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Godbersen

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[54] **MACHINE AND METHOD FOR PREPARING A SURFACE AND FOR SLIP FORMING A CONCRETE STRUCTURE**

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[52] **U.S. Cl.** **404/72,** 404/98, 404/84

[51] **Int. Cl.** **E01c 19/50**

[58] **Field of Search** ..... 94/46, 46 A, 39; 404/108, 84, 72

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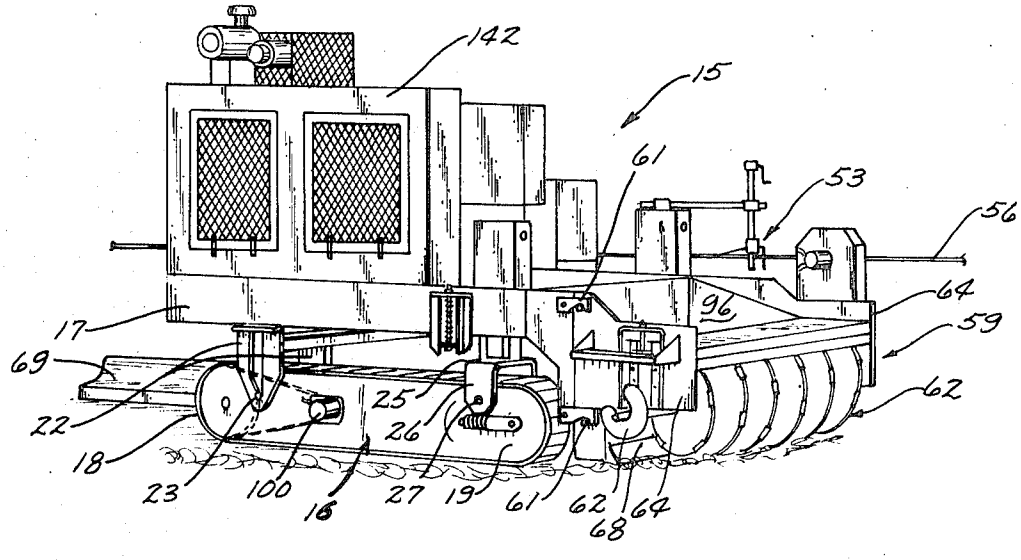
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[57] **ABSTRACT**

The machine and method provide for the simultaneous and continuous preparing of a graded surface and the slip forming of a curb and gutter or a sidewalk on the prepared surface. An adjustable frame that is carried over the prepared surface is movably adjusted to positions, in conformance with the grade characteristics of a grade line that is extended along one side of the machine, by means actuated by a grade sensor unit operatively associated with the grade line. The surface traveled by the machine is prepared by a grade trimmer carried at the front end of the adjustable frame and a slip form or mule is extended longitudinally of and supported from the adjustable frame at a position rearwardly of the grade trimmer.

