April 17, 1962 T. B. CRESWELL 3,029,714

MACHINE FOR SPREADING ROAD SURFACING MATERIAL

Filed Dec. 15, 1959 6 Sheets-Sheet 1

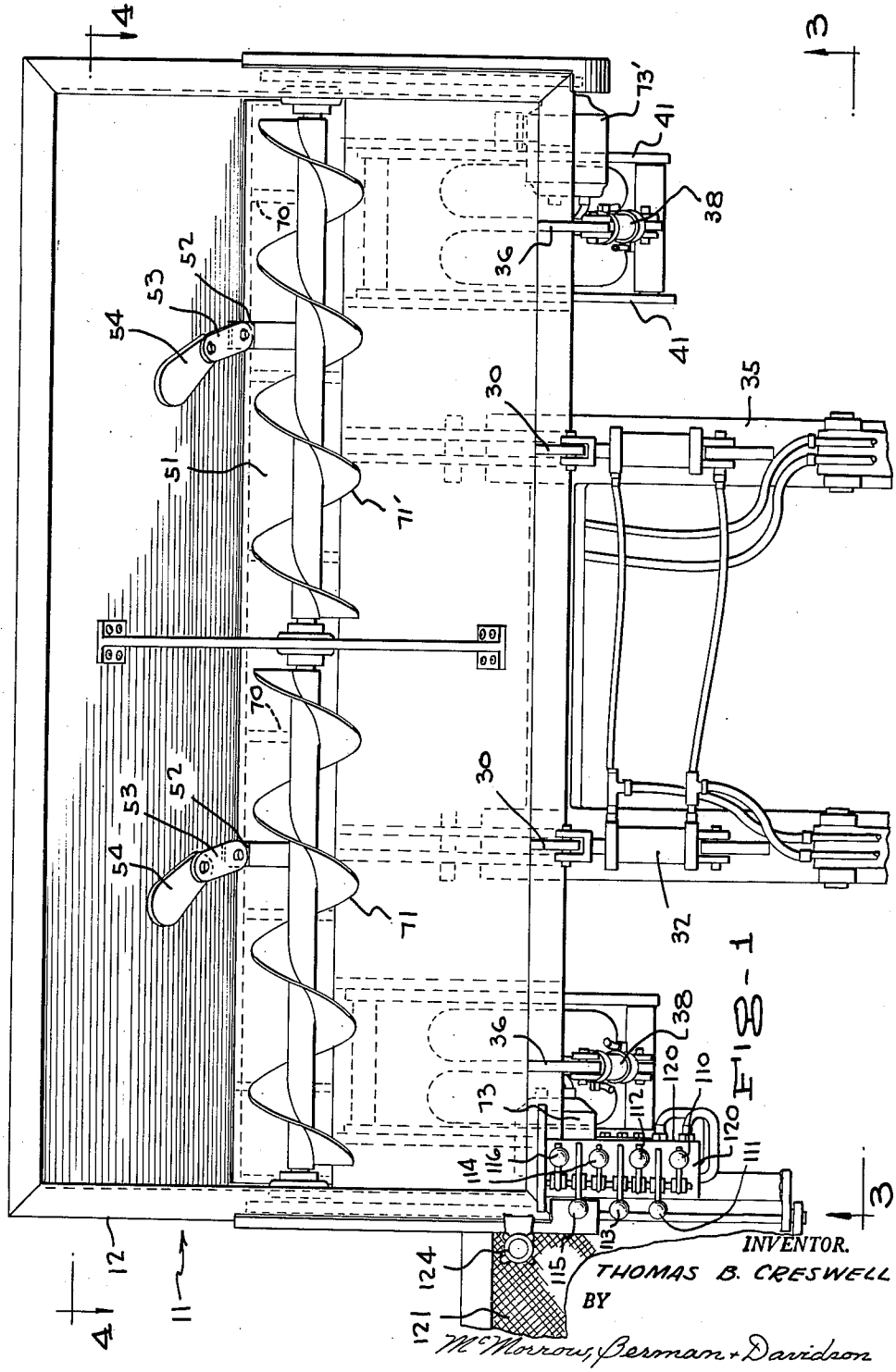


FIG. 1

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MACHINE FOR SPREADING ROAD SURFACING MATERIAL

