

Feb. 24, 1953

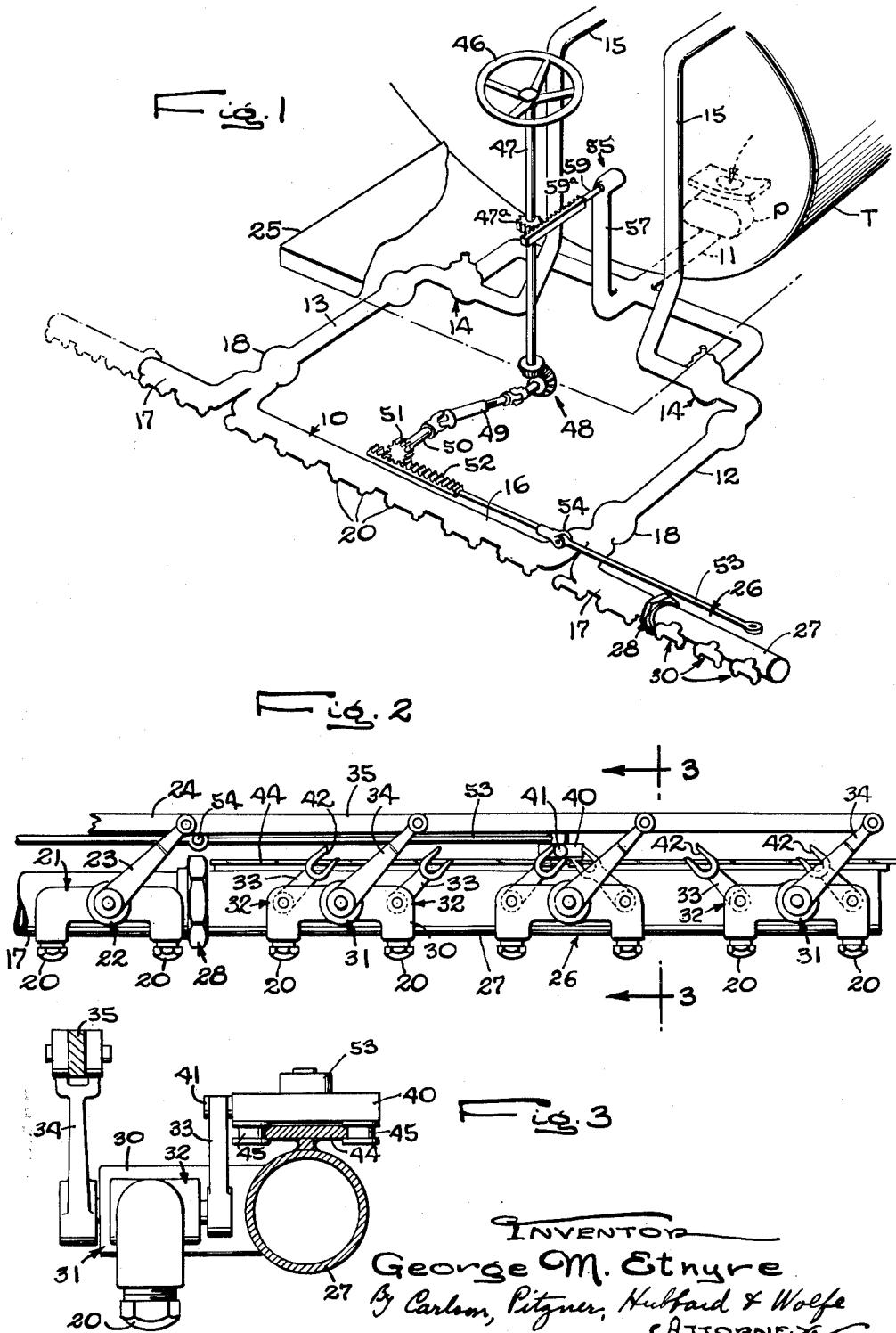
G. M. ETNYRE

2,629,629

DISTRIBUTOR FOR BITUMINOUS AND LIKE MATERIAL

Filed Aug. 11, 1949

2 SHEETS--SHEET 1



Feb. 24, 1953

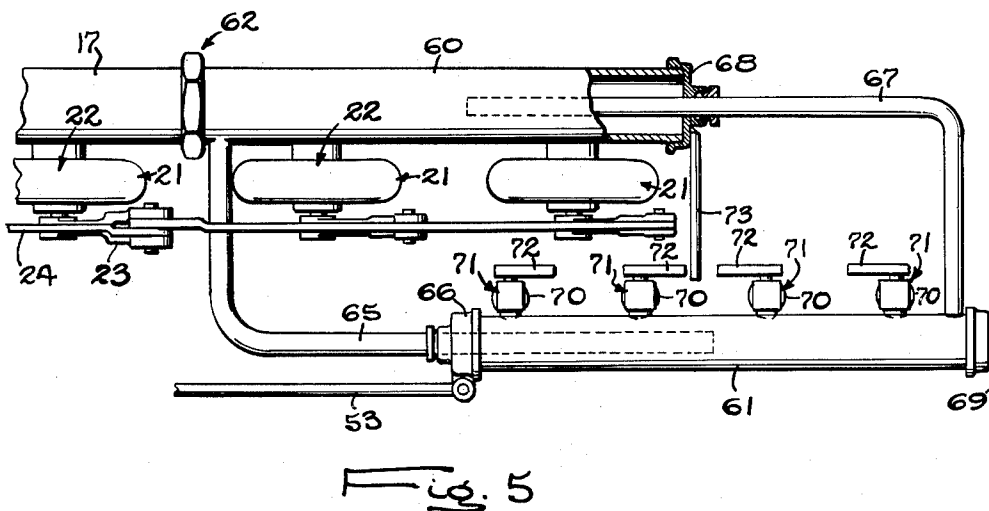
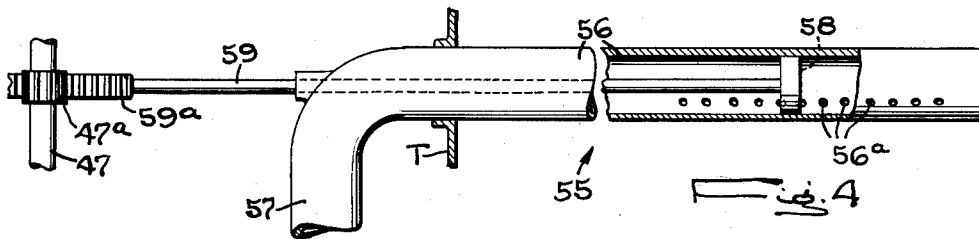
G. M. ETNYRE

2,629,629

DISTRIBUTOR FOR BITUMINOUS AND LIKE MATERIAL

Filed Aug. 11, 1949

2 SHEETS—SHEET 2



INVENTOR
George M. Etnyre
By Carlson, Pitzner, Hubbard & Wolfe
ATTORNEYS

UNITED STATES PATENT OFFICE

2,629,629

DISTRIBUTOR FOR BITUMINOUS AND
LIKE MATERIAL

George M. Etnyre, Oregon, Ill.

Application August 11, 1949, Serial No. 109,756

14 Claims. (Cl. 299—34)

1

The invention relates to mobile apparatus for distributing bituminous and like materials such as asphalt, road oil, tar and emulsions employed in the construction and maintenance of roads and other traffic carrying surfaces.

In apparatus of the above general character, the distribution of material over the traffic surface is effected through the medium of an elongated distributor bar supported above and parallel to that surface and disposed transversely of the path traveled by the vehicle upon which it is carried. Such distributor bars are provided with a series of longitudinally spaced outlets equipped with spray nozzles for insuring uniformity of distribution. The outlets, of course, are equipped with valves which are interconnected for actuation by a main valve controller so that distribution can be started and stopped at will. The material to be distributed is carried in a tank provided on the vehicle and is supplied to the distributor bar under pressure by means of a power-driven pump.

Distributor bars supplied for road construction and maintenance are made to spray the material over a strip of fixed width, which for example may be the full normal width or a fraction, such as half the width of the roads on which they are to be used. To adapt a bar for use on roads of narrower width than that for which it was designed, the outlets of one end of the bar may be plugged or the valves for such outlets may be disconnected from the actuating mechanism and secured in closed position. In either case the width of the sprayed area is, in effect, permanently fixed.

