Oct. 27, 1964 G. R. DABELLE 3,153,992

PAVEMENT SEALER SPREADER APPARATUS

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Fig. 1.

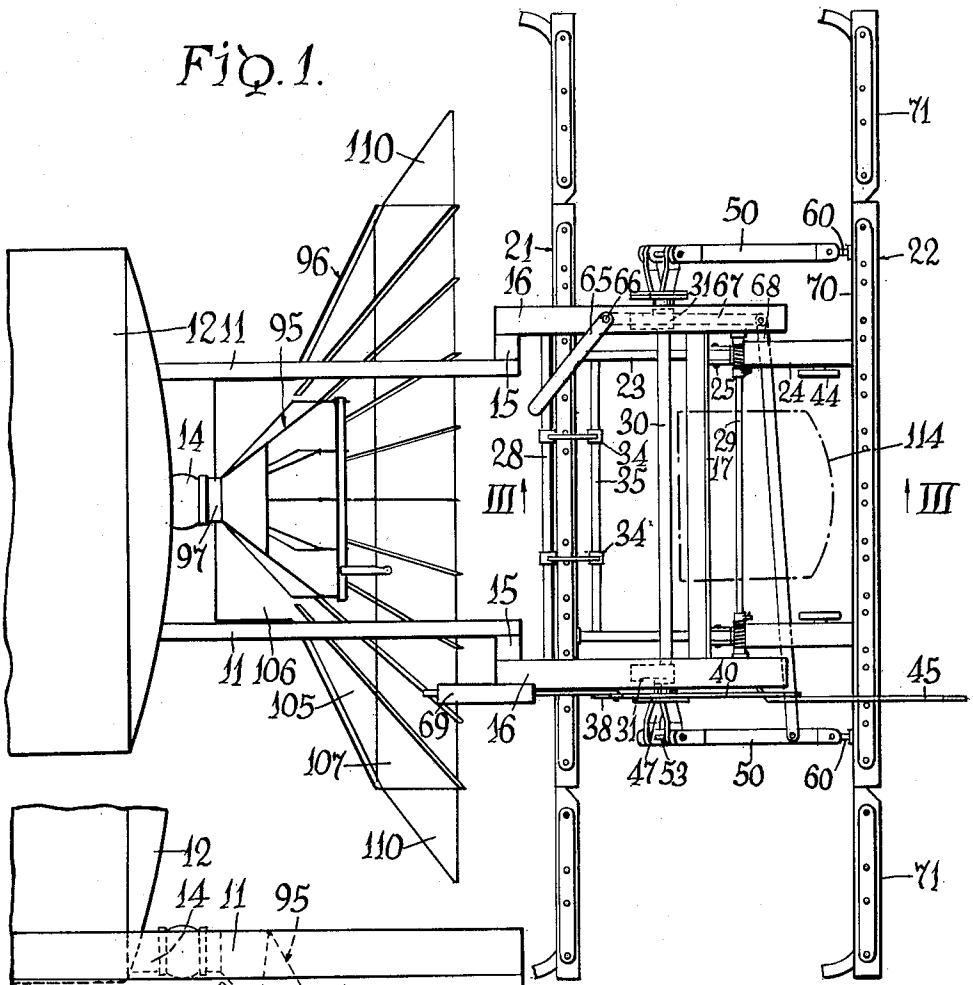


Fig. 2

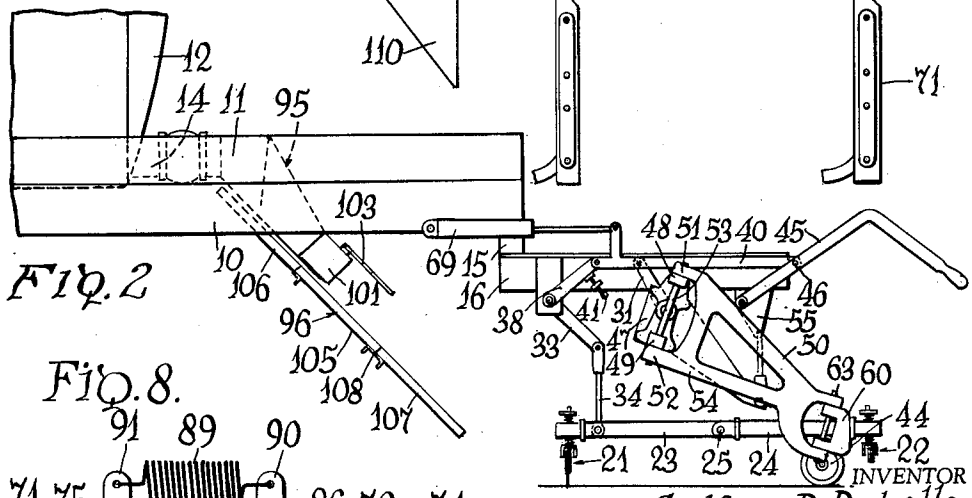
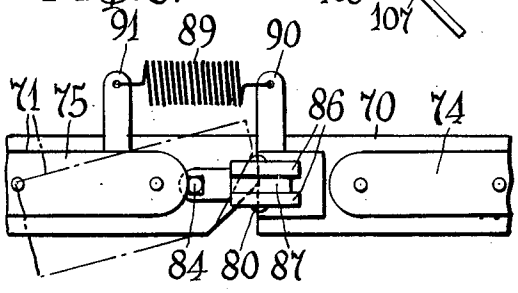


