April 15, 1958 N. J. MARIANI ET AL 2,830,510

MACHINE FOR DISTRIBUTING ROAD BUILDING MATERIALS

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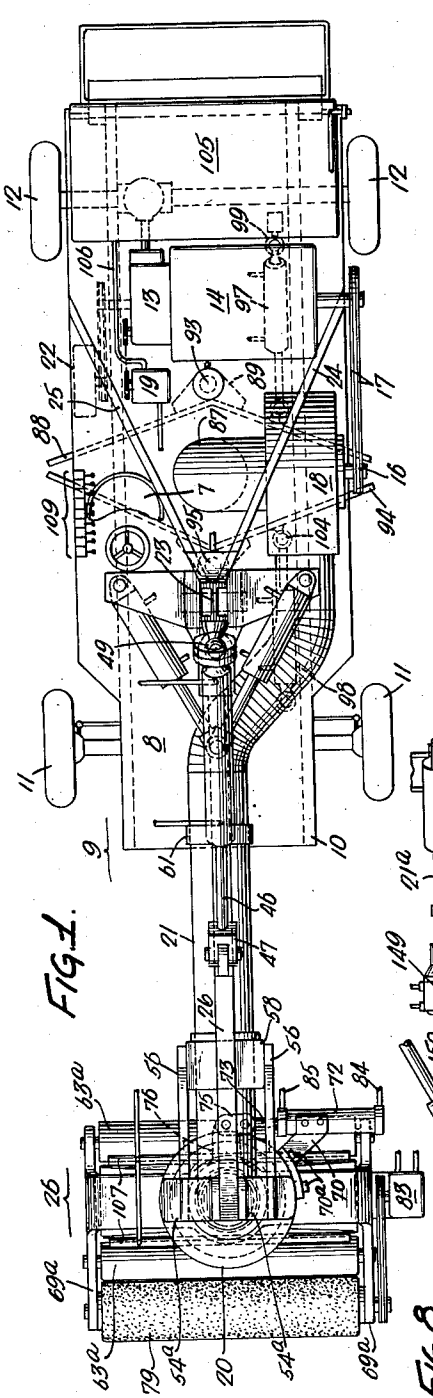

FIG. 1.

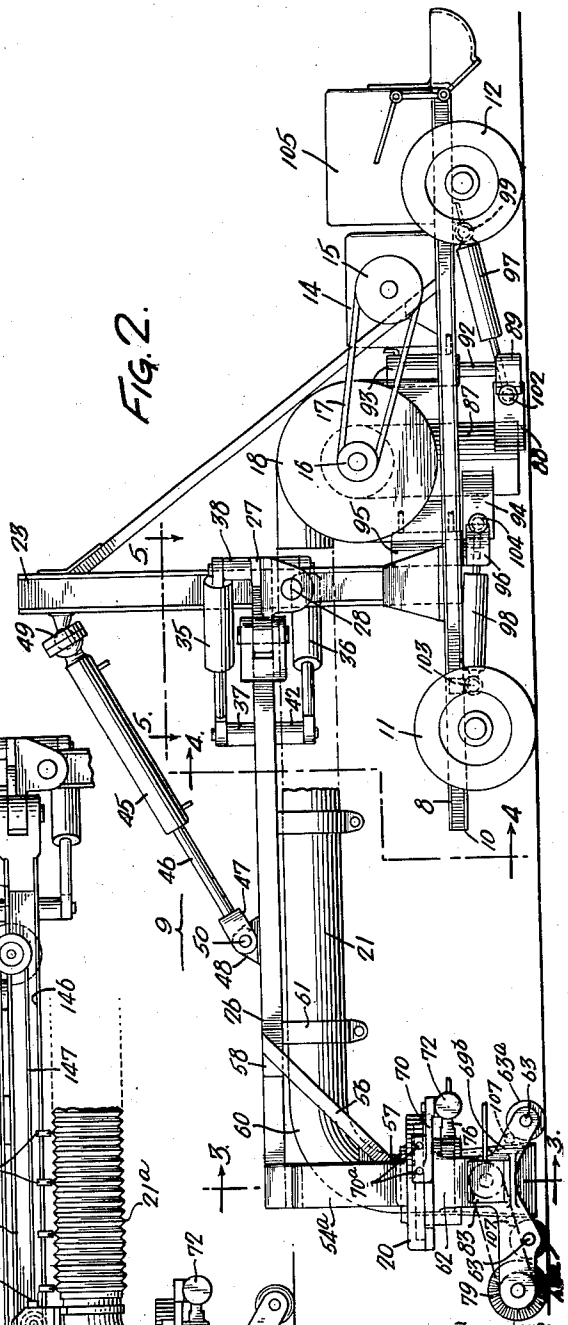

FIG. 2.

