

Dec. 25, 1951

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2,579,792

VEHICLE MOUNTED SPRAYING EQUIPMENT

Filed July 25, 1949

3 Sheets-Sheet 1

FIG. 1.

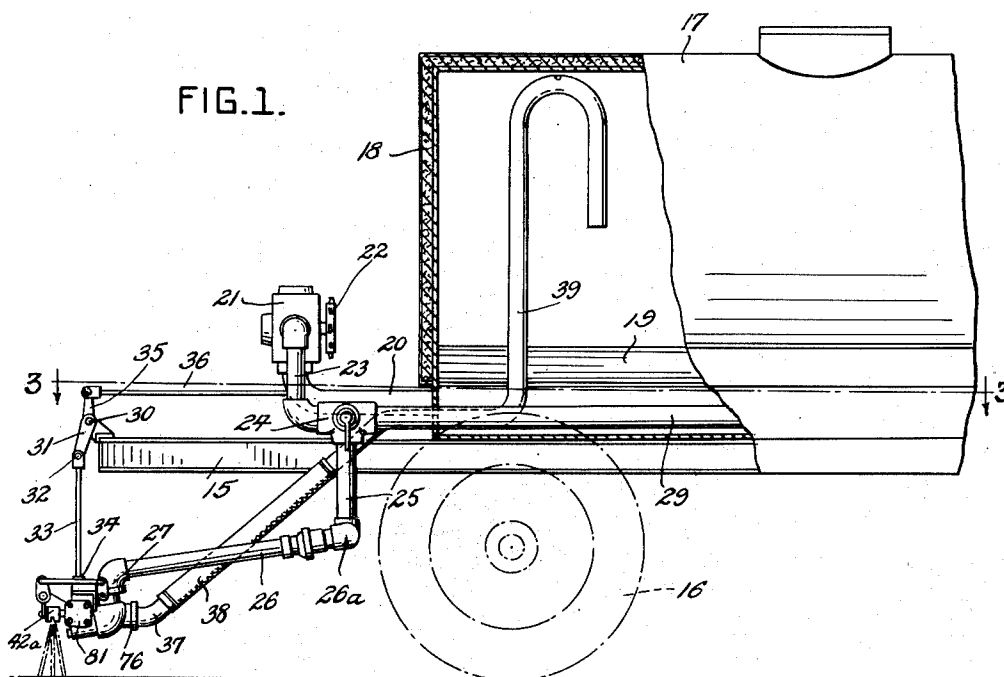
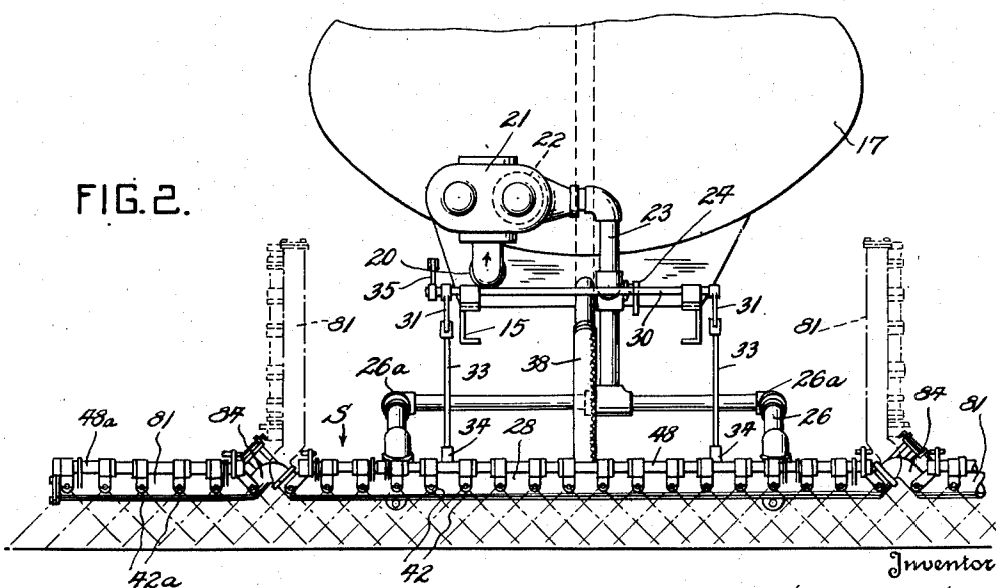


FIG. 2.



