Sept. 26, 1961 H. A. CARTWRIGHT 3,001,720

HEADER CONSTRUCTION FOR SPRAYING EQUIPMENT

Filed Aug. 11, 1958 5 Sheets-Sheet 1

Fig. 1

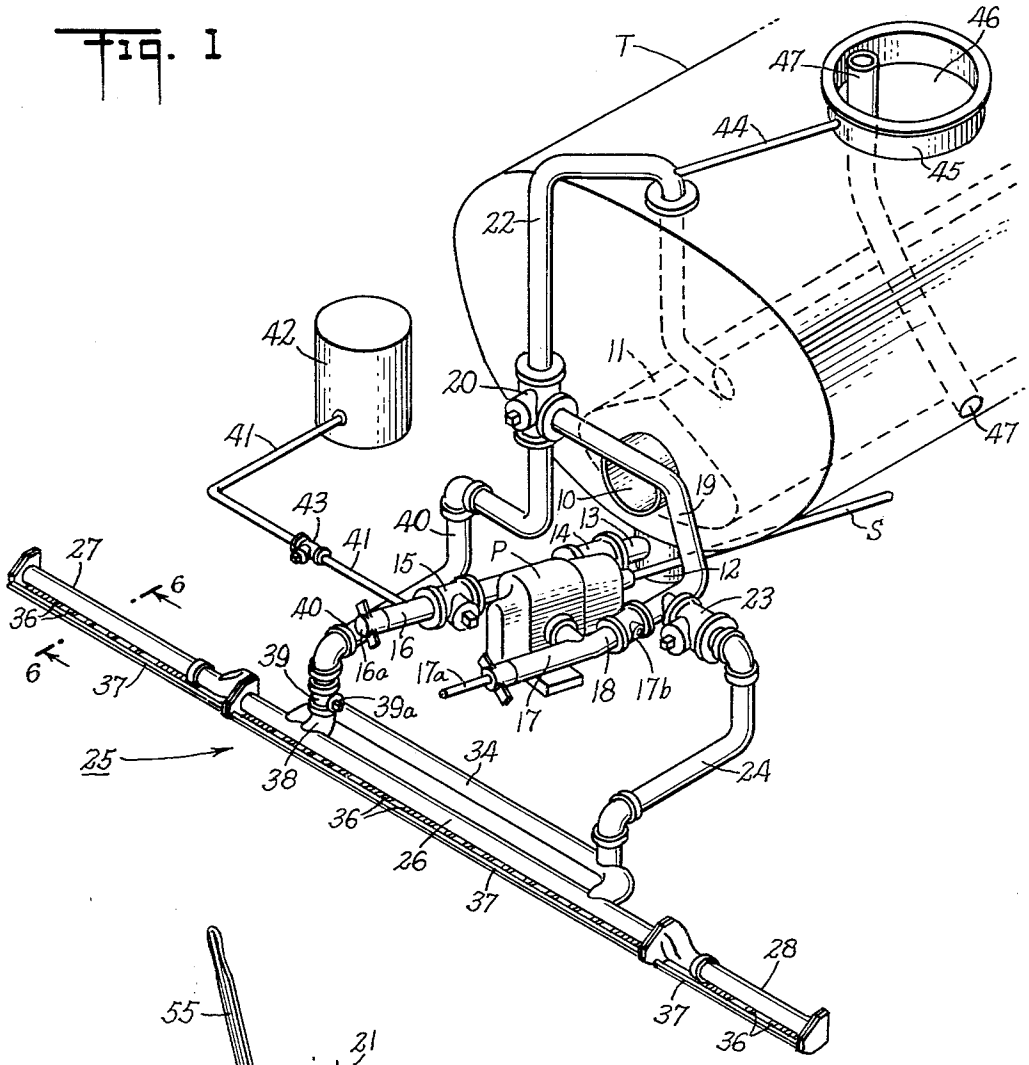
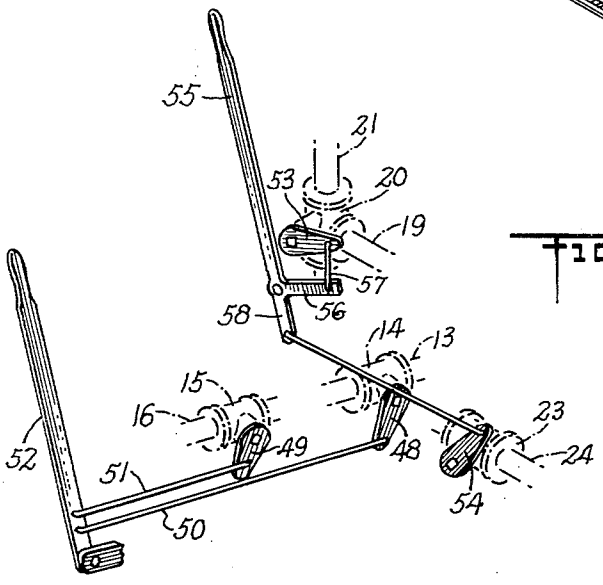


