

April 11, 1944.

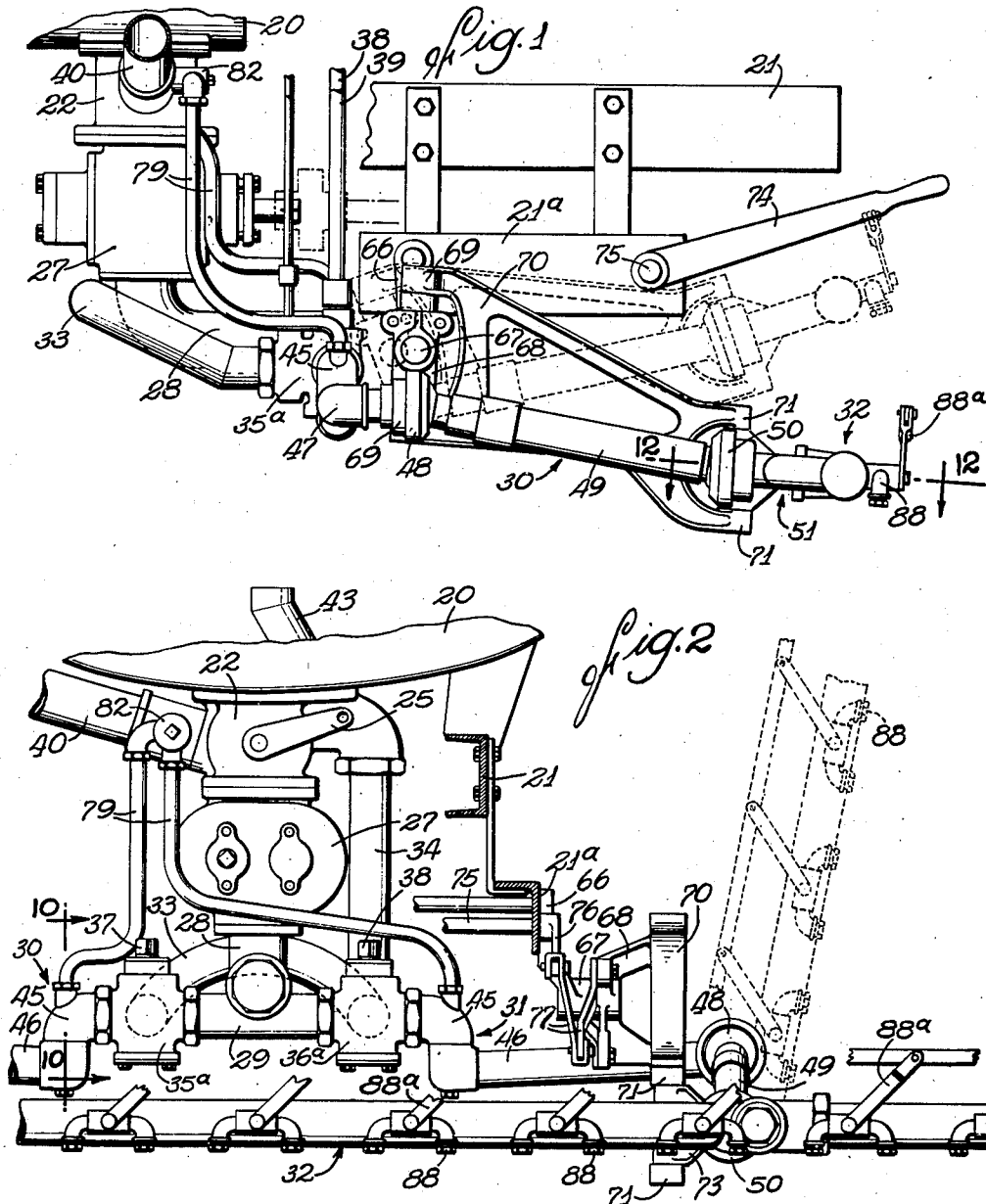
G. M. ETNYRE

2,346,478

DISTRIBUTOR FOR BITUMEN AND LIKE MATERIALS

Filed Jan. 14, 1938

4 Sheets-Sheet 1



INVENTOR

George M. Etnyre

By Parker, Carlson, Rigney & Hubbard
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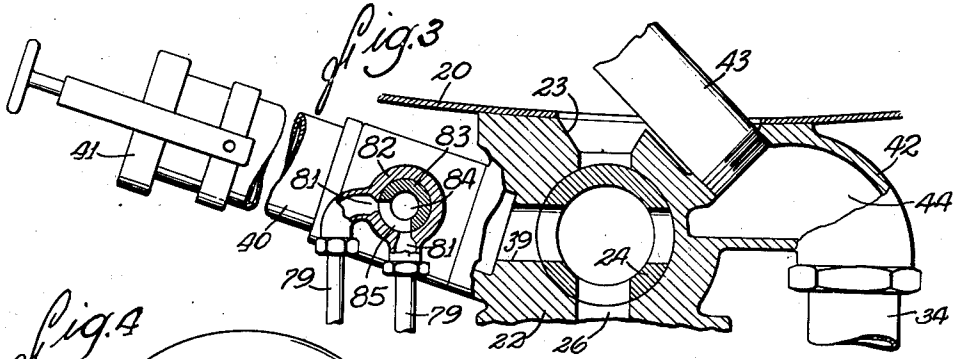
