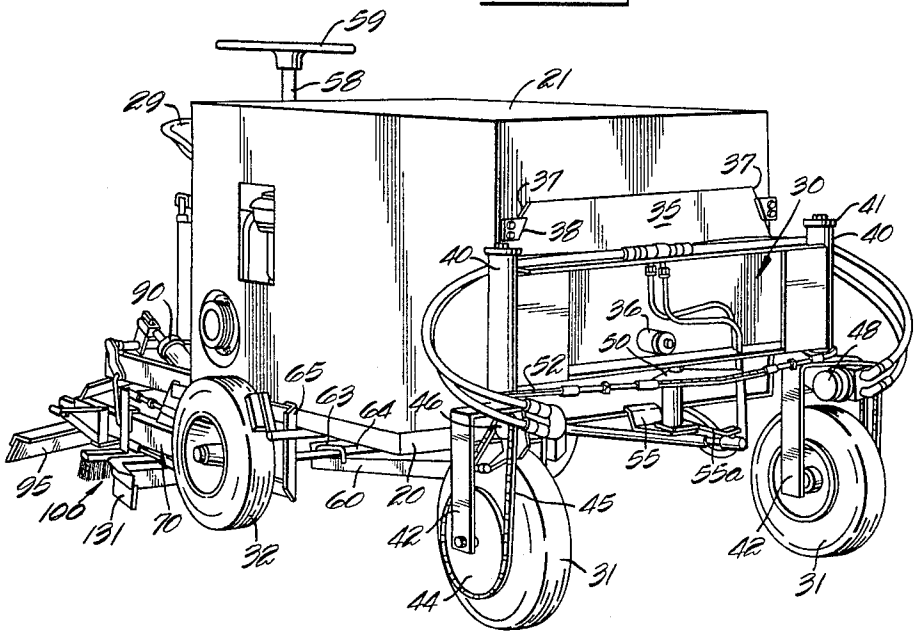
Nov. 8, 1966 C. E. GIFFORD ETAL 3,283,675

