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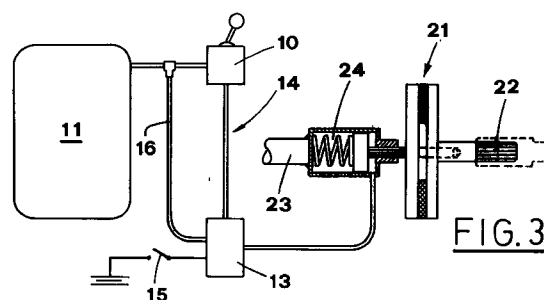
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(54) **Simplified safety device for stopping the rotating parts of road maintenance utility vehicles.**

(57) The present invention proposes a simplified safety device for stopping the rotating parts (4) of a road maintenance equipment fitted to an utility vehicle (1), including an emergency device (13) aimed at disengaging a secondary clutch (21) and an electromagnetic lamellar brake inserted in a transmission group (3) of the equipment (2). A further embodiment uses an electromagnetic lamellar brake-clutch assembly for stopping the rotating parts (4), wholly contained in the transmission group (3).



The present invention relates to a safety device mounted to operate in an equipment, provided with rotating parts, of a road maintenance utility vehicle.

The safety device is designed to forcibly stop such rotating parts in a simple and efficient way, any time it is requested by safety conditions.

There are known road maintenance utility vehicles equipped with rotating parts, also very powerful, usually connected to the power take-off of the same utility vehicles.

Different safety devices can be provided for reducing the danger caused by such rotating parts.

One of these devices, commonly used, is constituted by a barrier placed in front of the equipment and kept in a raised position so as not to disturb the machine effectiveness when it is working.

The barrier can be lowered, when necessary, by special means automatically controlled by devices sensitive to operator's abandonment of the seat or to opening of one of the vehicle doors.

The same operation can be performed manually by an operator, e.g. by operating a rapid intervention switch, suitably situated.

The same devices control the back off of the rotating parts from the power take-off, provoking their inertial stopping.

Both the manual control device and the automatic control device can be present in the same utility vehicle at the same time.

One of the biggest drawbacks of the safety device with frontal barrier results from the fact that the time necessary to stop the rotating parts can be rather long, since it depends on the weight of the rotating parts and on the friction opposing the rotation.

Another known safety device is constituted by a disc brake that can be activated, manually or automatically, by devices similar to the ones of the safety device previously described.

Such disc brake, is placed on the vehicle, coaxially to the means that transmit the motion to the power take-off and that are activated by an ancillary engine, generally situated in the rear part of the utility vehicle.

The brake activation causes a forced stopping of the rotating parts that is much quicker than the inertial stopping.

A drawback of this type of safety device results from the fact that it can be used only with specially constructed vehicles, provided with an ancillary engine-transmission shaft system, or anyway, arranged in this way.

On the other hand, the positioning of the disc brake on the equipment is not possible because of the dimension of the same disc brake, usually so big as to provoke a considerable increase of the same equipment size.

The main object of the present invention is to propose a considerably simplified safety device for blocking the rotating parts of an utility vehicle, without

reducing its versatility resulting from the fact that the equipments having such rotating parts can be used on general utility vehicle, and without increasing excessively the dimensions of the same equipments.

A further object of the present invention is to propose a safety device for blocking the rotating parts of an utility vehicle, that is very compact and completely contained inside the cited equipment.

The above mentioned objects are obtained in accordance with the contents of the claims.

The characteristic features of the present invention are pointed out in the following with reference to the attached drawing, in which:

- Fig. 1 shows a lateral view of the equipment, in the example snow blower machine, carried by a road maintenance utility vehicle;
- Fig. 2 shows a schematic view of a first embodiment of the device being the subject of the present invention;
- Fig. 3 shows a schematic view of a second embodiment of the device being the subject of the present invention;
- Fig. 4 shows a schematic view of a third embodiment of the device being the subject of the present invention.

With reference to the Fig. 1, the reference numeral 1 indicates a road maintenance utility vehicle, provided, in the front part, with a power take-off 22, to which there is removably connected a snow blower equipment 2 driven via a transmission group 3, designed to transmit the motion to the rotating parts 4 of the snow blower equipment 2.

