Sept. 8, 1959 V. SCHIAVI 2,902,908

FORM-GRADING AND PRESSING MACHINES FOR ROADWAYS

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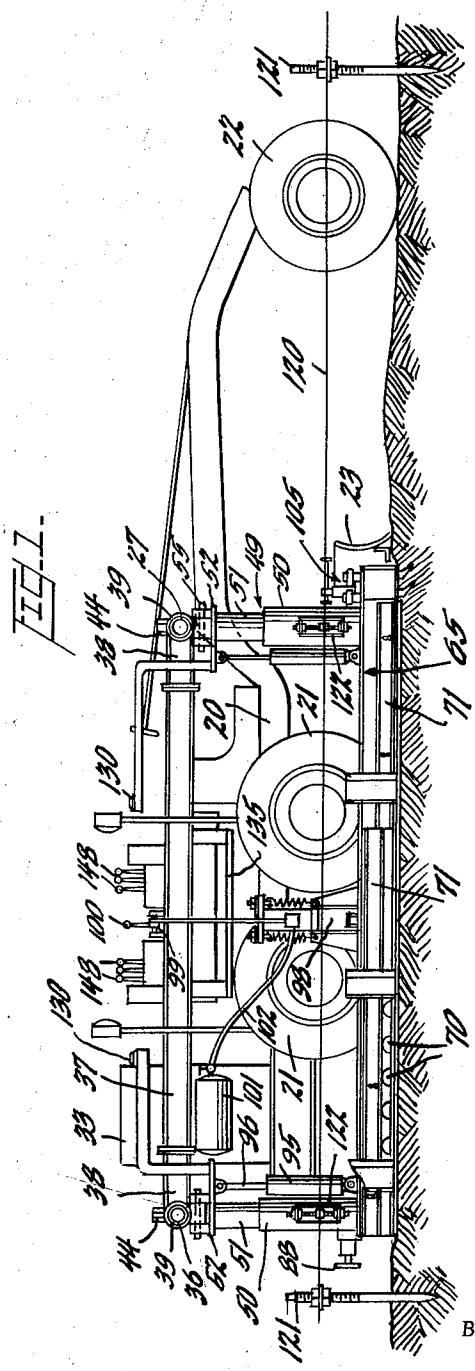


FIG. 1.

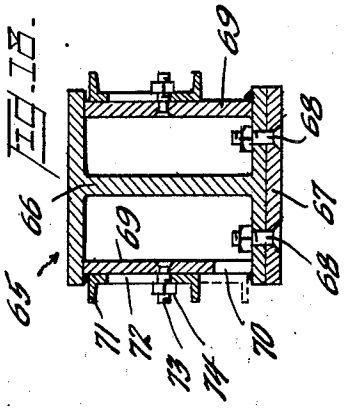


FIG. 18.

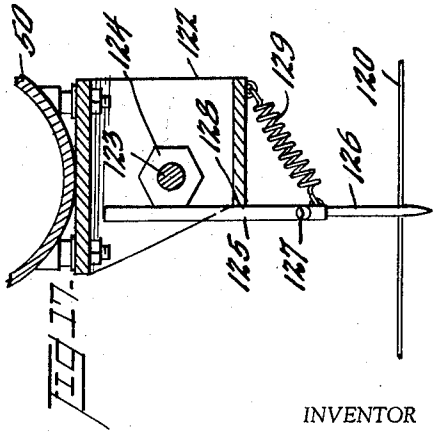


FIG. 17.

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Sept. 8, 1959 V. SCHIAVI 2,902,908