FIG. 3.

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FIG. 3

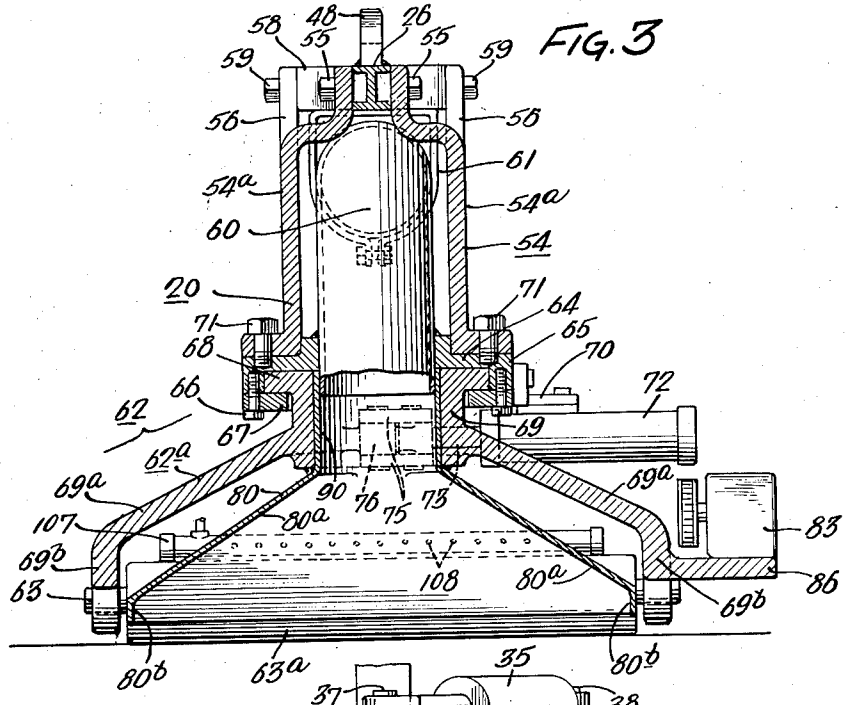

FIG. 4

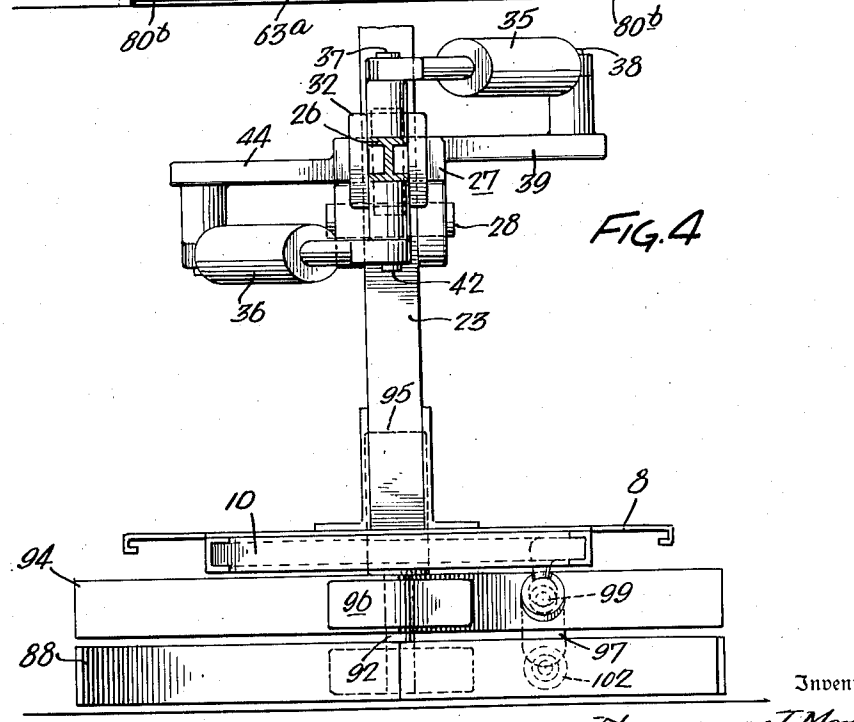

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FIG. 5.

