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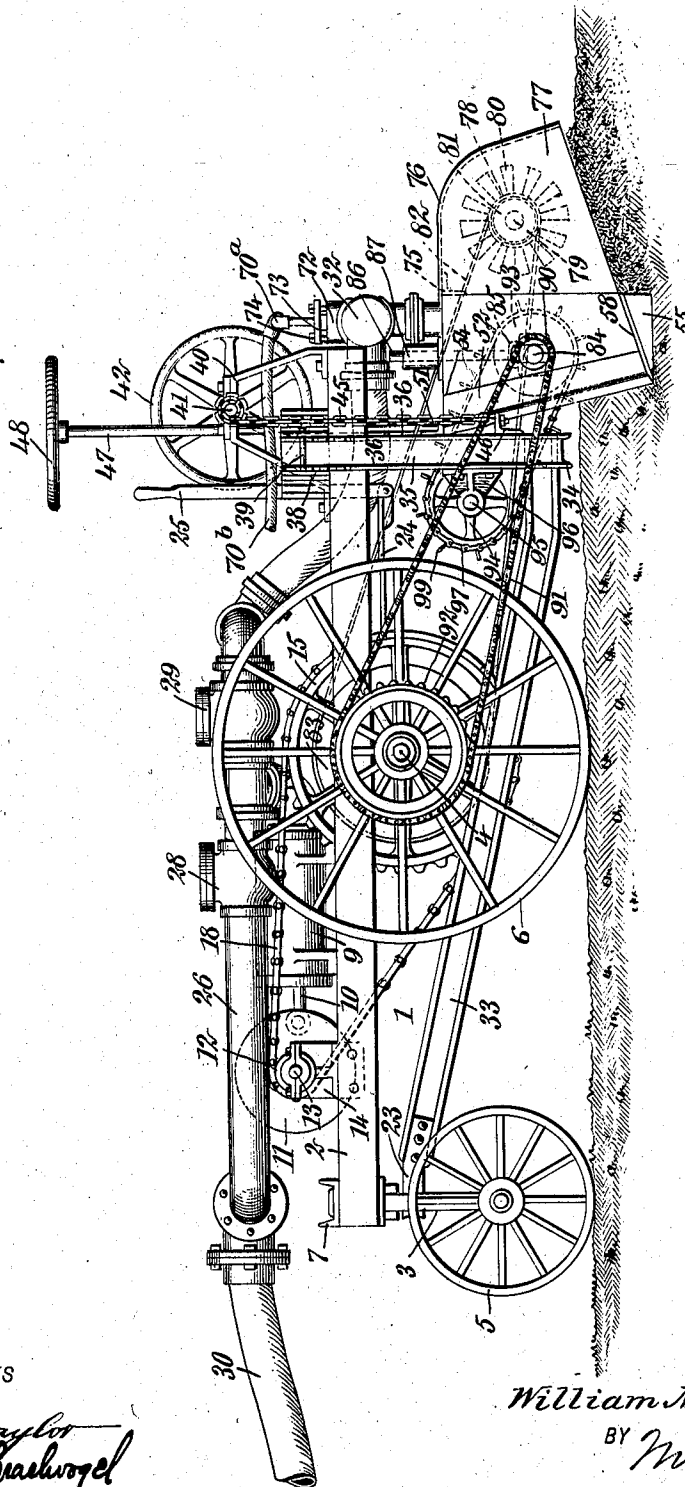
PATENTED APR. 14, 1908.

W. M. MURRAY.
OIL SPREADER.

APPLICATION FILED NOV. 5, 1907.

5 SHEETS—SHEET 1.

Fig. 1.



WITNESSES

Geo. W. Taylor
John K. Brachvogel

INVENTOR

William M. Murray

BY

Murray & Co.

ATTORNEYS

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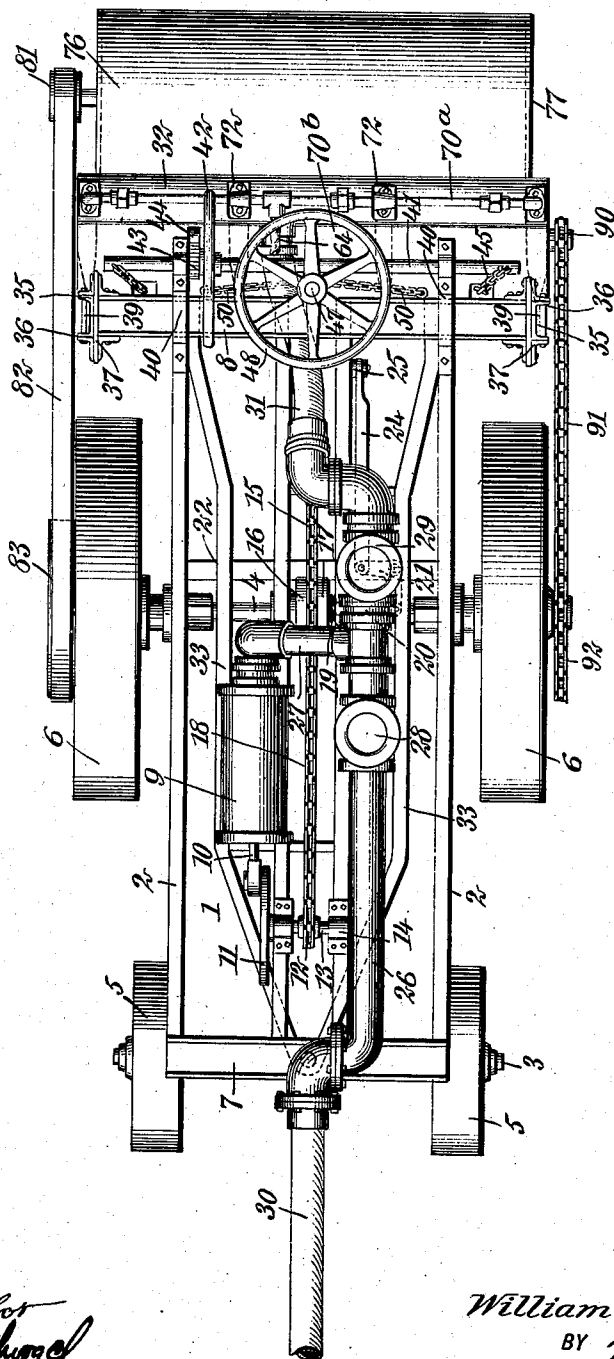
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5 SHEETS—SHEET 2.