Filed Dec. 15, 1959 6 Sheets-Sheet 2

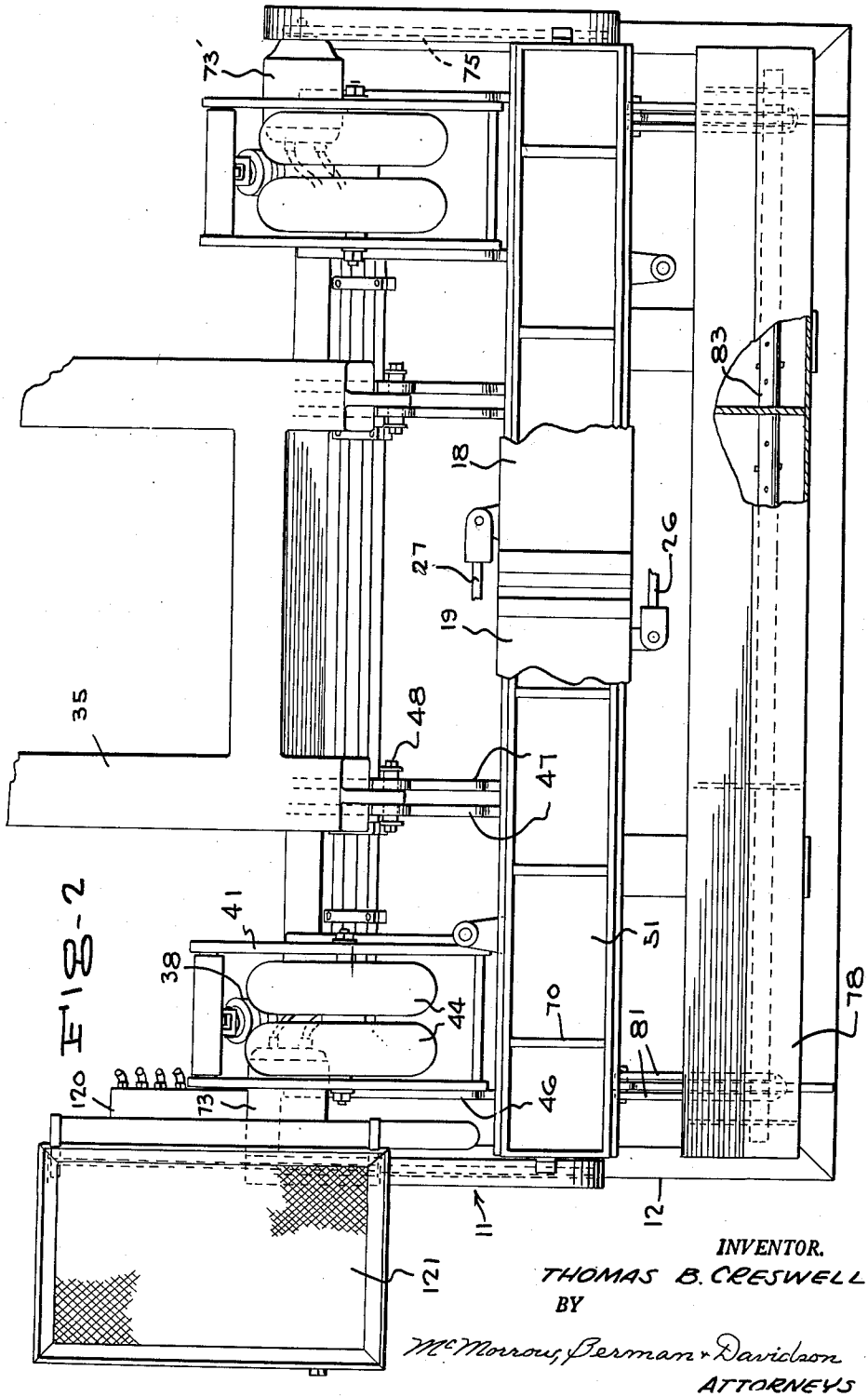


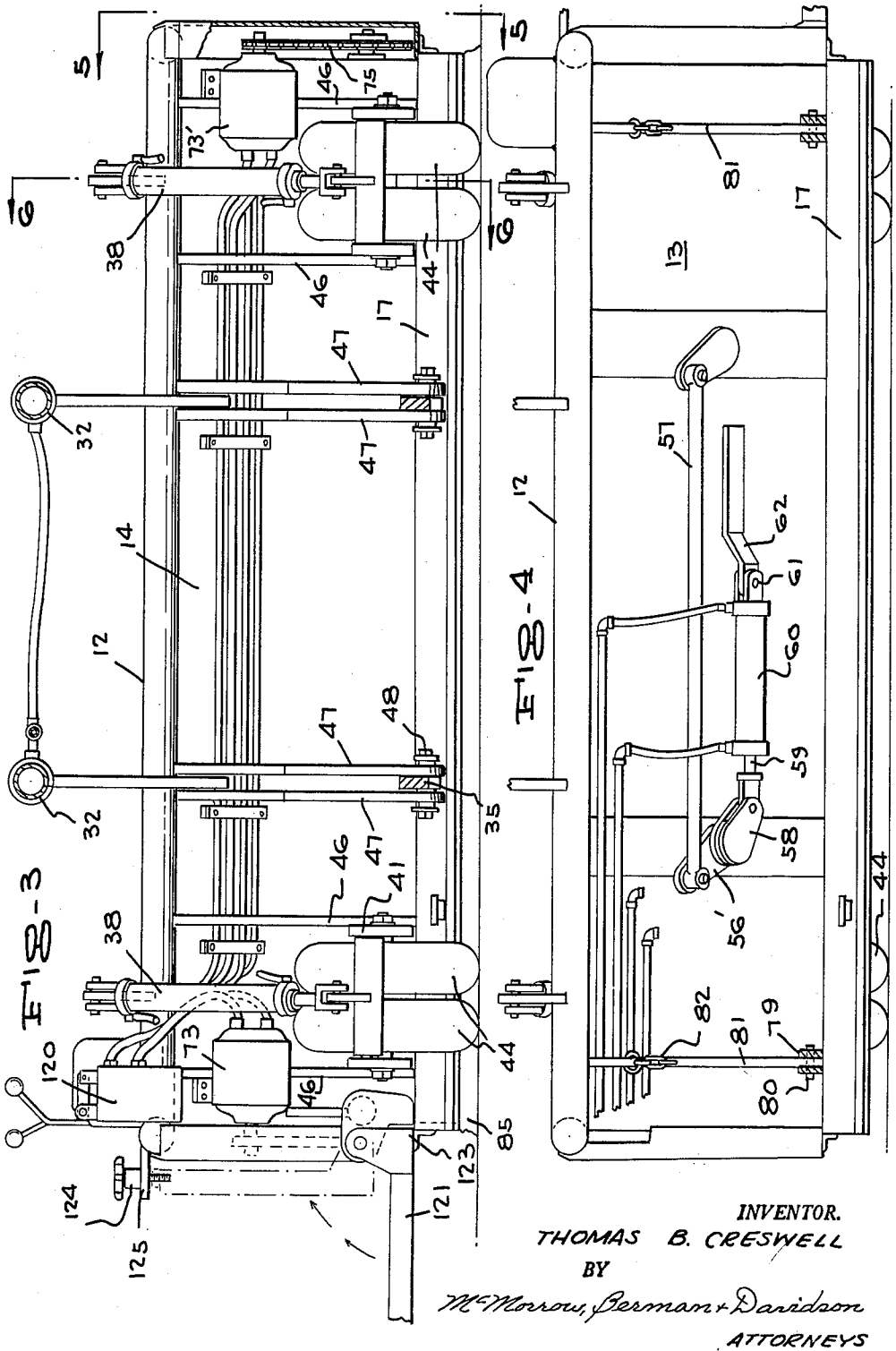
FIG. 2

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MACHINE FOR SPREADING ROAD SURFACING MATERIAL

