Actuator for construction machines

An actuator (9) particularly for construction site machines, such as earth-movers, lifting machines, hydraulic work vehicles. These machines comprise a chassis (2) for supporting a cab (3) and the motor drive arranged on tracks (4a) or supported on wheels (4b) and provided with an arm or a pair of main arms actuated by at least one first piston controlled by a hydraulic circuit. The actuator consists of at least one second piston (10) with an upward force, which is interposed between the chassis (2) and the main arm (5). The second piston (10) is connected to a separate actuation circuit.
The present invention relates to an actuator, particularly for construction site machines.

Earth-movers or lifting machines or hydraulic work vehicles usually comprising a chassis for supporting a cab and the motor drive, arranged on tracks or supported on wheels, are known presently among construction site machines.

These types of machine usually comprise at least one main arm, which is actuated by a first piston or by a pair of first pistons controlled by an adapted hydraulic circuit, the main arm being in turn pivoted to a forearm and being connected thereto by way of additional hydraulic pistons, such forearm being in turn connected to a bucket or shovel that is actuated by means of additional pistons, all of which are controlled by the same hydraulic circuit.

This known type of solution substantially has the drawback of requiring, for the movement of the main arm and of the arms connected thereto, including the tools, large amounts of power, which subject the machine to considerable stresses, consequently reducing its efficiency and making work more complicated.

The aim of the present invention is to solve the noted technical problems, eliminating the drawbacks of the cited background art, by providing a device which, applied to construction site machines, makes it possible to use said machines while requiring a modest stress thereto, so as to improve their efficiency and make work easier for the operator.

Within this aim, an object of the invention is to provide a device that reduces the negative influence of the main arm on the operation of the machine.

Another object of the invention is to make it possible to contain the consumption of fuel in the machine to which it is applied.

Another object is to obtain a device that is structurally simple, has low manufacturing costs, can be provided by means of usual and known systems, and can be applied simply and rapidly to construction site machines of known type.

This aim and these and other objects that will become better apparent hereinafter are achieved by an actuator particularly for construction site machines, such as earth-movers, lifting machines, hydraulic work vehicles, which comprise a chassis for supporting a motorized cab that is arranged rotatably on tracks or supported on wheels and is provided with at least one main arm actuated by at least one first piston or cylinder controlled by a hydraulic circuit, characterized in that it is constituted by at least one second piston or cylinder with an upward force, which is interposed between said chassis and said main arm and is connected to a separate actuation circuit.

Further characteristics and advantages of the invention will become better apparent from the detailed description of a particular but not exclusive embodiment thereof, illustrated by way of non-limiting example in the accompanying drawings, wherein:

Figure 1 is a front elevation view of the actuator applied to a hydraulic excavator;
Figure 2 is a detail view of the actuator;
Figure 3 is a view of the actuator applied to another earth-mover;
Figure 4 is a front view of the actuator;
Figure 5 is a side view of the actuator applied to a construction site machine.

In the exemplary embodiments that follow, individual characteristics, given in relation to specific examples, may actually be interchanged with other different characteristics that exist in other exemplary embodiments.

Moreover, it is noted that anything found to be already known during the patenting process is understood not to be claimed and to be the subject of a disclaimer.

With reference to the figures, the reference numeral 1 designates a construction site machine, such as an earth-mover, a lifting machine, or hydraulic work vehicles of the type comprising a chassis 2 for supporting a cab 3 and the motor drive and thus containing not only the engine but also tanks for the oil and piping for the supply of the hydraulic circuits and tracks 4a or wheels 4b on which the chassis 2 is arranged or supported.

A main arm 5 is associated with the chassis 2 and is actuated by a first hydraulic cylinder or piston or by a pair of first hydraulic cylinders or pistons 6a, 6b.

The main arm 5 is a monoblock arm or a positioning arm, as shown respectively in Figures 1 and 5.

Moreover, these machines of known type have a forearm 7 provided with a bucket or shovel 8, said machine also comprising usual and known components for feeding the fluid to the various hydraulic circuits of the main arm, of the forearm and of the bucket or shovel.

The reference numeral 9 designates an actuator, which is constituted by at least one second piston or cylinder 10 that is interposed between the chassis 2 and the main arm 5.

The second piston 10 has an upward force and is further interposed, in the illustrated embodiment, between the pair of first pistons 6a, 6b.

The second piston 10 is therefore arranged approximately according to an axis 11 that is central to the lower surface 12 of the main arm 5, and an adapted lug 13 for the anchoring of the upper end of the second piston 10 protrudes from said main arm.

