

Jan. 26, 1960

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2,922,345

APPARATUS FOR AUTOMATICALLY LEVELING MATERIAL
IN THE BUILDING OF ROADS AND THE LIKE

Filed June 6, 1955

4 Sheets-Sheet 1

FIG. 1.

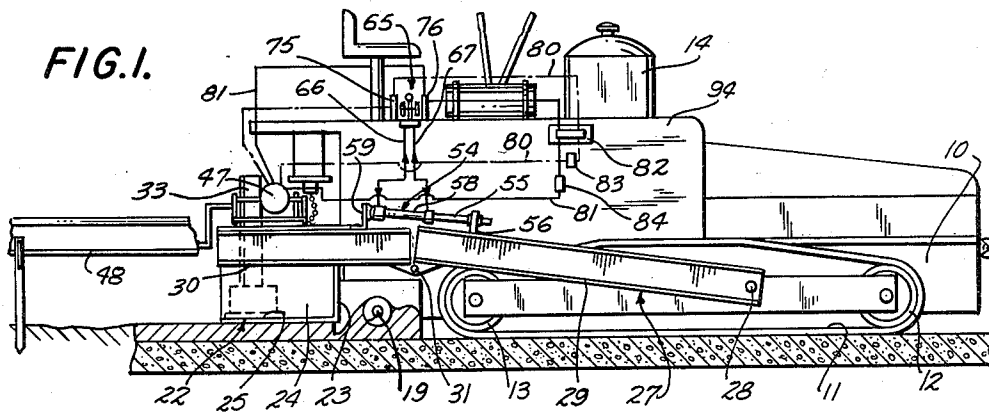


FIG. 2.

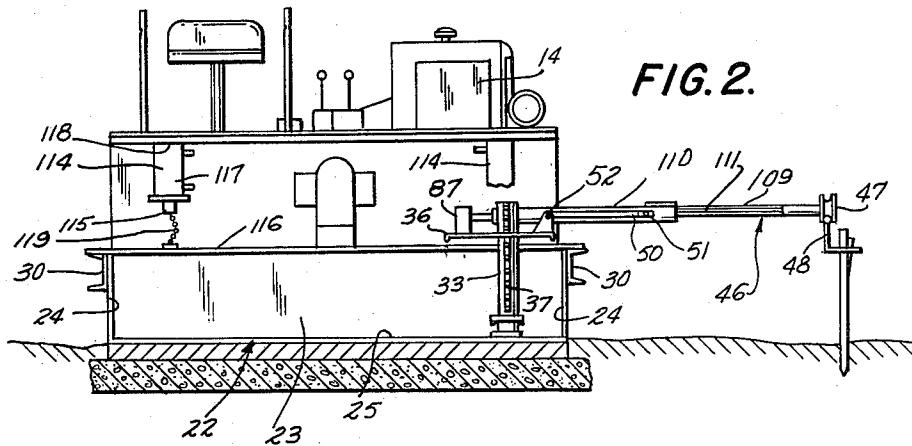
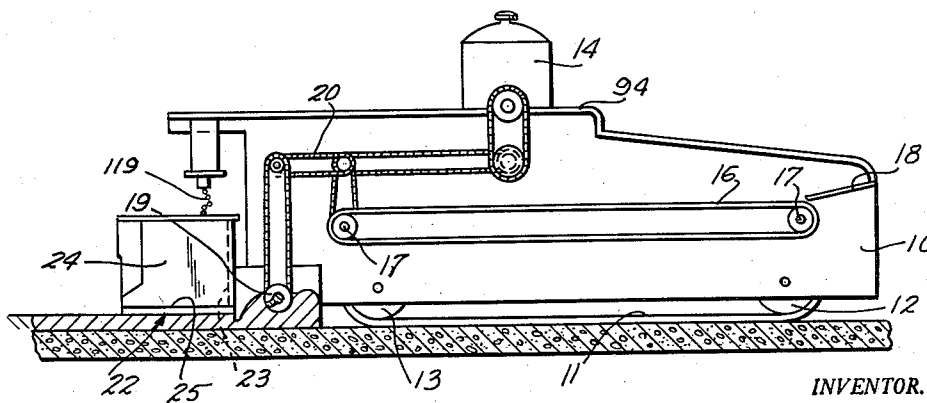


FIG. 3.