Fig. 2



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HEADER CONSTRUCTION FOR SPRAYING EQUIPMENT

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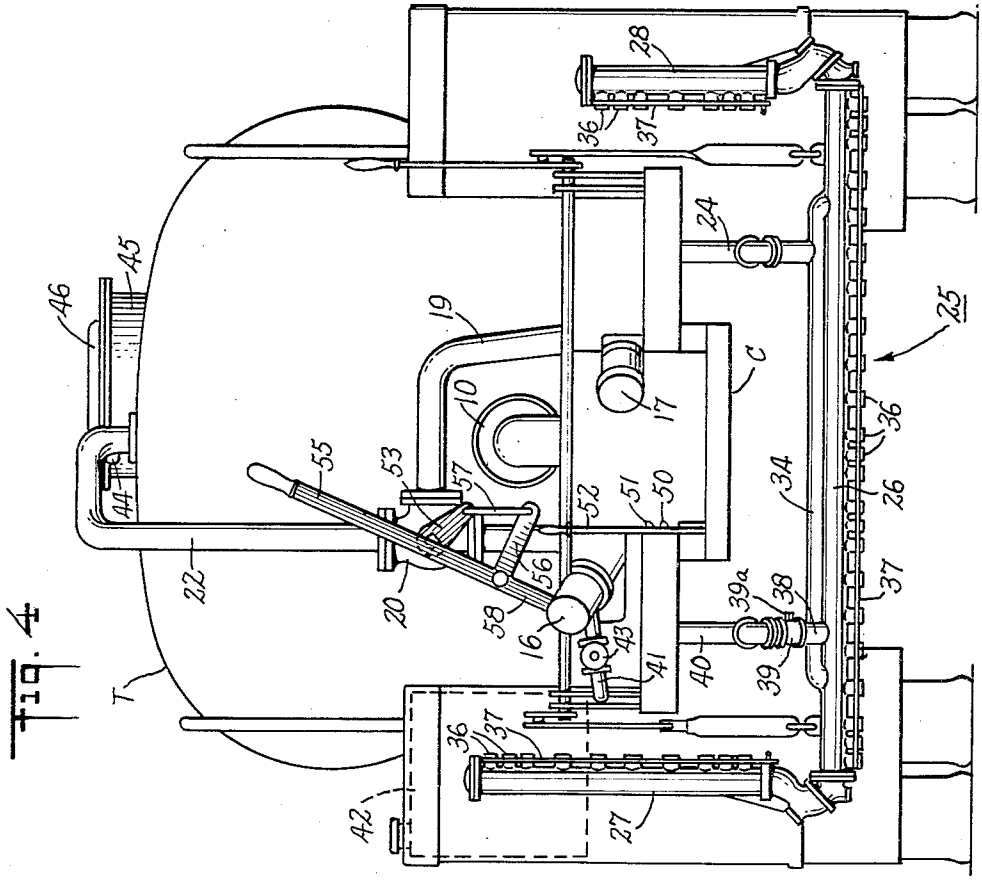


