Dec. 25, 1956 W. J. MORISON ET AL 2,774,980

APPARATUS FOR CLEANING VEHICLES

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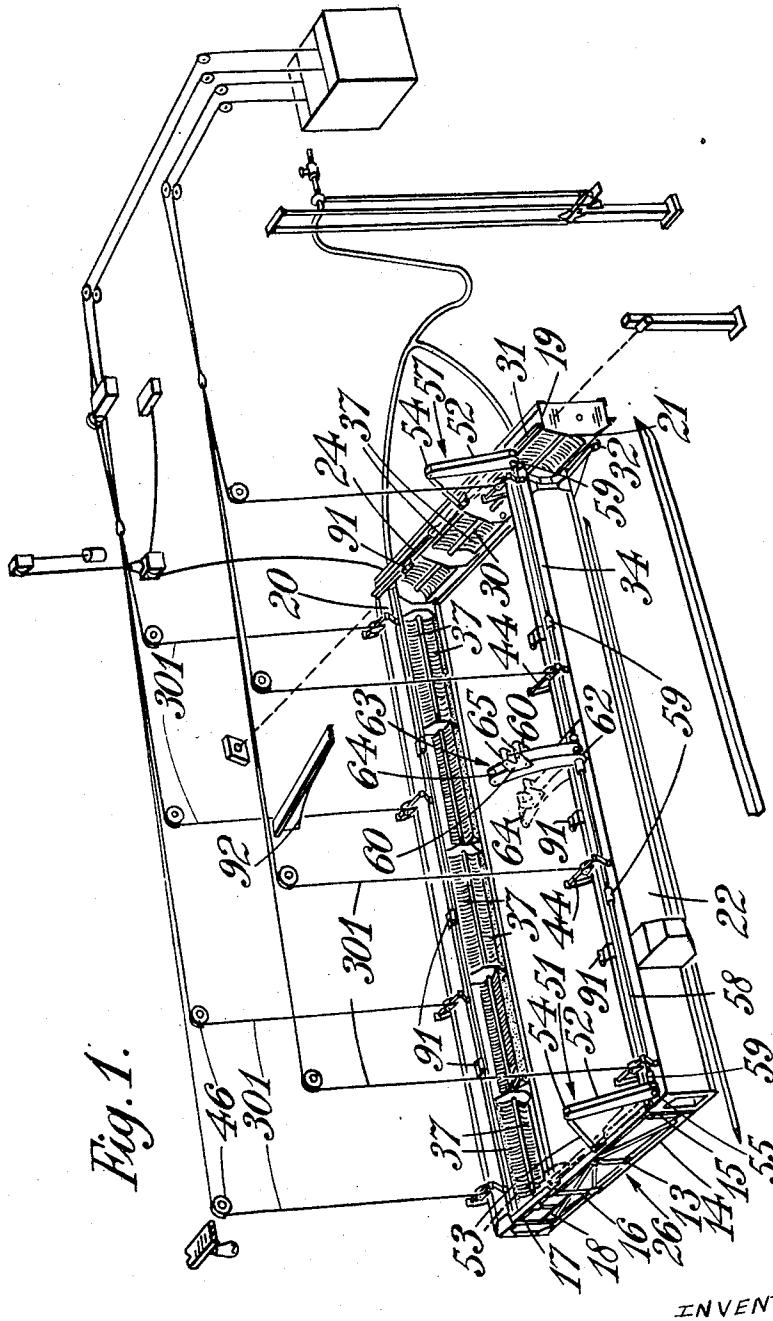


Fig. 1.

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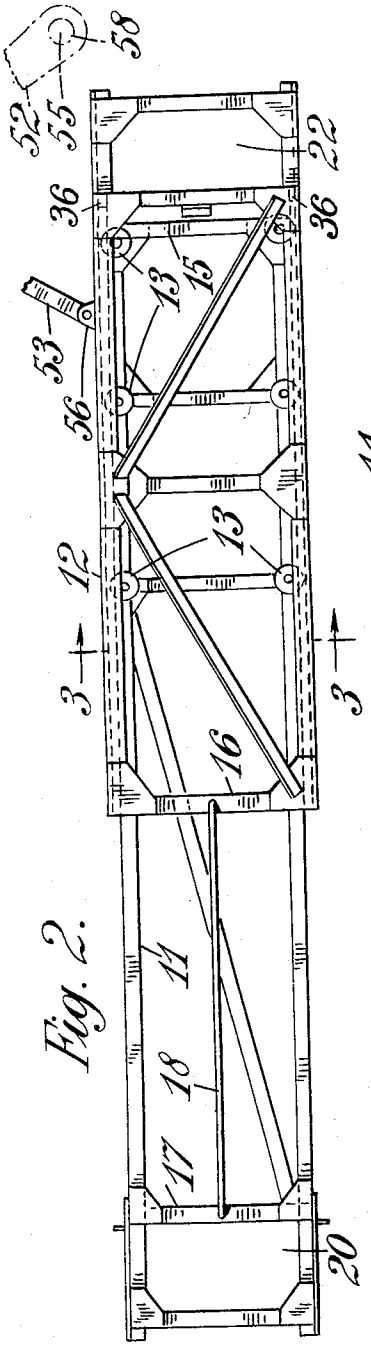


Fig. 2.

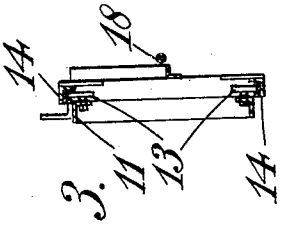


Fig. 3.