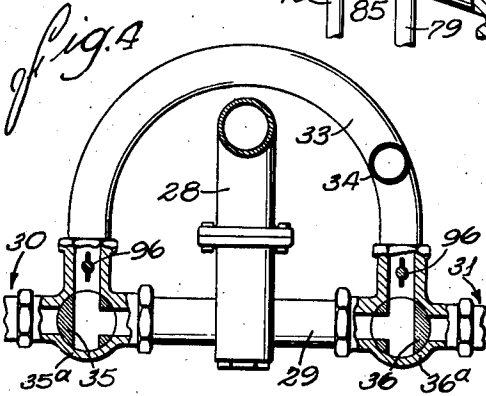
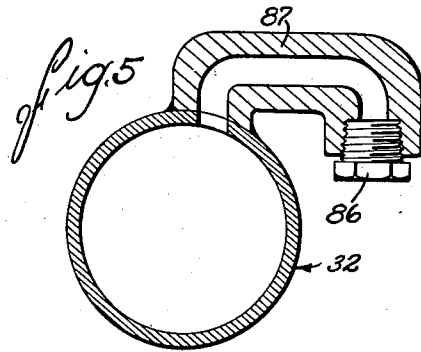
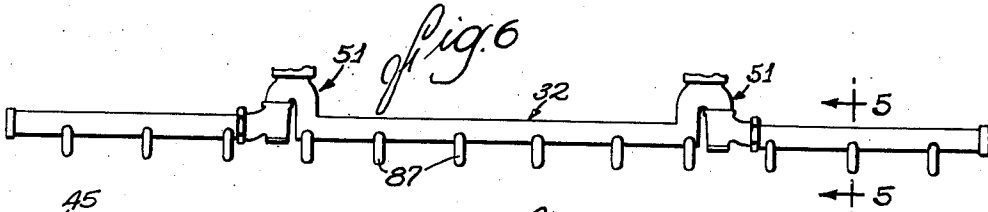
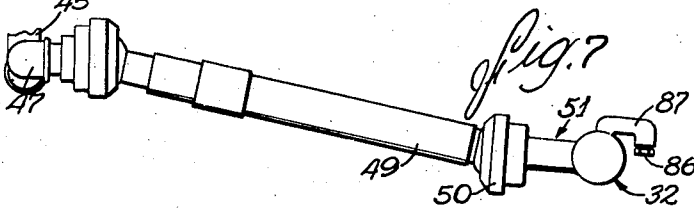
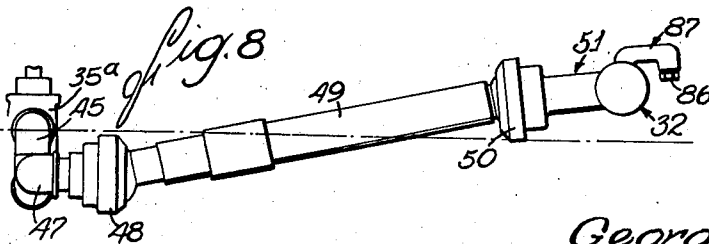
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4 Sheets-Sheet 2