Fig. 2.



WITNESSES

Geo. W. Haylor
John K. Buchholz

INVENTOR

William M. Murray

BY *Murray & Co.*

ATTORNEYS

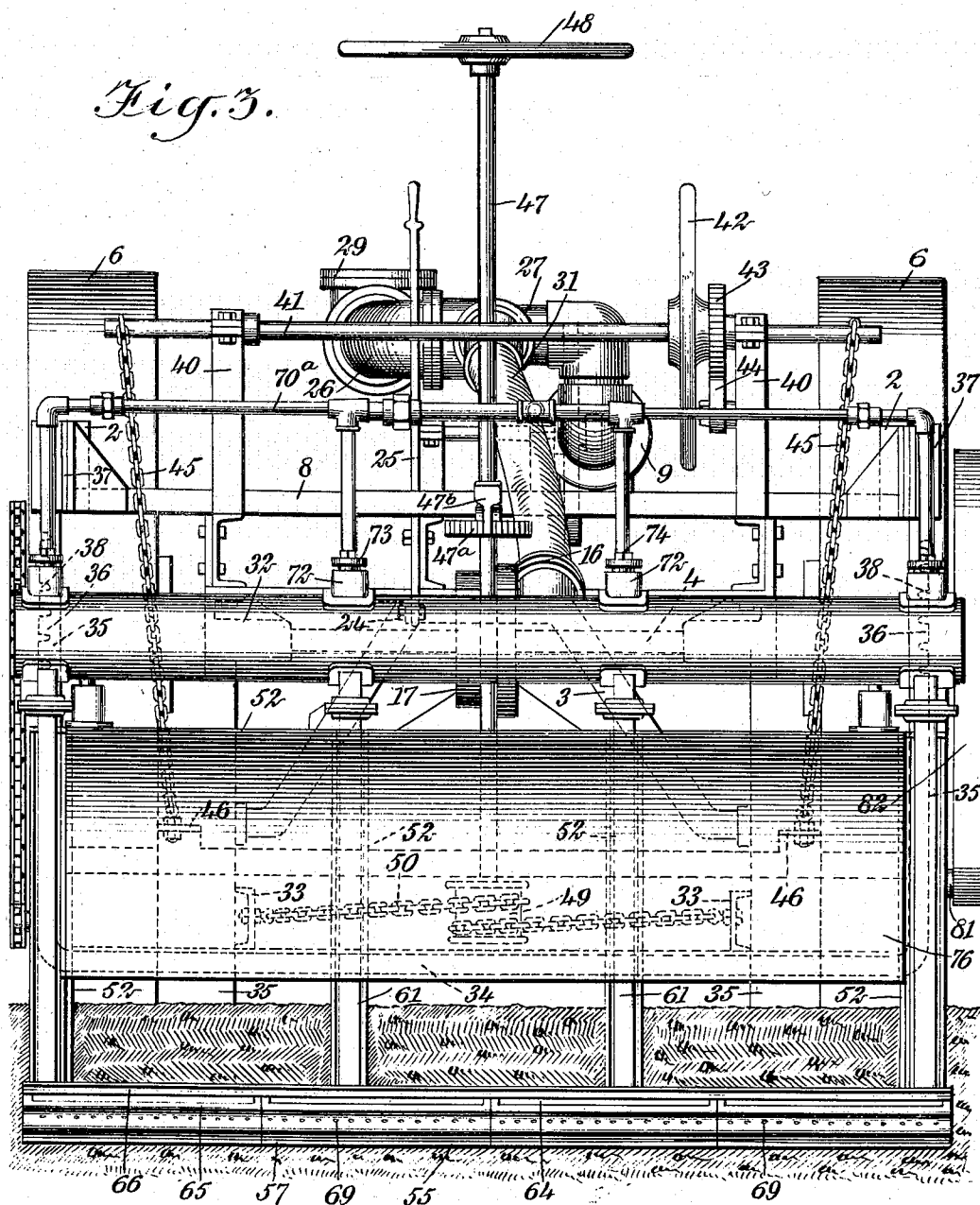
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5 SHEETS—SHEET 3.