Fig. 8.



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PAVEMENT SEALER SPREADER APPARATUS

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Fig. 3.

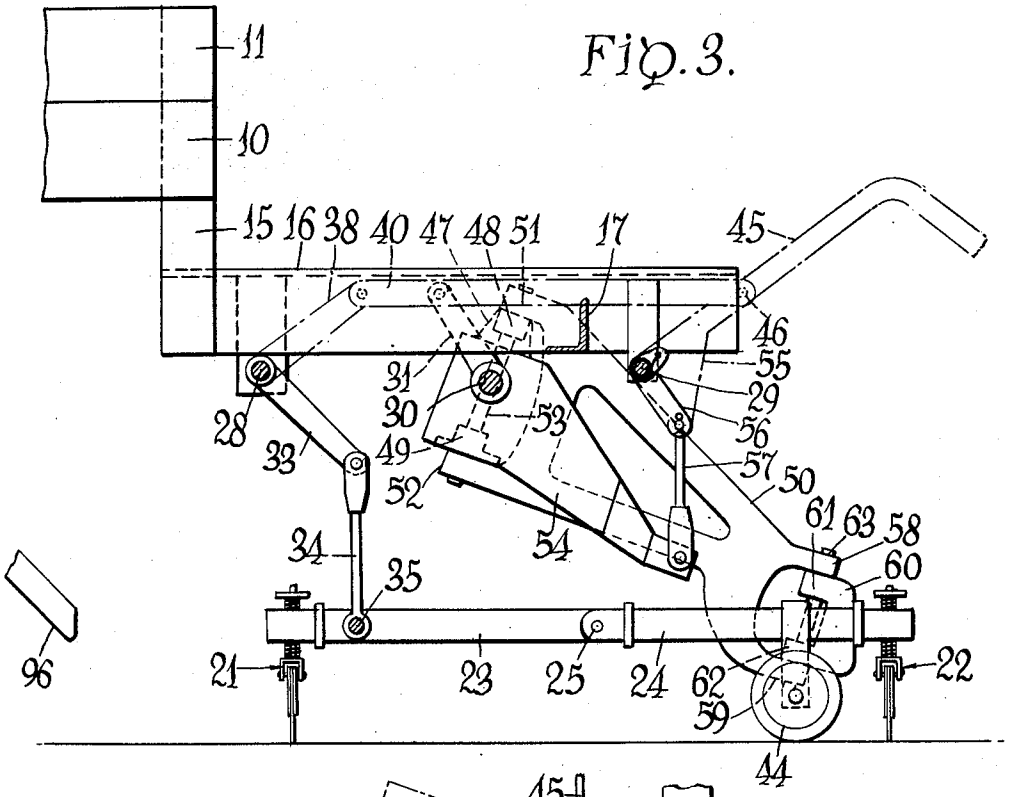
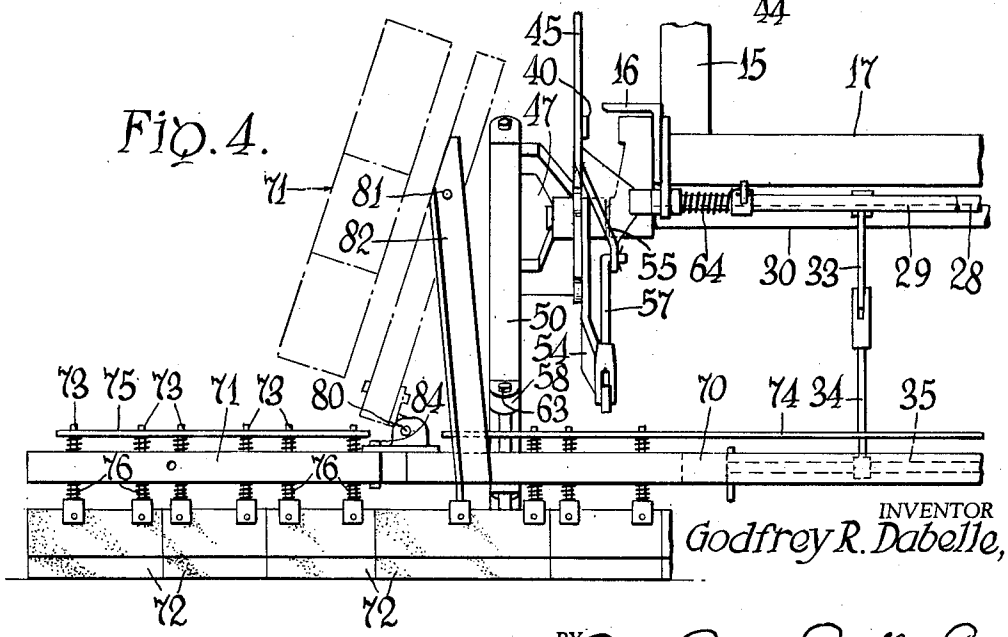


