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(54) **Earth moving machine**

(57) An earth moving machine (10) having:

- a drive unit (11);
- a dump body (13); and

- a bucket (29) for loading the body (13);

the earth moving machine (10) having a lifting device (12) for lifting the body (13) fitted with the bucket (29).

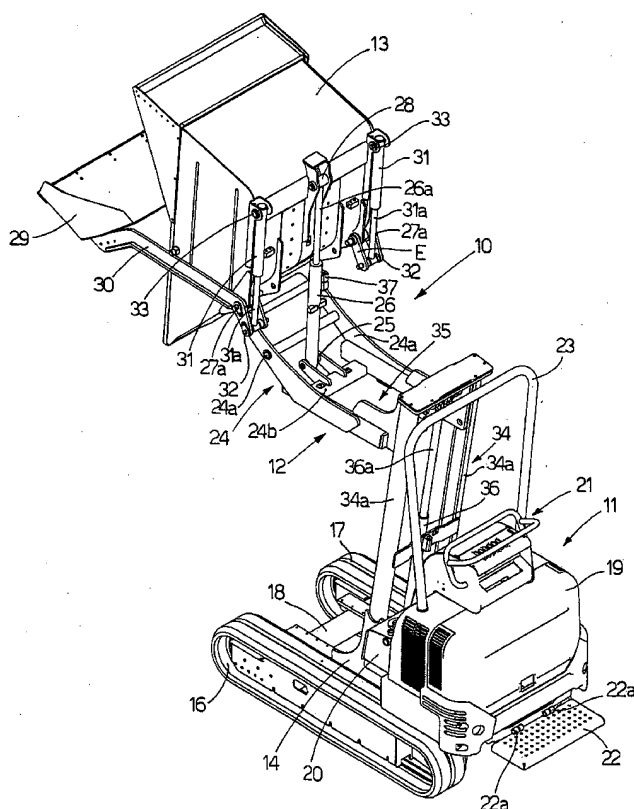


Fig.1

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Description

[0001] The present invention relates to an earth moving machine of the type commonly known as a "mini-dumper", for loading and transporting materials, in particular building materials such as sand, gravel, etc.

[0002] A minidumper normally comprises:

- a drive unit, almost always crawler-mounted, with rear drive and control levers worked by an operator standing on a platform at the rear of the drive unit; and
- a dump body fitted to a carriage on runners fixed to the drive unit, and equipped with hydraulic means for tipping the body with respect to the drive unit to dump the material from the body.

[0003] In one known embodiment, arms for operating a body loading bucket are hinged to the dump body, and each bucket operating arm is activated by a respective hydraulic actuator controlled by the operator using the rear drive and control levers.

[0004] Though advantageous in many respects, minidumpers of this type have the drawback, when loading a truck body for example, of having to dump the loose material from the minidumper alongside the truck, and then reload it onto the truck body by hand, or using a power shovel or some such device other than the minidumper used to transport the material.

[0005] Obviously, dumping the loose material from the minidumper and then reloading it onto the truck body makes for a considerable increase in building material handling time and cost.

[0006] It is an object of the present invention to eliminate the aforementioned drawback by providing a minidumper type earth moving machine as claimed in Claim 1.

[0007] A non-limiting embodiment of the present invention will be described by way of example with reference to the accompanying drawings, in which:

Figure 1 shows a first three-dimensional view of a minidumper in accordance with the present invention;

Figure 2 shows a second three-dimensional view of the minidumper according to the present invention; Figure 3 shows the Figure 1 and 2 minidumper with a body lifting device detached from the drive unit;

Figure 4 shows a body lifting mechanism;

Figure 5 shows larger-scale details of the Figure 4 lifting mechanism;

Figure 6 shows a side view of the Figure 1 and 2 minidumper scooping up loose material at ground level by means of a bucket operated by two arms operated by hydraulic actuators;

Figure 7 shows a side view of the Figure 6 minidumper unloading the loose material from the bucket into the body;

Figure 8 shows a side view of the Figure 6 minidumper once the body loaded with loose material is raised;

Figure 9 shows a side view of the Figure 6 minidumper unloading into a truck body, with the minidumper body at maximum off-ground height.

[0008] Number 10 in Figures 1, 2 and 3 indicates a minidumper in accordance with the invention.

[0009] Minidumper 10 comprises a drive unit 11, and a lifting device 12 for lifting a body 13; device 12 being fitted to drive unit 11 by means of two side flanges 14 and 15 and bored plates A and B (Figure 2) using conventional systems not shown (see Figures 2 and 3).

[0010] Drive unit 11 comprises two tracks 16 and 17, on which is mounted a supporting structure 18 supporting an engine assembly 19 having a fuel tank 20a, a hydraulic oil tank 20b (Figure 2), and a control panel 21 comprising a number of levers for driving minidumper 10 and operating the various body 13 devices described in detail later on.

