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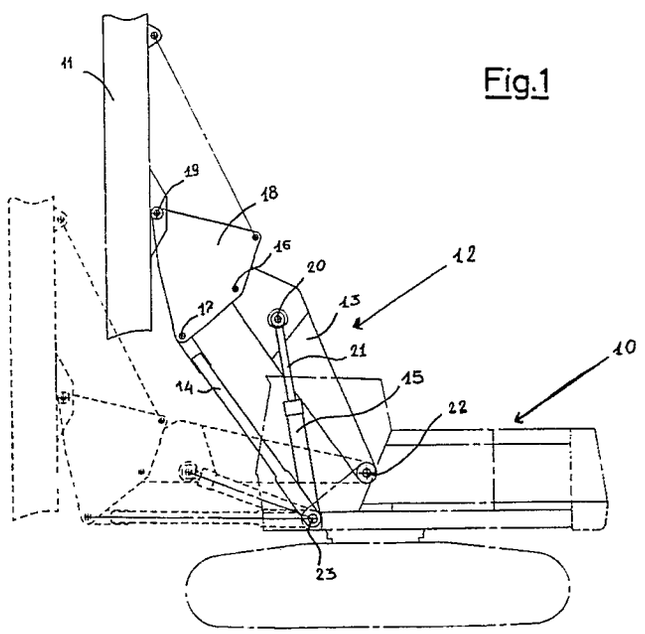
(54) A linkage system for making an equipment translate parallely to itself, such equipment being carried by an excavator or by a basic machine.

(57) A linkage system (12) connects an equipment (11) and an excavator or a basic machine (10) by which such linkage is carried. The linkage is quadrilateral so as to translate said equipment (11) parallely to itself and it consists of at least one rigid element (13) connecting the machine (10) and the equipment (11) and at least one piston actuator (15) for said rigid element (13). The elements forming the linkage system (13,14,15,40) or part of them are connected with the machine (10) by no more than two separate and substantially parallel hinge axles (22,23).

Fig.1



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A LINKAGE SYSTEM FOR MAKING AN EQUIPMENT TRANSLATE PARALLELY TO ITSELF, SUCH EQUIPMENT BEING CARRIED BY AN EXCAVATOR OR BY A BASIC MACHINE.

This invention refers to a linkage system for making an equipment translate parallely to itself, such equipment being carried by an exacavator or by a basic machine. More specifically the invention refers to an articulated parallelogram linkage system connecting drilling and other similar equipments with the machine carrying them. The mast of the equipment is known to be connected with the machine by means of an articulated linkage system which makes it translate, keeping the equipment consistently parallel to its own original position.

These linkages usually consist of bars, frames and pistons combined in such a way as to keep a constant parallelism of the equipment while the geometry of the linkage changes during the various movements of the equipment.

In common systems, two axles of the hinges of the linkage plus an axle of the piston hinge are realized on the excavator or on the basic machine.

When a mass produced hydraulic machine or excavator is being used, problems arise for there are usually only two hinge points, respectively one for the movements of a boom and the other for the actuator/s. This is the typical example of a boom excavator.

It is therefore obvious that the mounting of a drilling machine equipped with a linkage system is subject to the construction of a third pivoting point on the basic machine frame. This is hard work, in that the hinge support must almost always be welded, with a consequent alteration of the basic structure of the machine.

The mounting operation on second-hand or new commercial equipped machines becomes even more complicated, in that the welding of the third hinge cannot be provided on the site and quite often requires the facilities of a good workshop.

Moreover, the need for another hinge point can cause troubles, should one ever require to reconvert the basic machine to its original function.

Another drawback can be the fact that such a connection can alter the properties of the frame on which it is welded, making it weaker or at least making the original structure less reliable as a whole.

The purpose of this invention is to obviate the above mentioned drawbacks by proposing a linkage system allowing to keep the structure of new or existing multi-purpose commercial machines unvaried, as two hinging points are sufficient to carry the equipment.

For these and for other purposes which will be better understood further on, this invention proposes to realize a linkage system connecting an equipment and an excavator or a basic machine by which such linkage is carried, characterized in that the linkage is quadrilateral so as to translate said equipment parallely to itself; the linkage consisting of at least one rigid connecting element between the machine and the equipment and at least one piston-like actuating element for said rigid element; the elements forming the linkage system or part of them being connected with the machine along no more than two separate and substantially parallel hinge axles.

We are now going to describe the subject of the invention referring to a few configurations which are, however, of equivalent validity, as being based on the same innovating principle.