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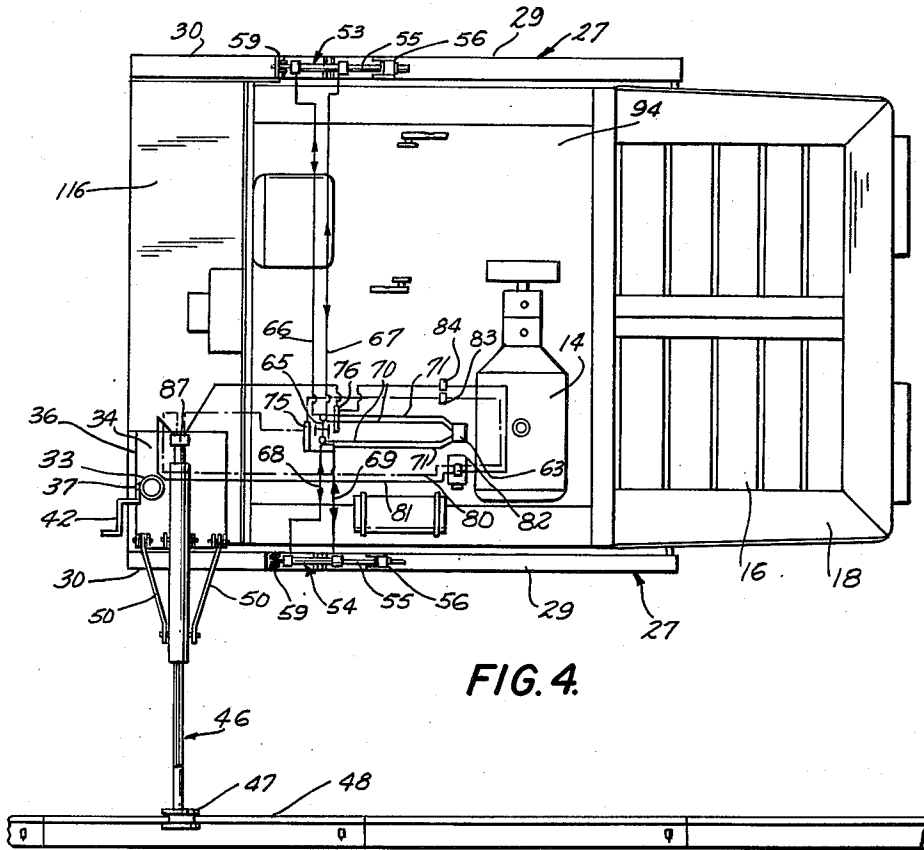


FIG. 4.

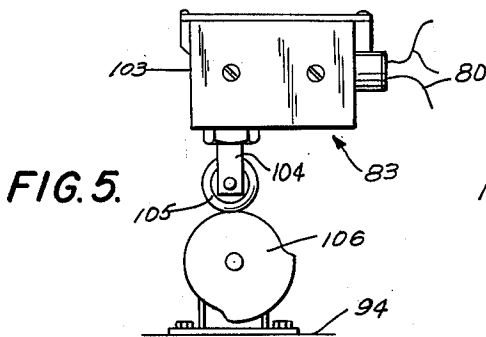


FIG. 5.

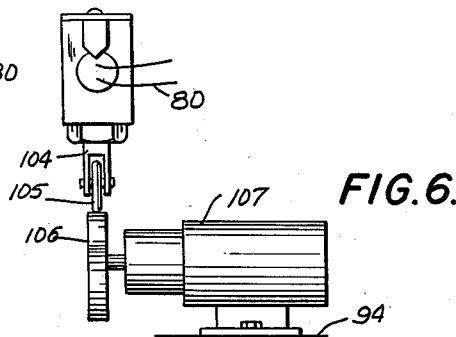


FIG. 6.

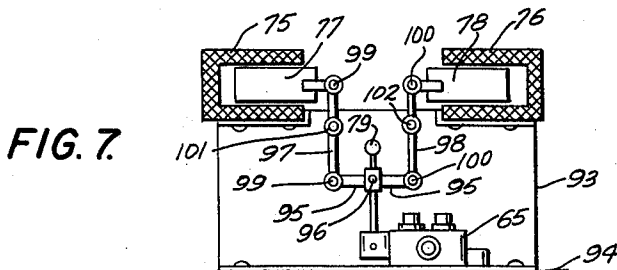


FIG. 7.