WITNESSES

Geo. W. Maylor
John K. Buchholz

INVENTOR

William M. Murray

BY *Munn Co.*

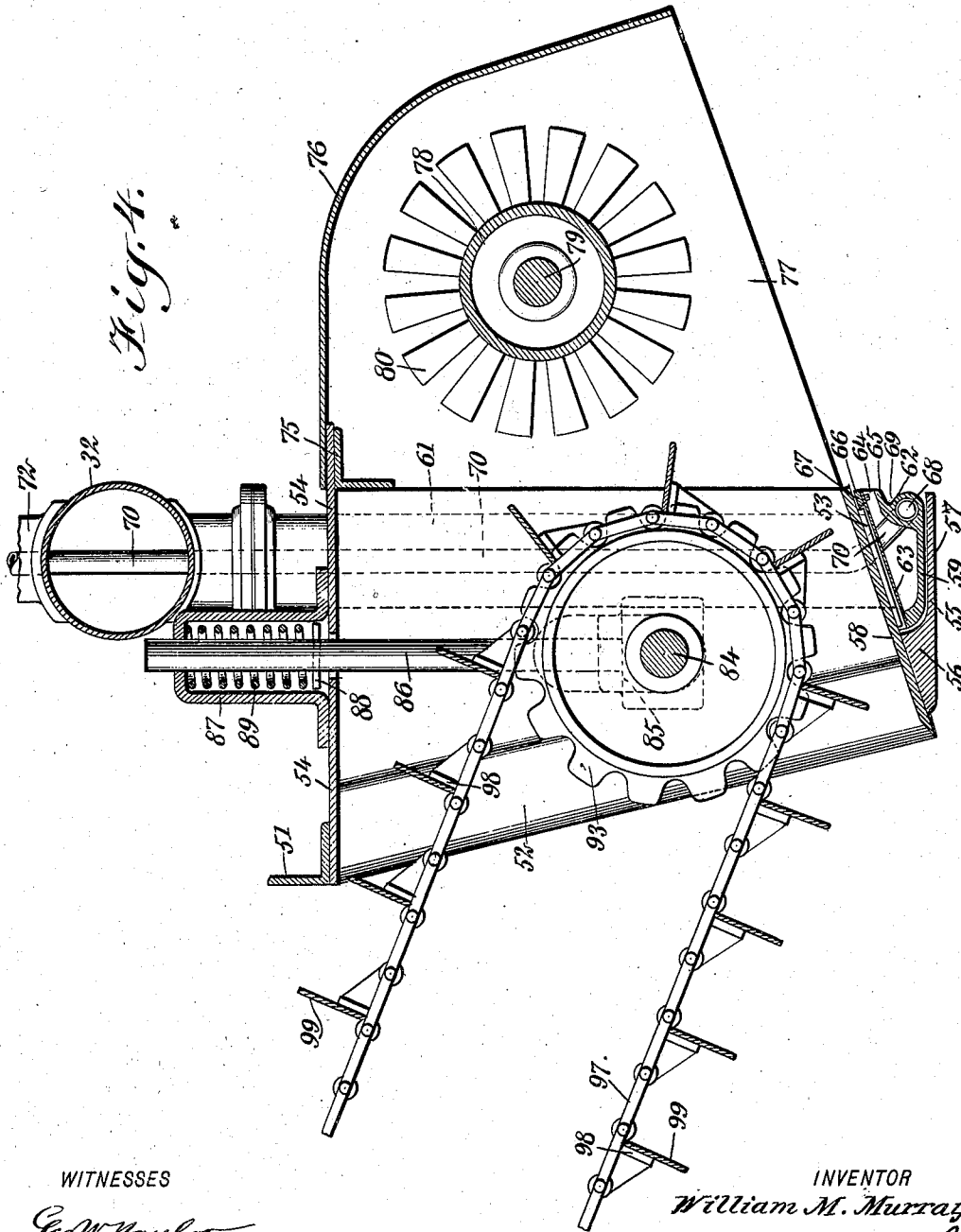
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6 SHEETS—SHEET 4.



WITNESSES

Geo. W. Maylor
John K. Brachvogel

INVENTOR

William M. Murray

BY

Murray & Co.

ATTORNEYS

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5 SHEETS—SHEET 5.

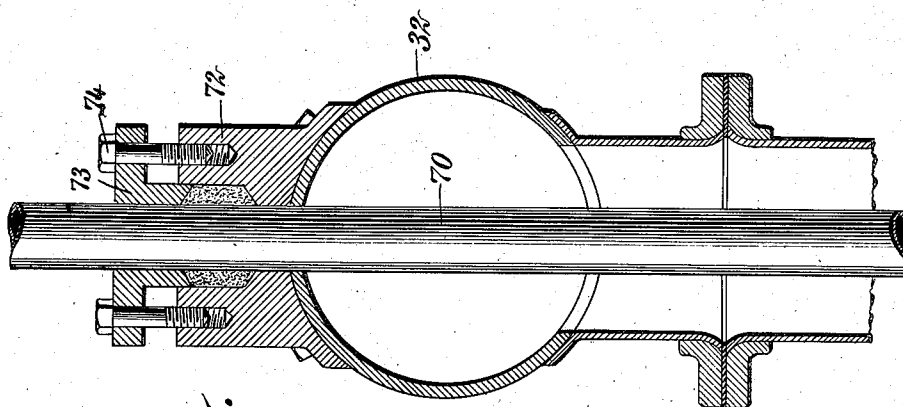


Fig. 7.

Fig. 5.

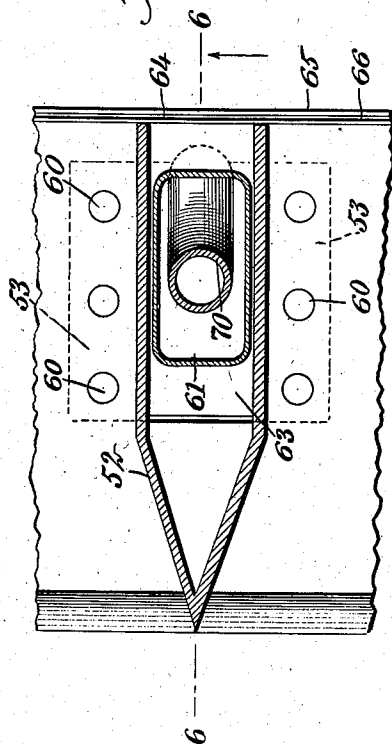
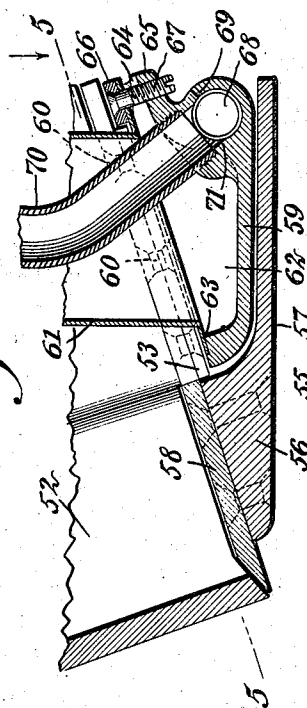


Fig. 6.



WITNESSES

Geo. W. Maylor
John K. Brachvogel

INVENTOR

William M. Murray

BY *MumCo.*

ATTORNEYS

UNITED STATES PATENT OFFICE.

WILLIAM MARION MURRAY, OF SAWTELLE, CALIFORNIA.

OIL-SPREADER.

No. 884,943.

Specification of Letters Patent.

Patented April 14, 1908.

Application filed November 8, 1907. Serial No. 400,803.

To all whom it may concern:

Be it known that I, WILLIAM MARION MURRAY, a citizen of the United States, and a resident of Sawtelle, in the county of Los Angeles and State of California, have invented a new and Improved Oil-Spreader, of which the following is a full, clear, and exact description.