Fig. 1
is the side view of the machine with an equipment and a linkage system according to this invention in a first configuration and with the equipment shown in two different operating positions.

Fig. 2
is a sectional view of the linkage of fig.1 illustrating some top-view details.

Figs. 3, 4 and 5
are views like fig. 1 of three further configurations of the linkage system according to this invention.

First of all, reference is made to the configuration illustrated in figs. 1 and 2.

A basic machine 10 carries a drilling equipment generally indicated by 11, which is moreover connected to the basic machine 10 by means of a linkage 12 that allows the equipment 11 to translate parallely to itself, as shown clearly by the figures.

We point out that we always refer to single parts as they are side-view represented, but obviously each part that is described is intended to have an equivalent side-mounted part so as to provide stability and reliability to the whole structure. Linkage 12 consists of a rigid boom 13, a rigid bar 14 and a piston 15. Boom 13 and bar 14 are hinged respectively in 16 and 17 to a frame 18, which in turn is hinged in 19 to the mast of equipment 11.

Stem 21 of piston 15 is hinged in an intermediate point 20 of boom 13.

The other end of boom 13 is hinged in 22 to the basic machine 10, while bar 14 and piston 15 are hinged along one hinge axle 23 to the same machine 10.

A preferential but not limitative configuration of this hinging system is shown by fig. 2, consisting

of two side-mounted bars 14, rigidly joined by a cross-member 24 with respective fork-extensions 25. These have their ends connected to flanges 26 of the machine 10 and to lugs 27 of two side-mounted pistons 15 that pivot on the same shaft through pins 23.

As to the configuration shown by fig. 3, the same reference numbers have been used for the parts corresponding to the ones already described in fig. 1 ; this will apply also to the other configurations, illustrated by figs. 4 and 5.

The substantial difference between the configuration of fig. 3 and that of figs. 1 and 2, is that piston 15 is now hinged in 30 to a lug 31 of boom 13, instead of being pivotally connected in hinge 23 of bar 14 ; stem 21 of piston 15 is hinged in 32 directly to frame 18 instead of boom 13.

The configuration shown by fig. 4 is different from the previous ones in that piston 15 is pivoting in 33 of a lug 34 of bar 14, while stem 21 is hinged in 20 to boom 13, as it is in the case of the embodiment shown by fig. 1.

Finally, in the configuration of fig. 5, bar 14 has been replaced by a second piston 40 therefore an ibrid solution results thereof, where: the first piston 15 as per fig. 3 is hinged in 30 to boom 13 and in 32 to frame 18; the second piston 40 is hinged with its stem 42 to boom 13 and in 23 to the machine 10, in the same way as piston 15 was hinged as per the embodiment shown by fig.1.

According to a favourite configuration, actuators 40 and 15 of fig. 5 are series connected through an incompressible fluid in such a way that if an actuator , for example 40, is expanded, the second actuator 15 is automatically forced by the first one to expand too, thus generating the parallel motion.

In all the above mentioned cases, the pivoting points of unit 12 to machine 10 are realized only along two horizontal axles 22 and 23, which, in the case of an existing machine such as a commercial excavator , are the hinging points provided for the attachment of the equipment that can be mounted on the machine. Consequently, the machine does not require any supplementary adapting parts, such as brackets to be welded on for extra hinge axles.

Should the machines be new, of course, the solution herein proposed by this invention allows to realize them in a simple way from the beginning, that is with only two hinge axles, as is normally required for all traditional equipments designed for being mounted on this kind of machines.

Claims

1. A linkage system (12) connecting an equipment (11) and an excavator or a basic machine (10) by which such linkage is carried, characterized in that the linkage (12) is quadrilateral so as to translate said equipment (11) parallely to itself; the linkage consisting of at least one rigid element (13) connecting the machine (10) and the equipment (11) and at least one piston-like actuating element (15) for said rigid element (13); the elements forming the linkage system (13,14,15,40) or part of them being connected with the machine (10) along no more than two separate and substantially parallel hinge axles (22,23).

2. A linkage system according to claim 1 characterized in that it is formed by a rigid boom (13) and a rigid bar (14) hinged to their ends respectively (16,17) to a frame (18), in turn hinged (19) to the equipment (11) and to said hinge axles (22, 23,) of the machine (10).

3. A linkage system according to claim 2 characterized in that the actuating element (15) is hinged on one end (20) to boom (13) and on the other end to the hinge axle (23) of bar (14) on the machine (10).

