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## (54) Vehicle washing equipment

(57) Vehicle washing equipment in which rotary brushes 1 are carried on arms 4 pivoted about vertical axes so that each brush 1 can swing in an arc between an advanced position in which it presses against the side of a vehicle and a retracted position in which it is clear of the vehicle. Each arm 4 is normally held in the parked position against a fixed stop 7 by a spring 8. The arms 4 have hydraulic actuators in the form of bellows-like rubber bags 9 for moving the brushes 1 into the advanced position, and these actuators use as their source of power the same water supply as is used to feed nozzles on spray bars 14 for spraying water onto the vehicle. The water is fed to the actuator bag 9 via a control system 13.

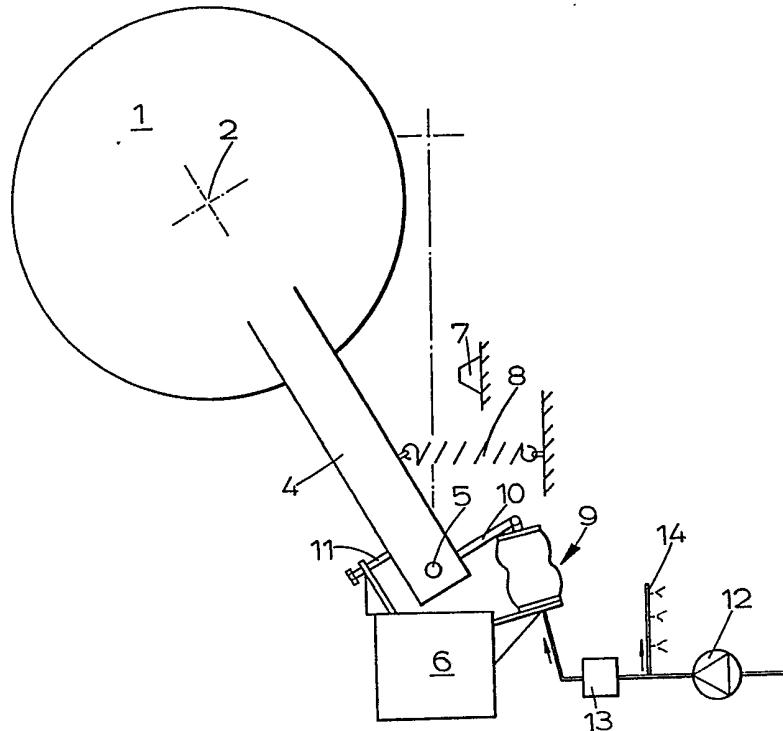


FIG. 2.

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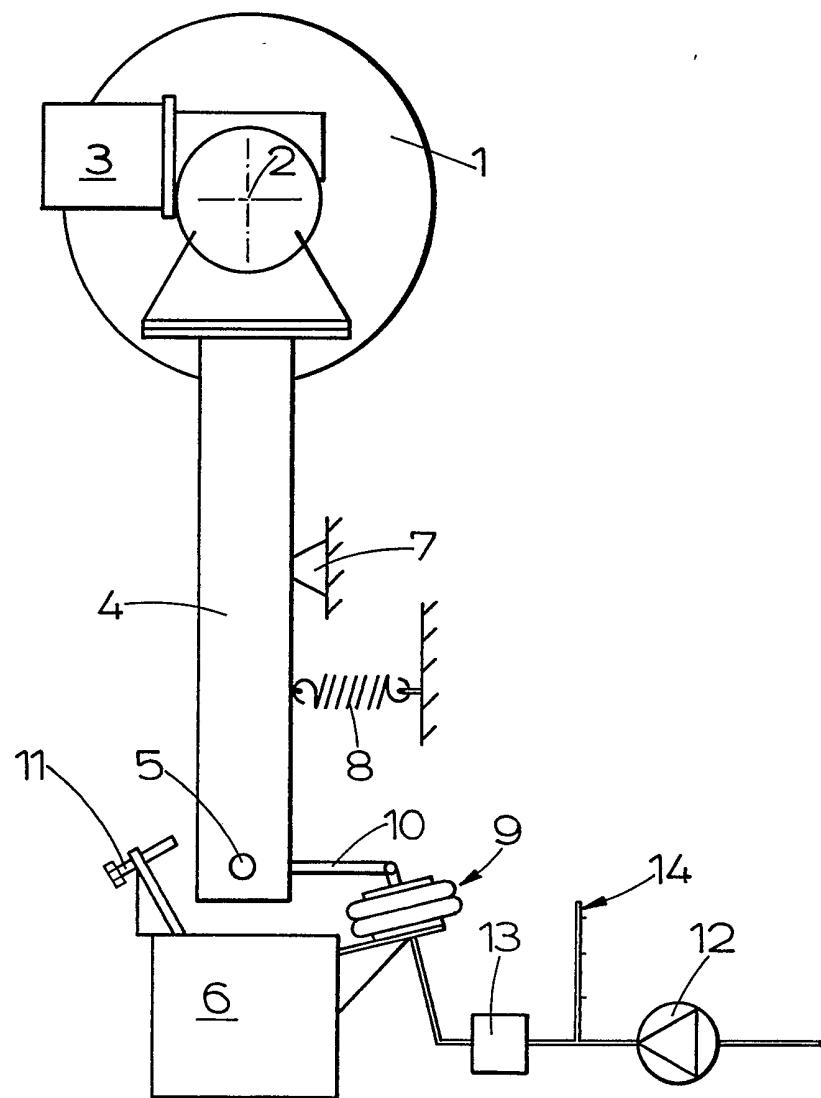


