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Takeuchi

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[54] **CAR BODY DRYING APPARATUS**

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[52] **U.S. Cl.** **34/229,** 34/223

[51] **Int. Cl.** **F26b 19/00**

[58] **Field of Search** ..... 34/223, 225, 229; 15/DIG. 2, DIG. 7, 405; 239/186

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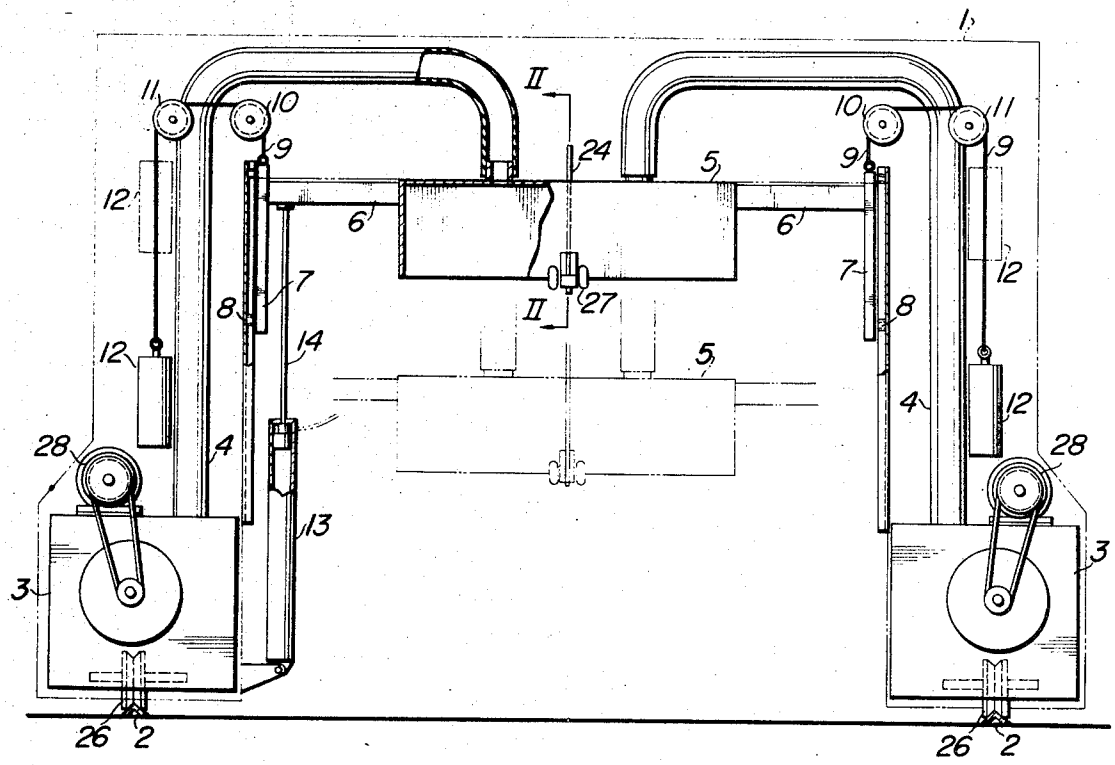
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Assistant Examiner—James C. Yeung
Attorney—Karl W. Flocks

[57] **ABSTRACT**

A car body drying apparatus having a nozzle assembly suspended by at least one rope and constantly pulled upwardly through the rope under the influence of a weight, a fluid pressure operated piston-cylinder being provided for lowering the nozzle assembly against the influence of the weight.

