Feb. 22, 1944. H. A. CARTWRIGHT 2,342,120

SPRAY BAR FOR DISTRIBUTING BITUMINOUS AND LIKE MATERIALS

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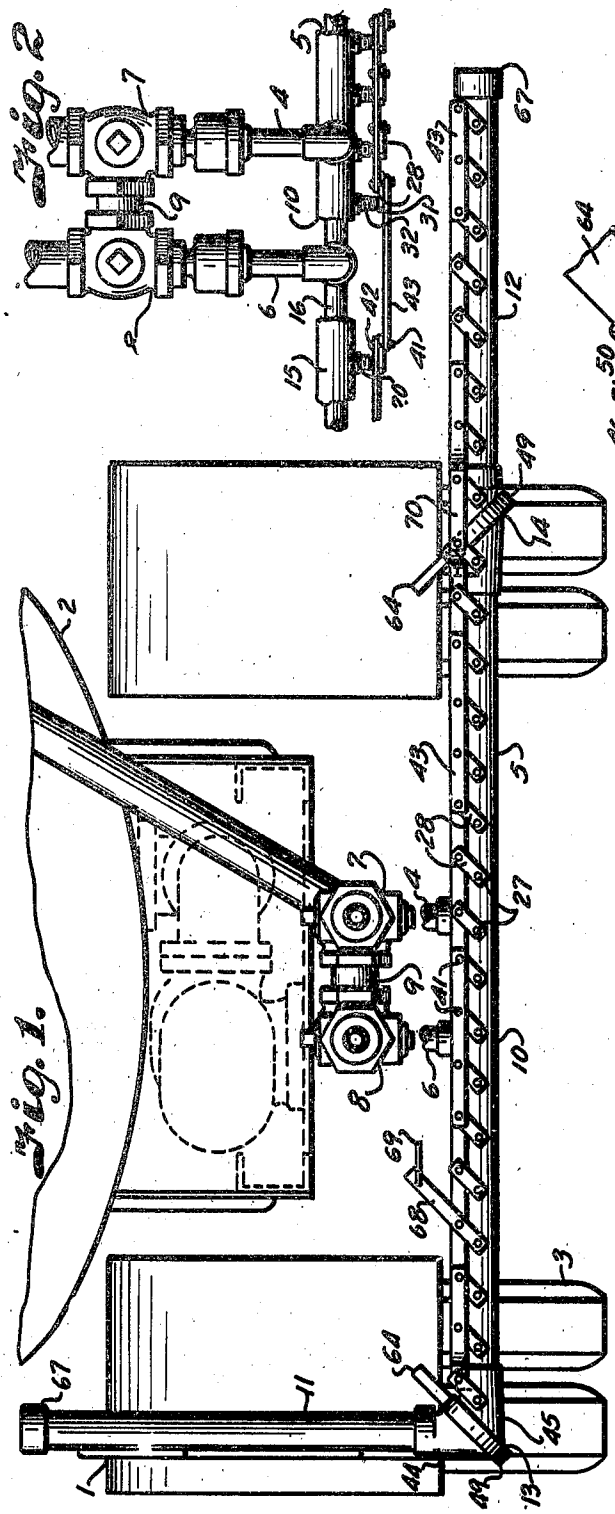


Fig. 1.

Fig. 2.

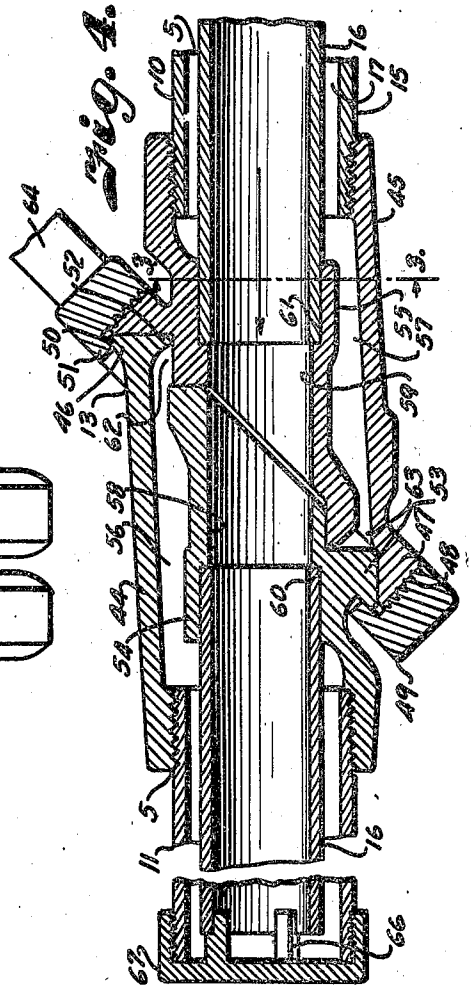


Fig. 4.