FORM-GRADING AND PRESSING MACHINES FOR ROADWAYS

Filed Jan. 12, 1955 9 Sheets-Sheet 2

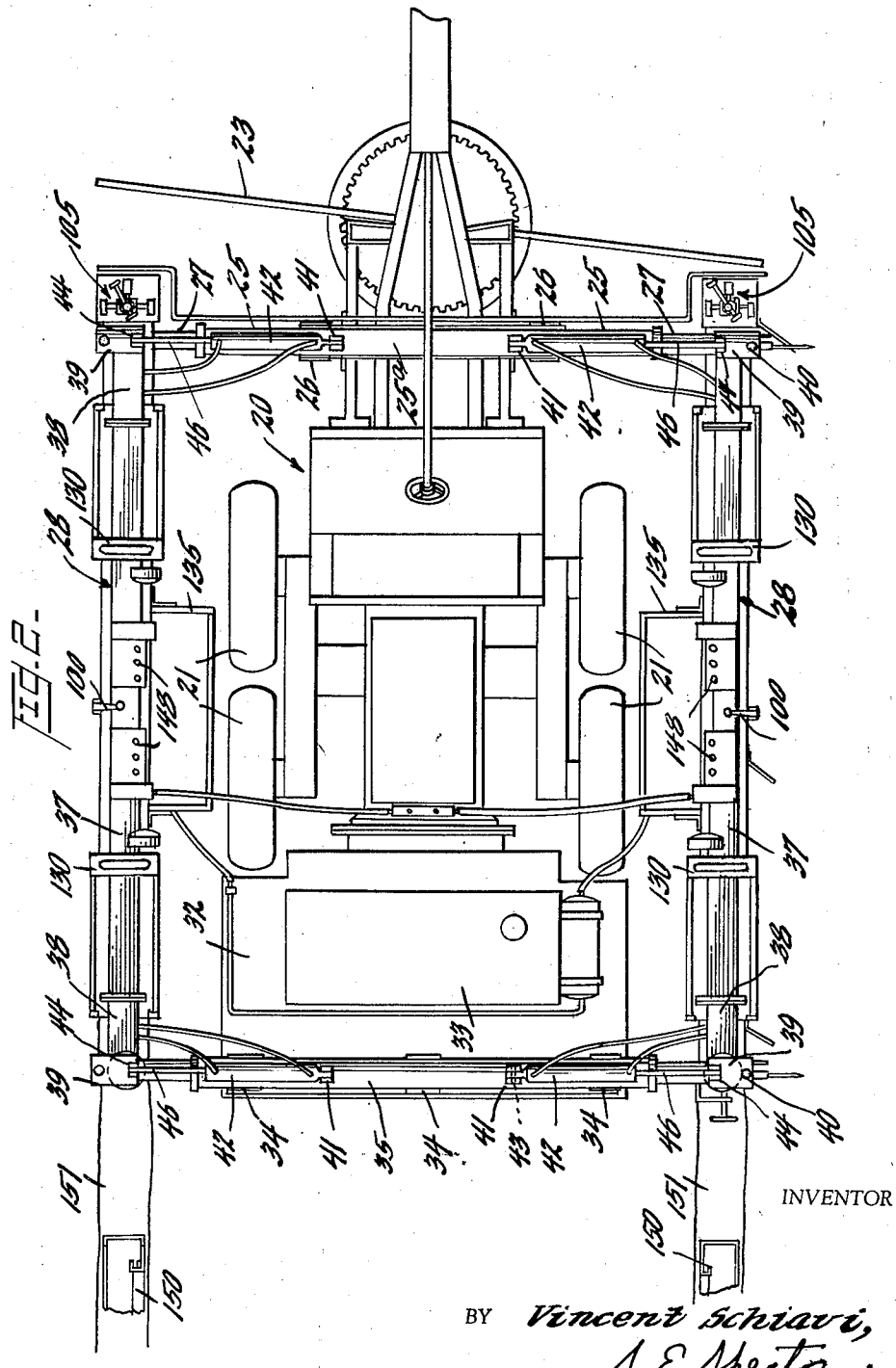


FIG. 2.

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Sept. 8, 1959 V. SCHIAVI 2,902,908

FORM-GRADING AND PRESSING MACHINES FOR ROADWAYS

Filed Jan. 12, 1955 9 Sheets-Sheet 3

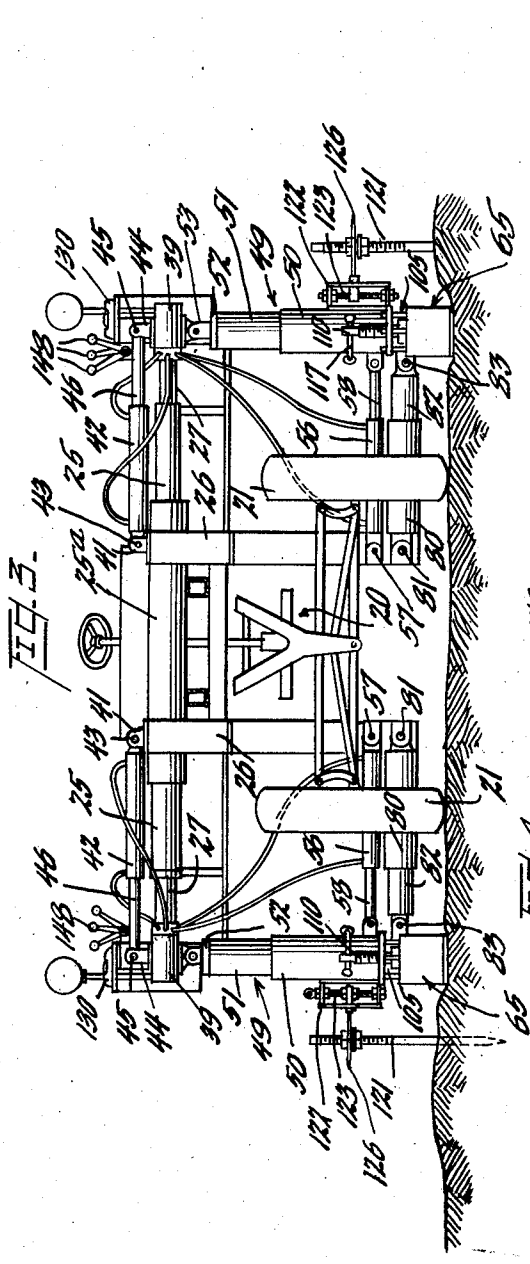


FIG. 3.