This invention relates to oil spreaders, and is particularly useful in connection with devices of this character used for the purpose of incorporating oil, tar, asphaltum and the like with the earth or other material of roads.

An object of the invention is to provide an oil spreader of simple, strong and efficient design, by means of which the oil or other fluid is atomized and forced into the roadway at an appreciable distance below the surface of the same.

A further object of the invention is to provide a device of this character by means of which the oil, tar, asphaltum or other fluid, is thoroughly atomized by means of a steam or compressed air spray and is ejected from an adjustable plow arranged to be forced longitudinally under the loosened material of the road, and which is provided with a roller adapted thoroughly to mingle the earth and fluid after the plow has passed through the former.

A still further object of the invention is to provide an oil spreader having a plow arranged to be forced longitudinally along the road at an appreciable distance below the surface of the same, having means for permitting the escape of the atomized oil or other fluid at the rear of the plow, and also having a device for regulating the passing of the loosened road material over the plow, whereby the admixture of the atomized fluid with the material can be controlled.

Another object of the invention is to provide an oil spreader including a wheeled frame carrying a plow which serves to loosen the road material and permits the escape of the atomized oil or other fluid therefrom to the material, and so arranged that the various operable parts of the device are driven by power derived from the movement of the wheeled frame.

The invention consists in the construction and combination of parts to be more fully described hereinafter and particularly set forth in the claims.

Reference is to be had to the accompany-

ing drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views, and in which

Figure 1 is a side elevation of my oil spreader showing the same in operative position upon a road; Fig. 2 is a plan view of the oil spreader; Fig. 3 is an enlarged rear elevation; Fig. 4 is an enlarged longitudinal section of a part of the oil spreader; Fig. 5 is an enlarged transverse section of a detail on the line 5—5 of Fig. 6; Fig. 6 is an enlarged longitudinal section of the same detail on the line 6—6 of Fig. 5; and Fig. 7 is an enlarged longitudinal section of a further detail.

Before proceeding to a more detailed explanation of my invention, it should be understood that the oil, tar, asphaltum or other similar substance, is incorporated into the material of the road for the purpose of rendering the same compact, and to a certain degree impervious to moisture. At the same time, the impregnation of the road with the oil or other fluid, to a large extent obviates dust. To carry out the process of incorporating the oil, tar or asphaltum with the dirt or other material of the road, the latter is usually plowed or harrowed to a certain depth and the lumps of earth are broken up as finely as possible, manually or in some other suitable manner. By means of my invention, the fluid is mingled with the earth of the road and incorporated with the same under the surface of the roadway, by means of a plow which travels longitudinally under the surface of the road and through which the fluid is ejected. It is of course of importance that the fluid be sprayed not merely upon the surface of the earth but be thoroughly mingled with the earth of the roadway. My invention effects not only this, but as well obviates the preliminary work of plowing or harrowing the road and breaking up the material. I employ steam or compressed air to atomize the oil, tar or asphaltum, and in this way the particles of the same are thoroughly scattered and mingled with the loosened soil, which is suitably worked up by a toothed roller, which follows the plow and is operated by the movement of the wheeled frame which carries the plow. At the same time the passing of the material over the plow is regulated by means of a belt with blades, which is operated by the movement of the frame and which serves to regulate the admixture of the

fluid with the earth, the speed of the device along the road controlling the operation of the admixture regulating mechanism.

Referring more particularly to the drawings, I provide a wheeled frame 1, which is constructed to travel upon the road as is an ordinary vehicle. The frame 1 comprises substantially horizontally supporting members 2, carried by the front axle 3 and the rear axle 4, mounted in suitable brackets attached to the members 2. Mounted upon the front axle 3 are the front wheels 5, and mounted upon the rear axle 4 are the rear wheels 6. The supporting members 2 are transversely braced by proper tie members 7 and 8, riveted in position and consisting preferably of channels. Arranged upon the supporting members 2 is a pump cylinder 9, the piston 10 of which is pivotally secured to a crank disk 11, mounted with a sprocket wheel 12 upon a transverse shaft 13, journaled in suitable bearing brackets 14 upon the supporting members. Loosely mounted upon the rear axle 4 is a second sprocket wheel 15, having a rigid clutch section 16. A second clutch section 17 arranged to engage the section 16, is slidably mounted upon the axle 4 and is arranged to rotate therewith. It will be understood that when the sections 16 and 17 are brought into operative engagement, the sprocket wheel 15, which is connected by means of a chain 18 with the sprocket wheel 12, revolves with the axle 4 and through the chain and the sprocket wheel on the axle 13 drives the pump. An annular guide member 19, is slidably mounted upon the axle 4 and is arranged to rotate therewith. The member 19 is secured to the clutch section 17 and is adapted to operate the same. An arm 20, at one end engages the annular member 19 and at the other end is secured to a bell crank lever 21 mounted on a transverse member 22 of the frame, the other end of the bell crank lever being secured to a link 24. The link 24 is pivotally attached to a lever 25, which can be manually operated and by means of which the clutch sections can be thrown into engagement to drive the pump, or separated to stop the operation of the same. It will be understood that the pump is operated by the movement of the device itself upon the roadway, the sprocket wheel 15 being driven from the rear wheels of the vehicle, as it is mounted upon the axle of said wheels.

A pipe 26, is mounted upon the supporting members 2 and has a branch 27, communicating with the pump cylinder 9. On each side of the connection of the pipe 26 and the branch 27 are valves 28 and 29, controlling the operation of the pump and serving to direct the fluid forced by the pump, in the proper direction, as will appear hereinafter. The pipe 26 has a flexible tube connection 30, with a supply tank which can be drawn upon

another vehicle or be elsewhere suitably carried. The pump draws the oil or other fluid from the tank through the pipe 26 and forces it along the same to a tube 31, joined to the end of the pipe and communicating with a transverse cylinder 32, located at the rear end of the device. The arrangement of the valves 28 and 29 is such, that during a suction stroke of the pump the valve 29 is closed and the valve 28 is opened. On the return stroke of the pump which forces the fluid from the cylinder, the valve 28 is closed and the valve 29 is opened, thereby permitting the flow of the fluid to the cylinder 32 and preventing the return of the fluid along the pipe 26.

