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Brunel et al.

[11] **3,786,779**

[45] **Jan. 22, 1974**

[54] **OVERHEAD RAIL CLEANER AND OILER**

[75] Inventors: **Roger L. Brunel**, Grove City; **Robert D. Fannon**; **Ronald L. Legue**, both of Columbus, all of Ohio

[73] Assignee: **Klenco Corporation**, Massilon, Ohio

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[21] Appl. No.: **288,870**

[52] **U.S. Cl.** ..... **118/4**, 15/77, 15/21 E, 15/312 R, 118/72, 118/307

[51] **Int. Cl.** **B05c 5/00**, E01h 8/00

[58] **Field of Search** ..... 118/305, 307, 72, 70, 4; 15/77, 21 E, 312 R; 198/229; 184/12

[56] **References Cited**

UNITED STATES PATENTS

2,264,048	11/1941	McMahon et al.	118/307
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3,641,618	2/1972	Rainey et al.	15/77 X

Primary Examiner—John P. McIntosh

Attorney, Agent, or Firm—Hamilton, Renner & Kenner

[57] **ABSTRACT**

An automatic cleaner for overhead conveyor rails comprising a motor-driven carriage riding on the rail. The machine has vertically disposed axially rotatable brushes for cleaning opposite sides of the rail and a suction device for collecting dirt removed by the brushes. The brushes are vertically adjustable to avoid interference with rail switches and with rail hanger brackets and their rivet heads. An oil spray system mounted on the machine behind the brushes coats the cleaned surfaces of the rail to inhibit corrosion.

