

[54] **CONTROL SYSTEM FOR  
 HORIZONTAL SCRUBBING BRUSH OF  
 VEHICLE-WASHING STATION**

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[51] Int. Cl. ....B60s 3/06

[58] Field of Search .....15/DIG. 2, 21 D,  
 15/21 E, 53, 97

[56] **References Cited**

**UNITED STATES PATENTS**

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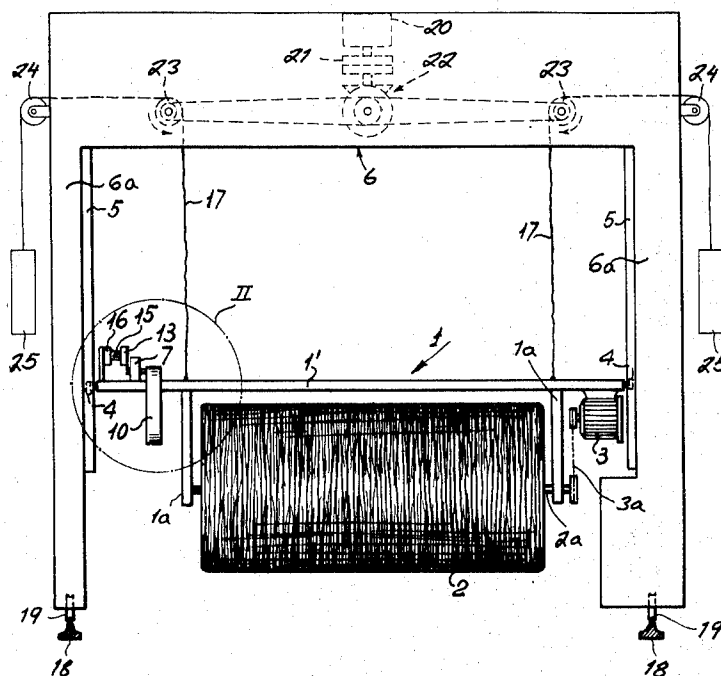
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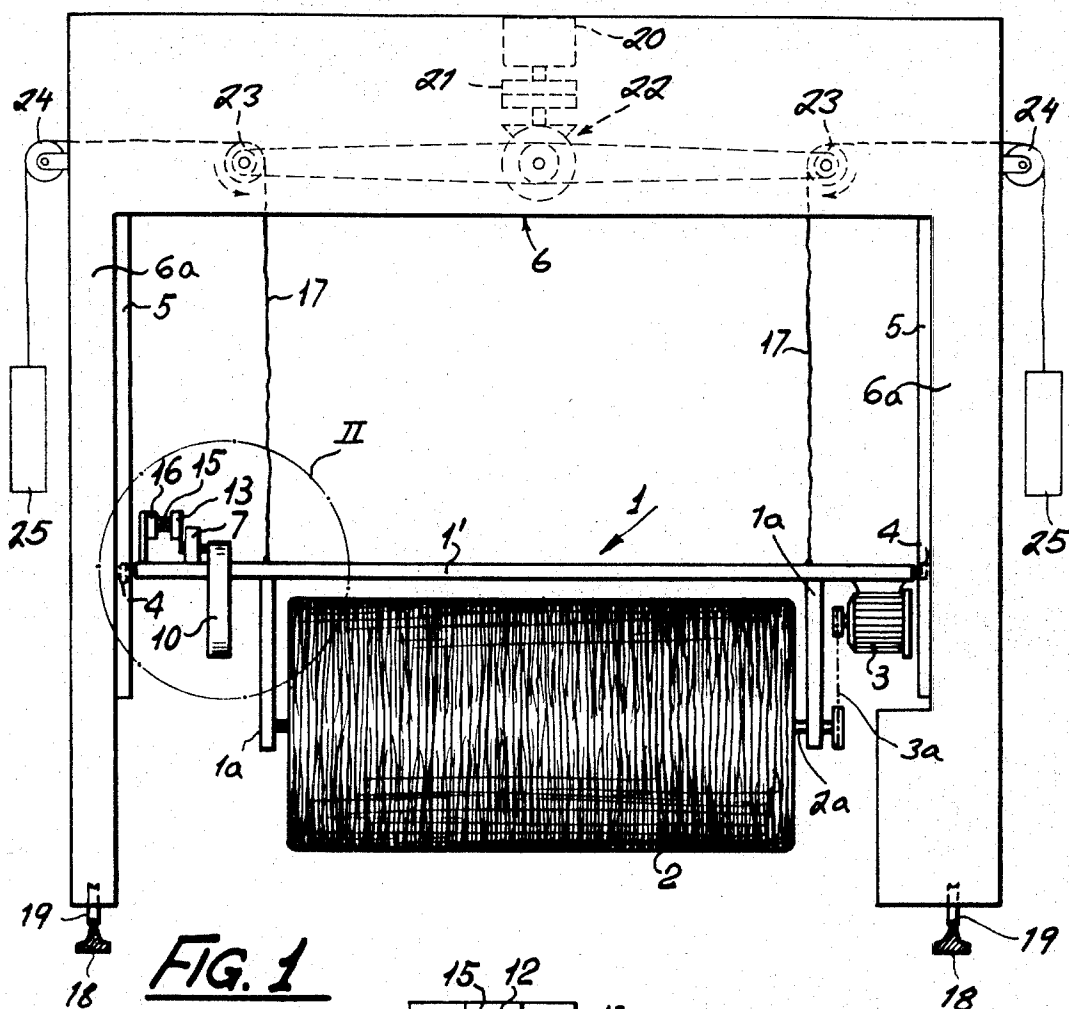
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[57] **ABSTRACT**