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5 Sheets-Sheet 3

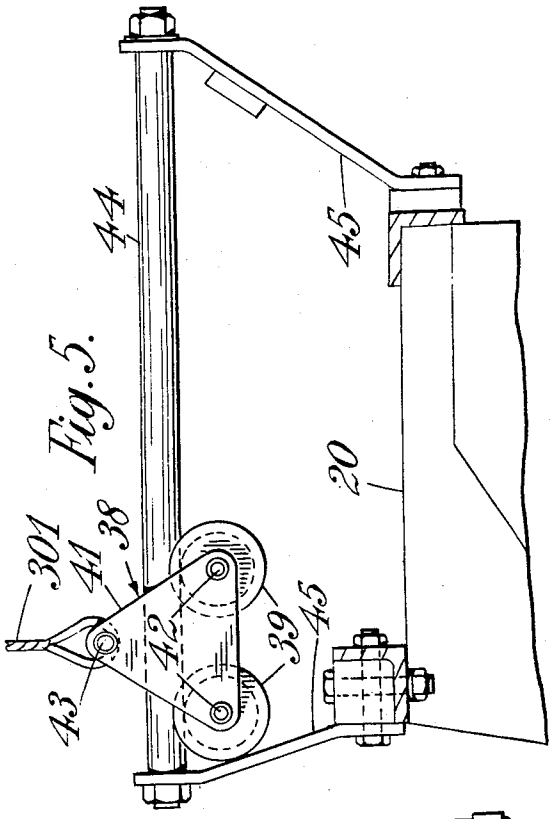


Fig. 5.

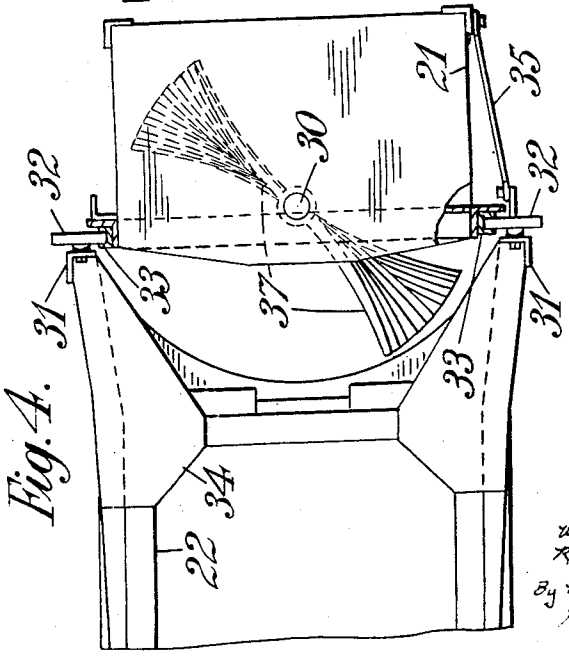


Fig. 4.

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Dec. 25, 1956 W. J. MORISON ET AL 2,774,980

APPARATUS FOR CLEANING VEHICLES

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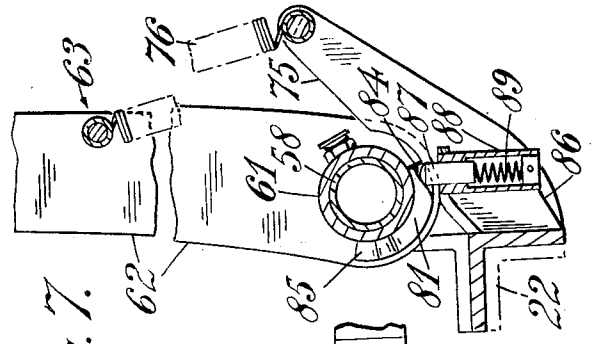


Fig. 7.

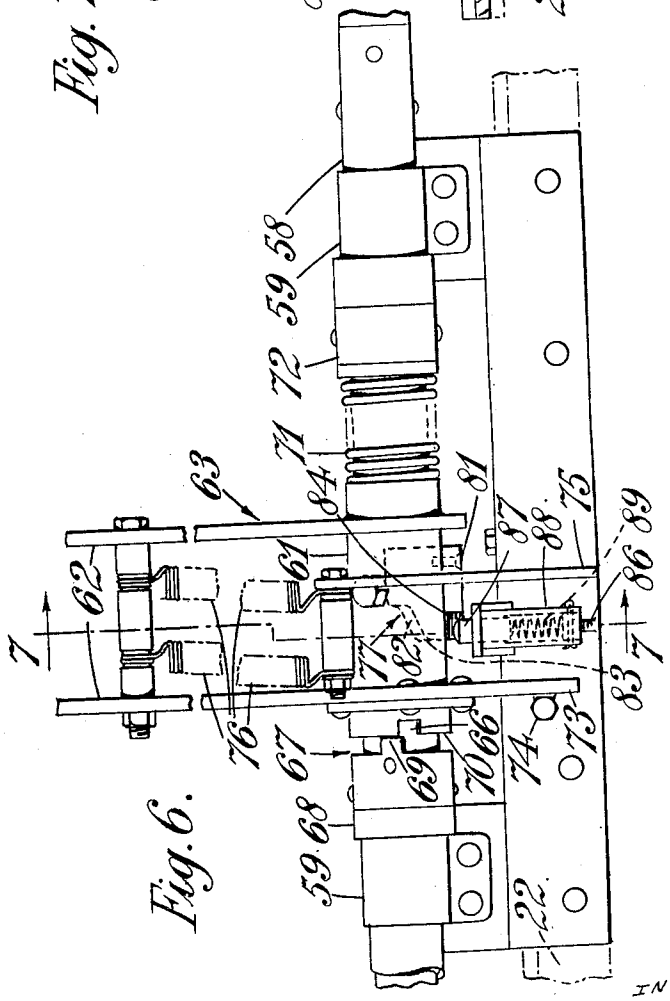


Fig. 6.