6 Claims, 12 Drawing Figures



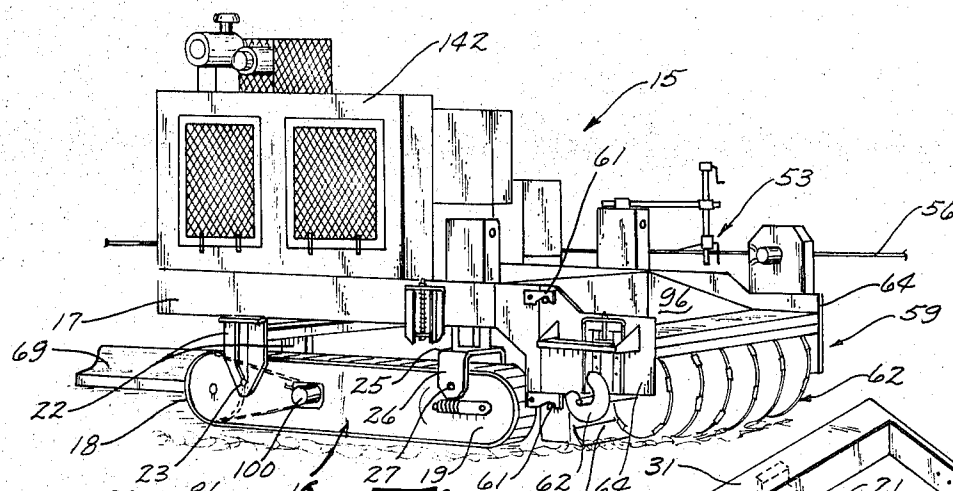


Fig. 1

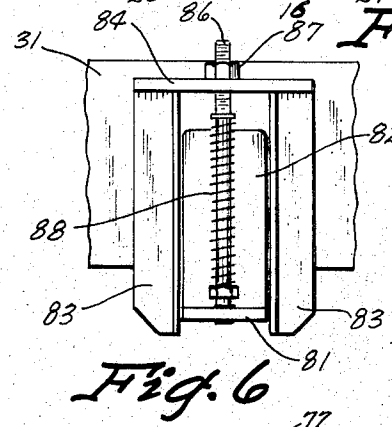


Fig. 6

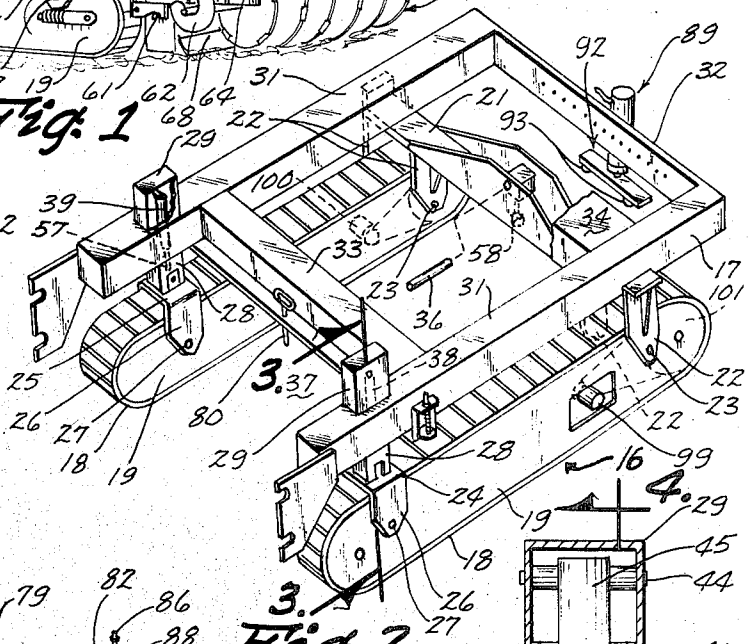


Fig. 2

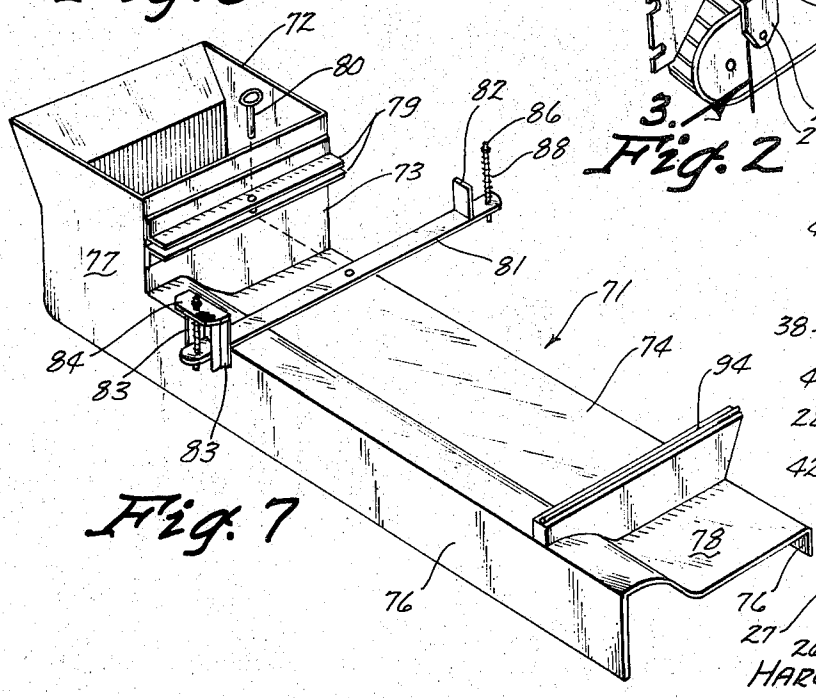


Fig. 7

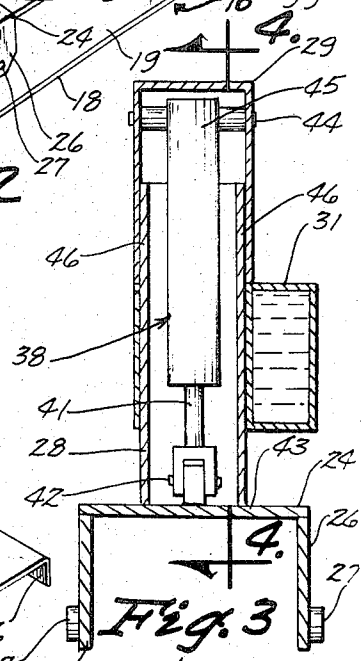


Fig. 3

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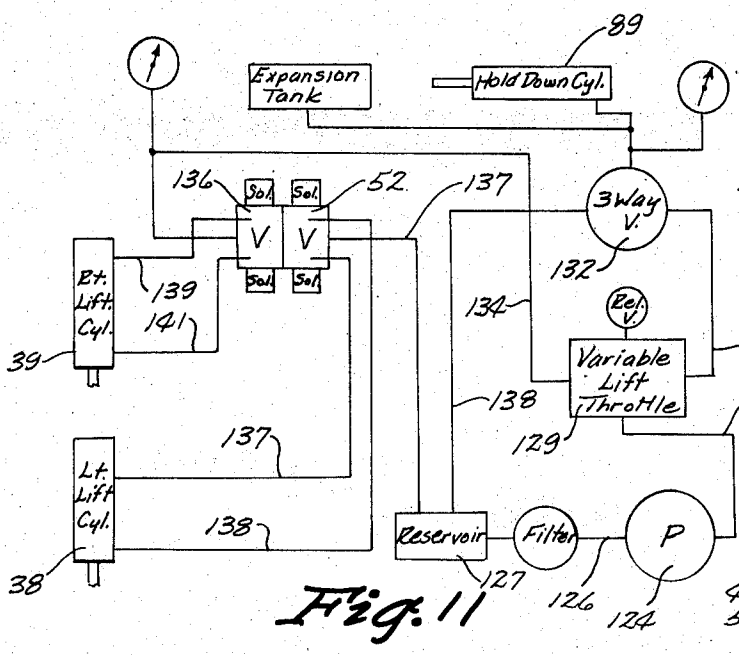