11 Claims, 9 Drawing Figures

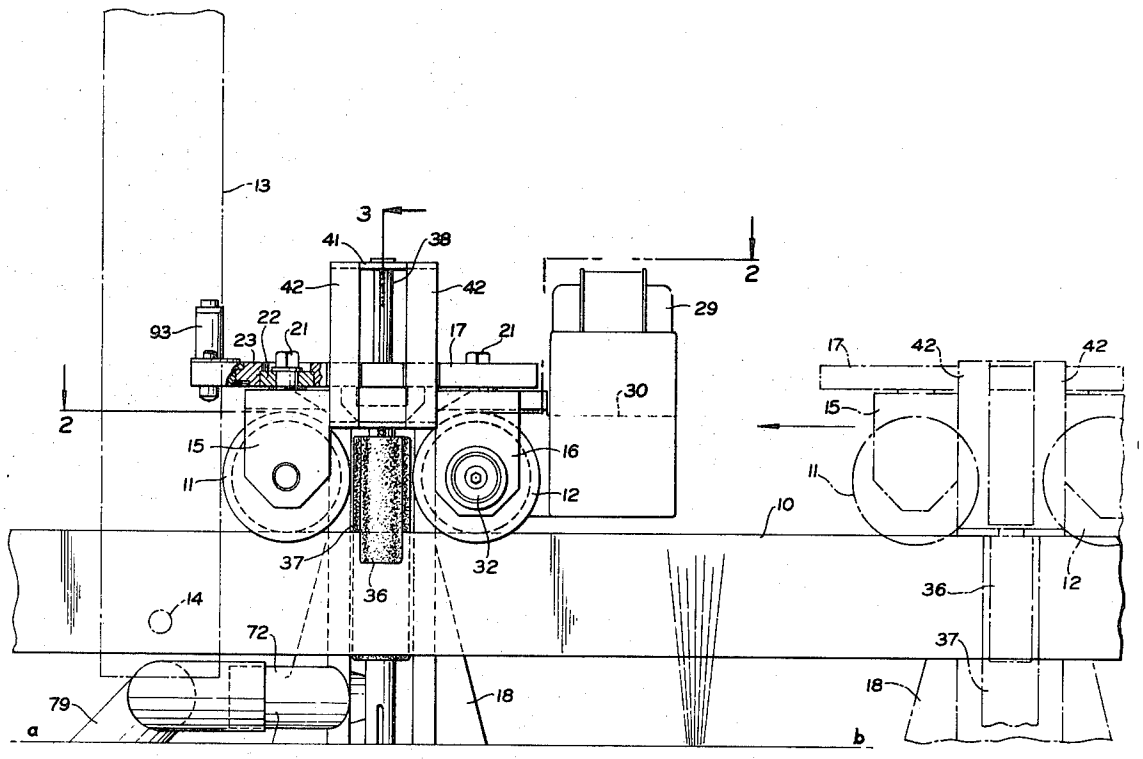


FIG. 1

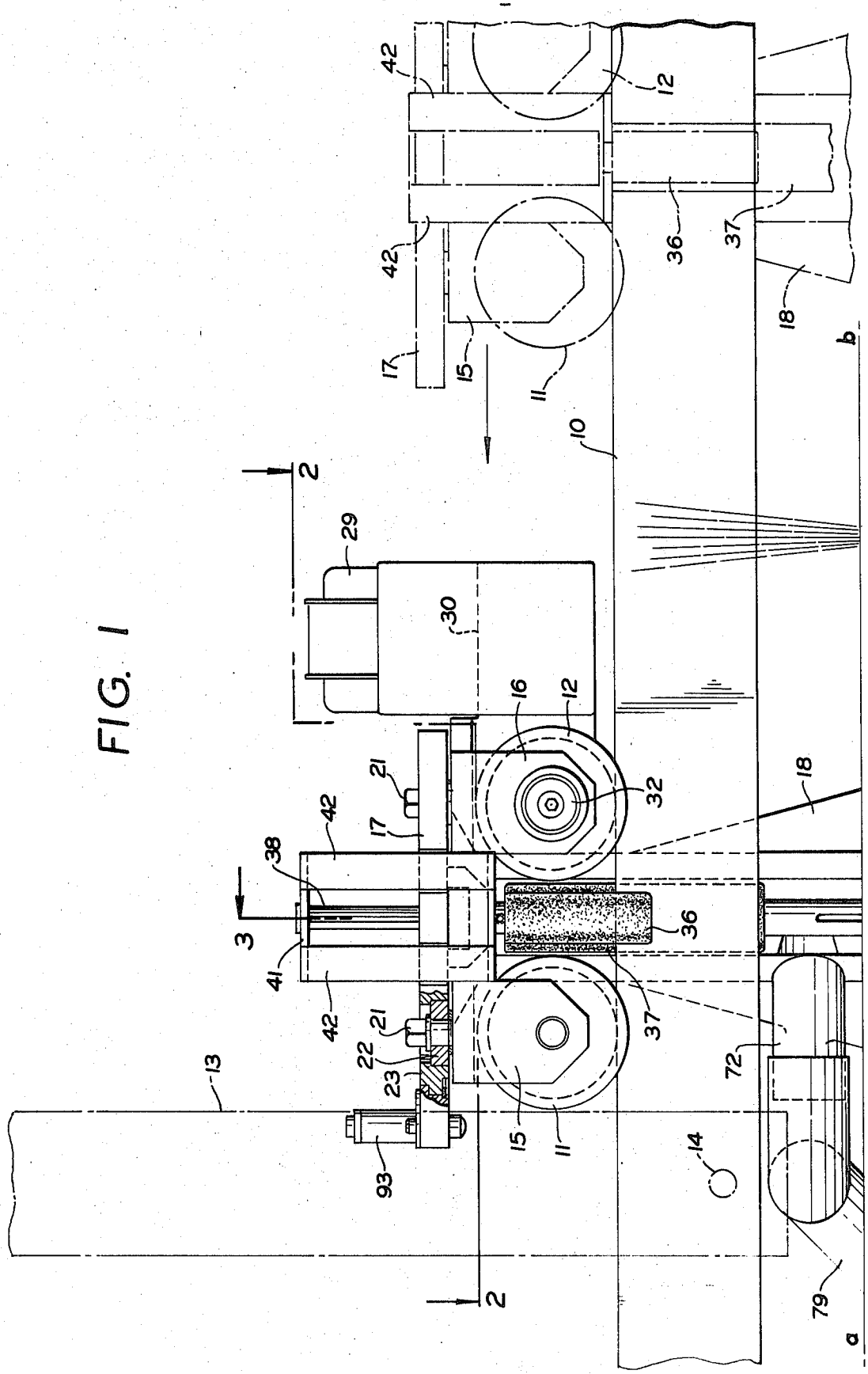
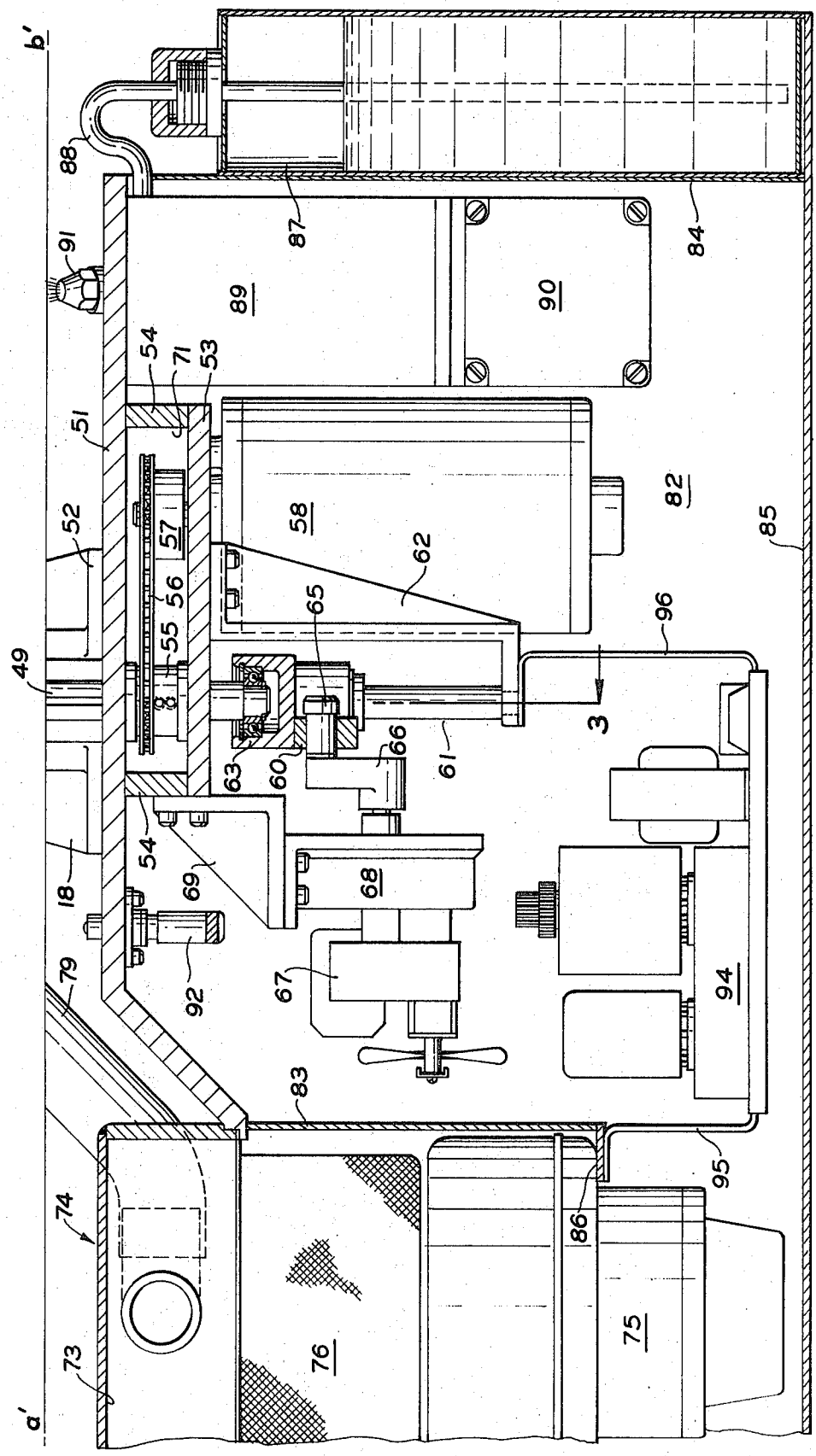