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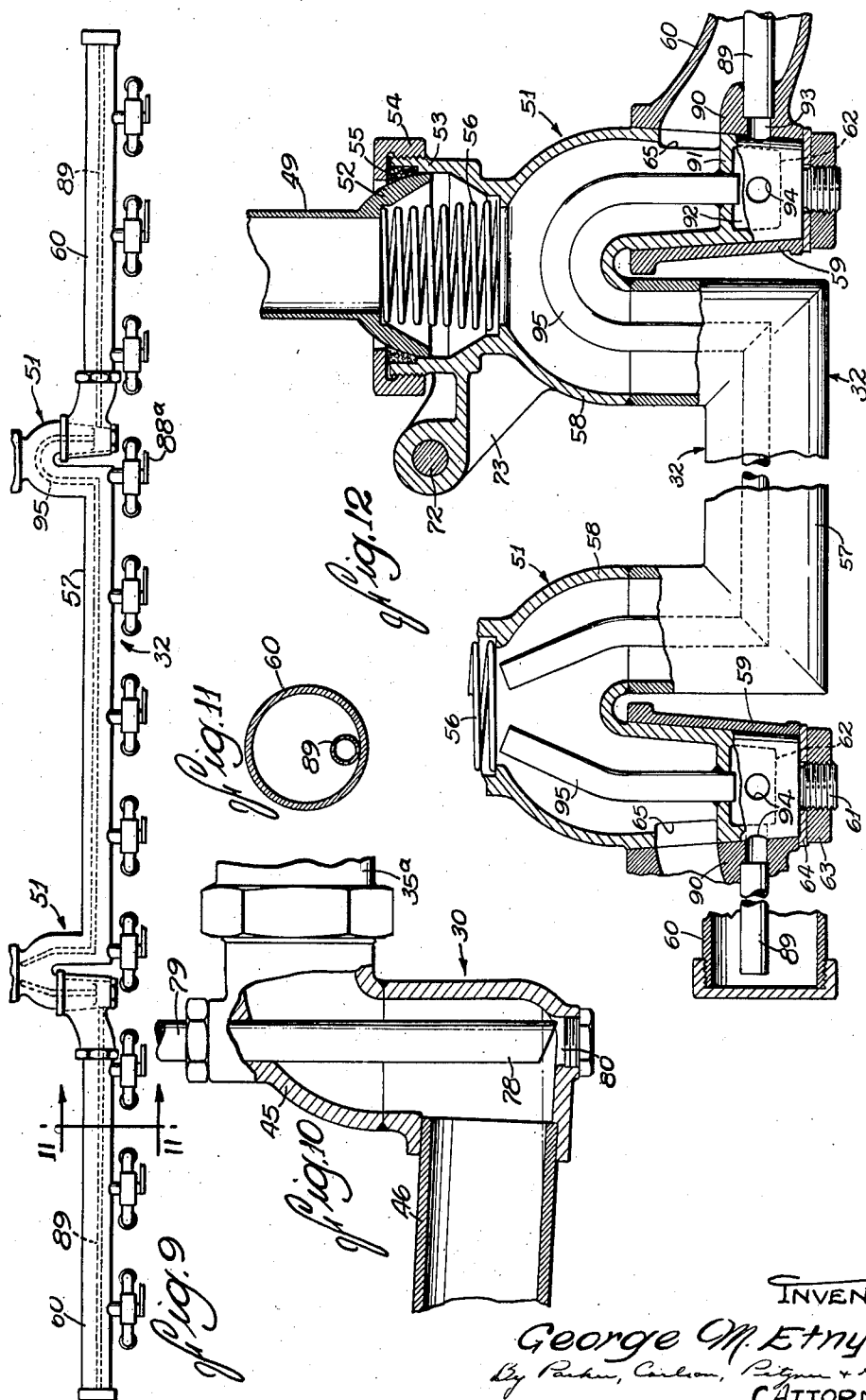
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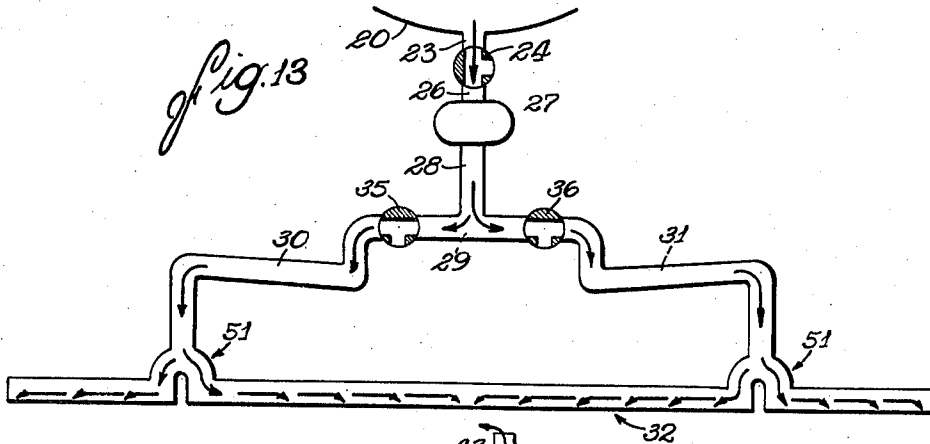
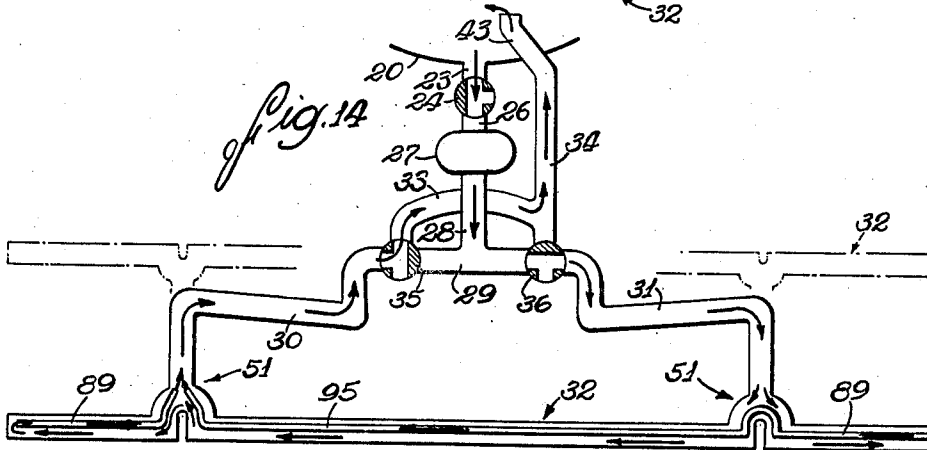
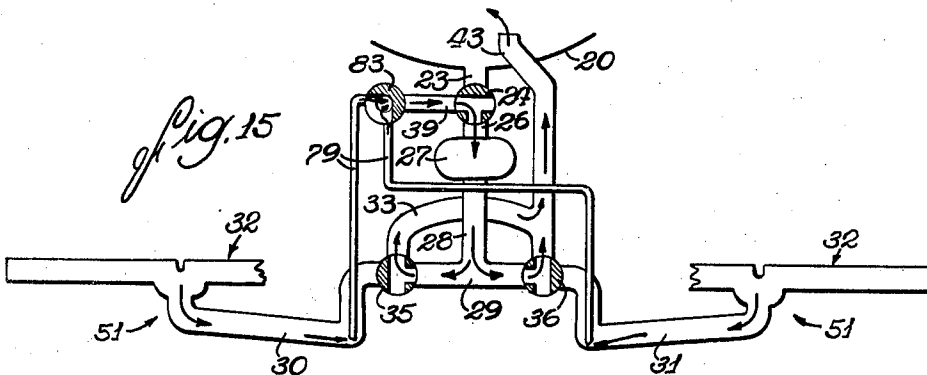
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DISTRIBUTOR FOR BITUMEN AND LIKE MATERIALS