Fig. 4.



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Fig. 5.

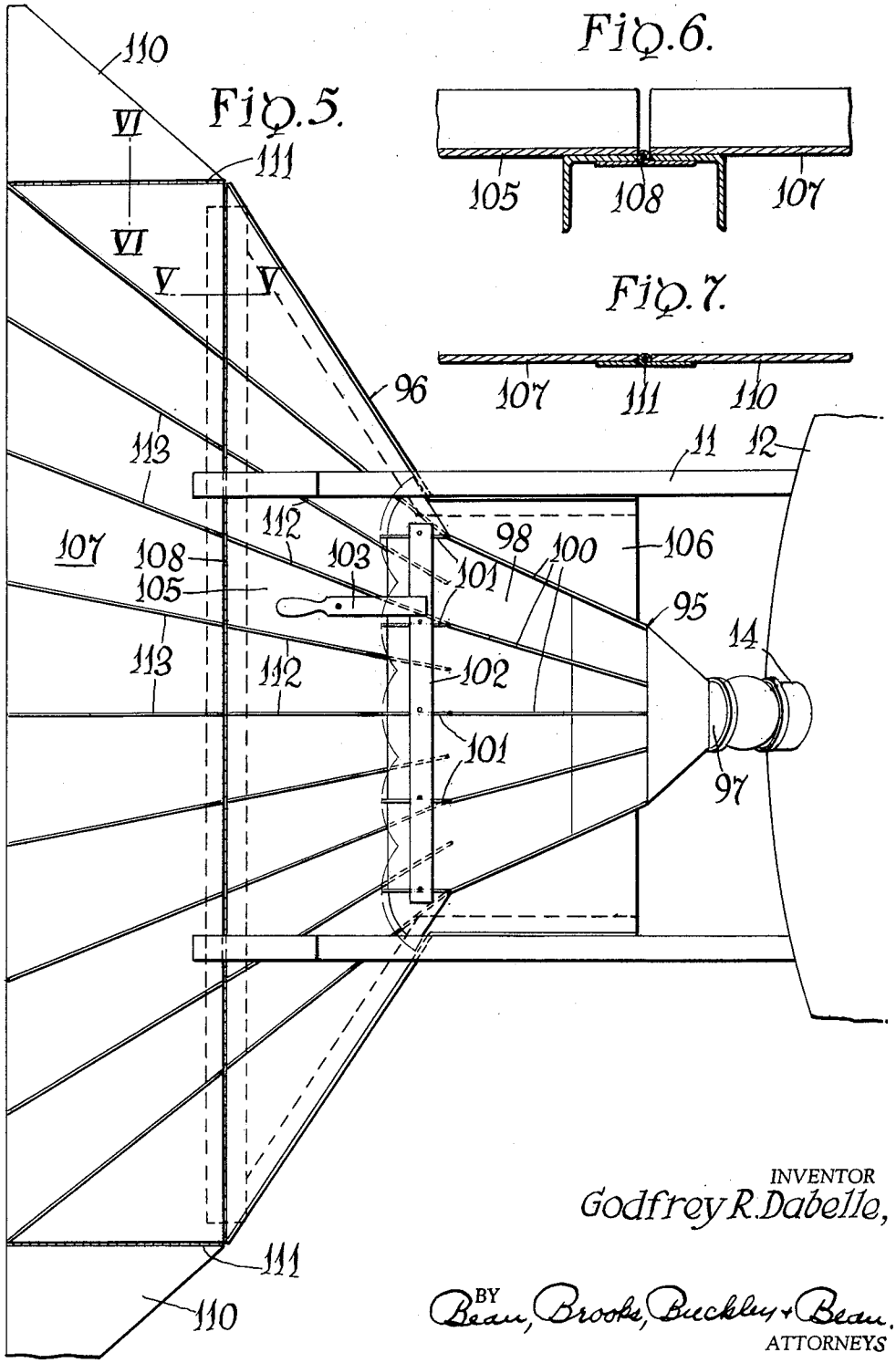


Fig. 6.

Fig. 7.

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PAVEMENT SEALER SPREADER APPARATUS

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2 Claims. (Cl. 94—44)

This invention relates to apparatus for depositing and spreading liquid or semi-liquid material or slurry on pavement, and more particularly to mobile apparatus adapted to deposit and spread such material continuously as the apparatus passes along a road or street.

Certain types of road pavements and similar paved surfaces such as blacktop and macadam are improved and rendered more durable and water-resistant by the application of liquid or semi-liquid sealing compounds or mixtures of various kinds. Such application involves depositing the material on the paved surface and spreading the same uniformly thereover as by means of squeegees or the like. The provision of suitable apparatus for this purpose presents the problem of securing a generally uniform deposit of material across the pavement as the apparatus moves therealong.

This problem is complicated by the sticky, somewhat viscous and adherent nature of the sealing or surface treating material and the tendency of the same to build up in the depositing apparatus and thus alter the depositing properties thereof. Other problems arise in the depositing of the material owing to the inclined surfaces of pavements, as when sealing material is being applied to one side of a crowned roadway or street, and also, when the apparatus is mounted at the rear of a truck or is towed thereby, due to inability of the truck driver to maintain a sufficiently straight or properly aligned course.