The above mentioned transmission group 3 contains also, partially or totally, as illustrated in the following, the safety device being the subject of the present invention.

In the first embodiment, illustrated in Fig. 2, the reference number 21 indicates an ancillary clutch belonging to the utility vehicle 1 and independent from the main clutch of the vehicle, that is normally in disengaged condition.

The ancillary clutch 21 is connected, at one side, to the power take-off 22 and, at the other side, to an actuating device 24, of known type, coaxial with the transmission shaft 23.

Such a device 24 is connected, through a duct 14, to a supply unit 11, adapted to supply a fluid under pressure. Between the actuating device 24 and the supply unit 11 there are respectively placed an emergency disengagement device 13 and control box 10.

Said emergency disengagement device 13 is, in its turn, controlled by known switching means 15 that can be of automatic intervention type, manual intervention type or a combination of both types.

The ancillary clutch 21, that in non-operative phases for the utility vehicle is normally in disengaged condition, can be set in engaged condition in order to allow the snow blower equipment 2 to operate.

The emergency disengagement device 13, in this case is constituted by a solenoid valve of the known type, allowing the fluid under pressure to flow from the supply unit 11 to the actuating device 24.

In emergency conditions the activating of the switching means 15 causes the intervention of the disengagement device 13, that blocks the flow of the fluid under pressure and sets immediately the ancillary clutch 21 to the disengaged condition.

The same switching means 15 also control the activation of a known electromagnetic lamellar brake that causes the immediate blocking of the rotating parts 4 of the snow blower equipment 2.

According to a second embodiment, illustrated in Fig. 3, the ancillary clutch 21 is normally in engaged condition and the emergency disengagement device 13 is also connected, via a secondary duct 16, to the part of the duct 14 joining the control box 10 with the supply unit 11.

In this case, the ancillary clutch 21 is normally in engaged condition and can be set to the disengaged condition by means of a control box 10, that when operated allows the fluid under pressure to flow from the supply unit 11 to the actuating device 24.

In emergency conditions, the disengagement device 13, controlled by the switching means 15, conveys the fluid under pressure coming from the supply unit 11, through the secondary duct 16, to the actuating device 24.

This immediately shifts the ancillary clutch 21 to the disengaged condition and the blocking of the rotating parts 4 of the snow blower equipment 2 due to the contemporary activation of the above mentioned lamellar electromagnetic brake.

In a third embodiment, illustrated in Fig. 4, the ancillary clutch 21 is of electromagnetic type, e.g. of the type normally in disengaged condition and can be set to the engaged condition electrically by a power supply unit 11a, that in this case is designed to supply the electric energy, with the interposition of the control box 10 and of the emergency disengagement device 13, that in this case is an electric switch.

The ancillary clutch 21 is shifted to the engaged condition electrically by the control box 10. If an emergency situation occurs, the disengagement device 13 is activated, in this case a known relay switch that is normally on, that cuts off the electric feed from the power supply unit 11a to the ancillary clutch 21.

Having reference to Fig. 1, it will be described a fourth embodiment of the safety device being the subject of the present invention, in which the brake-lamellar electromagnetic clutch assembly, not illustrated in detail since it is known, is inserted inside the transmission group 3 and controlled by switching means 15.

In this case, the emergency situation provokes, through the intervention of the switching means 15, the activation of the known brake-clutch assembly in-

serted in the transmission group 3 of the snow blower equipment 2, that causes the immediate blocking of the rotating parts 4 of the said equipment.

The main advantage of the present invention is a safety device, aimed at blocking the rotating parts, that is considerably simplified and extremely versatile since it allows to use the equipments having such rotating parts on general utility vehicles.

The safety device described herein also allows to use, in some of its embodiment, the ancillary clutch of the power take-off of the utility vehicle and therefore avoids the necessity of setting up another clutch into the equipment, with evident reduction of costs and dimensions of the same equipment.

Another advantage of the present invention is that it allows different equipments, which include only the lamellar electromagnetic brake, to use the same disengagement device of the ancillary clutch that is installed permanently on the utility vehicle.