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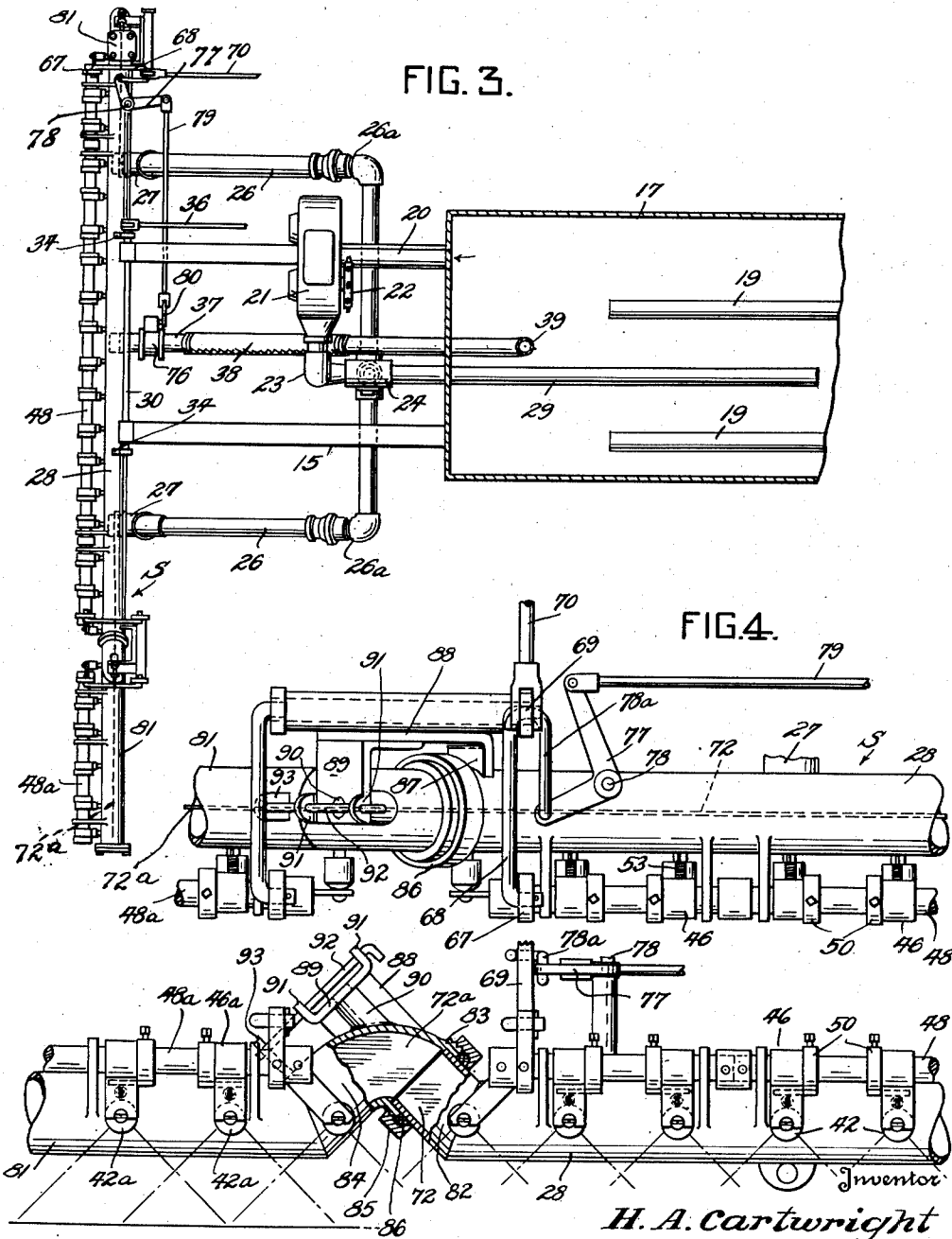
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FIG. 6.

