APPARATUS FOR OILING ROADS.

APPLICATION FILED OCT. 12, 1909.

**1,033,038.**

Patented July 16, 1912.

7 SHEETS—SHEET 1.

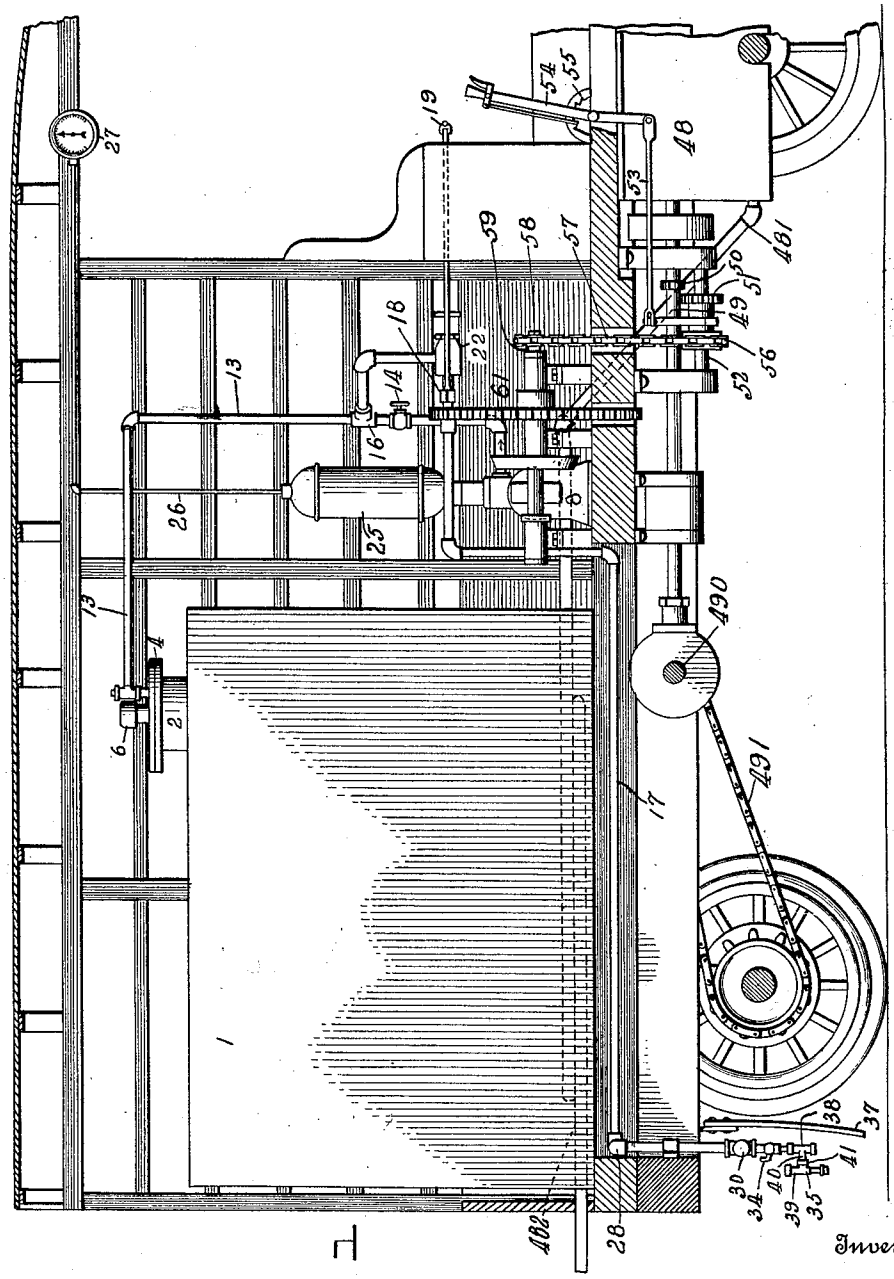


FIG. 1.

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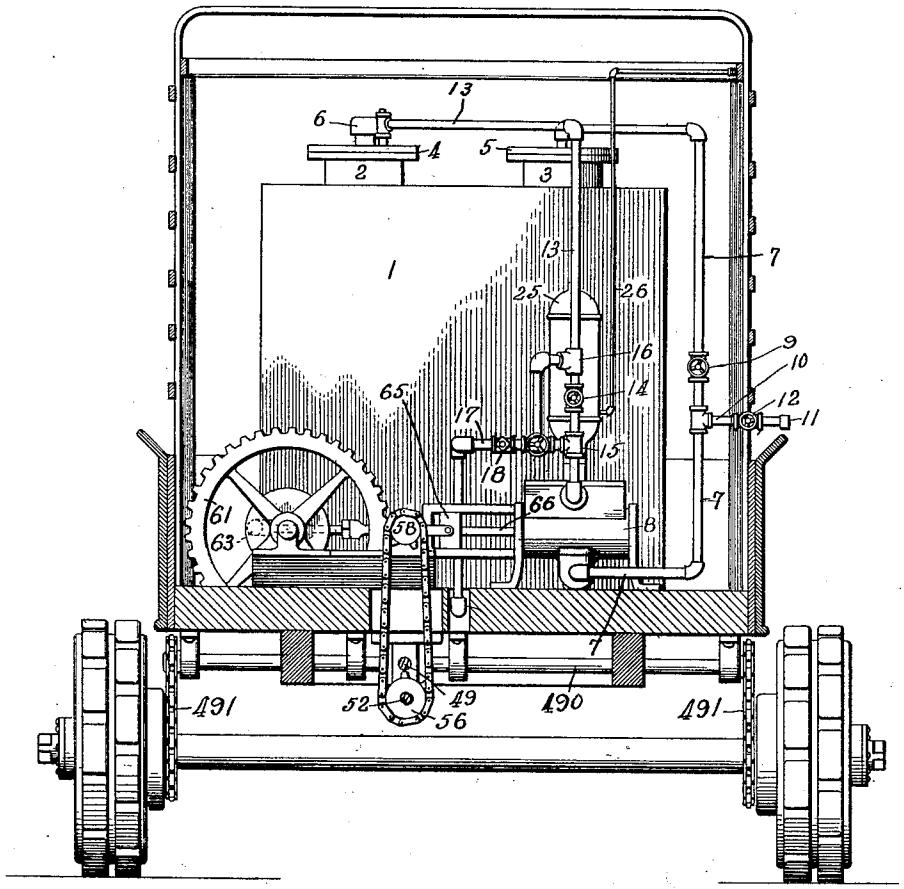
7 SHEETS—SHEET 2.