In present day road construction the straight sections are usually finished with a traffic surface of uniform width, while substantially wider traffic surfaces are provided on curves and approaching intersections. Such wider sections cannot be covered in a single pass of the distributor when the distributor bar thereof is set to properly spray the road sections of normal width. It would obviously be wasteful of time and material to take a distributor over the wider sections a second time, particularly as in most cases there would necessarily be a substantial overlapping of the sprayed areas. Specifications governing road construction and maintenance are usually very rigid in so far as they relate to the uniformity of material applied per unit area of road or other traffic surface. Any substantial variation from the specification, as for example a double spraying of the area or failure to apply the required amount, is often severely penalized.

2

It is therefore the custom to utilize manually operated spray equipment to apply material to the areas missed by the distributor in its initial pass. This manually-operated equipment may be supplied with material either from an auxiliary connection with the main distributor system or from a portable auxiliary tank. Such manual spraying is time consuming and materially increases the cost of road work. Moreover, it is difficult to apply the material with the same uniformity obtained by machine spraying.

With the above in view, one object of the invention is to provide distributing apparatus of the above general character which can be quickly and accurately adjusted while in motion to vary the width of the strip to which material is applied while maintaining a substantially uniform application of material per unit area.

Another object is to provide an improved distributor bar construction which permits the effective length of the bar and therefore the width of the strip covered thereby to be increased or decreased progressively in predetermined increments.

Another object is to provide an improved distributor bar element in the nature of an extension section which is readily applicable to conventional distributor bars now in use and which particularly adapts the bar for use on roads or other traffic surfaces of non-uniform width.

Still another object is to provide an improved valve organization for regulating the supply of material to the distributor bar.

A further object is to provide an improved nozzle and control valve construction for distributor bars.

Other objects and advantages of the invention will become apparent from the following detailed description of the preferred embodiment illustrated in the accompanying drawings, in which:

Figure 1 is a partly diagrammatic perspective view of a distributor embodying the features of the invention.

Fig. 2 is a fragmentary rear elevational view of the distributor bar and the extension section.

Fig. 3 is a transverse sectional view of the extension section of the bar taken in a vertical plane substantially on the line 3—3 of Fig. 2.

Fig. 4 is a fragmentary side elevational view of the valve means for regulating the supply of material to the distributor bar.

Fig. 5 is a plan view of a modified form of the extension bar section.

While the invention is susceptible of various modifications and alternative constructions, I

3

have shown in the drawings and will herein describe in detail the preferred embodiment, but it is to be understood that I do not thereby intend to limit the invention to the specific form disclosed, but intend to cover all modifications and alternative constructions falling within the spirit and scope of the invention as expressed in the appended claims.

For purposes of illustration, the invention has been shown as incorporated in a distributor system of the general type disclosed in the Etnyre Patent No. 2,046,373, granted July 7, 1936. In general, this system comprises an elongated tubular distributor bar 10 having a plurality of axially spaced valved outlets for the discharge of the fluid material to be distributed. Such material is supplied to the bar 10 by a pump P which draws the material from a tank T and discharges it into a conduit 11 having branches 12 and 13 leading to opposite ends of the bar 10. Valves 14 provided in the branch conduits may be set so as to effect the circulation of material through the bar in either direction and back to the tank through either of two return conduits 15 when the outlets for the bar are closed. The tank T and associated apparatus are commonly mounted on a truck or trailer chassis for mobility, distribution being effected by driving the vehicle over the surface to be treated.

In the particular embodiment illustrated, the distributor bar 10 is constructed in three sections, namely, an intermediate section 16, and end sections 17. The latter are connected to the main section by fittings 18 which serve as hinge elements permitting the end sections to be swung up or folded to a retracted position when the apparatus is being transported. As will be seen by reference to Fig. 1, the supply conduit branches 12 are connected to the bar 10 through the medium of the fittings 18.