Fig. 11

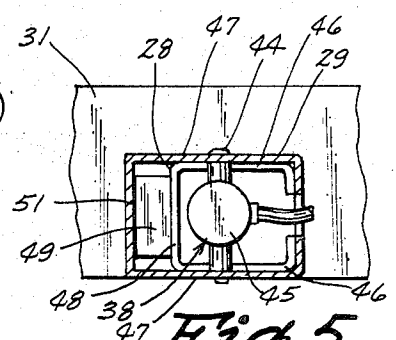


Fig. 5

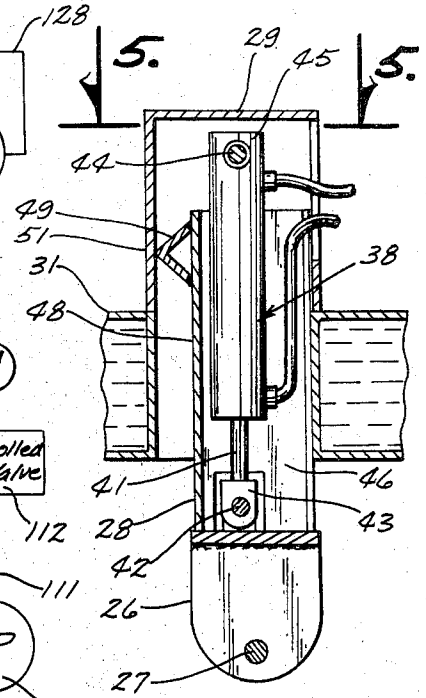


Fig. 4

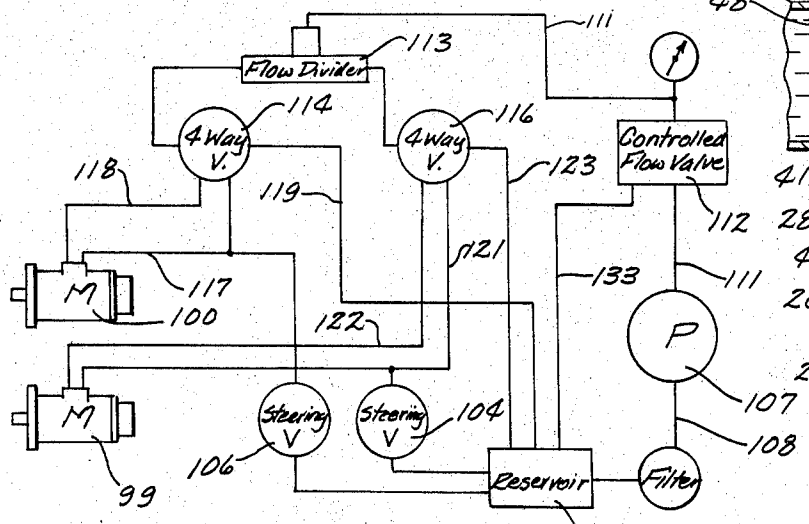


Fig. 12

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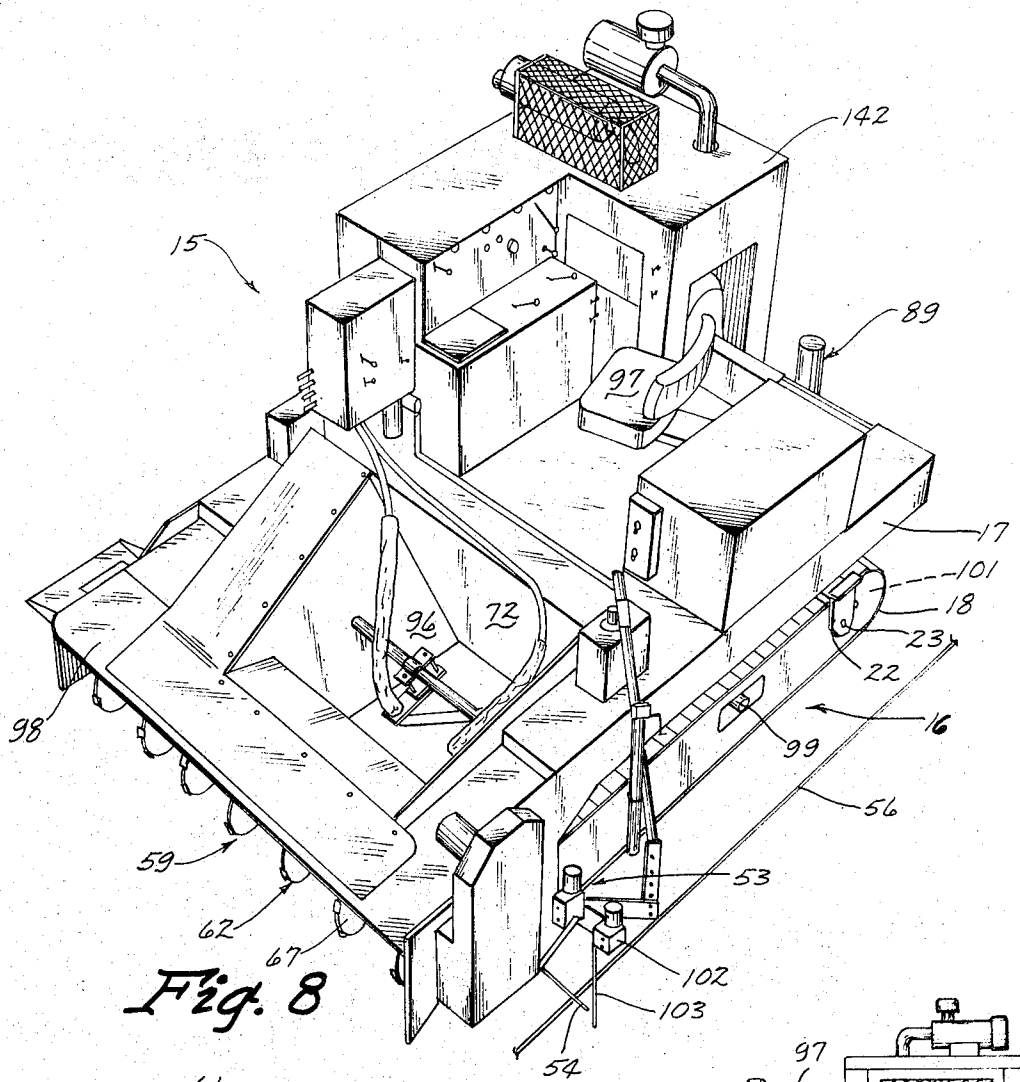