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36
37
18
b
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36
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42
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72
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13
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93
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a
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FIG. 1A


b'
a'
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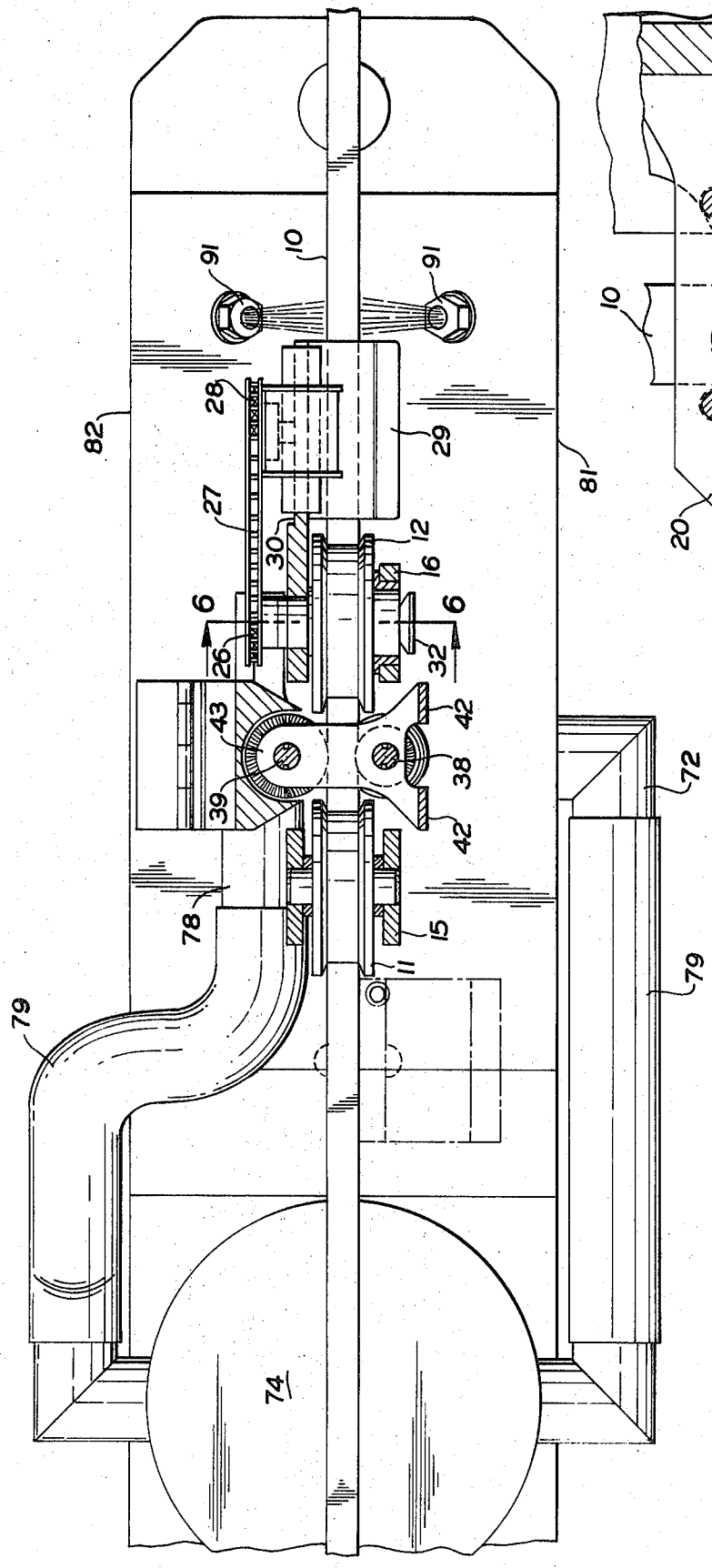