Fig. 4

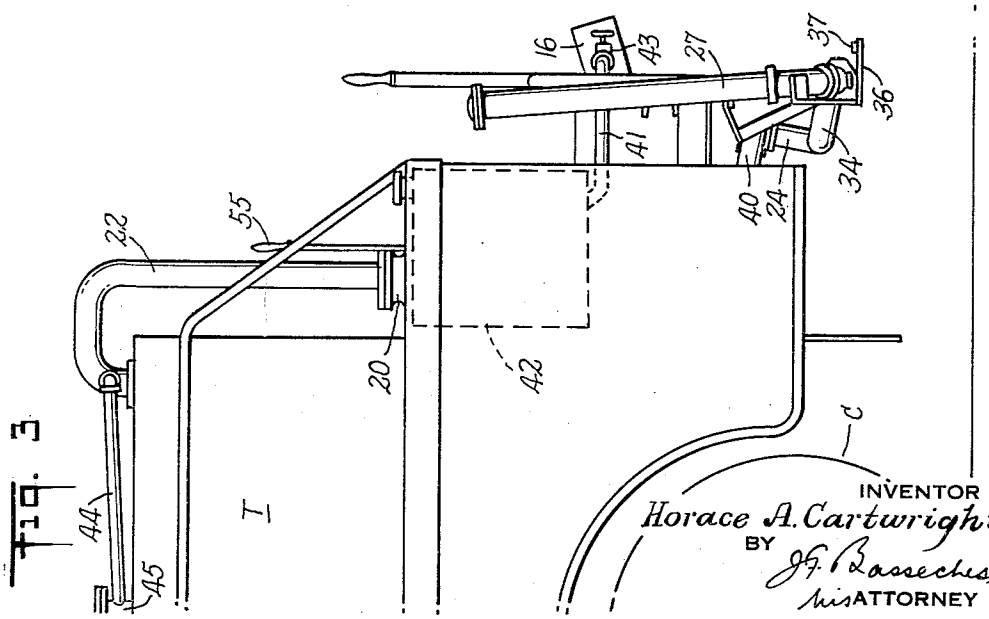


Fig. 3

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HEADER CONSTRUCTION FOR SPRAYING EQUIPMENT

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Fig. 5

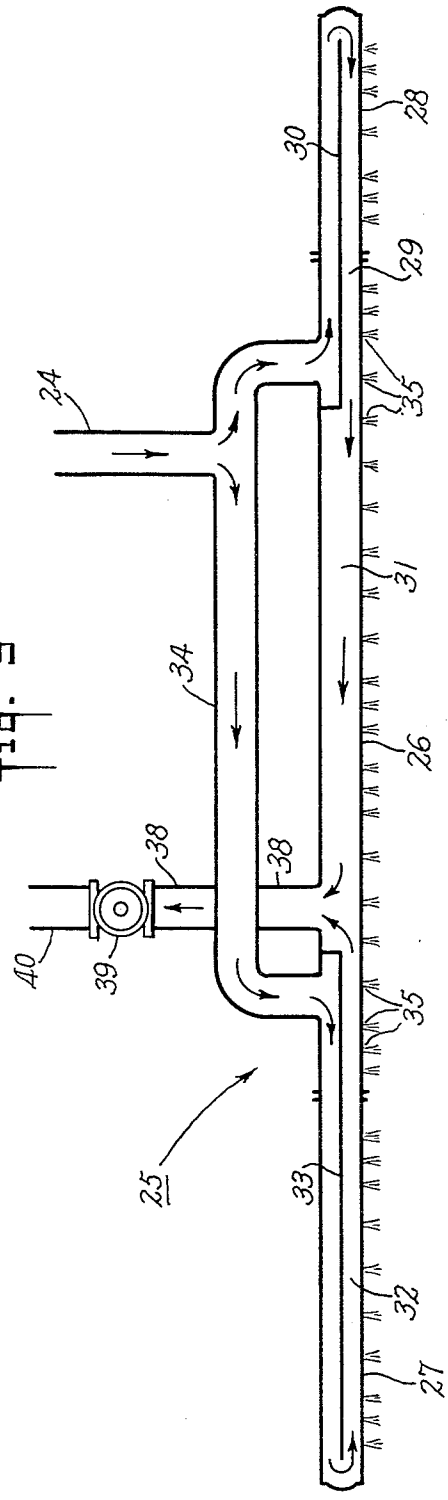


Fig. 7

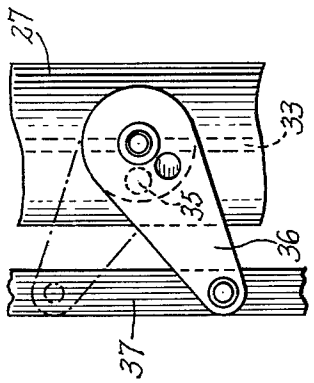
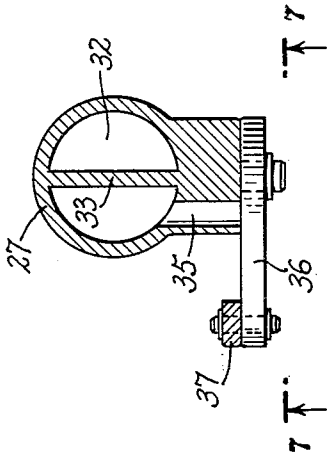


Fig. 6



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HEADER CONSTRUCTION FOR SPRAYING EQUIPMENT

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Fig. 8

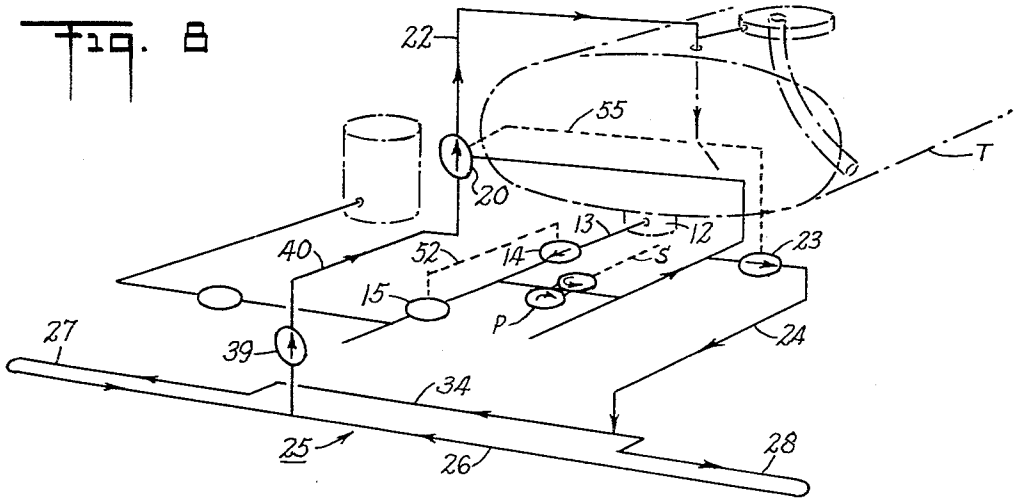


Fig. 9

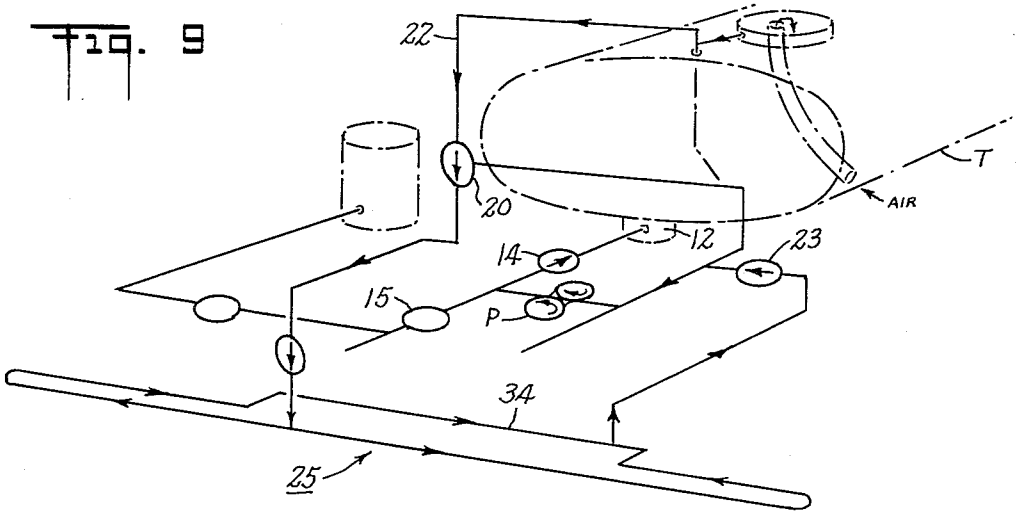
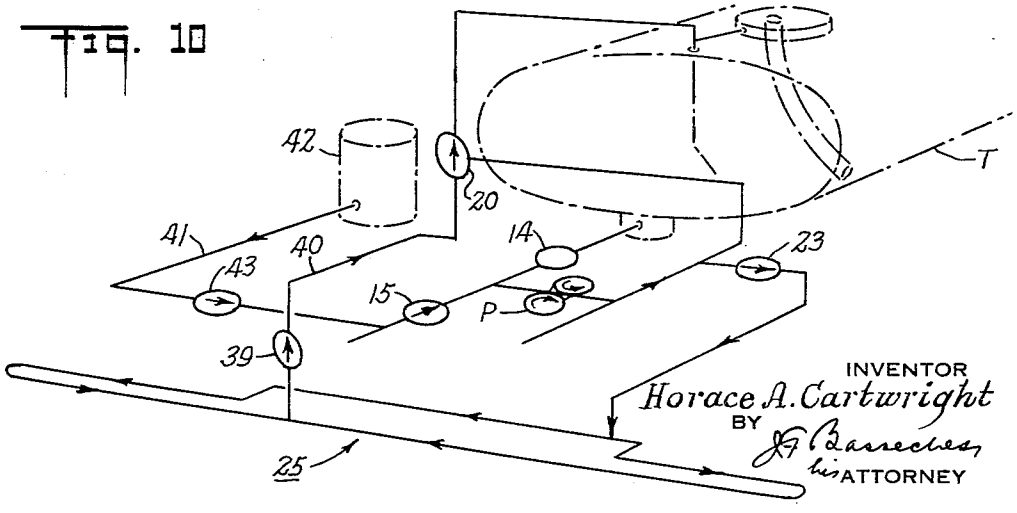


