(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 798 162 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
01.10.1997 Bulletin 1997/40

(51) Int Cl.[6]: **B60P 1/50**, E02F 3/64, E02F 3/348

(21) Application number: **97830136.4**

(22) Date of filing: **24.03.1997**

(84) Designated Contracting States:
AT BE CH DE ES FR GB LI NL PT

(30) Priority: **29.03.1996 IT BO960177**

(71) Applicant: **HS PENTA SRL**
48018 Faenza (Ravenna) (IT)

(72) Inventor: **Morozzi, Vincenzo**
48014 Castel Bolognese (RA) (IT)

(74) Representative: **Lanzoni, Luciano**
c/o BUGNION S.p.A.
Via Cairoli, 107
47037 Rimini (Forli) (IT)

(54) Self-loading vehicle with loading arm

(57) A self-loading vehicle with loading arm, comprising a lower chassis (4), a dump body (7) for collecting materials and at least one arm (3) for supporting a tool (2), in which, between the latter two devices, is interposed a connection mechanism (1) able to provide the tool (2) with the capability to rotate with respect to the arm (3). The self-loading vehicle (20) also comprises a swinging door (8) of reduced height, hinged to the front end of the dump body (7) to increase the operator visibility, as well as a quick coupling-uncoupling device (6), able to simplify tool (2) replacement operations, and to enhance the flexibility of employment of the invention [Figure 1].

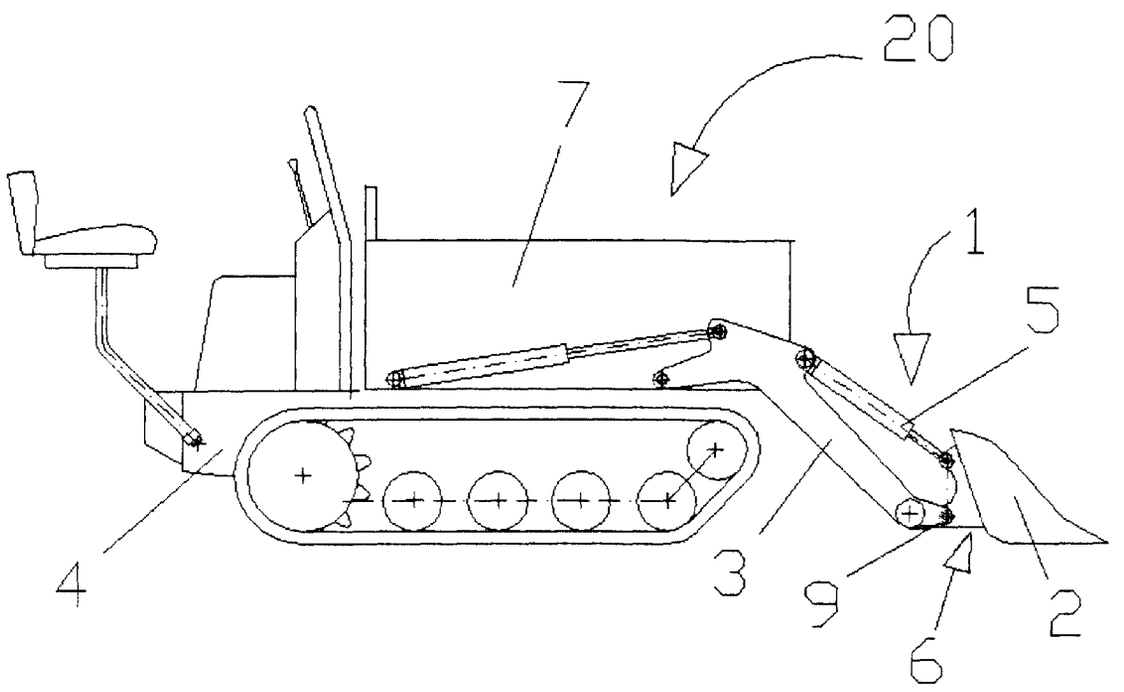

FIG. 1

EP 0 798 162 A2

Description

The present invention relates to a self-loading vehicle with loading arm. Powered mechanical vehicles, used to transport various materials in construction sites, are usually loaded manually or with the help of a second powered vehicle (almost always an excavator or a front loader). More recently, to make these vehicles intrinsically autonomous, they have been fitted with auxiliary equipment, such as buckets and loading arms, with one degree of freedom with respect to a dump body (or flatbed) used to collect the material.