Fig. 8

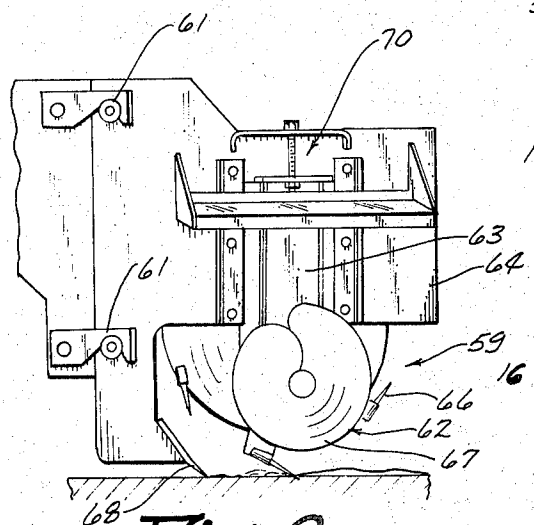


Fig. 9

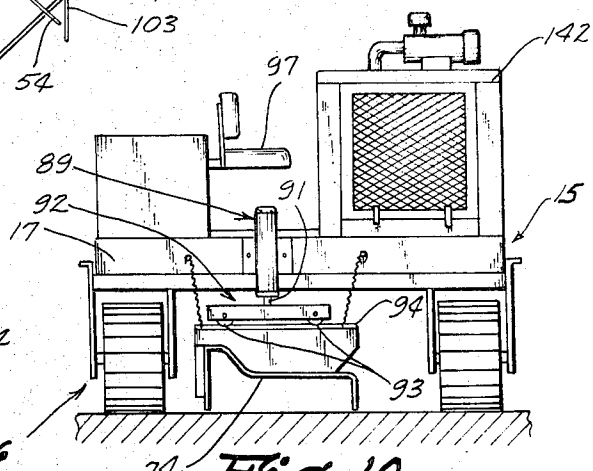


Fig. 10

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MACHINE AND METHOD FOR PREPARING A SURFACE AND FOR SLIP FORMING A CONCRETE STRUCTURE

SUMMARY OF THE INVENTION

The invention provides for a surface being prepared in accordance with predetermined grade and slope characteristics and a concrete structure being laid on the prepared surface by a single machine in one continuing operation. The machine is of a compact construction, efficient in operation and simply operated by a single operator having convenient access to all manual controls and full visibility of an instrument panel and of the work being performed by the machine. The grade trimmer and slip form are mounted on an adjustable frame that is continuously and automatically adjusted to prepare the surface for the slip formed structure in conformance with the predetermined grade characteristics established by a grade line extended along one side of the machine. Steering of the machine is automatically controlled by a sensor unit associated with the grade line. With the slip form having a concrete receiving hopper located rearwardly of the grade trimmer a concrete mixing truck is, therefore, able to travel along one side or forwardly of the machine to pour concrete in the hopper simultaneously with the advance of the machine on the prepared grade surface. Importantly, the slip formed structure can be constructed within close dimensional tolerances over its complete length with the upper surfaces thereof in conformance with the predetermined grade characteristics.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a front perspective view of the machine;

FIG. 2 is a perspective view of an adjustable frame which forms part of the machine shown in assembly relation with a self-propelled or base frame;

FIG. 3 is an enlarged sectional view as seen on the line 3 — 3 in FIG. 2 and showing a lift cylinder assembly for adjustably moving the adjustable frame;

FIG. 4 is a sectional view of the lift cylinder assembly taken along the line 4 — 4 of FIG. 3;

FIG. 5 is a sectional view of the lift cylinder assembly as seen on line 5 — 5 in FIG. 4;

FIG. 6 is enlarged elevational detail view showing a part of the structure for supporting a slip form on the adjustable frame;

FIG. 7 is a perspective view of the slip form showing in exploded perspective the draw bar supporting structure therefor;

FIG. 8 is a top perspective view of the machine;

FIG. 9 is an enlarged detail side elevational view of a grade or surface trimmer that is carried on the adjustable frame;

FIG. 10 is a rear elevational view of themachine showing the location of the slip form to the under side of the adjustable frame at a position between the traction units of the machine;

FIG. 11 is a diagrammatic showing of the hydraulic control system for the left cylinder assemblies which adjust the adjustable frame; and

FIG. 12 is a diagramatic showing of the hydraulic control system for the hydraulic motors that advance or drive the machine along a prepared surface.

DETAIL DESCRIPTION OF THE INVENTION

Referring to FIG. 1 of the drawing the machine of this invention, designated generally as **15**, includes a self-propelled main or base frame **16** and an adjustable or platform frame **17** which carries substantially all of the operating equipment for the machine. The main frame **16** (Flg. 2) includes a pair of transversely spaced endless track units **18**, each of which includes a longitudinally extended supporting frame structure **19**. A rear bolster **21** has a pair of depending leg plates **22** at each of its ends arranged in a straddling relation with a corresponding track unit **18**. Each pair of leg plates **22** is pivotally supported at **23** on an adjacent track frame **19**, with the pivots **23** being in axial alignment transversely of the frame **16**.