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APPARATUS FOR CLEANING VEHICLES

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Fig. 8.

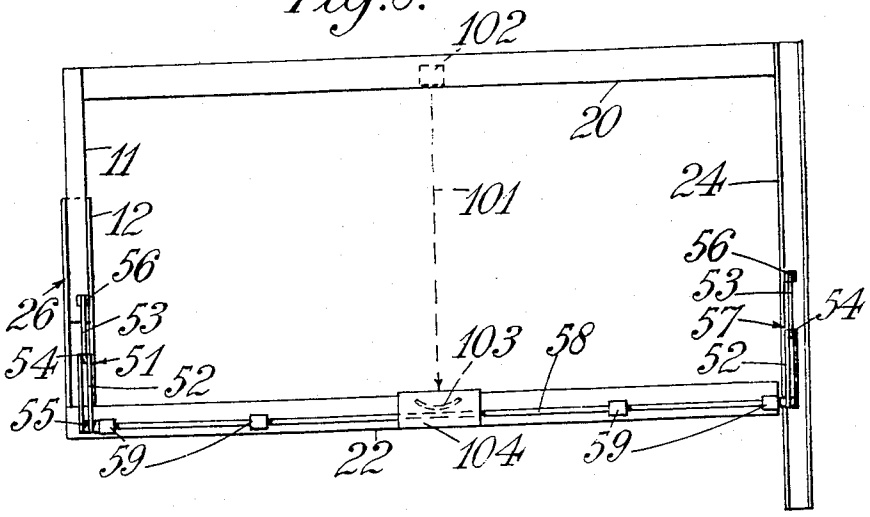
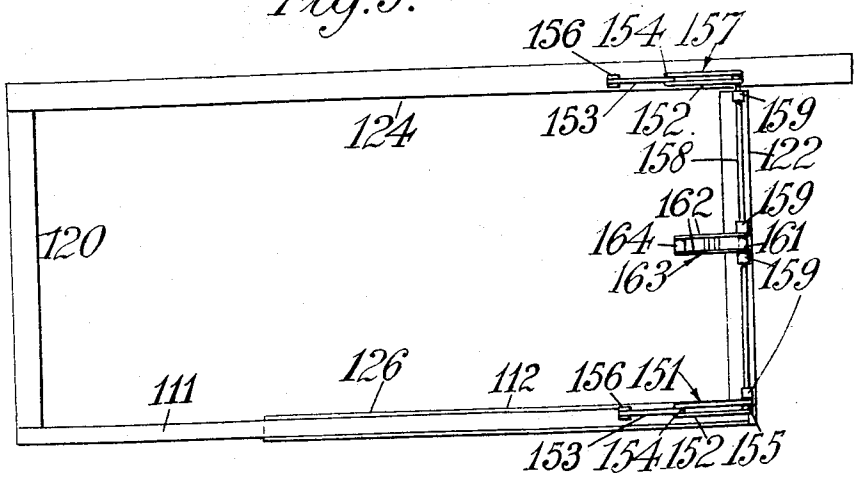


Fig. 9.



Inventors: William J. Morison and Ronald F. Cronin

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APPARATUS FOR CLEANING VEHICLES

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Application September 8, 1953, Serial No. 379,034

Claims priority, application Great Britain September 15, 1952

18 Claims. (Cl. 15—21)

This invention relates to apparatus for cleaning vehicles and is more particularly concerned with such apparatus of the kind (hereinafter referred to as the kind described) comprising a carrier comprising two horizontally spaced limbs, between which a vehicle may be received for cleaning and which each carry one or more cleaning devices, and at least one tie member connecting the two spaced limbs at or near one pair of corresponding ends of the two spaced limbs for maintaining the two spaced limbs in close relation to the vehicle so that the cleaning devices may act thereon; and suspension means by which the carrier is suspended from a superstructure lying above the level of the top of the vehicle and which are operable to effect vertical movements of the carrier while the cleaning devices act on the vehicle; in which apparatus the length of the or each tie member may be varied to vary the separation of the two spaced limbs.

Apparatus of the kind described is disclosed in United States Patent No. 2,583,703. In that specification the cleaning devices are wiper devices.

It is an object of the invention to provide improved apparatus of the kind described, which may be readily employed for cleaning vehicles (e. g. motor-vans) having any width or length within a continuous range of widths or lengths less than a maximum.

The invention provides apparatus of the kind described, in which the tie member or members is or are of continuously variable length and comprises or comprise means urging the two spaced limbs towards one another, which apparatus comprises holding means for holding the two spaced limbs apart, against the action of the urging means, in relative positions in which they have a maximum distance of separation, detector means for detecting the presence of a vehicle between the two spaced limbs, means operated by the detector means to render the holding means inoperative so that the two spaced limbs may adopt a lesser relative distance of separation determined by the vehicle between them, and means for moving the two spaced limbs relatively apart to their said relative positions of maximum separation and for rendering the holding means operative when the carrier moves to a position beyond a vertical extremity of the vehicle.

Preferably the holding means comprise an over-centred toggle mechanism, the detector means comprise a feeler arm pivoted to the carrier and rotatable about tis pivot to and from a detecting position in which it projects partly across the space between the two spaced limbs so as to engage a vehicle when the carrier is moved vertically from beyond a vertical extremity of the vehicle to receive the vehicle between the two spaced limbs and to be rotated about its pivot by such engagement, and there are provided means connecting the feeler arm to the toggle mechanism so that on rotation of the arm by engagement of the vehicle as aforesaid the toggle is "broken," which connecting means include a clutch between the feeler arm and the toggle mechanism; means for dis-engaging the clutch after the toggle has been

"broken" as aforesaid, while the vehicle is between the two spaced limbs, and re-setting means for re-engaging the clutch and for operating the feeler arm to "remake" the toggle after the carrier has moved to a position beyond a vertical extremity of the vehicle.