In the exemplary distributor, the outlets for the main distributor bar section 16 and end sections 17 are equipped with spray nozzles 20 (Fig. 2). These nozzles are mounted in pairs in T-shaped fittings 21, each of which includes a control valve 22 common to the two nozzles. Each valve has an operating arm 23 projecting transversely of the distributor bar and connected to a valve operating linkage 24 by which the valves may be opened or closed simultaneously to start or stop a spraying operation. This linkage is actuated by a manually operable controller such as a hand lever accessible to an operator riding on the vehicle, as for example, on a control platform 25 located at the rear of the tank T.

In accordance with the invention, adjustability for spraying strips of varying width is attained by providing at one or both ends of the distributor bar a series of valved auxiliary outlets or nozzles and valve actuating mechanism operable to open the valves in succession and to close them in the reverse order so as to selectively and progressively vary the number of outlets effective for the discharge of material.

In order to maintain uniformity of discharge, provision is also made for concurrently varying the amount of material supplied to the distributor bar in accordance with the number of effective outlets. More particularly, provision is made for increasing or decreasing the amount of material delivered to the distributor bar in proportion to the number of auxiliary outlets conditioned for operation. Controls are provided whereby such adjustments may be effected from a point remote from the distributor bar, prefer-

4

ably from the platform from which the operation of the distributor bar is controlled.

While the auxiliary outlets may be provided in the distributor bar if desired, it is preferred to place them in an auxiliary bar section 26 adapted to be connected to the extreme end portion of the bar. The auxiliary bar section thus constitutes an extension of the distributor bar and receives material therefrom for distribution. In the case of distributor bars having folding end sections such as that shown in Fig. 1, the auxiliary bar section is secured to the outer or free end of such folding end section.

In the preferred form shown in Figs. 1-3 of the drawings, the auxiliary bar section 26 comprises an elongated tubular body 27 closed at its outer end and having a suitable coupling 28 at the other end for connection with the distributor bar 17. Mounted on and projecting rearwardly from the body 27 are a series of T-shaped nozzle fittings 30 similar in shape and size to the fittings 21 and having two similarly disposed outlets each equipped with a spray nozzle 20. The fittings 30 are mounted so that the nozzles 20 are aligned axially of the distributor bar with the nozzles of the fittings 21 and are uniformly spaced apart the same distance as the other nozzles. Accordingly, uniform distribution of material may be effected over a strip having a width varying from the length of the distributor bar 10 to the combined length of the distributor bar and the auxiliary bar section 26.

Each nozzle fitting 30 has a control valve 31 common to the two outlets of the fitting for opening or closing the outlets simultaneously. In order to adapt the fitting for the contemplated mode of operation, two additional valves 32 individual to the respective outlets or nozzles 20 are provided. The valves 32 are of the rotary type each having an operating member in the form of an arm 33 projecting transversely of the bar section. The valves 31 are also of the rotary type and have operating arms 34 all pivotally secured to a rod 35 which is coupled to and operable by the valve actuating linkage 24 for the distributor bar. Thus when the valves 32 are open, the outlets for the auxiliary bar section as well as those for the distributor bar may be opened or closed simultaneously by appropriate manipulation of the actuating linkage 24.

Means is provided for operating the individual outlet valves 32 in a predetermined order to vary the number of outlets effective to discharge material or, in other words, to condition a selected number of outlets for operation when the control valves 31 are opened. As it is desirable to apply the material to a continuous strip of surface, the valve operating means is arranged so that the valves 32 are opened in succession, starting from one end of the auxiliary bar section and are closed in the reverse order. In the forms shown in Figs. 1-3 of the drawings, the order of opening runs from the end of the auxiliary bar section adjacent the distributor bar.

The operating means for the valves 32 as shown in Figs. 2 and 3 comprises a member 40 supported for movement longitudinally of the bar section 26 and having an actuating element adapted to coact with the valve arms 33 in succession in such movements. For this purpose the arms are terminated in spaced fingers defining an open-ended slot 42 adapted to receive the element 41 which may conveniently comprise a cylindrical pin or stud projecting laterally from the member 40. The arrangement is such that

as the actuating member moves toward the outer end of the bar section (from left to right as viewed in Fig. 2), the pin 41 enters the slot in the first arm 33 and rocks it in a clockwise direction from the closed position to the open position in which the first three valves are shown. The pin then leaves the slot and engages each successive arm in a similar manner. Upon return movement of the actuating member, the pin coacts with the arms in the same manner but rocks them in a counterclockwise direction to closed position.