7 Claims, 4 Drawing Figures



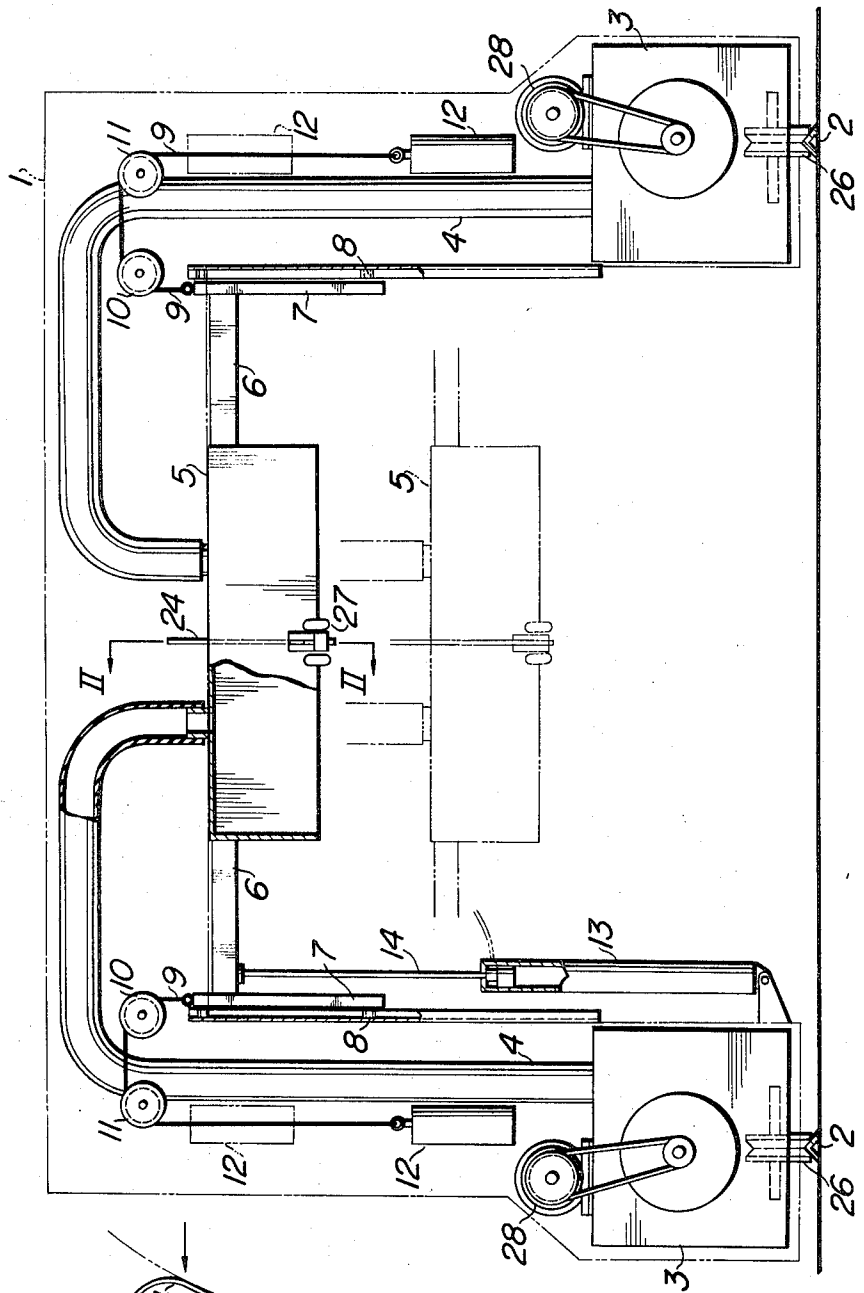


FIG. 1

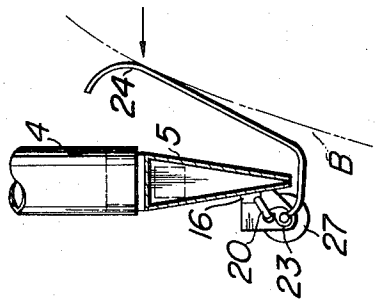


FIG. 2

FIG. 3

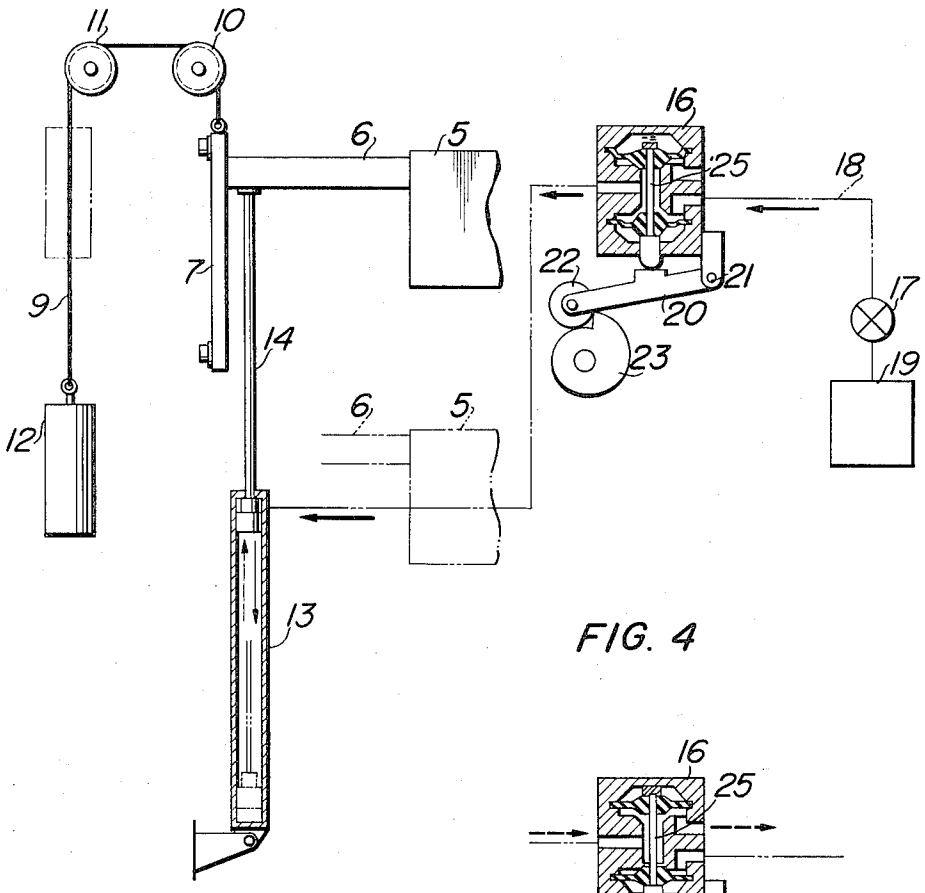
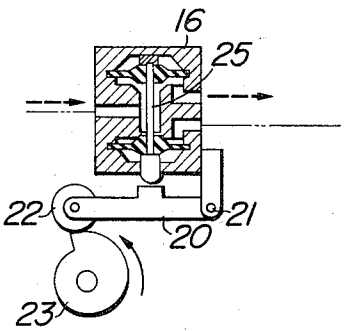


FIG. 4



CAR BODY DRYING APPARATUS

The present invention relates to a car body drying apparatus and more particularly to such an apparatus that is equipped with a novel safety feature.

In a conventional car washing apparatus, it is customary to use a car body drying apparatus in order to forcibly dry a car body after it is washed. According to a known arrangement, the car body drying apparatus comprises an upper and side nozzles corresponding respectively to the upper and side surfaces of the car body, whereby dried air is discharged through the nozzles against the car body. The upper nozzle is vertically movably mounted so that it can follow the upper contour of the car body. However, in this known arrangement, if the elevating device itself or the driving system thereof becomes out of order, the upper nozzle may possibly be allowed to fall on the car body damaging the upper surface thereof.

The present invention has a primary object to eliminate the aforementioned disadvantages of the conventional apparatus.

A further object of the present invention is to provide a car washing apparatus which is provided with safety feature for preventing inadvertent fall of the upper air nozzle.

According to the present invention, there is provided a car body drying apparatus comprising a frame, a nozzle assembly vertically movably mounted on the frame and adapted to spray drying air, means for constantly biasing the nozzle assembly in the upward direction, and means for lowering the nozzle assembly against the action of the biasing means.