The means for disengaging the clutch may comprise cam means arranged to move one member of the clutch away from the other on continued rotation of the feeler arm as aforesaid after the toggle has been "broken." One member of the clutch may be carried by the feeler arm for rotation therewith about its pivot and the cam means may act to disengage the clutch by moving the feeler arm axially of its pivot against the action of a spring. Means, e. g. a spring, may be provided to rotate the feeler arm about its pivot out of engagement with the vehicle while the clutch is disengaged. The re-setting means may comprise a ramp or like abutment arranged for engagement by the feeler arm, on movement of the carrier beyond a vertical extremity of the vehicle, to rotate the feeler arm to its detecting position. The clutch may be a dog clutch constructed and arranged so that the projection or projections of one member thereof engage with the slot or slots of the other member to re-engage the clutch when the feeler arm has been rotated by the ramp to bring the projection or projections into alignment with the slot or slots, the continued rotation thereafter of the feeler arm towards its detecting position operating the toggle mechanism to cause relative movement of the two spaced limbs to assume their said maximum distance of separation and to "remake" the toggle i. e. to bring it into its over-centred condition in which it acts as a strut preventing relative movement of the two spaced limbs towards one another, means being provided to render the cam means ineffective during the rotation of the feeler arm by the re-setting means to permit re-engagement of the clutch as aforesaid.

The suspension means are preferably attached to the two spaced limbs by attachment means which permit movement of the two spaced limbs, in the direction of separation thereof, relative to the lower ends of the suspension means.

Two tie members are preferably provided and each is preferably partly constituted by all or part of one or more rigid members connected to the two spaced limbs by connecting means which permit the said rigid member or members to move longitudinally relative to at least one of the two spaced limbs, to provide the aforesaid continuous variation in length, the rigid member or members constituting a cross-limb extending between the two spaced limbs, and the two cross-limbs being at or near the opposite ends of the two spaced limbs respectively. The connecting means may comprise wheels (e. g. constituted by roller bearings) and tracks along which the wheels are constrained to run. Cleaning devices are preferably also provided on one or both of the cross-limbs, and are preferably provided along the full length of the cross limb, from one of the spaced limbs to the other, even when the two spaced limbs have their maximum separation. One or more of the cleaning devices on the or each cross-limb may lie beyond the end of one of the two spaced limbs when the two spaced limbs have a separation less than their maximum separation.

A specific construction of apparatus for cleaning vehicles and embodying the invention will now be described by way of example, and with reference to the accompanying drawings, in which:

Figure 1 is a perspective view of the apparatus,

Figure 2 is a view of the front end of the carrier,

Figure 3 is a sectional view of the front end of the carrier, on the line 3—3 of Figure 2,

Figure 4 is a side view of the rear end of one side of the carrier,

Figure 5 is a detail view of the means for suspending the carrier,

Figure 6 is a detail view of mechanism associated with the feeler arm,

Figure 7 is a sectional view on the line 7—7 of Figure 6,

Figure 8 is a plan view of the carrier embodying an alternative form of detector means; and

Figure 9 is a plan view of a modification of the carrier shown in Figures 1 to 7 in which the carrier is adapted to clean vehicles of different lengths.

This apparatus is a modification of that described and illustrated in United States Patent No. 2,583,703.

In this example the cleaning devices are in the form of flat brushes **37** extending in diametrical planes from shafts **30** on which they are carried, and alternate brushes have their said diametrical planes spaced at substantially 90° around those shafts.

The front tie member **26** comprises two rigid flat rectangular braced frame members **11, 12** overlapping longitudinally. The frame **11** is about twice as long as the frame **12**; the frame **11** being attached by one end to the front end of side limb **20**, and the frame **12** being attached by one end to the front end of side limb **22**. The two frames **11, 12** are secured together by means of six wheels **13** on the front face of the frame **11** (three spaced along near its upper edge and three spaced along near its lower edge) which engage within U-section tracks **14** secured to the upper and lower edges of the rear face of the frame **12**, the tracks **14** having the mouths of the U-sections directed vertically towards one another.

The two frames **11, 12** are thus constrained for longitudinal movement relative to one another from relative positions in which the free end **15** of the frame **11** lies close to the side limb **22** (this disposition being shown in Figures 1 and 2), to relative positions in which that free end **15** is spaced about 18 inches away from the side limb **22**. The free end **16** of the frame **12** is connected to the remote end **17** of the frame **11** by a length of strong elastic cord **18** which urges the two frames **11, 12** relatively towards their first-mentioned relative positions, as shown in Figures 1 and 2.

The end limb **24** continues across the end of the side limb **22** and the latter is shortened so that its end abuts against the mouth of the continuation **19** of the guard **21** of the end limb **24**. That end of the side limb **22** carries at its upper and lower edges angle girders **31** which extend across the width of that limb and project therefrom for a distance of about half that width towards the other side limb **20**. These angle girders **31** each carry two wheels **32**, one near each end, which wheels **32** engage within U-section tracks **33** secured to the upper and lower faces of the end limb **24** adjacent to the mouth of that limb. The end **34** of the side limb **22** is thus constrained for movement along the length of the end limb **24** over a distance of about 18 inches. This end **34** of the side limb **22** is connected to a point intermediate in the length of the limb **24** by a length of strong elastic cord **35** which acts to urge the limbs **20, 22** towards one another.