Fig. 10



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HEADER CONSTRUCTION FOR SPRAYING EQUIPMENT

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Fig. 11

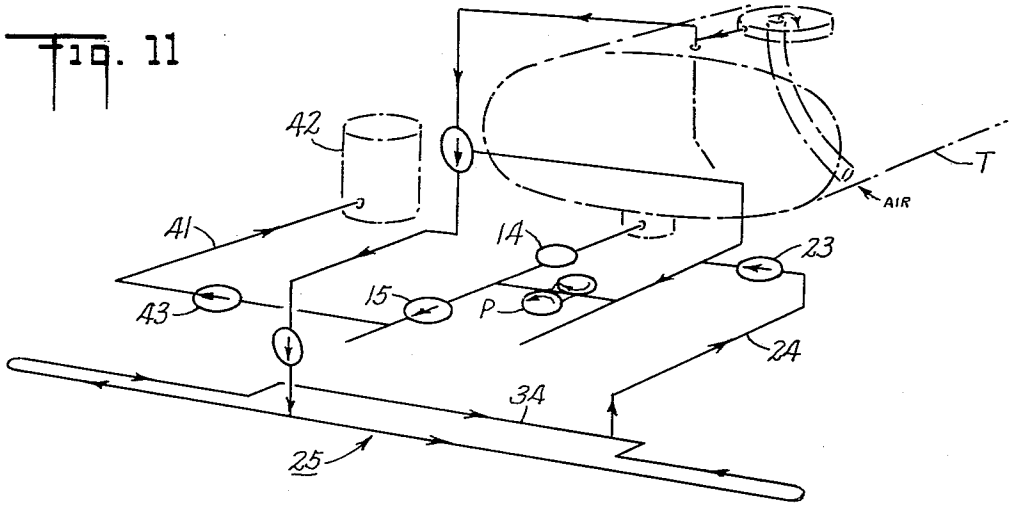


Fig. 12

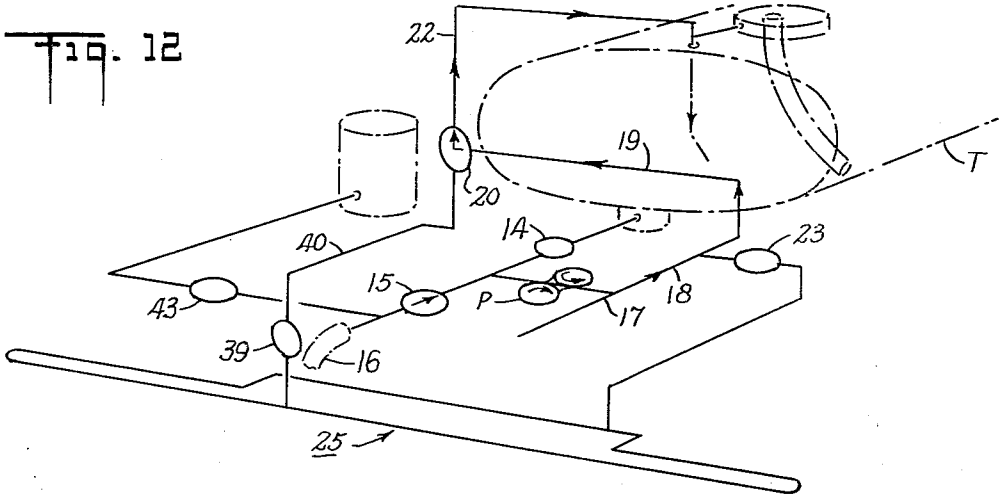
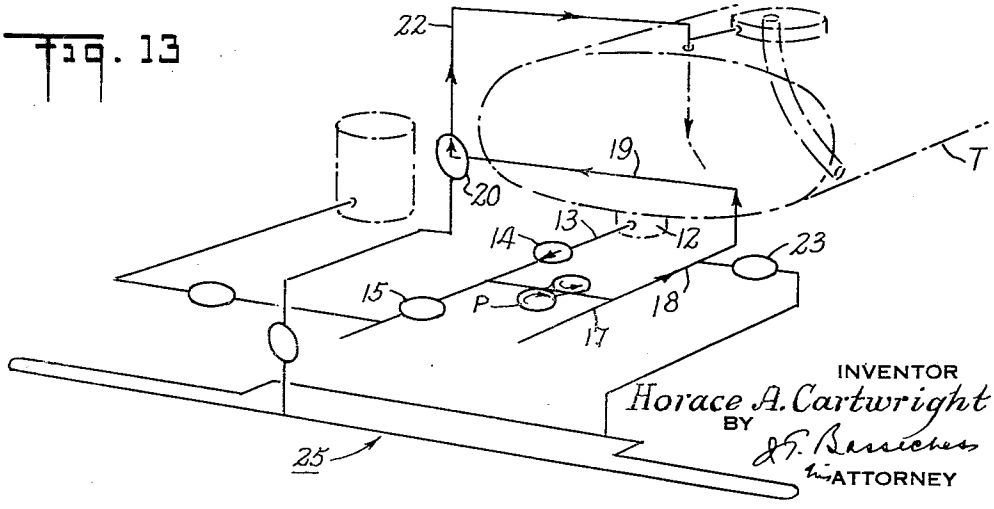


