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(54) **Device for the profiling of canals**

(57) Device for profiling ditches, consisting of a vehicle (3), a profiling cutter (4) coupled to said vehicle (3) that is provided with a bin (12) with an open end (18) and with cutter elements (13) provided opposite the open end (18) of the bin (12), further consisting of an exhaust system (30) with which the content of the bin (12) can be sucked out and collected in a reservoir (31), and which is formed of a vacuum reservoir (31) with a vacuum pump (33) and a drive (34), and whereby the vacuum reservoir (31) is connected to an opening (26) in the bin (12) by

means of an exhaust pipe (35) with an exhaust mouth (37), said vacuum reservoir (31) being a mobile reservoir which is carried along by the vehicle (3), and whereby the bin (12) is provided with a partition (25) at a distance from the open end (18) of the bin (12), and with an opening (26) in the partition (25) to which the exhaust mouth (37) of the exhaust system (30) is connected in order to suck out the content of the bin (12).

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Description

[0001] The present invention concerns a device for profiling ditches.

[0002] As is known, ditches have to be profiled again after a certain while so as to guarantee a good water drainage.

[0003] Up to now, said profiling is very often done with a shovel, as it produces a good profile. It is clear, however, that this way of profiling is very time-consuming and consequently expensive. Moreover, it is often difficult to find the necessary manpower to do the job.

[0004] That is why excavators are often used.

[0005] However, said excavators can only deepen but they cannot profile. Nor can they make slanting sides, as a result of which the sides will cave in afterwards. It is also very difficult to obtain a flat bottom with an excavator.

[0006] From BE 1,009,679 of the present applicant is already known a profiling device which mainly consists of a vehicle and a profiling cutter coupled to the latter which is provided with a bin with an open far end and with cutter elements provided opposite the open far end of the bin.

[0007] With this device, before the profiling of the ditch starts, the profiling cutter is positioned in the ditch and is slowly moved through the ditch while riding, whereby the sides of the ditch are cut in shape by means of the cutter elements, and excess ground that has been loosened is collected in the bin.

[0008] A disadvantage of this device is that the content of the bin is limited and that, each time the bin is full, it has to be emptied on the verge or in a vehicle that rides along.

[0009] The repeated emptying of the bin results in a serious loss of time, especially since, each time the bin needs to be emptied, the vehicle has to stop, after which the profiling works continue as of the point where they were interrupted in order to empty the bin.

[0010] Moreover, if the content of the bin cannot be emptied on the verge, an additional vehicle will have to be provided for that rides along in order to collect said content.

[0011] The present invention aims to remedy one or several of the above-mentioned and other disadvantages.

[0012] To this end, the invention concerns a device that is appropriate for profiling ditches, consisting of a vehicle, a profiling cutter coupled to said vehicle that is provided with a bin with an open end and with cutter elements provided opposite the open end of the bin, further consisting of an exhaust system with which the content of the bin can be sucked out and collected in a reservoir, and which is formed of a vacuum reservoir with a vacuum pump and a drive, and whereby the vacuum reservoir is connected to an opening in the bin by means of an exhaust pipe with an exhaust mouth, whereby the vacuum reservoir is a mobile reservoir which is carried along by the vehicle, and whereby the bin is provided with a par-

tion at a distance from the open end of the bin, and with an opening in the partition to which the exhaust mouth of the exhaust system is connected in order to suck out the content of the bin.

[0013] The opening in the bin or the exhaust mouth can be closed, preferably by means of a slide, lid or the like with a drive and a control that opens or closes the opening or the exhaust mouth for a certain while at regular intervals.

[0014] Optionally, the device can be provided with a sprinkler system to sprinkle the ground that has been loosened by the profiling cutter so as to be obtain a better suction result, depending on the circumstances and the nature and dampness of the ground that has been loosened up by the cutter.

[0015] In order to better explain the characteristics of the invention, the following preferred embodiment of the device according to the invention that is appropriate for profiling ditches is described as an example only without being limitative in any way, with reference to the accompanying drawings, in which:

figure 1 schematically represents a device according to the invention for profiling ditches, seen from above;

figure 2 represents a view according to arrow F2 in figure 1;

figure 3 represents the part indicated by F3 in figure 1 to a larger scale;

figures 4 and 5 represent a section according to lines IV-IV and V-V in figure 3 respectively.