FIG. 1.

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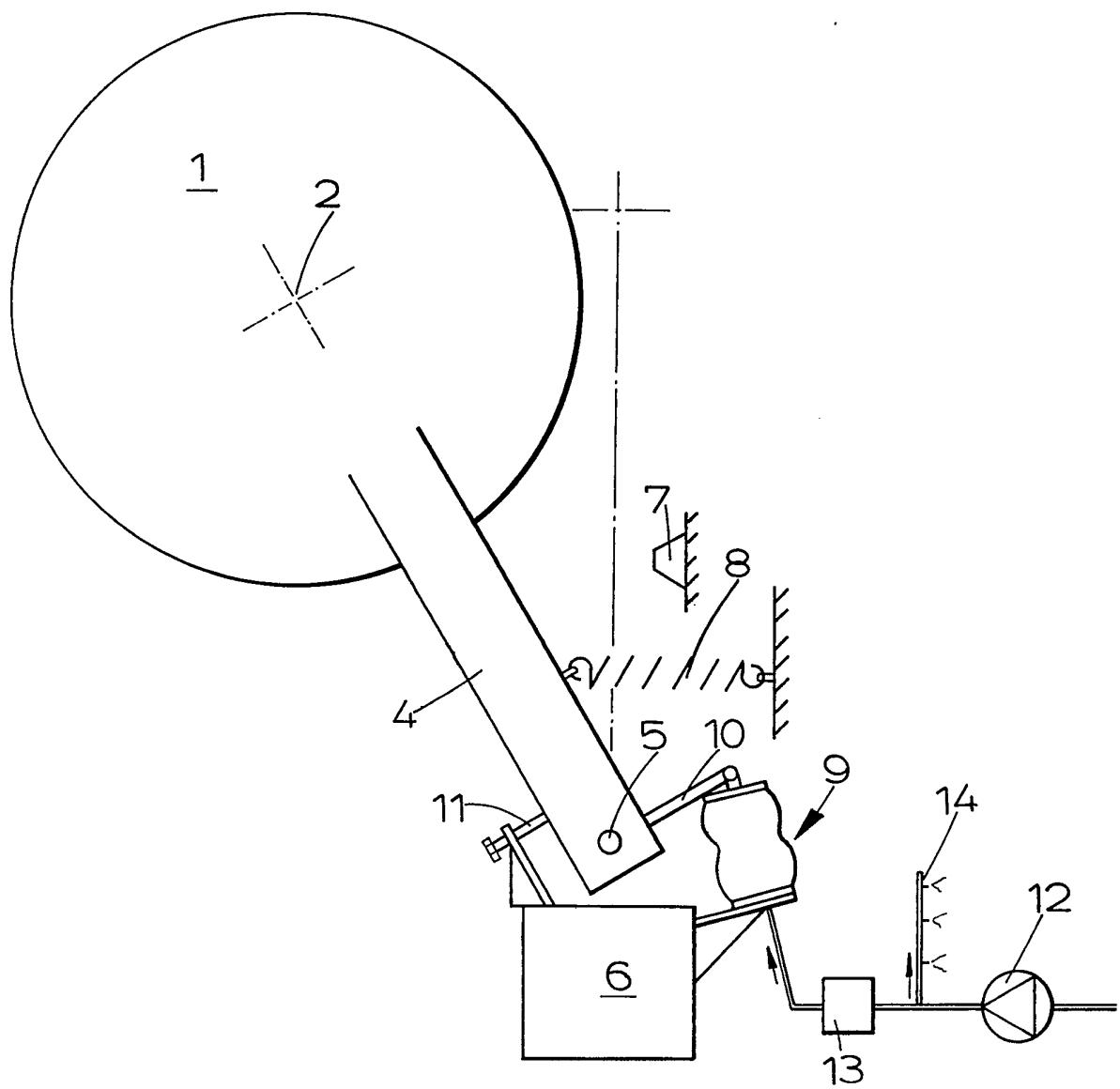