4. A linkage system according to claim 2 characterized in that the actuating element (15) is hinged on one end (32) to the frame (18) and on the other end (30) along boom (13).

5. A linkage system according to claim 2 characterized in that the actuating element (15) is hinged on one end (20) along boom (13) and on the other end (33) along the bar (14).

6. A linkage system according to claim 1 characterized in that it is formed by a rigid boom (13) and by two actuating elements (15, 40); boom (13) being hinged on one end (16) to the frame (18) and on the other end to one of the hinge axles (22) of the machine, one of the actuating elements (15) being hinged (32) respectively to the frame (18) and along boom (13) and the other one (40) being hinged (41) along boom (13) and to the second of the hinge axles (23) of the machine; the actuating elements (15,40) being series connected to one another by an incompressible fluid in such a way that, if one of the actuating elements is expanded, the second actuating element is forced by the first one to expand and viceversa, generating the parallelogram system.

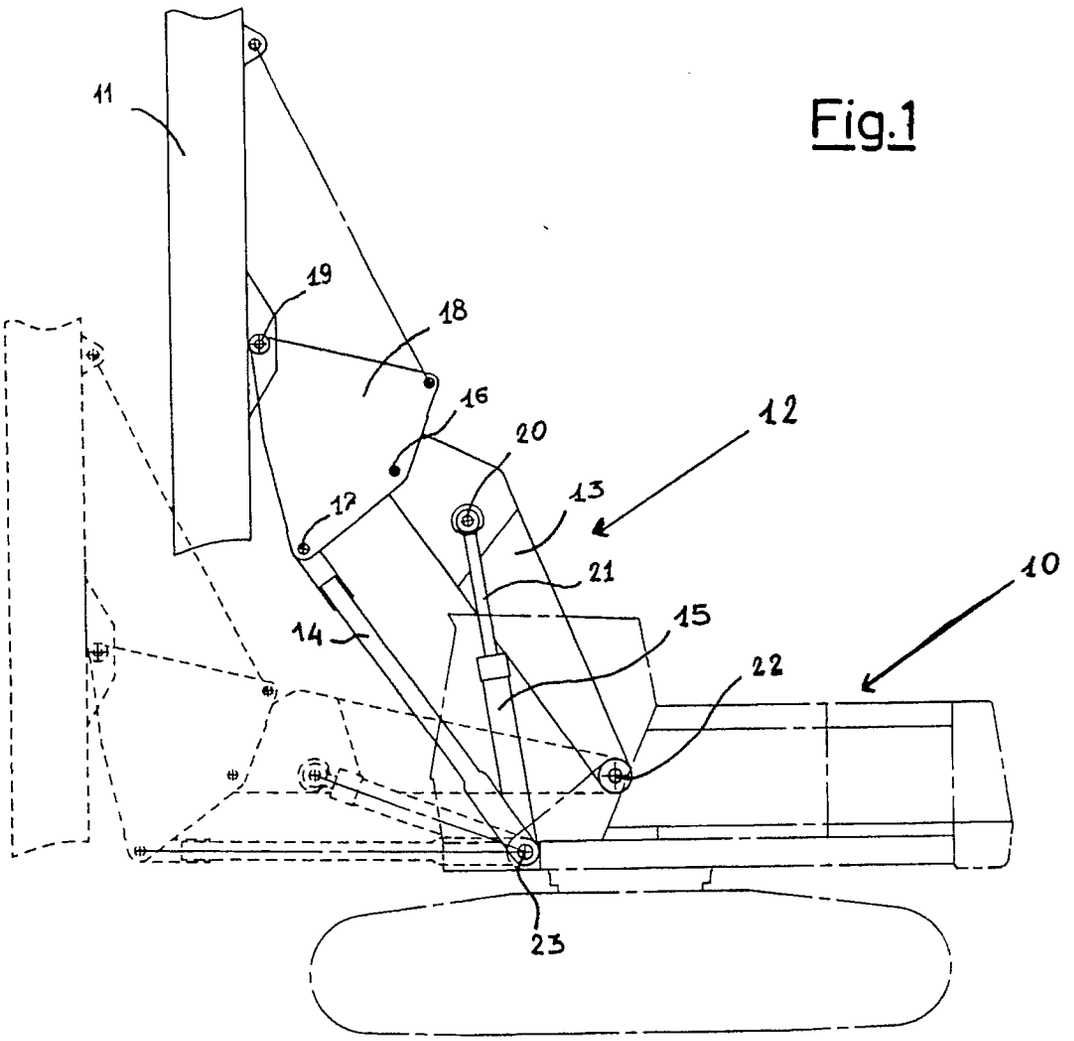
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Fig.1