[0016] The device 1 according to the invention for profiling ditches 2 as represented in the drawings comprises a vehicle 3 and a profiling cutter 4 coupled to the vehicle 3 by means of a positioning mechanism 5 which makes it possible to position the profiling cutter 4 at the required depth in the ditch 2 to be profiled.

[0017] In the given example, the vehicle 3 is a tractor.

[0018] The positioning mechanism 5 is in this case a conventional hydraulic, adjustable, articulated crane jib with two articulated arm parts 6 and 7 that are hinge-mounted in relation to each other by means of a horizontal shaft 8.

[0019] The crane jib 6-7 is thereby provided with one far end hinging sideward round a vertical shaft 9 on the vehicle 3, whereas the profiling cutter 4 is fixed to the other far end.

[0020] The crane jib 6-7 is provided with the necessary drives which, for simplicity's sake, are not represented in the drawings and which can be made for example in the shape of hydraulic cylinders or motors that can be connected to a hydraulic circuit as is traditionally available in a tractor.

[0021] The profiling cutter 4 mainly consists of a frame 10 which is hinge-mounted to the free end of the crane jib 6-7 by means of a horizontal shaft 11, whereby a bin 12 is coupled to this frame 10 which, seen in the riding

direction V, is open in the front, as well as two rotating cutter elements formed of disc-shaped knives 13 that are mounted next to one another on the frame 10 in front of the foremost open end of the bin 12 and which can be driven by hydraulic motors 14.

[0022] The bin 12 is formed of a bottom 15 and of a standing rear wall 16 and two slantwise standing side walls 17 which diverge to the top, such that the bin 12 has a preferably reversed trapezoidal section as can be seen in figure 5.

[0023] Near the front open end 18, the bin 12 is hinged-mounted to the frame 10 by means of a hinge pin 19 which is directed crosswise to the longitudinal direction of the bin 12 and which is also directed crosswise to the horizontal shaft 11 on the crane jib 6-7.

[0024] In the given example, the top side of the bin is open, but if need be it may also be entirely or partly closed.

[0025] In order to be able to hinge round the shaft 19, a hydraulic cylinder 20 has been mounted between the frame 10 and the rear wall 16 of the bin 12, which is hinged-mounted to the frame 10 and to the rear wall 16 concerned of the bin 12.

[0026] The two rotating knives 13 are provided with teeth 21 on their sides turned towards each other. They are each driven separately by a hydraulic motor 14 which is coupled to the frame 10 by means of an arm and a support and which drives the knife in such a manner that its bottom side moves to the rear. The sense of rotation of the knives 13 is indicated by arrow D in figure 4.

[0027] The two knives 13 are erected next to one another at the same height, with the lower side somewhat beneath the lower side of the bottom 15 of the bin 12 and the top side somewhat above the top side of the bin 12, and such that they end up with their back side somewhat above said bottom 15.

[0028] These knives 13 diverge to the front as well as to the top. They extend at practically the same angle in relation to the vertical shaft as the side walls 17, such that their rear side is practically situated against the side walls 17 on the inside.

[0029] Given the place that is required for the motors 14, one knife 13 is situated somewhat more to the front than the other.

[0030] The front edge 22 of the bottom 15 of the bin 12 is situated slantingly in relation to the riding direction V in a corresponding manner, such that both knives 13 are situated with their bottom side against the front edge 22 of the bottom 15.

[0031] Moreover, the front knife 13 can be adjusted at an angle in relation to the riding direction V, such that the distance between the front sides of the two knives 13 can be set as a function of the required profile width of the ditch 2.

[0032] A scraping knife 23 is mounted on the rear side of the bin 12, which can be moved up and down by means of an additional hydraulic cylinder 24 which is fixed to the rear wall 16 of the bin 12. This scraping knife 23 has more

or less the same shape as the lower part of the rear wall 16 and it can be set in height between a topmost position in which said scraping knife 23 is situated higher than the bottom 15 and a lower position in which the scraping knife 23 extends from under the bottom 15.

[0033] The bin 12 according to the invention is hereby provided, at a distance from the front open end 18, with a partition 25 in whose bottom has been provided an opening 26 to which the sealing mouth 37 of the exhaust system 30 connects in order to suck out the content of the bin 12.

