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(71) Applicant: **J.C. BAMFORD EXCAVATORS LIMITED**
Rocester
Uttoxeter
Staffordshire ST14 5JP (GB)

(72) Inventor: **Booth, Barry Edward**
66 Vicarage Road
Mickelover,
Derby DE3 5ED (GB)

(74) Representative: **Lucking, David John**
FORRESTER & BOEHMERT
Franz-Joseph-Strasse 38
D-80801 München (DE)

(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 slidable within the housing 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 actuating means (26,40) comprises a piston (40) and cylinder (26) arrangement wherein the cylinder (26) is provided by a bore (26) in the latch member (24) and the piston (40) comprises a pin or rod in sealing engagement with the cylinder (26), relative movement between the piston and cylinder being achieved when fluid is introduced into the cylinder.

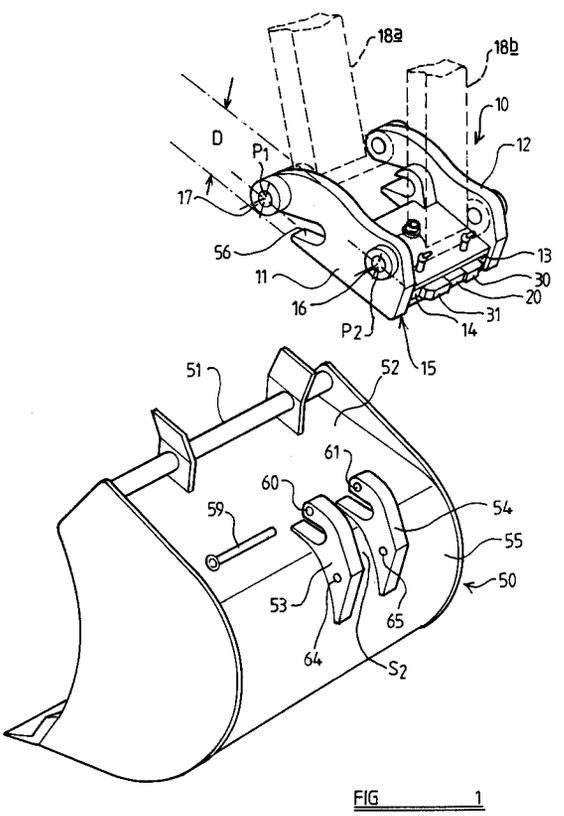


FIG 1

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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.

It is an object of the invention to provide a device for releasably mounting a working implement on a working arm with a minimum depth dimension thus minimising the above problem.

It is a further object of the invention to provide such a device with a minimum number of components which is simple to overhaul.

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, means for securing the housing 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 in the housing 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, characterised in that the actuating means comprises a piston and cylinder arrangement 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.

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 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 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.

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.

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 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 latch member 24, a space S1.

The latch member 24 is preferably a generally solid single part in which the cylindrical opening 26 is machined. However, the tongue formations 30, 31, may be separately formed and subsequently attached to the central stem 25.

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 latch 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 the 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.

Claims

1. A device (10) for releasably mounting a working implement (50) on a working arm (18a,18b), the device (10) comprising a housing (15), means (16,17,P1,P2) for securing the housing 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 dis-

engaged from the receiving means (53,54), the latch member (24) being movable in the housing (15) 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, characterised in that the actuating means (26,40) comprises a piston (40) and cylinder (26) arrangement wherein the cylinder (26) is provided by a bore (26) in the latch member (24) and the piston (40) comprises a pin or rod (40) in sealing engagement with the cylinder (26), relative movement between the piston (40) and cylinder (26) being achieved when fluid is introduced into the cylinder (26).

2. A device according (10) according to claim 1 characterised in that the actuating means (26,40) is a single-way actuator which moves the latch member (24) against the force of a resilient biasing means (42,43) to its unlatched position, the resilient biasing means (42,43) being effective to return the latch member (24) to its latched position and the pin (40) is immovable relative to the housing (15) such that the cylinder (26) and hence the latch member (24) moves relative to the housing (15) when fluid is introduced into the cylinder (26), thus to move the latch member (24) to its unlatched position.

3. A device (10) according to any one of the preceding claims characterised in that the latch member (24) comprises, one or more tongue parts (30,31) which when the latch member (24) is in its latched position, project from the housing (15) and when the latch member (24) is in its unlatched position, the previously projecting tongue parts (30,31) are retracted inwardly of the housing (15).