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FIG. 2

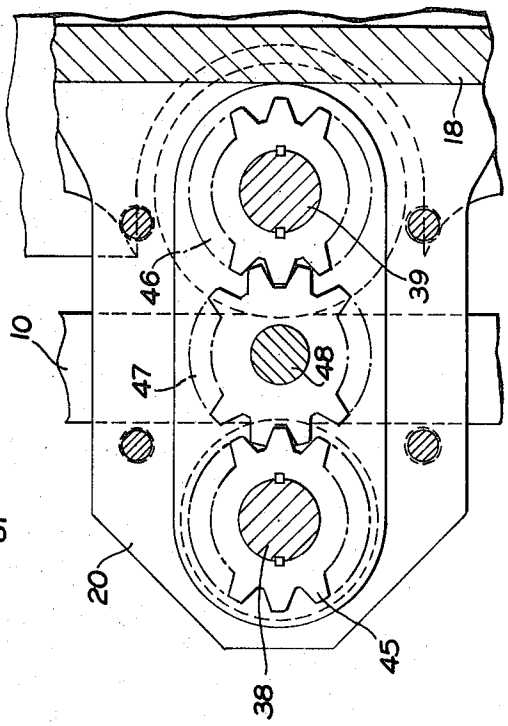

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FIG. 5

FIG. 3

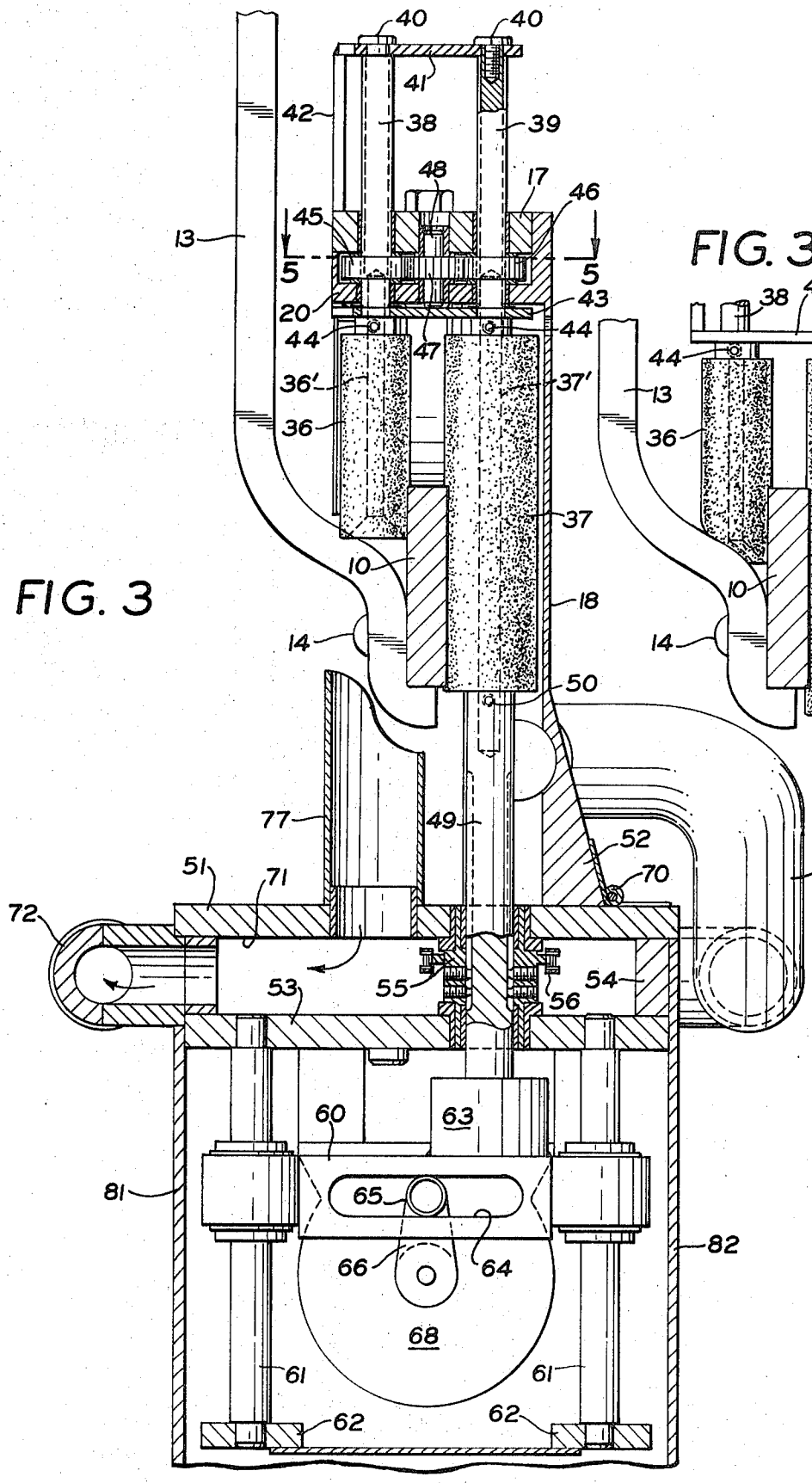
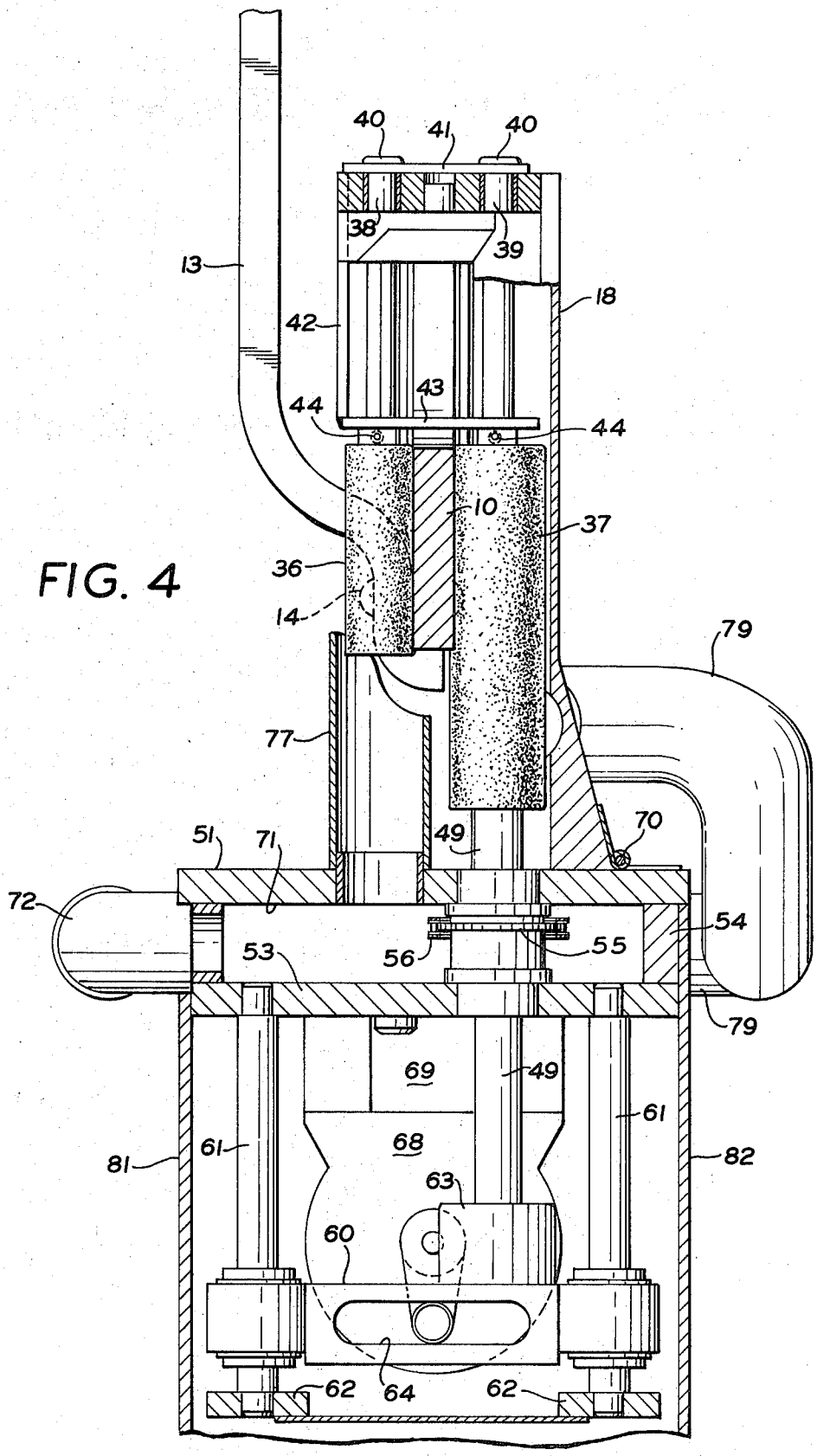