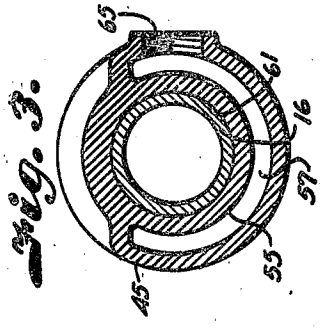


Fig. 3.

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Fig. 6.

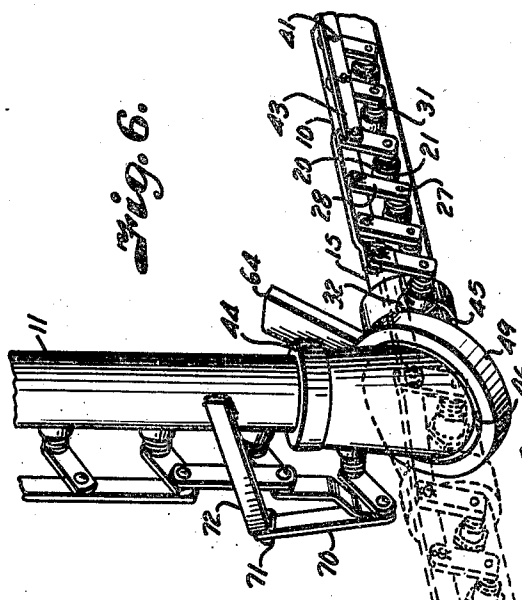


Fig. 7.

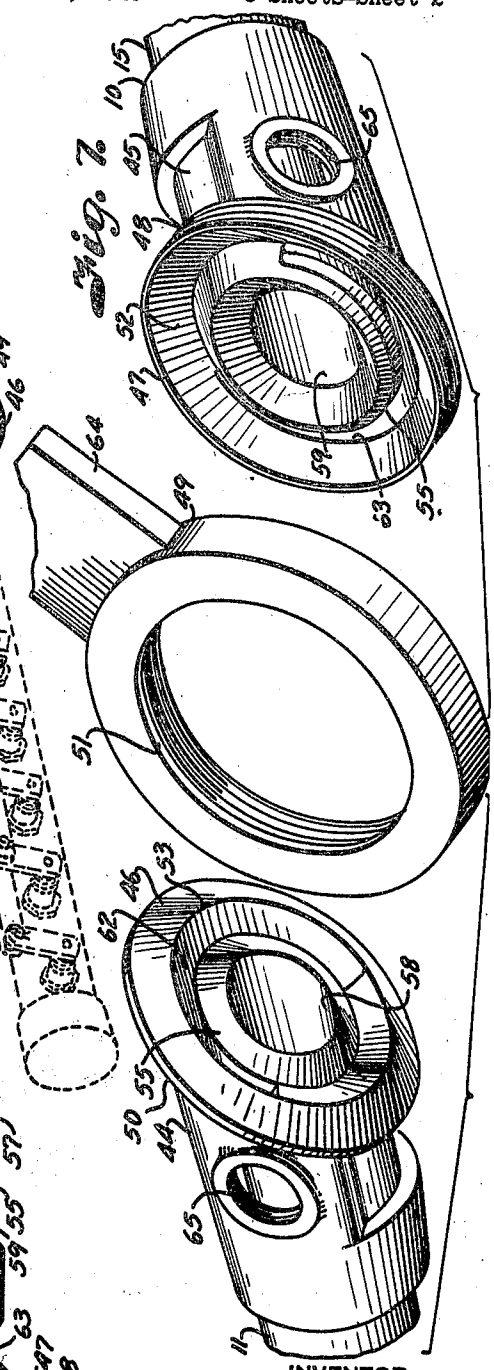
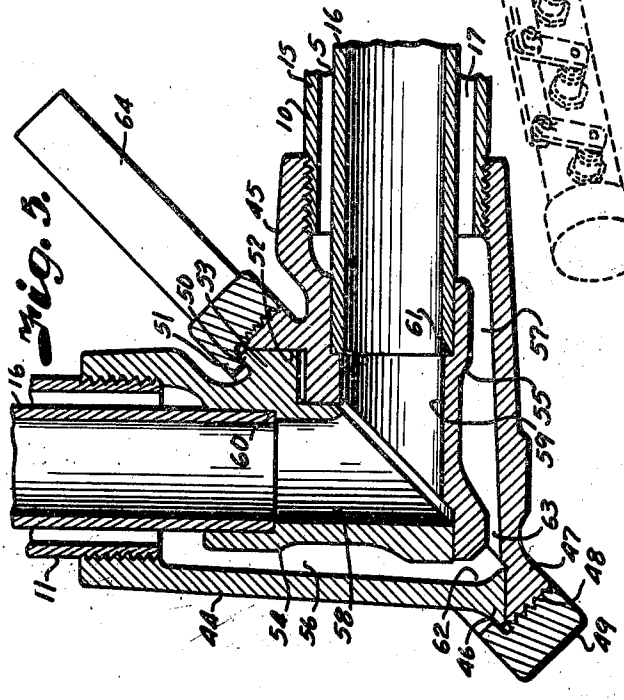