[0011] Engine assembly 19 is fitted in known manner at the rear with a platform 22, which pivots on two hinges 22a, and on which the operator (not shown) stands to drive minidumper 10 and/or operate the various devices from panel 21.

[0012] A U-shaped bar 23 is fitted integrally to the fixed cowling supporting structure D to protect the operator standing on platform 22.

[0013] As shown in Figures 1-3, body 13 is fitted to a fork-shaped supporting structure 24 comprising two side members 24a joined by a rear plate 24c (Figure 2) and by a cross member 24b, to which a hydraulic actuator 26 for tipping body 13 is hinged by a pin 25. Body 13, in fact, is hinged by two pins 37 to the ends of the two side members 24a of supporting structure 24, while hydraulic actuator 26, in addition to being hinged, as stated, by pin 25 to cross member 24b, is also hinged to the bottom of body 13 by a hinge 28 (Figure 1).

[0014] As shown in Figure 1, when extended, the rod 26a of actuator 26 tips body 13 away from drive unit 11.

[0015] Body 13 is fitted with a bucket 29 for loading loose material into body 13.

[0016] Bucket 29 is hinged to the sides of body 13 by pins 27a, to which are hinged two side arms 30 and two connecting rods E (Figure 1); and each arm 30 is activated by a respective hydraulic actuator 31 comprising a rod 31a. More specifically, each arm 30 is a first-class lever hinged to a pin 27a; one end of each arm 30 is integral with bucket 29; and the other end is hinged by a pin 32 to actuator 31, which pivots about a hinge 33 fitted to the bottom of body 13.

[0017] Actuators 26 and 31 are connected hydraulically in known manner to an oil feed circuit (not shown), and are controlled by the operator from panel 21.

[0018] In addition to side members 24a, device 12 for lifting body 13 also comprises a vertical guide 34 defined by two parallel uprights 34a. A slide 35 runs inside ver-

tical guide 34, and is fitted to fork-shaped supporting structure 24 supporting body 13 and bucket 29; and the two uprights 34a are fixed by known means to side flanges 14, 15 and therefore to supporting structure 18.

[0019] Device 12 for lifting body 13 also comprises a hydraulic actuator 36 having a rod 36a, and which provides for raising body 13 from a bottom loading position (Figures 6 and 7) to a position in which rod 36a is fully extended (Figures 1, 2, 8, 9), and loose material M is unloaded into the body 40 of a truck 100 (Figures 8, 9).

[0020] Hydraulic actuator 36 is connected hydraulically to the same oil circuit as actuators 26 and 31.

[0021] Figures 4 and 5 show more detailed views of a lifting mechanism 38 for lifting body 13, and of which hydraulic actuator 36 forms part.

[0022] More specifically, with reference to Figures 4 and 5, lifting mechanism 38 comprises a fork 38a integral with rod 36a of actuator 36, and a pin 38b fixed to fork 38a.

[0023] Pin 38b is fitted idly with two pairs of side pulleys 38c, and a central bearing 38d.

[0024] Side pulleys 38c permit rotation of the hydraulic pipes (not shown) supplying oil to hydraulic actuators 26, 31 on body 13, while central bearing 38d acts as a guide for a lift chain 38e (Figure 4). As shown in Figure 4, a first end C1 of lift chain 38e is fixed to slide 35, and a second end C2 is fixed to an anchoring device 39 integral with uprights 34a of guide 34. The action of rod 36a on pin 38b (Figure 5) by means of fork 38a causes chain 38e to exert a force F1 on, and lift, slide 35 (Figure 4).

[0025] Operation of minidumper 10 according to the present invention is easily deducible from Figures 6-9.

[0026] Figure 6 shows the position of body 13 just before it is loaded by bucket 29.

[0027] Figure 7 shows material M being loaded into body 13 by bucket 29 operated by arms 30 swung about pins 27a by lateral actuators 31.

[0028] Once loaded with material M, body 13 is raised by lifting device 12 and mechanism 38 from the lowered position (Figures 6 and 7) to the raised position (Figures 8 and 9). More specifically, body 13 is raised by actuator 36, which, as stated, acts on bearing 38d to produce force F1 on chain 38e fixed at one end to guide 34, and at the other end to slide 35. The movement of chain 38e raises slide 35 and therefore body 13 (Figure 9).

[0029] When body 13 and the devices connected to it reach the raised position shown in Figure 8, rods 31a of actuators 31 are fully extended, so that arms 30 are substantially vertical, and material M can be dumped into body 40 of truck 100 (Figure 9) with no interference from bucket 29.

[0030] Though drive unit 11 may be wheel-mounted (not shown), tracks 16 and 17 represent the best solution by effectively distributing stress over the ground, and improving balance to prevent minidumper 10 from tipping forward when body 13 is loaded with material M and in the raised position shown in Figures 1, 2, 8 and 9.

