Oct. 27, 1953 P. E. JONES 2,657,092

APPARATUS FOR SPRAYING HOT LIQUIDS SUCH AS ASPHALTIC EMULSIONS ON ROADWAY SURFACES

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Fig. 1

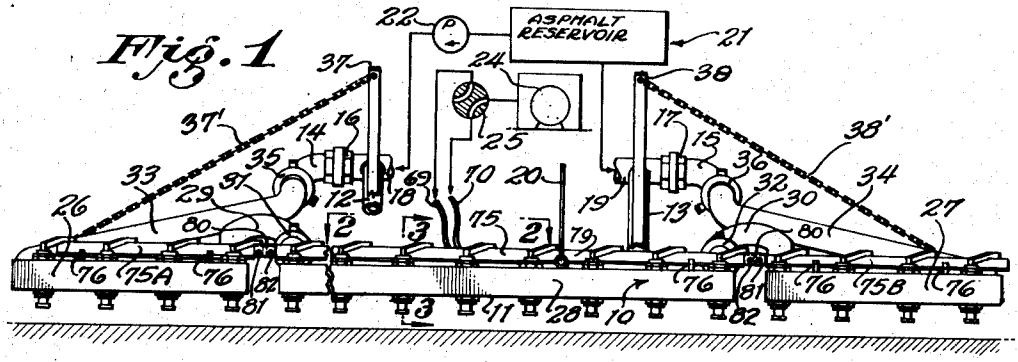


Fig. 2

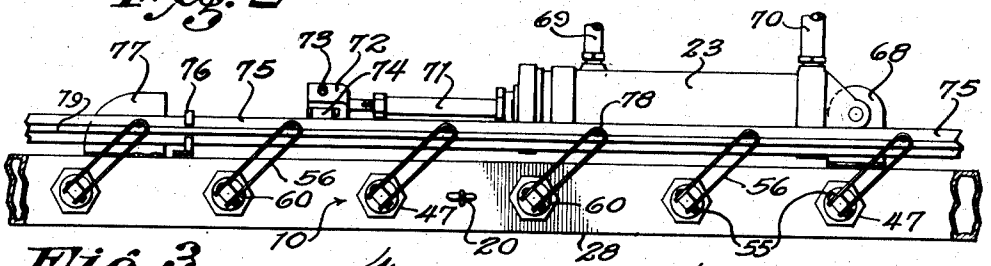


Fig. 3

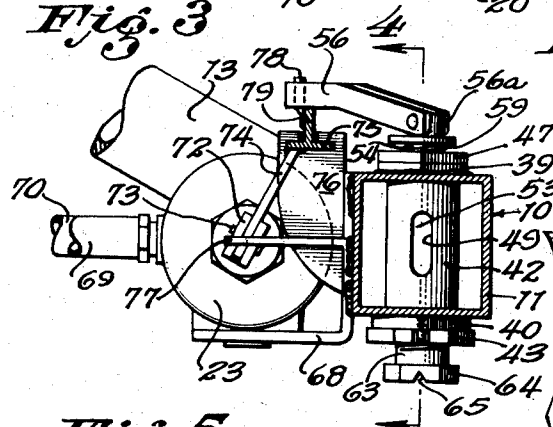


Fig. 4

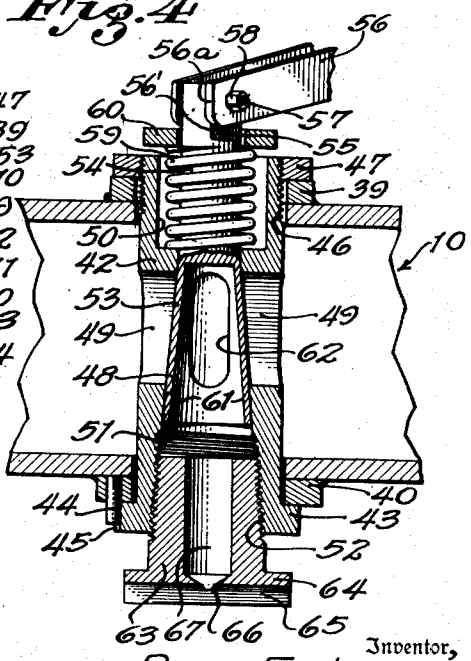
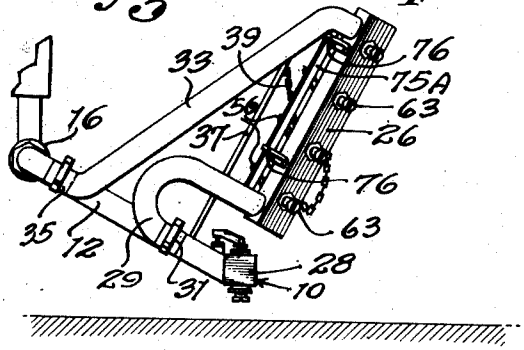