Fig. 5.

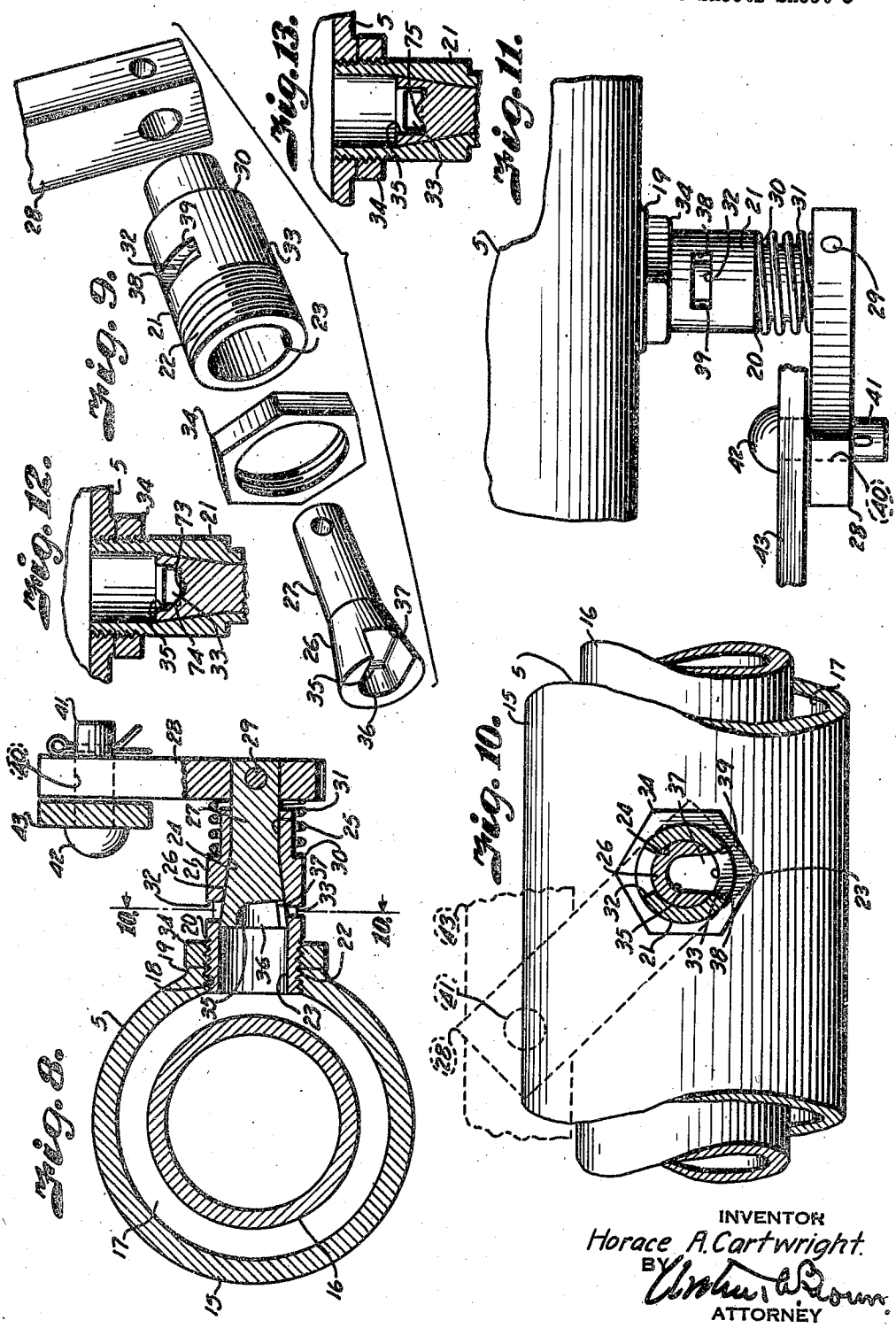


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SPRAY BAR FOR DISTRIBUTING BITUMINOUS AND LIKE MATERIALS

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UNITED STATES PATENT OFFICE

2,342,120

SPRAY BAR FOR DISTRIBUTING BITUMINOUS AND LIKE MATERIALS

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Application January 22, 1940, Serial No. 315,056

10 Claims. (Cl. 299—34)

This invention relates to spray bars for distribution of bituminous materials used in road construction and maintenance work, and has for its principal object to provide a circulating spray bar capable of efficiently handling heavy viscous materials.

Another object of the invention is to provide a circulating spray bar having end sections connected with a central section by simple and reliable hinge joints which coordinate with the spray mechanism of the bar for facilitating transposition of the end sections to and from travelling and operating positions without loss of time and inconvenience.

Further objects of the invention are to provide the bar with spray nozzles capable of effecting positive cut-off of the spray material; to provide spray nozzles which are self-clearing of material that becomes set in the jet orifices thereof, thereby avoiding skipping of the nozzles; to provide means for retaining the valves of the end sections closed when the end sections are raised to travelling position; to provide a hinge joint designed for continuing circulation through the end sections when in travelling position; to provide a rotary type of valve wherein circulation of heated material is maintained up to the point of cut-off; and to provide a valve with differentially sized ports which may be selectively used, depending upon the character of the coating material or the amount of coverage desired.