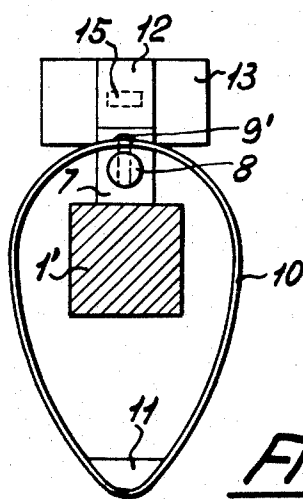
A portal frame in a vehicle-washing station has two vertical tracks engaged by a pair of coaxial rollers at the ends of a supporting bar having a horizontal scrubbing brush suspended therefrom, the brush and its support being nearly balanced by counterweights so as to rest only lightly on a horizontal vehicular surface to be scrubbed. The brush is continuously rotated in such a sense that, upon relative motion of frame and vehicle, the brush spontaneously creeps up any moderately inclined surface it encounters. Steeply inclined or vertical surfaces cause the brush support to swing about its vertical axis, in the direction of relative vehicle motion, whereupon an inclination-responsive switch cuts in a drive to elevate the brush. The switch may comprise a weighted cam carrier freely pivoted on the support and coacting with a follower mounted on the bar thereof.

**8 Claims, 4 Drawing Figures**





**FIG. 1**

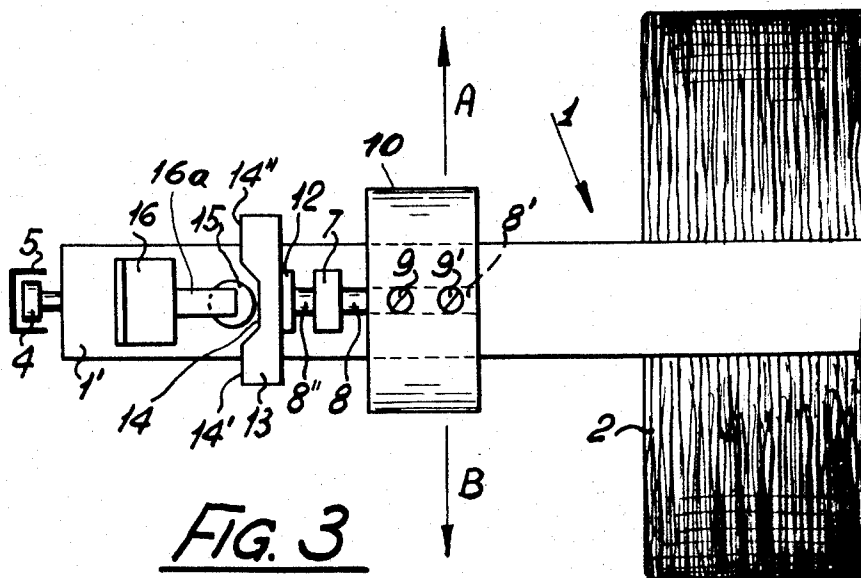
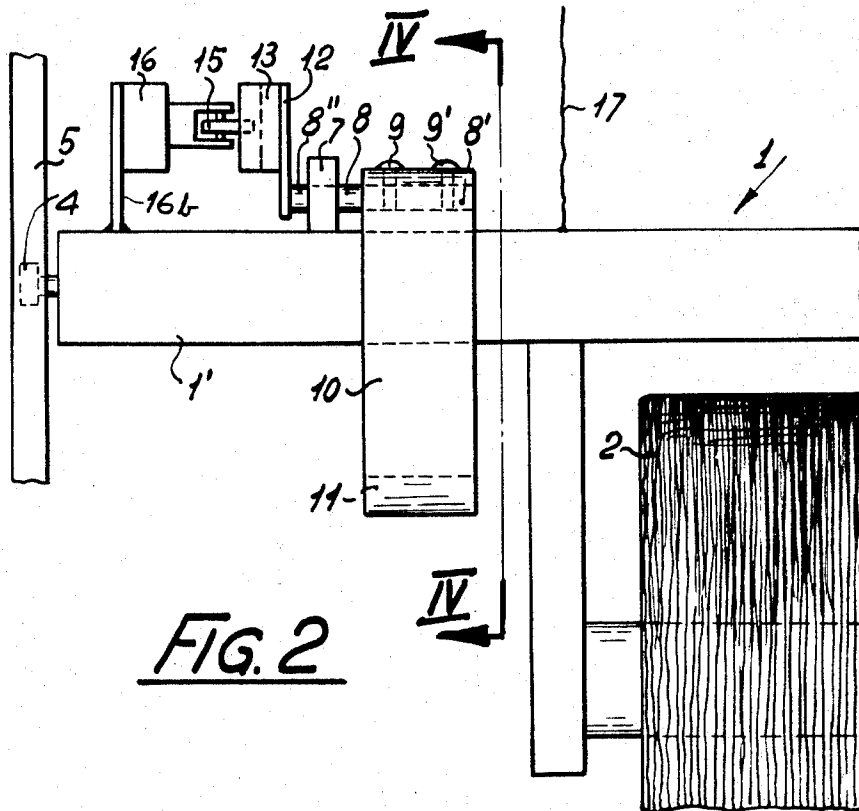


**FIG. 4**

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# CONTROL SYSTEM FOR HORIZONTAL SCRUBBING BRUSH OF VEHICLE-WASHING STATION

My present invention relates to a plant for cleaning, i.e., washing and/or drying, automotive vehicles and the like with the aid of rotating scrubbing brushes, e.g., as generally described in my prior U.S. Pat. No. 3,500,487.