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36'
37'
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37
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77
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71
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78
72
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FIG. 3A

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FIG. 4


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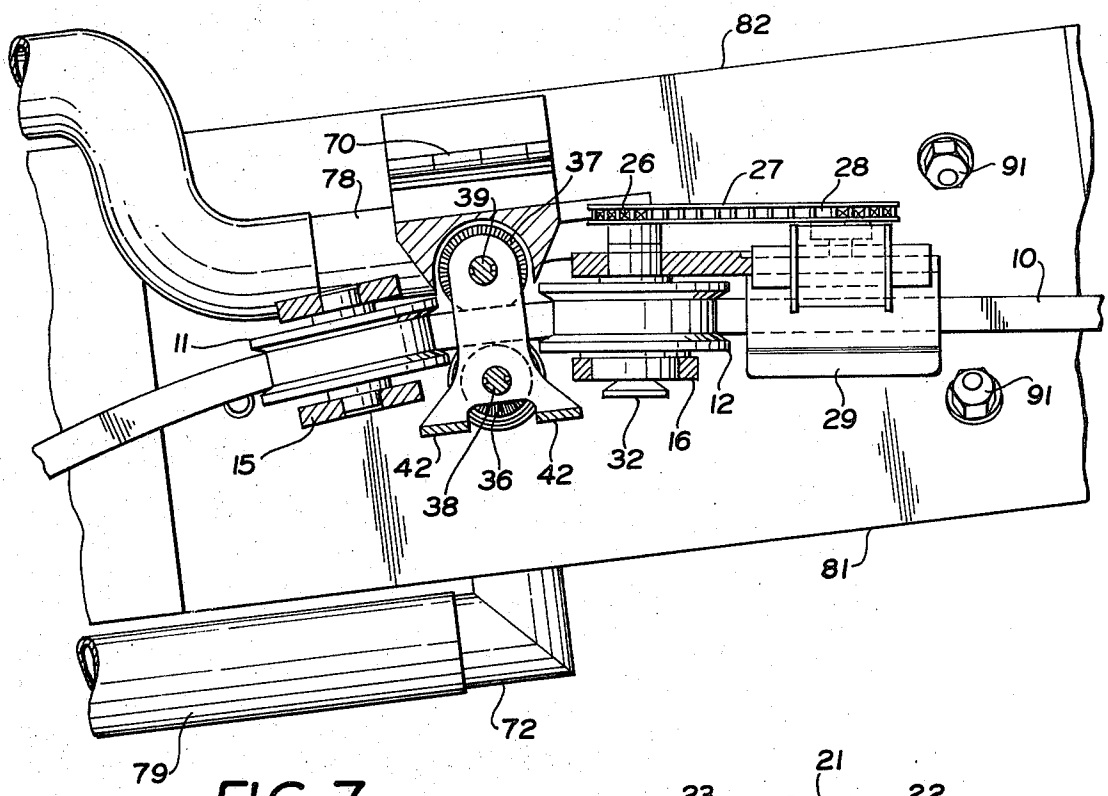