The present invention provides apparatus which receives liquid or semi-liquid material as the same flows from a tank and diverges the flow by means of a novel arrangement of open channels which are inherently nonclogging, easy to clean when necessary or desirable, and adapted to maintain uniform depositing properties during long periods of continuous or intermittent use. The spreading and depositing apparatus of the present invention is further arranged so that the zone in which the material is deposited may readily be shifted laterally in either direction to compensate when depositing on an inclined surface and to offset or laterally adjust the deposit for any other operational reason.

The spreading phase of the operation which follows the actual depositing of the material is likewise rendered difficult by reason of unavoidable surface irregularities which are encountered in treating roads and other paved surfaces, particularly in the case of roads or pavements which may have been in use for substantial periods before the application of the sealing or surfacing material contemplated herein.

The spreading apparatus of the invention includes a pair of successively operating squeegee members, a first squeegee for effecting a general spreading of the deposited material and a second squeegee for effecting a final or finish spreading. The first squeegee is arranged to have an adjustable but relatively fixed height with respect to the vehicle to which the apparatus is attached while the second squeegee embodies ground engaging wheels for accurately determining the degree of engagement of the squeegee with the road surface, regardless of variations in the height of the truck frame due to springing movement thereof or due to large variations in load on the springs which occur as the tank carrying the treating material goes from full load to empty.

To further facilitate the spreading operation and produce a uniform wiping action despite unavoidable variations in the contour of the pavement, each squeegee is made up of a plurality of sections mounted for individual resilient upward movement, as will appear later herein.