Fig 2

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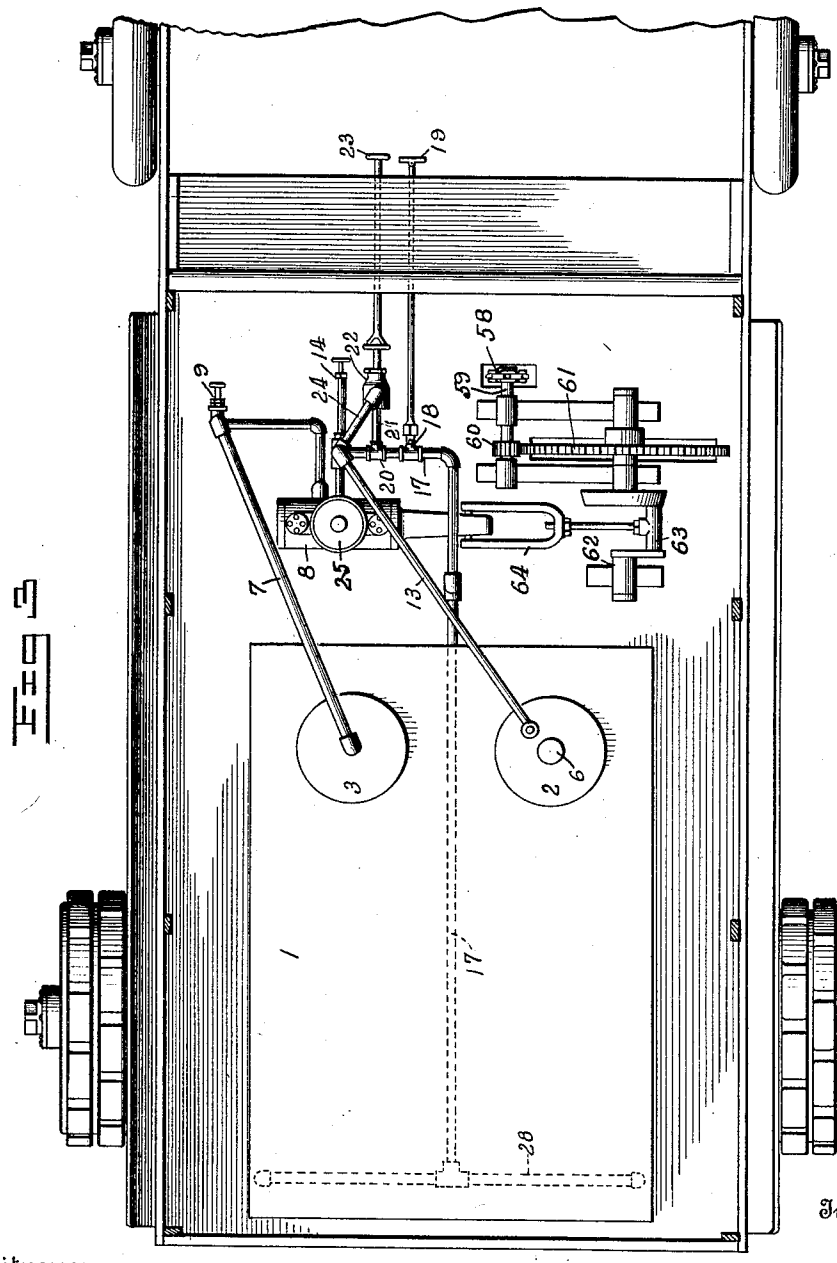


FIG 5

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7 SHEETS—SHEET 4.