With particular reference to tracked mini-carriers, both those solutions which entail loading means fastened to the load-bearing chassis, and others in which they are fastened to the dump body collecting the material are known. The basic structure of these vehicles is almost always the same: a metalwork load-bearing chassis is moved by tracks or wheels; to its upper surface, by means of pins, is fastened a dump body, which can be moved by the extension of a hydraulic cylinder.

Mini-carriers in which the loading means are fastened directly to the dump body have the advantage of automatically solving the problem of the mechanical interference between the bucket and the dump body when loading. However, the stress transmission system causes wear in the pins and results in backlash which can jeopardise the correct operation of the machine, greatly shortening its useful working life. Moreover, the structure of the vehicle forces the operator to stay in the erect position when the vehicle moves, as otherwise he would not be able to see the area where the tool is working.

Mini-carriers whose loading arms are fastened to the lower chassis have better structural strength than the others and can employ lighter dump bodies, which may be obtained by pressing. However, since in the course of unloading the dump body needs to rotate clockwise and the tool must not interfere with its travel, these mini-carriers have been provided with a rather complex and cumbersome hydraulic device which regulates the motion of both dump body and tool.

In the two cases described, lastly, the rigidity of the self-loading device and its poor suitability for being associated with other tools greatly limit the scope for using these powered vehicles.

The purpose of the present invention therefore is to eliminate the drawbacks just mentioned. The invention, as it is characterised by the claims, solves the problem of providing the tool in use with one degree of freedom with respect to the arm which supports it.

One of the advantages obtained through the present invention essentially consists of the fact that the potential of these powered vehicles is greatly enhanced, so they are much better suited to be combined to several tools with no need for laborious fitting operations.

In their most typical use, in which they are associated to a bucket, an important advantage stems from the fact that the latter may be used with several other functions as well: for instance, as an excavator, to fill trenches or, by reducing bumps, to ease travel over uneven or stepped terrains.

Lastly, the invention allows to maintain a good view of the area where the tool is working even when the operator sits in the driver seat.

The invention is described more in detail below, with the aid of drawings representing an embodiment provided purely by way of non limiting example, in which:

- Figure 1 provides a side view depiction of the invention;
- Figures 2 and 3 illustrate a side view of the invention according to two alternative preferred embodiments;
- Figure 4 illustrates the invention combined with a different tool;
- Figure 5 illustrates the invention in a front prospective view;
- Figure 6 illustrates a detail of the invention in a side view and in an exploded view.

As can be observed in the figures, the present invention relates to a self-loading vehicle with loading arm, of the type comprising a lower chassis (4), a body (7) for the collection of materials and at least one arm (3) for supporting a tool (2).

The invention provides for the presence of a connecting mechanism (1) interposed between the arms (3) and the tool (2), able to give the latter the ability to rotate with respect to the arms (3). In the illustrated embodiment, this mechanism (1) comprises a pair of extendible cylinders (5), hinged at their ends to the arms (3) and to the tool (2), and a pair of hinges (9) also constraining the arms (3) and the tool (2), so that the latter can assume an arbitrary inclination with respect to the arms (3).

The greater versatility of the machine thus obtained, depicted by way of example in Figure 4 associated with a hydraulic hammer, enhances the value of using a quick coupling-uncoupling device (6) able to simplify tool (2) replacement operations. In the embodiment illustrated by way of example in Figure 6, such device (6) comprises a plate (12) which can be securely made fast to the connection mechanism (1) and fitted with means (13) for coupling it to a tool (2). These coupling means (13) in turn comprise a cross bar (14), able to intercept at least a pair of corresponding hooks (15) of the tool (2), and a latch (16), able to secure a slot (17) of the tool (2), protruding from its rear surface. Operationally, with the tool (2) on the ground, the cross bar (14) is inserted under the hooks (15) and then raised and possibly rotated to let the latch (16) interfere with the slot (17). The latch (16) can be shut manually as well as with a remote control (18), so the operator can control it with the vehicle (20) in motion and remaining in the driver seat.