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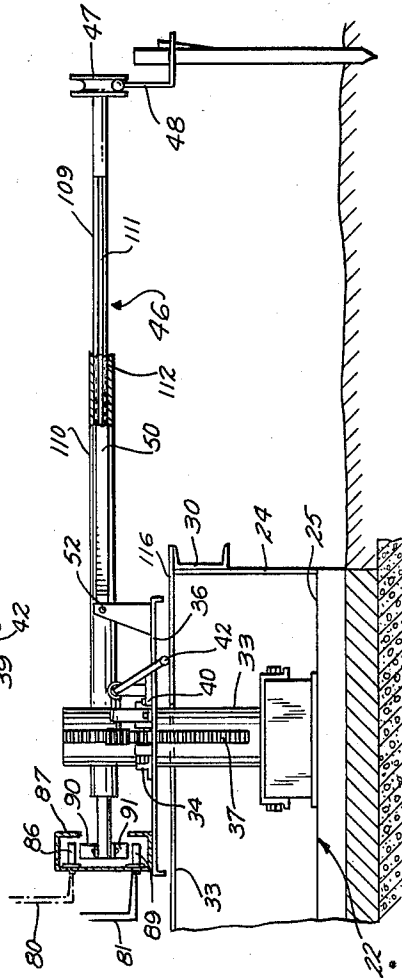
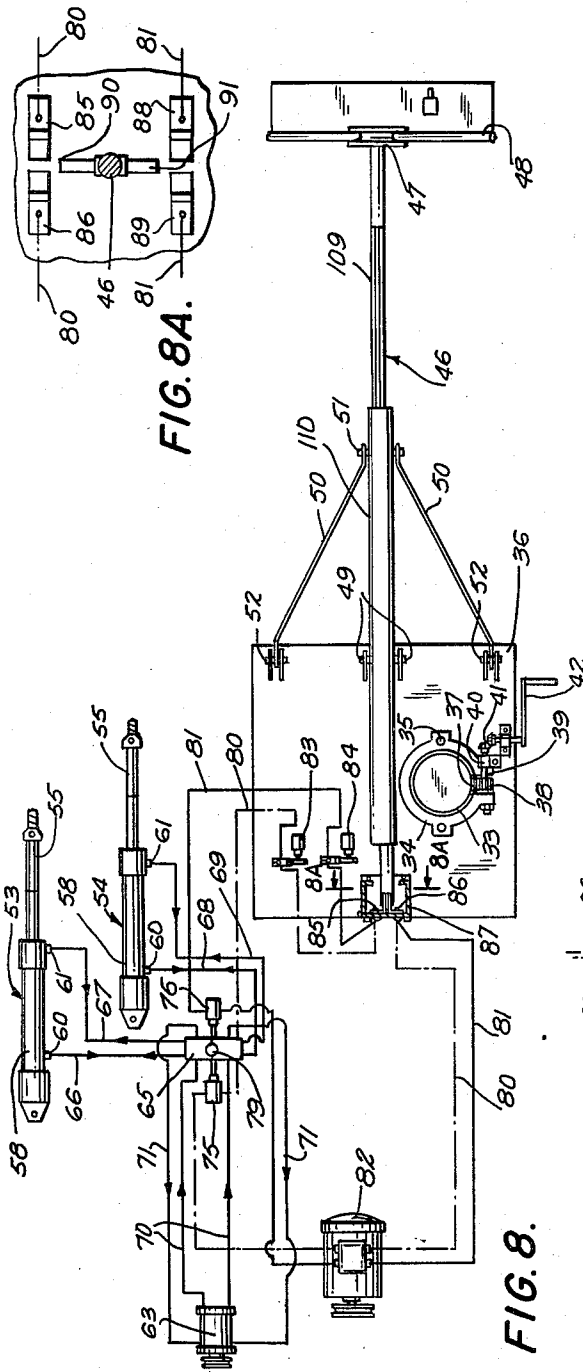
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FIG. 10

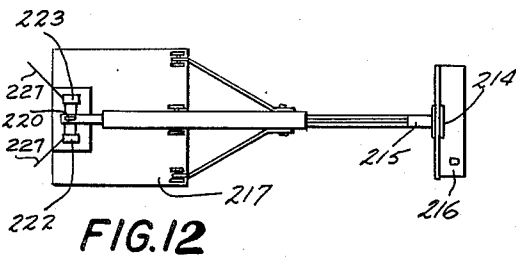
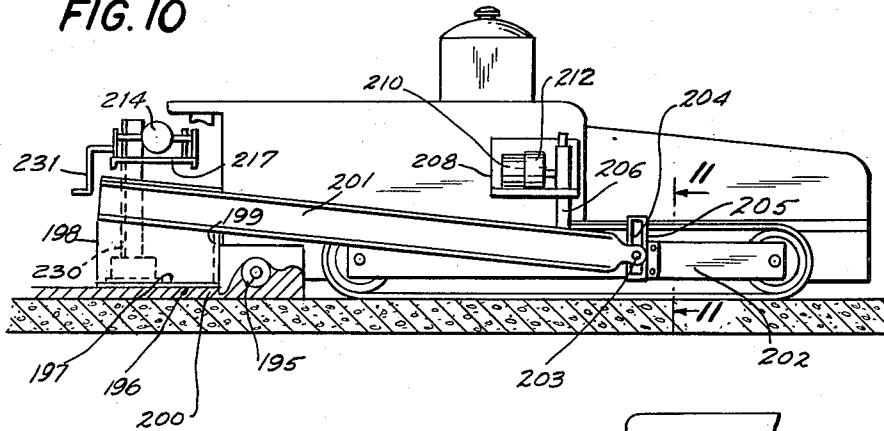


FIG. 12

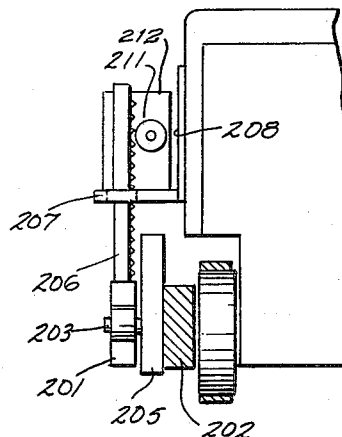


FIG. 11

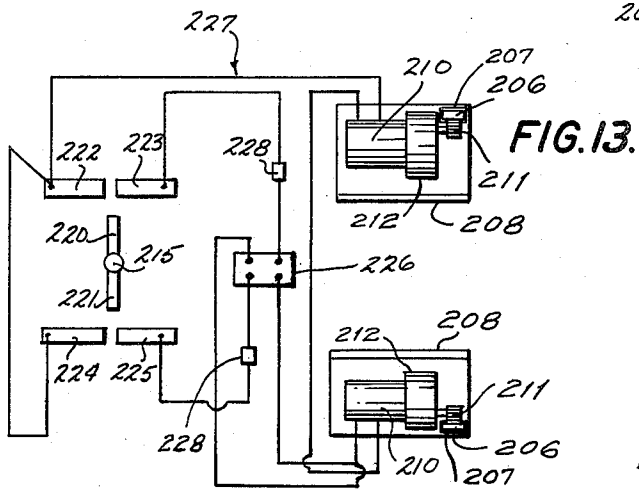


FIG. 13.