Fig 4

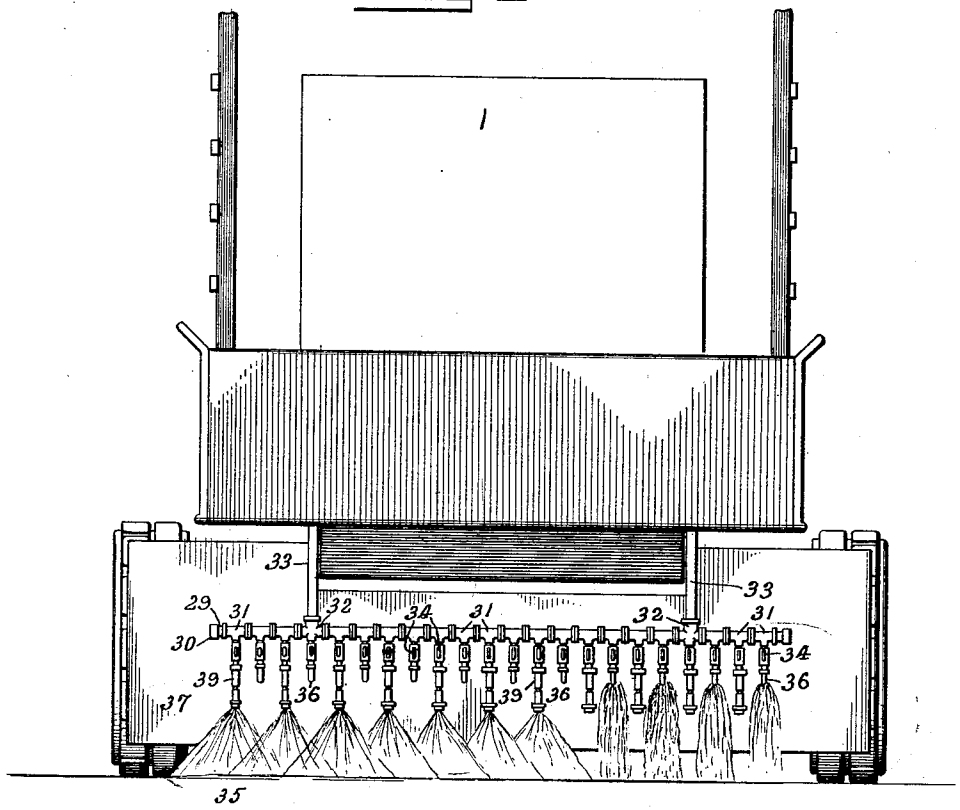



Fig 12

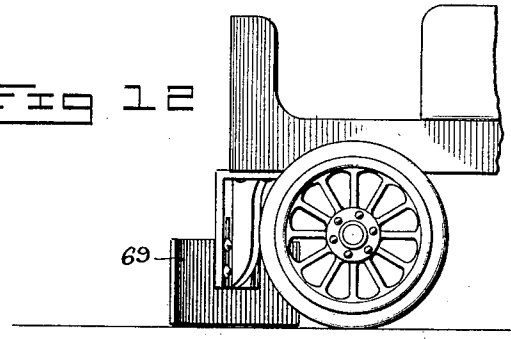
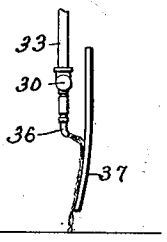



Fig 13

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7 SHEETS—SHEET 5.

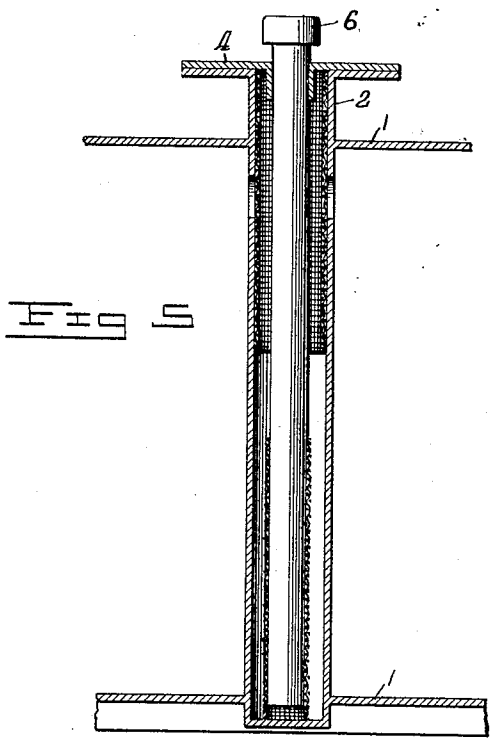


Fig 5

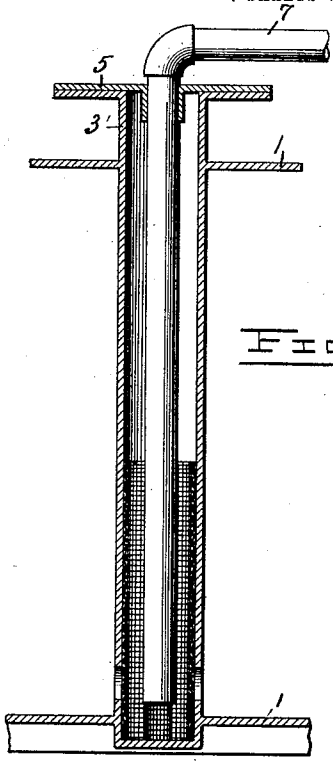


Fig 6

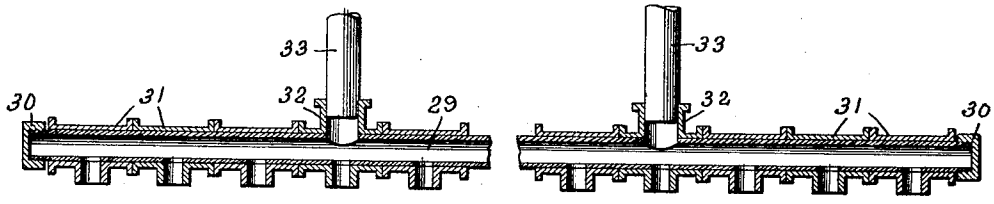


Fig 8

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APPARATUS FOR OILING ROADS.

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7 SHEETS—SHEET 6.