According to a preferred feature of the present invention, the frame is arranged on guide rail means so that it is movable therealong. The nozzle assembly is preferably suspended by a pair of ropes, each of which is secured at one end to the nozzle assembly and passed upwardly, then around guide pulley means and finally downwardly. A weight is secured to the other end of each rope so as to constitute the biasing means. The means for lowering the nozzle assembly is preferably constituted by a fluid pressure operated piston cylinder assembly.

The above and other objects and features of the present invention will become apparent from the following descriptions of a preferred embodiment taking reference to the accompanying drawings, in which;

FIG. 1 is a front view of a car drying apparatus embodying the features of the present invention, the apparatus being partially cut away in order to show the interior thereof;

FIG. 2 is a fragmentary sectional view taken substantially along the line A — A in FIG. 1;

FIG. 3 is a diagrammatical view showing a nozzle elevating means and a valve mechanism associated therewith; and

FIG. 4 is a fragmentary sectional view showing the valve in the open position.

Referring now to the drawings, particularly to FIG. 1, the drying apparatus includes a frame 1 of an inverted channel shape having a pair of vertical legs. The frame 1 is movably supported on a pair of guide rails 2 and provided with a blower 3 at the lower end of each vertical leg. Each of the blowers 3 has an output port which is connected to one end of an air conduit 4. The air conduits 4 are in turn connected at their opposite ends

to a nozzle assembly 5. The nozzle assembly 5 has a pair of supporting rods 6 extending horizontally from the opposite ends thereof and is supported by the frame 1 through sliding members 7 secured to the outer ends of the supporting rods 6 and slidable along guide members 8 provided on the frame 1. A rope 9 is secured at its one end to the upper end of each sliding member 7, the rope 9 being extended upwardly therefrom, then passed around a pair of guide pulleys 10 and 11 and extended downwardly. At the opposite end of the rope 9, there is secured a weight 12. The weights 12 serve to constantly bias the nozzle assembly 5 upwardly.

As shown in FIGS. 1 and 3, an air cylinder 13 is disposed along one of the legs of the frame 1 with the bottom end of the cylinder 13 secured thereto. The cylinder 13 has a piston rod 14 having an upper end secured to one of the supporting rods 6. As shown in FIG. 3, the upper compartment of the air cylinder 13 is connected to an air pressure accummulator 19 through a conduit 18 which includes a switching valve 16 and a shut-off valve 17. As shown in FIGS. 1 and 2, the valve 16 is mounted on the nozzle assembly 5 at the center portion of its front surface and serves to allow the air to flow into the nozzle assembly from the upper compartment of the air cylinder 13.

An actuating arm 20 is pivotally supported at a point 21 and extends below the switching valve 16. The arm 20 has a roller 22 carried at the free end thereof for cooperation with a cam 23 rotatably mounted on the nozzle assembly 5. The cam 23 has a feeler 24 secured at its one end to the cam 23 with the other end normally extending rearwardly. An appropriate stopper (not shown) may be provided to prevent the feeler from drooping downwardly due to its weight. The valve 16 has a valve rod 25 which projects downwardly from the valve and co-operates with the central portion of the actuating arm 20. Thus, when the cam 23 is rotated to make the actuating arm 20 swing upwardly, the valve rod 25 is moved upward and the port of the valve 16 leading to the upper compartment of the air cylinder 13 is opened to atmosphere. In the normal position shown in FIG. 3, the accumulator 19 is connected through the valve 16 to the upper compartment of the air cylinder 13.

In FIG. 1, the reference numeral 26 shows wheels supported on the rails and 28 a pair of motors, each associated with each one of the blowers 3. The reference numeral 27 in FIGS. 1 and 2 designates a pair of rollers made of resilient material and rotatably supported at the center portion of the lower edge of the nozzle assembly 5. The rollers 27 serve to contact with the upper surface of a car body B to be washed and maintain a predetermined clearance therebetween.