Carriers 33, preferably comprising similar longitudinal channel bars are pivoted to the forward axle 3 by means of a suitable bracket 23. The carriers 33 are inclined at an angle with the ground, and have the rear ends disposed parallel to the ground and extending under the transverse cylinder 32. A cross member 34 is secured near the rear ends of the carriers 33 and has the extremities upwardly disposed to form uprights 35, which are provided with lateral flanges 36. Preferably, the transverse member and the uprights 35 are formed from a single, suitably bent channel. The uprights 35 are located slidably in brackets 37, provided at the ends of the tie member 8. The flanges 36 of the uprights are provided at the edges with a plurality of notches 38, adapted to engage with pins 39, located in openings of the brackets 37. By means of the notches 38 and the pins 39, the uprights can be secured to the tie member 8 in a plurality of positions, whereby the height of the carriers above the road-bed can be regulated and adjusted as desired.

Rotatably mounted in proper journal brackets 40, carried at the ends of the members 2, is a transverse shaft 41, having a controlling hand-wheel 42, and a ratchet 43 engaging with a pawl 44 mounted upon one of the journal brackets. Wound upon the shaft 41 near the ends of the same are chains 45, secured to extensions 46 rigid with the uprights 35. By turning the shaft 41 by means of the hand wheel 42, the carriers 33 can be raised or lowered as desired, to adjust their height above the roadway. A shaft 47 at substantially right-angles to the transverse shaft 41, and provided at its upper end with a controlling hand-wheel 48 and at its lower end with a drum 49, is rotatably mounted at the rear of the frame in journal brackets provided for the purpose. Wound about the drum 49 is a chain 50, having its extremities respectively secured to the opposite carriers 33. By turning the shaft 47 by means of the hand wheel 48 in one direction or the other, the carriers 33 can be adjusted laterally as conditions require. The shaft 47

has a toothed or serrated wheel 47^a rigid therewith, and adapted to engage a dog 47^b, which thereby locks the shaft against a movement of rotation. When it is desired to lower the carriers 33, it is necessary to displace the pawl 44 to permit the shaft 41 to rotate. Similarly, when it is desired to turn the shaft 47 in one direction or the other, the dog 47^b must be disengaged from the toothed wheel 47^a.

A transverse beam 51, is rigidly secured to the uprights 35, and consists preferably of an angle member and carries the plow supports 52, which depend therefrom and are secured thereto in any suitable manner. The plow supports 52 are hollow and open at the rear, having the forward portions wedge-shaped to facilitate their passage through the material of the road. At the lower edges they are provided with laterally disposed flanges 53, for a purpose which will appear hereinafter. A cover 54, is arranged at the top of the plow supports, and extends between the same and the transverse beam 51. The plow supports 52 are inclined forward as is shown most clearly in Fig. 4, this inclination serving to facilitate the movement of the supports through the material of the roadway. As the edge of each of the plow supports is disposed toward the direction of motion of the device, the supports can move easily through the loosened earth of the roadway. The plow 55 is arranged transversely of the device, and is wedge-shaped in form with a horizontal edge extending toward the frame of the device. The plow comprises a solid body 56, having a substantially horizontal lower face 57, and an inclined top plate 58, having the lower edge beveled to form the cutting or forward edge of the plow. At the rear, the body of the plow is cut away and receives a hollow movable member 59. The top plate 58 has openings formed therein to receive the laterally disposed flanges 53 of the plow supports. The flanges 53 engage at the under side of the top plate 58 adjacent to the edges of the openings, and are secured to the top plate by means of rivets 60. Within the plow supports 54 are oil ducts 61, which communicate with the cylinder 32 and have the lower ends arranged within the openings of the top plate 58. The movable member 59 has chambers 62 therein, extending the entire length of the member and provided with flexible covers 63, consisting, for instance, of diaphragms of copper plate or the like. The open lower ends of the ducts 61 are arranged at suitable openings of the covers 63, and thereby the flow of oil from the cylinder through the ducts 61 to the chamber 62 is effected. A slot or opening 64, is formed at the rear of the member 59 between a lip 65, and a movable bar 66, which is secured to the

flexible cover 63. Set screws 67 arranged in openings of the lip 65 and the bar 66, permit the adjustment of the slot 64 to regulate the flow of the oil through the same. The slot 64 is upwardly directed and permits the close regulation of the oil flow. Within the movable member 59 underneath each oil chamber 62 is a second or steam chamber 68, which extends lengthwise of the member 59 and is provided with a number of openings 69, which permit the escape of steam from the chamber. The openings 69 are directed upwardly and at an angle with the slot 64; consequently, the steam jets escaping from the openings 69 intersect the stream of oil flowing from the slot and atomize the same. Within each of the ducts 61 is located a steam pipe 70, having the lower or discharge end arranged in an opening 71, communicating with the steam chamber 68. The steam pipes 70 extend upwardly and communicate with a common steam pipe 70^a to which the steam may be admitted by means of a pipe 70^b. It will be understood that compressed air can be used as well as steam. The steam pipes 70 extend through openings in the cylinder 32 and pass through stuffing boxes 72 of the usual form and including glands 73 and adjusting screws 74.

The discharge openings of the oil chambers and the row of openings of the steam chambers extend substantially the entire length of the plow, and are so arranged that the oil and steam or compressed air escaping therefrom mingle a short distance behind the plow, the vapor atomizing the liquid and causing the same to permeate the earth which falls over the rear edge of the upper plate 58 of the plow as the latter moves along under the loosened road material.

At the rear edge of the cover 54 is a transverse angle member 75; to which is secured an apron 76, extending backwardly and downwardly toward the road and having sides 77. Underneath the apron is mounted a roller 78, carried upon a shaft 79, journaled in bearing brackets at the sides of the apron. The roller 78 has radial projections or teeth 80, which serve to break up, level and otherwise work the material of the roadway at the back of the plow. At one side, the roller has a pulley 81, which is operatively connected by means of a belt 82, with a pulley 83, rigidly mounted upon the axle 4, so that the roller is operated by the forward movement of the vehicle along the roadway.