Filed Dec. 15, 1959 6 Sheets-Sheet 3



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MACHINE FOR SPREADING ROAD SURFACING MATERIAL

Filed Dec. 15, 1959 6 Sheets-Sheet 4

FIG-5

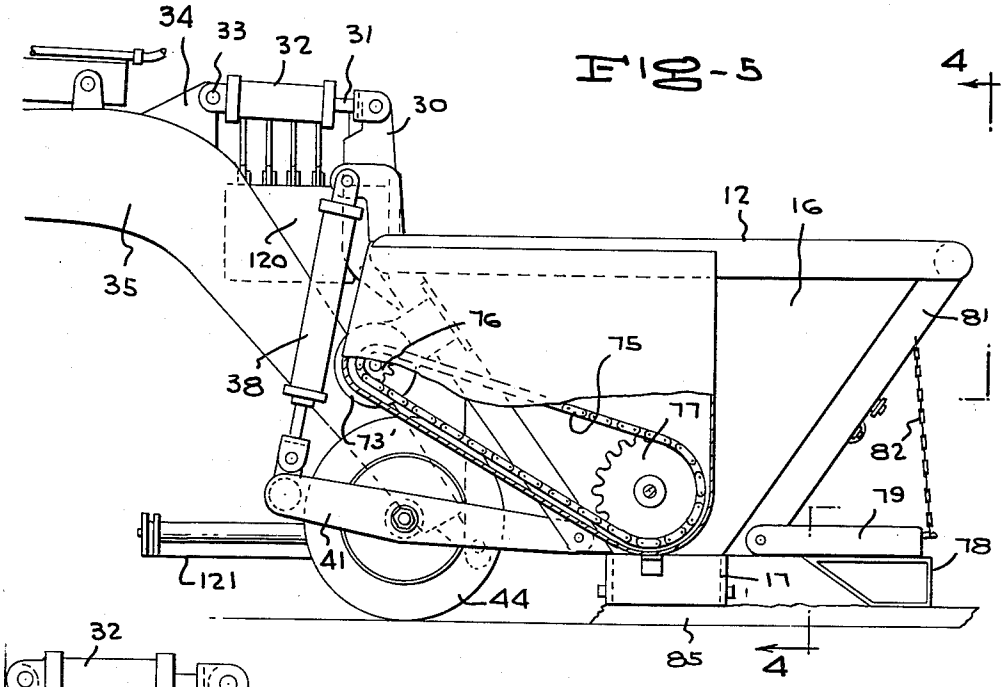
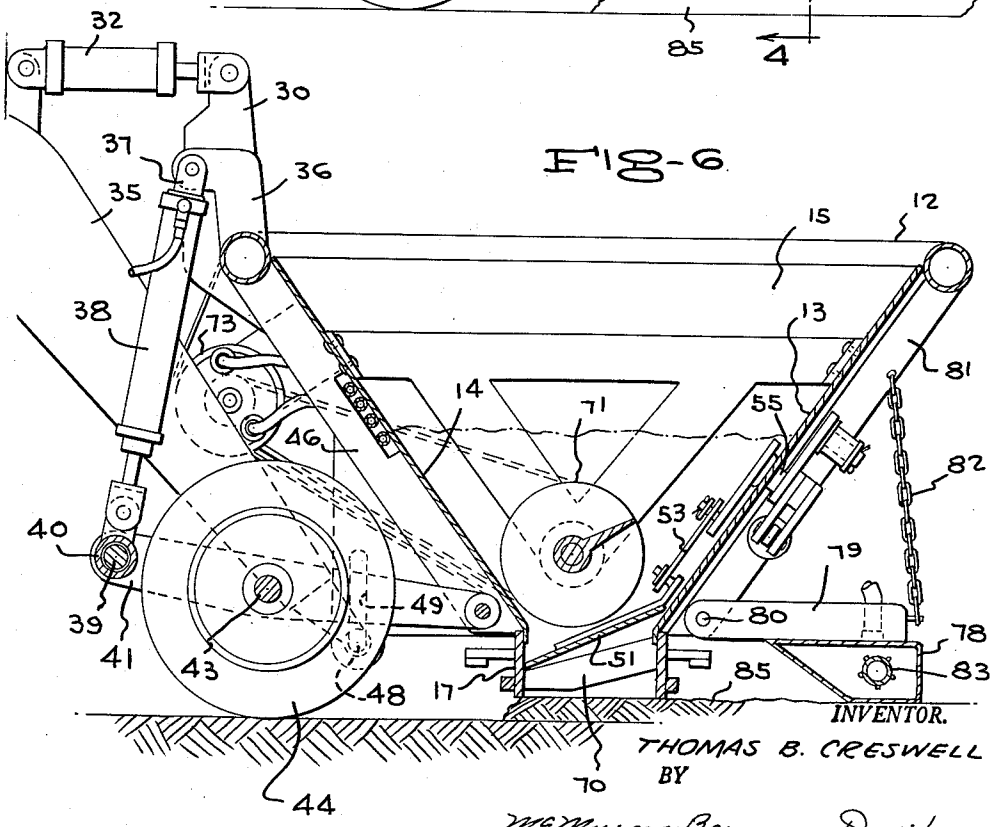