The wheels **13, 32** comprise ball bearings, the outer races of which engage with the tracks **14, 33** and the inner races of which are secured by means of bushes fitting with their inner peripheries. Stops e. g. **36** are provided at the ends of the tracks **14, 33** to prevent the two side limbs **20, 22** from moving closer together than a minimum separation determined by the limit of the permissible 18 inches of movement mentioned above, and the two side limbs **20, 22** are constrained by the action of the wheels **13, 32** and tracks **14, 33** to maintain parallel relation during their relative movement. The end **34** of the side limb **22** adjacent to the end limb **24** is shaped as shown in Figure 4 to permit brush devices **37** in the adjacent part of the end limb **24** to pass that end while being rotated, during movement of the side limbs **20, 22** towards one another.

Instead of being attached to the side limbs **20, 22** at fixed points, each suspension rope **301** is attached at its lower end to a device **38** having two equal sized pulley wheels **39** spaced apart perpendicularly to their axes. The pulley wheels **39** are rotatably mounted, between two flat triangular plates **41**, on axles **42** extending between those plates near to their two lower apices respectively. The rope **301** is attached to a similar axle **43** extending between the other apex of the plates **41**. The pulleys **39** engage the underside of a bar **44** which is supported, by arms **45** extending upwardly and outwardly from the upper longitudinal edges of the limbs **20, 22**, so as to extend across and above the width of that limb. The limbs **20, 22** are thereby permitted to move towards and away from one another relatively to the lower ends of the suspension ropes **301**. The tendency for the exertion of a force tending to separate, or move together, the limbs **20, 22** when those limbs do not lie vertically below the pulleys **46** from which the ropes **301** depend, is overcome or reduced as the devices **38** at the lower ends of the ropes are free to travel to and fro along the bars **44** by which they support the carrier.

The upper face of the free end of the frame **11** of the front tie member **26** is connected to the upper face of the limb **22** by means of a toggle **51** comprising two toggle arms **52, 53** pivoted end-to-end at **54** and having their free ends pivoted respectively at **55, 56** to the limb **22** and the frame **11**. The three pivotal axes **54, 55, 56** are all parallel and horizontal so that the toggle arms **52, 53** move about their pivots in a vertical plane, the central toggle pivot **54** moving upwards when the toggle is "broken." When the limbs **20** and **22** are at their maximum separation the central pivot **54** of the toggle **51** lies slightly below the line joining the other two pivots and is prevented from moving lower by engagement of the toggle arm **52** against the upper face of the limb **22**. In that position the toggle is over-centered and acts as a strut preventing movement of the limbs **20, 22** towards one another. An identical toggle **57** connects the end limb **24** to the side limb **22**. The pivotal connections of the toggles **51, 57** to side limb **22** are effected by means of a shaft **58** which extends from end-to-end of the side limb **22** above the upper face near to its outer longitudinal edge. This shaft **58** is rotatable in bearings **59**, by which it is attached to the side limb **22**, and the appropriate toggle arms **52** are fast with it for rotation with the shaft **58** to constitute their pivotal connection to the side limb **22**.

At the centre of its length the shaft **58** has fast with it a short sleeve **61** carrying two radially extending slightly curved elongated flat plates **62** arranged in spaced parallel relation a short distance from the respective ends of the sleeve **61**. These elongated plates **62** constitute a feeler arm **63** and they carry between them at their free end a small roller **64**. Two further rollers **65** are carried between plates **60** attached respectively to the two plates **62**. The relative radial positions of the feeler arm **63** and the toggles **51, 57** are such that when the toggles **51, 57** are in their over-centred condition (shown in chain lines) the feeler arm **63** is in its detecting position (shown in chain lines), in which it projects substantially horizontally towards the other side limb **20**, the curve of the plates **62** forming the feeler arm **63** being such that when the carrier is lowered to embrace a vehicle the roller **64** makes contact with the roof of the vehicle before any other part of the feeler arm **63** can do so. The feeler arm **63** is sufficiently long to be able to detect the presence between the side limbs **20, 22** of any vehicle which is sufficiently wide for the apparatus to clean. The sleeve **61** has slots **66** across one end of it at one diametrical position and that end forms one member of a dog-clutch **67**. The other member of the clutch **67** is provided as another sleeve **68**, fitted on the shaft **58** and firmly secured thereto in end-to-end relationship to the sleeve **61** and having, at its end adjacent to the sleeve **61**, two pro-

jections 69 upstanding at diametrically opposite positions on its end face for engagement within the slots 66. The sleeve 61 is urged towards the sleeve 68 by a helical spring 71 surrounding the shaft 58 adjacent the other end of the sleeve 61 and having its ends abutting against that end and a third sleeve 72 firmly secured to the shaft 58. The feeler arm 63 has a rearward projection 73 on one of its two constituent plates 62, which projection 73 has an adjustable screw 74 to abut against the outer side face of the limb 22, when the feeler arm 63 is rotated from its detecting position (shown in chain lines) to its retracted position (shown in full lines), in which the roller 64 lies vertically above the limb 22, such abutment preventing rotation of the feeler arm beyond its retracted position. A short stub arm 75 extends outwardly and upwardly from the outer side face of the limb 22 to carry the lower ends of a pair of helical springs 76, the other ends of which are attached to the feeler arm 63 about one third of the way of its length from the shaft 58 so as to rotate the feeler arm 63 to its retracted position when the toggles 51 and 57 are broken and the clutch 67 is disengaged.