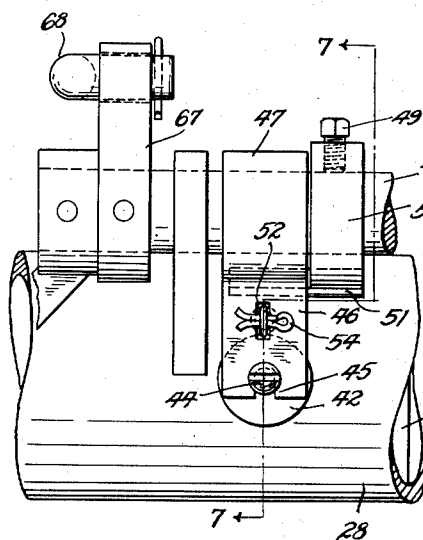


FIG. 7.

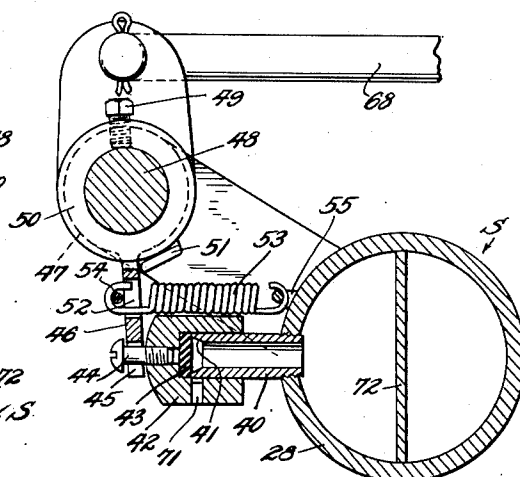


FIG. 8.

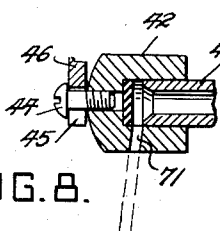


FIG. 9.

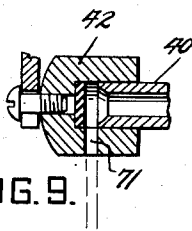


FIG. 10.

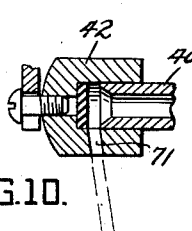


FIG. 11.

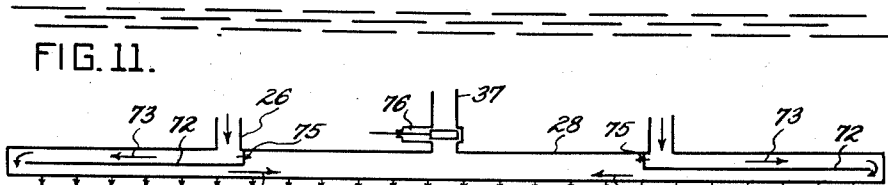


FIG. 12.

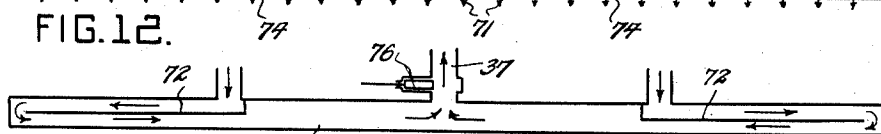


FIG. 13.

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VEHICLE MOUNTED SPRAYING EQUIPMENT

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11 Claims. (Cl. 299—34)

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This invention relates to an apparatus for spraying, distributing and spreading fluids and fluidic substances on defined surface areas. More specifically, the present invention is concerned with the improvement of spraying equipment of the type employed in connection with road vehicles for depositing asphalt, tars and other relatively heavy oleaginous hydrocarbons on roads rial on a road surface;

In the operation of such vehicle-mounted spraying equipment, it may be pointed out that roads or highways frequently vary in width, so that spraying equipment, in the case of relatively wide roads, is apt to leave marginal portions of a motor road uncovered, whereas in the case of narrow roads, the treating material is often deposited on the sides of a roadway where it is not required. Therefore, it is an object of the present invention to provide a distributor for the spraying of fluidic treating materials on road surfaces wherein the distributor involves a spray bar whose effective length may be quickly adjusted or varied to adapt the same to the width of a road or other surface undergoing a spraying operation, whereby to obtain accurate control in the deposit of the material sprayed on a road surface, to effect economy in the treating material employed, and also to comply with contractual specifications respecting the deposit of a given amount of treating material per square yard of roadway treated.