[0034] Said opening 26 can be sealed by means of a slide 27. Said slide 27 can be adjusted in height in the guides 28 on the above-mentioned partition 25 and it can be operated by means of a hydraulic cylinder or another drive 29.

[0035] The drive 29 of the slide 27 may be provided with a control, not represented in the figures, which will open the slide 27 for a while at regular intervals and then close it again.

[0036] The device is further provided with an exhaust system in the form of a vacuum tank 31 which, according to the invention, is a mobile tank 31 on wheels 32 which is carried along by the above-mentioned vehicle 3, and which is designed such that it can suck out the content of the bin 12.

[0037] To this end, the exhaust system 30 is provided with a vacuum pump 33 and ditto drive 34 to create a vacuum in the tank 31, and the exhaust system 30 is further provided with an exhaust pipe 35 which is connected to the inner space of the vacuum tank 31 with one far end via a connecting piece 36, and which is provided with an exhaust mouth 37 on its other far end 25 which is connected to the above-mentioned opening 26 in the partition 25 in the bin 12.

[0038] The drive of the vacuum pump 33 may be an autonomous drive or it may be a drive that is driven by the vehicle 3, for example via the branch shaft that is traditionally available in a tractor.

[0039] Further, the device is optionally provided with a sprinkler system for sprinkling the loosened ground, for example with a sprinkler 38 to atomize water in the exhaust pipe 35, whereby this sprinkler 38 is preferably mounted at a short distance from the opening 26 in the partition 25 and whereby said sprinkler 38 is provided with water from a reservoir 41 via a hose 39 by means of a pump 40, which reservoir is mounted for example on the mobile exhaust system 30 or on the vehicle 3 or on the profiling cutter 4.

[0040] The sprinkler 38 may be either or not provided with an adjustable sprinkler head with which the flow, the pressure and the shape of the jet can be adjusted depending on the necessities in the field.

[0041] The working of the device is simple and as follows.

[0042] When the profiling works start, the ground is first scraped off from the bottom of the ditch 2 to be profiled, namely there where the ditch 2 begins and over a

short distance, by means of the lowered scraping knife 23.

[0043] Next, the scraping knife 23 is retracted again and the profiling cutter 4 is positioned in the ditch 2 in the known manner at the required depth by means of the positioning mechanism 5.

[0044] The vehicle then rides slowly beside the ditch to be profiled, whereby the two knives 13 are set in motion.

[0045] The ground is worked loose on the sides by said knives 13, insofar as necessary to obtain the desired profile and, also by the teeth 21, the loosened ground is thrown in the bin 12. Said teeth 21 thereby end up in their bottommost position right above the bottom 15 of the bin 12.

[0046] The front edge 22 of the bottom 15 of the bin 12 also works as a knife that shovels up the ground from the bottom in the ditch 2 between the knives 13.

[0047] Thanks to the slanting position of the knives 13 and the bottom 15 of the bin 12, not only a perfect profile is obtained, but all the loosened ground is collected as well.

[0048] While riding, the slide 27 is manually or automatically pulled up at regular intervals, as a result of which the opening 26 and the exhaust mouth 37 connected to the latter are opened, and the ground which has accumulated in front of the partition 25 in the bin 12 is sucked up by the vacuum in the vacuum tank 31 and is recycled via the exhaust pipe 35 in the vacuum tank 31.

[0049] Thus, while riding, the loosened ground which has been collected in the bin 12 can be uninterruptedly sucked out and collected in the vacuum tank 31 until the tank 31 is full.

[0050] As a result, the bin 12 no longer has to be emptied at regular intervals each time the bin 12 is full, as used to be the case.

[0051] This results in a considerable gain of time.

[0052] Depending on the type of ground in the ditch 2 and the dampness of the ground, the sprinkler system can be optionally activated, either or not continuously, to first dampen the sucked-in ground by means of a water injection via the sprinkler 38, which may lead to better results under certain conditions than without using the sprinkler system, especially during periods of aridity when the ground in the ditch is dry.

[0053] Favourable results have already been obtained with a vacuum tank 31 with a content of 14 m³ and an exhaust system with a driven power of 300 hp to suck in ground via an exhaust pipe 35 with a diameter of 15 to 20 cm.