The sleeve 61 has a cam member 81 secured to it and extending around just over one quarter of its peripheral length, between the feeler arm plates 62. The cam member 81 has at one end one corner cut away at 77 to provide a flat cam face 82, hereinafter referred to as the forward cam face, the adjacent side part 83 of the cam member being referred to as the side cam face. At the other end of the cam member a part of its peripheral face is chamfered away, the chamfered face 84 being hereinafter referred to as the aft cam face. The thin end of the cam member having the aft cam face 84 lies beneath the axis of the shaft 58 when the feeler arm 63 is in its retracted position. The other end 85 of the cam member lies beneath the axis of the shaft 58 when the feeler arm is in its detecting position. On a bracket 86 attached to the limb 22 is carried a retractable abutment pin 87 which projects upward for engagement with the cam faces as hereinafter described and is retractable downwards into a socket 88, against the action of a supporting spring 89 therein, when axial downward pressure is applied to the upper end of the pin 87.

In the operation of the apparatus the carrier descends from a storage position close beneath the roof or other superstructure, with its side limbs 20, 22 at their maximum separation and with the toggles 51, 57 "made" to hold them at that separation, the feeler arm 63 being in its detecting position. The abutment pin 87 is received at this time within the cut away part 77 of the cam member 81. When the vehicle is embraced between the side limbs 20, 22 the feeler arm 63 engages against the roof of the vehicle, and on further downward movement of the carrier the feeler arm 63 is rotated, by its engagement with the vehicle roof, to "break" the toggles 51, 57. The forward cam face 82 then engages against the side of the abutment pin 87 and serves, on continued rotation of the feeler arm, to move the sleeve 61 and feeler arm axially of the shaft 58 to dis-engage the clutch 67. The feeler arm then moves to its retracted position under the action of the springs 76, the side face 83 of the cam member riding against the pin until the feeler arm is nearly to its retracted position whereupon the aft cam face 84 of the cam member comes near to the pin 87 and permits the sleeve 61 and the feeler arm to move back axially under action of the spring 71 to let the projections 69 of the clutch 67 ride over the end face 70 of the other clutch member 61. The clutch 67 cannot however become re-engaged because the slots 66 are not aligned with the projections 69. The elastic cords 18, 35 cause relative movement of the side arms 20, 22 towards one another until rollers 91 on the inner edges of the limbs 20, 22 engage with the sides of the vehicle. The carrier completes its descent then rises again during which time the wiper devices clean the vehicle. After passing beyond the upper extremity of the vehicle the side limbs 20, 22 move to their minimum separation under the action of the elastic cords 18, 35. When the carrier approaches the roof or other superstructure, the feeler arm rollers 64, 65 engage against a suitable positioned metal plate 92 which acts as a ramp to rotate the feeler arm 63 back to its detecting position during the final upward movement of the carrier. This rotation of the feeler arm 63 serves to bring the projections 69 of the clutch 67 into line with the slots 66 thereof to re-engage the clutch 67 and then to actuate the toggles 51, 57 to move the side limbs 20, 22 to their maximum separation and to "make" the toggles 51, 57 to hold them at that separation. During this rotation of the feeler arm 63 the aft cam face 84 engages the end of the pin to retract it to permit the cam member 81 to pass freely over it until it is re-lifted by its spring 89 as soon as the cam member 81 permits it to enter the cut away part 77 thereof.

The invention is not restricted to the details of the foregoing example. For instance, any other suitable detector means may be employed e. g. a beam of light 101 directed from a lamp 102 on one of the two spaced limbs 20, 22 to a photoelectric cell 103 on the other, suitable electrical devices 104 being provided to operate the other parts of the apparatus accordingly when the beam of light 101 is interrupted by a vehicle.

Two spaced limbs, 120, 122 (Figure 9) as aforesaid, connected by side limbs 124, 126, may be arranged to lie at opposite ends of the vehicle instead of at the sides, in order that vehicles of various length may be cleaned. The side limb 126 comprises two frames 111, 112, constructed and arranged as the frames 11, 12 of Figures 1 to 7. The upper face of the free end of the frame 111 of the side limb 126 is connected to the upper face of the limb 122 by means of a toggle 151 comprising toggle arms 152, 153 pivoted end-to-end at 154 and having their free ends pivoted respectively at 155, 156 to the limb 122 and the frame 111. The toggle 151 is identical to the toggle 51 shown in Figures 1 to 7. An identical toggle 157 connects the side limb 124 to the end limb 122. The pivotal connections of the toggles 151, 157 to the end limb 122 are effected by means of a shaft 158 which extends from end-to-end of the end limb 122 above the upper face near to its outer longitudinal edge. This shaft 158 is rotatable in bearings 159, by which it is attached to the end limb 122, and the appropriate toggle arm 152 is fast with it for rotation with the shaft 158 to constitute their pivotal connection to the end limb 122.

At the center of its length the shaft 158 has fast with it a short sleeve 161 carrying two radially extending slightly curved elongated flat plates 162 arranged in spaced parallel relation a short distance from the respective ends of the sleeve 161. These elongated plates 162 constitute a feeler arm 163 identical with the feeler arm 63 shown in Figures 1 to 7, the plates 162 carrying between them at their free ends a roller 164. The feeler arm 163 is arranged to operate the toggles 151, 157 through a clutch precisely as described with reference to, and shown in, Figures 1 to 7.