Another object of the invention is to provide a vehicle-mounted spray bar for use in connection with apparatus of the character set forth wherein the spray bar is composed of a linearly extending main section having joined with one or both of the ends thereof a swivel-type gooseneck union by which extension conduits are movably formed with the ends of the main section of the conduit in such manner that the extension conduits when in active use will be aligned longitudinally with the main section of the conduit for fluid distributing purposes over the entire overall length of the main and extension conduit sections, and to provide for the elevation of said extension conduits to cause the same to assume substantially vertical positions when the apparatus is operating over narrow roadways which do not require the maximum length of the spray bar, as represented by its main and auxiliary sections when actively positioned.

It is another object of the invention to provide a spray bar having ported outlet nozzles for the discharge of asphalt or other oils upon a road surface, the interior of the spray bar being pro-

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vided with baffles admitting of circulation of the asphalt or heated oils through the spray bar when the outlet nozzles are closed whereby to preclude clogging of said nozzles with the fluidic material contained within the spray bar.

It is a further object of the invention to provide the ported nozzles of the spray bar with an improved valve mechanism, whereby to open and close said nozzles at will in an effective, easily executed, and improved manner.

With these and other objects in view, as will be more readily understood as the description proceeds, the invention accordingly consists in the novel features of construction, combinations of elements and arrangements of parts herein-after more particularly described and claimed.

In the accompanying drawings:

Fig. 1 is a vertical sectional view taken through a road vehicle for distributing liquids on roads and provided with the improved spray bar equipment comprising the present invention;

Fig. 2 is a rear elevational view of the mechanism disclosed in Fig. 1. In this figure, the main and auxiliary sections of the spray bar are shown in full lines in their extended or active positions, with the auxiliary sections being shown by broken lines in their retracted or inactive positions.

Fig. 3 is a horizontal sectional view taken on the plane indicated by the line 3—3 of Fig. 1;

Fig. 4 is a fragmentary plan view on an enlarged scale showing one end of the main section of the spray bar and its associated nozzle closing valve means, together with one of the swivel gooseneck connections employed in uniting one of the auxiliary sections to the main section equivalent, projecting from the spray bar.

Fig. 5 is a front elevational view, partly in vertical section, of the mechanism disclosed in Fig. 4;

Fig. 6 is an enlarged detail front elevational view of the spray bar and associated valve means for controlling the outflow of treating material from one of the ported nozzles of the spray bar;

Fig. 7 is a vertical transverse sectional view on the plane disclosed by the line 7—7 of Fig. 6;

Figs. 8, 9 and 10 are detail sectional views disclosing the sliding valve caps of the ported nozzles of the spray bar in open positions for the discharge of fluidic treating materials from the spray bar. In these figures, the positions of the various outlet orifices provided in the valve caps are set forth to disclose their relative angularity.

Fig. 11 is a diagrammatic view showing in schematic fashion how the arrangement of the

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nozzles and the construction of the valve caps operate to produce deposit patterns of the treating material on a road surface, and showing more particularly the staggered relationship of the areas of a road surface on which the treating material is deposited by each spray bar nozzle;

Fig. 12 is a diagrammatic or schematic view disclosing the paths of travel of heated oil through the spray bar of the apparatus comprising the present invention when the nozzles of the bar are open to discharge treating material on a road surface;

Fig. 13 is a similar view disclosing the spray bar with its nozzles closed and illustrating the paths of circulation of the heated treating material through the spray bar.

Referring more particularly to the drawings, the numeral 15 designates the frame of a self-propelled or truck-drawn vehicle, the frame being provided with supporting wheels 16 and having mounted thereon a tank 17 for the reception of the tar, asphalt, or other treating material to be sprayed on a roadway or like surface. In this instance, the tank has been shown as being substantially elliptical in transverse cross section and it is preferably covered by heat-insulating material 18, since the heavy viscous oils or tars are maintained at elevated temperatures in the operation of the apparatus to promote fluidity and mobility on the part thereof. The interior of the tank may be provided with one or more longitudinally extending burner tubes 19 for the confined passage of hot gases, heat from the walls of the tubes being transmitted to the asphalt or tars contained within the tank, as is customary in apparatus of this character.