It is also an object of the invention to provide control valves having special shaped passages whereby the sprays may have lean or rich centers.

In accomplishing these and other objects of the invention, as hereinafter described, I have provided improved details of structure, the preferred form of which is illustrated in the accompanying drawings, wherein:

Fig. 1 is a rear elevational view of a portion of a distributing machine equipped with a spray bar embodying the features of the present invention, one of the end sections of the spray bar being shown in travelling position and the other in spraying or distributing position.

Fig. 2 is a plan view of the circulation control valves.

Fig. 3 is a cross-section on the line 3—3 of Fig. 4.

Fig. 4 is an enlarged section through one of the hinge joints.

Fig. 5 is a similar section through the hinge joint showing position of the parts when the end section is moved to travelling position.

Fig. 6 is a fragmentary perspective view of the hinge joint and adjacent ends of the spray bar sections showing the joint when the end section is in travelling position in full lines and in spraying position in dotted lines.

Fig. 7 is a detail perspective view of the parts of one of the hinge points shown in disassembled spaced relation.

Fig. 8 is a cross-section through the spray bar particularly illustrating the spray valve construction.

Fig. 9 is a detail perspective view of parts of one of the spray valves shown in disassembled spaced relation.

Fig. 10 is a cross-section through the valve and spray ports on the line 10—10 of Fig. 8.

Fig. 11 is a plan view of a portion of the spray bar and one of the spray valves.

Fig. 12 is a view of a spray valve designed for producing a spray having a rich center.

Fig. 13 is a similar view of a spray valve for producing a lean center.