Such systems normally include a so-called portal frame which straddles the path of the vehicle to be cleaned and which carries one or more scrubbing brushes, including at least one brush rotatable about a horizontal axis for cleaning the front, top and rear surfaces of the vehicle. Motion is imparted to the frame and/or to the vehicle for relatively displacing same during the scrubbing operation, the drive means used for this purpose being advantageously reversible to permit a more intensive sweep of both end surfaces.

In my copending application Ser. No. 99,408 filed 18 Dec. 1970, now U.S. Pat. No. 3,688,329, I have disclosed a washing or cleaning stage of this general type wherein a horizontal scrubbing brush is vertically guided along the jambs of a portal frame and is partly balanced by counterweights so as to tend to descend onto an underlying vehicle surface, the vertical guide tracks for the brush being formed by a pair of uprights which are swingably mounted on the portal frame so as to yield in the direction of relative vehicle motion whenever the brush encounters an inclined or vertical surface. Such a swing from a normal brush position actuates an inclination sensor, e.g., a mercury switch, which thereupon starts a hoisting motor to elevate the brush until the latter clears the engaged surface. In the preferred embodiment described in the copending application, the brush is continuously rotated in a sense preventing it from creeping up a rising surface in contact with it, the swingable brush support being advantageously provided with centering springs or the like tending to maintain it in its normal vertical position.

The general object of my present invention is to provide a control system for such a horizontal scrubbing brush which is of simplified construction, avoiding the need for a pair of swingable guide tracks to mount the brush on its portal frame.