4. A device (10) according to claim 3 characterised in that between the projecting tongue parts (30,31) of the latch member, there is a space in which a stop member (20) of the housing (15) is received, the piston (40) bearing on the stop member (20) at least as the latch member (24) is moved by the actuating means towards the unlatched position.

5. A device (10) according to claim 4 characterised in that the receiving means (53,54) of the working implement comprises a pair of hook formations (53,54) each of which receives one of the projecting tongue parts (30,31) and a passageway (60,61) between the pair of hook formations (53,54) to receive a mechanical locking pin (59), the pin (59) in use engaging with the stop member (20) so that the working implement (50) is retained relative to the device (10) even if the latch member (24) is moved to its unlatched position.

6. A device (10) according to any preceding claim 1 characterised in that the housing (15) comprises a pair of spaced side plates (11,12) and the means for securing the housing to the working arm comprises openings (16,17) in the spaced side plates (11,12) to receive connecting elements (P1,P2) by which the device (10) may be secured to the working arm (18a,18b) and wherein a plane containing the centres of the openings (16,17) is spaced a minimum distance from the latch member (24).

7. A device (10) according to any preceding claim characterised in that the housing (15) comprises a recess (56) to receive a projecting formation (51) of the working implement (50), the projecting formation (50) being spaced from the receiving means (53,54) for the latch member (24) and the recess (56) of the housing (15) opening in a direction facing generally away from the latch member (24).

8. In combination a device (10) according to any one of claims 1 to 7 and a working implement (50).

9. A loading and/or excavating machine having at least one working arm (18a,18b), and an implement (50) secured to the working arm (18a,18b) by a device (10) according to any one of claims 1 to 7.

