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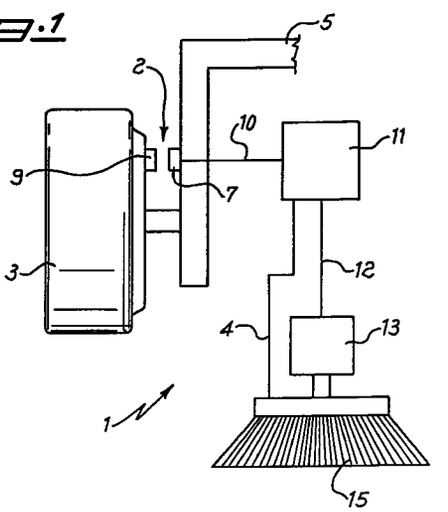
(54) A device for automatically controlling the operation of brushes on wheelers for floor cleaning

(57) An automatic device for controlling the rotation speed of a brush on a wheeled vehicle for cleaning floors, said device comprising: detecting means (2) for detecting the advance speed of the vehicle, automatic regulation means (11) for controlling the rotation speed of the brush (15) of the vehicle, the said means regulating the rotation speed of the brush as a function of the advance speed of the vehicle.

Fig.1



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Description

The present invention relates to an automatic device for controlling the operation of the brushes in wheeled vehicles for cleaning floors.

The use of vehicles suitable for cleaning very extensive floor areas such as road sweepers and floor-washer-drier machines, is very widespread.

These vehicles are generally motorised and move on wheels, steered by an operator seated on the vehicle itself. In the lower part of the vehicle there are one or more rotating brushes with different functions. Some or all of the brushes can be raised and lowered; depending on the desired function, they can be lowered to come into contact with the floor for carrying out the cleaning operation and raised when the vehicle is not in use in order to facilitate its movement.

Generally, the rotation speed of the brushes in these vehicles is fixed, although vehicles are known where it is possible to regulate the speed of the brushes manually. In other words, while the driver is steering the vehicle, he adjusts the rotation speed of the brushes according to the speed at which they are advancing.

However, this manual regulation requires the operator to be constantly attentive since he must regulate the speed of the brushes whenever the need arises. Therefore the regulation is imperfect in that it will be barely satisfactory and moreover manual regulation distracts the operator from driving the vehicle. This drawback is aggravated by the fact that one of the operator's hands must leave the steering wheel in order to carry out this regulation. In fact, in order to avoid imprecision in steering the vehicle, or even the possibility of swerving if driving up or downhill, the operator is forced to stop the vehicle each time he wishes to change the speed of the brushes.

Another problem of the known technology is due to the fact that the side brushes cannot be used while the central brush is in its raised position.

An object of the present invention is therefore to solve the above mentioned problems by providing a vehicle of this type which is able to automatically adjust the operation of the brushes as a function of the condition of the vehicle, that is according to its state parameters (advance speed of same and/or state of at least one of the brushes). In this way, the driver need only adopt the appropriate speed for the ground conditions and can drive the vehicle safely.

This object is reached by means of an automatic device for controlling the operation of the brushes in wheeled vehicles for cleaning floors, according to claim 1.

According to a preferred embodiment of the invention, the device detects the advance speed of the vehicle and consequently controls the brush rotation speed.

According to a further aspect version of the invention, the device detects the operative or non-operative state of the central brush of the vehicle and consequently activates or deactivates the operation of the side brushes.

The invention will now be described in greater detail with reference to the drawings, which are intended to be illustrative and not imitative thereof and, wherein:

fig. 1 is a diagram of the device according to the invention,

fig. 2 shows an application of this device.

With reference firstly to fig. 1, 1 indicates an automatic control device according to the present invention.

It comprises detecting elements 2 for detecting the speed of a wheel 3 which is rotatably mounted on a chassis 5 (shown in part) of a vehicle. In the shown embodiment, the detecting elements consist of an encoder which, as it is well known, basically consists of a fixed detector 7 to read off the revolutions of the wheel attached to the chassis and a rotating reference 9 integral to the wheel.

The number of revolutions of the wheel detected by the encoder is sent via a line 10 to automatic regulation elements 11. These elements may be electronic means, a microprocessor for example. Said automatic regulation elements 11 are connected via another line 12 to an electric motor 13 which enables the rotation of the brush 15. The elements 11 allow to vary the rotation speed of the motor 13 as a function of the rotation speed of the wheel according to preset parameters laid down by the manufacturer or operator of the vehicle. The motor is in turn coupled to one or more brushes 15. Obviously, the automatic regulation devices can be connected to a number of electric motors activating as many brushes.

In the case of a hydraulic vehicle, the automatic regulation devices will not be connected to an electric motor but rather to a switchboard or integrated circuit for controlling the fluid. In this case, the automatic regulation devices will vary the brush rotation speed by controlling the flow of a fluid.

Line 4, as shown in fig. 1, makes it possible to detect the state of the brush 15 in order to consequently control, by means of elements 11, the operation of the remaining brushes of the vehicle.

With reference to fig. 2, the elements 11 can be used to activate or deactivate the side brushes 17 in accordance with the operative or non-operative state of the central brush 19. In this case, only two side brushes are shown in order to simplify the explanation, but their number may be greater. The side brushes operate only if the central brush is in operation, that is if it is lowered in the direction of the bidirectional arrow A. In fact, only when the brush 19 is lowered all the blocking means on the controls 8 of the side brushes are freed and all the side brushes may be lowered, raised and activated either all together or only some at a time independently of one another. However, if the central brush has not been lowered, then it will not be possible to lower and activate the side brushes. In the same way, if the central

brush is raised, the elements 11 will automatically operate the elements 8 to raise the side brushes 17 and disactivate them.