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2,922,345

APPARATUS FOR AUTOMATICALLY LEVELING MATERIAL IN THE BUILDING OF ROADS AND THE LIKE

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Application June 6, 1955, Serial No. 513,209

5 Claims. (Cl. 94-46)

This invention relates to an apparatus for automatically producing a level surface which is leveled in accordance with a predetermined level established in continuous fixed relation with the prescribed grade of roads and the like. The invention comprehends an apparatus having a leveling member for producing a level surface in the bed of a road and the like and in the material employed in the construction thereof and which leveling member is movable in accordance with a predetermined guide level established by the requirement of the grade of the road to automatically vary the elevation thereof.

In the construction of roads and the like stakes are set out along the terrain adjacent the site of the road on which the required grade of the road is marked together with the amount of excavation and/or fill required to convert the terrain to conform to the plan of the road. As the excavation and fill-in proceed constant checking is required with the markings on the stakes. This is done by sighting and checking the deviation of the work done from the markings on the stake to determine the progress of the work and the amount of excavation and/or fill-in required. The checking is customarily done by the foreman having charge of the machines employed in the excavating and filling-in and spreading of the materials. When the excavating and/or filling-in have been substantially completed and the bed of the road must be graded to substantial accuracy with the requirements of the grade set on the stakes, constant checking is required to complete the final excavating and/or filling-in to establish the bed of the road. In order to carry out the last filling-in and grading, and spreading and paving operations it is frequently customary to insert stakes approximately 25 feet apart in order that constant checking with the grade marks on the stakes may be conveniently made. In order to overcome this constant checking with the grade marks and other information on the stakes the present invention provides grading and spreading apparatus with means for automatically leveling the terrain of the bed of the road and the materials used in the building thereof in accordance with a guide which is set at a level established by the grade for the finished road.

The invention is applicable to grading apparatus having a blade for excavating and filling-in earth and which blade is adjustable to various elevations. The invention is also applicable to apparatus for spreading broken stone, bituminous material and the like and which is provided with a leveling member or screed adapted to be set for spreading the required depth of material. In carrying out the invention the apparatus is provided with an arm which is adapted to engage a guide extending in continuous fixed relation with the site of the road. The arm is mounted on the apparatus and operatively connected with the leveling member for varying the height thereof so as to vary the thickness of the material being discharged and to produce a continuous level upper surface in the material.

A further object of the invention is to provide an

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apparatus for leveling materials in the building of roads and the like in association with a guide established by the requirement of the grade of the road and with means carried by the apparatus and engaging said guide for leveling the material in accordance with the grade as the apparatus is moved.

With the foregoing and other objects in view, reference is now made to the following specification and accompanying drawings in which the preferred embodiments of the invention are illustrated.

In the drawings:

Fig. 1 is a view in side elevation of an apparatus for spreading material in the building of roads and the like which is shown in association with a continuous guide and having means disposed in engagement with the guide constructed in accordance with the invention for producing a level upper surface in materials spread by the apparatus.

Fig. 2 is an end view thereof.

Fig. 3 is a schematic longitudinal view of the apparatus with parts broken away to show the underlying features of construction.

Fig. 4 is a top plan view of the apparatus.

Fig. 5 is an enlarged view in elevation of one of the micro switches.

Fig. 6 is an end view thereof.

Fig. 7 is a fragmentary view showing the mounting for the solenoids and the four-way control valve.

Fig. 8 is an enlarged top plan view of the arm and bracket support therefor together with a schematic view of the electric wiring and hydraulic layout.

Fig. 8A is a fragmentary sectional view taken approximately on line 8A-8A of Figure 8.

Fig. 9 is an enlarged side view of the arm and support therefor.

Fig. 10 is a side view of an apparatus embodying a modified form of the invention.

Fig. 11 is an enlarged fragmentary sectional view taken approximately on line 11-11 of Fig. 10.

Fig. 12 is an enlarged top plan view of the arm and bracket support therefor and showing the wheel at the end of the arm in engagement with a guide rail.

Fig. 13 is a schematic view of the wiring diagram and associated parts.

Referring to the drawings and more particularly to Figs. 1 to 9 thereof inclusive in which the invention is shown in its application to an apparatus for spreading broken stone, bituminous material and the like, the apparatus may be of any preferred construction and as illustrated includes a chassis 10 mounted on an endless track 11 at each side thereof which are trained about wheels 12 and 13 at the front and rear and are driven by a motor 14 such as an internal combustion engine.

The apparatus also includes an endless conveyor 16 mounted on front and rear shafts 17 suitably supported on the chassis 10 and driven by the motor 14. The conveyor 16 is located at the bottom of a hopper 18 in which broken stone or bituminous material is dumped to be fed through the rear of the apparatus for spreading the required depth and width thereof. The material is discharged from the conveyor 17 onto a screw 19 extending transversely of the apparatus from one side thereof to the other and which is journaled for turning movement on the chassis 10. The screw is driven by a chain drive 20 operatively connected with the motor 14, one-half of the screw having a right-hand blade and the other half having a left-hand blade for conveying and distributing the material from the center of the apparatus to the side edges thereof.