Fig 14

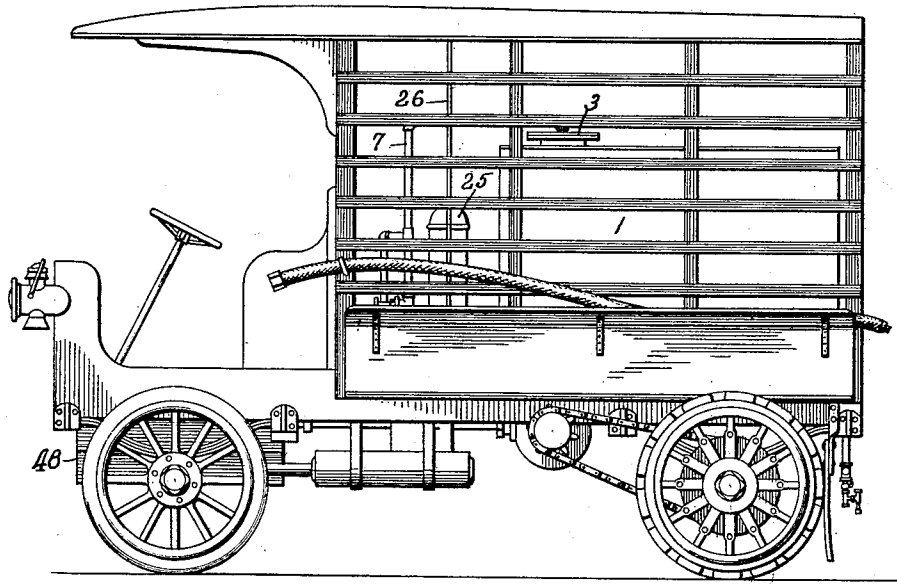



Fig 7

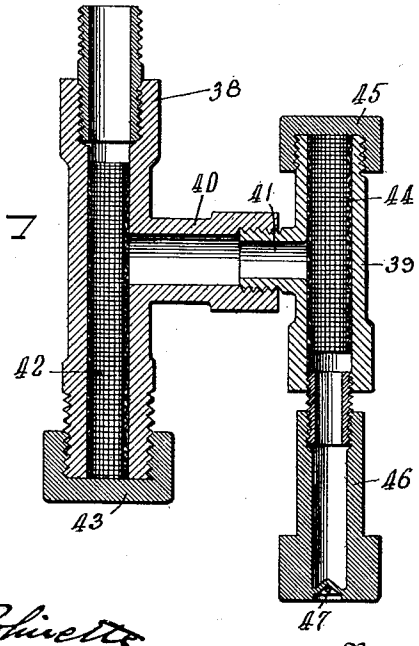
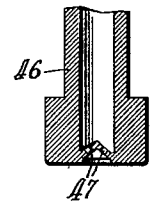



Fig 8

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7 SHEETS—SHEET 7.

Fig 10

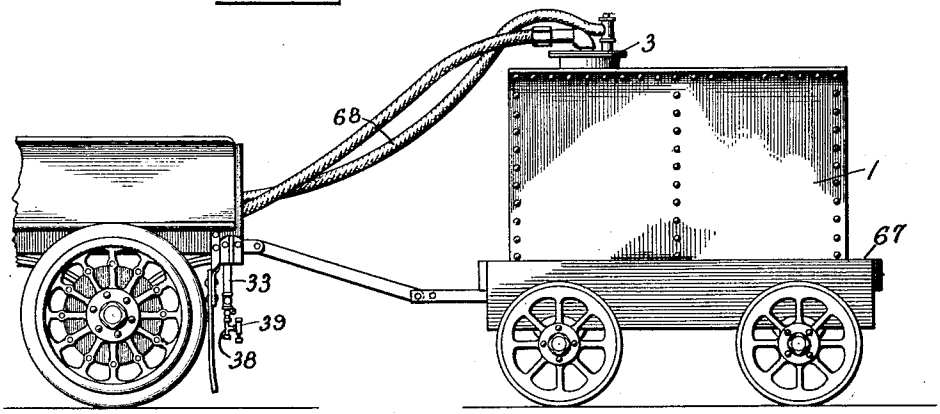
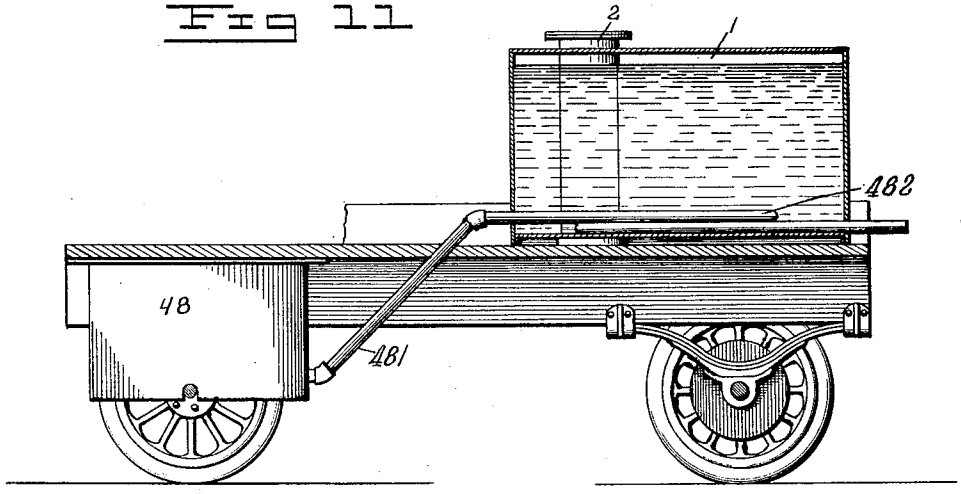



Fig 11

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# UNITED STATES PATENT OFFICE.