[0031] The advantages of the present invention can be summed up in minidumper 10 according to the invention eliminating the two operations involved in dumping the material alongside truck 100 from a conventional minidumper, and reloading the material into body 40 of truck 100 by hand or using another appropriate device. Using minidumper 10 according to the present invention, the material loaded into body 13 is raised by lifting device 12 and mechanism 38 to a height above sides 41 of body 40 of truck 100, thus enabling material M to be dumped into the truck body.

Claims

1. An earth moving machine (10) comprising:

- a drive unit (11) having rear drive and control means (21) operated by an operator standing on supporting means (22) fixed to said drive unit (11);
- a dump body (13) hinged to said drive unit (11) and fitted with actuating means (26) for tipping said body (13) with respect to said drive unit (11) to unload the material from said body (13); and
- a bucket (29) for loading said body (13), and operated by operating arms (30) hinged to said body (13), each of said operating arms (30) of said bucket (29) being activated by respective actuating means (31) as controlled by the operator using said rear drive and control means (21);

the earth moving machine (10) being **characterized by** comprising lifting means (12) for lifting said body (13) fitted with said bucket (29).

2. An earth moving machine (10) as claimed in Claim 1, **characterized in that** said lifting means (12) comprise a substantially vertical guide (34), in turn comprising two parallel uprights (34a), in which run a supporting device (24, 35) supporting said body (13).

3. An earth moving machine (10) as claimed in Claim 2, **characterized in that** said supporting device (24, 35) comprises a slide (35) running in said two parallel uprights (34a).

4. An earth moving machine (10) as claimed in any one of the foregoing Claims, **characterized in that** said drive unit (11) comprises a pair of tracks (16, 17).