FIG-6



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MACHINE FOR SPREADING ROAD SURFACING MATERIAL

Filed Dec. 15, 1959 6 Sheets-Sheet 5

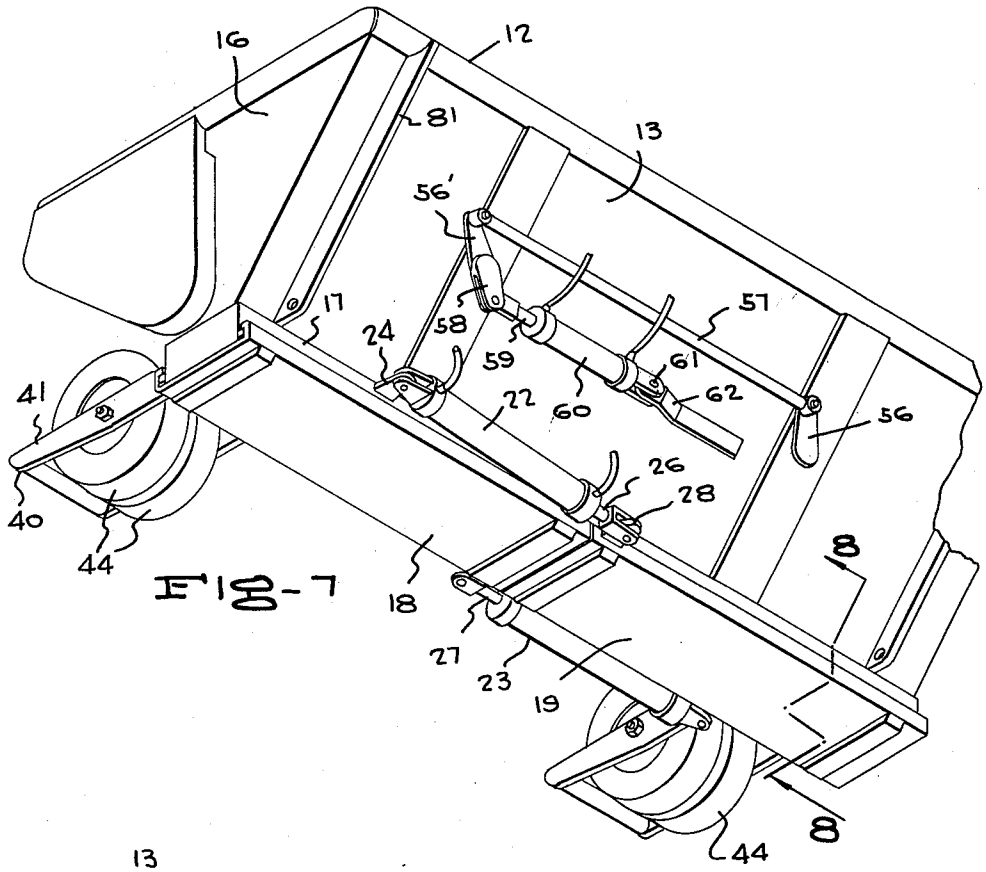


FIG-7

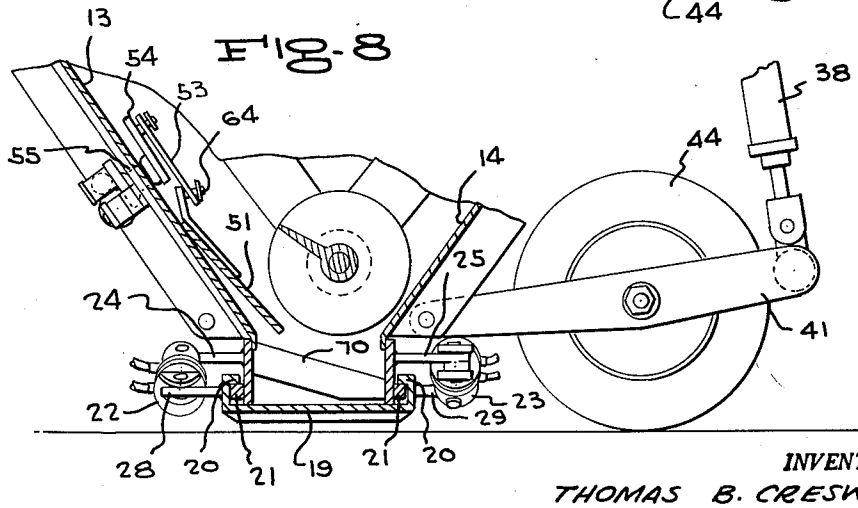


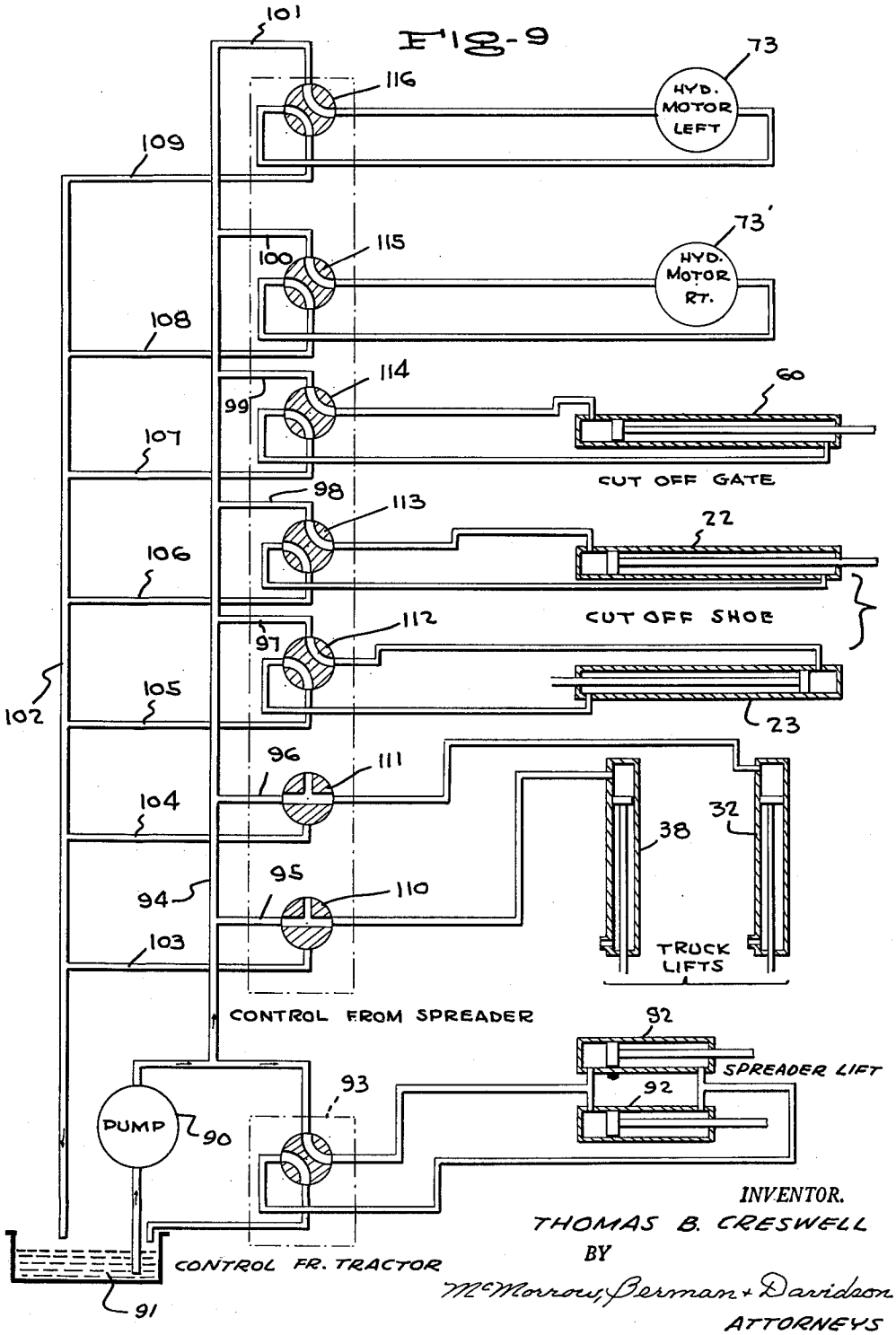
FIG-8

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MACHINE FOR SPREADING ROAD SURFACING MATERIAL

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3,029,714

MACHINE FOR SPREADING ROAD SURFACING MATERIAL

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Filed Dec. 15, 1959, Ser. No. 859,760
6 Claims. (Cl. 94—44)