FIG. 2.

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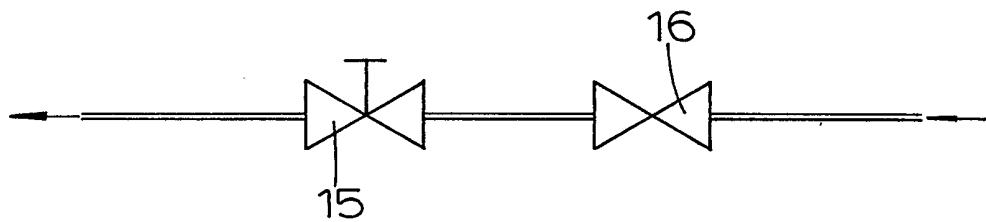


FIG. 3.

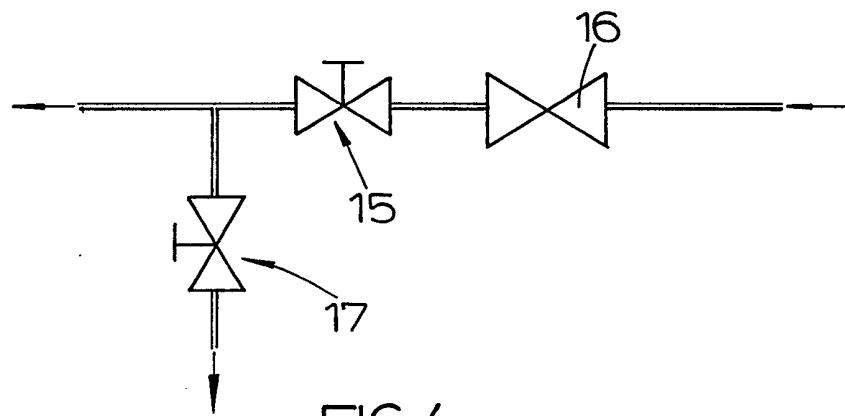


FIG. 4.