Referring more in detail to the drawings:

1 designates a machine for distributing bituminous material on a road under construction or in the maintenance thereof. The machine includes a tank 2 for containing material to be distributed and which is carried on the chassis of a motor truck indicated by the wheels 3. The tank 2 is provided with a heater (not shown) so that the material is kept in heated condition and capable of free flow under pump pressure through a pipe 6 to a spray bar 5, circulated through the spray bar, and returned to the tank through a pipe 4. The pipes 4 and 6 are provided with three-way valves 7 and 8 respectively, having interconnection through a nipple 9 so that when material is being circulated from the tank through the bar, the valves 7 and 8 are set to provide flow through the respective pipes to and from the tank, and when the spraying operation is to be started the valves 7 and 8 are adjusted to provide flow to the spray bar through both pipes.

The spray bar 5 is suitably supported transversely at the rear of the truck and includes a horizontally arranged central section 10, and end sections 11 and 12 which are hingedly connected to the ends of the central section by hinge joints 13 and 14 to provide full width coverage of a roadway when the end sections are extended, and to provide clearance when the end sections are moved to vertical position as when the truck is travelling along a highway to and from the site of operation. Each spray bar section includes an outer pipe 15, Fig. 4, having an axially

arranged inner pipe 16 of smaller diameter than the inner diameter of the outer pipe to provide a flow passageway 17 therebetween. Formed in the rear sides of the outer pipes is a series of threaded openings 18, Fig. 8, which extend through lateral bosses 19. Threaded in the openings 18 are spray valves 20, each including a cylindrical body 21, having external threads 22 to receive the threads about the openings 18 and provided with axial valve chambers 23.

The valve chambers 23 are of cylindrical form at their inlet ends and have central conical seats 24 terminating in reduced cylindrical bearing portions 25. Engaging the conical seats are conical shaped valve heads 26 having stems 27 rotatable in the bearing portions 25. The valve stems form the valve bodies and carry actuating levers 28. The actuating levers 28 are fixed to the stems of the valves by pins 29 extending therethrough as shown in Fig. 8. The exterior of the valve housings have similarly reduced portions to form annular seats 30 for springs 31, having their opposite ends bearing against the levers 28 to retain the conical heads 26 of the valves in sealing engagement with the conical seats 24 of the bores.

Formed at opposite diametrical sides of the valve bodies are arcuate slots 32 and 33, Fig. 10, having different widths, either one of which may be turned downwardly to provide a spray outlet orifice for the coating material. For example, in Fig. 8 the narrower slot is being utilized as the effective spray outlet and the wide slot is closed by the conical head of the valve. The valve bodies are retained in selected position by lock nuts 34 that are threaded thereon and drawn against the faces of the bosses 19 as shown in Fig. 8. Formed in the heads 26 of the valves are passageways 35 having inlets 36 coaxially of the end faces of the valves and having outlets 37 opening radially through the conical faces of the heads to connect with the selected spray ports as shown in Fig. 8. The terminal edges 38 and 39 of the respective slots are bevelled outwardly so that any material which may set therein is readily blown out when the valve is opened. The free ends of the levers 28 are provided with openings 40 to receive the shanks 41 of studs 42 projecting from links 43. The links are preferably arranged so that they connect the valves in groups, with the ends of adjacent links for each group connected together through common mounting on one of the shanks 41, as shown in Fig. 6.

The hinge joints 13 and 14 are of the same construction and are best illustrated in Figs. 4 to 7 inclusive so that the same description and numerals may be applied to either of the joints. As shown in Fig. 4, a hinge joint includes mating tubular sections 44 and 45 having angularly arranged abutting flanges 46 and 47, one of which, for example the flange 47, has the periphery thereof provided with external threads 48 to mount a ring-like nut 49. The other flange forms a shoulder 50 which is engaged by an inwardly directed annular flange 51 on the nut to retain the sections in assembled condition. In order to enhance the seal between the flanges, the flange 47 has an annular V-shaped groove 52 to seat an annular rib 53 on the other flange, as clearly shown in Fig. 4.