A further advantage of the present invention is an embodiment of the safety device for blocking the rotating parts of a road maintenance utility vehicle in which the whole device is made integral within a unique pre-constructed assembly, completely contained inside the equipment, with considerable advantages of compactness and simplicity of use and maintenance.

Claims

1. A safety device for blocking the rotating parts of an equipment (2), carried by a road maintenance utility vehicle (1) equipped with:
 - a power take-off (22) that is joined to an ancillary clutch (21), independent from the main clutch of the vehicle;
 - a control box (10) aimed at controlling the above mentioned ancillary clutch (21);
 - a fluid supply unit (11), if the ancillary clutch (21) is actuated by a fluid, or an electric power supply unit (11a) if said ancillary clutch is actuated electrically;
 - the said safety device being characterised in that it includes at least one emergency disengagement device (13), mounted on the utility vehicle (1) and designed to command the ancillary clutch (21) of the said utility vehicle (1), and at least one electromagnetic lamellar brake, situated inside a transmission group (3) of the equipment (2).
2. Safety device for blocking the rotating parts of an equipment (2), carried by a road maintenance utility vehicle (1) equipped with a power take-off (22), characterised in that said device includes an electromagnetic lamellar clutch and an electromagnetic lamellar brake, forming an electromagnetic lamellar brake-clutch assembly, inserted in

the transmission group (3) of the equipment (2).

3. Safety device according to claim 1, characterised in that the emergency disengagement device (13) is interposed between the control box (10) and the actuating device (24) of the ancillary clutch (21), and performs its operation by blocking the flow of the fluid under pressure directed to the above mentioned actuating device (24). 5
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4. Safety device according to claim 1, characterised in that the emergency disengagement device (13) performs its operation by resuming the flow of the fluid under pressure directed to the actuating device (24). 15
5. Safety device according to claim 1, characterised in that the emergency disengagement device (13) performs its operation by cutting off an electric circuit for the power supply of the ancillary clutch (21). 20