PAVEMENT SURFACE-SEALER APPLYING MACHINE

Filed Dec. 14, 1964 6 Sheets-Sheet 1

Fig 1



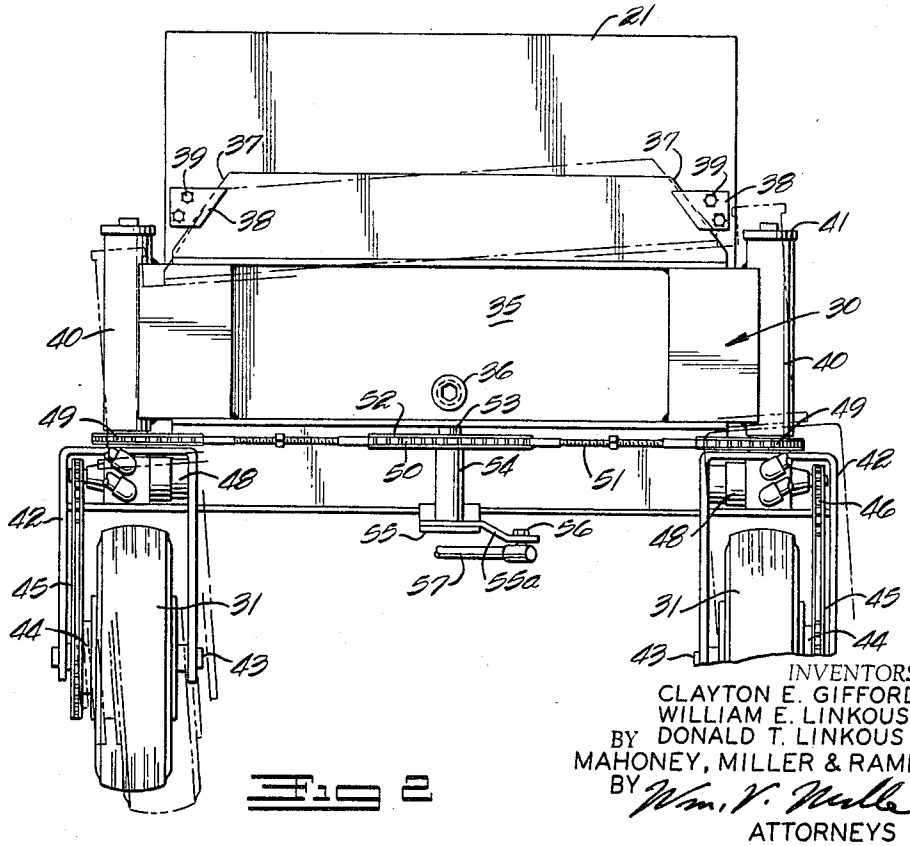


Fig 2

INVENTORS
CLAYTON E. GIFFORD
WILLIAM E. LINKOUS
BY DONALD T. LINKOUS
MAHONEY, MILLER & RAMBO
BY Wm. V. Miller
ATTORNEYS

Nov. 8, 1966 C. E. GIFFORD ETAL 3,283,675

PAVEMENT SURFACE-SEALER APPLYING MACHINE

Filed Dec. 14, 1964 6 Sheets-Sheet 2

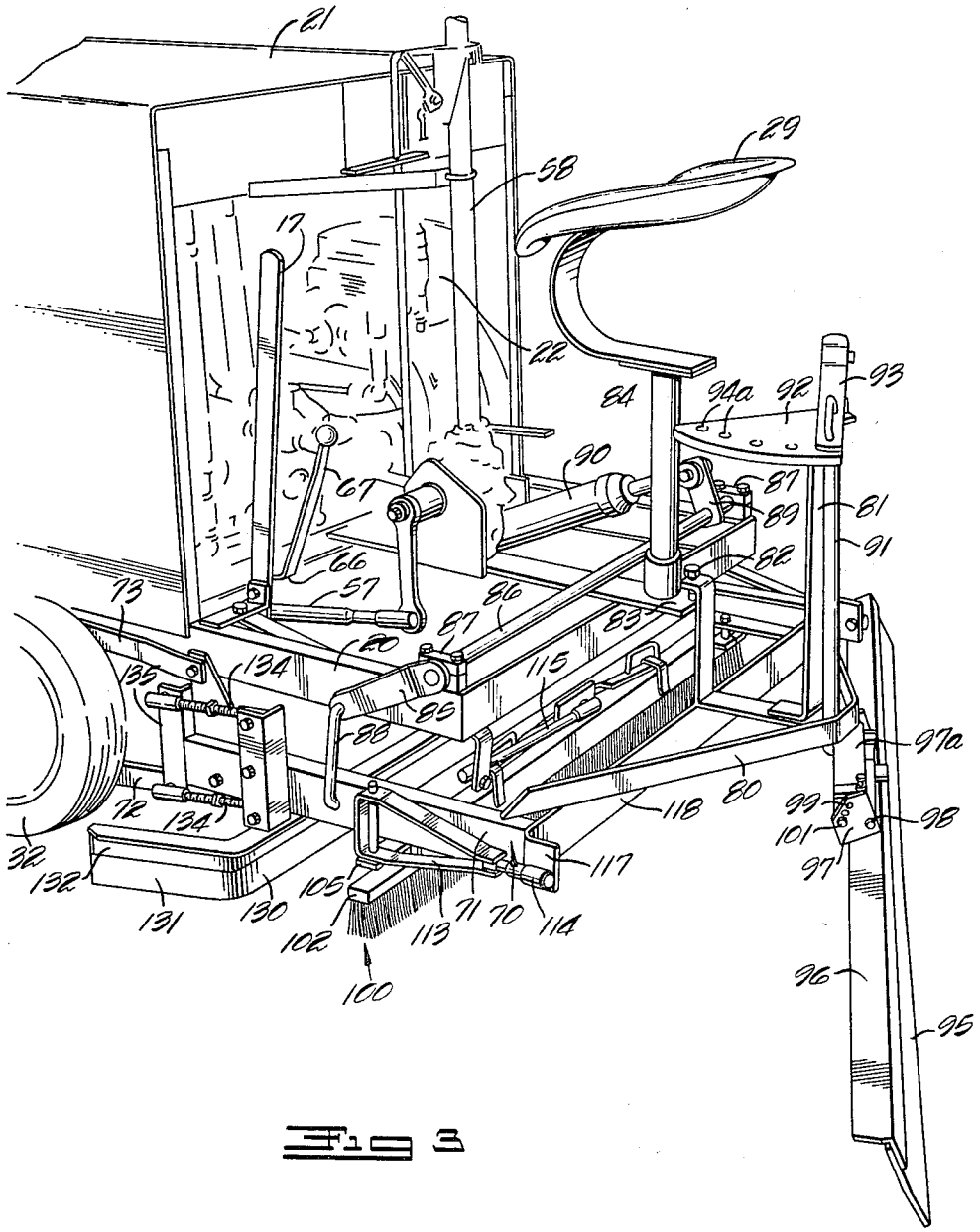


Fig 3

INVENTORS
CLAYTON E. GIFFORD
WILLIAM E. LINKOUS
BY DONALD T. LINKOUS
MAHONEY, MILLER & RAMBO
BY Wm. V. Miller
ATTORNEYS

Nov. 8, 1966 C. E. GIFFORD ETAL 3,283,675

PAVEMENT SURFACE-SEALER APPLYING MACHINE

Filed Dec. 14, 1964 6 Sheets-Sheet 3

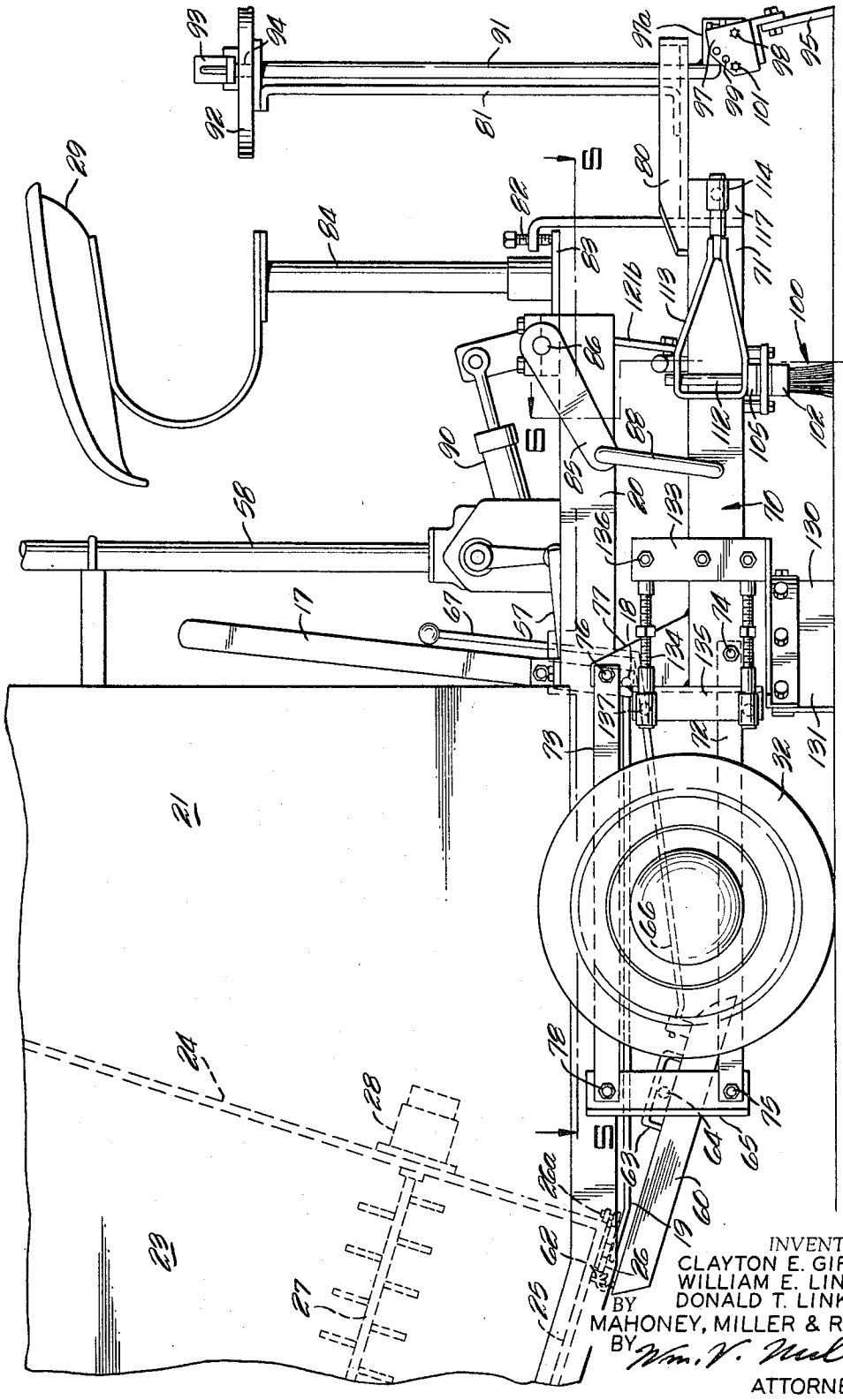


FIG 4

INVENTORS
CLAYTON E. GIFFORD
WILLIAM E. LINKOUS
DONALD T. LINKOUS
BY MAHONEY, MILLER & RAMBO
BY Wm. V. Miller
ATTORNEYS