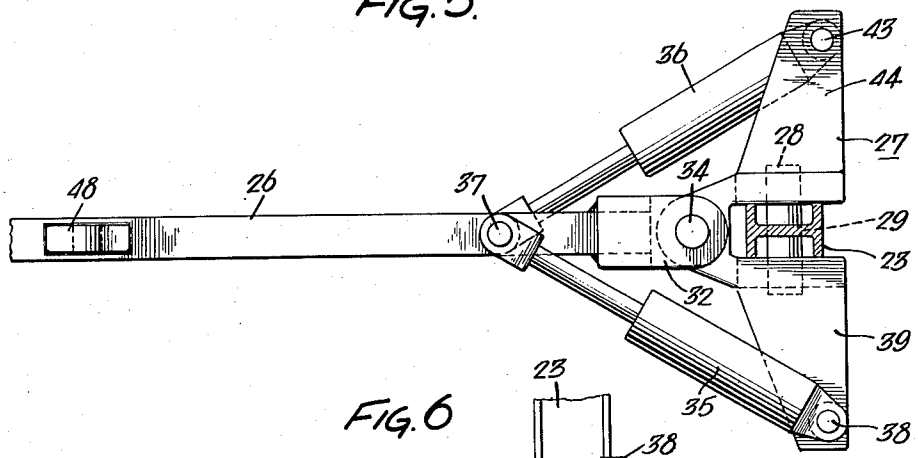


FIG. 6

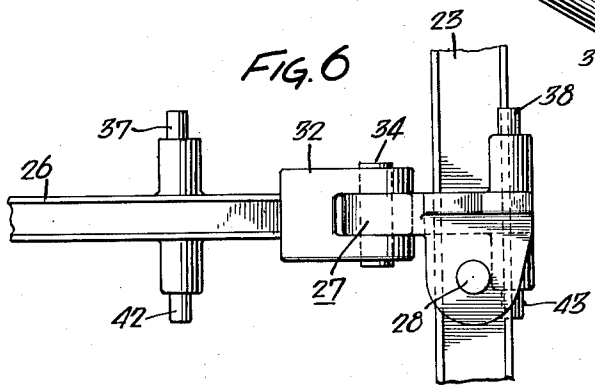
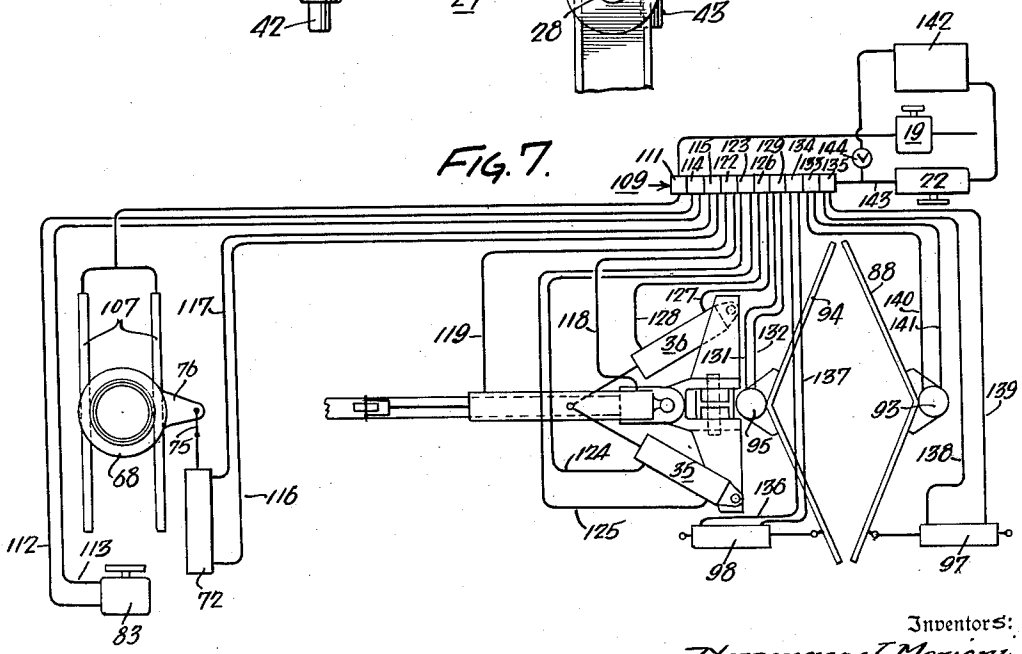


FIG. 7.