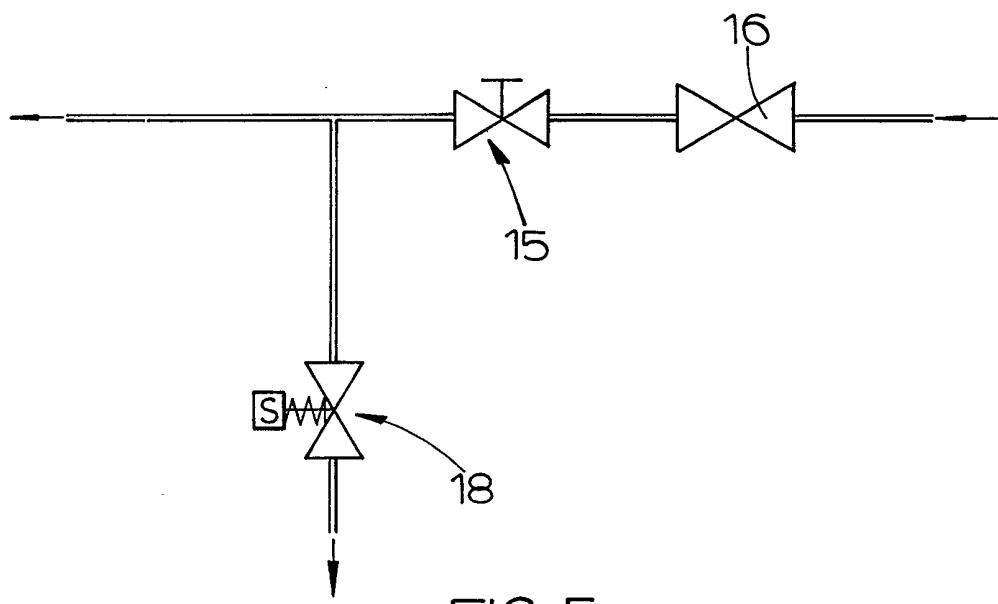


FIG. 5.

## SPECIFICATION

## Vehicle washing equipment

5 It is well-known to wash road and rail vehicles by the provision of rotary brushes of basically cylindrical shape and carried on arms which are themselves pivoted about substantially vertical axes so that each brush can swing in an arc between an advanced 10 position in which it presses against the side of the vehicle and a retracted position in which it is clear of the vehicle. With the brush in its advanced position, water is simultaneously sprayed onto the vehicle as it is driven slowly between a pair of such brushes, or 15 in some cases the vehicle is stationary and the brushes move past the vehicle.

To press the brushes against the vehicle the arms may be spring loaded, but springs have the drawback that the pressure varies with deflection and so if 20 the vehicle is not quite central, or if vehicles of different widths use the same equipment without the brushes being shifted, or if a vehicle has sides which, along their length, are not of constant distance from the centre line, the pressure will vary, being possibly 25 so great as to scratch or damage the vehicle on the one hand, or so little as to achieve inadequate cleaning on the other.

A better solution is to use a pneumatic or hydraulic ram to apply the force, and in particular an arrangement employing a hydraulic ram, complete with a 30 blow-off valve to limit the force to a pre-determined maximum value (which may be adjustable) is disclosed in Patent Specification No. 1 073 066, now expired. In that layout the hydraulic pressure was 35 derived from an electrically driven hydraulic pump, with the usual relief valve, reservoir and filter, and using the normal oil-based hydraulic fluid. However this involves a significant outlay in equipment, maintenance of the hydraulic equipment, topping up 40 with hydraulic fluid and so on.

The aim of the present invention is to achieve the desirable result of substantially even or constant brush pressure, yet without this additional complication.

45 According to the invention vehicle washing equipment comprises a brush, spray means for spraying water onto the brush or onto the surface to be washed, and an hydraulic actuator operable to move the brush from its inoperative, retracted, position to 50 its operative, advanced, position, the arrangement being such that the hydraulic actuator uses as its source of power the same water supply as is used to feed the spray means.

According to a further feature of the invention 55 instead of piston and cylinder rams, which are expensive items and open to corrosion when water is used, we employ bellows-like rubber bags as the actuators, similar to those used as air springs in suspension systems.

60 Where possible, the source of water is simply the same pumped supply as is used to spray the vehicle, as its pressure is usually sufficient, provided the actuator bags are made of ample diameter; then no auxiliary equipment, such as hydraulic pumps, filters 65 and reservoirs, is needed at all.

An additional important advantage of the invention is the 'fail-safe' aspect, that is to say, regardless of the source, failure of the water supply to the spray nozzles also relieves the brush pressure, so there is no danger of the brushes abrading a dry surface. 70 The brush may be biassed towards the retracted position by a spring or a counter-weight, or by tilting the axis of the arms slightly so that the weight of the brush itself swings it clear in the absence of 75 hydraulic pressure.

An example of an installation according to the invention, with alternative control systems, will now be briefly described with reference to the accompanying drawings, in which:-

80 *Figure 1* is a diagrammatic plan view of a single brush and its supporting column in the 'parked' (retracted) position;

*Figure 2* is a view similar to *Figure 1*, showing the brush advanced and rotating; and

85 *Figures 3, 4 and 5* show alternative control systems.