As in the system of my copending application, the brush is of generally cylindrical configuration with the cylinder axis extending horizontally and transverse to the path of relative motion of the portal frame and the vehicle. The brush is mounted on a support which is swingable with reference to the portal frame but, in contradistinction to the mounting of the copending application, is vertically guided in a pair of fixed tracks on the frame jambs. This support may simply comprise a horizontal bar spanning the portal frame and terminating in a pair of end rollers engaging the two guide tracks, the common axis of these rollers constituting the swing axis of the brush and its support. The inclination-responsive switch senses any deflection of the brush from its normal vertical attitude to operate an associated hoist motor, generally in the manner disclosed in my copending application, to raise the brush past the rising vehicular surface.

Although such a system could be used with the brush rotating in either sense as the vehicle is relatively dis-

placed in a predetermined direction, an advantageous embodiment (more fully described hereinafter) utilizes a sense of rotation opposite that preferentially employed in my earlier system, i.e., a rotation tending to induce upward creep along an inclined vehicular surface. The relatively low moment of inertia of the swingable unit of my present system enables almost instant detection of even a moderate upward slope so that the brush can readily follow the contours of the vehicle.

According to a more specific feature of my invention, the inclination sensor on the brush support comprises a weighted element which is freely pivoted on the supporting bar and coacts with a mounting element rigid with that bar, one of these elements being provided with a camming profile displacing a follower on the other element in a relatively swung-out position of the two elements.

The above and other features of my invention will be described in detail hereinafter with reference to the accompanying drawing in which:

FIG. 1 is a somewhat diagrammatical front-elevational view of a vehicle-washing station embodying the present improvement;

FIG. 2 is an enlarged front-elevational view of a part of the system of FIG. 1 encompassed within the area II thereof;

FIG. 3 is a top plan view of the elements visible in FIG. 2; and

FIG. 4 is a cross-sectional view taken on the line IV—IV of FIG. 2.

The system shown in the drawing comprises a vertically movable unit, generally designated 1, slidably guided in the jambs 6a of a portal frame 6 with the aid of a pair of channeled track members 5 secured to these jambs. Frame 6 rides, by means of two sets of rollers 19 which are driven by a motor not shown (see U.S. Pat. No. 3,688,329), on horizontal rails 18 so as to be movable with reference to a stationary vehicle positioned between these rails. It will be understood that the frame could also be stationary if the vehicle is in motion during the scrubbing operation.

Mobile unit 1 includes a horizontal bar or beam 1' which terminates in a pair of end rollers 4 guided in the slots of track members 5. This mode of guidance also allows the bar 1' to pivot on the common axis of rollers 4. Such pivotal movement is communicated to a horizontal scrubbing brush 2 which is suspended from bar 1' by two arms 1a in which it is rotatably journaled; the shaft 2a of brush 2 is driven from a motor 3, also carried on bar 1', with the aid of a belt or chain transmission 3a.

An inclination sensor 10 comprises a hoop of generally ovoid shape whose downwardly pointed extremity is weighted by a heavy insert 11 and which therefore maintains a vertical attitude as illustrated in FIG. 4. Hoop 10 embraces the bar 1' with enough clearance to allow a substantial relative swing to either side, the top of the hoop being fastened for this purpose to an extremity 8' of a horizontal pin 8 journaled in a lug 7 which rises from bar 1'; the hoop is secured to the pin 8 with the aid of a pair of bolts 9, 9'. The opposite end 8'' of pin 8 is rigid with an arm 12 carrying a cam member 13 with a camming edge 14, 14', 14'' symmetrical about the bisector of the hoop 10. A cam follower