Extending from the tank is a drawoff pipe 20 which leads to the inlet of a pump 21 carried by the vehicle, the pump being preferably of the rotary gear type, having a drive sprocket shown at 22 by means of which power from an engine or the like, not shown, may be applied to the pump to effect its operation.

Leading from the outlet side of the pump is a pipe line 23 which extends to a manually actuated valve 24. When this valve is normally positioned, the treating material discharged by the pump is advanced through the valve 24 and thence through the stationary section of a pipe line 25 and finally through a movable oscillatory section 26, the latter turning about a pivotal axis 26a on the section 25. The oscillatory section terminates at its outer and lower ends in pipes 27 which enter the main section 28 of a spray bar S. The valve 24 may also be positioned to arrest material flow from the pump into the pipe line 25 by causing such material to be diverted through a return pipe line 29 leading to the interior of the tank 17, thus shunting the fluidic treating material from the spray bar and providing for its circulation within the tank.

The spray bar S is raised and lowered between active and inactive positions by providing the end of the frame 15 with a rock shaft 30 which carries crank arms 31, the latter having their outer ends pivotally connected as at 32 with the upper ends of link rods 33, the lower ends of said rods being connected with bosses 34 carried by the spray bar. One of the ends of the rock shaft is provided with a lever 35 which is connected with the rear end of a forwardly extending link 35, adapted to be actuated from the operator's position, not shown, at the forward end of the vehicle in any suitable manner.

The fluid return of the spray bar includes an

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elbow 37 disposed in approximately the center of the main spray bar. To this elbow is connected the lower end of a section of flexible tubing 38, the upper end of said tubing being joined with the outer end of a gooseneck return pipe 39 located within the tank 17, as shown in Fig. 1. The flexible tubing 38 permits of the raising and lowering of the spray bar without any interference to the movement thereof on the part of the fluid return connections of the spray bar, and the swivel connection at 26a provides for corresponding freedom of swinging movement for the fluid-supplying connections.

The main section 28 of the spray bar is formed on one side thereof with a plurality of longitudinally spaced horizontally arranged threaded openings, the latter receiving the inner threaded ends of short horizontally extending nozzle tubes 40, the outer ends of said tubes having the internal bores thereof feathered or countersunk as at 41. Slidably mounted on each of the tubes 40 is a valve thimble 42, each of these thimbles having an internal socket for the reception of a complementary tube 40, the inner end of each socket being provided with a valve gasket 43, the latter being normally arranged for engagement with the reduced circular edge provided on the outer end of each tube 40 as a result of the countersunk or feathered portion 41 thereof.

To move the valve thimbles so that the ends of the tubes 40 may be uncovered for the discharge of fluids from the spray bar, each thimble 42 is, in this instance, formed in the headed region thereof with a threaded opening for the reception of the shank of a headed screw 44. Cooperative with the shank of each of these screws between a thimble 42 and the headed outer end of the screw is the lower bifurcated end 45 of a crank arm 46. Each of these crank arms is formed with a hub 47 which is loosely received on a rock shaft 48. Fixed to the rock shaft by means of the set screws shown at 49, adjacent to the hub 47 of each of the crank arms, is a collar 50. Each of these collars is formed with a laterally projecting finger 51 disposed adjacent to a complementary crank arm 46, as indicated in Figs. 6 and 7, whereby oscillation of the rock shaft in one direction causes simultaneous and similar rocking action on the part of the crank arms 46. Each of the crank arms 46 is provided with an opening 52 through which projects the forward hook-shaped end of a coil spring 53, a cotter key 54 being passed through the forward hook-shaped end of each of the coil springs to hold the same in connection with the crank arms 46. The rear hook-shaped end of each of the coil springs 53 is connected with a bail 55, or its equivalent, projecting from the spray bar.

It will be seen that by the provision of the spring construction shown at 53, an individual spring is provided for rocking each of the crank arms 46, the normal tendency of the coil springs 53 being to maintain the crank arms 46 in positions holding the valve thimbles 42 and their gaskets 43 in fluid flow obstructing relationship with the outer ends of the nozzle tubes 40.

The rock shaft 48 is provided at one end with a crank arm 67 with which is connected the forward laterally bent end of a link 68, the rear end of said link being connected with a pivoted crank arm 69 from which a rod 70 extends forwardly to an operator's position, enabling the operator of the vehicle to rock the shaft 48 and thereby simultaneously open or close the ends of the nozzle

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tubes 40 in regulating the discharge of fluid to an underlying road surface.