[0054] In particular, the positioning mechanism 5 with the profiling cutter 4 must not necessarily be mounted on a vehicle. The positioning mechanism itself may be mobile or it may be part of a mobile machine.

[0055] The profiling cutter 4 may for example also be provided directly under or behind the vehicle 3, whereby the vehicle moves over the ditch then.

[0056] Other positioning systems, either or not tele-

scopic, are not excluded either.

[0057] It is clear that the opening 26 and the exhaust mouth 37 connected to the latter may also open in other places in the bin 12, such as for example directly in the rear wall 16, whereby the partition 25 is then formed of this rear wall 26.

[0058] Depending on the circumstances, it is also possible to work without a slide 27 to seal the opening 26 in the partition 25 and the exhaust mouth, or also other sealing mechanisms such as a butterfly valve or the like may be applied.

[0059] The meaning of the term bin should be interpreted broadly as an element which makes it possible to collect the loosened up ground in order to have it sucked in by the exhaust system.

[0060] Moreover, the bin 12 must not necessarily tilt round the shaft 19; it can also be a fixed construction. However a tilting bin 12 may facilitate maintenance of the bin, as well as the use of the scraping knife 23 at the start of the ditch clearing works.

[0061] Although, in the given example, the cutter elements are formed of disc-shaped knives 13, it is not excluded to form the cutter elements in other ways, for example in the shape of a single, preferably horizontal worm provided in the extension of the bin opposite the open end 18 of the bin 12 or in the shape of two horizontal worms provided slantingly in relation to one another in a V-shaped arrangement opposite the open end 18 in order to loosen the sides of the ditch while being driven and to push the loosened ground in the direction of the open end 18.

[0062] The present invention is by no means restricted to the embodiment described as an example and represented in the accompanying drawings; on the contrary, such a device according to the invention for profiling ditches can be made in all sorts of shapes and dimensions while still remaining within the scope of the invention.

Claims

1. Device for profiling ditches, consisting of a vehicle (3), a profiling cutter (4) coupled to said vehicle (3) that is provided with a bin (12) with an open end (18) and with cutter elements (13) provided opposite the open end (18) of the bin (12), further consisting of an exhaust system (30) with which the content of the bin (12) can be sucked out and collected in a reservoir (31), and which is formed of a vacuum reservoir (31) with a vacuum pump (33) and a drive (34), and whereby the vacuum reservoir (31) is connected to an opening (26) in the bin (12) by means of an exhaust pipe (35) with an exhaust mouth (37), **characterised in that** the vacuum reservoir (31) is a mobile reservoir which is carried along by the vehicle (3), and whereby the bin (12) is provided with a partition (25) at a distance from the open end (18) of the bin

(12), and with an opening (26) in the partition (25) to which the exhaust mouth (37) of the exhaust system (30) is connected in order to suck out the content of the bin (12).

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2. Device according to claim 1, **characterised in that** the opening (26) in the partition (25) or the exhaust mouth (37) can be sealed.

3. Device according to claim 2, **characterised in that** it is provided with a control to open or close the opening (26) or the exhaust mouth (37) at regular intervals during a certain while. 10

4. Device according to any one of claims 1 to 3, **characterised in that** it is provided with a sprinkler system which is suitable to sprinkle the ground that has been loosened by the profiling cutter (4), whereby this sprinkler system is provided with a sprinkler (38) which opens in the exhaust pipe (35) of the exhaust system (30). 15 20

5. Device according to claim 4, **characterised in that** the sprinkler (38) is placed at a short distance from the opening (26) in the partition (25). 25

6. Device according to claim 5, **characterised in that** the sprinkler (38) is placed at a short distance from the exhaust mouth (37). 30