Located at the rear of the screw 19 is a leveling member 22 for leveling the upper surface of the discharged material as the apparatus is moved along the bed of the

road. The leveling member 22 is termed a "screed" and extends the full width of the apparatus and includes a vertically disposed front plate 23, end plates 24 and a bottom plate 25 which compresses the material discharged by the conveyor and smooths and levels the top surface thereof with the movement of the apparatus. In the embodiment illustrated the leveling member 22 is affixed at its ends to side arms 27 pivoted to the chassis 10 on pins 28. Each of the side arms 27 is composed of front and rear sections 29 and 30 which are pivotally connected together in end to end relation on pins 31. The end plates 24 of the leveling member 22 are secured to the rear sections 30 and the rear sections together with the leveling member 22 have swinging movement about the pin 28 as the center. Mounted on the bottom plate 25 is a column 33 which is slideable in a collar 34 affixed by bolts 35 to a plate or platform 36. The column protrudes through an opening in the plate and through the collar and is provided with a rack 37 which is engaged by a gear 38. The gear is secured to a shaft 39 mounted for turning movement in a bracket 40 affixed to the plate or platform 36 and is operatively connected by mitre gears 41 with a crank 42 adapted to be turned for raising and lowering the plate or platform 36 with reference to the column.

In order that the leveling member 22 is automatically raised and lowered to produce a level top surface in the material discharged by the apparatus in accordance with a predetermined level established by the prescribed grade of the road, the apparatus is provided with an arm 46 extending laterally outward from one side of the apparatus and having a wheel or shoe 47 at the outer end thereof which is adapted to engage a guide rail 48 extending in continuous relation to the site of the road and in fixed relation with the required grade thereof or in other words any point on the guide rail corresponds to the finished grade of the road at such point. The arm 46 is pivoted to the plate 36 on pins 49 and is pivotally connected to tie rods 50 on pins 51 which tie rods are pivotally connected to the plate 36 on pins 52. This construction retains the arm 46 in substantially right angular relation with the apparatus and permits of rocking movement thereof on the pins 49.

It will be understood that any unevenness in the road bed is imparted to the leveling member 22 when the apparatus is moved over the road bed and such unevenness heretofore has created unevenness in the upper surface of the material spread by the apparatus. This uneven movement of the apparatus is compensated for in the present invention by instrumentalities operatively connected with the inner end of the arm 46 and with hydraulic rams 53 and 54. The inner end of the arm 46 is movable to different positions with the up and down movement of the apparatus and which functions to automatically elevate the leveling member 22 when the inner end of the arm 46 is moved to one of said positions and to automatically lower the leveling member 22 whenever the arm is moved to the other of said positions.

The rams 53 and 54 may be actuated in any desired manner to raise and lower the leveling member 22. As illustrated the rams include pistons 55 which are pivoted to posts 56 respectively affixed to the channel sections 29. The pistons 55 protrude from the cylinders 58 which are pivoted to brackets 59 respectively affixed to the channel sections 30. The heads of the pistons 55 are arranged within the cylinders 57 between ports 60 and 61. The rams 53 and 54 are hydraulically connected with an oil pump 63 through a four-way control valve 65. The ports 60 and 61 of the ram 53 are connected by conduits 66 and 67 with the ports at one end of the control valve 65 and the ports 60 and 61 of the ram 54 are connected by conduits 68 and 69 with the opposite end of the four-way control valve 65.

The four-way control valve 65 is connected with the

oil pump 63 by supply conduits 70 and by return conduits 71. The valve is controlled by two solenoids 75 and 76 having oppositely disposed armatures 77 and 78 connected with an actuating lever 79 for opening the ports for the flow of hydraulic fluid to and from the rams 53 and 54 thereof and for shutting off the flow thereto. The actuating lever 79 is spring loaded and is normally maintained by the spring in neutral position. The solenoids are connected in electric circuits 80 and 81 respectively with a direct current generator 82. Interposed in the circuits 80 and 81 are micro switches 83 and 84 respectively. The circuit 80 is connected to two spaced switch terminals 85 and 86 affixed to a bracket 87 mounted on the plate 36 and the circuit 81 is connected to two spaced switch terminals 88 and 89 affixed to said bracket 87 with the switch terminals respectively disposed in vertical alignment.

Affixed to the inner end of the arm 46 are oppositely disposed switch blades 90 and 91. The switch blade 90 is adapted to engage between the switch terminals 85 and 86 and the switch blade 91 is adapted to engage between the switch terminals 88 and 89 for closing the circuits 80 and 81 respectively. It will therefore be understood that any movement of the apparatus or the arm 46 by which the inner end of said arm is swung upwardly to dispose the switch blade 90 between the switch terminals 85 and 86 will close the circuit 80 to thereby energize the solenoid 75 and any movement of the apparatus or the arm 46 by which the inner end of said arm is moved downwardly whereby the blade 91 is moved between the switch terminals 88 and 89 the circuit 81 will be closed to energize the solenoid 76.