Fig. 5



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APPARATUS FOR SPRAYING HOT LIQUIDS SUCH AS ASPHALTIC EMULSIONS ON ROADWAY SURFACES

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3 Claims. (Cl. 299—34)

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My invention relates particularly to machines used to spray liquified asphaltic materials used in road construction and especially for surfacing and patching roadways but in its broader aspects my invention pertains to the spraying of any material required to be used at elevated temperatures.

Asphalt is obtained as the residue from the distillation of various types of crude petroleum being a viscous heavy liquid even at relatively high temperatures and to enable it to be sprayed, all parts of the machine through which the heated asphalt is circulated should be kept at a high temperature since any local fall in temperature is likely to cause the asphalt to clog up in the cooled portion of the spraying equipment.

In road building and maintenance particularly, various special requirements have to be met, for instance, the trucks on which the spraying equipment is mounted work over rough ground and in the usual type of spraying equipment having low hung projecting spraying nozzles, the nozzles and spreader bars on which they are mounted are liable to damage by striking piles of earth and other obstructions.

The areas to which the asphalt or oil spray is to be applied may vary from the full width of the roadway to narrow strips, and the spraying equipment should, therefore, be readily adjustable as to spread of spray, without allowing portions not in use to become cool enough to cause clogging of the heavy fluid therein.

The spraying equipment should be readily taken apart for cleaning, when necessary, or to change spray nozzles, etc., with minimum loss of time, and it should also be possible to put the equipment into condition for use after a period of disuse, for instance, when starting a day's work, as speedily as possible.

In order to meet the above and other requirements of hot spraying equipment, an object of my invention is to provide an arrangement of the spraying valves whereby they are at all times during operation surrounded by and maintained substantially at the same temperature as the liquid to be sprayed.

A further object of the invention is to provide for the continuous circulation, during operation of the equipment, of the hot liquid to be sprayed through structure in which the spraying valves are mounted so that chilling of any portion of the structure is prevented, thus avoiding the possibility of having to temporarily stop the functioning of the machine.

Another object of my invention is to arrange

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the spraying valves of the machine in groups, the outer group or groups being mounted so that they may be readily put out of action until again required, the circulation of hot fluid around such inactive groups of spraying nozzles being maintained, however, so that they are kept at the temperature of the active spraying valves. The result of this arrangement is that the equipment is readily adjusted to cover areas of different width.

A further object of my invention is to provide spraying equipment particularly adapted to the requirements of road building and maintenance by reason of the protected mounting of the spraying valves in the "spreader bars," which are the structural members holding the spraying valves and their nozzles above the ground to be sprayed, and through which the hot liquid, such as liquid asphalt or road oils, is delivered to the nozzles.

Another object of my invention is to arrange the spraying valves and spray nozzles so that they may be adjusted in unison by the operator of the spraying equipment, a valve operating member being provided to which the groups of valves and the individual valves are connected, the connection being arranged so that the operating members of auxiliary groups of valves may be readily disconnected from the main group of valves to enable the latter to be operated without operating an auxiliary group when desired, the connection also enabling any individual valve to be disconnected from its operating member when required.

A still further object of the invention is to provide road spraying equipment having the spraying valves and spray nozzles mounted in the spreader bar in such a manner that they may be readily individually assembled, in, and removed from position and spray nozzles may be readily changed in a minimum of time.