This invention relates to road surfacing machines, and more particularly to a machine for spreading bituminous paving material, such as "blacktop" or the like on road surfaces, or other areas to be paved.

A main object of the invention is to provide a novel and improved machine for spreading surfacing material, said machine being relatively simple in construction, being easy to operate, and providing accurate control over the material being dispensed therefrom.

A further object of the invention is to provide an improved machine for spreading surfacing material, particularly suitable for spreading "blacktop" or similar paving material on walkways, driveways, parking areas, and the like, the machine being relatively inexpensive to manufacture, being durable in construction, and being arranged to be operated from the hydraulic power system of a conventional tractor or similar vehicle.

A still further object of the invention is to provide an improved material-spreading machine for use in paving roadways, parking areas, driveways, or the like, the machine being provided with means to control the width of the layer of material dispensed therefrom, as well as to control the thickness of the deposit of material.

A still further object of the invention is to provide an improved machine for spreading surfacing material, such as "blacktop" or similar bituminous material, the machine being relatively compact in size, being reliable in operation, being provided with means for smoothing the deposited material so as to form a finished top surface thereon, and being further provided with means for at times lifting the machine so that it may be readily transported by the vehicle to which it is attached.

Further objects and advantages of the invention will become apparent from the following description and claims, and from the accompanying drawings, wherein:

FIGURE 1 is a fragmentary top plan view of an improved machine for spreading surfacing material constructed in accordance with the present invention.

FIGURE 2 is a bottom view of the machine shown in FIGURE 1.

FIGURE 3 is a transverse vertical cross sectional view taken substantially on the line 3—3 of FIGURE 1 with the bottom gate members omitted.

FIGURE 4 is a transverse vertical cross sectional view taken substantially on the line 4—4 of FIGURE 5.

FIGURE 5 is a side elevational view of the machine of FIGURES 1 to 4, said view being taken substantially on the line 5—5 of FIGURE 3.

FIGURE 6 is an enlarged transverse vertical cross sectional view taken substantially on the line 6—6 of FIGURE 3.

FIGURE 7 is a fragmentary perspective view of the material spreading machine of FIGURES 1 to 6.

FIGURE 8 is an enlarged fragmentary vertical cross sectional view taken substantially on the line 8—8 of FIGURE 7.

FIGURE 9 is a piping diagram showing the conduit connections of the hydraulic control system employed with the material spreading machine of FIGURES 1 to 8.

Referring to the drawings, 11 generally designates a surfacing material spreader constructed in accordance with the present invention. The material spreader 11 comprises a hopper 12 which is provided with the downwardly converging front and rear walls 13 and 14 and

the substantially vertical end walls 15 and 16. The hopper 12 is provided with a transversely extending discharge spout 17 located at the bottom edges of the hopper wall, said discharge spout extending vertically and being provided with a pair of laterally movable horizontal gate members 18 and 19. The gate members 18 and 19 are generally channel-shaped and are provided with inturned top flange portions 20 which slidably engage on respective transversely extending guide ribs 21, 21 provided on the lower marginal portions of the front and rear walls of the depending vertical spout 17, whereby the gate members 18 and 19 are guided for transverse horizontal movement beneath the mouth of the discharge spout 17.

Respective fluid pressure cylinders 22 and 23 are pivotally connected to respective pivot lugs 24 and 25 provided on the front and rear transverse vertical walls of the discharge spout 17. The cylinders 22 and 23 are provided with outwardly extensible piston rods 26 and 27 which are respectively connected to lugs 28 and 29 on the inner end portions of the gate members 19 and 18, whereby the gate members are extended outwardly responsive to the extension of the respective piston rods 26 and 27 from the fluid pressure cylinders 22 and 23. Thus, by suitably extending the piston rods 26 and 27, it is possible to accurately control the transverse size of the discharge opening defined beneath the depending discharge spout 17.

The rear wall 14 of the hopper 12 is provided with a pair of upstanding lugs 30, 30 which are spaced symmetrically on opposite sides of the longitudinal vertical plane of the hopper and which are respectively pivotally connected to the ends of piston rods 31 extending from fluid pressure cylinders 32 pivotally connected at 33 to upstanding lugs 34 provided on the forwardly extending supporting beam elements 35 of a conventional motor grader or similar propelling vehicle. Additional symmetrically located upstanding lugs 36, 36 are provided on the top edge of rear wall 14, said lugs 36 being pivotally connected to respective piston rod members 37 associated with the pistons contained in respective fluid pressure cylinders 38, 38 which are pivoted to the transversely extending rear shaft members 39 of respective truck assemblies 40. Each truck assembly 40 comprises a pair of longitudinally extending side bars 41, 41 which are connected at their rear ends by the transversely extending shaft elements 39 and which are connected at their intermediate portions by transversely extending wheel shaft members 43 on which are journaled respective pairs of supporting wheels 44, 44. The forward ends of the side bars 41 of the respective truck assemblies are pivotally connected to the lower portion of the forward wall 14 of the hopper 12 at vertically extending frame bars 46 provided on said forward wall 14.

The forward ends of the beam members 35 are slidably connected to the hopper 12 subjacent the lower portion of rear wall 14 at respective pairs of vertical lug members 47, 47 secured to the lower portion of wall 14, the beam members 35 being received between the pairs of lug members 47, 47 and being slidably connected thereto by suitable bolt means 48 extending through transversely aligned pairs of vertical slots 49 formed in the lugs 47, 47.