It will be observed that each of the valve thimbles is formed with a sector-shaped orifice 71 which, when the valve thimbles are moved to open positions, as depicted in Figs. 8 to 10, inclusive, provide for the controlled outflow of fluid from the spray bar.

By reference to Figs. 8 to 11, inclusive, it will be evident that the shape and operating positions of these orifices are such as to produce overlapping deposits of the asphalt, tar or oil on underlying road surfaces. Certain of the orifices 71 as shown in Fig. 8, are slanted in a rearward and downward direction. In Fig. 9, the orifice 71 is disclosed as extending straight downwardly in a true vertical plane, whereas in Fig. 10, the orifice is shown as arranged in a forwardly and angularly extending direction. Due to their relative angularity and the sector-like shape, the orifices produce the staggered overlapping deposits of the oleaginous material on the roadway after the patterns disclosed in Fig. 11, assuring a uniform film-like distribution of the materials.

As shown particularly in Figs. 12 and 13, an improved circulation of the heated coating material takes place through the spray bar, as well as an improved regulated discharge thereof through the orifices 71 by providing each end of the main section 28 of the spray bar with a fixed divisional wall 72. These walls are so positioned that the coating material entering the spray bar section 28 through the pipes 26, is first caused to move in the direction indicated by the arrows 73 and thence inwardly and longitudinally toward the center of the section 28, as disclosed by the arrows 74. Bleeder ports may be provided at 75 in the partition walls to admit of a limited or restricted inflow of the coating material directly from the pipes 26 into the center regions of the main section 28 of the spray bar.

Leading from the center of the spray bar is the return elbow 37. In this elbow, there is provided a gate valve 76 which opens and closes the return piping for the coating material, so that when the coating material is being discharged on a highway surface, as in Fig. 12, the gate valve occupies its position of closure and, conversely, when the orifices 71 are closed by the valve thimbles 42, as in Fig. 13, the gate valve is automatically maintained in an open position, providing for the circulation of the heated coating material through the spray bar and back to the tank 17. This circulation is of advantage in that the flowing hot or heated material keeps the spray bar and its small passages free of clogging deposits of a flow-restricting nature, enabling the apparatus to function effectively when the coating material is at proper temperature with frequent opening and closing operations on the part of the valve thimbles 42 and the gate valve 76.

As shown in Fig. 3 particularly, the operation of the gate valve and the thimble valves are synchronized for simultaneous but reverse operation by the provision of a bell crank lever 77 which is pivoted as at 78 on one end of the main section of the spray bar. The shorter arm of the lever 77 is joined by a link 78a with the crank arm 69 at a position above the link 68. The longer arm of the lever 77 is connected by means of a rod 79 with the stem-actuating control 80 of the gate valve 76. By this mechanism, the thimble valves 42 and the gate valve 76 are operated in a conjoint manner so that when the valves 42 are open, the gate valve 76 is closed and vice versa.

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Roadways vary in width and therefore it is desirable in spray equipment of this kind to provide means for varying the effective length of the spray bar. The present invention provides practical apparatus for this purpose in the form of a pair of auxiliary or supplemental spray bar sections 81. In Fig. 2, these supplemental sections have been shown in full line in their active positions in which they constitute longitudinally aligned extensions of the main section 28 of the spray bar. In Fig. 2, the supplemental sections have been shown in broken lines in their inactive or raised positions in which the same are out of use as spraying sections.

To unite the supplemental sections 81 in a manner admitting of swinging movement thereof between such active and inactive positions, the main section 28 has its ends formed with angularly upturned extensions 82. Fitted over the smooth outer circular ends of the extensions 82 is the internally socketed end 83 of a gooseneck extension 84 provided on the inner end of each of the supplemental spray bar sections 81. The ends of the extensions 84 are externally threaded for the reception of internally threaded rings 85 which hold a leak-resisting packing 86 in operative relation with the extensions 82.