Such second piston is controlled by a separate circuit 14 for its actuation, which consists of an adapted duct which is connected to a tank 15 or to a plurality of cylinders 16, both of which comprise a gas or a fluid, preferably nitrogen.

The operation of the invention is as follows: during work, when the user activates the main arm 5, the actuator 9 is activated simultaneously and independent-
ly, actuating the second piston 10, which by using a different actuation circuit 14 extends itself, with the primary function of reducing the influence of the main arm 5 and of what is connected thereto, canceling its burden on the operation of the machine, thus facilitating the hydraulic operation of said machine, which can thus be used with a reduced employment of power, so as to limit the stress on said machine, improving its efficiency and making work easier.

[0022] The cylinders 16, connected to the second piston 10 by means of appropriately provided ducts, act as an accumulation system like the tank 15 and are therefore adapted to obtain a desired pressure for the activation of the second piston 9.

[0023] In practice it has been found that the invention has achieved the intended aim and objects, a device having been obtained which can be applied easily to existing construction site machines, such as excavators, loaders, lifters, and consists substantially in a new construction of the suspension, where a second cylinder 10 is added to the pair of existing first hydraulic cylinders 6a, 6b, with the primary function of reducing the influence of the main arm 5 on the operation of the machine.

[0024] Since the second cylinder 10 thus assembled ensures lighter hydraulic operation and further entails a reduced stress on the machine and best efficiency and simplifies work, fuel consumption is also reduced.

[0025] The second cylinder 10 is mounted under the main arm 5 and with the ascending force imparted by the gas contained therein it acts by eliminating the force of gravity applied to the main arm and to what is applied thereto.

[0026] The cylinders 16 are connected to the second cylinder 10 with the separate actuation circuit 14, which comprises adapted ducts through which the gas passes, and therefore they assume the function of the accumulation system (tank) for maintaining the necessary pressure.

[0027] The materials used, as well as the contingent shapes and dimensions, may of course be any according to specific requirements.

[0028] The various means for performing certain different functions naturally need not to coexist in the illustrated embodiment but can per se be present in many embodiments, including ones that are not illustrated.

[0029] The characteristics indicated as advantageous, convenient or the like may also be omitted or be replaced by equivalents.


[0031] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

1. An actuator (9) particularly for construction site machines (1), such as earth-movers, lifting machines, hydraulic work vehicles comprising a chassis (2) for supporting a cab (3) and the motor drive arranged on tracks (4a) or supported on wheels (4b) and provided with at least one main arm (5) actuated by at least one first piston or cylinder controlled by a hydraulic circuit, characterized in that it consists of at least one second piston or cylinder (10) with an upward force, which is interposed between said chassis (2) and said main arm (5) and is connected to a separate actuation circuit.

2. The actuator (9) according to claim 1, characterized in that it consists of at least one second piston or cylinder (10) and is arranged approximately along a central axis (11) with respect to the lower surface (12) of said main arm (5).

3. The actuator (9) according to claims 1 and 2, characterized in that an adapted lug (13) protrudes from said main arm (5) for the anchoring of the upper end of said second piston or cylinder (10).

4. The actuator (9) according to claims 1 and 3, characterized in that said second piston or cylinder (10) is controlled by a separate circuit (14) for its activation.

5. The actuator (9) according to claims 1 and 4, characterized in that said separate circuit (14) consists of an adapted duct, which is connected to a tank (15) or to a plurality of cylinders (16), both of which comprise a gas or a fluid.

6. The device according to claims 1 and 5, characterized in that said tank (15) or said cylinders (16) contain nitrogen.

7. The device according to claims 1 and 6, characterized in that simultaneous and independent activation of said at least one second piston (10) occurs upon activation of said main arm (5).

8. The actuator (9) according to claim 1, characterized in that it consists of at least one second piston or cylinder (10) arranged approximately along a central axis (11) with respect to the lower surface (12) of said main arm (5) and interposed between a pair of first hydraulic cylinders or pistons (6a, 6b), which are interposed between said chassis (2) and said main arm (5).
Fig. 2
## DOCUMENTS CONSIDERED TO BE RELEVANT

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<th>Category</th>
<th>Citation of document with indication, where appropriate, of relevant passages</th>
<th>Relevant to claim</th>
<th>CLASSIFICATION OF THE APPLICATION (IPC)</th>
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For more details about this annex: see Official Journal of the European Patent Office, No. 12/82
REFERENCES CITED IN THE DESCRIPTION

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