Means are provided whereby the aforesaid pair of squeegees may be selectively adjusted laterally jointly and without interference with their vertical positions or their degrees of predetermined spreading contact with the pavement. Thus the squeegees may be accurately positioned to operate close to a curbing or other desired guide line despite minor variations in the course of the truck carrying the apparatus.

The machine of the present invention further provides means for selectively raising the entire squeegee structure clear of the pavement when the apparatus is to be moved about between spreading operations. Such means may be entirely manual or power operated or, as in the instance set forth herein by way of example, may have combined manual and power operated means for effecting raising and lowering movements.

According to the arrangement of the apparatus of the present invention set forth herein by way of example, the depositing and spreading mechanism is attached to the rear of an automotive tank truck which carries a supply of the liquid or semi-liquid sealing or coating material. An operator seated above the spreading mechanism has within easy reach control means for regulating the discharge valve from the tank truck to control the quantity of material passing to the depositing means; a control lever for disposing the spreading squeegees in the proper lateral positions and adjusting such positions as often as may be necessary; a control lever for adjusting the lateral range of deposit of the material prior to spreading; and manual and power booster means for raising and lowering the entire squeegee mechanism as required.

While a single complete embodiment of the principles of the present invention is set forth herein and illustrated in the drawings by way of example, it is to be understood that numerous mechanical modifications and variations may be effected or introduced without departing from the spirit of the invention, the scope of which is limited only as defined in the appended claims.

In the drawings:

FIG. 1 is a general top plan view of one form of the apparatus of the present invention shown in association with the rear portion of a tank truck;

FIG. 2 is a side elevational view of the structure shown in FIG. 1;

FIG.3 is a view similar to FIG. 2 but on a larger scale and showing the squeegee supporting and controlling structure in cross sections, as indicated approximately by the line III—III of FIG. 1;

FIG. 4 is a fragmentary rear elevational view of the left hand portion of the squeegee and squeegee supporting structure of FIG. 3;

FIG. 5 is an oblique plan view of the material distributing chute portion of the structure as viewed approximately from the upper right of FIG. 2;

FIG. 6 is a fragmentary cross sectional view on the line VI—VI of FIG. 5;

FIG. 7 is a fragmentary cross sectional view on the line VII—VII of FIG. 5; and

FIG. 8 is a fragmentary top plan view of a portion of the squeegee structure on an enlarged scale showing a hinge portion thereof.

Speaking generally, the material depositing and spreading apparatus of the present invention, in the form described herein and illustrated in the drawings, is mounted at the rear of a tank truck to be drawn thereby along a roadway or the like, and the material which is deposited and spread by the present apparatus issues to the depositing and spreading apparatus from the tank of the carrying truck. The material is a liquid or slurry which may comprise a bituminous or other sealing material or any road-

way or pavement treating material in liquid or semi-liquid form.

Like characters of reference denote like parts throughout the several figures of the drawings and, referring particularly to FIGS. 1 and 2, the numeral 10 designates the usual parallel longitudinal channels of the frame portion of a truck chassis and the numeral 11 designates a pair of tank base members mounted thereon. A tank 12 is mounted on the base members 11 and feeds sealing liquid or slurry to the apparatus of the present invention by way of an outlet conduit 14. A valve (not shown) is provided in the conduit 14 so that the operator of the apparatus may regulate the rate of flow of material to the depositing means.

Referring to FIGS. 1, 2 and 3, a pair of depending support members 15 are fixed rigidly to the truck frame members 10 and the tank base members 11 and generally horizontal angle iron members 16 are fixed to the lower ends of the depending members 15 and extend rearwardly therefrom as is best illustrated in FIGS. 1 and 3. A transverse brace member 17 extending between the angle irons 16 completes the general rigid supporting frame structure for the spreading apparatus portion of the structure.

Front and rear transversely extending squeegee assemblies are designated generally by the numerals 21 and 22 and are attached at opposite sides to the front and rear ends, respectively, of front and rear longitudinal bars 23 and 24 which are hingedly connected to each other as at 25. The arrangement is such that the squeegees 21 and 22 and the longitudinal support bars 23 and 24 are adjustable laterally as a unit so that the wiping path of the squeegees may be accurately adjusted to follow a desired line.