In operation, when the air cylinder 13 is not supplied with air pressure, the nozzle assembly 5 is lifted to the upper position as shown by the solid lines in FIG. 1 by means of the weights 12 which acts thereon through the ropes 9.

When the shut-off valve 17 is opened to supply pressurized air from the pressure accumulator 19 to the upper compartment of the air cylinder 13, the piston rod 14 is moved downwardly to cause the nozzle assembly 5 to move downwardly against the influence of the weights 12 to the position shown by dotted lines in FIGS. 1 and 3. The lowered position is previously determined so that a proper clearance is maintained between the nozzle assembly 5 and the front and rear

bonnet portions of the car body for performing a proper drying operation. In this position the blowers **3** are operated and the frame **1** is moved along the rails **2** passing over the car disposed between the rails **2**. When the nozzle assembly **5** passes over the front bonnet portion of the car body B and comes close to the windshield glass, the feeler **24** engages the glass surface and pushed upwardly as shown in FIG. **2** causing the cam **23** to rotate counterclockwise as seen in FIG. **4**. Thus, the actuating arm **20** is swung upwardly to push the valve rod **25** upwardly, whereby the valve **16** is allowed to open the upper compartment of the air cylinder **13** to the atmosphere. Thus, as far as the feeler **24** is in contact with the car body, the air in the upper compartment of the air cylinder **13** is continuously exhausted allowing the nozzle assembly **5** to move upwardly under the influence of the weights **12**. The nozzle assembly **5** is thus moved upwardly along the front windshield surface injecting dried air thereto. When the nozzle assembly **5** is moved along the roof portion or along the rear window glass, the valve **16** is in the position shown in FIG. **3** since the feeler **24** is free from the car body. Therefore, pressurized air is allowed to flow through the valve **16** into the upper compartment of the air cylinder **13**. Thus, the nozzle assembly **5** is urged downwardly but maintained apart from the car body due to the provision of the rollers **27**.

From the above description, it will be clear that the nozzle assembly **5** can follow the contour of the car body to effectively dry the surface thereof. It should further be noted that, even when the air cylinder **13** or its pneumatic system becomes out of order, the nozzle assembly **5** is not allowed to fall onto the car body but is moved upwardly under the influence of the weights **12**.

Although the invention has been illustrated and described with reference to a specific embodiment which is believed to be a preferred one, it is in no way limited to the details of the illustrated arrangement but should be construed as being broad enough to cover all changes and modifications which fall within the scope of the appended claims.

I claim:

1. A car body drying apparatus comprising

a frame,

a nozzle assembly vertically movably mounted on the frame and adapted to spray drying air,

means for constantly biasing said nozzle assembly in the upward direction,

means for lowering said nozzle assembly against the action of said biasing means,

feeler means connected to said nozzle assembly

valve means controlled by said feeler means to control said lowering means and adapted to cause said biasing means to overcome said lowering means when said feeler means is moved beyond a predetermined limit by its contact with the car body.

2. The car body drying apparatus of claim **1**, further characterized by

rail means movably supporting said frame.

3. The car body drying apparatus of claim **1**, further characterized by

said biasing means including

at least one rope secured at one end to said nozzle assembly and having a weight attached to its other end,

and guide pulley means supporting said at least one rope.

4. The car body drying apparatus of claim **1**, further characterized by

said lowering means including

a fluid pressure operated piston-cylinder assembly.

5. The car body drying apparatus of claim **4**, further characterized by

said valve means connected to said fluid pressure operated piston-cylinder assembly to release fluid pressure on one end of said piston-cylinder assembly to remove resistance against said biasing means when said feeler means is moved beyond the predetermined limit by its contact with the car body.

6. The care body drying apparatus of claim **1**, further characterized by

a cam means connected to said feeler means for rotation thereby and positioned to operate said valve means.

7. The car body drying apparatus of claim **1**, further characterized by

said nozzle assembly including at least one roller adapted to contact the car body for maintaining a predetermined clearance therebetween.

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