GEORGE M. SAYBOLT, OF JERSEY CITY, NEW JERSEY, ASSIGNOR TO STANDARD OIL COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW JERSEY.

## APPARATUS FOR OILING ROADS.

1,033,038. Specification of Letters Patent. **Patented July 16, 1912.**

Application filed October 12, 1909. Serial No. 522,265.

*To all whom it may concern:*

Be it known that I, GEORGE M. SAYBOLT, a citizen of the United States, residing at Jersey City, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Apparatus for Oiling Roads, of which the following is a specification.

My invention relates to improvements in apparatus for applying oil to roads. The practice of oiling roadways for the purpose of settling the dust, preventing formation of floating dust thereafter and preserving the roadway, has many well recognized advantages. At the same time, however, the prior practice has not been entirely satisfactory for the reason that in the ordinary methods the oil is applied to the road in the form of rather coarse spray or jets, with the result that for some time after such an application the oil stands in pools and puddles and the top surface of the road is in a condition which may well be termed slushy, so that riding or driving upon such a road at that time is destructive to vehicles and equipment, and disagreeable to persons using the road.

It is the object of my present invention to avoid these and other well known disadvantages and at the same time to attain a maximum of economy in time, labor and expense in oiling roads.

With these general objects in view my invention consists in an apparatus for oiling roads, which in its specific form embodies a self-propelling vehicle provided with means for forming an exceedingly fine mist of oil which may be directed downward against the road under a heavy direct pressure, the pressure being produced by a pump arranged to be driven by the same means which propels the vehicle. In addition, the apparatus may be provided with means for leveling the road-bed or cleaning it preparatory to applying the oil and with additional oil-applying mechanism whereby, under special conditions, any desired portion of the road-bed may be saturated or drenched with oil.

My invention will now be described in connection with the accompanying drawings and then more particularly pointed out in the claims.

In the drawings, Figure 1 is a longitudinal section, partly in elevation, of one form of apparatus embodying my invention; Fig. 2 is a transverse section, partly in elevation, looking from the front of the apparatus; Fig. 3 is a plan view with the top of the vehicle removed; Fig. 4 is a rear elevation showing the spraying devices; Fig. 5 is a detail sectional view showing the filling inlet; Fig. 6 is a similar view of the tank discharge outlet; Fig. 7 is a detail sectional view through one of the spraying devices; Fig. 8 is a similar view of one of the jets the section being at right angles to that of Fig. 7; Fig. 9 is a detail sectional view, partly broken away, of the manifold; Fig. 10 is a side elevation illustrating an optional embodiment with auxiliary oil tender; Fig. 11 is a longitudinal section partly in elevation showing more in detail the arrangement by which the tank is heated by the exhaust from the engine; Fig. 12 is a detail elevation showing the road preparing means; Fig. 13 is a detail elevation of one set of spraying devices; and Fig. 14 is a side elevation of the complete apparatus illustrated in Fig. 1.

Referring to the drawings, 1 is a tank having domes 2 and 3 provided with heads 4 and 5 suitably secured in place, as by bolts, one head, 4, being provided with a capped thimble 6 whereby upon removing the cap, the tank may be filled from a source of supply above the tank. Through the head 5 extends the end of a suction pipe 7 which terminates in a well or depression at the bottom of the tank, this suction pipe 7 leading to the suction side of a power pump 8. In the suction pipe 7 is located a valve 9, below which is a T to which is joined a branch connection 10 having a cap 11 on its end and provided with a stop cock or valve 12, for a purpose hereinafter explained. The power pump 8 has its discharge side connected by a pipe 13 to the dome 4, whereby the pump may discharge into the tank. In this pipe 13 is located a valve 14, and below and above this valve are located T's 15 and 16. The lower T 15 is connected by piping indicated at 17 to a header pipe of the spraying device, as more fully described hereinafter. The pipe 17 is provided with a control valve 18 having a long valve stem

extending within convenient reach of the operator and provided with a hand-wheel 19. The pipe 17 is provided also with a T 20 connected by a branch pipe 21 with one side of a regulator or relief valve 22, the tension of whose spring may be adjusted by a rod extending within convenient reach of the operator and provided with a hand-wheel 23. The other side of the regulator valve is connected by piping 24 to the T 16 of the discharge pipe 13. The pump 8, is provided with an air chamber 25, and from near the bottom of this air chamber leads a pipe 26 communicating with a pressure gage 27. The pump is driven by means hereinafter described.

The pipe 17, as hereinbefore stated, is connected to a header 28 arranged transversely at the rear of the apparatus, below which is a spraying mechanism connected to and supplied from said header. This spraying mechanism may comprise two distinct sets of apparatus, one set being arranged to send a spray directly downward onto the road and comprising an important feature of my invention, the other set being arranged to indirectly spray the road by discharging the liquid against a screen from which it splashes onto the road-bed.