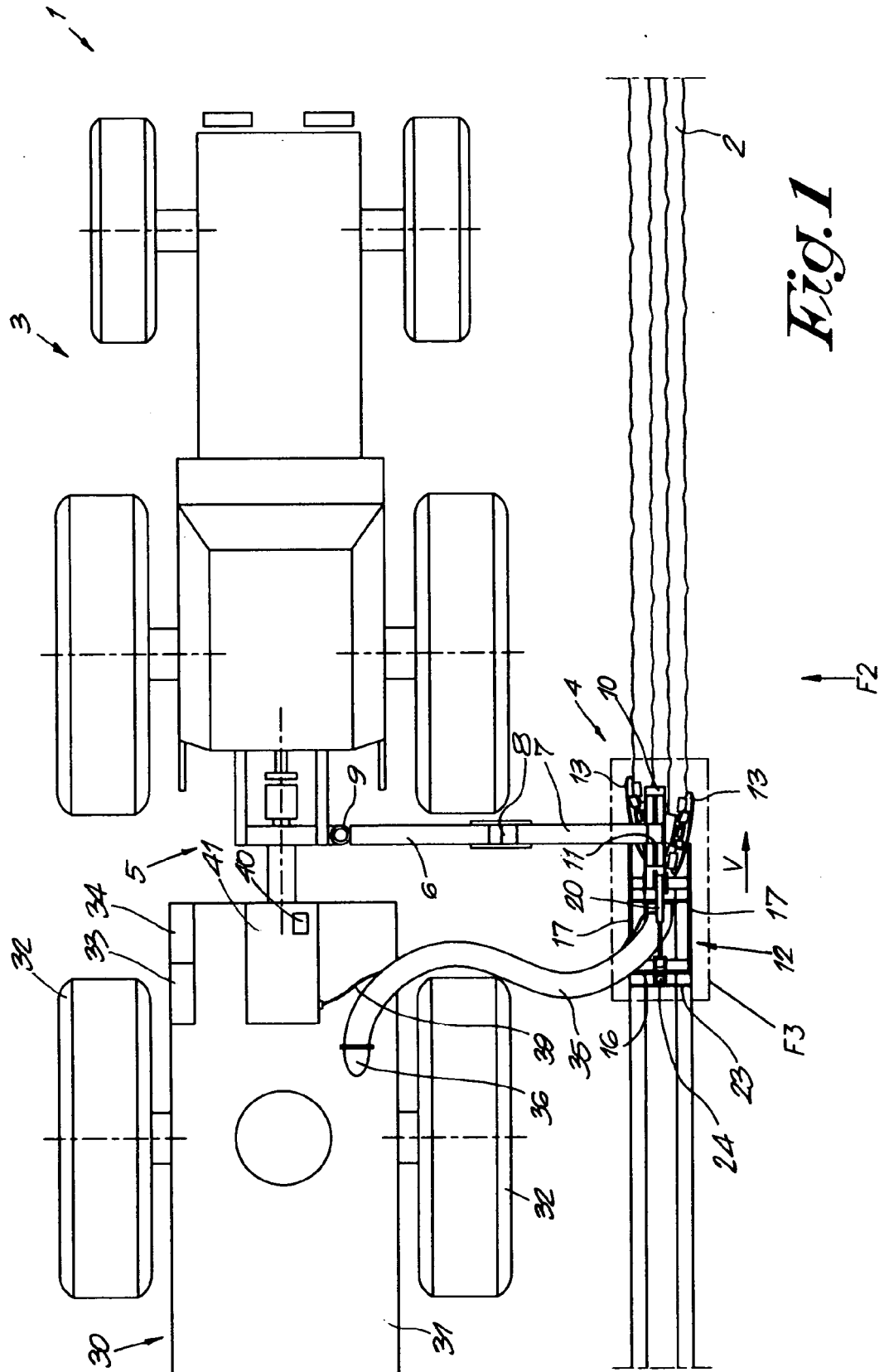
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