Front and rear transverse rock shafts 28 and 29 are supported at the under sides of the rearwardly extending members 16 and a further rock shaft 30 is journaled in the lower ends of a pair of arms 31 which are pivoted at their upper ends to the members 16. Rock arms 33 fixed to front rock shaft 28 are pivotally attached to depending links 34, the lower ends of which are in turn pivoted to a cross bar 35 extending between the front squeegee supporting bars 23. The cross bar 35 is axially slidable in the lower bearings of the links 34 to permit the above-mentioned lateral adjustment of the squeegee assembly.

A further rock arm 38 fixed to rock shaft 28 at the left hand end thereof as viewed from the rear of the apparatus connects pivotally at its upper end with the forward end of a control link 40. An adjustable abutment screw 41 limits clockwise swinging of the arm 38 and, accordingly, likewise limits clockwise rotation of arm 33. Since links 34 connect with front longitudinal bars 23 close to the squeegee 21, the lowermost position of the latter is thus adjustably determined.

The rear squeegee 22 is attached to the rear ends of the rear longitudinal bars 24 and the latter are provided with ground wheels 44 whereby the working position of the rear squeegee 22 is accurately maintained with respect to the road or pavement surface despite irregularities therein and despite relative vertical movements of the truck chassis due to its spring suspension.

The means for raising the squeegees clear of the pavement to inactive positions will now be described. A squeegee raising and lowering handle member 45 is fixed to the left hand end of rock shaft 29, as viewed from the rear, and the rear end of control link 40 is pivoted to the handle member as at 46. A pair of bearing block members 47 are fixed to opposite ends of the swinging rock shaft 30 and include axially spaced bearing formations 48 and 49. A bracket member 50 is pivotally connected to each of the bearing block members 47 by means of spaced coaxial bearings 51 and 52 and a pivot pin 53.

Each bearing block member 47 includes an arm formation 54. Handle member 45 includes an offset arm portion 55 and a rock arm 56 is fixed to the right hand end of rock shaft 29, as viewed from the rear. Both the offset arm portion 55 of the handle member and the rock arm 56 connect pivotally with the upper ends of links 57 whose lower ends are pivoted to the outer ends of the arm formations 54 of the bearing block members 47.

The lower rear portions of the bracket members 50 include spaced coaxial pivot bearings 58 and 59 and bearing block members 60 attached to rear squeegee 22 have aligned pivot bearings 61 and 62. Pivot pins 63 extending through the bearings 58, 59, 61 and 62 pivotally connect the block members 60 to the bracket members 50 for pivotal movement about generally upright axes which in the present instance are parallel to the axes of the pivot pins 53.

From the foregoing it will be seen that swinging the handle member 45 in a counterclockwise direction about 140 degrees from the position illustrated in FIGS. 2 and 3 will dispose the pivots connecting the rock arms 33 and 56 and the offset arm portion 55 with the links 34 and 57 in an overcenter position with respect to the rock shafts 28 and 29 and thus support the squeegees 21 and 22 in a raised position clear of the roadway or pavement. To facilitate such raising movement the weight of the squeegee and squeegee mounting structure is counterbalanced to any desired degree as by means of torsion springs 64 shown in FIG. 4 which are attached at their inner ends to rock shaft 29 and at their outer ends to angle members 16 to bias the rock shaft in a counterclockwise direction as viewed in FIGS. 2 and 3.

It will be noted that the pivot connections of arms 50 as defined by pivot pins 53 and 63 permit free lateral movement of squeegee 22 by swinging of arms 50 and that squeegee 21 is connected, by longitudinal members 23 and 24, to move laterally with squeegee 22, the cross bar 35 sliding through the bearings of links 34 as aforesaid. This lateral movement which adjusts the path of the squeegees is effected and controlled by a handle member 65 fixed to a vertical rock shaft 66.

An arm 67 fixed to rock shaft 66 connects pivotally with one end of a link 68 the other end of which is pivoted to the left hand arm 50. The pivots of link 68 may be relatively loose to permit free lifting of the arms 50 when the squeegees are raised. For simplicity the handle member 65 and associated parts 66, 67 and 68 are shown in FIG. 1 but omitted from the other figures.