Concentrically supported in the tubular bodies of the sections are inner walls 54 and 55, spaced from the outer walls of the sections to provide passagesways 56 and 57 therebetween having direct communication with the annular passageways 17 of the connected bar sections. The inner walls form registering passages 58 and 59 conforming in diameter to the inner diameter of the inner pipes 16, the ends of the pipes being supported in sockets 60 and 61. It is thus obvious that the inner pipes 16 directly communicate with one another through the center of the hinge joint, and the passageways 17 connect with each other through arcuate ports 62 and 63 formed in the flanges 46 and 47 as best shown in Figs. 5 and 7.

For convenience in loosening or tightening of the ring-like nut, it is preferably provided with a lever arm 64 that is extended radially therefrom as shown in Fig. 5. In order that the spray valves may be substantially uniformly spaced along the length of the spray bar, each section of the hinge joint is provided with a threaded opening 65, Figs. 3 and 7, to receive one of the spray valves. When the end sections are in extended position, shown in dotted lines, Fig. 6, and at the right-hand side of the illustration in Fig. 1, the adjacent links are coupled together so that the valves in the end sections are operated simultaneously with the valves of the center section. The outer ends of the inner pipe 16 terminate short of the outer pipe of the end sections so as to connect with the passageway 17, as shown in Fig. 4, the ends of the pipes being preferably centered within the outer pipes by means of lugs or similar spacers 66 which may be carried by a cap 67 closing the ends of the outer pipes. The links may be reciprocated to effect opening and closing of the valves by any suitable mechanism, for example, one of the lever arms may be provided with an extension 68, Fig. 1, to which a control cable or rod 69 may be connected. When the end sections are moved to vertical position the links 70, which connect the valves in the sections of the hinge joint, are disconnected and connected by pins 71 with brackets 72 fixed to the end sections of the spray bar as clearly shown in Fig. 6, in which position the valves are retained closed so that circulation may continue through the end section of the bar and the valves controlling the central section may be opened to discharge the material, or these valves may be independently closed through operation of the control mechanism.

In operation, the bituminous material is pumped from the tank under pressure, the valves 7 and 8 being adjusted so that flow from the pump is delivered to both the inner pipes and the annular passageway 17 of the spray bar sections, and thence out the nozzles onto the road. When it is necessary to maintain circulation of the material through the bar, the valve 8 is open to discharge the material into the inner pipe 16 and the valve 7 is set so that the line 4 is open to return the material to the tank, the nozzles remaining closed. Since the bituminous material is usually obtained at a central station and conveyed to the site of the work, the end sections of the spray bar are moved to travelling position. This is effected by disconnecting the links 70, loosening the nuts 49, and swinging the bars 11 and 12 to vertical position as shown at the left-hand side of Fig. 1. Upon retightening of the nuts 49, the end sections are clamped in travelling position so that the bituminous material may be circulated through the end sections during travel of the vehicle to the site of the work. When heating the material in the tank and when loading, the valve 8 is adjusted to close flow to

the pipe 6 and the valve 7 is adjusted to connect the pipe 9 with the pipe returning to the tank. When the place of operation is reached, the nuts 49 are loosened to return the end section of the spray bar to horizontal position, whereupon the nuts are again tightened and the links 70 are reconnected. The valves 7 and 8 are then set so that the material is discharged under pump pressure through both pipes 4 and 6, and the valves are opened simultaneously by rocking the levers 28 to bring the outlet ports of the passageways into registry with the lower slots, for example 33. The material is then discharged through the slots onto the roadway. When the arms are swung in the opposite direction, the ports in the valves are moved out of registry with the slots to cut off the flow. Since the flow is cut off directly at the inlet of the slots, the only material that can set up would be that remaining in the slots, but due to the shape of the slots this material is readily discharged when the valves are again opened. If it is desired to increase the amount of material to be applied to the rod, the jam-nuts 34 may be loosened and the entire valve bodies rotated so that the larger slots 32 are facing downwardly, after which the jam-nuts 34 are tightened to retain the valve bodies in the selected position.

In some work it may be desirable to have more material discharged at the center of the sprays. This is effected as shown in Fig. 12 by shaping the passageway 35 so that the central portion 73 thereof is effective to open the slots while the ends of the slots are covered or partially covered as shown at 74 in Fig. 12. Similarly, the passageways in the valve may be shaped to provide lean centers by forming a ridge 75 in the center of the passageway so that the ends of the slots are open while the central portion is covered or partially covered as shown in Fig. 13.