The apparatus of my invention while attaining the objects referred to among others provides a simple and rugged structure requiring little maintenance and is free from liability to breakdowns.

Still further objects and features of my invention will appear from the following specification read with reference to the accompanying drawing illustrating an embodiment of the invention at present considered preferable by me and in which:

Figure 1 is a fragmentary view, in rear elevation, of a spreader bar in which nozzles are mounted to direct a spray of hot asphalt emul-

sion against the surface of a road, other cooperative elements of known construction cooperating with the elements of my invention, being shown diagrammatically;

Figure 2 is a fragmentary enlarged view of the spreader bar;

Figure 3 is a still further enlarged cross-section on the line 3—3 of Figure 1;

Figure 4 is a cross-section on the line 4—4 of Figure 3, but drawn on an enlarged scale, showing a valve member in closed position in a valve body;

Figure 5 is a fragmentary end view of the spreader bar, showing an auxiliary spreader bar in raised position.

Referring now to Figure 1, the numeral 10 indicates generally the spreader bar. This bar is a square-section tube 11 mounted for pivotal movement in upward and downward direction by and supplied with hot asphalt emulsion through pipes 12 and 13 projecting from lengths of pipes 14 and 15, connected by rotatable unions 16 and 17 with pipes 18 and 19 connected to a tank of hot asphalt, asphalt emulsion and the like.

The height of the spreader bar 10 above the ground may be adjusted by cables 20 secured at the lower end to the spreader bar and at the other end wound around a rotatable bar (not shown) mounted across the rear end of the truck on which the tank is mounted.

In Figure 1, the tank is diagrammatically represented at 21, and a pump delivering asphalt solution from the tank to the spreader bar is indicated at 22.

The spreader bar is fitted with a plurality of spray nozzles each controlled by an individual valve and in order to operate the valves in unison, I provide a pressure operated cylinder 23 (Figure 2) supplied with pressure fluid by a compressor indicated at 24 in Figure 1, the pressure fluid being operated by a two-way valve 25 arranged at a convenient point for manipulation by the operator of the equipment.

In order to provide adjustment of the spread covered by the spreader bar, I provide short lengths of auxiliary spreader bar 26 and 27, swingingly connected to the ends of the main portion 28 of the spreader bar. The auxiliary lengths of spreader bar are identical in arrangement with the main spreader bar and are supplied with hot asphalt solution through gooseneck connections 29, 30 having rotatable unions 31, 32 arranged in the length of the gooseneck, and pipes 33 and 34 connected to pipes 18 and 19 through rotatable unions 35 and 36.

Rotatable unions 31 and 35, are arranged on a common axis and the same is true of rotatable unions 32 and 36, so that either or both auxiliary spreader bars may be swung into a vertical position out of the plane of the main spreader bar. Alternatively, I may use pipes 12 and 13 merely as struts by welding them to the exterior surface of pipes 18 and 19, in either case the whole length of the main and auxiliary spreader bars is filled with hot asphalt solution during operation.

The auxiliary spreader bars 26 and 27 are held when in use, in a straight line with the main spreader bar by vertical posts 37 and 38, welded to pipes 12 and 13 and lengths of chain 37′ and 38′ connected between the tops of the posts and pipes 33 and 34.

When the auxiliary spreader bars are turned upward, they are rotated a little beyond the vertical and supported in this position by the engagement of the goosenecks with the vertical posts.

The valves and spray nozzles fitted therein are shown in detail in Figures 3 and 4. Pads 39 and 40 are welded at intervals to the top and bottom of the square section tube of which the spreader bar is made, a valve body 42 of cylindrical form considerably less in diameter than the interior width of the spreader bar being mounted in axially aligned openings through the pads and the wall of the tube.

The valve body is formed with an outwardly projecting peripheral flange 43 which abuts the lower pad 40 and is correctly positioned by a pin 44 pressed into and projecting from the pad and received in a notch 45 machined in the edge of flange 43.

The upper end of the valve body is exteriorly threaded as indicated at 46 and a flat nut 47 is screwed down on the threaded portion and against the upper pad 39 to draw the valve body upward and hold it securely in place. The valve body is formed with a tapered bore 48 diminishing in radius upwardly, vertically elongated ports 49 being formed through opposite sides of the valve body. The upper end of the valve body is counterbored to provide a recess 50, and the lower end of the body is counterbored to provide a recess 51 which is screw-threaded as indicated at 52.