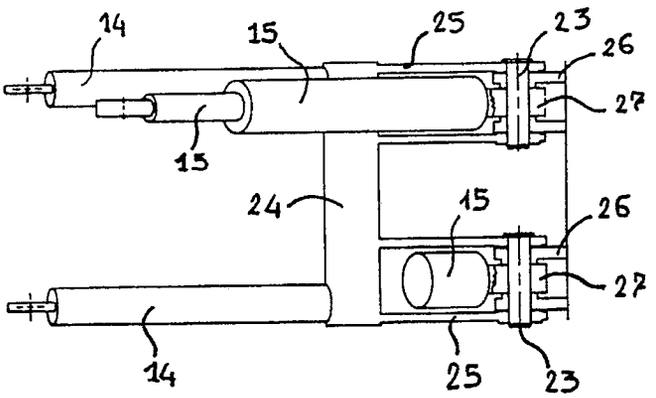
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Fig.2

Fig.3

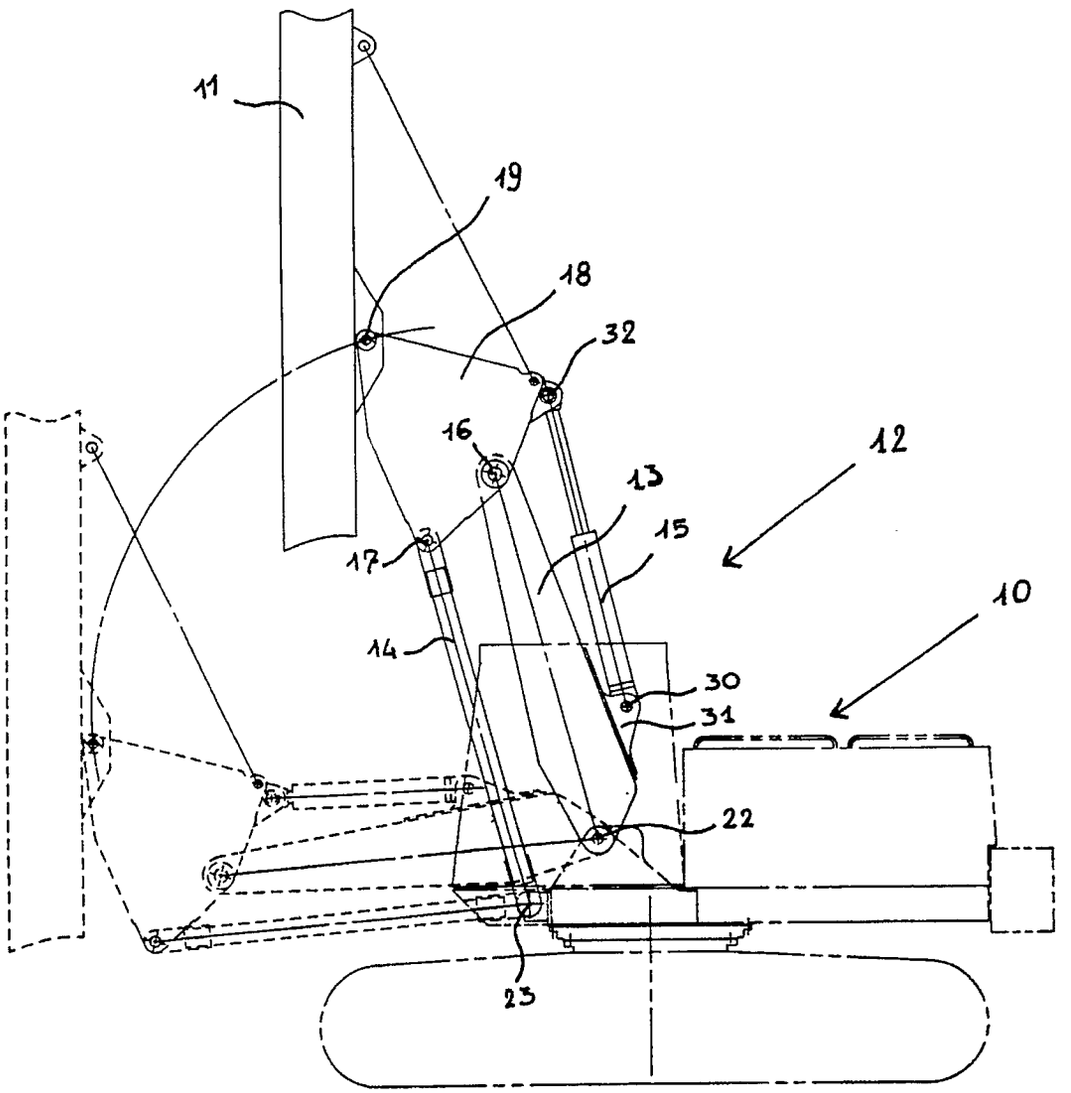


Fig.4

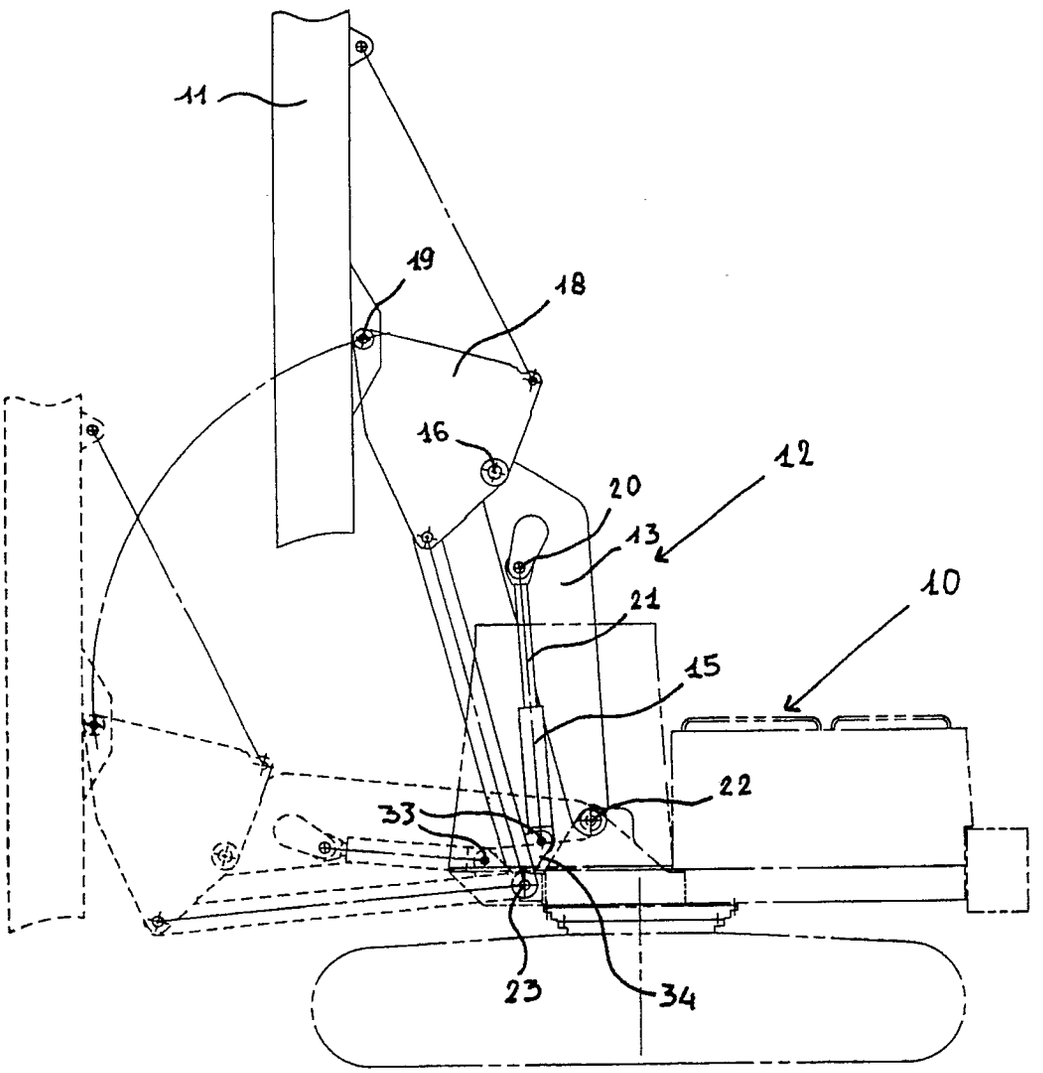
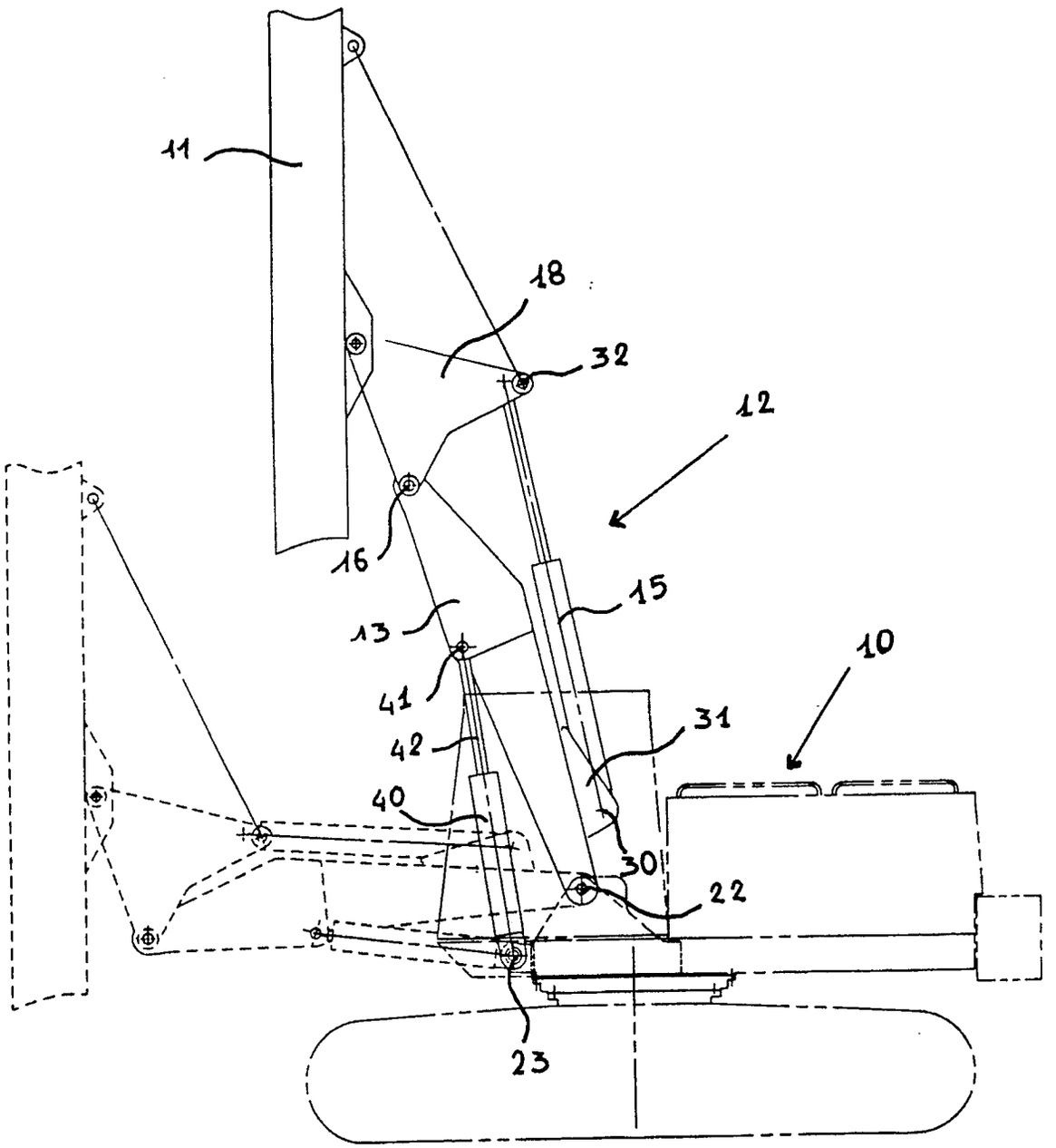


Fig.5



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EUROPEAN SEARCH REPORT

Application Number

EP 90 12 4091

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.5)
X	US-A-4 103 791 (ULLMANN) * Claims 1-8; figures 1-13 *	1	E 02 F 3/34 E 02 F 3/38
A		2-6	E 02 F 9/14
A	FR-A-2 537 183 (KOLLMANN et al.) * Figures 1,2 *	1,2	
A	US-A-4 364 705 (SHUMAKER) * Abstract; figures 1-3 *	1	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

E 02 F

The present search report has been drawn up for all claims

Place of search	Date of completion of search	Examiner
The Hague	04 February 91	ANGIUS P.

CATEGORY OF CITED DOCUMENTS

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