Minor modifications suffice to make this final function possible. It is sufficient that the electronic elements have an appropriate programme, and that the elements for controlling the vertical movement of the brushes, which are already foreseen on a vehicle of this type, be made dependent from said electronic elements.

The device operates as follows. First of all, the operator starts the vehicle, and drives it over surfaces to be cleaned. The operator moves the vehicle at the advance speed which is most conducive to optimum cleaning. The detector 7 reads the reference position 9 and is able to calculate the advance speed of the vehicle. It communicates this information via line 10 to the automatic electronic regulation elements 11. These elements, on this basis of their information, use the programme to process a particular control which is sent to the electric motor 13 via line 12. This control enables the motor and therefore the brush 15 to revolve at a speed with is a function of the advance speed of the vehicle.

Therefore, the vehicle may now be driven by the operator with the brushes rotating at the most appropriate speed for the type of surface and dirt encountered during the passage of the vehicle. For example, if certain parts of the surface are particularly dirty, he will drive the vehicle slowly and the brush or brushes will also turn slowly in order to render their cleaning action more efficient. Thus an efficient cleaning is obtained.

In addition, the operator can also drive the vehicle safely and continuously since he is not obliged to change the brush speed manually.

Finally, when the automatic regulation elements 11 are able to control also the vertical movement of the brushes, as illustrated in fig. 2, the vehicle has a safety function which prevents an undesired activation of the side brushes independently of the activation of the central brush.

Claims

1. A device (1) for controlling the operation of one or more brushes of a wheeled vehicle for cleaning floors, characterized in that it comprises:

   - sensor means (2,4) to detect at least one state parameter of the vehicle, chosen between advance speed of the vehicle and condition of a brush,
   - automatic means (11) for regulating the operation of said brush or brushes as a function of the detected parameters.

2. A device according to claim 1, characterized in that said sensor means are detectors (2) for reading the advance speed of the vehicle and said automatic means (11) comprise means for regulating the rotation speed of said brush or brushes as a function of the advance speed of the vehicle.

3. An automatic control device according to claim 2, characterized in that said sensor means (2) comprise an encoder (11) coupled to a wheel (3) of the vehicle.

4. A control device according to any of the preceding claims, characterized in that said sensor means (4) comprise means for detecting the operative or non-operative state of a first brush (19) and said automatic regulation means (11) prevent or enable respectively, the operation of the remaining brushes (17) of the vehicle, as a function of said state of the first brush (19).

5. A control device according to claim 4, characterized in that said first brush is a central brush and said remaining brushes (17) are side brushes.

6. A control device according to claim 4 or 5, characterized in that said automatic means (11) allow said side brushes (17) to operate independently of one another.

7. A control device according to any of the preceding claims, characterized in that said automatic regulation means (11) are electronic means.

8. A wheeled vehicle for cleaning floors with brushes, characterized in that it comprises a device (1) according to one or more of the preceding claims.

Fig.1

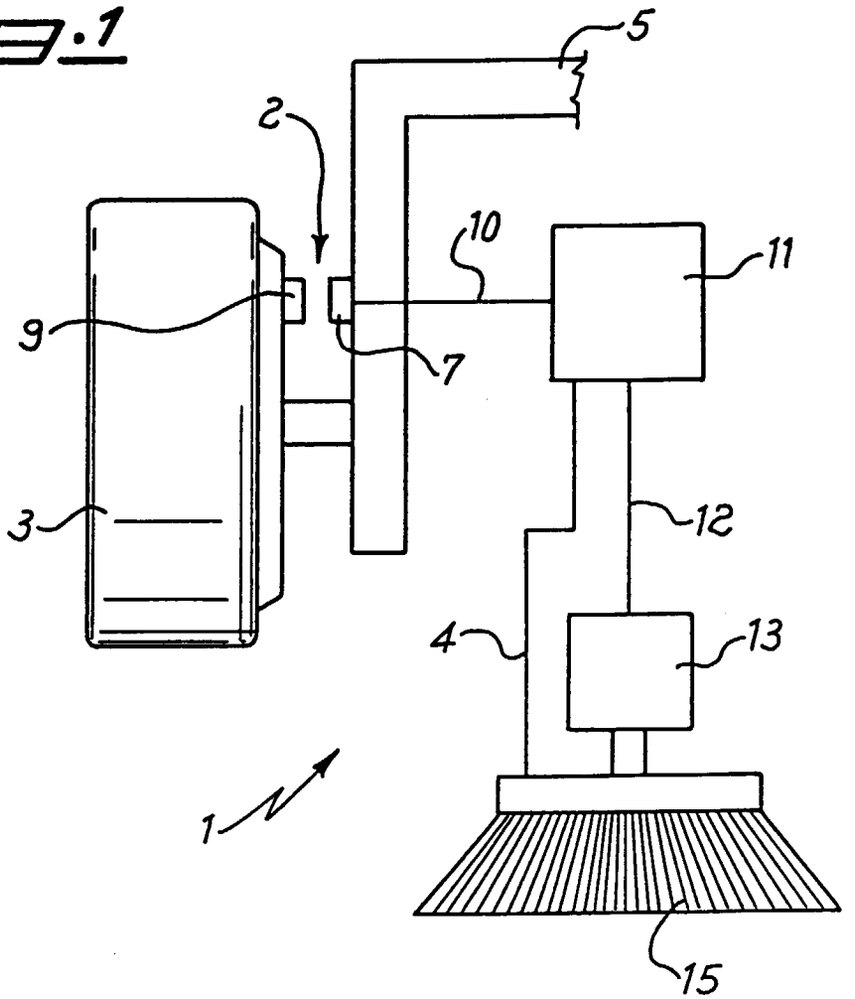

Fig.2