The solenoids 75 and 76 are affixed to an upstanding bracket 93 which is riveted or otherwise affixed to the top 94 of the apparatus. The four-way control valve 65 is also secured to the bottom plate of the bracket 93 with the actuating lever 79 extending upwardly therefrom and provided with outwardly extending arms 95 independently pivoted to the lever at 96.

The armatures 77 and 78 of the solenoids are mounted for reciprocatory sliding movement and in order to impart movement to the control lever 79 when the solenoids are energized the armatures are pivotally connected to levers 97 and 98 respectively on pivot pins 99 and 100 with the lower ends of said levers pivoted to the arms 95 on pivot pins 99 and 100 respectively. The levers 97 and 98 are pivoted to the bracket 93 on pivot pins 101 and 102. By this construction the actuating lever 79 will be swung to the right of the neutral position shown in Fig. 7 when the solenoid 75 is energized and will be swung to the left of the said neutral position when the solenoid 76 is energized, the lever returning to neutral position when the solenoids are deenergized.

The micro switches 83 and 84 are constructed to alternately make and break the circuits 80 and 81 respectively when the circuits are closed through the switch terminals and switch blades. This results in alternately making and breaking the circuit to the solenoids whereby the flow of the hydraulic fluid to the rams will be by a short impulse each time the circuit is closed by the actuation of the micro switch. It will be understood that each time either one of the circuits is broken by its micro switch the actuating lever 79 will be moved by the spring (not shown) to close off the flow to the hydraulic ram. The pistons however will move in small increments to adjust the leveling member so long as the circuits are closed respectively through the switch terminals and switch blade.

The micro switches 83 and 84 are of standard construction and include a normally open spring switch contained within the body 103 which are arranged in the circuits 80 and 81 respectively. The spring switch (not shown) is adapted to be closed by a reciprocatory plunger 104 having a roller 105 at the outer end thereof and which is engaged by a rotatable cam 106 driven by an electric motor 107 mounted on the top 94 of the apparatus.

The arm 46 consists of telescopically associated sections 109 and 110, the section 109 being freely slideable with reference to the section 110 to render the arm extensible and contractible with the movement of the apparatus laterally with reference to the guide rail. The section 109 is provided with longitudinally extending peripheral splines 111 which slideably fit in grooves 112 in the inner face of the section 110 to prevent rotation of the section 109 yet permitting relative sliding movement of the sections.

It will be understood that the leveling member or screed 22 being connected with the apparatus by the pivot pins 28 is dragged along by the apparatus over the material discharged by the conveyor 16 whereby the material is compacted and the upper surface thereof smoothed by the sliding thereover of the bottom plate 25 of the leveling member. The sections 29 and 30 of the side arms 27 being adjustable on the pivotal connections 31 permits of the adjustment thereof to control the thickness of the material being spread. When the pistons 55 are forced into the cylinders 58 of the rams 53 and 54 so as to raise the rearmost portion of the leveling member, the thickness of the material being spread is increased and when the pistons 55 are formed outwardly from the cylinders 58 of the rams so as to lower the rearmost portion of the leveling member, the thickness of the material being spread is decreased. Thus the automatic actuation of the rams by means of the movement of the inner end of the arm 46 functions to move the leveling member 22 upwardly and downwardly to compensate for uneven traveling movement of the apparatus to thereby produce a level upper surface in the material being spread.

When not in use the leveling member is elevated out of contact with the road bed by hydraulic rams 114 located one adjacent each end thereof which are of standard construction in an apparatus of this character, the pistons 115 thereof being releasably connected with the top plate 116 of the leveling member while the cylinders 117 are secured to the apparatus frame as 118. The rams are hydraulically operated and manually controlled to raise and lower the leveling member and when the same is initially adjusted for spreading the material at a desired thickness the pistons 115 are released and the leveling member connected with the frame 118 by one or more chains 119 which are sufficiently loose to permit of the raising and lowering of the leveling member to vary the thickness of the material being spread.

The generator 82 is operatively connected with and driven by the motor 14 of the apparatus to provide a constant source of current supply for the circuits 80 and 81. The hydraulic pump 63 is operatively connected with the motor 14 of the apparatus for driving the pump so as to produce the required pressure in the hydraulic fluid for actuating the rams 53 and 54. The rams 114 are suitably connected with a hydraulic pump (not shown) which is operatively connected with and driven by the motor 14 of the apparatus for producing the required pressure for actuating the said rams.

Instead of the hydraulic means for raising and lowering the leveling member 22 in the previous form of the invention, the leveling member may be raised and lowered by mechanical means as illustrated in the form of the invention shown in Figs. 10 to 12 inclusive of the drawings. The apparatus illustrated in this form of the invention is adapted for spreading bituminous material and the like and is similar in construction to the apparatus illustrated in Figs. 1 to 9 of the drawings. As in the previous form of the invention the bituminous material is discharged onto a screw 195 extending transversely of the apparatus, one half of which is provided with a right hand screw and the other half a left hand screw for conveying and distributing the material equally in front of a leveling member or "screed" 196. The leveling member 196 as in the previous form includes a bottom plate 197, end plates