A pair of like front yoke members **24** and **25** each has a pair of leg sections **26** straddling a corresponding track unit **18** for pivotal support at **27** on the forward end of a track frame **19**. Each yoke member **24** and **25** has an upright tubular guide member **28** (FIGS. **2** and **3**) telescopically received within an associated socket or tubular guideway **29** provided on the adjustable frame **17**. As shown in FIG. **2**, the adjustable frame includes a pair of side members **31** connected together by a rear end member **32** and a front member **33** spaced rearwardly from the forward ends of the side members **31** and rearwardly of the guideway **29**, each of which projects upwardly from a corresponding side member **31**.

For a purpose to appear later, an open space **37** is thus provided forwardly of the front member **33** and between the side members **31** and the endless track units **18**.

It is seen, therefore, that the front yoke members **24** and **25** are without any transverse interconnecting front bolster. However, the function of such a front bolster is performed by the forward end section of the adjustable frame **17** and the connection of such forward end section with the yoke members **24** and **25** through the coaction of corresponding guide members **28** and guide ways **29**. The base or main frame **16** thus comprises the track frame structures **19**, which constitute the side members thereof, the rear bolster **21** and a front bolster consisting of the front member **33** of the adjustable frame **17** and the assembly thereof with the side members **31** and the yoke members **24** and **25**.

Forwardly of the rear member **32** the adjustable frame **17** has a transverse mounting member **34** extended between and connected to the side members **31** for pivotal support intermediate the ends thereof on a pivot pin **36** supported on the rear bolster **21** and extended longitudinally of the main frame **16**.

As thus far described, it is seen that the adjustable frame **17** may be pivotally movable relative to the main frame **16** about the transverse pivots **23**, and tiltably movable relative to the longitudinal pivot **36** independently of or concurrently with pivotal movement about the axes **23**. It will also be noted that during pivotal movement of the adjustable frame about the transverse pivots **23**, that the rear bolster leg plates **22** and the front yoke members **24** and **25** are rockable longitudinally of the main frame **16** relative to the pivots **23** and **27**, respectively. As a result the adjustable frame **17**, during such pivotal movement, also has a limited longitudinal translatory movement relative to the main frame **16**.

On an upward movement of the front end of the adjustable frame **17**, therefore, pivotal movement thereof takes place relative to the transverse axes **23**, with the longitudinal pivot **36** functioning at such time primary as a rigid connection between the adjustable frame **17** and the rear bolster **21** of the main frame **16.** This pivotal movement provides for a grade setting of the adjustable frame. The tilting movement of the adjustable frame relative to the main frame **16** about the longitudinal axis **36** provides for adjustment of the frame **17** to a slope setting position.

Movement of the adjustable frame **17** to a grade setting position is accomplished by a hydraulic cylinder unit **38** (FIGS. **3, 4** and **5**) hereinafter referred to as the grade cylinder unit and illustrated in assembly with the yoke member **24** located at the left side of the main frame **16.** The assembly of this yoke member **24** and the grade cylinder unit **38** is identical in all respects to the assembly of the yoke member **25** at the right side of the main frame with its associated hydraulic cylinder unit **39** which will hereinafter be referred to as the slope cylinder unit. Only the grade cylinder assembly, therefore, will be described in detail and like numbers will be applied to corresponding parts in the slope cylinder assembly.

The grade cylinder unit **38** (FIGS. **3, 4** and **5**) is positioned within the upright guide **28** of the yoke member **24** and includes a piston rod **41** pivoted at **42** to the yoke cross member **43.** The closed end of the cylinder member **45** of the grade cylinder unit **38** is pivoted at **44** adjacent the top end of the guide way **29.** As shown in FIG. **5** the opposite side walls **46** of the upright guide **28** are in contact engagement with the corresponding adjacent sides **47** of the guide way **29.** However, the front side **48** of the guide **28** is provided adjacent its upper end with a forwardly projected fulcrum or bearing member **49** that is engageable with the front wall **51** of the guide way **29.** On extension and retraction of the piston rod **41** to pivotally move the adjustable frame **17** relative to the transverse axes **23** the yoke member **24** and guide **28** are rockable as a unit relative to the pivots **27** concurrently with a pivotal movement of the grade cylinder unit **38** relative to the pivots **42** and **44.** By virtue of the bearing engagement between the corresponding side walls **46** and **47** of the guide **28** and guide way **29,** respectively, the adjustable frame **17** is maintained against movement transversely of the main frame **16.**

The grade cylinder unit **38** is of double acting type and its operation is controlled by a solenoid vlav **52** (FIG. **11**) which is actuated by a sensor unit **53** (FIG. **8**) that includes a feeler wand **54** operatively associated with a grade line **56** extended along one side of the machine **15.** In response to the sensing action of the wand **54** relative to the grade line **56** the front end of the adjustable frame **17** is pivotally moved in an up and down direction relative to the rear bolster pivots **23** so that the elevated position of such front end is maintained in a conforming relation with the grade characteristics of the line **56.**

On extension and retraction of thepiston rod **57** for the slope cylinder unit **39** the adjustable frame is transversely tilted relative to the longitudinally extended pivot **36** to a position providing for a transverse inclination of the adjustable frame **17** in conformance with a predetermined setting of a pendulum sensor unit **58** (FIG. **2**) suitably carried on the adjustable frame in close proximity to the axis **36.** The pendulum sensor unit is Model No. G6522-029-001, commercially available from Grad Line, Inc. of Woodinville, Washington. The grade sensor unit **53** is Model No. G106, available from the same company. In use, the pendulum sensor or slope control **58** functions in a following relation relative to the grade sensor unit **53** to maintain a desired slope or inclination of the adjustable frame **17** in accordance with the grade setting of the adjustable frame.