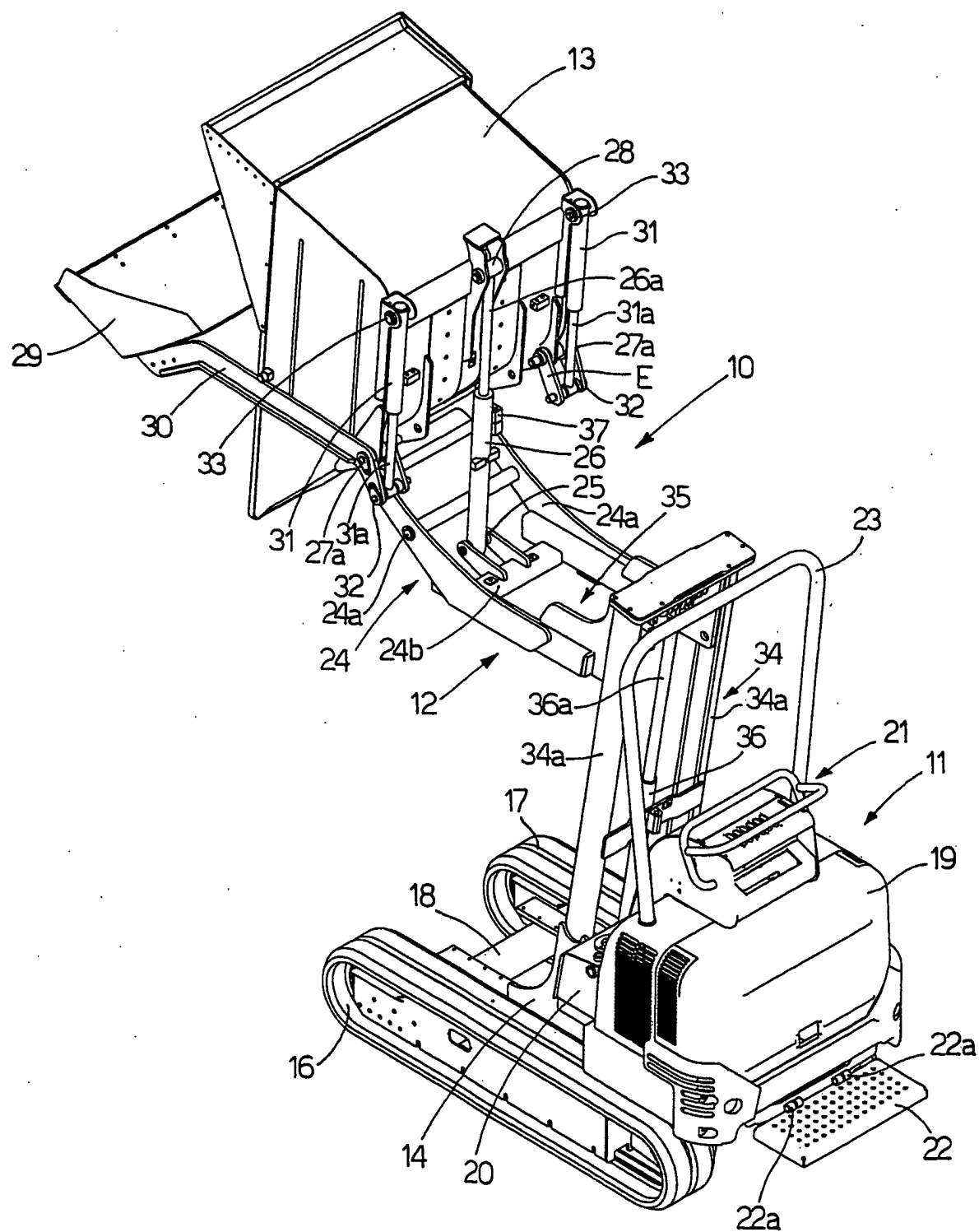


Fig.1

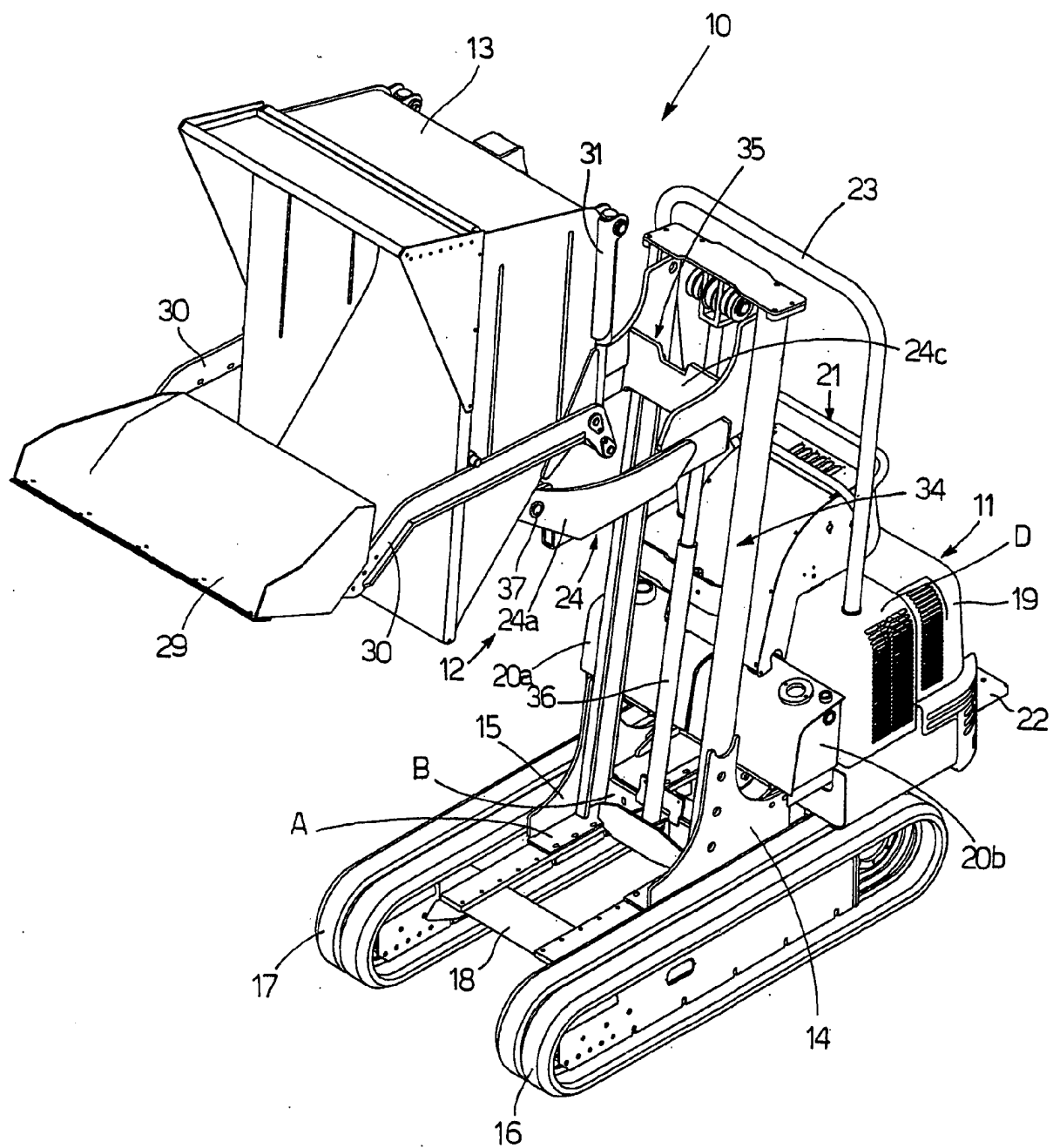


Fig.2