The spraying mechanism shown in the drawing is constructed as follows: Upon a manifold pipe, 29, having removable caps 30 upon its ends, are threaded a plurality of thimbles, two of which are crosses and the remainder T's, the T's being indicated at 31 and the crosses at 32. The thimbles are soldered to the continuous manifold pipe 29, which is perforated to register with the respective lateral branches of the T's and crosses. The upward branches of the two crosses 32 are connected to downward extending ends 33 of the header 28, as shown in Fig. 4 whereby the liquid is supplied from the header to the manifold. Preferably the crosses are located at about the center of each half of the length of the manifold, in order to assure a uniform distribution of oil to the discharge nozzles. The downward extending branch of each thimble 31 is connected to its respective discharge nozzle through a stop cock 34, the discharge nozzles being of two types, arranged alternately, one type of nozzle, as indicated at 35 extending straight downward, whereas the other type, indicated at 36 turns downward and forward so as to project its jet against an apron or screen 37 arranged in front of the manifold.

The downward discharging nozzles are of a special construction which forms an essential feature of my invention, one of these nozzles being shown in Fig. 7 and being constructed as follows: Two tubes 38 and 39 are connected intermediate their ends by branches 40 and 41 provided with a spigot and socket connection. The tube 38 I shall designate as the trap-tube, as its lower end below the branch 40 serves as a trap for sediment, while the tube 39 I shall designate as the jet-tube. Into the bottom of the trap-tube and extending a distance above the branch 40 is inserted a cylindrical strainer 42 of gauze or perforated metal, whose lower end is secured to a cap 43, threaded onto and closing the lower end of the trap-tube. The upper end of the jet-tube is provided with a similar downward-extending strainer 44 reaching below the branch 41 and provided with a cap 45 threaded on to the upper end of the jet-tube. On the lower end of the jet-tube 39 is a nozzle-head 46, which is provided with two very fine jet-orifices inclining toward each other and practically meeting near the center of the outer surface of the nozzle-head. These jet-orifices are best shown in Fig. 8 being indicated therein at 47.

The means for driving the vehicle may be of any suitable type, but most advantageously comprises an internal combustion engine, as indicated at 48, the hot exhaust gases from the engine being best led through pipe 481 to heating coil 482 in the bottom of the tank. The engine drives the vehicle through controllable connections or gearing in the usual way, said connections including as shown a longitudinally disposed rotary shaft 49 extending back from the motor (placed as shown at the front of the vehicle) and a transverse rotary shaft 490 transmitting motion by sprocket chains 491 to the vehicle wheels. The shafts 49 and 490 would be connected by the gearing commonly employed between such shafts in automobiles having them. From shaft 49 power may be taken to drive the pump. In the present example the said shaft is provided with a gear-wheel 50, arranged to mesh with a gear-wheel 51 slidably splined to a counter-shaft 52, and arranged to be shifted into and out of engagement with the gear-wheel 50, by a forked rod 53 longitudinally movable in bearings, as shown and operated by a hand lever 54 which has the usual spring pawl and lever engaging a sector 55 whereby the gear-wheel 51 may be held in or out of engagement with the gear-wheel 50. On the counter-shaft 52 is fixed a driving wheel 56, in the present instance a chain-wheel, connected by a chain 57 with a chain wheel 58 on a shaft 59, mounted in suitable bearings and provided with a gear wheel 60 which engages a gear-wheel 61 on the pump shaft 62 which is provided with a crank 63, connected by a connecting rod 64 to the pump cross-head 65 to which the pump-piston rod 66 is connected.

The operation of the apparatus is as follows: The tank 1 is filled with oil by gravity from an elevated supply through the

thimble 6, if feasible; if not, then the cap 11 is removed and the connection 10 coupled to a suitable source of oil supply. The valve 9 is closed and the valve 12 opened, and the engine being started, the oil is drawn by way of the pipe 10 past the valve 12 to the suction side of the pump 8 and through the pipe 13 is forced by the pump into the tank at the dome 2. The tank being charged and the valves 12 and 14 closed, the gears 50 and 51 are disconnected and the vehicle is moved by the engine to the place where it is desired to begin the treatment of the roadway. By the lever 54 the gears 51 and 50 are brought into mesh to start the pumps. The oil is drawn from the tank by the pipe 7 to the suction side of the pump 8; thence forced through the pipe 17 past the control valve 18 to the header 28 and the manifold 29, the cocks 34, through the strainers 42 in the trap tubes 38, the branches 40 and 41, through the strainers 44 in the jet tubes 39, to the jets 47 whence it is thrown in a plurality of fan-shaped sprays of mist onto the road.

The height of the jet nozzles above the roadway, the angles of their orifices and the distance apart of the said nozzles are so related that the edges of each fan-shaped spray strike the ground nearly in longitudinal vertical planes respectively passing through the centers of the adjacent jet nozzles. The arrangement of the nozzles is such however that the line of impact of each spray with the ground is at a slight angle to the transverse plane of the vehicle, that is, to the vertical plane through the nozzles; so that while the fan-sprays double the supply of oil to the road they do not strike each other directly.

The pump, being preferably of the double action type and equipped with the air chamber 25, will maintain, at a given speed of the engine, a substantially uniform pressure of say 150 pounds at the jets, the pressure being readable on the gage 27. As the speed of the pump, it being geared directly to the engine, will vary with that of the engine, it becomes advisable or even necessary to provide means to maintain a constant pressure at the discharge whatever the speed of the engine. This function is performed by the regulator or relief valve 22. This valve is so set that, if the delivery of the pump exceeds a volume corresponding to the chosen discharge pressure at the jets, the valve will open and permit the excess of oil to flow through the by-pass 24 to the T 16 and thence by the pipe 13 back into the tank. The tension of the regulator valve 22 being under the direct control of the operator, as stated, he may determine the pressure to be employed, regardless of the speed of the engine, the delivery of the pump beyond that necessary to maintain such pressure being directed back into the tank. This arrangement is also particularly useful where unhomogeneous liquid mixtures are applied to the road instead of homogeneous oil mixtures. For example, where emulsions of oily matter in water are employed, there is a tendency on the part of the constituents of the mixture to separate into layers, unless means are provided to prevent this, and consequently the character of the liquid drawn from the supply tank constantly varies. In the present arrangement this difficulty is readily obviated. By adjusting the tension of the relief valve 22 so that it will open at a pressure somewhat below that which is supplied by the normal operation of the pump, some of the liquid drawn from the supply tank will be returned through the pipe 13, thus producing a circulation through the supply tank which thoroughly mixes and homogenizes the liquid.