10. A working implement (50) adapted to be retained relative to a device (10) according to any one of claims 1 to 7.

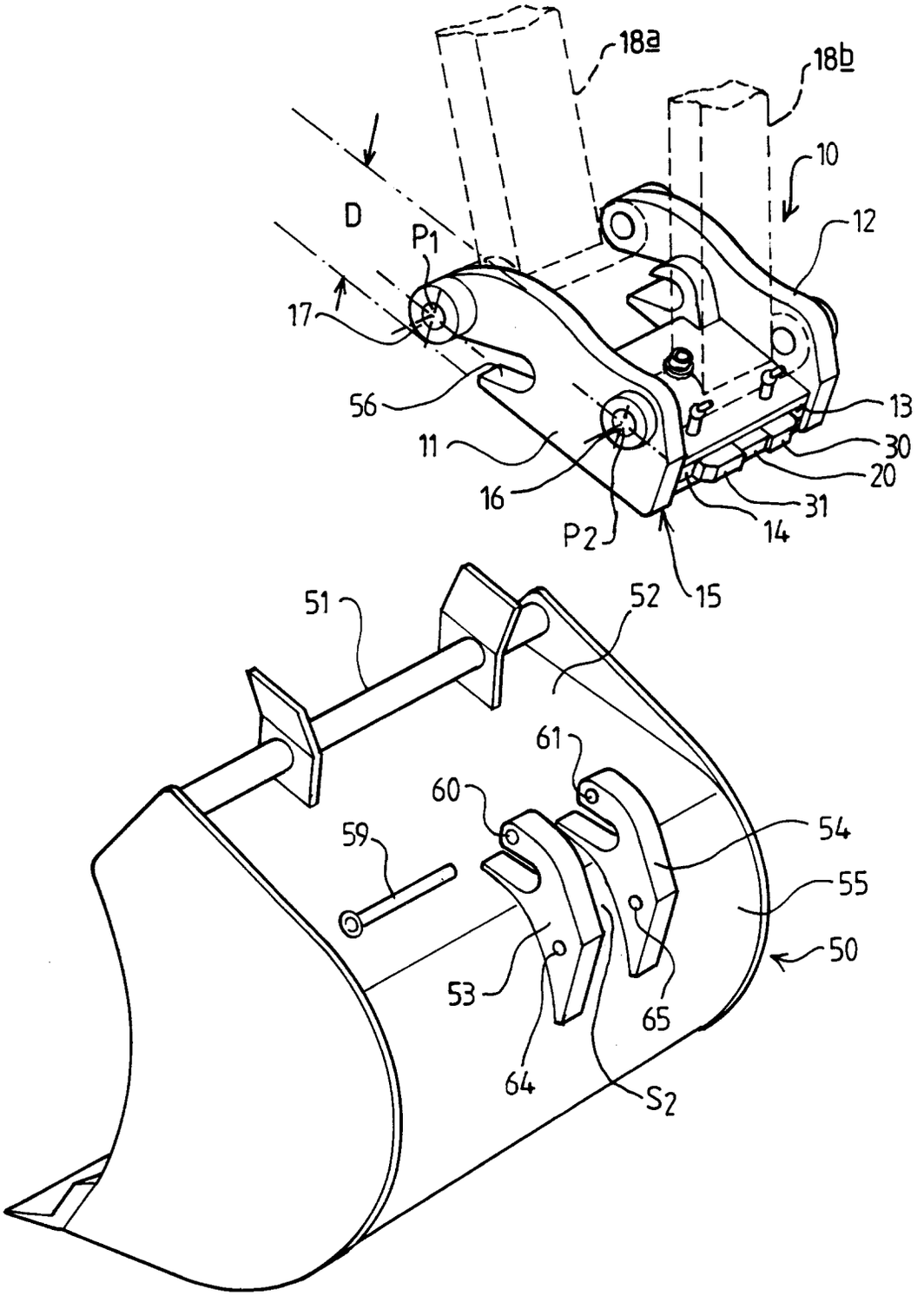

18a
18b
10
D
P1
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11
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64
S2