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2,830,510

MACHINE FOR DISTRIBUTING ROAD BUILDING MATERIALS

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Application April 13, 1954, Serial No. 422,766

7 Claims. (Cl. 94—44)

This invention relates to a machine for distributing road building materials and more particularly a machine for distributing finely divided grit into the interstices of a coarse crushed rock road bed to form a base for the surface coating of the road.

A principal object of the invention, is to provide a a machine for distributing granular road materials with a high degree of uniformity.

A further object of the invention is to provide a device of the stated type which is capable of distributing road building materials economically and efficiently.

A further object of the invention is to provide apparatus of the stated character which is characterized by its mobility and whereby it is possible to distribute the material over the entire width of the road bed with one pass of the machine.

A further object of the invention is to provide a machine for distributing road materials which is operable to distribute the material over a relatively large area while the machine is at a standstill.

A still further object of the invention is to provide a device for distributing road building materials which may easily be controlled from one position.

These and other objects of the invention are hereinafter set forth and described with reference to the accompanying drawings in which:

Fig. 1 is a plan view of the distributing machine of the present invention; certain elements being removed for the sake of clarity;

Fig. 2 is an elevational view of the machine of Fig. 1;

Fig. 3 is an enlarged sectional view taken substantially on line 3—3 of Fig. 2;

Fig. 4 is an enlarged fragmentary sectional view taken substantially on line 4—4 of Fig. 2;

Fig. 5 is an enlarged plan view taken substantially on the line 5—5 of Fig. 2;

Fig. 6 is a fragmentary elevational view of the structure of Fig. 5;

Fig. 7 is a schematic view of the control means employed in the machine of Fig. 1 and

Fig. 8 is an elevational view of a modified form of the invention.

The invention contemplates essentially the provision of a self-propelled machine which is capable of picking up vacuumatically finely divided grit previously deposited by dump-trucks in spaced piles along the centerline of a road bed, and distributing this grit evenly into the interstices of the coarse rock of the road bed with relatively little maneuvering of the machine.

With reference to the drawings and more particularly to Figs. 1 and 2, the embodiment of the invention disclosed comprises a vehicle 9 including a chassis 10 and a deck plate 8 disposed on top of the chassis, which is supported for movement along the road bed by front wheels 11 and rear wheels 12, the latter being driven through a conventional transmission 13 by means of an engine 14 mounted on the deck plate 8. A seat 7 is provided for

the operator of the vehicle. The engine 14 also drives, through the medium of sheaves 15 and 16 and belts 17, 17, a blower 18 for delivering the material to a distribution head 20 through a flexible conduit 21. At the opposite end of the engine are a water pump 19 and an hydraulic pump 22, both of which are driven by the engine 14 through suitable power take-offs. The purposes of these pumps will be hereafter described.

According to the present invention the distribution head 20 is movable laterally with respect to the vehicle to effect distribution of the grit over a relatively wide area. To obtain this result the head 20 is carried by a boom 26 which is mounted for horizontal and vertical pivotal movement about a mast 23 stepped in the chassis 10 and supported by struts 24 and 25. To this end one end of the boom 26 is provided with a yoke 32 pivotally connected by a pin 34 to a bracket 27 to afford horizontal movement of the boom. The bracket 27 is pivotally mounted on the mast 23 by means of a pin 28 extending through aperture 29 in the mast, as shown best in Fig. 5, to effect vertical movement of the boom for a purpose hereafter described.

By the above arrangement the boom can be positioned in a horizontal plane at any desired angle, within design limits, by means of hydraulic rams 35 and 36, fluid pressure for which is supplied by the hydraulic pump 22 through suitable conduits hereafter described. The ram 35 is pivotally mounted at one end on an upstanding pintle 37 secured to the top of the boom 26 and at the other end to an upstanding pintle 38 at the outer extremity of wing 39 of the mount 27. The ram 36 is pivotally mounted at one end to a depending pintle 42 disposed below the pintle 37 and at the other end to a depending pintle 43 at the outer end of wing 44 of the bracket 27.