Under some circumstances, instead of carrying a tank 1 and returning from time to time to a source of supply to recharge the same, it may be found desirable to eliminate the tank 1, thus reducing the weight of the spraying vehicle, and draw the supply of oil from a separate tender vehicle 67 drawn behind the sprayer and connected with the pipe 10. In this case, as illustrated in Fig. 10, the by-pass 24 leads to a pipe 68 discharging excess oil back into the tender. The operation in use is precisely the same, but the separate tender plan has the advantage that these tenders may be stationed wherever needed along the scene of operations, and as one is emptied it may be uncoupled and another coupled on. The emptied tenders can then be taken one by one to a supply tank and refilled, without the temporary withdrawal of the spraying vehicle from the field of action as would otherwise be necessary.

In connection with the vehicle, a leveler 69 may be employed to bring the road surface to a level in advance of the spray, and, where the dust is too thick on the roadway to permit of its being allowed to remain in that condition, it may be removed to one side in advance of the application of the oil to the road surface, by a suitable sweeping device, or gathered up by a pneumatic device, attached to the spraying vehicle and driven by the same engine, leaving the surface of the roadway in prime condition for oiling. When the surface is uneven, and the leveler fills the low places with dirt and dust from the elevated portions, it is advantageous to apply an extra amount of oil to saturate the accumulated material at that place. Meeting such conditions, the operator would direct a strong flow of oil through the nozzles 36 against the apron or screen 37 which will saturate the road at that particular place.

Under normal conditions, the discharge pressure and consequently the volume of discharge through the spray nozzles being constant at all speeds of the motor, the amount of oil sprayed on a given surface will vary with the speed at which the sprayer passes over the ground, and the amount of oil applied to the road can be regulated by increasing or decreasing the speed of travel. Sometimes, at low temperatures and using the exceedingly heavy oils best suited to certain road surfaces, the viscosity of the oil would prevent satisfactory results. It will then be found advantageous to employ the exhaust from the engine to heat the oil in the tank by means of an exterior jacket or an interiorly disposed coil as illustrated in Figs. 1 and 11. With such heavy viscous oils the temperature required to give the necessary fluidity at the point of discharge through the nozzles is relatively high, in many cases far above the boiling point of water. Owing to the high temperature of the gases exhausted from a gas engine, this required degree of temperature is readily obtained by passing the gases through a heating coil as described above.

While I have particularly designed my jet device for oiling roads, it also has many advantages for other purposes where a mist or very fine liquid spray is required, particularly in cases where the liquid to be sprayed contains impurities or suspended solids liable to interfere with the proper operation of an ordinary spray, and therefore I do not limit this feature of the invention to the combination with the remaining mechanism.

By means of the plurality of fine nozzles, with independent means for cutting off each, and the arrangement of these nozzles so that their fan-shaped sprays will lap past each other without striking, it is possible by cutting off each alternate one of the downward-directed nozzles to apply about half the oil that would be applied with all of the said nozzles in action, and yet not to leave any gaps between the oil sprays.

What I claim is:—

1. Apparatus for treating roadways with oil under high pressure comprising, in combination, a vehicle having suitable running gear, a motor mounted on said vehicle, suitable driving connections between said motor and said running gear for propelling said vehicle at any desired speed, spraying mechanism mounted on said vehicle, an oil supply tank, a pump arranged to be driven by said motor independently of the vehicle, suitable piping for conducting oil from said supply tank to said pump and thence to said spraying mechanism under pressure, and a relief valve in said piping between said pump and said spraying mechanism whereby the oil pressure on said spraying mechanism may be maintained constant without regard to the speed at which the vehicle is driven.

2. The combination with a vehicle, and nozzles carried by said vehicle for discharging liquid, of a driver's seat mounted at the front of said vehicle, a tank mounted on said vehicle back of said seat with a space intervening, a pump mounted on said vehicle in said space, piping between said tank and said pump comprising pipes running transverse to the vehicle's length, similarly arranged piping between said nozzles and said pump, and valves in said transversely running pipes accessible for operation at the front of the piping above the pump level, substantially as described.

3. The combination with a vehicle, and nozzles carried by said vehicle for discharging liquid, of a driver's seat mounted at the front of said vehicle, a tank mounted on said vehicle back of said seat with a space intervening, a pump arranged in said space, piping between said tank and said pump comprising pipes running transverse to the vehicle's said length and including suction and discharge pipes, both of which extend above the level of said seat and open into said tank, piping between said nozzles and said pump comprising pipes running transverse to the vehicle's said length, and valves in said transversely running pipes accessible for operation at the front of said piping above the pump level, substantially as described.