FIG 1

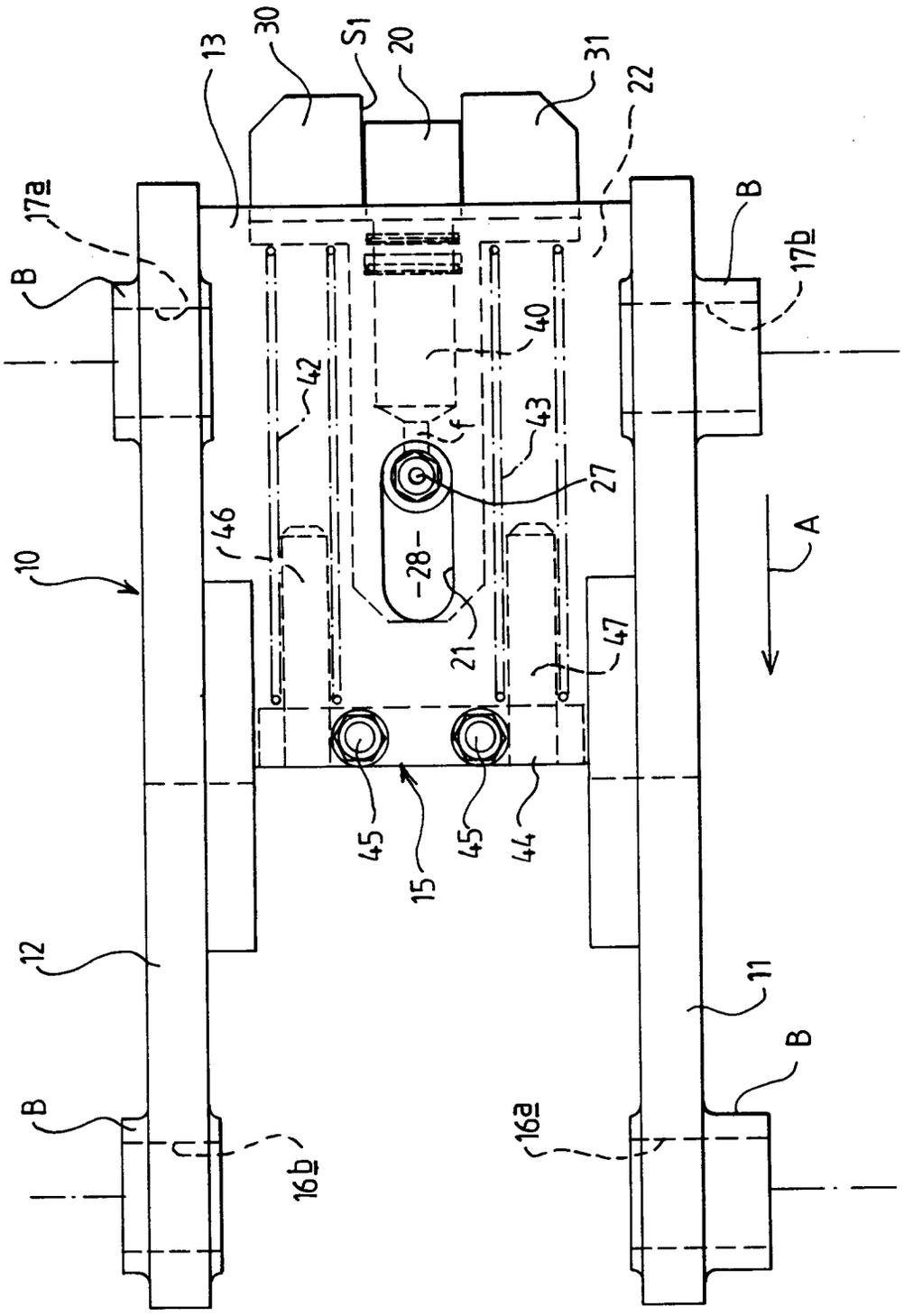

13
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17b
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16b
16a

FIG 2

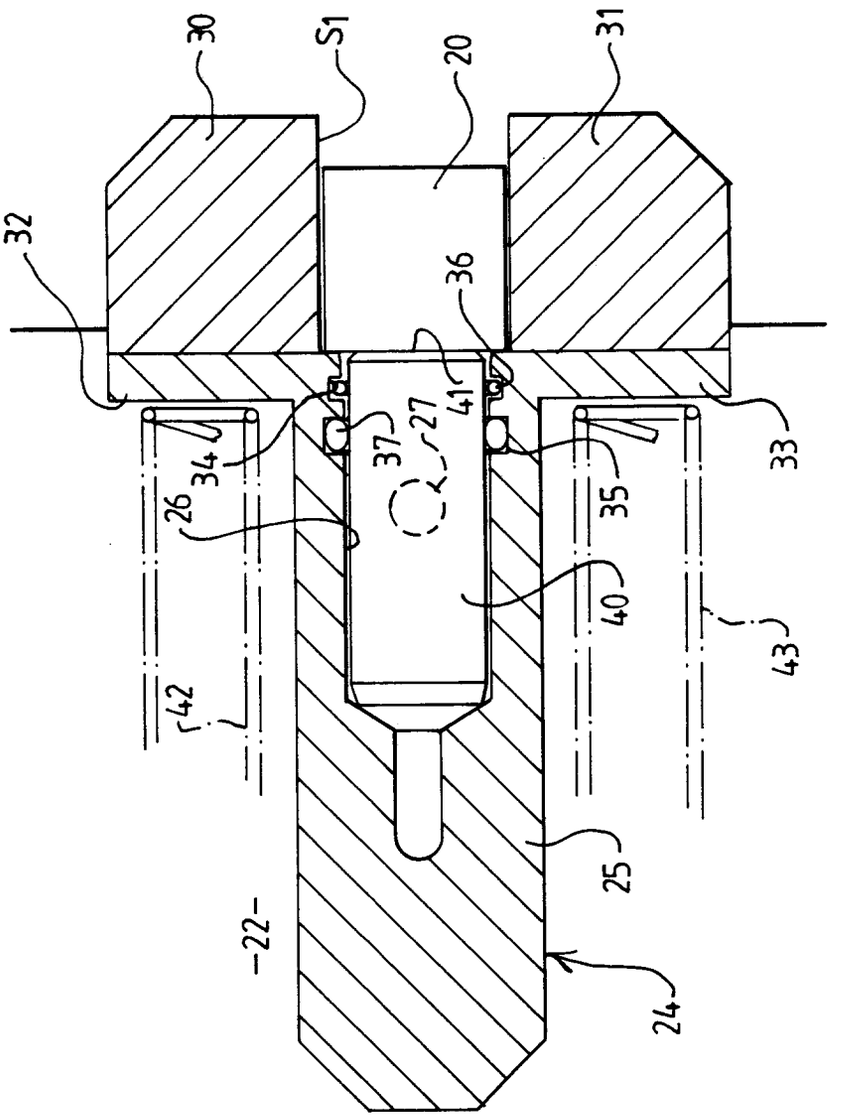


FIG 3

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 95 10 1276

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
A	EP-A-0 273 828 (G. PONCIN) * the whole document * ---	1-10	E02F3/36
A	WO-A-83 03629 (TOGA SYSTEM AB) * the whole document * -----	1-10	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

E02F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	11 May 1995	Estrela y Calpe, J

CATEGORY OF CITED DOCUMENTS

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