For transporting the vehicle over existing paved roads to the work site, the head 20 may be raised out of contact with the road by swinging the boom upwardly about the pin 28 through the medium of a hydraulic ram 45. This ram 45 includes a plunger 46 on the free end of which is a yoke 47 that is pivotally connected by a pin 50 to a lug 48 on the top of the boom approximately midway between its ends. Free movement of the opposite end of the ram 45 is afforded by the ball and socket joint 49, secured to the upper end of the mast. Fluid pressure for raising the boom is supplied to the ram 45 through a suitable conduit by the pump 22 and discharge of the fluid is provided for by a conduit more fully described hereafter.

With reference to Fig. 3 the particular distribution head employed in the present invention will now be described more fully. The head 20 comprises essentially an upper section 54 fixed with respect to the boom 26, and a lower section 62 rotatably mounted on the upper section for a purpose hereafter described. The upper section includes a mounting ring 64 connected to the boom 26 by means of brackets 54*a*. The upper ends of these brackets are fastened to the boom by screws 55 and struts 56, each of which is connected at one end to the brackets 54*a* at 57 (see Fig. 2) by welding or otherwise, and at the other end by means of screws 59 to a bracing plate 58 fastened to the top of the boom in transverse relation. The lower ends of the brackets 54*a* are secured to the ring 64 by screws 71. In the central aperture of the ring 64 is positioned one end of elbow 60, the other end of which is connected to the forward end of the conduit 21 to complete a passage for the grit from the blower 18 to the head 20. The conduit 21 is supported on the boom 26 by straps 61.

The lower section 62 of the head 20 includes a frame 62*a* which is provided with a generally cylindrical neck portion 69 at the upper periphery of which is formed

a radially projecting flange 68. This flange 68 is mounted in the ring 64 by means of an annular ring 67 which is secured to a depending annular flange 65 on the ring 64 by fastening elements 66 downwardly and outwardly from the lower edges of the neck portion 69 extend struts 69*a* which terminate in yokes 69*b*. The tines of these yokes are apertured for the acception of shafts 63 of rollers 63*a*, which support the entire head while the vehicle is in operation. Adjustment of the angularity of the frame 62*a* with respect to the boom is afforded by hydraulic ram 72. This ram, as best shown in Fig. 1, is mounted on the flange 65 by a bracket 70 secured in position by screws 70*a*, and is provided with a plunger 73 to the free end of which is pivotally secured to a link 75 which in turn is pivotally secured to a lug 76 on the neck portion 69. Upon outward movement of the plunger as viewed in Fig. 1, the frame 62*a* turns counterclockwise, and reverse operation of the plunger by a control system hereafter described effects opposite rotation.

Referring again to Fig. 3, a casing 80 is positioned between the struts 69*a* for reception of the grit from the discharge end of the elbow. This casing is formed with a generally cylindrical neck portion 90 for engagement with the inside cylindrical surface of the neck 69 of the ring 64. From the lower edges of the neck 90 the casing 80 is provided with downwardly and outwardly extending side walls 80*a* and substantially vertical end walls 80*b*. These walls terminate in proximate spaced relation to the level of the road bed, thus minimizing escape of the grit. The configuration of the side walls 80*a* assures distribution over a wide swath of road bed.

To insure even distribution of the grit a rotary broom 79 is mounted at the front of the head on the yokes 69*b*. Power is supplied to this broom by a motor 83, preferably hydraulic, fluid for which is provided by the pump 22 through conduits hereafter described. This motor is mounted on a bracket 86 secured to the yoke 69*b* and connection may be made to the broom by an endless chain or belt, as desired.

For directing the grit to blower intake 87 when the vehicle is operated forwardly a V-shaped blade 88 is provided. This blade is mounted by means of a bracket 89 on plunger 92 of an hydraulic ram 93 which is secured in fixed relation to the deck plate 8. By this arrangement, the blade 88 may be raised or lowered as required. When it is necessary to operate the vehicle rearwardly to direct the grit into the blower intake, V-shaped blade 94 may be lowered from the position shown in Fig. 2 to the level of blade 88, in that figure, by means of hydraulic ram 95 which carries the blade 94 through a bracket 96 secured to its plunger. It will be understood that the blade 88 is normally in its upper position when the blade 94 is in operative position and vice versa.

