United States Patent

Wiens

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[54] BITUMEN SPRAY AND TRANSFER WITH MASTER CONTROL

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[52] **U.S. Cl.**.....**239/112**, 239/127, 239/159

[51] **Int. Cl.**.....**B05b 15/02**

[58] **Field of Search**.....239/127, 128, 130, 131, 135, 239/139, 170, 159, 112, 124, 125; 94/44; 137/599.1

[56] **References Cited**

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[57] **ABSTRACT**

A generally conventional tank truck with heater and spray bar is equipped with valve manifolds and valves and a flush tank and external coupling connections and has a master control with valve actuating means which are preferably operated in desired bitumen circuit combinations by fluid pressure to perform a variety of operations other than merely spraying bitumen through the spray bar onto a highway.

12 Claims, 5 Drawing Figures

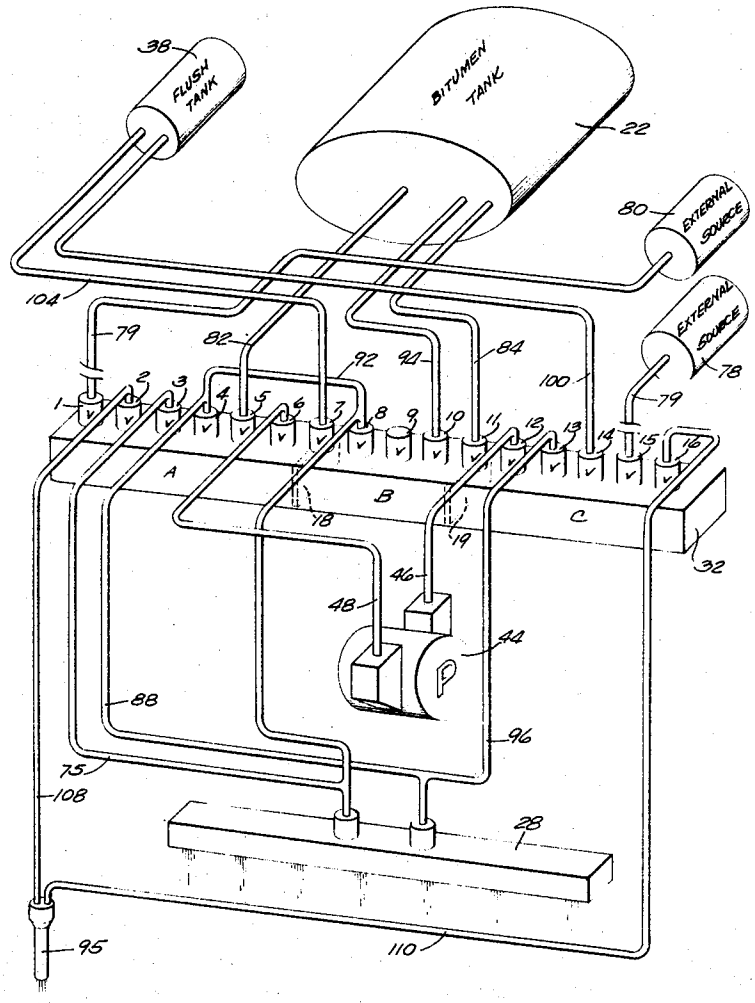

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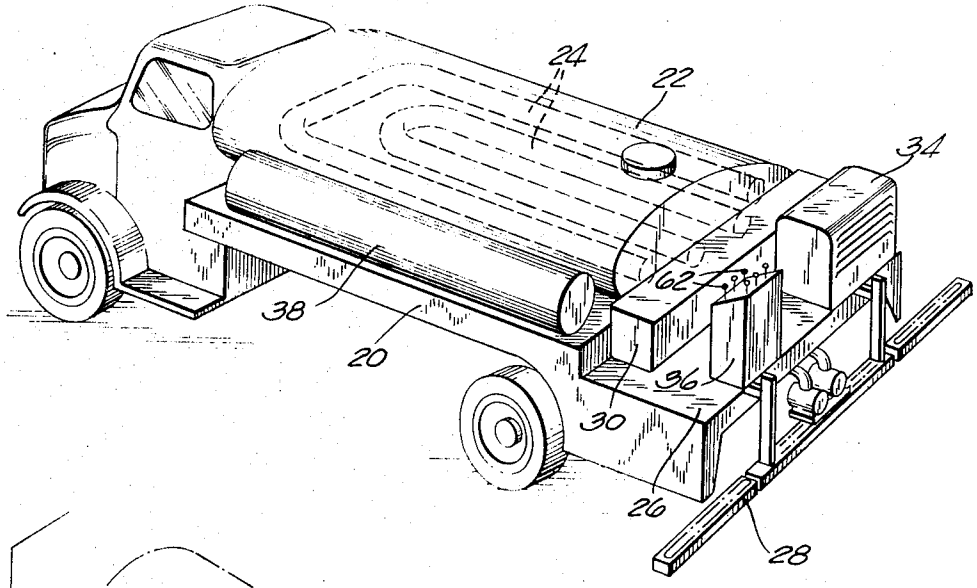
Fig. 1