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4 Sheets-Sheet 4



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2,346,478

DISTRIBUTOR FOR BITUMEN AND LIKE MATERIALS

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Application January 14, 1938, Serial No. 185,033

4 Claims. (Cl. 299—34)

The invention relates generally to apparatus for distributing heavy viscous fluids, such as bituminous material used in road construction. Apparatus of the type to which the invention pertains is disclosed in my patents, No. 2,011,894, issued August 20, 1935, and No. 2,046,373, issued July 7, 1936.

A general aim of the invention is to provide a new and improved apparatus operating in a novel manner to produce an efficient distribution of material by means which includes an effective control of the material flow.

Another object is to provide a distributor system of the character described which embodies novel means for effecting a sharply defined cessation of material distribution by reversing the direction of material flow.

Another object is to provide in such a system a new and improved means for clearing material from the distributing end of the system, which means is effective to withdraw material from said distributing end and return it to the source of supply.

In conjunction with the foregoing, another object of the invention may be more specifically stated as residing in an arrangement of drainage conduits in the system for selective connection with the intake side of a force pump to withdraw material from the distributor member and conduits in immediate association therewith, the distributor member being capable of elevation to facilitate gravity drainage of material to the part of the system with which the drainage conduits communicate.

A further object of the invention is to provide a distributor system embodying new and improved means for effecting a circulatory flow of material through the distributor member when discharge of material from said member is discontinued.

More specifically stated, another object is to provide, in a distributor system including a distributing bar having connections with supply conduits located at points spaced from the ends of the bar, novel means for producing a circulating but non-distributing flow of material directly between said connections as well as through the end portions of the bar located outwardly of said connections.

Other objects and advantages will become apparent in the following description and from the accompanying drawings, in which:

Figure 1 is a side elevational view of the distributor system embodying the features of the invention, the supply tank and the supporting frame being illustrated only fragmentarily.