In the exemplary embodiment, the valve actuating member 40 is supported and guided by a track element in the form of an elongated flat bar 44 mounted on and rigidly secured to the body 27 of the bar section. Grooved rollers 45 journaled on the member engage opposite side edges of the bar to retain the member in position while permitting it to ride freely along the bar.

To enable the operator of the distributor to variably set the valves of the bar section 26 while the distributor is in motion and without requiring him to leave the control platform, means is provided for shifting the valve actuating member 40 by remote control. While the shifting means may be of any suitable character, that shown herein comprises a handwheel 46 (Fig. 1) fixed to a vertical shaft 47 rotatably supported at the rear end of the distributor within convenient reach of the operator while standing on the platform 25. The shaft 47 is operatively connected by bevel gears 48 and a telescoping jointed shaft 49 with a shaft 50 extending fore and aft and overlying the intermediate section of the distributor bar. At its rear end the shaft 50 is fitted with a pinion 51 engaging a rack 52 supported and guided for endwise sliding movement longitudinally of the distributor bar. This rack is connected by a rod 53 with the valve actuating member 40 as shown in Fig. 2. A hinge 54 is provided between the rack 52 and rod 53 in this instance to avoid interference with the folding of the end section of the bar.

Ordinarily, an auxiliary bar section is required on only one end of the distributor bar, namely, the end which projects to the right of the vehicle on which the bar is mounted. However, such auxiliary sections may be provided at both ends of the bar if desired and in such case another operating rod 53 will be connected with the valve actuating member of such other auxiliary section through the medium of a rack 52 arranged above the pinion 51 so as to properly coordinate the setting of the valves of both bar sections.

In distributor systems of the type shown, uniformity of distribution is attained by operating the pump P at a speed coordinated with the rate of travel of the vehicle so that the pump delivers liquid material to the distributor bar in an amount effective to maintain a predetermined flow through the spray nozzles. This material of course is divided up between the various spray nozzles and is applied uniformly over the surface traversed by the vehicle.

In accordance with the present invention, provision is made for adjusting the amount of material supplied to the distributor bar concurrently with the setting of the valves 32 of the auxiliary bar sections so that uniformity of distribution is maintained regardless of the number of outlets in use. For this purpose the pump

P is operated so as to deliver to the distributor bar an amount of material sufficient to establish the predetermined desired flow through all of the outlets, including those in the distributor bar and those in the auxiliary bar section. In other words, the pump is conditioned for supplying the correct amount of material for treating a strip of maximum width. When one or more of the auxiliary outlet valves are closed to conform to the narrowing of the strip, the material supplied is reduced proportionately so as to maintain the same rate of discharge through the outlets remaining open.

To effect the foregoing adjustment of the material supply without changing the pump setting or speed, valve means 55 (Figs. 1 and 4) is interposed between the pump and the distributor bar and arranged so as to by-pass and return to the supply tank T varying proportions of the material, depending upon the requirements of the system. The valve means is mechanically interconnected with the valve actuating mechanism so that adjustment of the material supply is effected concurrently with the setting of the valve 32 and as an incident to such setting.

Referring to Figs. 1 and 4 of the drawings, the by-pass valve means 55 in its preferred form comprises an elongated tubular body 56 arranged in this instance to project through the rear wall of the tank T. The valve body has one end connected as by a branch conduit 57 with the supply conduit 11 leading from the pump P. A series of axially spaced discharge ports 56a in the valve body open into the tank T. These ports are adapted to be opened or closed progressively by a valve member 58 slidable axially within the body 56. Preferably the ports are dimensioned so as to pass the same amount of material as a spray nozzle so that the opening of a port concurrently with the closure of a valve 32 does not affect the flow of material through the other outlets of the distributor bar.