198 and a front plate 199. The leveling member is dragged over the bituminous material indicated by the reference character 200 which functions to compact the material and level the top surface thereof with the forward movement of the apparatus. The leveling member 196 is affixed at its ends to a side arm 201 at each side of the apparatus which are connected with the chassis frame 202 by pins 203 extending through openings in the forward ends of the side arms and slidably engaging in vertical slots 204 of guide brackets 205 secured to the chassis frame 202 respectively. The side arms 201 are rigidly connected with the leveling member 196 whereby raising of the forward end of the side arms will tilt the leveling member to raise the rearmost portion of the leveling member to thereby increase the thickness of the material being spread and lowering the foremost end of the side arms will lower the rearmost portion of the leveling member 196 to effect a spreading of a thinner layer of material. The side arms are raised and lowered by means of racks 206 secured thereto and projecting upwardly through a guide slot 207 in an angle bracket 208 affixed to the side of the apparatus. The racks 206 are engaged by gears 211 driven by electric motors 210 through reduction gearing in the gear box 212.

As in the previous form of the invention, the leveling member 196 is automatically raised and lowered to produce a level top surface in the material discharged by the apparatus in accordance with a predetermined level established by the prescribed grade of the road. For this purpose, the apparatus is provided with a wheel or shoe 214 rotatably mounted on the outer end of an arm 215 which is adapted to engage a guide rail 216 extending continuously along the side of the road in fixed relation with the required grade thereof as in the previous form of the invention. The arm 215 is pivoted to a plate 217 as in the previous form of the invention. The inner end of the arm 215 is movable to different positions with the up and down movement of the apparatus to automatically elevate the leveling member 196 when the inner end of the arm 215 is moved to one of said positions and to automatically lower the leveling member 196 when the inner end of the arm is moved to the other of said positions. The arm 215 is provided with oppositely disposed switch blades 220 and 221, the switch blade 220 being adapted to engage between switch terminals 222 and 223 while the switch blade 221 is adapted to engage between the switch terminals 224 and 225. The switch terminals are connected in an electric circuit 227 with the reversible motors 210 and with an electric generator 226 which is driven by any desired means for generating current supply for the motors. The switch terminals are so arranged that when the terminals 222 and 223 are closed by the switch blade 220, the motors 210 will be rotated in one direction and when the switch terminals 224 and 225 are closed, the motors will be rotated in the opposite direction. If desired, a micro switch 228 similar to the micro switches 83 and 84 in the previous form of the invention may be inserted in the circuit 227 which functions to alternately make and break the circuit 227 when the circuit is closed through the switch blades respectively by which the motors 210 will be actuated by short impulses to raise and/or lower the side arms 201 by small increments.

The plate 217 is adjustably supported by a column 230 mounted on the bottom plate 127 of the leveling member 196 and the plate 217 is adjusted in elevation by the turning of crank 231 similar to the means provided for raising and lowering the plate or platform 38 in the previous form of the invention.

While the preferred forms of the invention have been shown in the drawings and described herein, it is to be understood that the invention is not so limited and may be carried out by other forms and mechanical means without departing from the purview of the invention.

What is claimed is:

1. An apparatus for leveling the upper surface of material in the building of roads, in combination with a guide extending in continuous relation to the site of the road and in fixed relation with the required grade thereof, said apparatus including a supporting structure for receiving the material to be spread on the road, means rollably supporting said structure, a material leveling member extending transversely of the apparatus and including an upwardly directed front plate, end plates and a bottom plate, side arms each including front and rear sections hingedly connected together, said front section being hingedly connected with said supporting structure intermediate the rollable means at the sides respectively, said material leveling member being rigidly affixed to said rear sections for downward and upward movement with the movement of said rear sections, an arm pivotally mounted on said apparatus to extend laterally outward from one side thereof with the outer end of the arm in continuous engagement with said guide for maintaining the outer end of said arm in fixed relation with the required grade of the road and with the inner end of the arm movable to different positions with the upward and downward movement of the apparatus during traveling thereof over an uneven surface, hydraulically operated rams, said rams being connected to the confronting ends of said front and rear sections of the side arms respectively for relative movement of said sections for moving the leveling member downwardly and upwardly, said rams being arranged in an hydraulic fluid system having valve means for controlling the flow of the fluid to actuate said rams, solenoids arranged in electric circuits for controlling the operation of said valve means, switch means arranged in said circuits respectively, and means carried by said arm and located adjacent the inner end thereof for actuating said switches to close said circuits with the movement of said arm to said different positions to thereby energize said solenoids to place said rams in operation to move said leveling member downwardly and upwardly respectively.

2. An apparatus for leveling the upper surface of material in the building of roads, in combination with a guide extending in continuous relation to the site of the road and in fixed relation with the required grade thereof, said apparatus including a supporting structure for receiving the material to be spread on the road, means rollably supporting said structure, a material leveling member extending transversely of the apparatus and including an upwardly directed front plate and a bottom plate, side arms each including front and rear sections hingedly connected together, said front section being hingedly connected with said supporting structure intermediate the rollable means at the sides respectively, said material leveling member being rigidly affixed to said rear sections for downward and upward movement with the movement of said rear sections, an arm pivotally mounted on said apparatus to extend laterally outward from one side thereof with the outer end thereof in continuous engagement with said guide for maintaining the outer end of said arm in fixed relation with the required grade of the road and with the inner end of the arm movable to different positions with the upward and downward movement of the apparatus during traveling thereof over an uneven surface, hydraulically operated rams, said rams being connected to the confronting ends of said front and rear sections of the side arms respectively for relative movement of said sections for moving the leveling member downwardly and upwardly, said rams being arranged in an hydraulic fluid system having valve means for controlling the flow of the fluid to actuate said rams, means arranged in electric circuits for controlling the operation of said valve means, switch means arranged in said circuits respectively, and means carried by said arm and located adjacent the inner end thereof for actuating said switches to close said circuits with the movement of said arm to said different posi-

tions to thereby actuate said valve control means to place said rams in operation to move said leveling member downwardly and upwardly respectively.