Nov. 8, 1966 C. E. GIFFORD ETAL 3,283,675

PAVEMENT SURFACE-SEALER APPLYING MACHINE

Filed Dec. 14, 1964 6 Sheets-Sheet 4

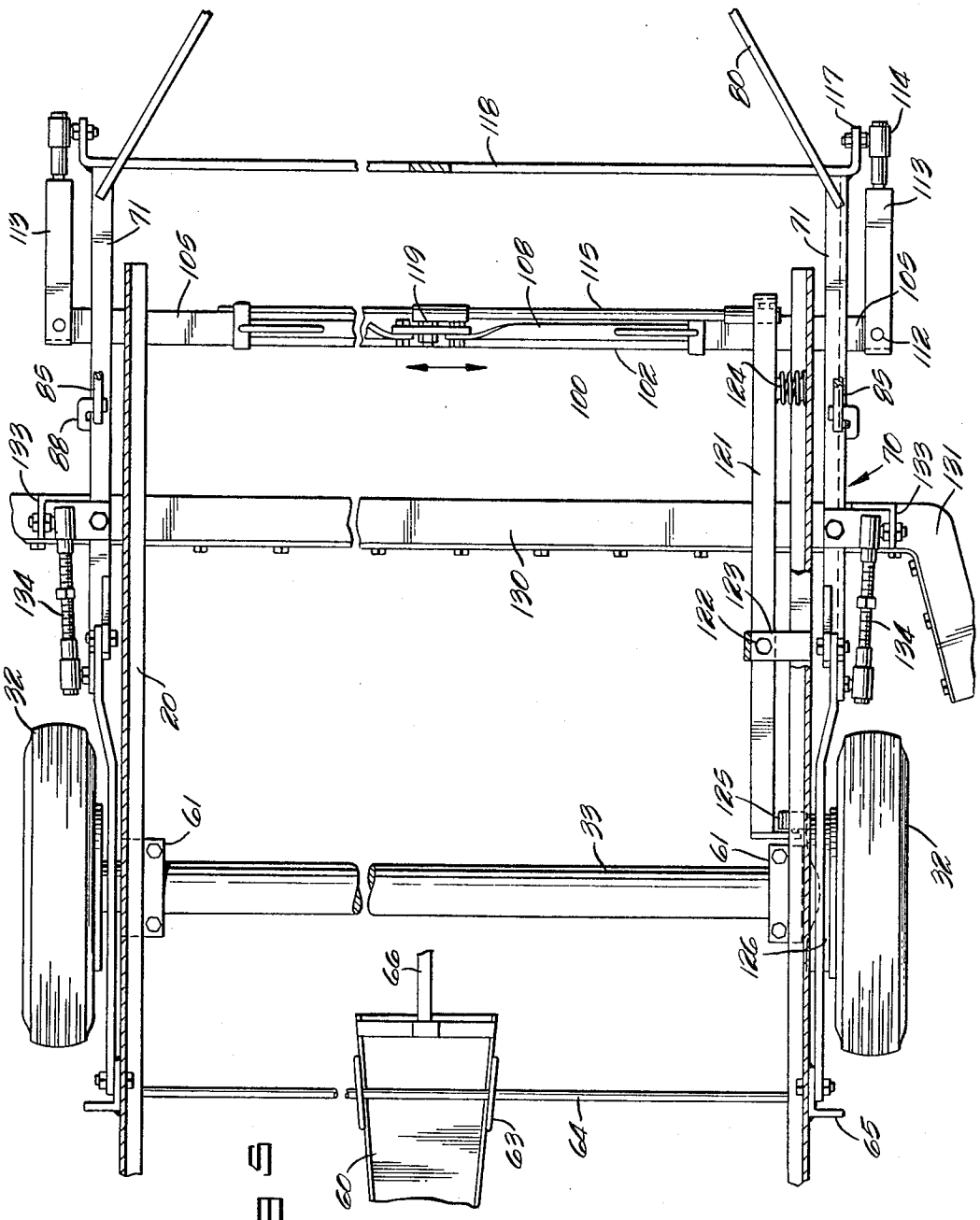


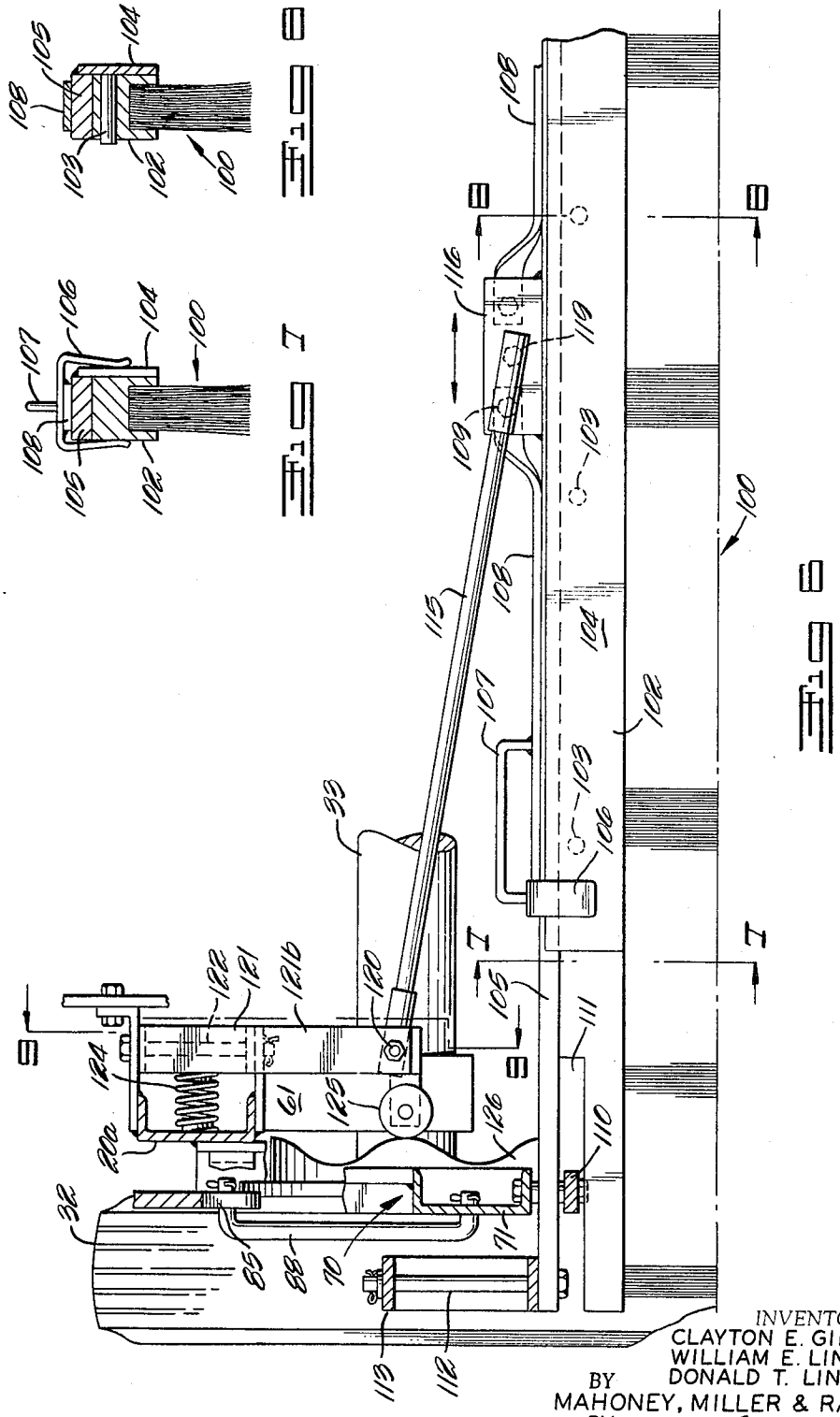
FIG. 5

INVENTORS
CLAYTON E. GIFFORD
WILLIAM E. LINKOUS
BY DONALD T. LINKOUS
MAHONEY, MILLER & RAMBO
BY Wm. V. Miller
ATTORNEYS

Nov. 8, 1966 C. E. GIFFORD ETAL 3,283,675

PAVEMENT SURFACE-SEALER APPLYING MACHINE

Filed Dec. 14, 1964 6 Sheets-Sheet 5

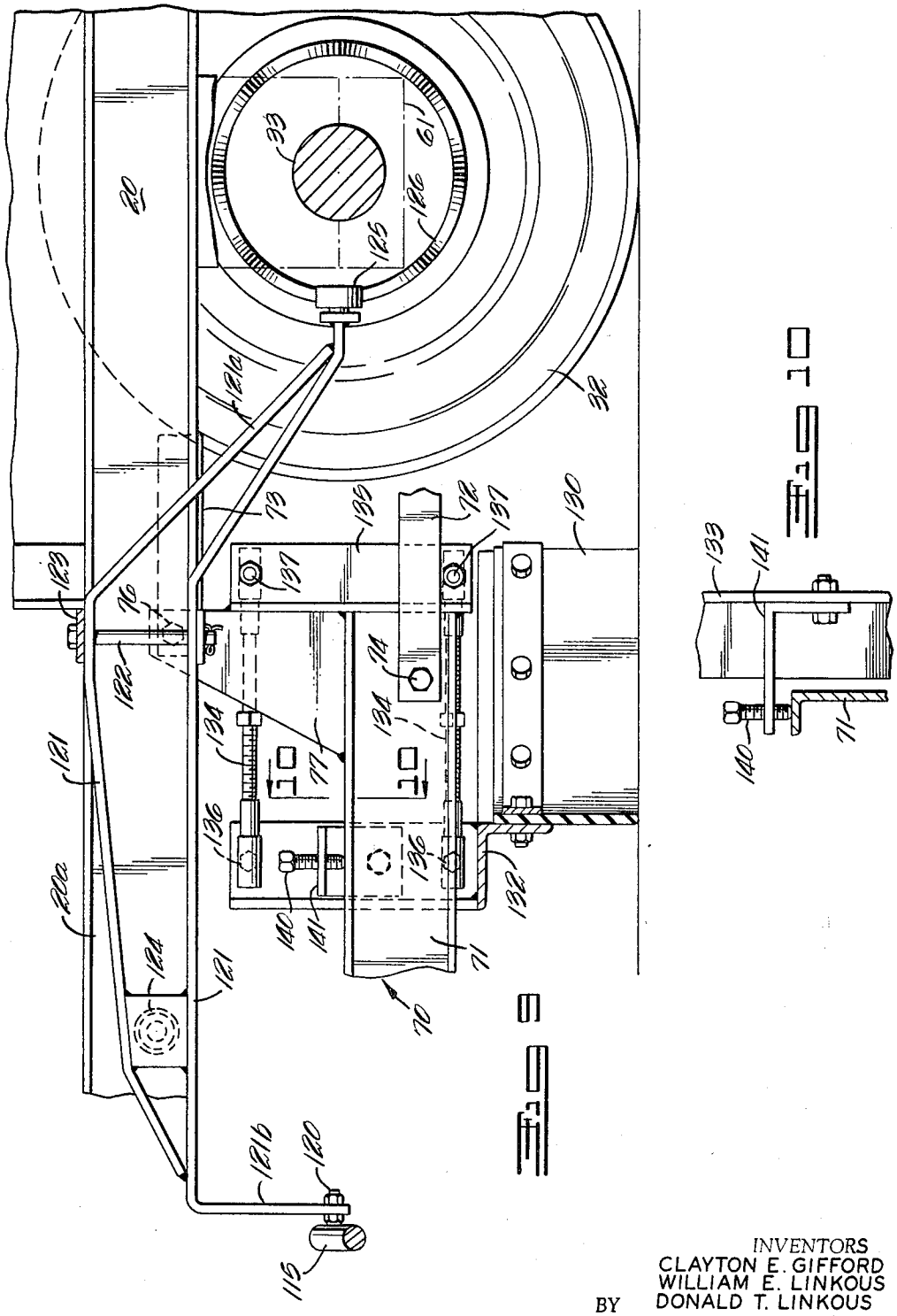


INVENTORS
CLAYTON E. GIFFORD
WILLIAM E. LINKOUS
DONALD T. LINKOUS
BY MAHONEY, MILLER & RAMBO
BY Wm. V. Miller
ATTORNEYS

Nov. 8, 1966 C. E. GIFFORD ETAL 3,283,675

PAVEMENT SURFACE-SEALER APPLYING MACHINE

Filed Dec. 14, 1964 6 Sheets-Sheet 6



INVENTORS
CLAYTON E. GIFFORD
WILLIAM E. LINKOUS
DONALD T. LINKOUS
BY MAHONEY, MILLER & RAMBO
BY Wm. V. Miller
ATTORNEYS

United States Patent Office

3,283,675

Patented Nov. 8, 1966

3,283,675

PAVEMENT SURFACE-SEALER APPLYING MACHINE

Clayton E. Gifford, Marion, and William E. Linkous and Donald T. Linkous, Columbus, Ohio, assignors to Asphalt Sealer Products Company, Inc., Columbus, Ohio, a corporation of Ohio

Filed Dec. 14, 1964, Ser. No. 417,965
20 Claims. (Cl. 94—39)

This invention relates to a pavement surface-sealer applying machine. It has to do, more particularly, with a self-propelled machine which is adapted to move over the surface of a pavement and apply thereto a sealer substance to protect that surface. In its specific application, it deals with a machine for applying a bituminous sealer of a semi-liquid or viscous type to the surface of bituminous pavement commonly known as "blacktop" pavement and spreading the sealer evenly and uniformly over that surface.