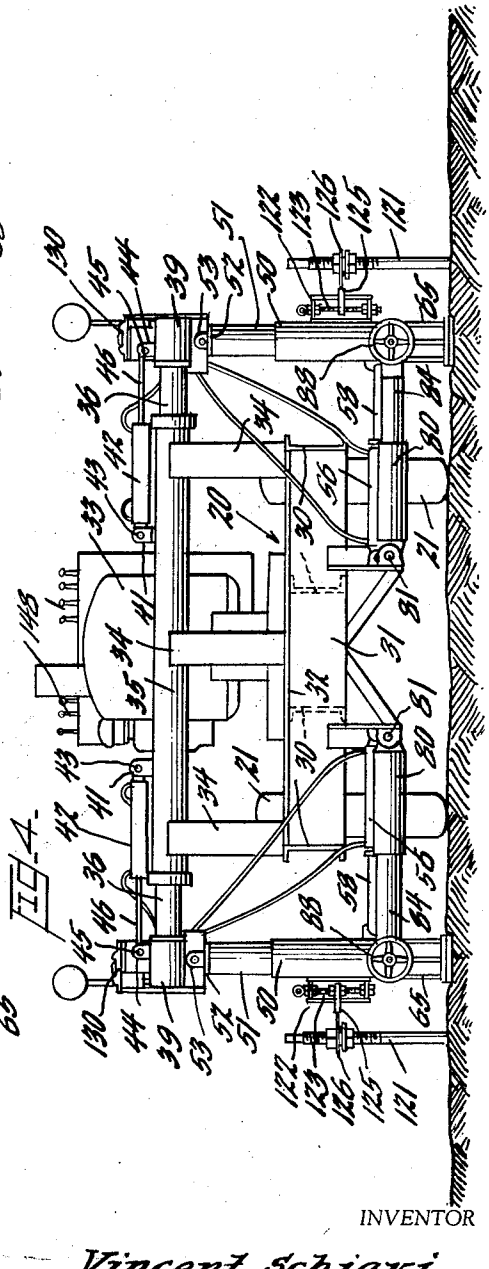


FIG. 4.

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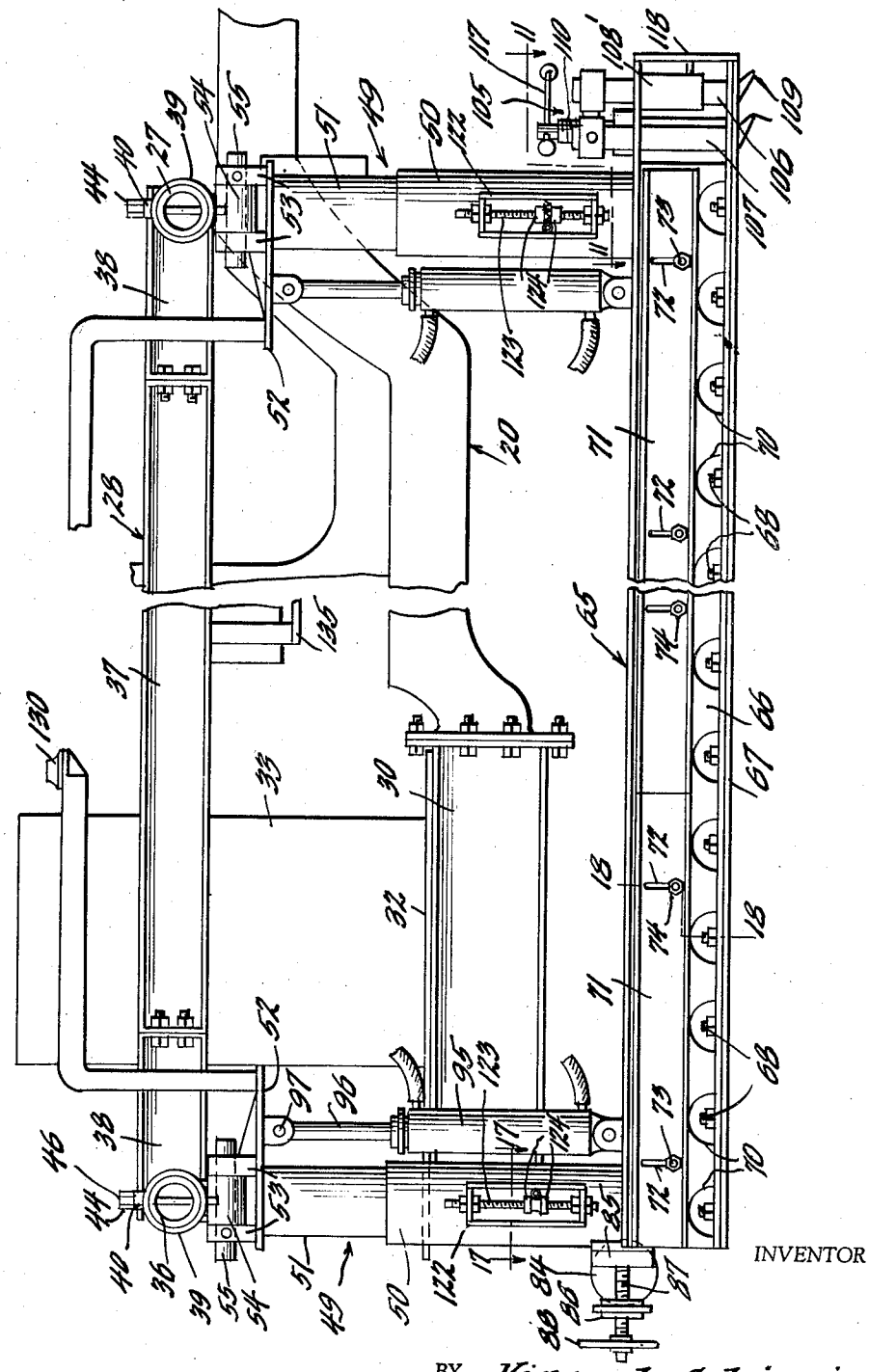
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Sept. 8, 1959 V. SCHIAVI 2,902,908