Welded or otherwise fixed to the ends of the main section 28 of the spray bar is the lower inturned flange 87 of a bracket 88, each of the latter being provided with an upper laterally directed flange 89 which overlies an associated extension 84. Each of the flanges 89 is apertured to receive the rotatably reduced outer end of a stud 90 projecting angularly from each of the extensions 84. The studs 90 are disposed in registration with the longitudinal axes of the extensions 82, providing outer bearing supports for the rotation of the extensions 84 and the sections 81.

The flanges 89 are formed with apertured ears 91 for the reception of removable frangible or readily distortionable pins 92, which pins are received at their lower ends in apertures formed in lugs 93 provided on the supplemental sections 81. When the pins 92 are positioned as shown in Figs. 4 and 5, the sections 81 are longitudinally aligned with the main body section 28 of the spray bar, the pins 92 holding the supplemental sections in such active positions, secure against accidental movement. If the supplemental sections during the operation of the apparatus should strike a relatively immovable object, the pins 92 will either break or distort so that the supplemental sections will be released from their fastened connections with the main body section and allowed to swing under the force of an impact to inactive positions of safety. When the supplemental sections are raised to their inactive positions, as indicated by dotted lines in Fig. 2, the pins may be reinserted manually through the openings in the ears 91 and the lugs 93 to hold positively the supplemental sections in their inactive elevated positions.

The supplemental sections are each provided with journaled rock shafts 48a which register with the rock shafts 48 when the supplemental sections are lowered, as in Fig. 5. The rock shafts 48a operate crank arms 46a which in turn operate valve thimbles 42a corresponding with the valve thimbles 42 of the main section of the spray bar. Also, the interior of each of the sections 81 may be provided with a divisional wall 72a which registers with the wall 72 of the main section.

In view of the foregoing, it is believed that

the nature and advantages of my improved spray bar apparatus will be readily understood and therefore a more extended explanation has been accordingly omitted.

I claim:

1. In apparatus for distributing fluidic road-surfacing materials, a main conduit, longitudinally extending centrally disposed partition walls arranged internally of said conduit contiguous to its end regions, said wall dividing said conduit into spaced longitudinally extending fluid-receiving and discharging chambers, road-surfacing material inlet means entering said conduit at longitudinally spaced positions between its ends and in registry with said fluid-receiving chambers, said material upon initially entering said conduit passing longitudinally and outwardly through the receiving chambers toward the outer ends of said conduit, said material thereafter reversing its direction of flow for passage longitudinally through the outlet chamber of said conduit toward the center of the latter, valved outlets provided at longitudinally spaced intervals in said conduit in communication with said outlet chamber, and a return connection leading from the central region of said conduit for returning treating material delivered to said conduit and not discharged through said outlets to a source of supply.

2. In apparatus as set forth in claim 1, in which the chamber-forming partition walls are formed with small diametered ports admitting of limited flow of treating material introduced into said fluid-receiving chambers directly in the main length of the conduit toward the central region thereof.

3. In a portable distributor for spreading heated asphaltic compositions on road surfaces, a spray bar embodying a main conduit, fixed divisional walls positioned longitudinally and interiorly in the ends of said conduit, said walls dividing the conduit internally into spaced longitudinally extending material-receiving and discharging chambers which communicate relatively at the outer ends of the conduit, longitudinally spaced fluid inlet means cooperative with said conduit for introducing treating material in a mobile state into said receiving chambers to produce outward flow of said material through said receiving chambers and thence inward flow longitudinally of the conduit through the material-discharging chamber, and valved outlet means provided at longitudinally spaced intervals in said conduit in communication with the material-discharging chamber therein.

4. In apparatus for spreading on road surfaces road-treating materials in a fluidic state, a spray bar comprising a main conduit section, a plurality of longitudinally spaced and outwardly and horizontally projecting treating material discharging pipes carried by said conduit section, valve sleeves slidably mounted on said pipes, said valve sleeves being provided with internally positioned gaskets normally possessing seating engagement with the outer ends of said pipes, said sleeves being provided with discharge orifices, oscillatory operating means for imparting simultaneously sliding movement to said valve sleeves for opening and closing to fluid flow discharge ends of said pipes, and spring means cooperative with said operating means for maintaining normally the gaskets of said sleeves in seated engagement with the ends of said outlet pipes, said valve sleeves upon the operation of said operating means being movable against the

resistance offered by said spring means to advance said sleeves to positions in which the orifices therein communicate directly with the interior of said pipes for fluid flow.