With particular reference to the use of the self-loading vehicle (20) in association with a tool (2) comprising

a bucket, it should be stressed that, as can be observed in Figures 2 and 3, important advantages are provided by fitting the invention with at least one wheel (10), with the axis (11) fixed with respect to the tool (2) during moves, able to ease the movement of the self-loading vehicle (20) on steps or steep terrains.

The embodiment depicted in Figure 2 shows a pair of wheels (10) fitted to the tool (2) in correspondence with the mechanism (1) providing connection to the arm (3): it is particularly advantageous in the case of moderate differences in level, since it allows to keep the tool (2) operating even in the course of moves. As is shown, by virtue of the degree of freedom provided the tool (2), it is possible to let the wheels (10) come in contact with the ground rotating the tool (2) itself counter-clockwise and lowering the arm (3). In case of greater differences in level, it is instead advantageous to adopt the solution shown in Figure 3, in which the same pair of wheels, or possibly a second one, is fitted to the tool (2) in correspondence with its front end, to obtain a support extension for the machine of the maximum possible length. The possibility of associating to the tool (2) at least a pair of wheels (10) which can move between its ends or along the connecting mechanism (1), and which can, as an alternative, be made fast thereto, provides the self-loading vehicle (20) with the utmost flexibility to meet diverse requirements.

From the front view provided in Figure 5, lastly, it is possible to note the presence of a swinging door (8) hinged at the front end of the dump body (7) and kept in the vertical position, during transport, by two hooks (19) which open automatically when the dump body (7) is lifted, allowing the material contained inside it to be off-loaded. The upper edge of the swinging door (8) is lower than the edge of the dump body (7), so that its reduced size can provide the operator with a better visibility. In a preferred embodiment, as illustrated, the swinging door (8) comprises an upper part (8a) made up of a grid, particularly useful in case of transport over very steep terrain, as it allows for a better containment of the transported material without jeopardising the operator ability to see the tool (2).

Additional uses to which the invention associated to a bucket can be advantageously applied can pertain to the excavation and filling of trenches and handling accumulations of material. Other tools which can easily be associated to it are the hydraulic hammer, whose tip can be oriented arbitrarily, a catenary trench digger, usable with reverse movements and optimising the angle of the equipment with respect to the terrain, snow blowers and snow ploughs.

The invention thus conceived can be subject to numerous modifications and variations without thereby departing from the scope of the inventive concept. Moreover, all components may be replaced with technically equivalent elements.

In practice, modifications and/or improvements are clearly possible without thereby departing from the scope of the following claims.

Claims

1. Self-loading vehicle with loading arm, of the type comprising a lower chassis (4), a dump body (7) for the collection of materials and at least one arm (3) for supporting a tool (2), characterised in that it comprises a connecting mechanism (1), interposed between the arm (3) and the tool (2), able to provide the tool (2) with the capability to rotate with respect to the arm (3).

2. Self-loading vehicle with loading arm, of the type comprising a lower chassis (4), a dump body (7) for the collection of materials, provided with a swinging door (8) hinged at the front end of said dump body (7), and at least one arm (3) for supporting a tool (2), characterised in that said swinging door (8) for opening the dump body (7) has reduced size, in order to provide the operator with greater visibility.

3. Self-loading vehicle according to claim 1, characterised in that it comprises a quick coupling-uncoupling device (6), able to simplify the replacement of the tools (2).

4. Self-loading vehicle according to claim 1, characterised in that the connecting mechanism (1) comprises at least one extendible hinged cylinder (5) and a hinge (9) constraining between them the arm (3) and the tool (2), so that the tool (2) can assume an arbitrary inclination with respect to the arm (3).

5. Self-loading vehicle according to claim 1, characterised in that it comprises at least one wheel (10) with an axis (11) fixed with respect to the tool (2) when the vehicle is moved, able to ease the movement of the self-loading vehicle (20) over steps or steep terrains.

6. Self-loading vehicle according to claim 2, characterised in that said swinging door (8) comprises an upper part (8a) made up of a grid.