This complementary operation of the grade cylinder unit **38** and slope cylinder unit **39** provides for the setting of a surface trimmer or cutter mechanism **59** in an adjusted position for working or preparing the ground surface forwardly of the traction units **18** in conformance with the grade characteristics of the grade line **56** and the slope characteristics of the pendulum sensor unit **58.**

The cutter assembly **59** is detachably connected by latching means, indicated generally at **61,** to the front end of the adjustable frame **17** so as to project forwardly from such frame, and includes an auger **62** extended transversely of the adjustable frame **17.** The auger is rotatably mounted in a pair of end bearing plates **63** that are mounted for vertical adjustment on corresponding upright side members **64** of the cutter assembly **59** (FIGS. **1** and **9**). Cutter members **66** circumferentially spaced on the auger flighting **67** are movable into cutting engagement with the ground surface forwardly of the machine **15.** Road material removed by the cutter member **66** is picked up by the flighting **67** and moved laterally outwardly to one side of the machine **15.**

Supported on the side members **64** of the cutter assembly **59** and extended transversely of the machine **15** at a position rearwardly of the auger **62** is a leveling blade **68.** The auger **62** and blade **68** are initially relatively adjusted by manipulation of an adjusting mechanism, indicated generally at **70,** to vertically move the auger bearing plates **63** on the side members **64** so that the cutter members **66** dig into the road surface at a depth of about seven-eighths of an inch below the lower side or leveling edge of the blade **68.** Any cut material collected forwardly of the leveling blade **68** is picked up and moved by the aguer **62.** It is seen, therefore, that the blade **68** levels the road surface forwardly of the track units **18** in conformance with the predetermined grade and slope characteristics set by the grade line **56** and pendulum unit **58,** respectively.

In actual practice it has been found that when the frame **17** has been adjusted for grade slope only minor later adjustments of the frame are thereafter required. In other words, with the cutter assembly **59** and leveling blade **68** operating in accordance with the predetermined grade and slope characteristics, and with the track units **18** traveling on the prepared surface, the adjustable frame **17,** main frame **16** and the prepared surface are positioned in substantially parallel planes.

To continuously slip form a concrete structure **69,** illustrated in FIG. **1** as a curb and gutter, in accordance with specification requirements and in conformance with the grade and slope characteristics of the prepared ground surface, a mule or slip form assembly **71** (FIG. **7**) extended longitudinally of the machine **15** is supported directly from the adjustable frame **17.** The slip form assembly **71** includes a front hopper **72,** (FIGS. **7** and **8**) located in the space **37** between the front yoke members **24** and **25** and rearwardly of the cutter mech-

anism 59. The hopper has an open bottom side located adjacent to the surface prepared by the cutter mechanism 59. The lower portion of the rear wall 73 of the hopper is open to the forward end of a slip form 74 which is rigid with the hopper and has side walls 76 continuous with the hopper side walls 77 and interconnected by a top wall 78.

The form assembly 71 is substantially equal in length to the adjustable frame 17 and is supported on the adjustable frame for a limited movement vertically and transversely of such frame. For this purpose the hopper rear wall 73 carries a pair of rearwardly extended vertically spaced mounting plates 79 which receive therebetween a transverse draw bar 81. A coupling pin 80 inserted centrally through the plates 79 and the draw bar 81 connects the form assembly 71 with the frame 17 for limited pivotal movement transversely of the adjustable frame as will appear later.

Each end of the draw bar 81 is projected laterally outwardly from a corresponding side member 31 of the adjustable frame 17 (FIGS. 2, 6, and 7) and is provided with an upright guide member 82 operatively associated with a pair of upright guide ways 83 longitudinally spaced on a side member 31. Interconnected across the upper ends of the guide ways 83 is a cross member 84. An upright screw 86 has a lower end secured to the draw bar 81 at a position outwardly from an adjacent upright guide 82 so that its upper end is extensible through an opening (not shown) formed in a corresponding cross member 84. A nut 87, threadable about the extended upper end of a screw 86 supports the draw bar 81 and in turn the slip form assembly 71 from the adjustable frame 17. Mounted about each screw 86 and positioned between the draw bar 81 and a cross member 84 is a coil spring 88.

It is seen, therefore, that the pivotal movement of the slip form assembly 71 relative to the coupling pin 80 and transversely of the adjustable frame 17 is limited by the engagement of the opposite ends of the draw bar 81 with corresponding guide ways 83. Likewise the hopper 72 is vertically moveable relative to the adjustable frame 17 through a limited distance defined by the initial adjustment of the supporting nuts 87 on the screw members 86 and the upward travel of the guides 82, against the action of the springs 88, into engagement with corresponding cross members 84.

This limited vertical movement of the draw bar 81 is essentially a safety precaution to accommodate any accidental riding of the lower end of the hopper 72 over a rock or other obstruction that may be on the prepared surface. This permitted elevation of the hopper 72 to clear such obstruction avoids any possible damage to the slip form assembly 71 or other parts of the machine. The limited transverse movement of the slip form assembly 71 relative to the adjustable frame 17 permits the slip form 74 to maintain a following relation with the concrete structure 69 being formed regardless of any slight deviations of the machine 15 from a straight line advance.