A transverse shaft 84, is arranged above the plow 55, and has the extremities journaled in suitable bearings 85. Rigid with the bearings 85 are posts 86, extending through openings in the cover 54 and passing through sockets 87. The posts 86 are movably mounted within the sockets and have rigid collars 88. The posts 86 at the upper

ends have helical springs 89, which resiliently hold the posts and the shaft 84. At one extremity of the shaft 84 is a sprocket 90, operately connected by means of a chain 91, with a sprocket 92, mounted upon the axle 4 at the outside of a wheel 6. Thus the shaft 84 is driven by the forward movement of the wheeled frame upon the roadway. Between each pair of adjacent plow supports 52, the shaft 84 carries separated toothed wheels 93, which are alined with similar wheels 94, mounted upon a transverse shaft 95, carried in journal brackets 96, attached to the up-rights 35. Chains 97, are arranged upon the alined toothed wheels 93 and 94, and have brackets 98 which carry transverse blades or paddles 99, extending from chain to chain of each pair between the adjacent plow supports.

The chains and pedals constitute a device for regulating the admixture of the atomized oil or other fluid with the earth, for the paddles are so arranged that they control the passage of the loosened earth over the plow. The paddles are driven over the plow toward the rear edge of the same and thus force the earth along the top plate and over the plow. The faster the vehicle travels the faster will the paddles move, and consequently the more rapidly will the earth be forced over the plow and to the rear of the same. It will be understood that if the earth passes slowly over the plow a greater quantity of oil will be mixed with the earth per unit mass of the same; consequently, if the vehicle travels more rapidly the earth is moved over the plow much faster and less oil is forced into the same. On the other hand, when the vehicle moves more slowly, the earth passes over the plow more slowly and a greater quantity of oil per unit mass of earth is incorporated in the material of the roadway.

Having thus described my invention I claim as new, and desire to secure by Letters Patent:—

1. In an oil spreader, a frame adapted to be drawn upon a road, a plow mounted upon said frame and adapted to be forced longitudinally along the surface of the road, means for discharging atomized oil from said plow, and means for working the material of the road.

2. In an oil spreader, a frame adapted to be drawn upon a road, a plow mounted upon said frame and adapted to be forced longitudinally under the surface of the road, means for discharging oil from said plow, and means for atomizing said oil at the point of discharge from said plow.

3. In an oil spreader, a frame adapted to be drawn upon a road, a plow mounted upon said frame and adapted to be forced longitudinally under the surface of the road, means for discharging atomized oil from said

plow, and means for controlling the movement of the road material over said plow, thereby regulating the admixture of the oil with the road material.

4. In an oil spreader, a frame adapted to be drawn upon a road, a plow mounted upon said frame and adapted to be forced longitudinally under the surface of the road, means for discharging oil from said plow, means for atomizing said oil near the point of discharge from said plow, means for regulating the admixture of the oil with the material of the road, and means for working the material of the road at the rear of said plow.

5. In an oil spreader, a frame adapted to be drawn upon a road, a plow mounted upon said frame and adapted to be forced horizontally along the surface of the road, means for discharging oil from said plow, means for atomizing said oil near the point of discharge from said plow, and means mounted behind said plow for working the material of the road.

6. In an oil spreader, a frame adapted to be drawn upon a road, a plow mounted upon said frame and adapted to be forced horizontally under the surface of the road, means for discharging oil from said plow, means for atomizing said oil near the point of discharge from said plow, means mounted behind said plow for working the material of the road, and means for controlling the material passing over said plow, thereby regulating the admixture of the oil with the material.

7. In an oil spreader, a frame adapted to be drawn upon a road, a plow secured to said frame and adapted to be forced longitudinally under the surface of the road, said plow having an inclined upper surface, means for discharging oil at the rear of said plow below the edge of said inclined surface, means for discharging steam at the rear of said plow to atomize said oil, and means for working the material at the rear of said plow.

8. In an oil spreader, a frame adapted to be drawn upon a road, a plow secured to said frame and adapted to be forced longitudinally under the surface of the road, said plow having an inclined upper surface, means for discharging oil at the rear of said plow below the edge of said surface, means for discharging steam at the rear of said plow to atomize said oil, means for working the material of the road, and means for regulating the mixture of the oil with the road material.

9. In an oil spreader, a frame adapted to be drawn upon a road, a plow mounted upon said frame and adapted to be forced longitudinally under the surface of the road, means for discharging oil from said plow, means for atomizing said oil near the point of discharge from said plow, means for adjusting said plow transversely of its length,

means for adjusting said plow in the direction of its length, and means for working the material of the road at the rear of said plow.

10. In an oil spreader, a frame adapted to
5 be drawn upon a road, a plow mounted upon said frame and adapted to be forced longitudinally under the surface of the road, means for discharging oil from said plow, means for atomizing said oil near the point
10 of discharge from said plow, means for adjusting said plow vertically, means for adjusting said plow horizontally, means for working the material of the road at the rear of said plow, and means for controlling the
15 movement of the road material over said plow, thereby regulating the admixture of the oil with the road material.

11. In an oil spreader, a frame adapted to be drawn upon a road, a plow mounted upon
20 said frame and adapted to be forced longitudinally under the surface of the road, a pump on said frame adapted to force oil through said plow, means for atomizing said oil at the point of discharge from said plow,
25 means for adjusting said plow transversely of its length, means for adjusting said plow in the direction of its length, means for driving said pump through the movement of said frame, and means for working the material
30 of the road at the rear of said plow.

12. In an oil spreader, a frame adapted to be drawn upon a road, a plow mounted upon said frame and adapted to be forced longitudinally under the surface of the road, a
35 pump on said frame serving to force oil through said plow, means for atomizing said oil at the point of discharge from said plow, means for adjusting said plow vertically, means for adjusting said plow horizontally,
40 means for driving said pump through the movement of said frame, means for working the material of the road at the rear of said plow, means for driving said working means through the movement of said frame, and
45 means for controlling the movement of the road material over said plow, thereby regulating the admixture of the oil with the road material.