A valve member 53 is mounted within the valve body, the exterior of the valve member being tapered to fit snugly in the tapered bore of the valve body and terminating at its upper end in a cylindrical operating stem 54, the upper end of the stem being flattened at opposite sides as indicated at 55.

An operating handle 56, formed by bending a strip of metal double, is secured against the flat faces of the stem 54 by a bolt 57 and nut 58, which is not tightened sufficiently to prevent upward pivotal movement of the handle when required. Pivotal movement of the handle is facilitated by rounding off corners 56′, but while in operative position handle 56 extends substantially at right angles to stem 54.

A coil spring 59 is positioned around stem 54 and in recess 50 under compression between the bottom of the recess and a washer 60 positioned on stem 54 between the operating handle and the top of the spring. One action of the spring 59 is to hold the tapered valve in close engagement with the tapered bore in the valve body.

The valve is provided with an interior bore 61 open at its lower end and elongated ports 62 are cut through opposite sides of the wall of the valve and are of the same size and shape as the ports 49 in the valve body, so that when in open position asphalt solution will both flow around the valve body and through the ports in the valve body and valve member and out of the spreader bar through the open end of the valve member. If the valve member is rotated in the valve body sufficiently to bring the valve member ports entirely out of registration with the ports in the valve body, the asphalt solution will be cut off from the interior of the valve member but can continue to flow through the spreader bar around the outside of the valve body.

The open end of the valve body is fitted with a spray nozzle 63, the body of which is screw threaded to fit in the screw threaded recess 51. While spray nozzles of various types may be utilized, I have illustrated a suitable form of nozzle which comprises an enlarged head 64 having a V

notch 65, extending across its face and a small orifice 66, communicating with the passage 67 formed within the body of the nozzle.

The pressure cylinder 23, which operates the valves, is mounted on brackets 68 welded to the back of the spreader bar 10, as shown in Figure 3, and is supplied with pressure fluid through pressure hose 69, 70, connected to opposite ends of the cylinder.

The piston rod 71 of the pressure cylinder is connected by forked head 72 and pin 73 to an arm 74 welded to and depending from a length of T-shaped operating bar 75 sliding in slots machined in plates 76 welded to the back of the spreader bar and acting as supporting brackets. It will be noted that the plates securely guide the bar 75. A piece of plate 77 is welded to the back of the spreader bar to act as a limit stop to arrest outward movement of the piston rod at a position in which the ports in the valve and the valve body are in accurate registration.

A plurality of pins 78 are welded to the vertical web 79 of the bar 75 and the handles 56 of each valve are engaged with the pins, the lower edge of each handle being held against the upper edge of the web 79, which is arranged to be in a plane higher than the pivotal point of each handle with its associated stem 54, by the pressure of spring 59 against washer 60 which is pressed upwardly by the spring against the end of the upwardly sloping handle projecting beyond the bolts 57, and consequently tends to urge the opposite end of the handle downwardly against the edge of the web 79 of the operating bar and is effective to prevent the handles from being jarred off the pins 78.

In order to permit the auxiliary spreader bars 26 and 27 to be turned upward the operating bars 75A and 75B carried on the auxiliary spreader bars are formed separate from the bar 75 mounted on the main spreader bar, but are identical therewith in form and arrangement and when the auxiliary spreader bars are in alignment with the main spreader bars, the operating bars 75A and 75B are connected to the main operating bar by any suitable readily detachable connection, for instance, as indicated in the drawing by U-shaped clips 80 pivoted on the web 79 of bar 75 and engaging over the web of the bars 75A and 75B and secured thereto by pins 81 and 82 passed through aligned holes in the clips and in the webs of operating bars 75A and 75B. When the pins 81 or 82 or both are withdrawn, the auxiliary spreader bars may be swung upwardly without the operation of the valves in the main spreader bar and auxiliary spreader bars are moved to closed position before they are swung upwardly and will remain closed since there is no force acting on their operating handles.