From the foregoing it is obvious that I have provided a spray bar having hinged end sections connected by simple hinge joints that are readily movable to and from their respective positions and which movement is readily effected without disconnecting the joints.

What I claim and desire to secure by Letters Patent is:

1. In a spray bar of the character described, a fixed section, a movable section, a hinge coupling connecting said sections, spray valves carried by the sections having operating levers, links interconnecting said levers, a bracket on the movable section, and means for connecting a selected link with said bracket to retain the spray valves on the movable section in closed position when the movable section is hinged relatively to the fixed section.

2. In a spray bar of the character described, a bar section comprising concentrically arranged pipes, means closing the ends of said pipes collectively and establishing communication therebetween, means for supplying one of said pipes with material to be dispensed, means in the outermost pipe for dispensing said material, means for folding a portion of said section relative to another portion thereof, and means in said folding means for maintaining communication between the respective pipes of the respective portions regardless of angular positions thereof.

3. In a spray bar of the character described, fixed and movable bar sections having means for dispensing material supplied thereto therefrom, a hinge joint, and means in the hinge joint connecting said sections in coaxial relation in one position of said joint and in angular relation in another position thereof.

4. A spray bar of the character described including, intermediate and end sections, each comprising inner and outer pipes, means for pivotally mounting said end sections on the ends of the intermediate sections for movement to selected angularly arranged positions, said pivotal mounting means having passages therein for maintaining communication between the respective pipes of the respective sections regardless of the angular positions thereof, supply and return conduits connected to the respective pipes intermediate their ends for producing circulatory flow through said pipes of material to be dispensed, and means in the outermost pipe for dispensing said material.

5. A spray bar of the character described including a pair of bar sections each including inner and outer coaxially arranged pipes, and hinge means operatively connecting said sections and having abutting faces of such angularity that when one of the sections is in the extended position, the pipes of it are coaxial with the pipes of the other section.

6. A spray bar of the character described including a pair of bar sections each including inner and outer coaxially arranged pipes, hinge means operatively connecting said sections and having abutting faces of such angularity that when one of the sections is in the extended position, the pipes of it are coaxial with the pipes of the other section, and sockets in said hinge means retaining said inner pipes in coaxial relation with the outer pipes.

7. A spray bar of the character described, including a pair of bar sections comprising inner and outer pipes, hinge means having angularly arranged mating conical seats for the respective inner and outer pipes of the bar sections, said conical seats on the respective hinge means of the bar sections being rotatable relative to each other for connecting respective bar sections for pivotal movement to selected angularly arranged positions, means closing the ends of the outer pipe and establishing communication between said pipes for circulation of material to be dispensed therebetween, means for supplying one of said pipes with material to be dispensed, and means in the other pipe for dispensing said material.

8. In a spray bar, the combination of a pair of pipe sections each comprising inner and outer coaxially arranged pipes, a hinge coupling for pivotally connecting the respective pipe sections and including members connected to the adjacent ends of said pipe sections having abutting angularly arranged flanges at the ends of said members, mating conical seats in the flanges for the respective inner and outer pipes and a coupling nut threaded on the flange of one member and provided with an inwardly extending shoulder engaging the flange of the other member to retain said seats in respective seating alignment, said coupling members having passages therein for establishing communication between the respective inner and outer pipes of the section.

9. In a spray bar, the combination of a pair of pipe sections each including inner and outer coaxially arranged pipes, a hinge coupling including members on each section having angularly arranged seating faces, and means holding said faces in sealing engagement and rotatable relative to each other for pivotaing the pipe sections to selected relative angles, said coupling members having communicating passages for estab-

lishing flow through the respective inner and outer pipes at any selected angular position of the sections.

10. In road spraying apparatus and the like, a relatively stationary spray bar section, a relatively movable spray bar section, means in said sections for providing separate longitudinally arranged inlet and outlet chambers therein, a pivot element connecting said spray bar sections, said pivot element having a pair of fluid conduits therein, one of said conduits being in communication with the inlet chambers of said spray bar sections in all positions of said relatively movable section, and said pivot element having the other fluid conduit therein in communication with said outlet chambers in all positions of said relatively movable spray bar section.

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