3. An apparatus for leveling the upper surface of material in the building of roads, in combination with a guide extending in continuous relation to the site of the road and in fixed relation with the required grade thereof said apparatus including a supporting structure for receiving the material to be spread on the road, means rollably supporting said structure, a material leveling member extending transversely of the apparatus and including an upwardly directed front plate, end plates and a bottom plate adapted for sliding movement on the material spread, side arms each including front and rear sections hingedly connected together, said front section being hingedly connected with said supporting structure intermediate the rollable means at the sides respectively, said material leveling member being rigidly affixed to said rear sections for downward and upward movement with the movement of said rear sections, a platform supported by said bottom plate, an arm pivotally mounted on said platform to extend laterally outward from one side thereof with the outer end of said arm in continuous engagement with said guide for maintaining the outer end of said arm in fixed relation with the required grade of the road and with the inner end of the arm movable to different positions with the upward and downward movement of the apparatus during traveling thereof over an uneven surface, hydraulically operated rams, said rams being connected to the confronting ends of said front and rear sections of the side arms respectively for relative movement of said sections for moving the leveling member downwardly and upwardly, said rams being arranged in an hydraulic fluid system having valve means for controlling the flow of the fluid to actuate said rams, solenoids arranged in electric circuits for controlling the operation of said valve means, switch means arranged in said circuits respectively, means carried by said arm and located adjacent the inner end thereof for actuating said switches to close said circuits with the movement of said arm to said different positions to thereby energize said solenoids to place said rams in operation to move said leveling member downwardly and upwardly respectively, and means for adjusting the height of said platform for varying the height of the inner end of said arm.

4. An apparatus for leveling the upper surface of material in the building of roads, in combination with a guide extending in continuous relation to the site of the road and in fixed relation with the required grade thereof, said apparatus including a supporting structure for receiving the material to be spread on the road, means rollably supporting said structure, a material leveling member extending transversely of the apparatus and including an upwardly directed front plate and a bottom plate adapted for sliding movement on the material spread, side arms each including front and rear sections hingedly connected together, said front section being hingedly connected with said supporting structure intermediate the rollable means at the sides respectively, said material leveling member being rigidly affixed to said rear sections for downward and upward movement with the movement of said rear sections, a platform supported by said bottom plate, an arm pivotally mounted on said platform to extend laterally outward from one side thereof with the outer end thereof in continuous engagement with said guide for maintaining the outer end of said arm in fixed relation with the required grade of the road and with the inner end of the arm movable to different positions with the upward and downward movement of the apparatus during traveling thereof over an uneven surface, hydraulically operated rams, said rams being connected to the confronting ends of said front and rear sections of the side arms respectively for relative movement of said sections for moving the leveling member downwardly and

upwardly, said rams being arranged in an hydraulic fluid system having valve means for controlling the flow of the fluid to actuate said rams, means arranged in electric circuits for controlling the operation of said valve means, switch means arranged in said circuits respectively, means carried by said arm and located adjacent the inner end thereof for actuating said switches to close said circuits with the movement of said arm to said different positions to thereby actuate said valve control means to place said rams in operation to move said leveling member downwardly and upwardly respectively, and means for adjusting the height of said platform for varying the height of the inner end of said arm.

5. An apparatus for leveling the upper surface of material in the building of roads, in combination with a guide extending in continuous relation along one side of the side of the road and in fixed relation with the required grade thereof, said apparatus including a supporting structure for receiving the material to be spread on the road, means rollably supporting said structure, a material leveling member extending transversely of the apparatus and including an upwardly directed front plate, and a bottom plate adapted for sliding movement on the material spread, side arms pivotally connected with said supporting structure intermediate the rollable members at the sides thereof respectively, said material leveling member being rigidly affixed to said side arms at the rear ends thereof for downward and upward movement with the swinging movement of said side arms, a platform vertically adjustably supported by said bottom plate to regulate and maintain predetermined spacings between said bottom plate and said platform, an arm pivotally mounted on said platform to extend laterally outward

from one side of said apparatus with the outer end of said arm in continuous engagement with said guide for maintaining said outer end in fixed relation with the required grade of the road and with the inner end of the arm movable vertically to different positions with the upward and downward movement of the apparatus during traveling thereof over an uneven surface, power operated means operatively connected with said leveling member for moving said leveling member downwardly and upwardly, electrically operated means arranged in electric circuits for controlling the operation of said power means, switch means arranged in said circuits respectively, and means carried by said arm and located adjacent the inner end thereof for actuating said switches to close said circuits with the movement of said arm to said different positions to thereby place in operation said electrically operated means to actuate said power means for moving said leveling member downwardly and upwardly respectively.

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