It will be noted that any individual spraying valve may be disconnected from its associated operating member by turning its handle upwardly so that the square end face 56a will rest on washer 60, and by unscrewing nut 47, the valve body, valve member and spray nozzle may be withdrawn from the spreader bar.

The spray nozzles may be readily changed for those of another type when required, since they are screwed into the lower end of the valve body which is positively held against rotation by the pins 44.

The spraying attachment may be quickly put into operative condition before commencing work by circulating the hot liquid through the spreader bar and auxiliary spreader bars for a short while, with the valves closed, the flow of hot liquid around the valve bodies will quickly bring the valves and spray nozzles to operating temperature.

The positive operation of the bar 75 controlling each valve individually by the pressure cylinder 23, actuated by the driver of the truck on which the spraying equipment is mounted, provides ample power to open and close the valves notwithstanding the close fit of the tapered valve members in the tapered bores in the valve bodies, which fit is maintained by the coil springs 59.

While I have specifically described and illustrated an embodiment of the invention at present considered preferably by me, it is to be understood that various changes and modifications of the described embodiments may be made by those skilled in the art without departing from the scope of the invention as intended to be defined by the appended claims.

What I claim is:

1. Liquid spraying apparatus comprising: a tubular spreader bar; a plurality of cylindrical valve bodies extending across the interior of the spreader bar and spaced from opposite sides of said bar to provide passages for liquid around said valve bodies, said valve bodies having tapered bores open at one end; spray nozzles secured at the open end of said valve bodies; tapered valve members fitted in the tapered bore of the valve bodies; the valve members having an inside bore open at the end toward the spray nozzles mounted in the body and closed at the opposite end, said valve bodies and valve members having registrable openings in the walls thereof; operating stems projecting axially from the closed ends of the valve members; handles pivotally mounted on the operating stems; an operating member effective to move the handles of the valve members in unison; and resilient means effective to both hold the valves in sealing engagement with the valve bodies and to normally hold the valve handles engaged with said operating member, the pivotal connection of the handles with the valve enabling any valve to be disconnected from the operating member.

2. In spraying apparatus for hot liquids, such as asphaltic emulsions: a square sectioned conduit for the liquid to be sprayed; spraying means having an apertured elongated tubular valve body mounted in and jacketed by said conduit so that the liquid circulates around and at times through said body; a tubular valve member arranged within the valve body and having apertures in the wall adapted to be brought into and out of alignment with the apertures of the valve body; co-acting sealing surfaces on the valve body and valve member; resilient means effective to maintain the sealing surfaces in contact during operation of the spraying means; a spray nozzle fitted in said spraying means; an operating member for controlling the position of said tubular valve member; said tubular valve body provided with a peripheral abutment around one end of the valve body and adapted to engage against the outside of the conduit; detachable securing means adapted to hold the opposite end of the valve body against the outside of the opposite side of the conduit to that engaged by the peripheral abutment; an operating stem projecting from said tubular valve; an operating handle pivotally secured to said stem and urged by said resilient means to extend normally to said resilient means in a position extending axially of the valve to enable said valve body to

be removed from the conduit after removal of the detachable securing means.

3. In spraying apparatus for hot liquids, such as asphaltic emulsions: a square sectioned conduit for the liquid to be sprayed; a plurality of spraying means arranged along said conduit, each spraying means having an apertured elongated tubular valve body mounted in and jacketed by said conduit so that the liquid circulates around and at times through said body; a tubular valve member arranged within the valve body and having apertures in the wall adapted to be brought into and out of alignment with the apertures of the valve body; co-acting sealing surfaces on the valve body and valve member; resilient means effective to maintain the sealing surfaces in contact during operation of the spraying means; a spray nozzle fitted in said spraying means; an operating member for controlling the position of said tubular valve member; an operating stem projecting from each

valve member; an operating handle pivotally secured to each stem and urged by said resilient means to extend normally to said stems; and an operating member common to said valves and detachably connected to said operating handles when the latter are in normal position whereby the valves may be operated in unison but any valve handle may be disconnected from said operating member by moving said handle against the effort of said spring to enable the associated valve to be independently operated.

PAUL E. JONES.

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