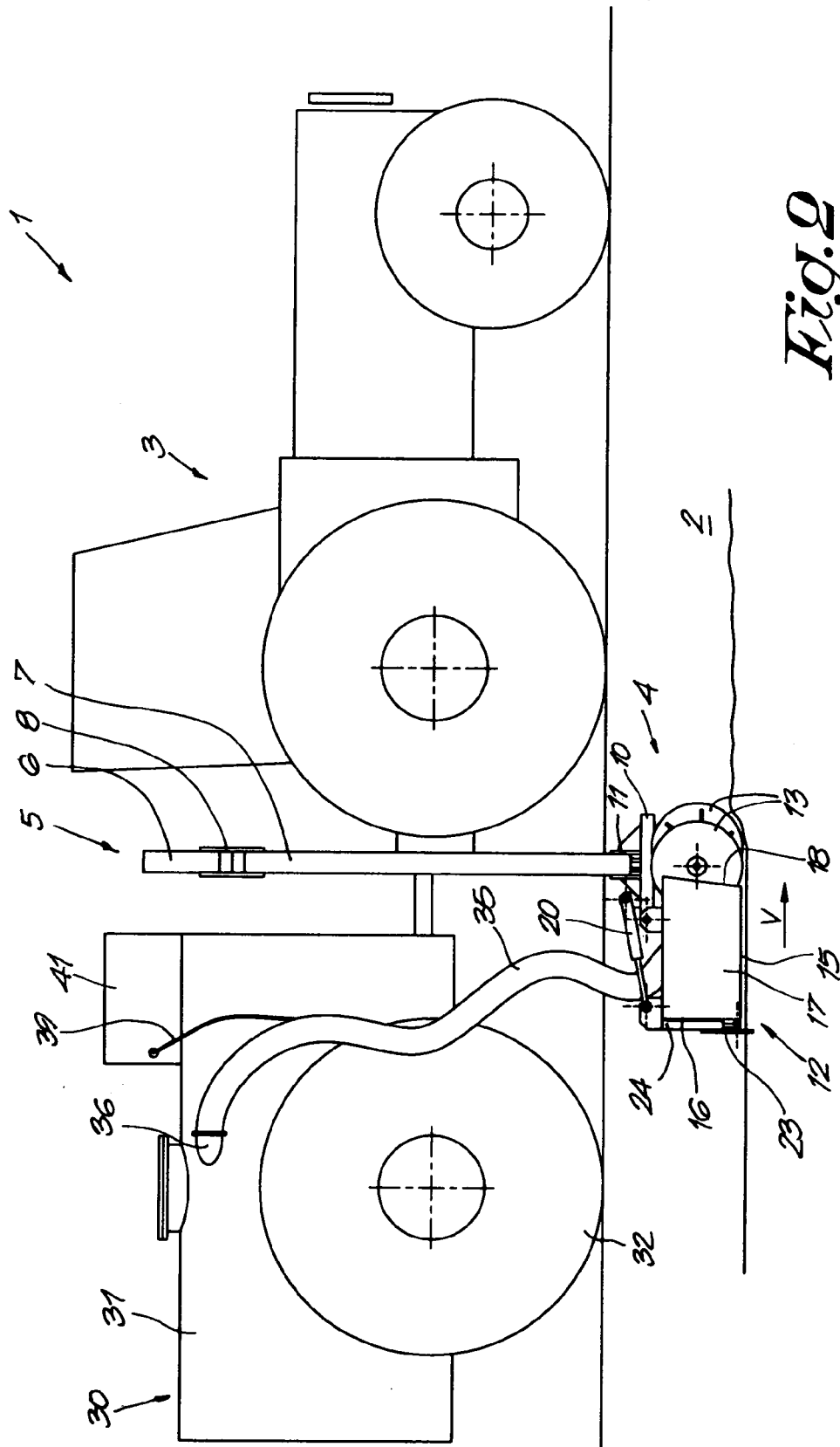