The plungers of the rams are freely rotatable and thus the blades 88 and 94 may be pivoted on a horizontal plane about the axes of the plungers by hydraulic rams 97 and 98 respectively. The ram 97 is secured to the deck plate 8 by the swivel 99 and to the blade 88 by the swivel 102. Similarly, the ram 98 is swivelly connected to the deck plate 8 by ring 103 and to the blade 94 by a ring 104. By this arrangement the rams 93 and 95 may be actuated to raise or lower the blades 88 and 94 respectively without interfering with the operation of the rams 97 and 98.

If the machine is moved forwardly i. e. to the left as viewed in Figs. 1 and 2, and the blade 88 is lowered to and near the rod level, the surface grit will be displaced by the two wings of the blade toward the intake 87, and this action can be accentuated and the grit brought into closer proximity to the intake by adjusting the blade about the axis of the plunger 92 so as to render the angularity of one or other wing of the blade more acute with respect to the direction of travel and to simultaneously bring the wing closer to the intake. When the machine is moving rearwardly the blade 94 functions in similar manner. As stated, when one of these blades is in the operative position, the other is retracted and inoperative.

To obtain the optimum moisture content in the grit for control of dust and proper compaction, water is drawn from tank 105 by the pump 19 through a conduit 106 and discharged into a flexible conduit (not shown) through which it flows to manifolds 107 mounted at each side of the lower section 62 of the head 20, see Figs. 3 and 7. The flow of this water through apertures 108 may be controlled by suitable valve means near the operator's seat.

In Fig. 7 is disclosed diagrammatically the control system for operation of the above described hydraulic devices and water system. This system includes a valve bank 109 having a plurality of conventional reversible three-way valves arranged within easy reach of the operator. The pump 22 draws fluid from a sump 142 and transmits this fluid to the valve bank 109 through conduit 143. A pressure relief valve 144 is provided to return the fluid to the sump in the event the pressure in the line exceeds a predetermined amount. The valve bank includes valve 111 for control of water from pump 19 to the distribution manifolds 107. The pump 22 supplies hydraulic fluid to the hydraulic motor 83 for driving the broom 79 through flexible conduit 112 and this fluid is returned to the pump through flexible conduit 113. Control of this flow is afforded by valve 114 which may be opened or closed at the will of the operator. The ram 72 may be actuated to rotate the head casing 62 by opening valve 115, the fluid being transmitted through flexible hoses 116 and 117. The ram 45 for raising the boom and the entire head 20 above the level of the rod is energized by transmission of fluid by way of the flexible conduits 118 and 119 upon opening of valve 122. The boom 26 may be pivoted about the pin 34 by concurrent operation of the rams 35 and 36. For instance, should it be necessary to move the head 20 to the left of the vehicle, the plunger of the ram 35 is moved to right, as viewed in Fig. 7, by actuation of valve 123 for transmission of fluid to ram 35 through conduit 124, and for return of this fluid by way of conduit 125. At the same time, valve 126 effects the passage of fluid to the ram 36 through conduit 127 to urge the plunger to the left, as viewed in that figure. Return of the fluid is provided for by conduit 128, and for reverse operation the directions of flow in the respective conduits is reversed. By this arrangement, the rams 35 and 36 cooperate to move the head 20 to any desired position relative to the vehicle. The ram 95 may be energized to raise or lower the blade 94 by actuating valve 129 to send fluid through the conduits 131 and 132, and the ram 93 may be set in motion by operation of valve 133, thus effecting a passage of fluid through conduits 140 and 141. Pivotal movement of the blades 94 and 88 by the jacks 98 and 97, respectively is effected by valves 134 and 135. By way of example, pivoting of blade 94 clockwise may be effected by transmission of fluid through conduit 136 and return of the fluid would be effected through conduit 137. Reverse operation would, of course, produce opposite rotation. Upon operation of the valve 135 and ram 97 would pivot the blade 88 in different directions depending upon the direction of flow of the fluid in the conduits 138 and 139.