According to this invention, there is provided a machine which includes a main frame carried by front and rear wheels for movement over the surface to be treated. At least some of these wheels are positively driven so that the machine is self-propelled. Preferably, the front wheels are driven and a novel arrangement is provided for driving and steering those wheels. The frame carries a tank or hopper in which the treating substance is mixed or agitated, by means of a driven mixer or agitator. Both the propelling wheels and the mixer or agitator are preferably hydraulically driven. The treating or sealer substance discharges by gravity from the bottom of the tank under control and is directed by a novel directing arrangement laterally relative to the longitudinal center line of the machine which is especially desirable if the machine is operating on a laterally crowned or tilted surface. The material is discharged in front of applicator means which is carried on a sub-frame that is connected to the main frame so that it will float relative thereto. This sub-frame carries one or more transversely extending leveling squeegees which first act on the treating or sealer substance to roughly spread and level it. It also carries one or more applicator brushes which extend transversely behind the forward squeegees and which are reciprocated or oscillated transversely so as to brush effectively the treating or sealer substance into irregularities of the pavement surface. A final squeegee, which is preferably angularly adjustable about a vertical axis, may be provided behind the brush to impart a final smooth surface to the sealer coating. The entire sub-frame or applicator sub-assembly is connected to the main frame by lifting means which normally permit it to float relative to the main frame but which can be actuated to lift the assembly for proper transporting or traveling clearance. This lifting arrangement is also preferably hydraulically actuated.

Various other objects and advantages of this machine will be apparent from the drawings and the following description.

The accompanying drawings illustrate a preferred form of machine embodying the principles of this invention but it is to be understood that specific details may be varied.

In these drawings:

FIGURE 1 is a front perspective view of the machine.

FIGURE 2 is a front elevational view of the machine showing particularly the front wheel mounting and steering arrangement.

FIGURE 3 is a rear perspective view showing particularly the leveling squeegee and applicator brush assembly.

FIGURE 4 is an enlarged side elevational view of the structure shown in FIGURE 3.

FIGURE 5 is a horizontal sectional view taken along line 5—5 of FIGURE 4.

FIGURE 6 is an enlarged detail in vertical section taken along line 6—6 of FIGURE 4.

FIGURE 7 is a vertical sectional view taken along line 7—7 of FIGURE 6 through the brush and its mounting means.

FIGURE 8 is a similar view taken along line 8—8 of FIGURE 6.

FIGURE 9 is an enlarged vertical longitudinal sectional view taken along line 9—9 of FIGURE 6.

FIGURE 10 is a detail in transverse vertical section taken along line 10—10 of FIGURE 9.

With reference to the drawings, the machine embodying the present invention is shown in FIGURES 1 and 2 as comprising a main frame, suitably fabricated from steel frame members, and indicated generally by the numeral 20. This main frame carries a box-like housing 21, preferably formed of steel plates, within which a tank for the treating or sealing substance is provided and which preferably encloses an internal combustion power unit 22 or engine illustrated schematically in FIGURE 3 along with an associated hydraulic pump and other portions of the power and hydraulic system, the details of which are not important to the present invention.

The housing 21 preferably has the tank 23 formed at its forward end in a suitable manner, as shown in FIGURE 4, with the rear wall 24 and the bottom wall 25 being inclined rearwardly in converging relationship to direct the substance therein toward an outlet controlled by a suitable valve 26 which may comprise a plate or disc 26 (FIGURE 4) pivoted at 26*a*, and actuated by the bar 19 which runs rearwardly under the frame 20 and is pivoted at 18 to a control handle 17. Within the tank is a mixer or agitator 27 which is preferably driven by a hydraulic motor indicated at 28.

The frame 20 projects rearwardly from the housing 21 and on this projecting portion of the frame an operator's seat 29 is provided. From this seat, the operator can see over the housing 21 and can operate the various controls for the machine which are conveniently located relative thereto.

The frame 20 is supported by a front wheel assembly 30 (FIGURES 1 and 2) which includes the pair of driven wheels 31 and a rear wheel assembly which includes the pairs of idler wheels 32 (FIGURES 5 and 6) which are mounted on a transverse axle 33 that extends transversely below and is suitably connected to the main frame 20 as shown.

The front wheel assembly 30, as shown best in FIGURES 1 and 2, includes a sub-frame mounted for vertical pivotal movement in a transverse plane about a pivot axis extending longitudinally of the frame 20 of the machine just above that frame. This sub-frame includes the upright transversely disposed plate 35 which is flat against the front wall of the housing 21 and is carried thereby by means of a pivot structure 36. The plate 35 has beveled upper corners 37 and associated with these corners are guide brackets or clips 38 which are fastened to the front wall of the housing 21 by the bolts and spacers 39 but extend laterally inwardly over the face of the plate 35. These permit the swinging movement of the plate 35 about the axis of the pivot 36 but prevent forward tilting of the plate away from the housing. Vertical swinging movement of the plate 35 is limited by the stops provided by the bolts and spacers 39.

At each outer side edge of the plate 35 an upright cylindrical spindle housing or bearing 40 is welded or otherwise secured thereto. Each housing rotatably receives the upright yoke spindle 41 which is suitably rotatably supported therein. The lower end of the spindle projects

from the cylinder 40 and carries a yoke or fork 42 which straddles the associated wheel 31 and carries the transverse axle 43 upon which the wheel is rotatably mounted. Each wheel 31 has bolted thereto a large sprocket 44, driven by a sprocket chain 45 from a smaller sprocket 46 which is keyed on the drive shaft of a suitable hydraulic motor 48. Each motor 48 is carried on the upper portion of the associated yoke or fork 42.

The lower end of each spindle 41, below the cylinder 40, has keyed thereto a sprocket 49. A sprocket chain 52 has its ends wrapped around the associated sprockets 49 and suitably anchored thereto. This chain passes around and in mesh with the forward side of a central segmental sprocket 50. The chain 52 is preferably provided with take-up turnbuckles 51 connected therein between each sprocket 49 and the segmental sprocket 50. The segmental sprocket 50 is keyed on the upper end of a sleeve 54 which is mounted for rotation on the upright pivot pin 53 rigidly carried by a bracket 55 that projects forwardly from the front wheel assembly 30. The lower end of the rock sleeve 54 has a rock arm 55*a* extending rigidly outwardly therefrom which has its outer end pivoted by a universal joint 56, such as a ball joint, to control linkage 57. This linkage 57 leads rearwardly under the frame to a connection with the vertical steering column 58 (FIGURE 3) which is provided with the steering wheel 59 on its upper end.

