receiving means for the latch member.
5. A device according to claim 4 wherein the recess of the housing opens in a direction facing generally away from the latch member.

6. A device according to any one of the preceding claims wherein the latch member is slidable in the housing between its latched and unlatched positions.

7. A device according to claim 6 wherein the latch member is resiliently biased to its latched position.

8. A device according to claim 7 wherein the actuating means is a single-way actuator which moves the latch member against the force of the resilient biasing means to its unlatched position, the resilient biasing means being effective to return the latch member to its latched position.

9. A device according to any one of the preceding claims wherein the actuating means is fluid actuated and comprises a piston and cylinder arrangement.

10. A device according to claim 9 wherein the cylinder is provided by a bore in the latch member and the piston comprises a pin or rod in sealing engagement with the cylinder, relative movement between the piston and cylinder being achieved when fluid is introduced into the cylinder.

11. A device according to claim 10 wherein the pin is immovable relative to the housing such that the cylinder and hence the latch member moves relative to the housing when fluid is introduced into the cylinder, thus to move the latch member to its unlatched position.

12. A device according to any one of the preceding claims wherein the latch member, when in its latched position, one or more tongue parts which project from the housing and when the latch member is in its unlatched position, the previously projecting tongue parts are retracted inwardly of the housing.

13. A device according to claim 12 wherein the receiving means of the working implement comprises a pair of hook formations each of which receives one of the projecting tongue parts.

14. A device according to claim 12 or claim 13 where appendant to claim 9 wherein between the projecting tongue parts of the latch member, there is a space in which a stop member of the housing is received, the piston bearing on the stop member at least as the latch member is moved by the actuating means towards the unlatched position.

15. A device according to claim 14 where appendant to claim 13 wherein a passageway is provided between the pair of hook formations to receive a mechanical locking pin, the pin in use engaging with the stop member so that the working implement is retained relative to the device even if the latch member is moved to its unlatched position.

16. A mounting device substantially as hereinbefore described with reference to and as shown in the accompanying drawings.

17. In combination a device according to any one of claims 1 to 17 and a working implement.

18. A combination of a mounting device and a working implement substantially as described with reference to and as shown in the accompanying drawings.

19. A loading and/or excavating machine having at least one working arm, and an implement secured to the working arm by a device according to any one of claims 1 to 16.

20. A working implement adapted to be retained relative to a device according to any one of claims 1 to 16.

21. Any novel feature or novel combination of features as herein defined and/or shown in the accompanying drawings.

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| Patents Act 1977 Examiner's report to the Comptroller under Section 17 (The Search report) | Application number GB 9402139.1 |
| Relevant Technical Fields (i) UK Cl (Ed.M) B8H (HPC) (ii) Int Cl (Ed.5) E02F 3/36 | Search Examiner D MCMUNN |
| Databases (see below) (i) UK Patent Office collections of GB, EP, WO and US patent specifications. (ii) | Date of completion of Search 28 MARCH 1994 Documents considered relevant following a search in respect of Claims :- 1-20 |

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| X | GB 2267887 A (SACMI) see Figures 2 and 3, particularly | 1 to 6,9,12, 17,19,20 |
| X | GB 2259293 A (EDELEAN) see Figures 1 and 2, particularly | 1 to 6,9,12, 17,19,20 |
| X | GB 2087349 A (EIMCO) see Figures 2 and 4, particularly | 1 to 6,9,12, 19,20 |
| X | EP 0569026 A1 (HARTSTAHL) see Figures 1 and 2, particularly | 1,7,12,17, 19,20 |
| X | EP 0555566 A1 (ATLAS) see Figures 2 and 3, particularly | 1 to 3, 6 to 12,17, 19,20 |
| X | US 5147173 (FAUBER) see Figures 1 and 2, particularly | 1,6,7,9,12, 13,17,19,20 |
| X | US 4955779 (KNACKSTEDT) see Figures 1 and 5, particularly | 1 to 3,6,7, 9,12,13,17, 19,20 |

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