As will be readily apparent, by extending the piston rods of the fluid pressure cylinders 38, the hopper 12 may be elevated, since this causes the truck bars 41 to rotate in a counterclockwise direction, as viewed in FIGURE 6, whereby the mouth of the discharge spout 17 will be elevated from the ground. This provides a means of adjusting the thickness of the layer of material deposited on the ground, since the thickness of said layer will depend upon the height of the mouth of the discharge spout 17 above ground level.

The beam members 35 are controlled by conventional

means on the associated vehicle, and may be at times elevated by suitable elevator means provided on the vehicle, whereby to lift the entire machine off the ground so that said machine may be transported by the vehicle to a desired location. The inclination of the hopper with respect to the supporting beam members **35** may be controlled by the operation of the fluid pressure cylinders **32**, since the hopper may be rotated with respect to the beam members **35** by extending or retracting the piston rod elements of said fluid pressure cylinders **32**.

Designated at **51** is a transversely extending plate-like gate member which is disposed in the lower portion of the hopper **12** and which is adapted to overlie the discharge spout **17**, said gate member **51** normally substantially closing the discharge spout, as illustrated in FIGURE 6. The gate member **51** is normally inclined, as illustrated in FIGURE 6 and is provided with a pair of connecting lugs **52, 52** (FIGURE 1) which are connected by respective link bars **53, 53** to the ends of respective crank arms **54, 54** rigidly secured on crank shaft elements **55, 55** journaled in the front wall **13** of the hopper. Secured to the outer ends of the crank shaft elements **55** are the respective crank arms **56** and **56'** (FIGURE 7), said arms being connected by a transversely extending link bar **57**. The arm **56'** is provided with an extension **58** which is connected to the end of a piston rod **59** associated with a fluid pressure cylinder **60** pivotally connected at **61** to a pivot bracket **62** secured on wall **13**.

As shown in FIGURE 7, when the piston rod **59** is in its retracted position, the arms **54, 54** are lowered, allowing the gate member **51** to assume its closed position, as illustrated in FIGURE 6. When the piston rod **59** is extended, the arms **56** and **56'** are rotated in a clockwise direction, as viewed in FIGURE 7, causing the inner crank arms **54, 54** to be elevated, which raises the gate member **51** to the open position thereof, shown in FIGURE 8, allowing material to pass downwardly from hopper **12** into the discharge spout **17**.

As shown in FIGURE 8, the pin connections **64** of the lug elements **52, 52** to the link bars **53** are relatively loose, so as to allow substantially free angular movement of the gate **51** with respect to the link bars **53**, whereby to allow the gate member **51** to assume a position relatively closely adjacent to the front wall **13** of the hopper when the gate member is in its elevated, open position, illustrated in FIGURE 8. However, when the gate member **51** is allowed to descend, the lowering of the link bars **53, 53** causes the gate member to rotate in a counterclockwise direction, as viewed in FIGURE 8, to a position such as that illustrated in FIGURE 6, inclined guide bars **70** being provided in the discharge spout **17** which guide the free lower transverse edge of the plate member **51** as said plate member descends and which slidably support the lower transverse free edge of the plate member for movement in a direction downwardly and to the right, as viewed in FIGURE 8, until the gate member reaches its closed position illustrated in FIGURE 6.

Designated at **71** and **71'** are a pair of axially aligned screw conveyors mounted transversely in the bottom portion of the hopper **12** over the discharge spout **17**, said screw conveyors being mounted for independent rotation and being respectively driven by hydraulic motors **73, 73'** mounted on the rear wall **14** adjacent the opposite sides of the hopper. Each motor is drivingly coupled to its associated screw conveyor by suitable transmission means, for example, by a sprocket chain **75** coupling a sprocket wheel **76** provided on the motor shaft to a larger sprocket wheel **77** provided on the outer end of the screw conveyor shaft. As above mentioned, the screw conveyors are suitably journaled for independent rotation on the same transverse axis in the hopper **12** and may be driven either forwardly or reversely, depending upon the direction of operation of the associated hydraulic motor **73** or **73'**. As will be apparent from FIGURE 6, the rotation of the screw conveyors causes the material in the hopper to be agitated and loosened and to be moved downwardly toward the discharge spout **17**. In one direction of rotation, the screw conveyors will move material from the outside toward the intermediate portion of the hopper, whereas in the opposite direction, the material will be moved from the intermediate portion toward the outer sides of the hopper. Obviously, the mode of operation of the screw conveyors will depend upon the adjustment of the horizontally movable bottom gate members **18** and **19**, since under certain conditions, it may be desirable to move the material toward the intermediate portion of the hopper, for example, where the gate members **18** and **19** are adjusted to provide a relatively limited discharge opening located at the intermediate portion of the discharge spout **17**. Alternatively, when the gate members **18** and **19** are considerably extended to provide a large discharge opening, it may be more desirable to rotate the conveyor members **71** and **71'** in directions to distribute the material outwardly and downwardly through the discharge spout **17**.

Designated at **78** is a hollow, transversely extending screed member which is located subjacent the forward wall **13** and which is provided with the connecting bar members **79** which are pivotally connected at **80** to the lower end portions of vertically extending flange bars **81** secured to forward wall **13**. The ends of the bars **79** are connected by chains **82** to the upper portions of the associated flange bars **81** so as to limit the lowering of the screed member **78** to a desired level. Mounted inside the screed member **78** is a tubular heater **83** which may be of any suitable type, for example, of the type utilizing bottled gas, the burner **83** being substantially coextensive in length with the hollow screed **78**, and serving to heat the screed member **78** substantially uniformly over its entire length. As shown in FIGURE 6, the screed member **78** is adapted to engage the deposited paving material, shown at **85** and to smooth said material as it is moved thereover.

Referring to FIGURE 9, the vehicle is provided with a suitable hydraulic power system which may include a conventional pump **90** and a hydraulic reservoir **91**. The elevating beam members **35** are raised and lowered by the operation of fluid pressure cylinders **92** provided on the tractor and being of conventional construction. A reversible valve **93** is provided on the tractor for controlling the admission of hydraulic fluid under pressure to the elevating cylinders **92, 92**. In the position of the valve **93** shown in FIGURE 9, hydraulic fluid will enter the cylinders **92** and elevate the beams **35**, lifting the machine **11** off the ground. To lower the machine, the valve **93** may be adjusted to allow the hydraulic fluid to discharge from the cylinders **92, 92**, namely, for example, by rotation of the rotary valve element thereof through an angle of 90 degrees in a clockwise direction, as viewed in FIGURE 9.