7. Self-loading vehicle according to claim 3, characterised in that said quick coupling-uncoupling device (6) comprises a plate (12) which can be securely fastened to the connecting mechanism (1), fitted with coupling means (13) for a tool (2).

8. Self-loading vehicle according to claim 5, characterised in that it comprises at least one pair of wheels (10), which can be secured in an irremovable manner to the tool (2) in correspondence with its front end, in such a way as to maximise the differences in levels which can be overcome.

9. Self-loading vehicle according to claim 5, characterised in that it comprises at least one pair of wheels (10) which can be made fast to the tool (2) in correspondence to the connecting mechanism (1), to aid its motion keeping the tool (2) operational during moves.

10. Self-loading vehicle according to claim 5, characterised in that it comprises at least one pair of movable wheels (10), which can be secured either to the tool (2) or to the connecting mechanism (1).

11. Self-loading vehicle according to claim 7, characterised in that the coupling means (13) comprise a cross bar (14), able to intercept at least a pair of corresponding hooks (15) of the tool (2), and a latch (16), able to secure a slot (17) of the tool (2).

12. Self-loading vehicle according to claim 11, characterised in that the latch (16) can be activated with a remote control (18), in such a way as to allow the operator to control it even when the vehicle (20) is inmotion.

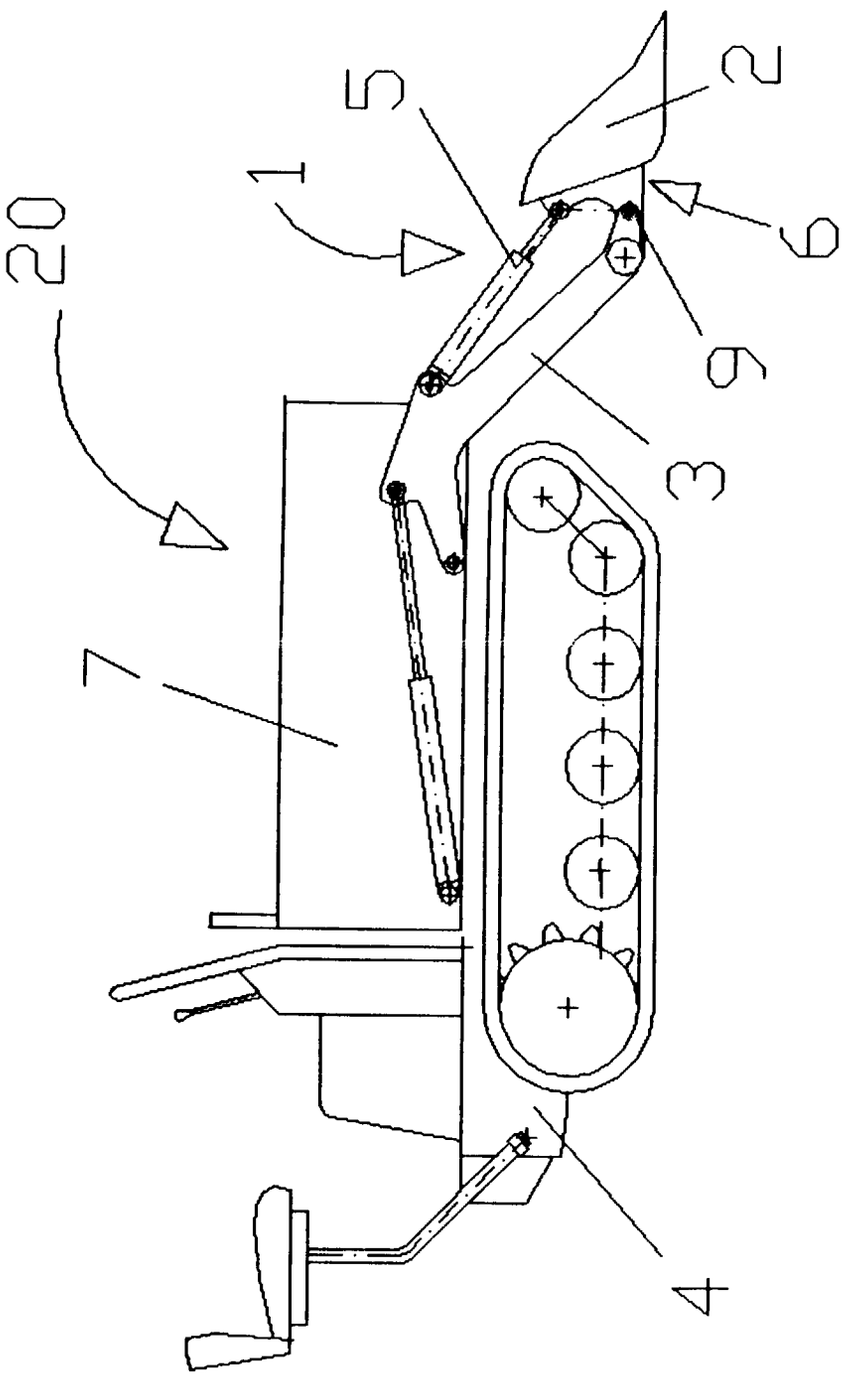

FIG. 1

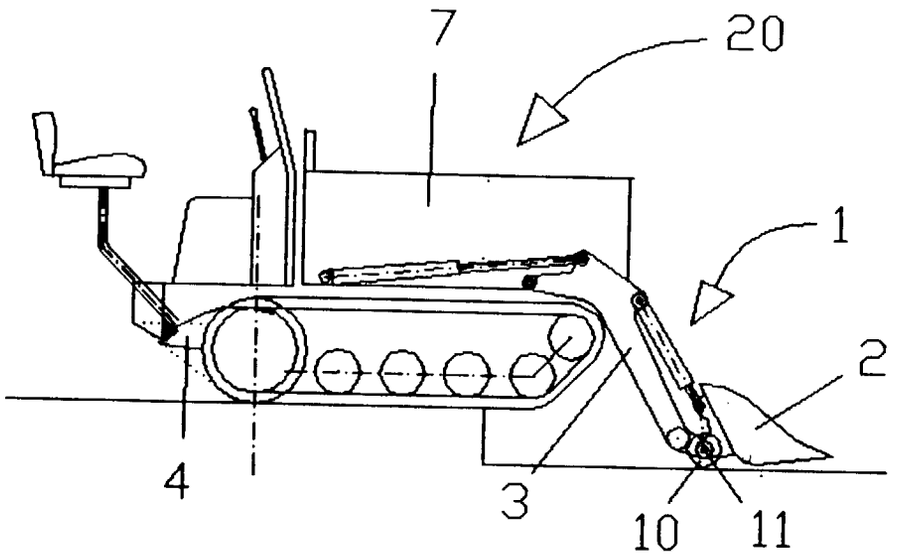

FIG. 2

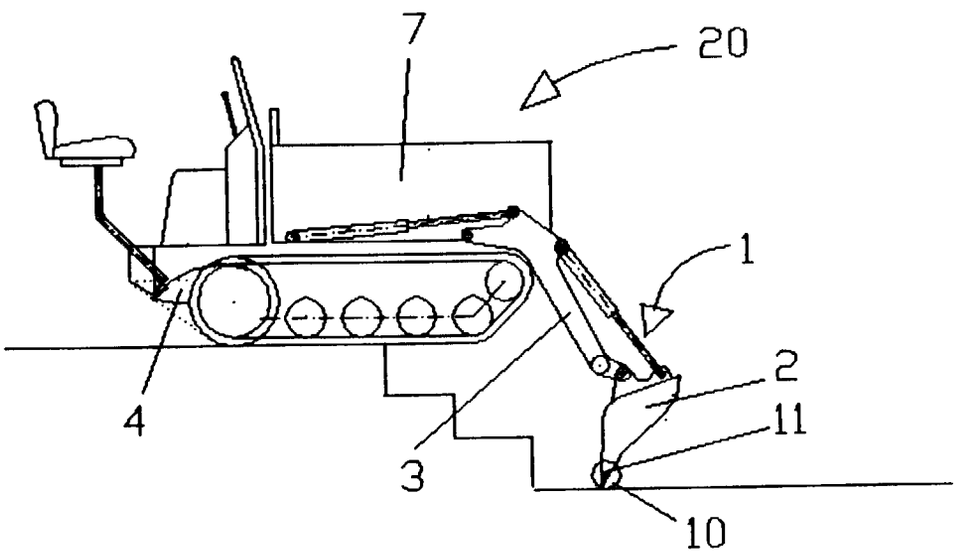

FIG. 3

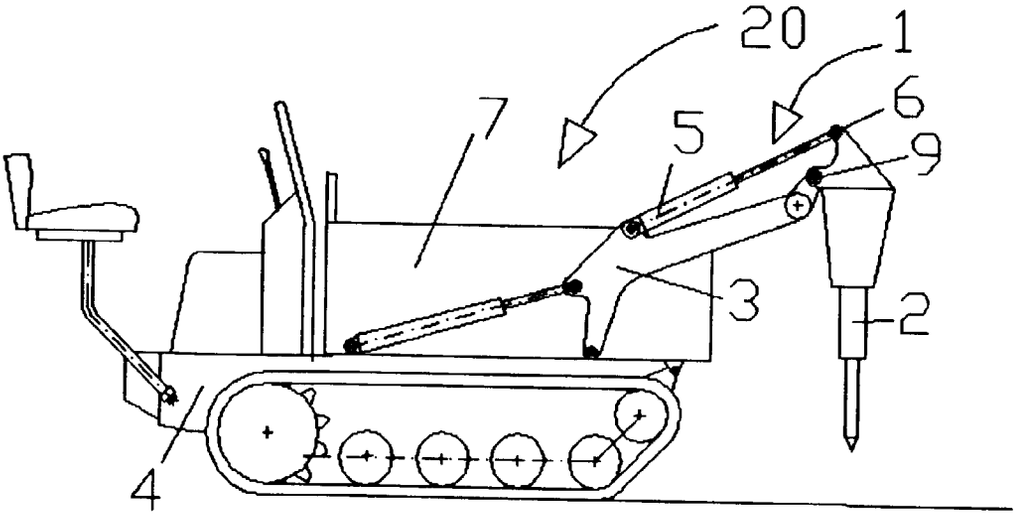

FIG. 4

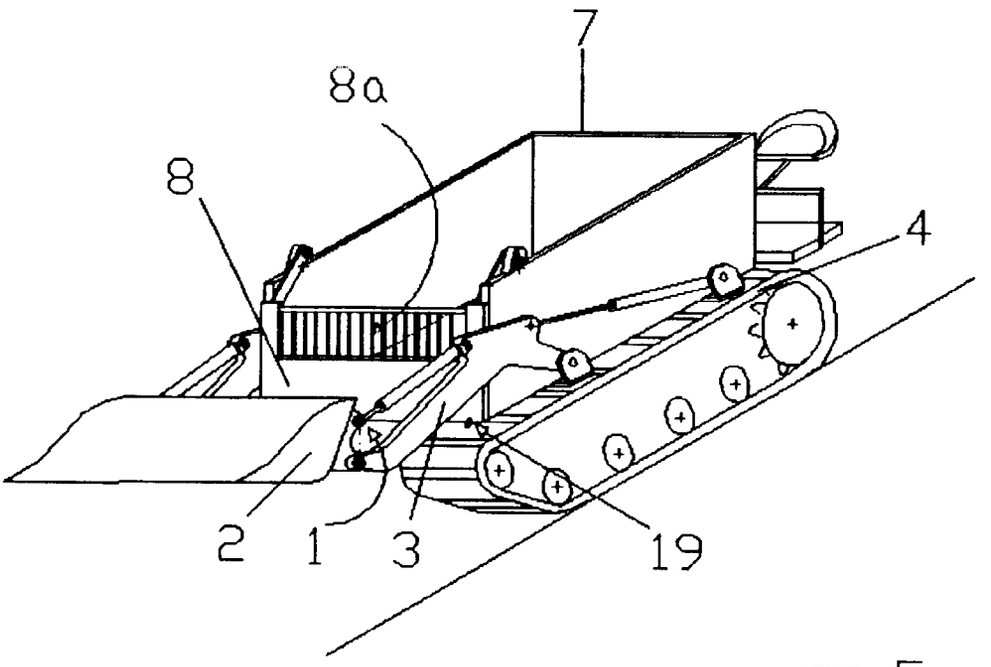

FIG. 5

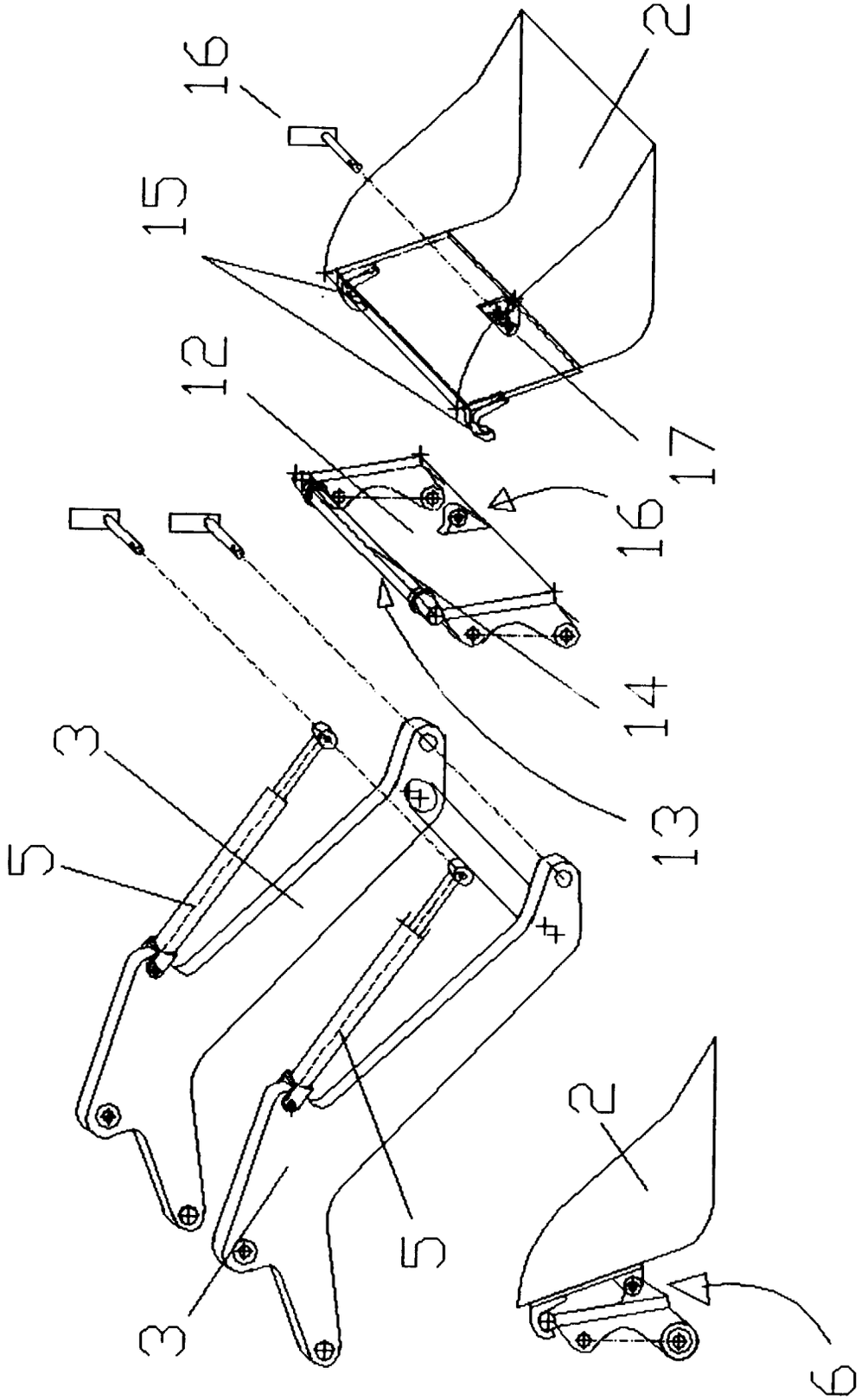

FIG. 6