Fig. 2

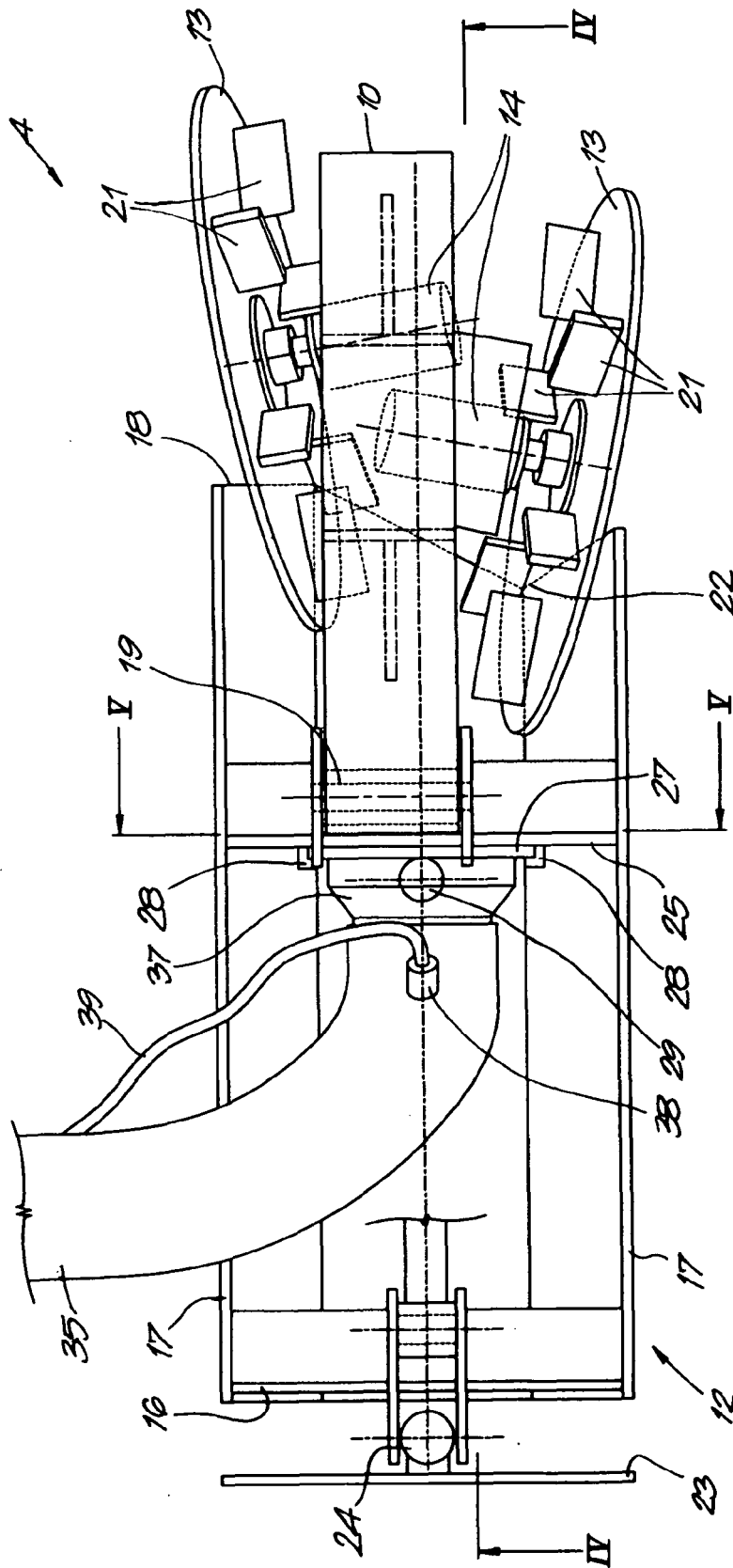
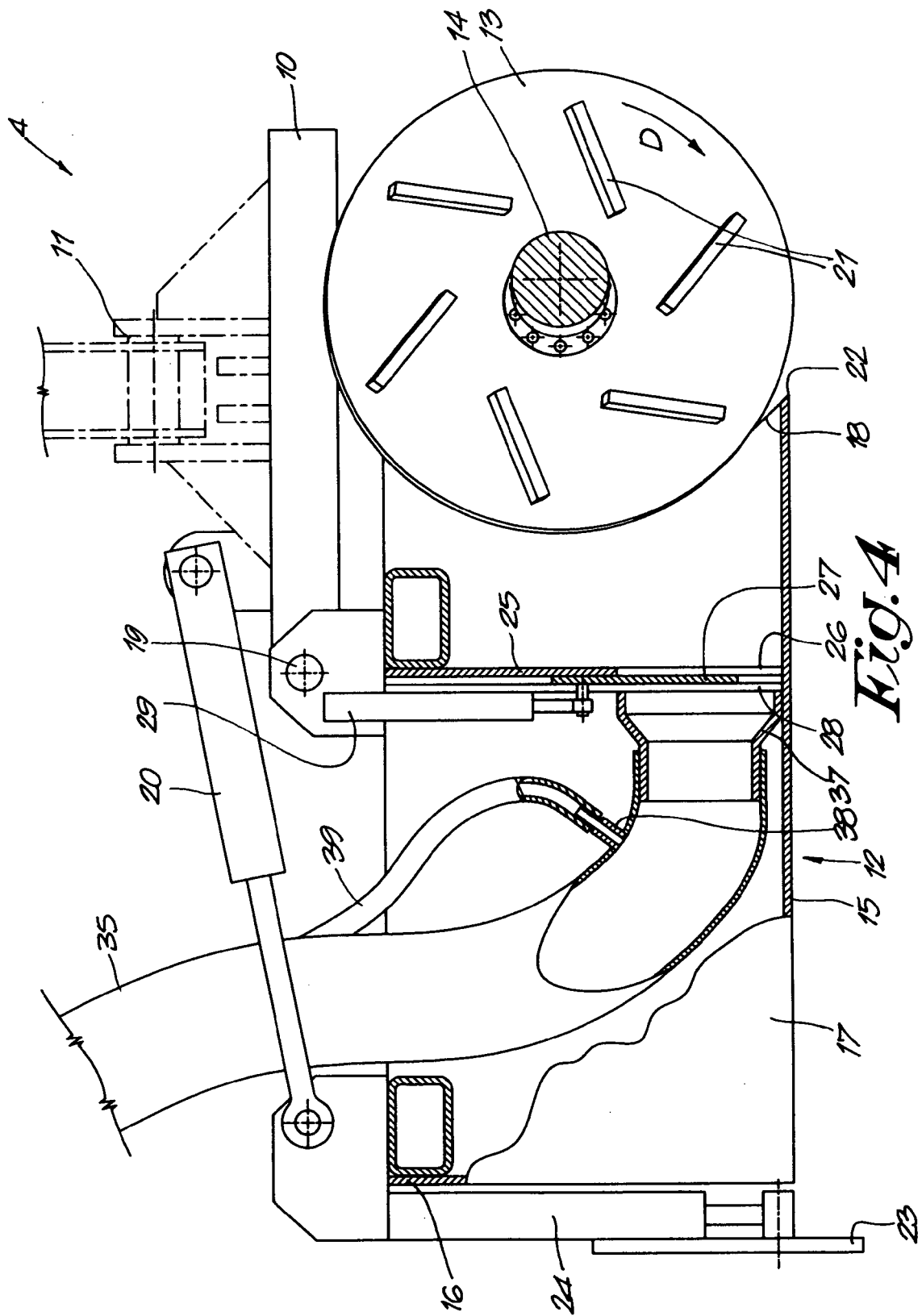