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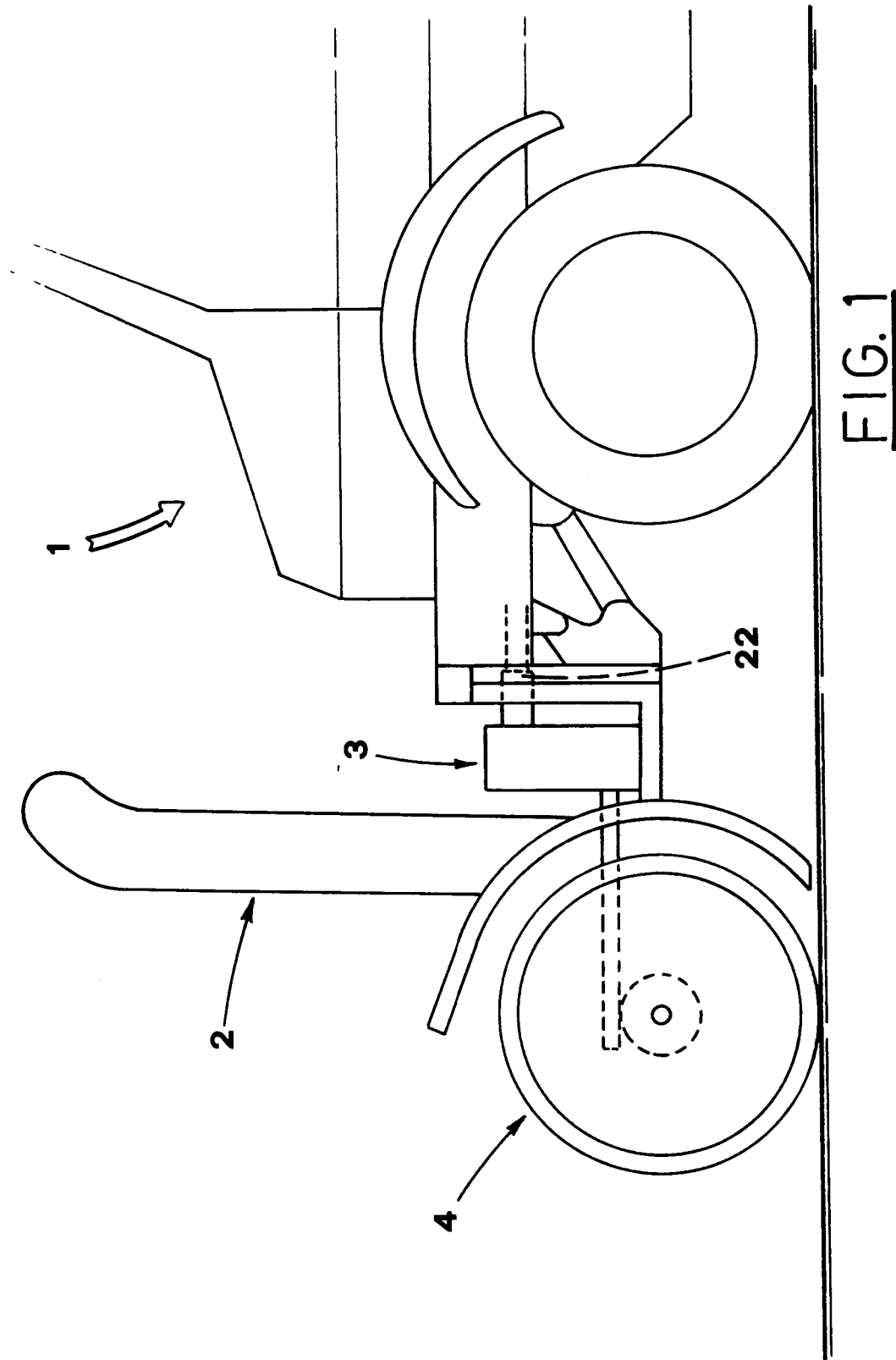
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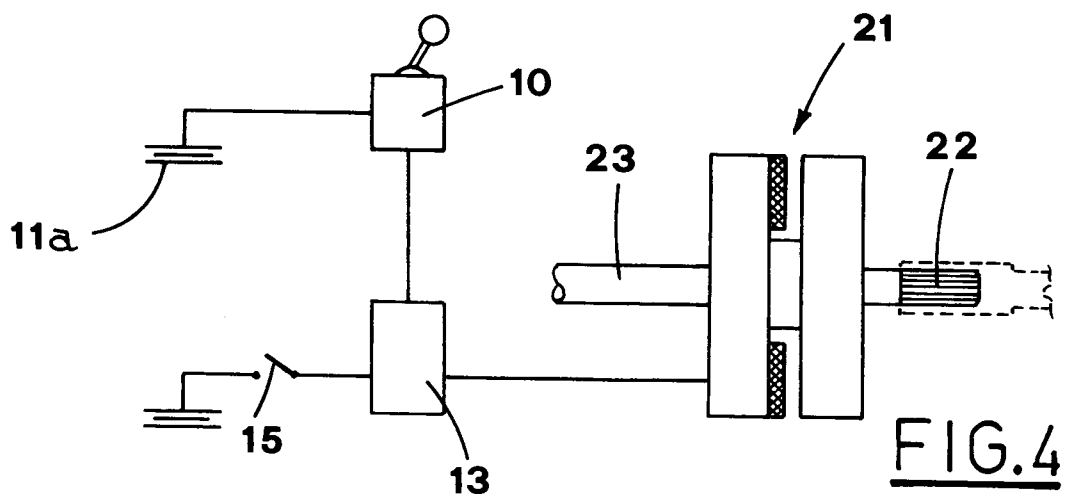
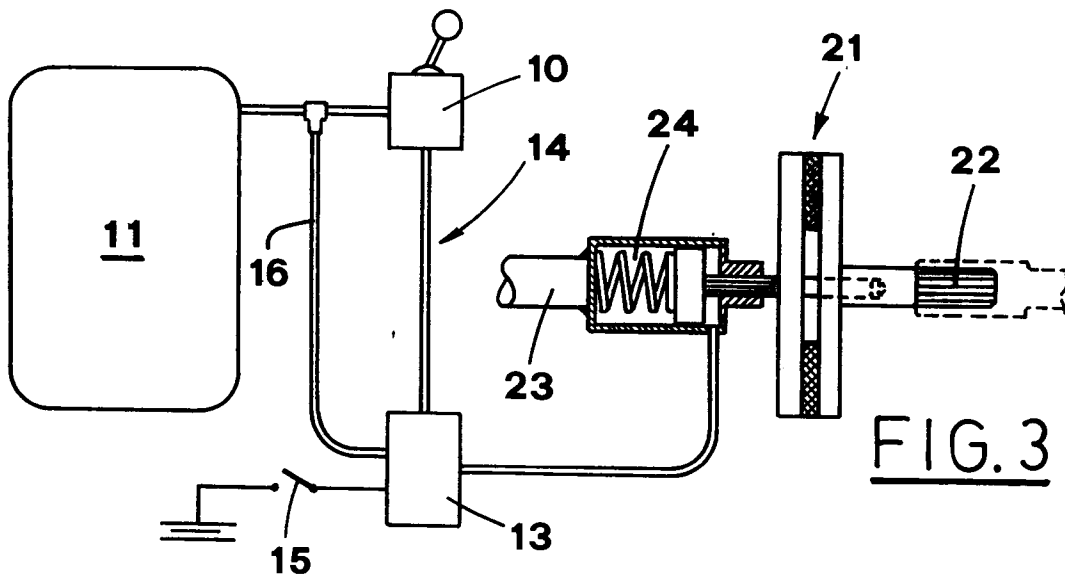
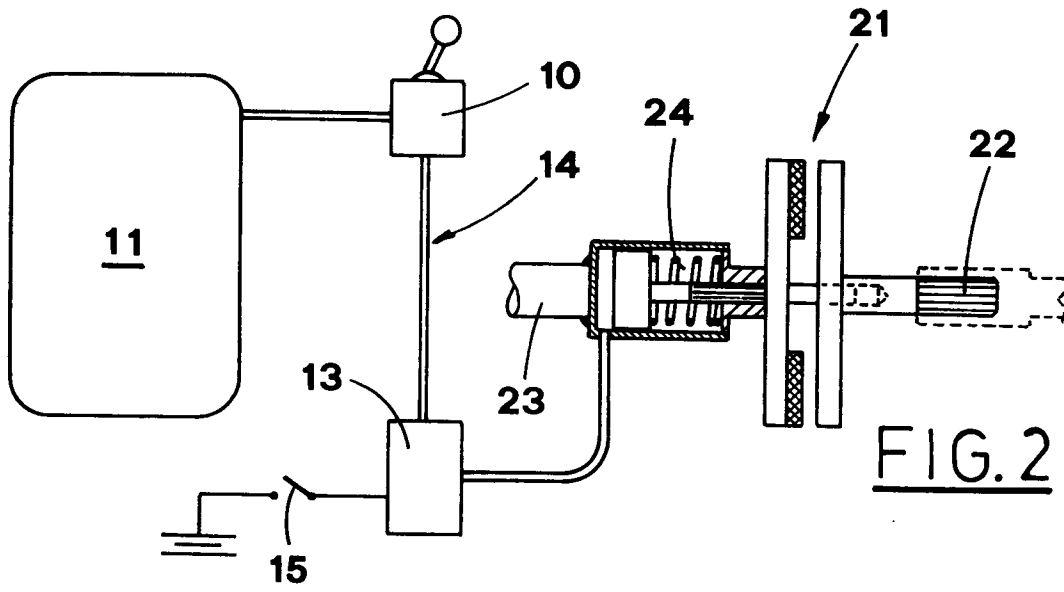
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European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 94 83 0496

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.6)
A	EP-A-0 295 544 (FRESIA) * the whole document * ---	1,3	E01H1/00 E01H5/09 E01C19/00
A	US-A-4 062 135 (DOBBERPUHL) * the whole document * ---	1	
A	WO-A-91 03601 (CATERPILLAR) * page 5, column 1 - page 11, line 23; figures * -----	1	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			E01H E01C B60R
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 3 February 1995	Examiner Dijkstra, G
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	
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