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FIG. 7

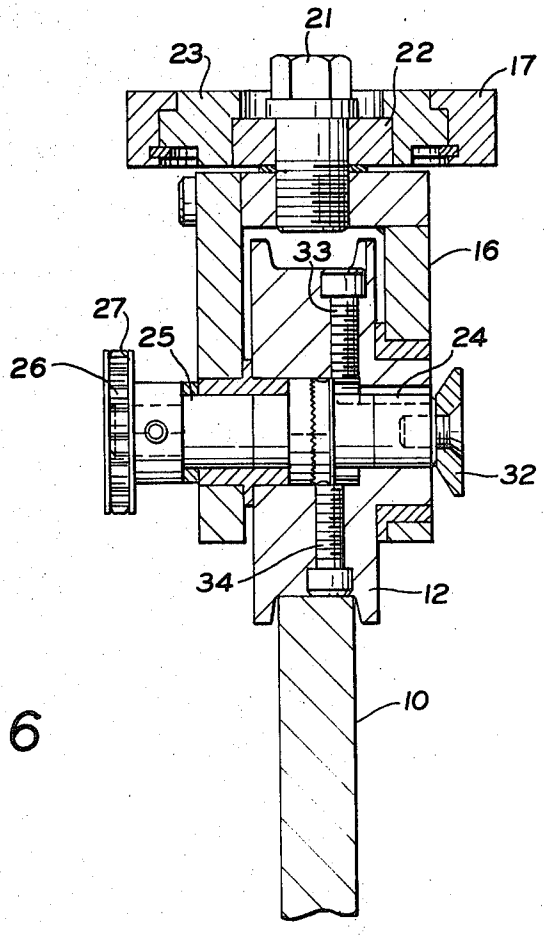

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FIG. 6

OVERHEAD RAIL CLEANER AND OILER

BACKGROUND OF THE INVENTION

In meat processing plants, animal carcasses and parts thereof are carried along on conveyor rails which are supported from the ceiling by hanger brackets. It is very important that the rails be kept as clean and sanitary as possible at all times by periodic cleaning, and U.S. Pat. No. 3,641,618, which is the most pertinent prior art known to applicant, shows an automatic rail cleaner for this purpose.

The rail cleaner of U.S. Pat. No. 3,641,618 requires three brushes which are laterally adjustably mounted on flexible shafts to avoid interference with hanger brackets, rivets and other obstructions by momentarily moving away from the rail surfaces as a result of which the rail surfaces behind the braackets and adjacent to the obstructions, as well as the obstructions themselves, are not cleaned. A fourth brush is required to clean behind the brackets. Moreover, the flexible shafts and the solenoids and linkages required for operating them are expensive and add substantial weight to the machine.

SUMMARY OF THE INVENTION

The improved rail cleaner of the present invention comprises a motor-driven carriage which is supported on the conveyor rail by two spaced-apart wheels rolling on top of the rail. These wheels are independently pivoted for following around curves or switches to other rails, and their axes are independently adjustable for tracking alignment. A manually actuated clutch is provided for disconnecting the wheels from the motor drive. The vertical axially rotatable brushes engaging opposite sides of the rail are geared together and driven by a separate motor. Power-driven mechanism for raising and lowering the brushes is actuated by a bracket or other obstruction on the rail interrupting a light beam moving with the machine. A suction device on the machine removes dust and dirt dislodged by the brushes and a following oil spray device coats the cleaned surfaces.

An object of the present invention is to provide an improved rail cleaning device which is lighter in weight, less expensive and faster in operation than prior rail cleaners.

Another and more specific object is to provide an improved rail cleaner which requires only two brushes to clean the rail surfaces.

A further object is to provide an improved rail cleaner having two vertical brushes which are automatically raised and lowered to clear obstructions on the rail.

A still further object is to provide brushes designed and constructed to clean rail surfaces behind and adjacent to obstructions.

Another object is to provide an oil spray system on the rear of the improved rail cleaner for coating the rail surfaces immediately after cleaning to inhibit corrosion.

These and other objects are accomplished by the improvements comprising the present invention which is shown by way of example in the accompanying drawings and described in detail in the following specification. Various modifications and changes in details of construction are comprehended within the scope of the appended claims.

DESCRIPTION OF THE DRAWINGS

FIGS. 1 and 1A taken together are a side elevation with the lower part in section of a preferred embodiment of the machine, showing the brushes in raised position.

FIG. 2 is a plan view on line 2—2 of FIG. 1.

FIG. 3 is an enlarged vertical sectional view on line 3—3 of FIGS. 1 and 1A.

FIG. 3A is a partial view similar to FIG. 3 showing the brushes raised to an intermediate position.

FIG. 4 is a similar view showing the brushes in lowered position.

FIG. 5 is a sectional view on line 5—5 of FIG. 3.

FIG. 6 is an enlarged sectional view on line 6—6 of FIG. 2.

FIG. 7 is a fragmentary sectional view similar to FIG. 2 showing the carriage supporting wheels traversing a curved portion of the rail.