Fig. 13



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3,001,720
HEADER CONSTRUCTION FOR SPRAYING EQUIPMENT

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Filed Aug. 11, 1958, Ser. No. 754,229
8 Claims. (Cl. 239—112)

This invention relates to a header construction, and more particularly to a header construction for spraying equipment.

This invention specifically relates, in a measure, to improvements in asphalt spreading installations generally referred to in my Patent No. 2,579,792 of December 25, 1951. In my said patent, apparatus for spreading bituminous surfacing material has been disclosed, characterized by a header in which a main distributor conduit is constructed with partition walls internally thereof, dividing said conduit into spaced, longitudinally extending fluid receiving and discharging chambers adjacent road surface spraying means whereby the road surfacing material pumped from a tank initially enters said conduit along split paths passing longitudinally outwardly through the receiving chambers and thereafter reverses its direction of flow for return to the storage tank of the treated material from out of the conduit, and not discharged through the spraying outlets in said conduit.

As desirable as this prior installation may be, interruption of the spraying operation for protracted periods leaves the heavy oleaginous hydrocarbons, such as asphalt, tars and the like, in and along the conduit, in which portions of the header the oleaginous material flows only when it is duly liquefied by heat transmitted directly or conductively to the main storage chamber or tank. Interruption of the spraying operation, which may therefore require withdrawal of the heat, resulting in chilling or solidifying of the asphalt, tar or other material in the header, serves greatly to delay the use of the equipment on the next occasion when it is required because of the difficulties encountered in draining and aerating the header lines.

Known to me are the efforts made to overcome the deleterious influence of chilling or cooling of the header, with its heavy asphalt content, when work is interrupted, by introducing suitable thinning liquids or flushing solvents into the header, to withdraw residues of such material. This operation has limited application, and unless performed under special conditions for collecting the flushing oil or thinner, is objectionable in that it cannot be carried out without fouling the roadway and employing a large and costly quantity of the flushing oil, thinner or solvent. Even disregarding the expense, diversionary passages leading to pumping equipment have been found to be ineffective and valueless.

Attempts to use such thinners for flushing, with inadequate drainage of the residue after spraying, have unduly tied up equipment because of the inadequacy of provision for air circulation during draining of residual quantities of roadway tars, asphalt or the like, before resorting to cleansing by flushing oils, to the end that the cleansing of headers of such road spreading equipment has been tedious and costly.

Accordingly, it is an object of this invention to provide a header construction for the roadway spreading operation for distributing heavy hydrocarbons, which may be thoroughly and economically drained, whereby spreading apparatus may be restored to use after inactivity without delay and without hazard.

Still more particularly, it is an object of my invention to provide a header construction for apparatus for distributing liquids on roads whereby the header, after use,

may be aerated, completely to drain the residual oil. Still more particularly, it is an object of my invention to provide a header for apparatus of the character described wherein the same pumping equipment for distributing the road covering oil, asphalt, tar, is made available to draw in and circulate a flushing oil to cleanse the header, without waste or road contamination or fouling, and without directing diluted residual amounts of the heavy asphalt or the like to contaminate the main supply in the tank.

Still more particularly, it is an object of this invention to provide a header construction which includes auxiliary tank means permitting rapid cleansing of the residual amount of asphalt in the header by recirculation, without contamination of the main supply of asphalt, and economically employing such thinning and flushing oil in any locality where the road spreading equipment may be in use.

Still more particularly, it is an object of my invention to provide a header having a spray head in association with a main storage tank for distributing road surfacing material, in which the header and spray conduit may be completely, effectively, and economically drained of residual asphaltic material and combined with an auxiliary tank furnishing a supply of flushing oil whereby the same pumping instrument and lines for distributing the asphaltic road surfacing material may be employed to flush out and cleanse the header and spraying assembly so that a relatively small quantity of flushing material may accompany the installation for repeated use in maintaining the header and associated equipment in working order after interruption in use of the heated asphaltic material.

In general, it is a further object of my invention to provide a header which may be quickly and economically maintained in effective operation to drain the spray bar and associated feed line therefor and cleanse the same after interruption in use, whereby the spray equipment may be restored to its intended purpose without undue firing or similar operations.