Fig. 2 is a fragmentary view of the system in rear elevation.

Fig. 3 is a fragmentary view on an enlarged scale illustrating in section the valve mechanism

for controlling the flow from the supply tank and in side elevation the intake and other conduits in immediate association with said valve mechanism.

Fig. 4 is a fragmentary view looking downwardly on the header and the distributing and return conduits associated therewith, the control valves being shown in section.

Fig. 5 is a cross sectional view on an enlarged scale of the distributor member and is taken substantially along the line 5—5 of Fig. 6.

Fig. 6 is a plan view on a reduced scale of a distributor member.

Figs. 7 and 8 are somewhat diagrammatic illustrations of the distributor member shown in Fig. 6, together with the supply conduits immediately associated therewith and illustrate respectively the relationship of the parts in the lowered and elevated positions of the distributor member.

Fig. 9 is a plan view on a reduced scale of a modified form of distributor member.

Fig. 10 is an enlarged fragmentary view partially in section showing a detail of the mechanism, and the view is taken substantially as indicated by the line 10—10 of Fig. 2.

Fig. 11 is an enlarged section taken substantially along the line 11—11 of Fig. 9.

Fig. 12 is an enlarged view showing details of construction of the modified form of distributor member (Fig. 9), the view being partially in section along the line 12—12 of Fig. 1.

Figs. 13, 14 and 15 are diagrammatic views illustrating the paths of flow under various operating conditions and show respectively the system during material distribution, circulation and drainage.

Since systems embodying the present invention are adapted to be used without substantial modification in conjunction with various types of supporting and manipulation controlling apparatus, as, for example, those illustrated in the above identified patents, it has not been deemed necessary herein to illustrate or describe fully such correlated apparatus.

With reference to the drawings, the numeral 20 designates a supply tank or reservoir which may be of conventional form and is usually supported upon a truck chassis, or the like. The chassis may include a rearwardly extending frame, illustrated fragmentally at 21, for supporting certain parts of the distributor system. Near its rear end, the lower side of the tank has a valve casing 22 rigidly secured thereto and provided with a passageway 23 (Fig. 3) opening into the supply tank. A valve 24 manipulative by the lever 25 (Fig. 2) controls the flow of material through the passageway 23 into a continuing passageway 26 which leads to the intake side of a suitable force pump (not shown) but indicated herein as being a pump of the

gear type housed within the pump casing 27. A conduit 28 (Figs. 1, 2 and 4) leads downwardly and thence rearwardly from the outlet or force side of the pump and communicates intermediately with a transversely extending header 29.

At the ends of the header are conduits 30, 31 which lead to spaced points on the distributor member or bar generally designated 32. Also communicating with the ends of the header are the opposite ends of a rearwardly disposed conduit 33 having an intermediately connected vertical pipe 34 (Figs. 2, 3 and 4) forming with the conduit 33 a return line for conveying material to the supply tank. At the junctions of the ends of the conduit 33, the ends of the header 29, and the ends of the conduits 30, 31, are flow control valves 35, 36 mounted in valve casings 35^a, 36^a respectively and manipulable by valve operators 37, 38. These valves are the main flow-control valves and may be set to direct a flow of material from the header to the distributor bar, from the header to the return line to the supply tank, or under certain conditions into the distributor bar through one of the conduits 30, 31 with return to the supply tank through the other of said conduits and the return line. These operating conditions will be hereinafter more fully discussed.

Referring to Fig. 3, the valve casing 22 has a passageway 39 extending substantially at right angles to the passageways 23, 26 and arranged to be controlled by the valve 24. Secured to the valve casing in communication with the passageway 39 is a material intake conduit 40 extending laterally beneath the supply tank 20. The outer end of the feed conduit 40 is normally sealed by a detachable cap 41 which may be removed to permit connection of the end of the intake conduit with a line leading from a source of material supply, such as a tank car. The valve 24 is a two-position valve, and in one position connects the conduits 23 and 26 to permit material to be drawn from the supply tank 20 by the pump and in its other position to place the passageways 39 and 26 in communication to allow the pump to draw material through the intake conduit 40.

For convenience in construction and assembly, the valve casing 22 may have a hollow extension 42 thereon to which the vertical pipe 34 of the return line is connected. A short length of pipe 43 communicates with the chamber 44 within the extension 42 for conducting material therefrom into the supply tank, thus completing the return line. With this arrangement, a single aperture in the supply tank 20 provides both outlet and inlet for the material.