4. The combination with a vehicle, and nozzles carried by said vehicle for discharging liquid, a motor mounted at the front of said vehicle, a driver's seat mounted at the front of said vehicle above the motor level, a driving shaft running back from said motor in the direction of the vehicle's length, vehicle propelling gearing, a tank mounted on said vehicle back of said driver's seat with a space intervening, a pump arranged in said space and having an operating shaft extending in the direction of the vehicle's length, gearing which interconnects said shafts and includes a clutch, piping between said tank and said pump which comprises pipes running transverse to the vehicle's said length and which also includes suction and discharge pipes extending both of them above the level of said seat and opening both of them into said tank, piping between said nozzles and said pump which comprises pipes running transverse to the vehicle's length, and valves in said transversely running pipes accessible for operation at the front of said piping above the pump level, substantially as described.

5. The combination with a tank-carrying vehicle, and nozzles carried by said vehicle for discharging liquid, of a supply tank, internal combustion engine, and a pump, all

mounted on said vehicle, pump-operating and vehicle-propelling gearing driven by said engine, means whereby heat generated from the waste gases in running said engine is applied to heat the liquid to be discharged from said nozzles, piping for circulating liquid from the tank to the pump and back to the tank, and piping for conducting liquid from said tank to said nozzles under pressure produced by said pump, substantially as described.

6. The combination with a tank-carrying vehicle, and nozzles carried by said vehicle for discharging liquid, of a supply tank, an internal combustion engine, and a pump, all mounted on said vehicle, pump-operating and vehicle-propelling gearing driven by said engine, means whereby the heat of the exhaust gases from said engine is applied to heat the liquid to be discharged from said nozzles, piping for circulating liquid from the tank to the pump and back to the tank, and piping for conducting liquid from said tank to said nozzles under pressure produced by said pump, substantially as described.

7. The combination, with a vehicle, a motor arranged to propel the same, a pump carried by the vehicle and arranged to be driven by the motor, a spraying device mounted on the vehicle, and a tank arranged to move with the vehicle, of a branched suction pipe connected to the suction side of the pump, each branch of the suction pipe having a valve, one of said branch suction pipes communicating with the tank, a branched discharge pipe connected to the discharge side of the pump, one of said discharge branches being in communication with the spraying device and the other with the tank, a by-pass connecting the two discharge branches, an adjustable relief valve controlling said by-pass, a valve in the branch discharge to the tank between its connections to the by-pass and to its companion branch discharge pipe and a valve in the latter branch discharge pipe between its connections with the by-pass and the spraying device.

8. In a road sprinkling apparatus, the combination, with a vehicle, and a tank moving with the vehicle, of a spraying device carried by the vehicle and comprising a series of nozzles arranged transversely of the vehicle, said nozzles being arranged to produce fan-sprays, each nozzle being arranged so that the line of impact of its fan-spray with the surface being sprayed is at an angle to the vertical plane through the series of nozzles, and means for supplying liquid under pressure from the tank to the spraying device.

9. In a road sprinkling apparatus, the combination, with a vehicle, and a tank moving with the vehicle, of a spraying device carried by the vehicle and comprising a series of nozzles arranged transversely of the vehicle, said nozzles being arranged to produce fan-sprays overlapping each other, each nozzle being arranged so that the line of impact of the fan-spray with the surface being sprayed is at an angle to the vertical plane through the series of nozzles, and means for supplying liquid under uniform pressure from the tank to the spraying device.

10. In a road sprinkler, the combination, with a vehicle, a motor for propelling the the same, a tank arranged to travel with said vehicle, and a pump carried by the vehicle and arranged to be driven by the motor, of a sprinkling device comprising two series of nozzles, arranged transversely of the roadway, the nozzles of one series being arranged to produce overlapping fan-sprays, the nozzles of one series alternating with the nozzles of the other series, pipe connections between the tank, the pump and the spraying device, means for maintaining a uniform discharge, and means for independently shutting off the individual nozzles of both series.

11. The combination with a vehicle, of nozzles carried by said vehicle and arranged to deliver overlapping but non-interfering fan-shaped jets of liquid onto a roadway to give a deposit of liquid extending continuously across a definite width thereof, and means for putting some of said nozzles out of operation to reduce the volume of liquid delivered without thereby destroying the continuity of the liquid deposit.

12. The combination with a vehicle, of nozzles carried by said vehicle and arranged to discharge onto the roadway fan-shaped jets spread transversely of the road and overlapped to the extent of half their width, means for supplying liquid to said nozzles, and means for putting alternate nozzles into and out of operation independently of or concurrently with the others, as may be desired, so that when all the nozzles are in operation the liquid is more evenly distributed by reason of the edges of the several jets being in line with the middle portions of the adjacent jets in the direction of the road, and when alternate nozzles are put out of operation the remaining nozzles deliver a part only of the former supply and yet distribute it across the roadway without vacant spaces, substantially as described.

13. The combination, with a vehicle, a pump mounted thereon, a tank arranged to travel with said vehicle, a coil at the bottom of the tank and discharging to the air, an internal combustion engine arranged to propel the pump, and having its exhaust connected to the coil in the tank, means for coupling the motor to and uncoupling it from the vehicle to propel the same, a spraying device carried by the vehicle and arranged to discharge to the road, a suction pipe con-

necting the bottom of the tank with the suction side of the pump, a branched discharge pipe connected to the discharge side of the pump, one branch leading to the spraying device and the other leading to the top of the tank, and valves in the respective branches of the discharge pipe whereby the pump may circulate the liquid through the tank to heat the liquid while the vehicle is stationary and the sprayer shut off.

In testimony whereof, I affix my signature in the presence of witnesses.

GEORGE M. SAYBOLT.

Witnesses:
OTTO HANSEN,
HENRY A. MCGEE.