To attain these objects and such further objects as may appear herein or be hereinafter pointed out, I make reference to the accompanying drawings forming a part hereof, in which—

FIGURE 1 is a fragmentary perspective view of the header assembly in accordance with my invention;

FIGURE 2 is a diagrammatic perspective view of the coupling of the valves of the header shown in FIGURE 1;

FIGURE 3 is a fragmentary side elevational view of my header installation on a truck tank;

FIGURE 4 is an end view thereof;

FIGURE 5 is a diagrammatic sectional view of the distributor;

FIGURE 6 is a magnified fragmentary view on the lines 6—6 of FIGURE 1;

FIGURE 7 is a view in the direction of the lines 7—7 of FIGURE 6;

FIGURE 8 is a diagrammatic perspective view of the header assembly for spraying, with the pump arranged for forward spraying;

FIGURE 9 is a diagrammatic perspecitve view of the header assembly, with the pump in reverse for initial clearing of the header;

FIGURE 10 is a diagrammatic perspective view of the header assembly, with the auxiliary tank connected and valves adjusted for flushing the header;

FIGURE 11 is a diagrammatic perspective view of the header, with the valves and pump adjusted for reverse flushing;

FIGURE 12 is a diagrammatic perspective view of the header, with the valves adjusted for loading the tank;

FIGURE 13 is a diagrammatic perspective view of the header, with the valves adjusted for heated recirculation.

My invention is predicated upon the observation that a single flow or stream header assembly, under the influence of single pumping means, with minimum or complete freedom from diversion or divided flow, is highly effective in the performance efficiently and economically of the procedural details of draining of the heavy road oils or hydrocarbons from the header and road spraying equipment, and where subjected to the flushing influence of a flushing oil, leads to an efficient and economical use of such material, whereby interruption in the use of the spraying equipment, with discontinuance of the heating equipment, may be effected, yet leave the assembly in condition for resuming use thereof without the undue delay and expense heretofore experienced.

My invention may further be briefly summarized by outlining the features as providing a road spraying nozzle and header assembly unique in that a single flow line, under the influence of the same single pumping means may be employed for aerating the header and spray nozzle system, to effect efficient withdrawal of header contained residues of the heavy road compounds and, by avoiding diversionary divided paths of flow, using the same equipment for circulation of a flushing oil, and whereby economies in use of such material is effected, among other advantages.

My invention may further be characterized by the features of combining with a road spreading nozzle and header therefor, a single flow circulating component, absent diversionary influence, to withdraw air from the header assembly, including the spray nozzle from the top of the system to withdraw residue, including flushing oil diluents from a low level and in a continuous, unbroken flow line, for economically and efficiently returning fluishing oil to an auxiliary tank by the same pumping equipment.

I now make reference to the drawing wherein my invention may be understood in connection with a vehicularly mounted tank T carried on the chassis C. The tank T has a flue **10** into which a burner may be directed, to heat the chamber **11** and thus heat the tank contents, as will be readily understood.

The tank T is arranged ot receive road spreading material, such as asphalt, tar or other roadway treating material. The tank T has a sump **12** to which there is connected the pipe **13** leading to a cock **14** to one side of a pump P which may be driven by the shaft S leading to a power take-off unit for forward and reverse pumping movement, as will appear hereafter.

The pump has a port leading to an advance cock **15**, to which the filling spout **16** is connected. The pump P has a T-shaped line **17**, one end **18** of which is connected with the pipe section **19** leading to the three-way cock **20**, whereby one branch **21** may be connected to the tank filling section **22** at the top of the tank T.

Between the sections **18** and **19**, a cock **23** is interposed, selectively coupling the lines **18** and **19** with the line **24** feeding the nozzle or conduit spray bar assembly **25**.

The nozzle assembly has a main conduit section **26**, with extension **27** and **28** which may carry out some of the functions of the spraying nozzle shown in my patent aforementioned. The spray nozzle assembly **25** has an end portion **29** provided with a divisional wall **30** to connect the section **29** with the conduit **24** and redirect the flow of a liquid through the main conduit section **31** to the opposite conduit section **32** where a divisional wall **33** is provided, to couple the remote side of the section **32** with the low level by-pass line **34** leading to the common line **24**. The common line **24** therefore is connected with the lowest possible point of the header system.

The nozzle assembly **25** is characterized by a plurality of spray ports **35**, each of which is closed by a swingable disk **36**. All of such disks are coupled to a draw bar **37** under manual control, whereby all of the disks **36** may be moved to the open or shut position in unison (see FIGURE 5).

The single effective flow line thus described has its single egress through the conduit **38** coupled to the cock **39**. The cock **39**, having an actuator arm **39***a*, leads to the pipe **40** to be connected to the three-way cock **20**, previously described. The line **40** is connected by a pipe **41** to an auxiliary tank **42** controlled by the cock **43**, whereby the auxiliary tank **42** may be placed in communication with or shut off from the line **40**.

The section **22** has tapped therein an air line **44** leading to a manhole apron **45** whereby air release and ingress is secured for the pipe line **22** through the manhole **46** into which the main air line **47** is extended, as will be readily understood. The conduit system H thus described leading to and from the conduit spray bar or nozzle assembly **25** is included within the term "header assembly."

The cocks **14** and **15** each have actuator arms **48** and **49**, respectively, with linkages **50** and **51** leading to the pivotal lever arm **52**. The three-way cock **20** and cock **23** each have actuator arms **53** and **54**, respectively. A manual control lever **55** has a bell crank arm **56** coupled by the link **57** to the actuator arm **53**. The lever **55** also has an extension **58** and a draw rod **59** (see FIGURE 2) coupled to the actuator arm **54**.

With the pipe line or header assembly as described, a number of operations may be performed, which will more clearly be understood by reference to FIGURES 8 to 13, it being understood that like parts are correspondingly numbered, and where cocks **20, 23, 14, 15, 43, 39** are intended to be shown diagrammatically, the blank circle illustration is intended to be the closed position of the cock and where the arrows are shown, it is intended to illustrate the open position, and direction of flow of the material to be pumped or to flow into the cock.