DESCRIPTION OF A PREFERRED EMBODIMENT

The improved meachine is carried on a conveyor rail 10 by two flanged wheels 11 and 12. The rail 10 is a flat strip of steel suspended from the ceiling by spaced hanger brackets 13 which are fastened to the rail by bolts or rivets 14. As shown in FIG. 3, the brackets 13 are preferably riveted to the bottom portion of the rail 10 and curve outwardly and upwardly therefrom.

The wheels 11 and 12 are journaled in yokes 15 and 16, respectively, depending from a top horizontal bar 17 which comprises the top of a frame having a rear supporting plate 18. A horizontal plate 20 spaced below the bar 17 extends forwardly from the plate 18 (FIG. 3) for a purpose to be described.

As shown in FIGS. 1 and 6, the yokes 15 and 16 are journaled in the top bar 17 so that the wheels 11 and 12 are independently pivotable around vertical axes to accommodate switches or curves in the rail, in the manner indicated in FIG. 7. The yokes are fastened by studs 21 to annular bearing plates 22 journaled in eccentric rings 23 mounted in bar 17, and by rotating the eccentric rings 23 the alignment of the steering axes of the wheels may be adjusted.

As seen in FIG. 6, wheel 12 is splined on clutch shaft 24 which is serrated at its inner end for meshing with the serrations on the inner end of sprocket shaft 25 on which wheel 12 idles. Sprocket shaft 25 has a sprocket 26 on its outer end which is driven by a chain 27 meshing with a sprocket 28 driven by an electric motor 29 supported on an extension 30 of yoke 16. A clutch handle 32 is secured to the outer end of shaft 24 for moving it manually into and out of mesh with sprocket shaft 25. Screws 33 and 34 are provided to frictionally hold the clutch shaft selectively in engaged and disengaged positions.

Thus, in the position of FIG. 6, with the clutch engaged, the sprocket shaft 25 drives the wheel 12 and the machine supported by the wheels 11 and 12 along the rail 10, and when the clutch is disengaged the sprocket shaft idles and the machine is stationary.

The axially rotatable wire brushes 36 and 37 have shafts 36' and 37' which are secured to upper vertical shafts 38 and 39, respectively. Shafts 38 and 39 are vertically slidable and rotatable in sleeve bearings in the top horizontal bar 17 of the frame and in the plate 20

thereof. The upper ends of shafts **38** and **39** are rotatably connected by screws **40** to a top plate **41**, and the front edge of plate **41** is connected by vertical bars **42** to a horizontal bottom plate **43** extending rearwardly under the horizontal plate **20** of the frame. Thus, the top plate **41**, bars **42** and bottom plates **43** form an upper slide frame which moves vertically with the shafts **38** and **39**.

The brush shafts **36'** and **37'** at their top ends extend into the upper shafts **38** and **39** and are secured thereto by set screws **44**. Between the plates **17** and **20** the shafts **38** and **39** are splined to gears **45** and **46**, respectively, which gears mesh with a medial idler gear **47** (FIG. 5) having its shaft **48** journaled in plates **17** and **20**. The gears have a **1** to **1** ratio so that the shafts **38** and **39** rotate conjointly at the same speed and in the same direction.

The bottom end of brush shaft **37'** extends into a driven shaft **49** and is secured thereto by a set screw **50**. Shaft **49** is journaled in a bearing sleeve in a horizontal plate **51** forming the top of a lower frame and supporting the base **52** of the upper frame. A supporting plate **53** is spaced below plate **51** by side plates **54**, and the shaft **49** is journaled in a bearing sleeve in plate **53**. Between the plates **51** and **53** is a driven sprocket **55** splined to the shaft to allow vertical movement of the shaft therein. The sprocket **55** is connected by a chain **56** to a drive sprocket **57** on the shaft of a drive motor **58** suspended from plate **53**. Thus, the motor **58** rotates the brush shafts **49** and **37'** which in turn rotate the brush shaft **36'** through the gears **45, 46** and **47**.

The mechanism for raising and lowering the shaft **49** to raise and lower both the brushes preferably comprises a cross bar **60** slidably mounted below plate **53** on vertical rods **61** mounted at their upper ends in the plate **53** and supported at their lower ends in brackets **62** depending from plate **53**. The bottom end of shaft **49** is journaled in an anti-friction bearing **63** mounted on top of the cross bar **60**. The cross bar **60** has a horizontal slot **64** therein and a roller **65** on the end of a crank arm **66** rides in the slot. The crank arm **66** is driven by a motor **67** suspended from plate **53** by brackets **68** and **69**.

When the motor **67** is energized it rotates the crank **66** to raise or lower the cross bar **60** and the shaft **49**. In the position of FIG. **4** the brushes **36** and **37** are in full surface contact with opposite sides of rail **10**, and in FIG. **3** the brushes have been fully raised to avoid interference with the hanger **13** or other obstacle such as a rail switch. The length of the spline in shaft **49** is such as to permit raising and lowering the shaft through the full stroke of the crank **66**.

As shown in FIG. **3A**, the brushes are positioned in an intermediate position slightly lower than fully raised position when passing a hanger bracket **13** to enable cleaning the rail behind the bracket. As indicated in dotted lines the bottom end of brush **36** is hollow to enable it to squeeze between the bracket and rail **10**.

In the lowered position of the brushes shown in FIG. **4**, the brushes **36** and **37** can be removed by removing set screws **44** and **50**, and then raising the upper slide frame together with the upper shafts **38** and **39** to lift them off of the upper ends of brush shafts **36'** and **37'**. After the brushes are removed the frame comprising top bar **17** and rear plate **18** can be tilted around hinge **70** away from base plate **51** to expedite maintenance and inspection.