Since the conduits 30 and 31, which lead to the distributor bar, are substantially identical, only one need be specifically described. Referring to Figs. 1, 2 and 10, each of the conduits immediately adjacent to the valve housing includes a double elbow section 45 which leads first outwardly from the valve casing, thence downwardly a short distance, and at its lower end opens laterally outwardly to connect with a pipe 46. As may be seen in Fig. 2, the pipe 46 is so connected that it slopes upwardly from its point of connection with the elbow section. At its outer end, the pipe 46 has a rearward bend 47 (Fig. 1) for communication through a fluid tight universal joint 48 with a rearwardly extending pipe 49. This pipe, through a similar universal joint 50, connects with inlet 51 on the distributor bar 32. As shown in Fig. 12, the

universal joints may be fashioned on the order of a ball and socket joint in which a flange 52, having an arcuate outer surface, is seated for universal movement in a receiving socket provided by an enclosing flange 53, a gland nut 54, and interposed packing 55. A suitable spring 56 holds the parts in firmly seated relationship.

In general, the exemplified forms of distributor members or bars shown in Figs. 6 and 9 have certain preferred characteristics common to both forms. Thus, the distributor bars are elongated members preferably comprising a relatively fixed central section and two end sections which are relatively movable from an aligned position with respect to the intermediate section to a vertical non-aligned and out of the way position, as shown in dotted outline in Fig. 2. The distributor bars are provided with a series of discharge nozzles and the material inlets 51 are located intermediate the ends of the bar and preferably at the ends of the intermediate section.

As shown in Fig. 12, the intermediate section of the distributor bar, designated 57, has at each end a U-shaped fitting 58 which may be integrally or permanently connected through one arm to the intermediate section. The other arm of the fitting is in the same flat plane as the intermediate section and has a slightly tapered, externally finished surface rotatably to receive an internally complementary tubular sleeve 59 formed at the end of an end section 60. An assembly which permits of rotational movement of the end section on its associated arm may be suitably effected as by a screw threaded stud 61 projecting from an end wall 62 on the arm for engagement by a nut 63 to hold an oversized washer 64 in limiting abutment with the end of the sleeve 59. An elongated aperture 65 appropriately formed in the side wall of the arm affords communication between the interior of the fitting and the associated end section. The base of the fitting has an aperture defined by the flange 53 which forms a part of the universal connection 50 with the supply pipe 49.

The purpose of the universal joints 48, 50 is to permit movement of the distributor bar relative to the underlying road surface. On each side of the machine is a frame part 21^a, and each part has pivotally secured thereto a depending arm 66 having at its lower end a transversely extending stub shaft 67 (Fig. 1). This shaft carries an intermediate support 68 provided with upper and lower trunnions aligned on a vertical axis and the trunnions are engaged by spaced bearings 69 (Fig. 1) fashioned on the arms of a bifurcated bracket 70. The bracket extends rearwardly and slightly downwardly to a point approximately on the line of the rear universal joints 50 and has a bifurcated end providing axially aligned upper and lower bearings 71 for engagement with a vertical pivot pin 72 (Fig. 12) carried by an arm 73 on the inlet fitting 51. By this arrangement, the distributor bar is supported for vertical movement, as well as adjustment in a direction longitudinally of the bar. Means for effecting such longitudinal adjustment is not herein shown, but reference may be had to Patent No. 2,011,894 for a disclosure of a suitable control mechanism.

Vertical movement or elevation of the distributor bar may be effected by the mechanism for that purpose illustrated in said patent, which is generally similar to the following arrangement of parts. A lever 74 (Fig. 1) on the frame part 21^a is secured to a rock shaft 75 (Figs. 1 and 2).

The rock shaft on each side of the frame carries a depending arm 76 (Fig. 2). Pivotaly connected links 77 extend between the lower end of each arm 76 and the intermediate support 68, the arrangement being such that when the lever 74 is raised the rear ends of the brackets 70 and the distributor bar will also be raised as shown in dotted outline in Fig. 1. For clarity in illustration, the linkage connections between the rock shaft 75 and the intermediate support 68 have been omitted from Fig. 1.

An important feature of the present invention is the provision of means for withdrawing all material from the distributor system beyond the main control valves 35, 36 after these valves have been set to prevent material flow through the conduits 30, 31 and the distributor bar. This feature is advantageous in view of the nature of the material distributed, since bituminous material or the like will congeal and clog the system if it is allowed to cool therein.