Spraying cycle—Pump forward

FIGURE 8 diagrammatically illustrates the header assembly in a position with the pump P pumping forwardly for spraying the bituminous road spraying material in the roadway, the operation having involved opening the nozzle assembly **25** by manual means, to open the spray ports **35**, hot bituminous oil being removed from the sump **12** through the line **13**, the cock **14**, the manual means **52** having moved the arm **49** to shut the cock **15**. The cock **23** is in the open position by the conjoint movement of the manipulative arms **54** and **53** whereby spraying is effected in a single line through the conduit **24** and the nozzle assembly **25** through the by-pass **34**, returning the excess not spread upon the roadway under the pressure of the pump through the cock **39**, the line **40**, through the cock **20** and into the overflow line **22** to the tank T.

At the completion of the spraying operation, or its interruption, when it is intended to withdraw heat in the flue, as at the close of a day's operation, a condition of the apparatus in accordance with FIGURE 9 is then established. The manual means for the nozzle assembly **25** is adjusted to swing the spray ports **35** to the closed position under the influence of the draw bar **37**.

Pump in reverse—Air withdrawn

In FIGURE 9, an initial condition of the installation is assumed on discontinuing operation. To effect this condition, the pump P is merely reversed under a control at the power take-off unit. By my arrangement, the pump forces the bituminous oil in the header in reverse into the sump **12** since the cock **15** is closed. Air enters the line **22** from a single port at the top of the system to clear the entire system without diversion along its entire

line, since the intake to the pump, at reverse flow, is from the lowest portion of the system at the by-pass **34**.

A novel phase of the header in accordance with my invention, by the intercoupling of the cocks **14** and **15** to open the cock **14** when the cock **15** is closed, and the entrance of the air only from the top of the system, and withdrawal of the bituminous oil from the low point, assures air entering the system and the clearing of the header within a few seconds.

The next step is one to adjust the apparatus preparatory to flushing.

Pump forward—Flushing operation

For flushing the header (see FIGURE 10) manual control means **52** are manipulated to open the cock **15** and simultaneously close the cock **14** by the expedients previously described. Under this condition of the cocks **14** and **15**, the auxiliary tank **42** is provided with flushing oil, such as thin kerosene or the like. The capacity of the tank **42** is limited so as preferably to include no more flushing oil than would be required to fill the header and spray bar, and thereby entirely deplete the supply of flushing oil in the tank **42** when a supply of flushing oil has reached a point just above the cock **20**, the pump P being connected to the power take-off means to drive the pump forward. The flushing oil or thinning solvent then passes through the cock **15** to the pump P, through the cock **23**, into the spray nozzle **25**, through the cock **39** and the line **40** up to a point above the cock **20**, without entering the main tank T.

The charge of thinning oil in the header **25** may be left in the header for a period of time during which experience has taught that solvent action will take place, or the flushing operation may be activated to take advantage of the solvent action of a moving stream of flushing oil. For this purpose the next operation is effected.

Pump in reverse—Flushing operation

For reverse flushing, the power take-off unit adjustment is changed so that the pump P is in reverse. In this position, a single flow line is established by the pump back to the tank **42**. The flushing oil and such bituminous material as it may have dissolved in drawn from the by-pass line **34** at the lowest portion thereof, through the line **24**, the cock **23**, through the pump, through the cock **43**, into the tank **42**. The operation described in connection with FIGURES 10 and 11 may alternately be practiced merely by first operating the pump forwardly, to draw in the flushing oil, and then reversing it to flush the flushing oil back into the tank **42**. Repeated cycles of forward flushing and reverse flushing may be performed, to assure cleaning of the header. The operations are performed without fouling the roadway and, finally, terminating the operation by the pumping in reverse of the pump P to leave in the tank **42** the flushing oil and such bituminous material which it has dissolved from the header.

This leaves the header in condition for performance of the next operation.

Pump forward—Loading (FIGURE 12)

To load the main tank T, control lever **55** is manipulated to close cock **23** and open cock **20** to line **19** only, and thereby close the line **40** to cock **20**. With this operation, cock **39** is closed and cock **43** is closed. Thereupon, filling spout **16** is opened to a source of supply coupled with a load of heated asphalt and the pump P is thrown to pump forward by the power take-off unit. The charge for the main tank T is drawn in through the cock **15**, through the pump P, the lines **17**, **18**, **19**, through the turn cock **20**, into the intake line **22**, to fill the main tank T as desired. With this operation accomplished, the installation is then adjustable to the next cycle, to assure a liquefaction of the bituminous oil under the influence of heat generated under the flue **11**. For this purpose, reference is made to FIGURE 13.

Heated recirculation

For purposes of assuring a highly liquefied condition of the road spreading bituminous material, heated bituminous oil may be recirculated in a portion of the header. For this purpose, after closing of the filling spout **16** by the closure **16a**, the manual means **52** are manipulated to close the cock **15** and open the cock **14**, the manipulating means **55** being left in a position to maintain the cock **23** closed and the cock **20** in the transverse position. The pump is then operated forwardly. Heated bituminous material is withdrawn from the sump **12**, forced into **T 17**, the line **18**, into the line **19** and thence through the cock **20** into the line **22** and then into the tank. In this condition, the sump pump may be used for agitating the heavy bituminous road spreading material and maintain a proper condition of fluidity to await the spraying operation first described, by establishing a position of the valves as described in connection with FIGURE 8.

As an additional advantage of my header and as an optional installation, I may include to one side of the **T 17**, a coupling hose valve **17a**, in which event I may provide an independently controllable fly valve **17b** to the opposed side of the **T 17**, whereby, when the pump P is operating forwardly, it may pump off contents from the tank, or by attaching a hose spray to the hose coupling valve **17a**, hand spraying with the pump in operation may be effected.

It will thus be observed that by the header assembly as described, high economies in operation may be effected, (*a*) assuring complete air withdrawal from the header system; (*b*) assuring against any diversionary paths of flow of the air; (*c*) drawing in a flushing oil efficiently and economically; (*d*) obtaining reverse flushing with the same mechanism and same flushing oil, without fouling the locality; (*e*) using the same installation efficiently for loading and heat circulation, as well as obtaining many additional advantages which will appear to those skilled in the art.