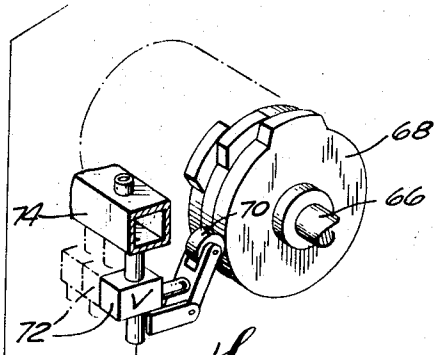


Fig. 4

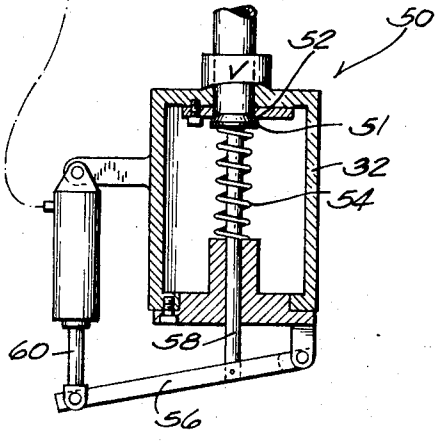


Fig. 5

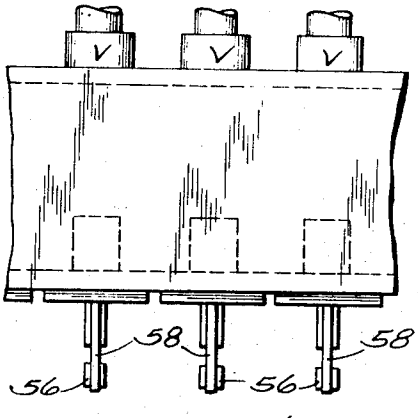


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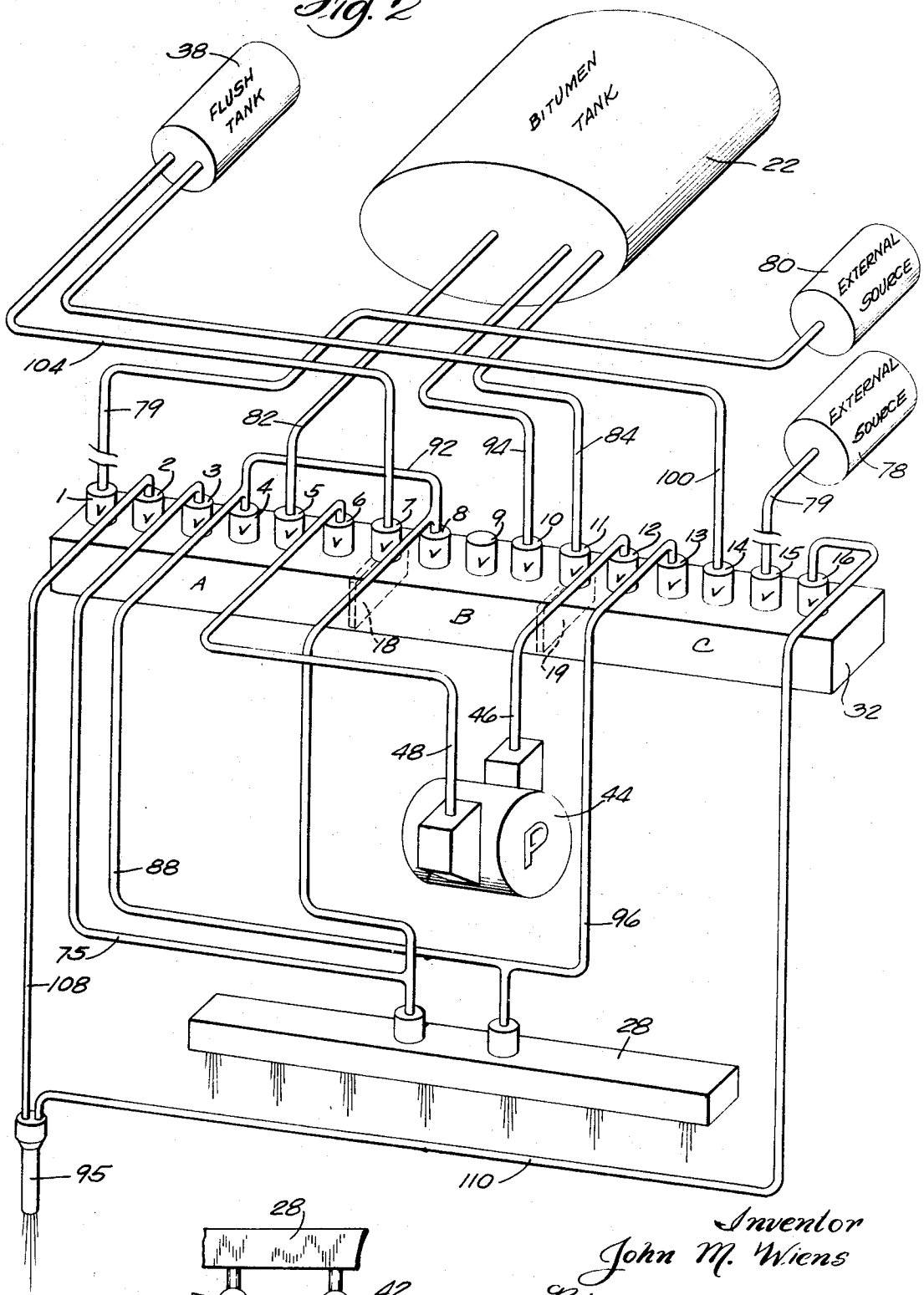
Fig. 2



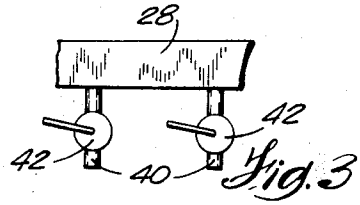


Fig. 3

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BITUMEN SPRAY AND TRANSFER WITH MASTER CONTROL

BACKGROUND OF THE INVENTION

The ordinary bitumen sprayer is capable of limited functions and has valves independently manually operated with the result that there is considerable labor involved and extensive servicing required for maintenance.

SUMMARY OF INVENTION

A master control and a large number of valves operable in accordance with this invention reduces labor and increases the work capacity of a truck of this character, at the same time eliminating much of the previous servicing made necessary by lapse of time between spraying operations and flushing and the like. To avoid the fouling of electrical contacts, the use of fluid pressure rather than electricity is preferred for the operation of the many valves required. In any case the concentration of the controls and the immediacy with which they can be actuated permits the valves and bar to be maintained warm by recirculation of the heated bitumen from the supply tank and permits the entire system or selected parts thereof to be flushed immediately as needed. It also makes conveniently possible pumping to or from external sources either to transfer bitumen from one tank to another or to fill or empty the tank truck system.