13. In an oil spreader, a frame adapted to
50 be drawn upon a road, carriers secured to said frame and arranged to swing in two directions, means for moving said carriers in two directions, an oil container mounted upon said carriers, a plow mounted upon said
55 carriers and adapted to be forced longitudinally under the surface of the road, said plow having an oil chamber presenting a discharge slot, said chamber and said container having internal communication, means for forcing
60 oil through said container into said chamber, and means for atomizing said oil at said slot.

14. In an oil spreader, a frame adapted to be drawn upon a road, carriers secured to said frame and arranged to swing vertically
65 and laterally, means for raising or lowering

said carriers, means for moving said carriers laterally, an oil container mounted upon said carriers, a plow mounted upon said carriers and adapted to be forced longitudinally under the surface of the road, said plow having
70 an oil chamber presenting a discharge slot, said chamber and said container having internal communication, means for forcing oil through said container into said chamber, means for atomizing said oil near said slot,
75 and a roller secured to said carriers and adapted to work the road material at the rear of said plow.

15. In an oil spreader, a frame adapted to be drawn upon a road, carriers secured to said
80 frame and arranged to swing vertically and laterally, means for raising or lowering said carriers, means for moving said carriers laterally, an oil container mounted upon said carriers, a plow mounted upon said carriers
85 and adapted to be forced longitudinally under the surface of the road, said plow having an oil chamber presenting a discharge slot, said chamber and said container having internal communication, means for forcing oil
90 through said container into said chamber, means for atomizing said oil near said slot, a roller secured to said carriers and adapted to work the road material at the rear of said plow, and means for controlling the move-
95 ment of the road material over said plow, thereby regulating the admixture of the oil with the road material.

16. In an oil spreader, a frame adapted to be drawn upon a road, carriers secured to
100 said frame and adapted to swing in two directions, uprights rigid with said carriers, means for removably securing said uprights in a plurality of positions, a shaft mounted upon said frame and adapted to be manually
105 operated, flexible members wound upon said shaft and secured to said carriers, a second shaft at an angle with said first shaft and mounted upon said frame, said second shaft being adapted to be manually operated, a
110 flexible member wound upon said second shaft and having its extremities secured to said carriers, a plow mounted upon said carriers and adapted to be forced longitudinally under the surface of the road, means for dis-
115 charging oil from said plow, and means for atomizing said oil at the point of discharge from said plow.

17. In an oil spreader, a frame adapted to be drawn upon a road, carriers secured to
120 said frame and adapted to swing horizontally and vertically, uprights rigid with said carriers, means for removably securing said uprights to said frame in a plurality of positions, a horizontal shaft mounted upon said
125 frame and adapted to be manually operated, flexible members wound upon said shaft and secured to said carriers, means for preventing the rotation of said shaft in one direction, a vertical shaft mounted upon said frame and
130

adapted to be manually operated and having a drum, a flexible member wound upon said drum and having its extremities secured to said carriers, means for locking said vertical shaft in a plurality of positions, a plow mounted upon said carriers and adapted to be forced longitudinally under the surface of the road, means for discharging oil from said plow, and means for atomizing said oil at the point of discharge from said plow.

18. In an oil spreader, a frame adapted to be drawn upon a road, carriers secured to said frame and adapted to swing horizontally and vertically, uprights rigid with said carriers, means for removably securing said uprights to said frame at a plurality of points, a horizontal shaft mounted upon said frame and adapted to be manually operated, flexible members wound upon said shaft and secured to said carriers, means for preventing the rotation of said shaft in one direction, a vertical shaft mounted upon said frame and adapted to be manually operated and having a drum, a flexible member wound upon said drum and having the extremities secured to said carriers, means for locking said vertical shaft in a plurality of positions, a plow mounted upon said carriers and adapted to be forced longitudinally under the surface of the road, means for discharging oil from said plow, means for atomizing said oil at the point of discharge from said plow, a roller secured to said carriers near the extremities thereof and adapted to work the road material at the rear of said plow, and means for controlling the movement of the road material over said plow thereby regulating the admixture of the oil with the road material.

19. In an oil spreader, a frame adapted to be drawn upon a road and having a wheeled axle, a plow mounted upon said frame and adapted to be forced longitudinally under the surface of the road, a pump carried upon said frame and arranged to force oil through said plow, means for atomizing said oil at the point of discharge from said plow, a revolvable shaft mounted upon said frame and controlling the operation of said pump, a clutch section upon said axle and free to rotate thereupon, means for operatively connecting said clutch section and said shaft, a second clutch section slidably mounted upon said axle to rotate therewith and adapted to engage with said first clutch section to drive the same, and means for manually sliding said second section upon said axle.

20. In an oil spreader, a frame adapted to be drawn upon a road, a plow mounted upon said frame and adapted to be forced longitudinally under the surface of the road, means for discharging oil from said plow, means for atomizing said oil near the point of discharge from said plow, means for adjusting said plow vertically, means for adjusting said plow laterally, and means for

working the material of the road at the rear of said plow.

21. In an oil spreader, a frame adapted to be drawn upon a road and having carriers, a plow mounted upon said carriers and adapted to be forced longitudinally under the surface of the road, means for discharging oil from said plow, means for atomizing said oil at the point of discharge from said plow, said carriers supporting an apron extending beyond said plow and having sides, an axle mounted between said sides, a roller upon said axle and adapted to work the road material at the rear of said plow, and means for operating said axle through the movement of said frame.

22. In an oil spreader, a frame adapted to be drawn upon a road and having a wheeled axle, said frame having adjustable carriers, a plow mounted upon said carriers and adapted to be forced longitudinally under the surface of the road, means for discharging oil from said plow, means for atomizing oil at the point of discharge from said plow, said carriers supporting an apron extending beyond said plow and having sides, an axle revolvably carried between said sides, a serrated roller rigid with said axle and adapted to work the earth at the rear of said plow, and means for operatively connecting said axle of said roller and said wheeled axle of said frame to drive said roller.

23. In an oil spreader, a frame adapted to be drawn upon a road, a plow secured to said frame and adapted to be forced longitudinally under the surface of the road, means for discharging oil from said plow, means for atomizing the oil near the point of discharge from said plow, movable blades arranged above said plow and adapted to assist the passage of the road material over said plow, and means for operating said blades through the movement of said frame, whereby the rate of operation of said blades is directly proportional to the rate of movement of said frame.