The hydraulic fluid under pressure from pump **90** is delivered to a fluid pressure conduit **94** and is connected through respective supply conduits **95** to **101** associated respectively with the fluid pressure cylinders **38, 32, 23, 22** and **60**, and the hydraulic motors **73'** and **73**. A return conduit **102** leads to the reservoir **91**, and respective return conduit members **103** to **109** are connected to the main return conduit **102**. Manually operated two-way valves **110** and **111** are interconnected with the supply conduits **95, 96**, the cylinders **38** and **32**, and the return conduits **103** and **104** as illustrated in FIGURE 9. The valves **110** and **111** provide control of the elevating cylinders **38** and **32** so that the cylinders may perform the operations previously described, namely, may adjust the angular position and discharge height of the hopper **12**.

Respective manually operated reversing valves **112, 113, 114, 115** and **116** are provided for the fluid pressure cylinders **23, 22** and **60** and the hydraulic motors **73'** and **73**, to reversibly admit fluid under pressure to these members. Thus, with the connections shown in FIGURE

9, the valve **112** will allow fluid under pressure to enter the right side of the cylinder **23**, moving the piston element thereof to the left, as viewed in FIGURE 9, causing the horizontal gate member **18** to be moved outwardly. In the reverse position of the valve **112**, the piston element of cylinder **23** will be moved to the right, as viewed in FIGURE 9, causing the horizontal gate member **18** to be moved toward its closing position.

The horizontal gate member **19** is controlled in a similar manner by the fluid pressure cylinder **22** and the manually operated control valve **113** associated therewith. The same type of control is provided by the valve **114** for the fluid pressure cylinder **60** which is associated with the main cutoff gate member **51** provided inside the hopper **12**.

Similarly, the hydraulic motors **73** and **73'** are reversibly controlled by their respective manually operated reversible control valves **116** and **115**.

The control valves **110** to **116** are constructed as a unitary assembly **120** and are mounted on the rear portion of the hopper adjacent one corner thereof, as shown in FIGURE 1. A platform **121** is hingedly connected to the frame of the hopper adjacent the control valve unit **120**, the platform **121** being movable to its outwardly extending horizontal position, as shown in FIGURE 3, wherein it is supported by abutment of its corner portion **123** against an adjacent portion of the frame of the machine. When not in use, the platform **121** may be rotated to a vertical position, such as that shown in dotted view in FIGURE 3, and may be secured in said position by a manually rotatable fastening bolt member **124** rotatably mounted on a bracket member **125** provided on the frame of the machine and being located so as to overlie the top edge of platform **121** when the platform is raised to its vertical position. The bolt member **124** may be threadedly engaged with the edge of the platform **121** to secure the platform in its elevated, inoperative position.

As shown in FIGURES 1 and 2, the platform **121** is located so that the operator may stand on the platform and may operate the control valves **110** to **116**, the operator being in a position to observe the movement of the material in the hopper **12**, and being thus able to closely regulate the operation of the machine in accordance with the conditions prevailing.

While a specific embodiment of an improved machine for spreading surfacing material has been disclosed in the foregoing description, it will be understood that various modifications within the spirit of the invention may occur to those skilled in the art. Therefore, it is intended that no limitations be placed on the invention except as defined by the scope of the appended claims.

What is claimed is:

1. A surfacing material spreader comprising a wheeled hopper adapted to receive surfacing material, said hopper having downwardly converging front and rear walls, end walls connecting said front and rear walls, and a transverse discharge spout at the bottom edges of said walls, a pair of laterally movable horizontal gate members slidably mounted on and underlying said discharge spout, said gate members being engageable at their inner edges to close off said discharge spout and being movable outwardly to allow material to discharge through said spout between said inner edges, respective oppositely directed fluid pressure cylinders mounted substantially horizontally on said hopper adjacent said discharge spout, said cylinders having respective outwardly projecting piston rod elements, means connecting said piston rod elements to the respective gate members, whereby to move said gate members responsive to operation of said fluid pressure cylinders, a plurality of parallel spaced inclined guide bars provided in and extending across said discharge spout at a substantial angle to the transverse direction of the hopper, a downwardly inclined cutoff gate member movably mounted in said hopper adjacent said discharge spout with a free transverse edge thereof slidably engaged on said guide bars, said last-named gate member being movable upwardly along said guide bars to an open position and being free to pivot as it is moved upwardly, upwardly movable crank arm means pivotally mounted in said hopper, and means loosely and pivotally connecting said crank arm means to said last-named gate member, whereby said gate member is movable upwardly to said open position responsive to upward movement of said crank arm means.

2. A surfacing material spreader comprising a wheeled hopper adapted to receive surfacing material, said hopper having downwardly converging front and rear walls, end walls connecting said front and rear walls, and a transverse discharge spout at the bottom edges of said walls, a pair of laterally movable horizontal gate members slidably mounted on and underlying said discharge spout, said gate members being engageable at their inner edges to close off said discharge spout and being movable outwardly to allow material to discharge through said spout between said inner edges, respective oppositely directed fluid pressure cylinders mounted substantially horizontally on said hopper adjacent said discharge spout, said cylinders having respective outwardly projecting piston rod elements, means connecting said piston rod elements to the respective gate members, whereby to move said gate members responsive to operation of said fluid pressure cylinders, a plurality of parallel spaced inclined guide bars provided in and extending across said discharge spout at a substantial angle to the transverse direction of the hopper, a downwardly inclined cutoff gate member movably mounted in said hopper adjacent said discharge spout with a free transverse edge thereof slidably engaged on said guide bars, said last-named gate member being movable upwardly along said guide bars to an open position and being free to pivot as it is moved upwardly, a further fluid pressure cylinder transversely mounted on said front wall and having an outwardly extending piston rod element, crank means pivotally mounted on said hopper, means drivingly connecting said last-named piston rod element to said crank means, and means loosely and pivotally connecting said crank means to said last-named gate member and including means to move said last-named gate member upwardly responsive to the operation of said last-named fluid pressure cylinder.