BRIEF DESCRIPTION OF DRAWINGS

In the drawings, which are largely diagrammatic,

FIG. 1 is a view in perspective of a truck equipped in accordance with this invention.

FIG. 2 is a diagram of the piping and valve connections.

FIG. 3 is a detail of individually valved spray nozzles depending from the spray bar.

FIG. 4 is a fragmentary diagram partially in perspective and partially in section showing a master cam and one of the valves actuated thereby.

FIG. 5 is a diagrammatic elevational view of the valve manifold shown in FIG. 4.

DETAILED DESCRIPTION

In many respects, the vehicle **20** is conventional. It has a main bitumen tank **22** provided internally with heating coils **24**. Behind the tank there is a platform at **26** from which brackets support a spray bar **28**. For purposes of the present invention, I provide immediately behind the tank a housing **30** for a manifold **32**. Behind that is an engine **34** and a master control center **36**. Elsewhere on the vehicle is the flush tank **38** within which is solvent liquid for cleaning the system.

In accordance with conventional practice, the spray bar **28** has depending nozzles at **40**. It is preferred that these be provided with valves **42** as diagrammatically illustrated in FIG. **3**. These may be linked mechanically for simultaneous operation if desired.

Pump **44** is power operated. It has an inlet pipe **46** and a delivery pipe **48**. The valve manifold **32** is divided by partitions **18** and **19** into chambers A, B and C. It is provided with valves which are numbered from **1** to **16** in FIG. **2**. A typical valve is shown at **50** in FIG. **4**. There is a seat at **52** at the top of the manifold **32** and the valve plug **51** is urged to this seat by a compression spring **54**. It may be retracted, in the FIG. **4** construction, by a lever **56** pivoted to the valve stem **58** and to a fluid operated ram **60**. Control levers **62** on the top of the control center cabinet **36** (FIG. **1**) may be used for the individual energization of the respective rams but it is preferred to use the construction shown in FIG. **4** whereby the control shaft **66** carries cams **68** which displace cam followers **70** to operate the respective valves **72** which control the supply of pressure fluid from manifold **74** to the respective rams. The fluid may be either liquid or gas such as air. It will be apparent that according to the connections from the cam operated valves **72** to their respective rams it will be possible for each cam to open and close one or more rams selectively according to the position of the control shaft **66**.

The various connections are shown diagrammatically in FIG. **2**. Subject to the control of the valve **12**, the chamber C may communicate with the inlet pipe **46** of pump **44**. Subject to the control of valve **6**, the outlet pipe **48** provides communication between the pump and chamber A. The other pipes and the valves controlling them can best be described in connection with the following summary of the operations which can be and are performed by the structure disclosed.

a. Bitumen can be pumped from the external source **78** into the heated bitumen tank **22**. For this purpose, the external source is connected through pipe **79** subject to the control of valve **15** with the chamber C which, as above noted, has connections controlled by valve **12** through inlet pipe **46** to the pump **44**. From pump **44** the bitumen passes through discharge pipe **48** subject to the control of valve **6** in the chamber A. It issues therefrom subject to the control of valve **5** to pass through pipe **82** to the heated tank **22**.

b. Bitumen pumped from source tank **78** may be discharged to another external storage such as tank **80** without entering the heated tank **22**. The bitumen passes into chamber A as above described and issues therefrom through valve **1** to traverse pipe **79** leading to the receiving tank **80**.

c. The manifold **32** can be warmed to prevent the bitumen from congealing therein by pumping bitumen from the heated tank **22** back to the heated tank without admitting any of such bitumen to the spray bar. This is done by opening valve **11** to connect the heated tank **22** through pipe **84** with chamber C, through which the bitumen passes via valve **12** and inlet pipe **40** to the pump **44**. From the pump **44** the bitumen passes through pipe **48** and valve **6** to the chamber A, returning through valve **5** and pipe **82** to the heated tank **22**.