24. In an oil spreader, a frame adapted to be drawn upon a road, a plow secured to said frame and adapted to be forced longitudinally under the surface of said road, means for forcing oil from said plow, means for atomizing the oil as it escapes from said plow, an endless belt arranged above said plow and having blades adapted to travel toward the rear of said plow, and means for driving said belt through the movement of said frame.

25. In an oil spreader, a frame adapted to be drawn upon a road, a plow secured to said frame and adapted to be forced longitudinally under the surface of said road, means for forcing oil from said plow, means for atomizing the oil as it escapes from said plow, a resiliently held shaft arranged above said plow, a second shaft carried by said frame, an endless belt arranged to travel upon said shaft and having blades, and means for driv-

ing said belt through the movement of said frame, said blades passing over said plow toward the rear of the same.

26. In an oil spreader, a frame adapted to be drawn upon a road, a plow secured to said frame and adapted to be forced longitudinally under the surface of said road, means for forcing oil from said plow, means for atomizing the oil as it escapes from said plow, journal brackets arranged above said plow, means for resiliently holding said brackets, a shaft carried in said brackets, a second shaft carried by said frame, endless belts arranged to travel upon said shafts and having blades connecting the same, and means for driving said belts through the movement of said frame, said blades being arranged to travel over said plow toward the rear of the same and to assist the passage of the road material over said plow.

27. In an oil spreader, a frame adapted to be drawn upon a road, a plow secured to said frame and adapted to be forced longitudinally under the surface of said road, means for forcing oil from said plow, means for atomizing the oil as it escapes from said plow, journal brackets arranged above said plow and having posts, sockets, said posts being resiliently mounted in said sockets, a shaft in said journal brackets, a second shaft mounted upon said frame, said shafts having toothed wheels rigid therewith, belts mounted upon said toothed wheels and having connecting cross-pieces, blades carried by said connecting cross-pieces, and means for driving one of said shafts through the movement of said frame.

28. In an oil spreader, a frame adapted to be drawn upon a road and having carriers, a plow secured to said carriers and adapted to be forced longitudinally under the surface of the road, journal brackets arranged above said plow and having posts, sockets supported by said carriers and having said posts slidably arranged therewithin, springs within said sockets for resiliently holding said posts, a shaft in said journal brackets, a second shaft carried by said frame, toothed wheels arranged upon said shafts, chain belts arranged upon said toothed wheels and having connecting cross-pieces, blades rigidly carried by said cross-pieces, means for driving said resiliently held shaft through the movement of said frame, and a roller mounted behind said plow and adapted to work the road material.

29. In an oil spreader, a frame adapted to be drawn upon a road, and a plow secured to said frame and adapted to be forced longitudinally under the surface of the road, said plow comprising a body having a substantially horizontal lower face and an inclined upper plate presenting a cutting edge, said body having a recess at the side adjacent to said upper plate, means for discharging oil

from said recess, and means for atomizing the oil near the point of discharge.

30. In an oil spreader, a frame adapted to be drawn upon a road, a plow carried by said frame and adapted to be forced longitudinally under the surface of the road, said plow having a body presenting a substantially horizontal lower face and, secured to said body an inclined plate presenting a cutting edge, said body having a recess at the side adjacent to said plate, a movable chambered member arranged in said recess and having an adjustable slot, means for discharging oil through said slot, and means for atomizing the oil near the point of discharge.

31. In an oil spreader, a frame adapted to be drawn upon a road, a plow carried by said frame and adapted to be forced longitudinally under the surface of the road, said plow having a body presenting a substantially horizontal lower face and secured to said body an inclined plate presenting a cutting edge, said body having a recess at the side adjacent to said plate, a movable member arranged in said recess, said movable member having chambers therewithin, one of said chambers having a plurality of orifices, the other of said chambers having an adjustable slot, said slot and said orifices being inclined with respect to one another, means for introducing oil into the chamber presenting the slot, and means for introducing steam into the other of said chambers.

32. In an oil spreader, a frame adapted to be drawn upon a road, a plow carried by said frame and adapted to be forced longitudinally under the surface of the road, said plow having a body presenting a substantially horizontal lower face and, secured to said body an inclined plate presenting a cutting edge, said inclined plate having a plurality of openings therethrough, said body having a recess at the side adjacent to said plate, a movable member arranged in said recess and having chambers therewithin, hollow plow supports secured to said plate over said openings, oil ducts arranged within said supports and communicating with chambers of said member, steam ducts within said oil ducts and communicating with the other chambers of said member, said chambers communicating with said oil ducts having adjustable slots, the other of said chambers each having a plurality of orifices, and means for adjusting said slots; said slots and said orifices being inclined with respect to one another.

33. In an oil spreader, a frame adapted to be drawn upon a road, and having a plow adapted to be forced longitudinally under the surface of the road, a cylinder upon said frame, an oil chamber within said plow communicating with said cylinder and having an opening at the rear of said plow, means for forcing oil into said cylinder, a second cham-

ber within said plow and having an opening at the rear of said plow adjacent to said first opening, means for forcing steam into said second chamber, and means for regulating the flow of liquid from said oil chamber.

34. In an oil spreader, a frame adapted to be drawn upon a road, a plow rigidly secured to said frame and adapted to be forced longitudinally under the surface of the road, said plow comprising a body and an inclined plate presenting an edge, a chamber within said plow having an opening at the rear thereof, means for discharging oil from said chamber, a second chamber within said plow having an opening directed toward said first opening, and means for discharging steam from said second chamber.

35. In an oil chamber, a frame adapted to be drawn upon a road and having adjustable

carriers, a plurality of supports secured to said carriers and presenting edges in the direction of movement of the oil spreader, a plow secured at the lower ends of said supports and having an inclined plate, an oil chamber in said plow and having a discharge slot at the rear thereof, means for discharging oil from said oil chamber, a steam chamber within said plow and having a discharge opening at the rear thereof, and means for discharging steam from said steam chamber.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM MARION MURRAY.

Witnesses:

EVALENA GROHE,
C. H. MERRILL.