With particular reference to Figs. 2 and 10, each of the elbow sections 45 has the end 78 (Fig. 10) of a drainage conduit 79 fixed therein to open at a point adjacent to the bottom of the section. A plug closed aperture 80 in the bottom of the section opposite the end of the drainage conduit may, if desired, be provided. Each of the drainage conduits lead, as shown in Fig. 2, to a point opposite the material intake conduit 40 where they communicate with ports 81 in a valve casing 82 (Fig. 3). Mounted in the valve casing is a four-position valve 83 having an axial bore 84 communicating with intake conduit 40 and a passage 85 capable of being placed in communication simultaneously with both of the ports 81 or selectively with either of said ports. The valve may also be positioned to prevent a flow through either port.

By proper arrangement of the several valves, as will be more particularly described in connection with Figs. 13, 14 and 15, either or both of the drainage conduits 79 may be connected with the intake side of the pump to withdraw material from the distributor bar end of the system. It is to be noted that drainage will be particularly efficient when the distributor bar and its associated conduits are in the position shown in dotted outline in Fig. 1, since all of the material will flow by gravity into the pockets formed at the lower ends of the elbow fittings 45. The permanent inclination of the pipes 46 facilitates the gravity flow.

The drainage system, when used in conjunction with the type of distributor bar illustrated in Figs. 5, 6, 7 and 8, may be utilized to produce a sharp cessation of material discharge from the distributor bar. As best shown in Fig. 5, each nozzle 86 on the distributor bar is connected with the interior of the bar by means of an inverted U-shaped duct 87 arranged to open into the upper side of the bar. The nozzles are not individually valve controlled. If the flow of material to the bar is stopped by closing the valves 35, 36, and approximately simultaneously both of the drainage conduits 79 are placed in communication with the intake side of the pump, the resulting reversal of flow of material in the discharge bar end of the system will be effective instantly to discontinue material discharge. As a result, there will be little, if any, irregularity at the end of the strip of applied material.

As to drainage of this form of distributor bar, it may be seen from a comparison of Figs. 7 and 8 that when the distributor bar is in its lowermost

position (Fig. 7), the arrangement locates the discharge ends of the nozzles approximately on the center horizontal plane of the bar. When the bar is elevated (Fig. 8), the nozzle openings will be on the horizontal plane of, or slightly above, the point of communication of the duct 87 with the discharge bar. Hence, when the distributor bar is elevated, practically all residual material therein and in the nozzles will drain backwardly into the system by gravity.

In the form of distributor bar shown in Figs. 1, 2 and 9, valve controlled nozzles 88 are provided, each of the nozzle valves being opened or closed by an associated operating lever 88^a. The nozzle valves may be simultaneously controlled by a leverage arrangement of the type shown in Patent No. 2,011,894. This form of distributor bar is employed where it is desired to provide a circulatory flow of material through the distributor bar while the nozzle valves are closed. The circulatory flow is generally used during more or less temporary interruptions of distribution.

A feature of the invention is the provision, in a distributing bar having inlets thereto which are spaced from the ends of the bar, of means for effecting a circulating flow of material throughout the distributor bar from one end to the other. As will become apparent, the system may be set so that material may be delivered to the distributor bar through one of the inlets and flow from the bar through the other of the inlets. Normally, this would produce a circulating flow through the intermediate section of the bar between the inlets, but the material in the end sections would not be circulated.

In the present embodiment, each of the end sections has a tube 89 (Figs. 9, 11 and 12), of substantially less diameter than the internal diameter of the section, extending from a point closely adjacent to the outer end of the section into a boss 90, formed as a part of the end section sleeve 59. The associated arm of the fitting 58 has a transverse wall 91 spaced from the end wall 62 to provide a closed chamber 92 at the end of the arm. The tube 89 communicates with the chamber through a bore 93 in the boss 90 and one or another of a series of approximately positioned apertures 94 in the side wall of the arm. The apertures 94 are disposed so that the tube 89 will communicate therewith in either the aligned or unaligned position of an end section relative to the intermediate section.

Mounted in each of the walls 91 is a tube 95 which extends therefrom to discharge into the inlet through which material flows from the distributor bar during the circulation operation. As the present system is illustrated, the right-hand inlet 51 is the inlet through which material flows into the distributor bar, while the left-hand inlet 60 is the one through which material flows out of the distributor bar during the circulation of material therethrough. Hence, the tube 95, which communicates with the chamber 92 in the right-hand fitting, runs the length of the intermediate bar section and terminates at a point approximately at the base of the opposite fitting. The other tube 95 is shorter and leads to substantially the same point. The tubes 89, 95 thus provide conduits for returning the material from the extremities of the end sections into the material flowing out of the distributor bar and produce a circulation of material through the end sections. The relative diameters of the ducts 89, 95 and the distributor bar will determine the distribution of pressure between the two flow paths there-

through and the speed of flow of material through each path.