d. For the purpose of preventing the bitumen from congealing in the spray bar **28**, the bitumen heated in tank **22** may be circulated through the spray bar and back to tank **22**. The connection to the pump and thence to chamber A has already been described. It involves valves **11** and **12** and **6**. From chamber A, flow occurs subject to valve **3** to the spray bar **28** through pipe **75**. From spray bar **28**, the bitumen returns through pipes **88** and **92** and, subject to the control of valve **8**, to reach chamber B. From this chamber, bitumen passes subject to control of valve **10** through pipe **94** back to the heated tank **22**.

e. For the purpose of emptying the tank **22**, the bitumen may be pumped from such tank to an external receiving tank such as that shown at **80** without entering the spray bar. The opening of valve **11** admits flow from the heated tank **22** into chamber C. Thence the bitumen passes through valve **12** and pump inlet pipe **46** to the pump. The discharge through the pipe **48** subject to the control of valve **6** delivers the bitumen into chamber A. Opening valve **1** permits the bitumen to flow from chamber A through pipe **79** to the receiving tank **80**.

f. In normal use, the bitumen is pumped from heated tank **22** to the spray bar **28** and discharged through the nozzles **40**. This is done by permitting flow through pipe **84** subject to the control of valve **11** into chamber C and thence subject to control of valve **12** through inlet pipe **46** to the pump. The bitumen discharged by the pump through pipe **48** passes subject to the control of valve **6** into chamber A. It issues from chamber A subject to the control of valve **3** which communicates through pipe **75** with spray bar **28**. It will be assumed that the nozzle valves **42** are open to permit the spraying of the bitumen, and that there are no valves open to permit return of the bitumen from the spray bar.

g. A hand spray attachment comprises a manually operable nozzle **95** through which bitumen can be ejected. The heated bitumen reaches chamber A of the manifold in the manner already described. Subject to the control of valve

2, the bitumen passes through a hose **108** to the hand-held spray nozzle **95** from which the bitumen is required to be discharged, since the return pipe **110** is not available, valve **16** being closed.

h. In order to leave the apparatus reasonably clean, the bitumen can be withdrawn from the spray bar and the hand nozzle **95** and all piping and returned to the bitumen tank. This is done by opening valves **16, 13, 6** and **5** whereby bitumen returned through hose **110** and pipe **96** from the hand nozzle and the spray bar will be received into chamber C and delivered through valve **12** and inlet pipe **40** to the pump and discharged through pipe **48** and valve **6** to chamber A and thence through valve **5** and pipe **82** back to the tank **22**.

i. A flushing solvent which may comprise oil or the like stored in tank **38** can be pumped through the piping and the spray bar and returned to the flush tank **38** without entering the bitumen tank **22**. This is done by opening valve **14** to provide communication through pipe **100** between the flush tank **38** and chamber C. From chamber C, the flushing liquid is passed through open valve **12** and inlet pipe **46** to the pump and thence via pipe **48** and open valve **6** to chamber A and thence through valve **7** and pipe **104** back to the flush tank **38**. By opening the valves **2** and **3** from chamber A, portions of the flushing liquid will pass via hose **108** to the hand nozzle **95** returning through pipe **110** to chamber C; other portions will pass through pipe **75** to the spray bar **28** returning through pipe **96** and valve **13** to chamber C. From chamber C the return path will be as already described whereby the flushing oil will be delivered back to tank **38**.

j. Bitumen may be withdrawn from the hand nozzle **95** and associated piping and returned to the storage tank **22** independently of the flushing operation above described. For this purpose, valve **16** is opened so that the bitumen can go from nozzle **95** through the hose **110** to the collecting chamber C, thence passing through valve **12** and inlet pipe **46** to the pump and being discharged through pipe **48** and valve **6** to chamber A from which bitumen emerges through valve **5** to return via pipe **112** to the tank **22**.

I claim:

1. In combination, a vehicular mounted bitumen tank and spray nozzles, a multiple chamber manifold located externally of said bitumen tank and having partitions separating said chambers, a bitumen pump, a plurality of bitumen circuit connections connected to said pump and said manifold chambers, and said circuit connections for controlling flow through said connections, and means providing a control station and having means for selectively opening and closing said valves for controlling from said station the flow of bitumen through said pump and selected circuit connections.