We claim:

1. Apparatus for cleaning vehicles, which apparatus comprises in combination a carrier comprising two horizontally spaced limbs, between which a vehicle may be received for cleaning, one or more cleaning devices carried by each limb, at least one tie member of continuously variable length connecting the two spaced limbs substantially at one pair of corresponding ends thereof, means urging the two spaced limbs towards one another, whereby the two spaced limbs may be maintained in close relation to the vehicle so that the cleaning devices may act thereon, suspension means for suspending the carrier from a superstructure lying above the top of the vehicle, which suspension means are operable to effect vertical movements of the carrier while the cleaning devices act on the vehicle, holding means for holding the two spaced limbs apart, against the action of the urging means, in relative

positions in which they have a maximum distance of separation, detector means for detecting the presence of a vehicle between the two spaced limbs, means operated by the detector means to render the holding means inoperative so that the two spaced limbs may adopt a lesser relative distance of separation determined by the vehicle between them, and means for moving the two spaced limbs relatively apart to their said relative positions of maximum separation and for rendering the holding means operative when the carrier moves to a position beyond a vertical extremity of the vehicle.

2. Apparatus according to claim 1, wherein the said detector means comprise a feeler arm pivoted to the carrier and rotatable about its pivot to and from a detecting position in which it projects partly across the space between the two spaced limbs.

3. Apparatus according to claim 2, comprising connecting means connecting said suspension means to the two spaced limbs, which connecting means permit movement of the two spaced limbs, in the direction of separation thereof, relative to the suspension means.

4. Apparatus according to claim 3, comprising two tie members each tie member being constituted by at least one rigid elongated member connected to the two spaced limbs by connecting means which permit the said rigid member to move longitudinally relative to at least one of the two spaced limbs, thereby providing continuous variation in length as aforesaid, said rigid members constituting cross-limbs extending between the two spaced limbs, and the two cross-limbs being substantially at the opposite ends of the two spaced limbs respectively.

5. Apparatus according to claim 4, wherein the said connecting means comprise wheels and tracks, and means for constraining the wheels to run on the tracks.

6. Apparatus according to claim 5, wherein at least one cleaning device is carried by at least one of the cross-limbs.

7. Apparatus for cleaning vehicles, which apparatus comprises in combination a carrier comprising two horizontally spaced limbs, between which a vehicle may be received for cleaning, one or more cleaning devices carried by each limb, at least one tie member of continuously variable length connecting the two spaced limbs substantially at one pair of corresponding ends thereof, means urging the two spaced limbs towards one another, whereby the two spaced limbs may be maintained in close relation to the vehicle so that the cleaning devices may act thereon, suspension means for suspending the carrier from a superstructure lying above the top of the vehicle, which suspension means are operable to effect vertical movements of the carrier while the cleaning devices act on the vehicle, an over-centred toggle mechanism for holding the two spaced limbs apart, against the action of the urging means, in relative positions in which they have a maximum distance of separation, a feeler arm pivoted to the carrier and rotatable about its pivot to and from a detecting position in which it projects partly across the space between the two spaced limbs, whereby when the carrier is moved vertically from beyond a vertical extremity of a vehicle to receive the vehicle between the two spaced limbs the feeler arm is engaged by the vehicle and is rotated about its pivot by the said engagement, connecting means connecting the feeler arm and the toggle mechanism for breaking the toggle on rotation of the feeler arm by engagement with a vehicle as aforesaid; the said connecting means including a clutch, between the feeler arm and the toggle mechanism, means for dis-engaging the clutch after the toggle has been broken, while the vehicle is between the two spaced limbs, and re-setting means for re-engaging the clutch and for operating the feeler arm to remake the toggle after the carrier has moved to a position beyond a vertical extremity of the vehicle.

8. Apparatus according to claim 7, wherein the cleaning means comprise rotary wiper devices and means for rotating said wiper devices.

9. Apparatus according to claim 7, wherein means are provided for rotating the feeler arm about its pivot out of engagement with the vehicle while the clutch is dis-engaged.

10. Apparatus according to claim 7, wherein the re-setting means comprise an abutment engageable by the feeler arm, on movement of the carrier beyond a vertical extremity of the vehicle, whereby the feeler arm is rotated to its detecting position.

11. Apparatus according to claim 7, wherein the clutch is a dog clutch comprising two members one of which members has at least one projection and the other of which members has at least one slot, means urging the said projection and said slot into inter-engagement when the feeler arm has been rotated to bring the projection into alignment with the slot, whereby rotation thereafter of the feeler arm about its pivot operates the toggle mechanism to cause relative movement of the two spaced limbs to assume their said maximum distance of separation and to remake the toggle, and wherein means are provided for rendering the cam means ineffective during rotation of the feeler arm by the re-setting means, thereby permitting inter-engagement of the projection and slot as aforesaid.

12. Apparatus according to claim 7, wherein the clutch comprises two co-operating members, and the means for dis-engaging the clutch comprise cam means operable to move one member of the clutch away from the other on continued rotation of the feeler arm as aforesaid after the toggle has been broken.

13. Apparatus according to claim 12, wherein one member of the clutch is carried by the feeler arm for rotation therewith about its pivot, the cam means are operable to disengage the clutch by moving the feeler arm axially of its pivot, and a spring acts to urge the feeler arm axially of its pivot in the reverse direction.

14. Apparatus for cleaning vehicles, which apparatus comprises in combination a carrier comprising two horizontally-spaced limbs, between which a vehicle may be received for cleaning, one or more cleaning devices carried by each limb, at least one tie member of continuously variable length connecting the two spaced limbs substantially at one pair of corresponding ends thereof, means urging the two spaced limbs towards one another, whereby the two spaced limbs may be maintained in close relation to the vehicle so that the cleaning devices may act thereon, suspension means for suspending the carrier from a superstructure lying above the top of the vehicle, which suspension means are operable to effect vertical movements of the carrier while the cleaning devices act on the vehicle, an over-centered toggle mechanism for holding the two spaced limbs apart, against the action of the urging means, in relative positions in which they have a maximum distance of separation, a feeler arm pivoted to the carrier and rotatable about its pivot to and from a detecting position in which it projects partly across the space between the two spaced limbs, whereby when the carrier is moved vertically from beyond a vertical extremity of a vehicle to receive the vehicle between the two spaced limbs the feeler arm is engaged by the vehicle and is rotated about its pivot by the said engagement, connecting means connecting the feeler arm and the toggle mechanism for breaking the toggle on rotation of the feeler arm by engagement with a vehicle as aforesaid, and re-making means for re-making the toggle after the carrier has moved to a position beyond the vertical extremity of the vehicle.