It will be apparent that with this arrangement, turning the steering wheel 59 will rock the arm 55*a* which will, in turn, rock the segmental sprocket 50. This, in turn, will drive the chain 52 in one direction or the other and consequently will turn the sprockets 49 in a corresponding direction thereby rotating the spindles 41 in the housings 40 both simultaneously in the same direction. Thus, steering is controlled by the wheel 59 which simultaneously turns both wheels 31 in the same direction about the vertical axes of the respective spindles 41 which carry them. Driving of the wheels 31 is accomplished by controlling the hydraulic motors 48 which drive them and which may be simultaneously controlled by a valve (not shown) located adjacent the driver's seat 29.

The rear wheels 32 are mounted in the manner indicated in FIGURES 4, 5, and 6. The axle 33 is attached to the frame 20 by means of depending supports 61.

As previously indicated, the outlet valve 26 is controlled from a point adjacent the driver's seat by means of the control handle 17. The treating substance leaving the tank outlet under control of the valve 26 drops into a directing chute or trough 60 shown best in FIGURES 4 and 5. The valve 26 and associated tank outlet are located midway laterally of the tank and the trough 60 is pivoted directly below it for lateral swinging movement about a vertical axis. For this purpose the pivot 62 is provided directly adjacent the wall 24 on the bottom 25 of the tank and may comprise a hook and eye which suspends the forward end of the trough in such a manner as to permit lateral swinging of the rear end thereof. The trough 60 is fan-shaped with a diverging rear end and is supported in rearwardly and downwardly inclined position on the frame 20, the pivot mounting 62 permitting this inclination. The rear end is supported for the lateral swinging movement by means of a rigid upstanding loop 63 on the trough. This loop straddles a transverse rigid support rod 64 which is supported at a level below the main part of the frame 20, in laterally extending relationship thereto, by means of a pair of depending bracket supports 65 which depend from the opposite outer side members of the frame. A rigid control bar 66 has its forward end rigidly connected to the rear end of the chute and extends rearwardly of the chute from its rear end, which is forward of the axle 33, over the axle and beneath the housing 21 to a point adjacent the driver's seat. By means of a handle 67 (FIGURE 3), this bar may be moved laterally to swing the directing chute 60 laterally about its pivot 62. The loop 63 extends sufficiently longitudinally of the frame 20 and transversely of the support bar 64 to permit this swinging movement about the pivot 62.

The applicator or spreader means of this machine is formed as a substantially separate unit which is indicated generally by the numeral 70 and includes a sub-frame that is disposed below and is pulled along by the main frame 20 to which it is connected for relative floating movement. This unit or sub-assembly is illustrated best in FIGURES 3–10.

The sub-frame includes a pair of longitudinally extending laterally spaced parallel outer side members 71 which extend longitudinally of the machine. This sub-frame has its rear end connected to the frame 20 so that it will be pulled therealong thereby by means of vertically swingable parallel linkage at each side of the frame and which includes a lower link 72 and an upper link 73. The lower link 72 is pivoted at its forward end at a pivot point 74 to the rear end of the associated side frame member 70 and is pivoted at its rear end at a pivot point 75 to the lower end of the support bracket 65 which rigidly depends from the frame 20 just ahead of the tank wall 24. The upper link 73 is pivoted at its forward end by a pivot 76 to the upstanding bracket 77 which is rigidly fastened on the upper edge of the member 70 at its rear end. The rear end of this link 73 is pivoted at 78 to the upper end of the support bracket 65. Thus, the unit or sub-frame assembly 70 will be located below the main frame 20 and will be pulled along therewith by the parallel linkage trough connection and will be capable of vertical floating movement relative to the frame 20. It will be noted best in FIGURE 4 that this sub-frame 70 extends rearwardly beyond the frame 20. It is provided with a triangular rear extension 80 to which is rigidly connected at its vertex an upstanding stop-carrying frame portion 81 which has a forward extending portion that carries a stop-screw 82. This stop-screw 82 is adapted to be disposed over and to engage a stop bar 83 which is provided on the upper surface of the frame 20 at its rear end and may be the support on which the seat pedestal 84 is mounted. Thus, the downward extent of the movement of the frame 70 relative to the frame 20 may be limited by the setting of the stop-screw 82.

The frame 70 will move vertically parallel to the main frame 20 because of the provision of the parallel linkage. To lift the frame 70 for proper traveling clearance, when desired, a hydraulic lifting arrangement is provided which is shown best in FIGURES 3 and 4. Thus, there is provided at each side of the frame 20, the vertically swingable lifting arms 85 which are keyed on the outer ends of a transversely disposed shaft 86 that is rotatably carried by bearings 87 carried on the frame 20. The outer ends of the crank arms 85 are connected to the side members 71 of the frame 70 by the pivoted lifting links 88. A rocker arm 89 is keyed to the shaft 86 and is rocked by means of a hydraulic cylinder and piston unit or ram 90 carried by the frame 20 and which may be suitably controlled. By actuating the ram 90, the frame 70 may be lifted or lowered relative to the frame 20.

At the vertex of the frame extension 80 there is also a rotatable shaft 91 which has its lower end supported by that extension and its upper end rotatably supported by a segmental plate 92 rigidly secured in position on the upper end of the frame portion 81. An adjusting handle 93 is keyed on the upper end of the shaft 91 and sweeps over the plate 92 being provided with a removable pin 94 for selectively cooperating with any of a series of openings 94*a* arranged arcuately of the plate 92. The lower end of this shaft 91 is keyed to a bracket 97*a* which is adapted to adjustably carry the final squeegee 95. This squeegee may be a flexible blade made of rubber or plastic and carried by an angle bar 96. This angle bar is provided midway of its ends with a pair of upstanding lugs 97 which are rigidly secured thereto and straddle

the brackets **97***a*. The lugs **97** are pivoted adjacent their rear lower corners by the opposed pivots **98** to the bracket **94** and each is provided with a series of openings **99**, opposite the pivot **98**, for selectively receiving a pin **101** passed through an opening in the lug. Thus, the squeegee asembly may be tilted about the axis of the pivots **98** and locked in adjustably tilted position by the pin **101**.

Ahead of the squeegee **95** on the sub-frame **70** is the transversely disposed, oscillatable or reciprocable brush assembly **100**, which is shown best in FIGURES 3–8, inclusive. This assembly **100** includes the brush member itself **102** which is removably received on transverse pins **103** (FIGURE 8) projecting laterally from a support bar **104**. This bar **104** is disposed on edge and is rigidly secured to a reciprocable bar **105** at one edge thereof and in depending relationship thereto. This bar **105** carries a retaining clip **106** of inverted U-form toward each of its ends which straddles the bars **105** and **104** and holds the brush **100** on the pins **103**. Each clip **106** is of resilient material and is rigidly attached to a metal strip **108** which extends longitudinally of the bar **105** and normally rests thereon. A handle loop **107** is attached to the strip **108** and may be used for swinging it about its pivotal connection **109**, at its inner end, to the upstanding lug **116** which projects upwardly from the bar **105** midway of its ends. The clips **106** resiliently straddle the brush **102** and hold it in place but can be moved upwardly out of the way by means of the handles **107** to permit removal and replacement of the brush.