15, in the form of a roller supported by a pushbutton-type operating arm 16a of a switch 16 fixedly mounted on an extension 16b of bar 1', confronts the camming edge 14, 14', 14'' so as to be shifted to the left (as viewed in FIGS. 1-3) whenever the sensor 10 swings out to either side as indicated by arrows A and B in FIG. 3. Such displacement closes the energizing circuit of a normally unoperated hoist motor 20 to drive, via a slipping clutch 21 and a transmission generally designated 22, a pair of capstans 23 rotatably journaled in the frame 6. A pair of cables 17, wound one or more times around these capstans, engage the mobile unit 1 and pass around idler rollers 24, terminating in counterweights 25 which partially balance the weight of the mobile unit whereby this unit tends to descend toward the bottom of its guide tracks 5 — or to a vehicular surface underneath brush 2 — if the motor 20 on frame 6 is not energized, i.e., if the brush hangs down vertically from the bar 1' so that the latter and sensor 10 are in their normal relative position. Brush motor 3, which advantageously is reversible together with the motor for the frame drive, operates in such a sense that the side of the brush facing the oncoming vehicle moves downwardly, thereby tending to propel the brush in a direction opposite that of relative vehicle motion; naturally, the brush rotates at such a high speed that its peripheral velocity greatly exceeds the relative velocity of the vehicle and the frame. The balancing effect of the counterweights 25 reduces the friction between the bristles or filaments of the brush and the scrubbed surface to such a value that, if this surface is substantially horizontal, the resulting swing of the mobile unit 1 about the axis of rollers 4 is insufficient to trip the switch 16 whose contactor 15 is normally spaced from the cam member 13. In the case of a slightly rising surface, the relative motion of the vehicle generates a forward thrust opposing the rearward creep of the brush; the brush is then more or less in its normal position or may be deflected forwardly (as viewed in the direction of relative vehicular motion), still without closing the switch 16. If, however, the brush-engaging surface has a substantial upward slope, the forward deflection of this unit with reference to the hoop 10 suffices to complete the energizing circuit of motor 20 whereby the unit 1 is elevated until the brush 2 is again free to swing back (by gravity and/or creep) after clearing the obstacle.

Naturally, the relative position of switch 16 and cam 13 could be interchanged, with the latter an integral part of the bar 1' and the former carried on the pivoted arm 12; with the illustrated construction, however, the electric circuits are simplified since the leads to and from the switch may be fixedly imbedded in bar 1' and mounting arm 16b. In its broader aspects, the invention could also be realized with other types of inclination-responsive devices such as the mercury switch of my copending application Ser.No.99,408 and U.S. Pat. No. 3,688,329. As likewise mentioned in that copending application and patent, the frame drive may be arrested in response to a substantial brush deflection to allow the unit 1 to clear a large vertical or nearly vertical vehicle surface, such as the front or back of a truck. For this purpose, and in line with the disclosure of that application, switch 16 may be provided with a break contact included in the energizing circuit of the frame

drive so as to open whenever the follower 15 is depressed sufficiently to operate the hoist motor 20.

It should be understood that the electric hoist motor 20 and other parts of the system may be replaced, if desired, by equivalent hydraulic and/or pneumatic means, e.g., as described in my above-identified prior U.S. Pat. No.3,500,487.

I claim:

1. In a vehicle-cleaning station, in combination:

a portal frame straddling the path of a vehicle to be scrubbed, said frame and said vehicle being relatively movable along said path;

a pair of vertical tracks at opposite jambs of said frame;

a horizontal bar provided with end rollers engaging said track, said end rollers being centered on a pivotal axis;

a generally cylindrical scrubbing brush suspended from said bar with its cylinder axis horizontal and transverse to said path;

normally inoperative hoist means on said frame for elevating said support means, the latter normally tending to descend and to lower said brush unto an underlying vehicle surface, said support means being swingable about a pivotal axis parallel to said cylinder axis;

drive means for rotating said brush about said cylinder axis, said brush yielding in the direction of relative vehicle motion upon encountering a relatively steeply inclined vehicular surface with consequent swinging of said support means about said pivotal axis; and

inclination-responsive switch means on said support means for actuating said hoist means upon such swinging from a normal position by a predetermined minimum angle, said switch means comprising a weighted element freely pivoted on said bar and a mounting element rigid with said bar, one of said elements being provided with a camming profile, the other of said elements being provided with a follower displaceable by said profile in a relatively swung-out position of said elements.

2. The combination defined in claim 1 wherein said weighted element comprises a hoop embracing said bar with clearance.

3. The combination defined in claim 2 wherein said bar is provided with an upstanding extension forming a fulcrum for said hoop.

4. The combination defined in claim 3 wherein said hoop is of generally ovoid shape with a downwardly pointed extremity.

5. The combination defined in claim 1 wherein said drive means is reversible and said bar is free to turn about said pivotal axis in either direction, said profile being symmetrical.

6. The combination defined in claim 1 wherein said bar is provided with cable means suspending same from said frame and with counterweight means on said cable means nearly balancing the combined weight of said bar and said brush.

7. The combination defined in claim 6 wherein said drive means is reversible and said bar is swingable about said pivotal axis in either direction to enable relative reciprocation of said frame and said vehicle.

8. The combination defined in claim 1 wherein said drive means is operative in a sense causing said brush to creep up relatively slightly inclined vehicular surfaces without substantial displacement from said normal position relative to said frame.

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