Referring particularly to FIG. 2, the numeral 69 designates a hydraulic piston and cylinder arrangement attached to truck frame member 10 and connected to link 40 to move the same forwardly and thus lift the squeegee mechanism when the cylinder is energized. The servo mechanism thus provided may be used in conjunction with the manual handle 45, as shown herein, or as the sole squeegee lift control means.

Referring particularly to FIG. 3, this lifting action, as to the rear squeegee 22 and associated support structure, is accomplished by counterclockwise rotation of arms 54 and bracket members 50 about the swinging rock shaft 30. When the handle 45 is in the operative position indicated in FIG. 3, the lower pivots of links 57 serve as a sort of fixed fulcrum for the squeegee 22 and its supporting structure, whereby the wheels 44 and the squeegee are free to adjust upwardly and downwardly in traversing a road surface and also in response to variations in the height of the fixed frame structure from the road as when the tank 12 contains varying quantities of material. As the bracket members 50 and arms 54 oscillate about the lower pivots of links 57 in effecting such adjustments, the rock shaft 30 is free to raise and lower by oscillation of the arms 31 which support the same.

Both pairs of the links 34 and 57 may be selectively adjusted as to length as by threading into and out of their end fittings.

The squeegees 21 and 22 are substantially identical and therefore a description of one will suffice for both. As shown in FIGS. 1 and 4, the rear squeegee 22 comprises a central rail member or carrier 70 and connected

lateral rail members **71**, each of which gives resilient support to a plurality of individual end-to-end squeegee sections **72** as shown in FIG. 4. In the present instance each squeegee section **72** has a pair of rods **73** extending upwardly therefrom through the rail members **70** and **71** and through spring backing members **74** and **75**, respectively, the individual squeegee sections **72** being urged downwardly by coil springs **76**.

Thus the independent yieldability of the several squeegee sections **72** permits the squeegee to traverse uneven road surfaces, the squeegee sections **72** being pressed individually into resilient engagement with the varying surface portions of the road or pavement. It will be noted from FIG. 1 that the end squeegee sections are angled forwardly to retain the material within the path of the squeegees.

The lateral or end members **71** of the squeegees **21** and **22** are connected to the center member **70**, in each case, by pivot means so that the end members may be pivoted upwardly to the dot and dash line position of FIG. 4 for treating narrow pavements or to clear obstacles or to occupy less width when the squeegees are not in use. For this purpose the end members **71** are pivoted to the center members **70** on horizontal axes as indicated at **80** in FIG. 4. The end members may be held in raised positions by releasable pins **81** carried by generally upright arms **82** which are fixed to opposite ends of each center member **70**.

The end members **71** are also pivoted to the center members **70** in such a way that they may resiliently deflect rearwardly when an obstacle is encountered. A vertical pivot pin for this purpose is indicated at **84** in FIG. 4 and the details of this resilient connection are shown in the fragmentary enlarged plan view, FIG. 8. The horizontal pivot **80** includes spaced bearing parts **86** fixed to center member **70** and a pivoted bearing part **87**. The pivoted bearing part **87** is in turn pivoted to end member **71** by the aforesaid vertical pivot pin **84**.

An extension coil spring **89** is fixed to lugs **90** and **91** carried by the center and end members **70** and **71**, respectively, and normally maintains these members in abutting alignment as shown in FIG. 8. When an obstruction is encountered the end member **71** may deflect resiliently rearwardly to any necessary extent as indicated by the dot and dash lines in FIG. 8.

Reference will now be had to the means provided herein for depositing the sealing or other liquid or semi-liquid pavement coating or treating material on the roadway or pavement surface ahead of the aforesaid squeegee arrangement in order that the same may be spread thereby. For uniform and efficient spreading it is required that the material be deposited on the roadway or pavement somewhat uniformly thereacross and this result is not readily achieved owing to the viscous, sticky and adherent nature of the sealing material.

Conventional liquid distributing manifolds which involve moderately restricted orifices result in clogging and stoppage and resultant uneven and inadequate deposit of material and clearing such internal stoppages is virtually impossible in the field. The present invention provides a distributing arrangement whereby the liquid or semi-liquid slurry is distributed fanwise by means of open chutes or passages of substantial width which do not impose narrow or constricted flow paths and which, due to their open nature, are inherently non-clogging and readily accessible for cleaning when necessary or desired.