5. The apparatus set forth in claim 4 and wherein the outlet orifices of the sleeves are disposed in relative angular order with respect to each other to deposit treating material on a road surface in relatively staggered patterns.

6. The apparatus defined in claim 4 and wherein the valve sleeves are formed with open-ended sockets in which the conduit pipes are positioned, the seating gaskets of the sleeves being disposed in the ends of said sockets and with the outlet orifices of the sleeves communicating with said sockets at one side of said gaskets, so that as the sleeves are moved outwardly on said pipes said orifices communicate with the discharge ends of the pipes.

7. Apparatus for distributing fluidic materials, a conduit member, a plurality of longitudinally spaced outlet pipes carried by said conduit member for the discharge of fluidic materials therefrom, valve caps slidably mounted on the outer ends of said pipes, a rock shaft, crank arms fixed to rock with said shaft, means connecting said crank arms with said valve caps to effect simultaneously sliding movement on the part of said caps to open and close the ends of said pipes for fluid flow, and spring means cooperative with said crank members for maintaining said caps normally in positions arresting fluid flow from the ends of said outlet pipes.

8. In apparatus for distributing fluidic materials, a conduit member, a plurality of longitudinally spaced outlet pipe extensions carried by said member, said extensions having open outer ends, valve caps slidably mounted on said pipe extensions, said caps being each formed to include an internal socket for the reception of one of said extensions, a seating gasket provided at the inner end of each of said sockets for precluding fluid flow from said pipe extensions when said valve caps occupy positions of closure, each of said caps being formed with a slotted outlet orifice arranged to communicate with its respective socket in such manner that when the cap is moved to a position spacing said gasket from the open end of an associated pipe extension, said orifice is open for fluid discharge, oscillatory means for imparting motion simultaneously to said valve caps, and supply means associated with said oscillatory means and normally serving to maintain the gaskets of the valve caps in seating engagement with the outer ends of said pipe extensions.

9. In a spray bar for asphalt and tar distributors, a main conduit member, the ends of said member terminating in angularly directed cylindrical extensions, supplemental conduit members joined with the ends of said conduit member, each of said supplemental members including an angularly extending curved neck rotatable in a swiveled manner on the angular ends of said main conduit member, brackets carried by said main conduit member and overlying the angular ends of said supplemental members, and studs projecting from the angular ends of said supplemental members and journaled at their outer ends in bearing openings provided in said brackets, said studs being disposed in the longitudinal axes of turning movement of the supplemental conduit members on the angular ends of said main conduit member.

10. In apparatus for distributing treating ma-

terial in a fluidic state over road surfaces, a main conduit member, said member having angularly bent cylindrical ends, a supplemental conduit member having an angularly bent cylindrical end mating with the corresponding end of said main conduit member to provide a swiveled connection therewith, bracket means extending from said main conduit member, and a removable pin carried by said bracket means cooperative with said supplemental conduit member to maintain the latter in longitudinal registry with the main conduit member, the removal of said pin admitting of turning movement of said supplemental conduit member to an elevated inactive position at one end of said main conduit member.

11. Spray bar construction for use in distributing road-surfacing materials, comprising: a main distributing conduit, a pair of extension conduits, swivel joints uniting the adjacent ends of the main and extension conduits, said joints providing for the swinging of said extension conduits relative to the main conduit between active positions in which said extension conduits are disposed in longitudinal alignment with said main conduit and inactive elevated positions in which said extension conduits are disposed in substantially upright perpendicular relation to said main conduit, internal partition walls provided centrally and longitudinally in the end portions of said main conduit, registering partition walls positioned centrally and longitudinally

nally in said extension conduits, road-surfacing material inlet means entering said main conduit at longitudinally spaced positions between its ends, said inlets communicating with said main conduit on one side of the partition walls therein to cause said material upon initially entering said conduit to travel longitudinally and outwardly through flow chambers formed by said walls in said main and extension conduits and thereafter to reverse its direction of flow for passage longitudinally through said conduits and their outlet chambers toward the center of the main conduit, material outlet means joined with the central region of the outlet chambers of said main conduit for the return of excess treating material from said conduits to a source of supply, and a plurality of valved outlets provided at longitudinally spaced intervals in the outlet chambers of said conduits.

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