Fig. 3



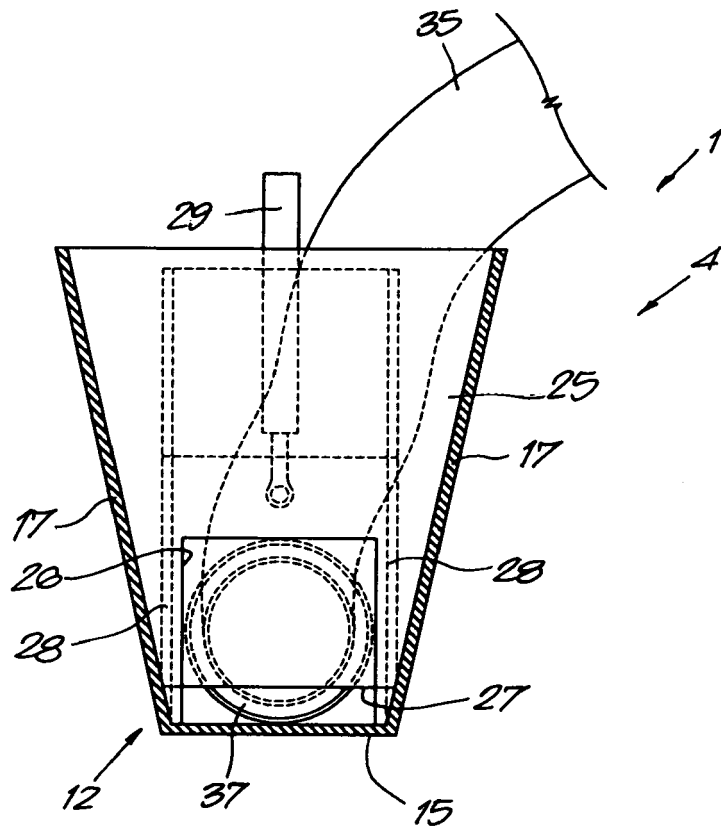


Fig.5

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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