Shifting of the valve member 58 is effected through the medium of a stem 59 extending rearwardly of the valve body and having a rack portion 59a coacting with a pinion 47a on the valve actuating shaft 47. It will be understood of course that the gearing is so proportioned that one of the discharge ports 56a is closed for each valve 32 opened or vice versa. When two auxiliary bar sections are installed, two of the valves 32 will be opened or closed simultaneously and consequently it will be necessary to close or open two of the ports 56a to maintain a uniform discharge. Accordingly, the supply of material delivered to the distributor bar is accurately proportioned at all times to the number of effective outlets or spray nozzles in use without any attention on the part of the operator other than that involving the opening or closing of the valves 32.

In the operation of a distributor equipped with an extension bar of the type described, the valves 32 are closed while treating a traffic surface or road of minimum width. When traversing the narrow sections of the road the vehicle is driven so that the outermost spray nozzle of the distributor bar is substantially aligned with the outer edge of the roadway. The pump P is operated to deliver more material to the distributor bar than is required under those conditions and the excess material is by-passed back to the tank T through the valve means 55.

As the apparatus approaches a widened section of the roadway the vehicle continues in a

straight line, or, if the widened section is curved it continues in the same relationship to the center line of the roadway as for the straight section. The operator then manipulates the hand-wheel 46 to open the valves 32 in succession as required to gradually increase the width of the sprayed strip until all of such valves are open. Concurrently with such valve setting the by-pass valve 55 is set so as to progressively decrease the amount of material by-passed in proportion to the number of valves remaining open.

On approaching the end of the widened section, the width of the strip covered is decreased by progressively closing the valves 32. In such closing the by-pass valve 55 is progressively opened to maintain uniformity of discharge through the remaining effective nozzles. Thus the width of the strip covered by the apparatus may be increased or decreased at will without affecting the uniformity of the distribution. Roadways or traffic surfaces of irregular width can therefore be treated efficiently and sprayed uniformly in a single pass of the apparatus. Control of the equipment is easily and conveniently effected by an operator stationed at a point remote from the distributor bar where he is well removed from the fumes and heat of the distributed material and moreover is in the best position to observe and supervise the operation of the apparatus.

Fig. 5 shows a modified form of the auxiliary extension bar section in which the relative movements of the valve operating means and the individual outlet valves are effected by shifting the bar section axially of the distributor bar. As herein shown, the auxiliary bar section comprises a pair of tubular members 60 and 61 interconnected for communication and for relative longitudinal movement. The tubular member 60 is connected to the end of the bar section 17 by a coupling 62. This member as shown, is equipped with two dual orifice fittings 21 similar to those of the main section of the distributor bar and having their control valves 22 coupled directly to the linkage 24 for operation therewith.

The member 61 is telescoped over a smaller tubular member 65 which opens at one end to the interior of the member 60 and extends axially through a suitable packing gland in a cap 66 secured to the end of the member 61. A pipe or conduit 67 opening from the other end of the member 61 is slidable through a cap 68 closing the end of the member 60. A cap 69 closes the outer end of the member 61. With this arrangement, material is supplied to both auxiliary bar members from the main distributor bar.

The tubular body member 61 is provided with a series of outlets, four in the present instance, each equipped with a single nozzle fitting 70 having a shutoff valve 71. The valve is of the rotary type and is operated through the medium of a forked arm 72 projecting transversely of the member. Operation of the valves 71 to open or closed positions is effected as an incident to the movement of the tubular member 61 relative to the distributor bar. In this movement the operating arms 72 of the valves coact successively with a rigid bar 73 mounted on and projecting rearwardly from the cap 68. The arrangement is such that as the tubular member 61 is shifted to increase the length of the distributor bar, the valves 71 are opened successively and are closed in the reverse order when the member is retracted.

Shifting of the tubular member 61 may be ef-

fectured by the operating rod 53 and actuating means heretofore described, which likewise operates the by-pass valve to vary the amount of material supplied in accordance with the number of the valves 71 conditioned for operation.

It will be apparent from the foregoing that the invention provides distributing apparatus of novel and advantageous construction for applying material such as asphalt, road oil, tar or emulsions to roadways and other traffic carrying surfaces. The provision of an extension bar section on the distributor bar, together with a novel valve organization and actuating mechanism permits the width of the strip covered by the apparatus to be varied progressively while maintaining uniform discharge through all of the outlets of the bar. Roads or traffic surfaces of varying width may thus be treated in a single pass of the apparatus without waste of material and with a minimum of labor.