15. Apparatus for cleaning vehicles, which apparatus comprises in combination a carrier comprising two horizontally-spaced limbs, between which a vehicle may be received for cleaning, one or more cleaning devices carried by each limb, at least one time member of continuously variable length connecting the two spaced limbs substantially at one pair of corresponding ends thereof, means urging the two spaced limbs towards one another,

whereby the two spaced limbs may be maintained in close relation to the vehicle so that the cleaning devices may act thereon, suspension means for suspending the carrier from a superstructure lying above the top of the vehicle, which suspension means are operable to effect vertical movements of the carrier while the cleaning devices act on the vehicle, an over-centered toggle mechanism for holding the two spaced limbs apart, against the action of the urging means, in relative positions in which they have a maximum distance of separation, detector means for detecting the presence of a vehicle between the spaced limbs, toggle-operating means responsive to the detector means and for breaking the toggle when said detector means detects the presence of a vehicle between the spaced limbs, and re-making-means for re-making the toggle after the carrier has moved to a position beyond the vertical extremity of the vehicle.

16. Apparatus for cleaning vehicles, which apparatus comprises in combination a carrier comprising two horizontally-spaced limbs, between which a vehicle may be received for cleaning, one or more cleaning devices carried by each limb, at least one tie member of continuously variable length connecting the two spaced limbs substantially at one pair of corresponding ends thereof, means urging the two spaced limbs towards one another, whereby the two spaced limbs may be maintained in close relation to the vehicle so that the cleaning devices may act thereon, suspension means for suspending the carrier from a superstructure lying above the top of the vehicle, which suspension means are operable to effect vertical movements of the carrier while the cleaning devices act on the vehicle, an over-centered toggle mechanism for holding the two spaced limbs apart, against the action of the urging means, in relative positions in which they have a maximum distance of separation, a feeler arm pivoted to the carrier and rotatable about its pivot to and from a detecting position in which it projects partly across the space between the two spaced limbs, whereby when the carrier is moved vertically from beyond a vertical extremity of a vehicle to receive the vehicle between the two spaced limbs the feeler arm is engaged by the vehicle and is rotated about its pivot by the said engagement, disengageable connecting means connecting the feeler arm and the toggle mechanism for breaking the toggle on rotation of the feeler arm by engagement with a vehicle as aforesaid, means for disengaging said connecting means after the toggle has been broken, while the vehicle is between the two spaced limbs, and re-setting means for re-engaging said connecting means and for operating the feeler arm to re-make the toggle after the carrier has moved to a position beyond a vertical extremity of the vehicle.

17. Apparatus for cleaning vehicles, which apparatus comprises in combination a carrier comprising two horizontally-spaced limbs, between which a vehicle may be received for cleaning, one or more cleaning devices carried by each limb, at least one tie member of continuously variable length connecting the two spaced limbs substantially at one pair of corresponding ends thereof, means urging the two spaced limbs towards one another,

whereby the two spaced limbs may be maintained in close relation to the vehicle so that the cleaning devices may act thereon, suspension means for suspending the carrier from a superstructure lying above the top of the vehicle, which suspension means are operable to effect vertical movements of the carrier while the cleaning devices act on the vehicle, an over-centered toggle mechanism for holding the two spaced limbs apart, against the action of the urging means, in relative positions in which they have a maximum distance of separation, detector means for detecting the presence of a vehicle between the two spaced limbs, means operated by said detector means to break the toggle when said detector means detects the presence of a vehicle between the limbs so that the two spaced limbs may adopt a lesser relative distance of separation determined by the vehicle between them, and means for moving the two spaced limbs relatively apart to their said relative positions of maximum separation and for re-making the toggle when the carrier moves to a position beyond a vertical extremity of the vehicle.

18. Apparatus for cleaning vehicles, which apparatus comprises in combination a carrier comprising two horizontally-spaced limbs, between which a vehicle may be received for cleaning, one or more cleaning devices carried by each limb, at least one tie member of continuously variable length connecting the two spaced limbs substantially at one pair of corresponding ends thereof, means urging the two spaced limbs towards one another, whereby the two spaced limbs may be maintained in close relation to the vehicle so that the cleaning devices may act thereon, suspension means for suspending the carrier from a superstructure lying above the top of the vehicle, which suspension means are operable to effect vertical movements of the carrier while the cleaning devices act on the vehicle, holding means for holding the two spaced limbs apart, against the action of the urging means, in relative positions in which they have a maximum distance of separation, a feeler arm pivoted to the carrier and rotatable about its pivot to and from a detecting position in which it projects partly across the space between the two spaced limbs, whereby when the carrier is moved vertically from beyond a vertical extremity of a vehicle to receive the vehicle between the two spaced limbs the feeler arm is engaged by the vehicle and is rotated about its pivot by the said engagement, means operated by the feeler arm to render the holding means inoperative so that the two spaced limbs may adopt lesser relative distance of separation determined by the vehicle between them, and means for moving the two spaced limbs relatively apart to their said relative positions of maximum separation and for rendering the holding means operative when the carrier moves to a position beyond a vertical extremity of the vehicle.

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