The ends of the bar **105** (FIGURES 4 and 6) extend slidably outwardly through guides **110**, each of which is carried at the lower edge of the associated side frame member **71** of the sub-frame **70**, the upper portion of the body of the brush being cut away at **111** so as not to interfere with the associated guide. Each of the outer ends of the bar **105** is connected by a vertical pivot pin **112** to the forward end of a push-yoke **113**. The rear end of this yoke is pivoted by a universal **114** (FIGURE 4) to a lug **117** on the outer end of a transverse brace **118** attached to the rear ends of the side frame members **71**. The bar **105** is free to move vertically in the guides **110** to provide for limited yielding upward movement of the brush **102** as it engages the coated surface. The yokes **113** will keep the brush substantially upright and will exert a forward thrust thereon and reciprocation of the brush will be permitted since the bar **105** will be able to slide in the guides **110** longitudinally of itself as well as be able to move laterally of itself in the guides **110** and the universal joints **114** will permit both horizontal and vertical swinging of the yokes **113**.

For reciprocating the bar **105** and the brush **102** which it carries, a novel cam-actuated arrangement is provided which is controlled by rotation of the rear wheels **32** so that the speed of brush reciprocation will vary as the speed of travel of the machine varies. This reciprocating means comprises a connecting rod **115** (FIGURE 6) disposed transversely above the bar **105** and having its inner and lower end pivoted at a horizontal pivot **119** to the lug **116** upstanding from the bar **105**. The outer end of this rod **115** is pivoted at a horizontal pivot **120** to the lower end of a higid arm portion **121***b* depending from the rocker beam **121**. This beam **121** is located inwardly of one of the side members **20***a* of the frame **20** and is pivoted for swinging movement in and out in a horizontal plane relative to that member by means of a vertical pivot **122** (FIGURE 9) located toward its forward end which is carried by a bracket **123** attached to the side member **20***a* at the inner side thereof. At the rear end of this beam **121**, between it and the member **20***a*, is a compression spring **124** which normally swings its rear end inwardly and its forward end outwardly. This forward end is provided with a downwardly inclined portion **121***a* which carries on its lower end a cam follower roller **125** which engages the cam edge of an annular cam flange **126** that surrounds the hub of the associated wheel **32**. Thus, when the wheel rotates, it will rock the beam **121**, about its pivot **122**, which, through the connecting rod **115**, will reciprocate the brush unit **100**.

One or more squeegees is provided ahead of the brush unit **100** to spread and level the coating material in a preliminary manner. In the drawings, in FIGURES 3–5 and 9, a single squeegee **130** is provided. This squeegee extends transversely below the frame **70** and is provided with forwardly turned ends **131** to confine the material as it is spread across the surface, this being the material which is deposited from the chute **60** in front of the squeegee. This squeegee comprises a metal angle member **132** which carries a flexible squeegee block of rubber or the like. This angle member is rigidly connected to the lower ends of angle brackets **133** disposed directly outwardly of the side frame members **71** and extending upwardly thereabove. This member **133** is connected by means of forwardly extending, parallel upper and lower thrust links **134** at each side of the frame **70** to an associated upstanding bracket **135** rigidly carried on the forward end of the side member **71**. The links **134** include adjustable turnbuckles and have simple horizontal pivots **136** at their rear ends and universal pivots **137** at their forward ends. By means of these links **134** at the opposed ends of the squeegee **130**, it may be adjusted to an upright position and will be maintained in that position even though it is free to float vertically because of the parallel linkage. Downward movement of the squeegee **130** is limited by stop screws **140** (FIGURES 9 and 10) carried by angle clips **141** secured to the inner sides of the members **133**. These screws **140** will engage with the upper edges of the associated side frame members **71**.

In the use of this machine, the proper coating material will be supplied to the tank **23** and will usually be a liquid sealer which may have sand or other material added thereto. The hydraulic motor **28**, which drives the mixer or agitator **27**, will be actuated and the machine will be propelled along by actuating the hydraulic drive motors **48**. The ram **90** will be actuated to lower the sub-frame **70** so that the brush unit **100** and the squeegees **95** and **130** will contact with the surface to be treated. The material-directing trough **60** will be swung to the proper lateral position to direct the material flowing from the outlet of the tank **23** in the desired direction. The flow of this material will be controlled by opening or closing the valve **26** from time to time. Also, the direction of flow may be varied from time to time by a change in the position of the trough **60**. This will permit directing the liquid or semi-liquid material to the higher side of a surface if it is tilted transversely. As the machine moves along, the rotation of the cam **126** with one of the wheels **32** will swing the rocker beam **121** laterally which will produce reciprocation of the brush **102**. The sealer material will be deposited in front of the squeegee **130** and will be roughly spread laterally thereby, spreading being limited by the forwardly extending ends **131** of the squeegee. This squeegee will be permitted to float vertically because of the provision of the parallel linkage **134**. The spread material will next be acted upon by the transversely reciprocating brush **100**. This brush is also free to float vertically to a limited extent and the sealer will be worked into any irregularities of the surface. Finally, the spread and worked sealer material will be acted upon by the squeegee **95** which will finally smooth and level it. This squeegee **95** may be angled rearwardly towards one side or the other to direct excess material laterally to one side off the surface. The entire applicator assembly, including the squeegees and the brush, is carried by the frame **70** and this frame is free to move vertically in its entirety relative to the frame **20**. When it is desired to move the machine to a different location, the ram **90** may be actuated to lift the unit **70** so that the squeegees and brush will not contact with the surface.

In moving over the surface, the front driving wheels 31 can pivot as a unit about the horizontal pivot 36, it being understood that they are carried on the frame 35 for this purpose. This transverse pivoting or swinging of the wheel-carrying frame 35 will insure firm driving contact of both front wheels with the surface over which the material travels even if one or the other rides over a bump or into a depression. The wheels 31 are positively driven by the hydraulic motors 48 and they are steered by means of the steering wheel 59 which actuates the chain 52 and associated sprockets to turn the wheels about the axes of the vertical spindles 41.

It will be apparent from the above that this invention provides for a novel machine which will effectively spread sealer material over pavement surfaces. Many advantages of this machine have been discussed and others will be apparent.