I claim as my invention:

1. In a distributing system of the character described, in combination, an elongated distributor bar having a plurality of outlets each equipped with a valve operable to open or close the outlet, means operative to supply fluid material under pressure to said bar to establish a predetermined flow of material through said outlets when all of said valves are open, actuating means operable to open and close said valves in progressive order, valve means settable to by-pass varying amounts of material from said bar, said actuating means being operably connected to said valve means for varying the setting thereof as an incident to actuation of successive ones of said valves to progressively increase the amount of material by-passed as said valves are closed and to correspondingly decrease the amount of material by-passed as said valves are opened.

2. In a distribution system of the character described, in combination, a tubular bar section adapted to be connected with and to receive liquid material from a distributor bar, a series of axially spaced outlets for said bar section, a first series of valves each individually associated with one of the outlets, a second series of valves each associated with adjacent pairs of outlets, actuating means for opening and closing the valves of said first series in succession, and other actuating means for opening and closing the valves of said second series simultaneously.

3. In a distribution system of the character described, the combination of an outer tubular bar section having a support member at one end for connection with a main distributor bar, said bar section having a series of outwardly open spray nozzles spaced axially therealong and communicating with said section through individual fluid passageways, a valve for each of said passageways having a pivoted operating arm extending transversely of the bar section, actuating means including a member movable longitudinally in opposite directions along said bar section, and an element carried by said member engageable with said arms in succession to fully open said valves in sequence in the relative movement of said member in one direction, said element engaging said arms to fully close the valves in reverse order in the return movement of said member.

4. In a distribution system of the character described, the combination of a tubular bar section adapted to be connected to and to receive liquid material from a distributor bar, said bar section having a series of axially spaced outlets,

a valve for each outlet having an operating arm extending transversely of the bar section, said arms being free of mechanical interconnections with each other, thus providing for operation of individual ones of said valves without changing the setting of adjacent valves, a valve actuating member having an element projecting laterally of the bar section for cooperation with said arms, said bar section and said member being relatively movable axially of the bar section to engage said element with said arms in succession to cause opening of said valves sequentially from one end of said section to the other and closing of said valves in the reverse order in response to such relative movements in opposite directions, and control means for relatively moving said bar section and said member.

5. In a distributor system of the character described, in combination, an elongated bar section having a coupling at one end for connection with a distributor bar, a series of nozzle elements carried by said bar section, each of said elements having a pair of discharge nozzles spaced apart axially of the bar section and connecting therewith, a control valve for each pair of nozzles, a shut-off valve for each individual nozzle, actuating means for operating said control valves simultaneously, and other actuating means for operating said shut-off valves in a predetermined order of succession.

6. In a distributor system of the character described, the combination of a distributor bar having a plurality of axially spaced outlets, a valve for each outlet operable to open or close the outlet, a shiftable actuator operable upon movement in one direction to open said valves in succession and upon movement in the other direction to close said valves in the reverse order, means for supplying liquid material under pressure to said bar, and means operated concurrently with the shifting of said actuator for regulating the amount of material supplied to the bar.

7. In a distributor system of the character described, the combination of a distributor bar having a plurality of axially spaced outlets, a valve for each outlet operable to open or close the outlet, a shiftable actuator operable upon movement in one direction to open said valves in succession and upon movement in the other direction to close said valves in the reverse order, a constant delivery pump connected to deliver fluid material under pressure to said bar, a by-pass valve interposed between said pump and said bar, and means for opening and closing said by-pass valve progressively in response to the shifting of said actuator respectively in valve opening and valve closing directions.

8. In a mobile system for distributing fluid material, in combination, a distributor bar having a series of valved outlets, actuating means operable to open and close the valves of said outlets in progressive order, a pump connected to supply fluid material under pressure to said bar, a by-pass valve for controlling the amount of fluid supplied to the bar, said valve having an elongated tubular body communicating with the connection between said pump and said bar, said body having a series of axially spaced by-pass ports, and a valve member shiftable axially of said body by said actuating means to close and open said ports in progressive order.