Having thus described my invention and illustrated its use, what I claim as new and desire to secure by Letters Patent is:

1. In spray apparatus for spreading bituminous road surfacing material to a roadway in a fluidic state from a main tank to provide a first supply means, the combination comprising a main conduit spray bar assembly arranged to be in a low point spraying position and a header assembly connected to provide a line between said main tank and spray bar assembly, and having conduit sections terminating with said spray bar, said header assembly having a conduit section having an inlet to an auxiliary tank to provide another supply means of fluidic material to said spray bar assembly and common circulating means for the header and spray bar assembly connecting said supply means having interposed in the lines leading to and from the same interconnecting valve means for said conduit sections to and from said circulation means and supply means to provide single, undiverted flow and return passage lines to and from said supply means and to said spray bar assembly.

2. In spray apparatus for spreading bituminous road surfacing material to a roadway in a fluidic state, from a main tank to provide a first supply means, the combination comprising a main conduit spray bar arranged to be positioned at a low point spraying position, and a header assembly having conduit means connected therewith to provide a flow line to and from the spray bar and tank, said header assembly conduit means terminating with said spray bar, with the opposite open end having an air inlet leading to adjacent the top of the tank and including pumping means interposed in said conduit means to provide circulating means for the header, a second tank, a plurality of cock members interposed in the

conduit means along the header having interconnecting means to each other and second tank to provide a single, undiverted flow passage from said air inlet to said spray bar and an outlet to said tanks.

3. In spray apparatus for spreading bituminous surfacing material to a roadway, in a fluidic state from a main tank to provide a first supply means, circulating means therefor, the combination with a main, longitudinally extended spray bar conduit having centrally spaced partitioning means internally thereof at its end to divide said conduit into a pair of longitudinally extending fluid receiving chambers and a unitary discharge chamber along a effective flow passage with a single effective continuous passage from the inlet and outlet port means to and from the spray bar conduit, a header assembly, said header assembly having conduit means thereof providing one end as an inlet means to the main tank and the opposite end as outlet means to said inlet means of said spray bar conduit, and a plurality of valving means interposed along said conduit means for controlling the flow of fluid in said header, said valving means having interconnecting conduit means to said circulating means and second fluid supply tank means, and the valving means being connected with each other to provide a single, continuous path flow line to and from said spray conduit and tank means.

4. In a spray apparatus in accordance with claim 3 wherein said fluid circulating means are reversible and said header assembly includes a conduit having an air inlet adjacent the top of said tank, whereby spraying means may be put into effect in one direction of flow of the fluidic surfacing material by the said circulating means and air clearing of the header assembly in a single undiverted flow line may be effected in the reverse direction of flow of the fluidic material by the action of said circulating means.

5. In a spray apparatus in accordance with claim 3 wherein said fluid circulating means are reversible and said header assembly includes a conduit havnig an air inlet adjacent the top of said tank, whereby spraying means may be put into effect in one direction of flow of the fluidic surfacing material by the said circulating means and air clearing of the header in a single undiverted flow line may be effected in the reverse direction of flow of the fluidic surfacing material by the action of said circulating means, and conduit means connected at its opposite end in said header and tank, respectively, for returning fluid from said header to said tank in the reverse circulation of flow of said fluid surfacing material by said circulating means.

6. A spray apparatus for spreading bituminous surfacing material in a fluidic state from a main tank, the combination with a main, longitudinally extended spray bar conduit having inlet and outlet means connected thereto having internal partitioned wall means to divide said conduit into a pair of longitudinally extending fluid receiving chambers and a single discharge chamber along a single effective flow passage, with conduit sections coupled thereto to provide single effective continuous passage from said inlet and outlet means to and from said spray bar conduit, a header assembly connected therewith, said header assembly including conduit sections having inlet means connected to the tank and having an outlet end connected to the inlet end of said spray bar conduit, said inlet means being coupled to fluid circulating means, an auxiliary flush tank having a conduit section connected with said conduit to said inlet means and interconnected valving means interposed in the lines between said flush tank and circulating means in the inlet to said main tank having interengaged linkage for operating said valves whereby said valving means may be closed and opened in unison to cut off the feed to said circulating means from said tank when said valve to said flush tank is open, whereby to provide a single, continuous path flow line to and from said auxiliary tank and spray conduit.

7. A spray apparatus in accordance with claim 6 wherein said circulating means comprises pump means having drive means which is reversible and the valving means has coupling means to close the inlet to said tank, whereby when the inlet to said auxiliary tank will be opened, the flushing oil in said header is returned to said auxiliary tank in the reverse flow of said circulating means.

8. A spray apparatus for spreading bituminous surfacing material in a fluidic state from a main tank to a roadway, the combination with a low level extended spray bar conduit, of a header having conduits leading to and from the tank and having a single effective inlet and outlet means to said spray bar conduit, said header having a conduit section including inlet means to said tank, and a return conduit having an outlet to said tank, pump means having forward and reverse circulating means in the lines of said header, interconnected valving means in the lines leading to the inlet and outlet side of said pump means, interconnected linkage for operating the valving means to and from said spray bar conduit, one of which valve means being in the line having a conduit returning to said main tank and comprising an auxiliary tank arranged to retain flushing oil, and a conduit section having an inlet from said auxiliary tank to the line of said first interconnected valve means, the header, in the forward circulation of said pump means, having the line connected by said valving means to said flushing tank, whereby flushing along a single, undiverted path of flow is effected from said header through said spray bar conduit, and in the reverse circulation of said pump means, with the interconnected valving means reversed, the header may be emptied to return the flushing oil to said auxiliary tank from the line connected to said header.

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