Preparatory to operation of the machine a series of spaced piles of the grid material to be distributed is deposited along the centerline of the road by dump trucks. The engine of the vehicle is now started, thus operating the blower 18, and the pumps 19 and 22. The vehicle is then driven forwardly over one of the piles of grit so that the blower intake is in close proximity to the pile of grit material. The suction produced by the blower causes the material to be drawn into the blower, from which it is discharged by way of the conduit 21 through the head 20. Since the head 20 must be moved on its rollers 63*a* to afford wide distribution of the material and since the material must therefore be directed into the blower

intake as the vehicle proceeds, the valve **133** is then operated to lower the blade **88** to direct the grit into the suction side of the blower **18**, as the vehicle proceeds slowly. At the same time the valves **123** and **126** are operated to direct the head **20** to one side of the vehicle or the other, as may be desired. For operation of the head **20** at these positions the valve **115** is operated to direct fluid to ram **72** to adjust the position of the lower section of the head **20** so that the rollers travel in the same direction as the vehicle wheels. Water pressure in the manifolds **107** may then be obtained by operating valve **111**. Once a swath of grit has been laid at one side of the road the vehicle may be reversed to cover the center of the road. At this time the blade **88** is raised, the blade **94** is lowered and the head **20** is returned to the position shown in Fig. 1. Should it be necessary to adjust the horizontal position of the blade **94** to direct the grit into the blower, ram **98** may be energized by valve **134** to effect this result. When the swath of grit in the center of the road is laid the vehicle is again operated forwardly with the head **20** positioned at the opposite side of the vehicle and the casing **62** arranged accordingly. When distribution of the grit is completed over the width of the road at one point, the vehicle is advanced to the next pile and the above operation is repeated. Should more thorough distribution of the grit be desired, the area may be retraversed with the broom **79** in operation.

In Fig. 8 is shown a modified form of the invention wherein distribution of the grit over a particular width of the road may be effected while the vehicle remains in one position, that is, with the blower intake disposed over a particular grit pile. According to this modified form of the invention, distribution head **20***a* is mounted for movement longitudinally of the boom **26***a* on a movable bracket **144** secured to upper section **54***a*. On the interior side surfaces of the bracket **144**, trolley wheels **145** are rotatably mounted for rolling engagement with the flanges **146** of the I-shaped boom **21***a*. The bracket **144** is movable back and forth on the boom by means of cables **150** and **147** wound about drum **148**, which is driven by hydraulic motor **149** positioned on top of the boom. The motor **149** is desirably controlled by a valve (not shown) similar to that employed for control of the above hydraulic devices. The cable **150** passes over pulley **152** and is secured to the bracket **144** at **153** while cable **147** extends directly from the drum and is secured to bracket **144** at **154**. Upon rotation of the drum counterclockwise, as viewed in Fig. 8, cable **147** draws head **20***a* rearwardly. Opposite rotation of the drum affords movement of the head forwardly. For control of conduit **21***a* and retraction of the head **20***a* it is formed with accordion pleats and is supported by clips **155** which are slidable on the lowermost flange **146** of the boom. This modified form of distribution head is intended to supplant the head **20** of the principal form of the invention.

We claim:

1. A machine for distributing granular material over the surface of a road bed comprising a chassis, wheels for said chassis, a power source mounted on said chassis and operatively connected to some of said wheels for locomotion of the chassis, a mast mounted on said chassis, a boom adjustably secured to said mast for movement with respect to and laterally of the direction of travel of said chassis, a distribution head secured to the outer end of said boom, a blower, conduit means connecting said blower and said distribution head, power means selectively operative upon actuation to traverse the boom with respect to and transversely of said direction of travel of said chassis, said distribution head comprising a frame, rollers to support the frame on the road bed surface, means for angularly adjusting the frame on said boom in a substantially horizontal plane so as to maintain the said rollers in alignment with the direction of travel of the chassis, and means for delivering the granular material to said blower for transmission by way of said conduit to the distribution head.

2. A machine for distributing granular material over a road bed comprising a chassis, wheels for said chassis, a power source mounted on said chassis and operatively connected to some of said wheels for locomotion of the chassis, a mast mounted on said chassis, a boom adjustably secured to said mast for movement with respect to and laterally of the direction of travel of said chassis, a distribution head secured to the outer end of said boom, a blower, conduit means connecting said blower and said distribution head, power means selectively operative upon actuation to traverse the boom with respect to and transversely of the direction of travel of said chassis, said distribution head comprising a frame and rollers to support the frame on the road bed surface, means for angularly adjusting the frame on the boom in a substantially horizontal plane so as to maintain said rollers in alignment with the direction of travel of the chassis, a suction conduit connected to the blower and having an intake in proximity to the surface of the road bed for transmission by blower suction of granular material from the said bed to the blower, and plow means for delivering the granular material to said intake.