The road clearance of the lower side of the slip form assembly 71 is initially set by the adjustment of the supporting nuts 87 which results in vertically locating the draw bar 81 and in turn the slip form assembly 71 relative to the adjustable frame 17. This adjustment, when the machine 15 is operated, is maintained over the length of the assembly 71 by a presser cylinder assembly 89 (FIGS. 2 and 10) mounted on the rear member 32 of the adjustable frame 17. A piston rod 91 for the presser cylinder assembly 89 is extendible in a downward direction and carries at its free or lower end a roller assembly 92 that includes a pair of rollers 93 spaced transversely of the slip form 74. The rollers 93 are in riding engagement with a transversely extended track member 94 that is supported on the upper surface 78 of the slip form 74. A predetermined pressure is applied on the roller assembly 92 by the pressure cylinder 89 to maintain the bottom edges of the slip form side walls 76 in conformance with the road clearance set by the supporting nuts 87. By virtue of the roller assembly 92 movement of the slip form 74 transversely of the adjustable frame 17 is permitted while maintaining the dimensional specification requirements of the concrete structure 69. As a result a uniformity in the cross sectional dimensions of the concrete structure 69 is maintained over its full length.

As best appears in FIGS. 1 and 8, the mouth or fill opening 96 of the hopper 72 faces upwardly at a position immediately behind the cutter assembly 59 so as to be readily accessible for receiving concrete from the discharge spout (not shown) of a usual concrete mixing truck. The opening 96 is readily visible to the machine operator from his seat, indicated at 97 in FIG. 8. A top cover plate 98 supported on the side members 64 of the cutter mechanism 59 at a position above the auger 62 provides a walking platform for workers handling the discharge of the mixing truck. A truck may be advanced concurrently with the machine 15 at a position to either the right side of the machine or in advance of the machine so that concrete can be continuously supplied to the hopper 72 in the forming of the concrete structure 69.

The machine 15, during its advance over the surface prepared by the cutter mechanism 59, is automatically steered in a following relation with the grade line 56. The track units 18 are driven by corresponding hydraulic motors indicated at 99 and 100, each of which is in a driving relation with an associated track driving gear 101. The motors 99 and 100 are relatively controlled from a common steering sensor unit 102 which has an upright feeling wand 103 in operative association with the grade line 56 (FIG. 8).

The steering sensor 102 available as Model G116 from Grad-Line, Inc. of Woodinville, Washington, is in electrical association with a pair of solenoid operated valves 104 and 106 (FIG. 12) corresponding to the hydraulic motors 99 and 100, respectively. The valves 104 and 106 form part of a hydraulic control system for the motors 99 and 100 which system additionally includes an oil pump 107 having an inlet 108 connected to an oil reservoir 109. The pump outlet 111 supplies oil to a flow control valve 112 which in turn is connected to a flow divider 113. One side of the flow divider 113 discharges to a four way valve 114 corresponding to the drive motor 100 and its opposite side to a four way valve 116 coresponding to the drive motor 99. The valves 114 and 116 are actuated by the machine operator from his position on the seat 97.

Oil under pressure from the valve 114 is supplied through line 117 to the motor 100, and is exhausted from the motor 100 through line 118 back to the valve 114 and into a return line 119 connected to the reservoir 109. In a similar manner oil under pressure is supplied from the valve 116 to the motor 99 through a feed line 121 and is exhausted from the motor 99 through

line 122 and valve 116 to a return line 123 connected to the reservoir 109. The solenoid valves 104 and 106 are connected into the supply lines 121 and 117, respectively.

Thus, on opening of a valve 104 or 106 oil from a supply line 121 or 117, respectively, is by-passed or bled directly into the reservoir 109. As a result the motor 99 or 100 corresponding to an open valve 104 or 106, respectively, is supplied with a reduced amount of oil relative to the other motor. So long, therefore, as a solenoid valve 104 or 106 remains open the motor corresponding to such open solenoid valve will operate at a reduced speed relative to the other motor. By reducing the speed of one motor relative to the other, to in turn vary the relative rate of travel of the track units 18, the line of advance of the machine 15 in a stragith line is accomplished with a minimum of deviation.

The control system for the grade cylinder unit 38 and slope cylinder unit 39 (FIG. 11) includes a pump 124 having an inlet 126 connected to a reservoir 127. The outlet of the pump 124 supplies oil under pressure through line 128 to a variable lift throttle 129 that has a first feed line 131 connected to a three way valve 132 for manually controlling the supply of oil to the hold down or presser cylinder 89. The valve 132 is under the control of the machine operator and has a return line 133 to the reservoir 127. A second feed line 134 from the lift throttle 129 supplies oil under pressure to the solenoid valve 52 for the grade cylinder unit 38 and a solenoid valve 136 for the slope cylinder unit 39. Although the solenoid valves 52 and 136 are shown adjacent to each other and provided with a common oil supply line 134 and a common reservoir return line 137, it is to be understood that each valve 52 and 136 is separately and electrically controlled by its associated grade sensor unit 53 and pendulum sensor unit 58, respectively. The grade cylinder unit 38 and slope cylinder unit 39 are of a double acting type with the cylinder unit 38 having connection with the solenoid valve 52 through lines 137 and 138 and the slope cylinder unit 39 with the solenoid valve 136 through connecting lines 139 and 141.

The pump 107 for the hydraulic motors 99 and 100, and for the pump 124 for the cylinder units 38, 39 and 89 form part of a power source that is supported on the adjustable frame 17 and located within the compartment indicated generally at 142 in FIGS. 8 and 10. The reservoirs 109 and 127 may be combined into a single reservoir common to all of the hydraulically operated equipment and in the embodiment illustrated the frame members 31, 32 and 33 of the adjustable frame 17 are of a tubular construction and interconnected so as to constitute such a common reservoir.