The operation of the system will be best understood by reference to Figs. 13, 14 and 15. Fig. 13 shows the condition of the system during distribution. In this setting, the valve 24 places the passageways 23 and 26 in communication, and the valves 35, 36 are set to connect the header 29 with the conduits 30 and 31. Material is drawn by the pump from the supply tank 20 and simultaneously delivered through both inlets 51 to the distributor bar.

If the distributor bar is of the type shown in Fig. 9, a circulating flow of material may be obtained by leaving the positions of the valves 24 and 36 unchanged and setting the valve 35 to connect the conduit 30 with the return conduit 33 (Fig. 14). The material, in this arrangement, is forced by the pump through the header 29 and conduit 31 to the right-hand inlet of the distributor bar. From this point, the material flows directly through the intermediate section of the bar to the left-hand inlet. The material also flows into both end sections and thence through the tubes 89, 95 to the left-hand inlet, from which point the material travels through conduit 30 and return conduits 33, 34, 43 to the supply tank.

The system, in operative condition for draining material from the distributor bar end thereof, or for discontinuing material distribution, is shown in Fig. 15. In this setting, the valve 24 connects the material intake conduit 39 with the passageway 26. The valves 35 and 36 connect the header 29 with the return conduit 33. As shown, the valve 83 is positioned to connect both of the drainage conduits 79 with the material intake conduit. The material flow is then from the low point of the system, toward which material drains from the distributor bar, through the drainage conduit 79, material intake conduit 39, passageway 26, conduit 28, header 29 and return conduits 33, 34, 43 to the supply tank. This flow is produced by the pump and will thoroughly clean substantially all of the material from the system beyond the valves 35, 36. The effectiveness of cleaning may, when desired, be increased by selectively connecting the drainage conduits 79 with the material intake conduit 39 to drain material first from one and then the other side of the system.

The present system is capable of being set for other operative functions, such as filling the supply tank from a tank car, or the like, or distributing material selectively from different sections of the bar. Such other functions are disclosed in the above mentioned patents. However, in the present system, if it becomes desirable to deliver material to the distributor bar through only one of the conduits 30, 31, auxiliary cut-off valves 96 are provided in the return line between the main valves 35, 36 and the pipe 34 to prevent a flow from the header to the return line when one of the valves 35, 36 is set to deliver material to the distributor bar and the other valve is positioned to prevent a similar flow.

While the invention is susceptible of various modifications and alternative constructions, I have shown in the drawings and herein described 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.

I claim as my invention:

1. In a distributor system, the combination of a supply tank, an elongated distributor member having a plurality of inlet connections, a conduit leading from said tank and having branches leading to said inlet connections, bypass conduits leading from said branches to the tank, valves selectively controlling the flow through said branches or said bypass conduits, pumping means for drawing material from said tank and forcing it through said conduit and branches or through said conduit and bypass conduits depending upon the setting of said valves, means for raising the distributor member from a lowered distributing position, and conduits connected with said branches at the lowest point thereof when said distributor member is raised and leading to the intake side of said pumping means for exhausting material from the system on the distributor member side of said valves.

2. Fluid distributing apparatus of the character described having, in combination, a fluid pump, a valve on the outlet side of said pump, means providing a fluid supply passage including a distributor member and having a low point toward which all of the fluid in the passage will tend to flow while said valve is closed, and a separate conduit connectible at one end to the inlet of said pump and having its other end communicating with said passage at said low point whereby all of the fluid in the system may be withdrawn by said pump following closure of said valve.

3. In a distributor system for such heavy fluids as are used in road construction, the combination with a plurality of distributor members, a pump, a conduit for connecting the intake of said pump with a source of material, supply conduits for connecting the outlet from said pump with said distributor members, valve means in each of said conduits, said conduits from said outlet having low points toward which all fluid therein and in the distributor members will tend to flow by gravity, other conduits extending separately from each such low point to the intake of said pump, and valve means in said other conduits providing for the drainage through said other conduits of fluid from said low points when the valve means in said supply conduits are closed.

4. In a distributor system for such heavy fluids as are used in road construction, the combination with a plurality of distributor members, a pump, a conduit for connecting the intake of said pump with a source of material, supply conduits for connecting the outlet from said pump with said distributor members, independently operable valve means in each of said conduits, said conduits from said outlet having low points toward which all fluid therein and in the distributor members will tend to flow by gravity, other conduits extending separately from each such low point to the intake of said pump, and valve means in said other conduits providing for the selective drainage from the low point of either of said supply conduits when the valve means in the selected supply conduit or conduits is closed.

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