Referring first to *Figures 1 and 2*, a cylindrical brush 1 is rotated about a vertical axis 2 by an electric motor 3, the motor and the brush spindle 90 being supported on a pair of arms, of which only the upper one is visible at 4. These arms are pivoted at 5 to a fixed support column 6. Each arm is normally held in the parked position against a fixed stop 7 by a spring 8. However when water is admitted under 95 pressure to a flexible-walled rubber bag actuator 9, similar in shape and size to a two-convolution bellows-type vehicle air spring, acting on the arm 4 through a link 10, the brush is advanced to the position shown in *Figure 2*. An adjustable stop 11 100 limits the travel in the absence of a vehicle. The water comes from a source, which may be a pump 12 fed from a reservoir (not shown) or it could be the mains supply. It feeds the bag 9 through a control system 13 and it also feeds nozzles on a spray bar 105 indicated diagrammatically at 14.

One such control system 13 is shown in *Figure 3*; it simply comprises a variable restrictor 15 to limit the flow so that the brush is not advanced too rapidly, and there is also a shut-off valve 16 to allow the 110 spray to be used, if necessary, without advancing the brush at all.

An alternative, slightly more refined, control system is shown in *Figure 4*; in this case there is a further restrictor 17 in a path leading back to the 115 reservoir, or to waste, or to jets for spraying onto the vehicle or the brush 1 (alternatively the jets may themselves perform the function of the restrictor 17); by relative adjustment of the two restrictors it is possible to set accurately the pressure of the water 120 that reaches the actuator, and it remains constant regardless of the pressure from the pump or other supply.

*Figure 5* shows a further refinement, in which a solenoid-operated pressure control valve 18 is connected in the waste branch, in place of the restrictor 17 and allowing the pressure applied to the actuator 125 to be set and controlled from a remote point.

A water/detergent mixture may be used, rather than just water, to feed the bag actuator 9. One of the 130 advantages of the present system is that very fine

filtration is not needed and it can actually operate on relatively contaminated water.

It will be understood that throughout the Specification and in the claims the term 'water' is intended 5 to cover a mixture of water and detergent, as well as pure water.

## CLAIMS

- 10 1. Vehicle washing equipment comprising a brush, spray means for spraying water onto the brush or onto the surface to be washed, and an hydraulic actuator operable to move the brush from its inoperative, retracted, position to its operative, 15 advanced, position, the arrangement being such that the hydraulic actuator uses as its source of power the same water supply as is used to feed the spray means.
- 20 2. Vehicle washing equipment as claimed in claim 1, in which the hydraulic actuator takes the form of a bellows-like, flexible bag.
- 25 3. Vehicle washing equipment as claimed in claim 2, in which the bag is made of rubber.
4. Vehicle washing equipment as claimed in 25 claim 1, 2 or 3, in which the water is fed to the hydraulic actuator via a control system comprising a variable restrictor for limiting the flow so that the brush is not advanced too rapidly and a shut-off valve to allow the spray to be used without advancing 30 the brush.
- 35 5. A vehicle washing equipment as claimed in claim 4, in which the control system also comprises an exhaust by-pass controlled by means of a further variable restrictor, so that by relative adjustment of the said two restrictors it is possible to set the pressure of the water that reaches the actuator to a desired constant level.
- 40 6. Vehicle washing equipment as claimed in claim 5, in which the by-pass leads to further spray means for spraying water onto the brush or onto the surface to be washed.
- 45 7. Vehicle washing equipment as claimed in claim 5, in which the said further restrictor comprises further spray means for spraying water onto the brush or onto the surface to be washed.
- 50 8. Vehicle washing equipment as claimed in claim 5, in which the said further restrictor comprises a solenoid-operated pressure control valve so that the pressure applied to the actuator can be set and controlled from a remote point.
9. Vehicle washing equipment substantially as herein described with reference to Figures 1, 2 and 3 of the accompanying drawings.
- 55 10. Vehicle washing equipment as claimed in claim 9 as modified with reference to Figure 4 of the accompanying drawings.
11. Vehicle washing equipment as claimed in claim 9 as modified with reference to Figure 5 of the accompanying drawings.