2. A combination according to claim **1** in which said tank is provided with bitumen heating means.

3. A combination according to claim **2** in which the circuit connections to the several nozzles include a spray bar on which the nozzles are mounted, and pipes subject to the control of said valves communicating between the manifold chambers and the pump and spray bar and tank.

4. In combination, a vehicular mounted bitumen tank and spray nozzles, a bitumen pump, a plurality of bitumen circuit connections, a plurality of valves controlling flow through said connections, and means providing a control station and having means for selectively opening and closing said valves for controlling from said station the flow of bitumen through said pump and selected circuit connections and in which the circuit connections to the several nozzles include a spray bar on which the nozzles are mounted and a manifold having a plurality of chambers equipped with the said valves, and pipes subject to the control of said valves communicating between the manifold chambers and the pump and spray bar and tank and, further including a vehicular mounted flush tank having circuit connections to respective chambers, the said valves and circuit connections providing for circulation of the flushing liquid through said chambers and spray bar.

5. A combination according to claim **3** in which certain of said chambers have connections for external bitumen tanks adapted respectively to supply and receive bitumen to and from said first mentioned bitumen tank.

6. A combination according to claim **3** in further combination with a manually operable spray nozzle having flexible hoses connecting it with respective chambers for the flow and retraction of bitumen.

7. In combination, a vehicular mounted bitumen tank and spray nozzles, a bitumen pump, a plurality of bitumen circuit connections, a plurality of valves controlling flow through said connections, and means providing a control station and having means for selectively opening and closing said valves for controlling from said station the flow of bitumen through said pump and selected circuit connections and in which the circuit connections to the several nozzles include a spray bar on which the nozzles are mounted and a manifold having a plurality of chambers equipped with the said valves, and pipes subject to the control of said valves communicating between the manifold chambers and the pump and spray bar and tank, and in which the means for selectively opening and closing said valves comprises fluid operable rams connected with respective valves and means at said control station for controlling actuation and retraction of said rams.

8. A combination according to claim **7** in which said last mentioned means comprises a rotor having a plurality of cams mounted thereon, and cam followers having control means extending operatively therefrom to the respective rams.

9. A combination according to claim **3** in which one of said chambers constitutes a collecting chamber from which a pipe leads to said pump and another of said chambers constituting a distributing chamber to which a pipe leads from said pump.

10. In combination, a vehicle, a bitumen tank and a multiple chamber manifold mounted on the vehicle said manifold having first, second and third separate chambers, a pump also mounted on the vehicle and having an inlet connected with one of the chambers of the manifold and an outlet connected with another chamber of the manifold, a spray bar also mounted on the vehicle and provided with a plurality of bitumen spray nozzles, a flush tank mounted on the vehicle and adapted to carry a system flushing liquid, pipes providing connections between the bitumen tank and said first, second and third chambers of the manifold and between the flush tank and said second and third chambers of the manifold and between the spray bar and said first, second and third chambers of the manifold, and a pump having an inlet connected with said third chamber and an outlet connected with said first chamber, valve means controlling the flow of bitumen and flushing liquid between said chambers and spray bar and pump and bitumen tank, and centralized means for the actuation of said valves.

11. A combination according to claim **10**, together with means for heating the bitumen in the bitumen tank, said connections and valve actuation means including means for circulating heated bitumen from the bitumen tank through the manifold chambers and the pump and the manifold, independently of said spray bar.

12. In combination, a vehicular mounted bitumen tank and spray nozzles, a multiple chamber manifold having partitions separating said chambers, a bitumen pump, a plurality of bitumen circuit connections connected to said pump and said manifold chambers, a battery of valves arranged in an array on each of said chambers and communicating with each of said manifold chambers and said circuit connections for controlling flow through said connections, and means providing a control station and having means for selectively opening and closing said valves for controlling from said station the flow of bitumen through said pump and selected circuit connections.

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