Speaking generally, the liquid material or slurry distributing and depositing arrangement shown herein comprises a pair of successively arranged generally fan shaped inclined chute devices designated generally by the reference numerals **95** and **96**. The chute device **95**, in the structure set forth herein by way of example, is provided with an entry conduit portion **97** connected with the outlet conduit **14** of tank **12** and an inclined fan-shaped bottom wall **98**. Bottom wall **98** is divided into four channels which increase in width in the direction of flow, as clearly shown in FIG. 5, by virtue of five generally upright diverging wall members **100** which are fixed to bottom wall **98**.

At their discharge ends the wall members **100** have hinged thereto wall member extensions **101** which are each pivoted to a common transverse bar **102** having a handle **103** fixed thereto. Movement of handle **103** to the right or left swings the wall member extensions **101** jointly as indicated by the dot and dash arcs in FIG. 5 to vary the lateral points of discharge from the chute device **95** to the chute device **96**.

The entry end of chute device **96** underlies chute device **95** as clearly shown in FIG. 2 and chute device **96** comprises a fan shaped bottom wall **105** extending at an incline generally parallel to the bottom wall **98** of chute device **95**. An upward extension **106** of bottom wall **105** is fixed between the truck frame members **10** and tank base members **11**. A downward continuation of bottom wall **105** designated **107** is hinged to bottom wall **105** as at **108**, see FIG. 6, so that such downward continuation may be swung upwardly (in a counterclockwise direction as viewed in FIG. 2) to be entirely clear of the road or pavement and thus afford ample road clearance when the depositing and spreading means is not in operation.

As shown in FIGS. 1 and 5, the hinged bottom wall continuation **107** of chute device **96** has lateral extensions **110** hinged thereto as at **111**, whereby such lateral extensions may be hinged upwardly when not in use to narrow the overall width of the apparatus in conjunction with upward pivotal movement of the lateral members **71** of the squeegees.

The upper surfaces of the bottom wall portions **105** and **107** are provided with generally upright diverging ribs or wall members **112** and **113**, respectively, which form a plurality of channels, in the present instance ten in number, which increase in width in the direction of flow.

By reason of the greater number of channels in the relatively wider chute **96** as compared with the upper narrower chute **95**, the channels in the two chutes are of generally the same order of width so that they distribute the material laterally without undue constriction in the flow and still with sufficient equality of distribution.

It will be noted that the lateral swinging of the wall member extensions **101** of chute **95** may be employed to direct the material somewhat more to one side or the other of the chute **96** and this control of the distribution pattern is particularly advantageous when one side of a crowned road or pavement is being treated so that the apparatus is laterally inclined and the normal tendency would be for the material to be deposited too much toward the low side of the road or pavement.

In FIG. 1 the numeral **114** designates, in dot and dash lines, a seat from which an operator of the depositing and spreading apparatus operates the various controls and adjustments described herein. While the specification and claims refer generally to the spreading elements as squeegees, it is to be understood that this term is not used in a restrictive sense and that various forms of wiping members may be employed as the actual spreading elements within the purview of the invention.

I claim:

1. Apparatus for applying flowable material to a pavement suface comprising mobile means adapted to move along a pavement surface and deposit flowable material thereon and means for spreading the deposited material uniformly across a band of predetermined width along said pavement, said spreading means comprising a pair of transverse generally co-extensive squeegees adapted to traverse the pavement successively, a support for said squeegees and means mounting the first squeeges from said support for relative vertical adjustment, said second squeegee being movably mounted with respect to said

support for relative vertical movement and having ground engaging means for gauging the degree of wiping engagement thereof with the pavement, means for selectively raising said support to raise both squeegees jointly laterally to adjust the position of the wiping band relative to the mobile means.

2. Apparatus for applying flowable material to a pavement surface comprising mobile means adapted to move along a pavement surface and deposit flowable material thereon and means for spreading the deposited material uniformly across a band of predetermined width along said pavement, said spreading means comprising a pair of transverse generally co-extensive squeegees adapted to traverse the pavement successively, a support for said squeegees and means mounting the first squeegee from said support for relative vertical adjustment, said second squeegee being pivotally mounted for limited relative vertical movement with respect to said support and having ground engaging means for gauging the degree of wiping engagement thereof with the pavement independently of the height of the support means within the range of said limited pivotal movement, and means for selectively raising said support to raise both squeegees jointly to inoperative positions.

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