3. A machine for distributing granular material over the surface of a road bed comprising a chassis, a power source mounted on said chassis, a blower, a mast mounted on said chassis, a boom secured to said mast for pivotal movement with respect to said chassis substantially in a horizontal plane, a distribution head mounted on the outer end of said boom, conduit means connecting said blower and said distribution head and forming a passage for the material, power means selectively operable to pivot said boom and said distribution head in a substantially horizontal plane so that the boom assumes an angular relation with respect to the chassis, said distribution head including an upper section secured in fixed relation to said boom and a lower transversely extended discharge section attached to said upper section for rotation with respect thereto in a substantially horizontal plane, means for rotating said lower section so as to maintain a given angular relation between the head and the chassis irrespective of the pivotal position of the boom and means for delivering the material to said blower.

4. A machine for distributing granular material over the surface of a road bed comprising a chassis, wheels for said chassis, a power source mounted on said chassis and operatively connected to some of said wheels, a blower operable by said power source, a mast mounted on said chassis, a boom secured to said mast for pivotal movement with respect to said chassis substantially in a horizontal plane, a distribution head mounted on the outer end of said boom, conduit means connecting said blower and said distribution head and forming a passage for the material, power means selectively operable to pivot said boom and said distribution head in substantially horizontal plane so that the boom assumes an angular relation with respect to the chassis, said distribution head including an upper section secured in fixed relation to said boom and a lower transversely extended discharge section attached to said upper section for rotation with respect thereto in a substantially horizontal plane, means for rotating said lower section so as to maintain a given angular relation between the head and the chassis irrespective of the pivotal position of the boom and means for delivering the material to said blower.

5. A machine for distributing granular material over the surface of a road bed comprising a chassis, wheels for said chassis, a power source mounted on said chassis and operatively connected to some of said wheels, a blower operable by said power source, a mast mounted on said chassis, a boom secured to said mast for pivotal movement with respect to said chassis substantially in a horizontal plane, a distribution head mounted on the outer end of said boom, conduit means connecting said blower

and said distribution head and forming a passage for the material, power means selectively operable to pivot said boom and said distribution head in a substantially horizontal plane so that the boom assumes an angular relation with respect to the chassis, said distribution head including an upper section secured in fixed relation to said boom and a lower section attached to said upper section for rotation with respect thereto in a substantially horizontal plane, means for rotating said lower section so as to maintain a given angular relation between the head and the chassis irrespective of the pivotal position of the boom, a suction conduit connected to the blower and having an intake in proximity to the surface of the road bed for transmission by blower suction of granular material from the said bed to the blower, and a blade for delivering the material to the intake of said suction conduit, means for lowering said blade into sweeping relation to the road bed and for retracting said blade into proximate relation to said chassis.

6. A machine for distributing granular material over the surface of a road bed comprising a chassis, wheels for said chassis, a power source mounted on said chassis and operatively connected to some of said wheels, a blower operable by said power source, a mast mounted on said chassis, a boom secured to said mast for pivotal movement with respect to said chassis substantially in a horizontal plane, a distribution head mounted on the outer end of said boom, conduit means connecting said blower and said distribution head and forming a passage for the material, power means selectively operable to pivot said boom and said distribution head in a substantially horizontal plane so that the boom assumes an angular relation with respect to the chassis, said distribution head including an upper section secured in fixed relation to said boom and a lower section attached to said upper section for rotation with respect thereto in a substantially horizontal plane, means for rotating said lower section so as to maintain a given angular relation between the head and the chassis irrespective of the pivotal position of the boom, a suction conduit connected to the blower and having an intake in proximity to the surface of the road bed for transmission by blower suction of granular material from the said bed to the blower, a plurality of V-shaped blades supported by said chassis and selectively operable upon operation of the machine over the road bed to deliver the material to the intake of said suction conduit.

7. A machine for distributing granular material over the surface of a road bed comprising a chassis, a power source mounted on said chassis, a blower operable by said power source, a mast mounted on said chassis, a boom secured to said mast for pivotal movement with respect to said chassis in a substantially horizontal plane, a distribution head slidably mounted on said boom for back and forth movement, longitudinally contractable conduit means connecting said blower and said distribution head, means selectively operable to pivot said boom and said distribution head in a substantially horizontal plane so that the boom assumes an angular relation with respect to the chassis, means for delivering granular material to the blower, and means operable upon actuation to traverse the distribution head along the length of the boom for distribution of the material over a wide area of the road bed while the machine is at a standstill.

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