Having thus described this invention, what is claimed is:

1. A machine for applying a viscous treating substance to a surface over which it is adapted to move comprising a frame carried by wheels for movement along the surface to be treated, means on the frame for depositing the treating substance on said surface, brush means for working said deposited substance on the surface, means for mounting said brush means on the frame behind said depositing means for reciprocation transversely of the frame and relative to the normal path of movement thereof, and means for reciprocating said brush means and including cam means actuated by the rotation of at least one of said wheels, said cam means comprising a cam rotatable with the wheel, a cam follower engaging said cam and an operative connection between said follower and said brush means.

2. A machine according to claim 1 in which the wheel is rotatable about an axle extending transversely of the frame, said cam being an annular cam which surrounds said axle, said cam having a cam edge, said follower embodying a roller engaging said cam edge, said operative connection comprising a beam extending longitudinally of the frame and mounted thereon for transverse rocking movement and carrying said roller on one of its ends adjacent said cam, and a connecting rod connecting the opposite end of the beam to said brush means.

3. A machine according to claim 1 in which said means for depositing the treating substance on the surface comprises a tank having a discharge outlet with means below the outlet for directing the substance, said means being adjustable laterally to direct the substance laterally relative to the direction of normal movement of the machine.

4. A machine according to claim 3 in which said directing means comprises a chute pivotally mounted on the frame so that its forward end can be adjusted laterally in either direction from a central forwardly extending position.

5. A machine according to claim 1 including a squeegee carried by said machine following said depositing means and ahead of said brush means and extending transversely of the frame, said squeegee having forwardly turned end portions to limit spreading of the substance by the squeegee.

6. A machine according to claim 4 in which another squeegee is disposed on said machine behind said brush means, said last-named squeegee being mounted for adjustable movement about a vertical axis, and means for retaining the squeegee in selected adjusted positions.

7. A machine for applying a viscous treating substance to a surface over which it is adapted to move comprising a main frame carried by transporting means for movement along the surface to be treated, said main frame carrying a tank for the substance having a downwardly directed discharge outlet, a sub-frame disposed below the main frame, means connecting the sub frame to the main frame so that it will move along therewith but will be free to move vertically relative thereto, brush means mounted on said sub-frame for reciprocation transversely relative thereto, and cam means actuated in response to actuation of said transporting means and operatively connected to said brush means to produce reciprocation thereof as the machine moves along said surface and in timed relationship thereto, said transporting means comprising a pair of rear wheels and a pair of forward wheels, said forward wheels being carried on opposite sides of a transversely extending frame, and means for mounting said last-named frame on said main frame for pivotal movement about a horizontal axis extending longitudinally of the machine, said front wheels being carried on said last-named frame by vertical spindles at each side of the frame, and means for adjusting both of said wheels simultaneously about the axes of said spindles to steer the machine.

8. A machine according to claim 7 in which said front wheels are rotatably mounted in forks carried by said spindles, and hydraulic driving motors carried by said forks and drivingly connected to said wheels.

9. A machine according to claim 8 comprising rotatable mixing means in said tank, and a hydraulic motor for driving said mixing means.

10. A machine according to claim 7 in which said connecting means between the main frame and the sub-frame comprises parallel linkage, means for lifting the sub-frame relative to the main frame for travel, said means comprising lifting arms carried by the main frame and connected to the sub-frame, a rock shaft for swinging said arms, and a hydraulic ram for actuating said shaft.

11. A machine according to claim 7 comprising a downwardly inclined directing chute disposed below said tank outlet, and means for pivotally mounting the forward end of said chute and laterally adjustably supporting the rear end of said chute on said frame for lateral swinging movement.

12. A machine according to claim 7 including a transversely disposed squeegee carried by said sub-frame and located between said discharge outlet and said brush means, said squeegee having forwardly turned outer ends for limiting outward spreading of the treating substance.

13. A machine according to claim 12 including parallel linkage for connecting said squeegee to said sub-frame, said parallel linkage including adjustable turnbuckles and universal joints to permit tilting adjustment of said squeegee.

14. A machine according to claim 12 including a squeegee located behind said brush means and carried by said sub-frame, means for mounting the last-named squeegee on said sub-frame, said means comprising a vertical pivot structure carried by said sub-frame and about which the squeegee can be adjusted to angle it transversely of the frame, and means in cooperation with said pivot for holding said squeegee in adjusted position therearound.

15. A machine according to claim 14 in which said squeegee includes a flexible blade and a support attached to said pivot by means permitting tilting adjustment of said support.

16. A machine for applying a viscous treating substance to a surface over which it is adapted to moved comprising a main frame carried by transporting means for movement along the surface to be treated, said main frame carrying a tank for the substance having a downwardly directed discharge outlet, a sub-frame disposed below the main frame, means connecting the sub-frame to the main frame so that it will move along therewith but will be free to move vertically relative thereto, brush means mounted on said sub-frame for reciprocation transversely relative thereto, and cam means actuated in response to actuation of said transporting means and operatively connected to said brush means to produce reciprocation thereof as the machine moves along said surface and in timed relationship thereto, said mounting means

for the brush including guides for receiving a brush supporting bar to permit transverse guided reciprocation thereof as well as vertical floating movement, and thrust yokes pivoted to the ends of said bar by vertical pivots and pivoted to said sub-frame by universal pivots to permit the transverse reciprocation of said brush bar as well as vertical movement thereof.

17. A machine according to claim **16** including means for removably suspending a brush member from said bar.

18. In a machine of the type described a frame supported at its rear by transporting means, means for supporting the front of the frame, said means comprising a pair of laterally spaced front wheels carried at the outer sides of a sub-frame extending across the front of said main frame, and means for pivotally connecting said sub-frame to the main frame for pivotal movement about an axis extending longitudinally of said main frame, said wheels being carried by forks pivoted by vertical spindles rotatably mounted in upright bearings at the outer sides of said sub-frame, and means for turning the forks about the axes of said spindles simultaneously to steer the machine by the front wheels.

19. The combination of claim **18** including hydraulic motors carried by said forks for driving said wheels.

20. The combination of claim **19** in which said main frame carries a housing having a flat vertically disposed, transversely extending front wall, said sub-frame being a flat plate disposed transversely flat against said wall and pivoted thereto by said pivot, and guides between the wall and said plate to permit said pivotal movement transversely but to prevent forward tipping of the plate.

References Cited by the Examiner

UNITED STATES PATENTS

1,755,653	4/1930	Koehring	94—46
1,978,773	10/1934	Trant	94—44
2,175,511	10/1939	Wahlstrom	94—44
2,453,510	11/1948	Jackson	94—48
2,754,732	7/1956	Beyer	94—45
2,954,088	9/1960	Williamson	94—59
2,962,946	12/1960	Neff	94—44

JACOB L. NACKENOFF, *Primary Examiner.*