It will be apparent that if the prepared surface for the concrete structure 69 is to be formed without any slope characteristic that the sensor unit 58 may be eliminated and the cylinder units 38 and 39 connected together for operation in complementary relation to maintain the grade characteristics of the adjustable frame 17. In some instances a surface may be prepared independently of the machine 15 so as to require only the forming thereon of a concrete structure 69 in conformance with grade characteristics as predetermined by the grade line 56. Under these circumstances the cutter assembly 59 may be removed from the machine 15 by releasing the latch mechansim 61. The adjustable frame 17 will then be operated in all respects in the manner previously described and the concrete structure formed continuously with the pouring of concrete into the hopper 72. Since the slip form assembly 71 is mounted directly on the adjustable frame 17 the concrete structure thus formed would have the top surfaces thereof inclined in conformance with the grade line even though the laying surface was prepard independently of the machine 15. The structure 69 has been referred to as being formed of a concrete material. However, other materials such as asphalt and like flowable material having setting characteristics may be used.

Although the invention has been described with respect to a preferred embodiment thereof, it is to be understood that it is not to be so limited since changes and modifications can be made therein which are within the full intended scope of this invention as defined by the appended claims.

I claim:

1. The method for concurrently preparing a grade surface in conformance with a grade line and slipforming a concrete structure on the prepared surface comprising:

a. movably supporting an adjustable frame on a tractor unit for adjustment to positions conforming to a predetermined grade characteristic of the concrete structure,

b. simultaneously grading the surface in advance of the tractor unit to said predetermined grade characteristic by supporting a rotary transversely extended surface trimming mechanism on the front end of the adjustable frame,

c. sensing the grade line only at a position transversely opposite said surface trimming mechanism,

d. adjusting the adjustable frame to the grade conforming positions in response to said grade line sensing for controlling the movement of the surface trimmer mechanism to surface preparing positions corresponding to said grade conforming positions,

e. forming the concrete structure by supporting a longitudinally extended slip form from the lower side of said adjustable frame for yieldable contact engagement with the prepared surface and at a position rearwardly of said surface trimmer mechanism for movement with the adjustable frame to the grade conforming positions and for limited pivotal movement transversely of and relative to the adjustable frame about a vertical axis adjacent the forward end of the slip form, and

f. pouring concrete into the forward end of the slip form as the tractor unit advances on the prepared surface.

2. The method according to claim 1 wherein the step of movably supporting an adjustable frame on a tractor unit includes:

a. pivotally supporting the adjustable frame for adjustable transverse tilting movement about an axis located adjacent one end of the tractor unit and lying in a vertical plane extended through the longitudinal axis of the adjustable frame, and for adjustable longitudinal tilting movement about an axis extending transversely of the tractor unit adjacent said one end thereof.

3. The method according to claim 2 wherein the step of adjusting the adjustable frame includes:

a. interconnecting the tractor unit and adjustable frame by a pair of vertically adjustable power units

spaced transversely opposite each other adjacent the other end of the tractor unit, and

b. concurrently operating said pair of vertically adjustable means in response to said grade line sensing to move the adjustable frame to the grade conforming positions.

4. A machine for concurrently preparing a graded surface and slip forming a concrete structure on the prepared surface, comprising:

a. a portable frame having a pair of longitudinal frame members and a rear transverse member pivotally supported on said frame members for pivoted movement about an axis extended transversely of said portable frame,

b. an adjustable frame positioned above said portable frame having the rear end thereof pivotally supported on said rear transverse member for pivotal movement about an axis extended longitudinally of said portable frame and located in a vertical plane through the longitudinal axis of the portable frame,

c. a pair of transversely opposite spaced vertically adjustable means supporting the front end of said adjustable frame on said frame members,

d. a transversely extended surface cutting and material conveying mechanism on the front end of said adjustable frame for preparing the graded surface in accordance with the adjusted position of said adjustable frame relative to said portable frame,

e. a grade control sensor means carried on said adjustable frame transversely opposite the surface cutting and material conveying mechanism and responsive in operation to a grade line extended along one side of said portable frame for actuating one of said adjustable means,

f. a slope control unit on said adjustable frame for actuating the other one of said adjustable means in response to the actuation of said one adjustable means, and

g. a longitudinally extended slip form suspended from the underside of said adjustable frame rearwardly of said surface cutting and material conveying means.

5. The machine according to claim **4,** including:

a. means pivotally supporting the forward end of said slip form on said adjustable frame for transverse movement relative to said adjustable frame, and

b. means for yieldably urging the rearward end of said slip form toward the prepared surface to maintain said grade characteristics on the concrete structure formed thereby.

6. A machine for concurrently preparing a graded surface and slip forming a concrete structure on the prepared surface comprising:

a. a portable frame including a pair of transversely spaced self-propelled endless track units,

b. an adjustable frame overlying said portable frame,

c. longitudinally spaced transversely opposite pairs of front and rear yoke members on said track units,

d. said portable frame including a rear bolster member interconnected with the rear pair of said yoke members,

e. means pivotally supporting the rear end of said adjustable frame on said bolster member for transverse tilting movement about an axis lying in a vertical plane extended through the longitudinal axis of said adjustable frame,

f. a pair of transversely opposite vertical hydraulic cylinder assemblies connecting the front pair of said yoke members with the adjustable frame,

g. a transversely extended surface trimming means for preparing the graded surface mounted on the front end of the adjustable frame forwardly of the self-propelled track units,

h. grade controlled means for actuating said hydraulic cylinder assemblies, including a grade sensor supported on said adjustable frame at a position transversely opposite said surface trimming means, and

i. a longitudinally extended slip form suspended from said adjustable frame rearwardly of said surface trimming means having a concrete material receiving front section.

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