9. In a translatable distributor system for applying a liquid coating to a road surface or the like, the combination of means for supplying

coating fluid under pressure, an elongated distributor bar section connected to said means and including an outer tube having a plurality of axially spaced spray nozzles communicating with said tube and opening outwardly therefrom to direct spray toward the surface to be coated, a plurality of shut-off valves interposed between successive ones of said nozzles and said tube, each of said valves having an individual operator therefor, said operators being mechanically independent for operation independently of each other, a common actuator for said valves arranged to shift said operators successively to effect sequential opening of said valves and, hence, associated ones of said nozzles from one end of said tube to the other and sequential closing of said valves in reverse order, and by-pass means communicating with said fluid supply means and operable as an incident to opening and closing of successive ones of said valves to maintain an unvarying flow of fluid through open ones of said valves and, hence, associated ones of said nozzles.

10. In a distributor system for applying a liquid coating to a road surface or the like, the combination of means for supplying coating fluid under pressure, an elongated distributor bar section connected to said means and including an outer tube having a plurality of axially spaced spray nozzles communicating with said tube through fluid passageways and opening outwardly from the tube to direct spray toward the surface to be coated, a plurality of shut-off valves interposed in said respective fluid passageways, each of said valves having an individual operator therefor, said operators being operable independently of each other, and a common actuator for said valves arranged to shift said operators successively to effect sequential opening of said valves and, hence, associated ones of said nozzles from one end of said tube to the other and sequential closing of said valves in reverse order.

11. For use in a distributor system having a main distributor bar supplied by a source of pressurized coating fluid for applying a liquid coating to a road surface or the like, an elongated distributor bar section for variably increasing the width of the swath coated by a single pass of the distributor system, said bar section comprising, in combination, an elongated outer tube having fluid coupling means on one end thereof for connecting the tube to one end of the main distributor bar, a plurality of fluid spray nozzles spaced longitudinally along said tube and communicating therewith through fluid passageways, said nozzles being freely open outwardly of said tube to direct spray toward the surface to be coated, a plurality of shut-off valves interposed in said respective fluid passageways, each of said valves having an individual operator therefor, and a common actuator for said valves disposed alongside said bar section and arranged to actuate said operators successively to effect sequential opening of said valves and associated ones of said nozzles from said one end of said tube to the other and to cause closing of said valves and nozzles in reverse order.

12. For use in a distributor system having a main distributor bar supplied by a source of pressurized coating fluid for applying a liquid coating to a road surface or the like, an elongated distributor bar section for variably increasing the width of the swath coated by a single pass of the distributor system, said bar section comprising, in combination, an elongated outer tube

11

having coupling means thereon for connecting the tube to the source of pressurized coating fluid, a plurality of openings spaced longitudinally along said tube, a shut-off valve associated with each of said openings to selectively cause opening and closing thereof, fluid spray nozzles connected to said respective openings and being freely open outwardly of said tube to direct spray toward the surface to be coated, each of said valves having an individual actuator thereon, said actuators being operable independently of each other, an operator arranged to operate said actuators successively to effect sequential opening of said valves and associated ones of said nozzles from said one end of said tube to the other and to cause closing of said valves and nozzles in reverse order.

13. A distributor system as set forth in claim 4 characterized by said control means being operatively connected to said bar section for causing movement thereof to produce said relative movement between said section and said valve actuating member.

14. The combination set forth in claim 9 and comprising, in addition, a main distributor bar

12

disposed in generally parallel alinement with said bar section, and operating means connected to said bar section for causing axial extension thereof into positions projecting varying distances beyond said main bar, and said actuator serving to open said valves in succession and to close the valves in reverse order upon extension and retraction of said section.

GEORGE M. ETNYRE.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
876,015	Ray	Jan. 7, 1908
1,001,014	French	Aug. 22, 1911
1,558,064	Thrift	Oct. 20, 1925
2,031,262	Hill	Feb. 18, 1936
2,046,373	Etnyre	July 7, 1936
2,278,819	Gredell	Apr. 7, 1942
2,329,331	Brosemer	Sept. 14, 1943
2,330,568	Erickson	Sept. 28, 1943
2,342,120	Cartwright	Feb. 22, 1944