As shown in FIGS. **1A, 3** and **4**, the space within horizontal plates **51** and **53** and side plates **54** is an air chamber **71** connected by a front conduit **72** to the vacuum chamber **73** of a vacuum cleaner unit **74** having a motor **75** and filter element **76**. An air inlet duct **77** is connected with chamber **71** and its upper end sucks dirt particles brushed from the front side of rail **10** by brush **36**. An air inlet elbow **78** sucks dirt brushed from the rear side of the rail by brush **37** and delivers it through duct **79** to the vacuum chamber **73**.

That part of the machine below horizontal plate **51** is enclosed by front and rear vertical shroud plates **81** and **82** and side plates **83** and **84**, respectively, with a bottom plate **85**. The vacuum cleaner unit **74** is supported at one edge of plate **51** on an exterior flange **86** of side plate **83**. The oil spray system preferably includes an oil reservoir **87** mounted on side plate **84** and supplying oil through pipe **88** to an air pump **89** operated by a motor **90** to discharge oil from the spray nozzles **91** onto opposite surfaces of the rail **10**. As indicated by the direction arrow in FIG. **1**, the machine travels from right to left, so that the oil sprays follow the brushes and the vacuum inlets below the brushes.

The vertical raising of the brushes **36** and **37** is initiated by interruption, by an obstacle on the rail, of the light beam projected from a light source **92** mounted on plate **51** and a photocell **93** mounted above the light source on the forward edge of bar **17**. Thus, the light beam travels ahead of the brushes. The photocell is connected electrically to a logic module unit of known construction indicated at **94** supported within the housing by bracket plates **95** and **96**. A suitable logic module unit is Farmer Model TR5-14 Dual Time Delay Module, manufactured by Farmer Electric Products Co., Inc., of Natick, Mass. By interruption of the light beam, this sensing means actuates motor **67** to rotate crank **66** to raise the brushes to the intermediate position of FIG. **3A** where the brushes are in position to clean the rail behind a hanger. If the obstacle is a rail switch a limit switch on the cleaner is actuated to cause the motor **67** to rotate crank **66** through 180° and raise the brushes to the full upper position of FIG. **3**. After the obstacle has passed the motor **67** returns the crank and brushes to the lowered position of FIG. **4**. Absence of a rail in front of the cleaner causes another limit switch to close, disconnecting all circuits and stopping further travel of the cleaner.

It will be apparent that an improved automatic rail cleaner has been provided which travels along and is supported on the top of the rail, the opposite surfaces of which are continuously cleaned by vertically disposed axially rotating brushes on the cleaner, and when the brushes approach an obstruction such as a hanger bracket or a rail switch, the obstruction is sensed by a light beam on the forward part of the rail cleaner which automatically causes raising the brushes to clear the obstacle and immediately lowers the brushes when the obstacle is passed. The dirt removed by the brushes is collected by the suction cleaning device carried by the machine and the cleaned rail surfaces are coated by an oil spray device carried on the rear part of the machine to inhibit corrosion of the cleaned surfaces.

We calim:

1. An automatic cleaner for a conveyor rail comprising a frame, a supporting wheel journaled in said frame and rolling upon the top of the conveyor rail, power means on the frame for driving said wheel, vertically

disposed axially rotatable brush shafts on opposite sides of the rail, brushes on said shafts contacting opposite surfaces of the rail, one on said brush shafts being mounted for vertical movement in said frame, means operatively connecting said brush shafts for conjoint rotation and vertical movement, power means for raising and lowering said one brush shaft, and sensing means on said frame actuated by passage of an obstacle on the rail for operating the power means for raising and lowering said one brush shaft to allow the brushes to pass the obstacle.

2. An automatic cleaner as in claim 1 in which one of said brushes has a hollow lower end to enable it to squeeze between the rail and a hanger bracket supporting the rail.

3. An automatic cleaner as in claim 1 in which there is an additional supporting wheel journaled in said frame and rolling upon the top of the rail and both wheels are independently pivoted for following around curves.

4. An automatic cleaner as in claim 3, in which said wheels are independently adjustable for tracking alignment.

5. An automatic cleaner as in claim 1, in which a suction cleaning device is mounted on the frame having inlets below both sides of the rail.

6. An automatic cleaner as in claim 5, in which an oil spray device is mounted on a following part of the frame for coating the surfaces of the rail after they have been cleaned.

7. An automatic cleaner as in claim 1, in which an oil spray device is mounted on a following part of the frame for coating the surfaces of the rail after they have been cleaned.

8. An automatic cleaner as in claim 1, in which the upper end portions of the brush shafts are splined in gears journaled in the frame and operatively connecting the shafts, and the upper ends of the brush shafts are connected for moving together vertically.

9. An automatic cleaner as in claim 8, in which the upper end portions of the brush shafts are carried in a slide frame which moves vertically with the shafts.

10. An automatic cleaner as in claim 8, in which the power means for raising and lowering said one brush shaft includes a vertically movable cross bar mounting the lower end of said shaft and having a slot therein, and a crank arm slidably engaged in said slot to raise and lower said cross bar.

11. An automatic cleaner as in claim 1, in which the power means for raising and lowering said one brush shaft includes a vertically movable cross bar mounting the lower end of said shaft and having a slot therein, and a crank arm slidably engaged in said slot to raise and lower said cross bar.

* * * * *