3. A surfacing material spreader comprising a wheeled hopper adapted to receive surfacing material, said hopper having downwardly converging front and rear walls, end walls connecting said front and rear walls, and a transverse discharge spout at the bottom edges of said walls, a pair of laterally movable horizontal gate members slidably mounted on and underlying said discharge spout, said gate members being engageable at their inner edges to close off said discharge spout and being movable outwardly to allow material to discharge through spout between said inner edges, respective oppositely directed fluid pressure cylinders mounted substantially horizontally on said hopper adjacent said discharge spout, said cylinders having respective outwardly projecting piston rod elements, means connecting said piston rod elements to the respective gate members, whereby to move said gate members responsive to operation of said fluid pressure cylinders, a plurality of parallel spaced inclined guide bars provided in and extending across said discharge spout at a substantial angle to the transverse direction of the hopper, a downwardly inclined cutoff gate member movably mounted in said hopper adjacent said discharge spout with a free transverse edge thereof slidably engaged on said guide bars, said last-named gate member being movable upwardly along said guide bars to an open position and being free to pivot as it is moved upwardly, a further fluid pressure cylinder transversely mounted on said front wall and having an outwardly extending piston rod element, crank means pivotally mounted on said hopper, means drivingly connecting said last-named pis-

ton rod element to said crank means, and means loosely and pivotally connecting said crank means to said last-named gate member and including means to move said last-named gate member upwardly responsive to the operation of said last-named fluid pressure cylinder, a pair of axially aligned screw conveyors mounted transversely in the bottom portion of the hopper over said discharge spout, and means to simultaneously rotate said screw conveyors in directions to move material in the hopper toward said discharge spout.

4. A surfacing material spreader comprising a pair of wheeled truck members, each of said truck members comprising parallel side bar members and supporting wheels journaled between the intermediate portions of said side bar members, a hopper pivoted to the forward ends of said side bar members, said hopper being adapted to receive surfacing material, fluid pressure-operated means connected between the top portion of the hopper and the rear ends of said side bar members and including means to at times vary the height of said hopper relative to said supporting wheels, said hopper having downwardly converging front and rear walls, end walls connecting said front and rear walls, and a transverse discharge spout at the bottom edges of said walls, a pair of laterally movable horizontal gate members slidably mounted on and underlying said discharge spout, said gate members being engageable at their inner edges to close off said discharge spout and being movable outwardly to allow material to discharge through said spout between said inner edges, respective oppositely directed fluid pressure cylinders mounted substantially horizontally on said hopper adjacent said discharge spout, said cylinders having respective outwardly projecting piston rod elements, means connecting said piston rod elements to the respective gate members, whereby to move said gate members responsive to operation of said fluid pressure cylinders, a plurality of parallel spaced inclined guide bars provided in and extending across said discharge spout at a substantial angle to the transverse direction of the hopper, a downwardly inclined cutoff gate member movably mounted in said hopper adjacent said discharge spout, with a free transverse edge thereof slidably engaged on said guide bars, said last-named gate member being movable upwardly along said guide bars to an open position and being free to pivot as it is moved upwardly, a further fluid pressure cylinder transversely mounted on said front wall and having an outwardly inclined piston rod element, crank means pivotally mounted on said hopper, means drivingly connecting said last-named piston rod element to said crank means, and means loosely and pivotally connecting said crank means to said last-named gate member and including means to move said last-named gate member upwardly responsive to the operation of said last-named fluid pressure cylinder.

5. A surfacing material spreader comprising a pair of wheeled truck members, each truck member comprising a pair of parallel side bar members and a supporting wheel journaled between the intermediate portions of said pair of side bar members, a hopper pivoted to the forward ends of said side bar members, said hopper being adapted to receive surfacing material, fluid-pressure operated means connected between the top portion of the hopper and the rear ends of said side bar members and including means to at times vary the height of the hopper relative to said supporting wheels, said hopper having downwardly converging front and rear walls, end walls connecting said front and rear walls, and a transverse discharge spout at the bottom edges of said walls, a pair of laterally movable horizontal gate members slidably mounted on and underlying said discharge spout, said gate members being engageable at their inner edges to close off said discharge spout and being movable outwardly to allow material to discharge through said spout between said inner edges, respective oppositely directed fluid pressure cylinders mounted substantially horizontally on said hopper adjacent said discharge spout, said cylinders having respective outwardly projecting piston rod elements, means connecting said piston rod elements to the respective gate members, whereby to move said gate members responsive to operation of said fluid pressure cylinders, a plurality of parallel spaced inclined guide bars provided in and extending across said discharge spout at a substantial angle to the transverse direction of the hopper, a downwardly inclined cutoff gate member movably mounted in said hopper adjacent said discharge spout with a free transverse edge thereof slidably engaged on said guide bars, said last-named gate member being movable upwardly along said guide bars to an open position and being free to pivot as it is moved upwardly, a further fluid pressure cylinder transversely mounted on said front wall and having an outwardly extending piston rod element, crank means pivotally mounted on said hopper, means drivingly connecting said last-named piston rod element to said crank means, means loosely and pivotally connecting said crank means to said last-named gate member and including means to move said last-named gate member upwardly responsive to the operation of said last-named fluid pressure cylinder, a pair of axially aligned screw conveyors mounted transversely in the bottom portion of the hopper over said discharge spout, and means to simultaneously rotate said screw conveyors in directions to move material in the hopper toward said discharge spout.

6. A surfacing material spreader comprising a wheeled hopper adapted to receive surface material, said hopper having downwardly converging front and rear walls, end walls connecting said front and rear walls, and a transverse discharge spout at the bottom edges of said walls, laterally movable horizontal gate means slidably mounted on and underlying said discharge spout, said gate means being movable outwardly to allow material to discharge through said spout, means to move said gate means outwardly, a plurality of parallel spaced inclined guide bars provided in and extending across said discharge spout, a downwardly inclined cutoff gate member movably mounted in said hopper adjacent said discharge spout with a free transverse edge thereof slidably engaged on said guide bars, said last-named gate member being movable upwardly along said guide bars to an open position and being free to pivot as it is moved upwardly, upwardly movable crank arm means pivotally mounted in said hopper, and means loosely and pivotally connecting said crank arm means to said last-named gate member, whereby said gate member is movable upwardly to said open position responsive to upward movement of said crank arm means.

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