FORM-GRADING AND PRESSING MACHINES FOR ROADWAYS

Filed Jan. 12, 1955 9 Sheets-Sheet 4

FIG. 5.



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Sept. 8, 1959 V. SCHIAVI 2,902,908

FORM-GRADING AND PRESSING MACHINES FOR ROADWAYS

Filed Jan. 12, 1955 9 Sheets-Sheet 5

FIG. 6.

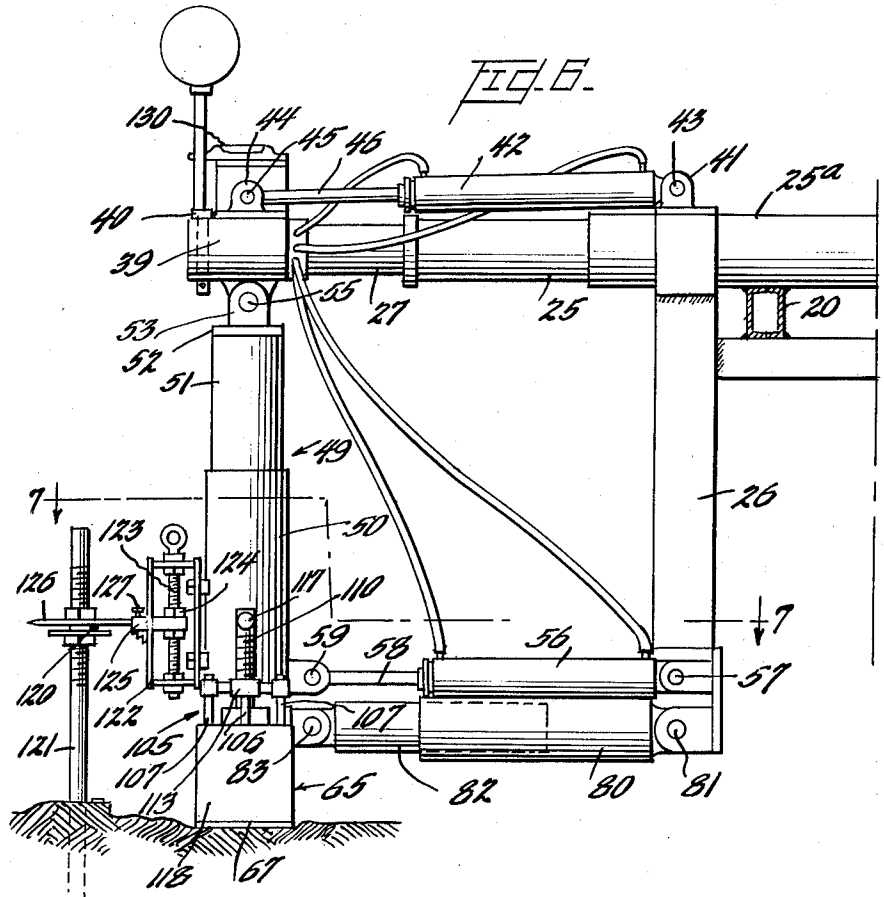
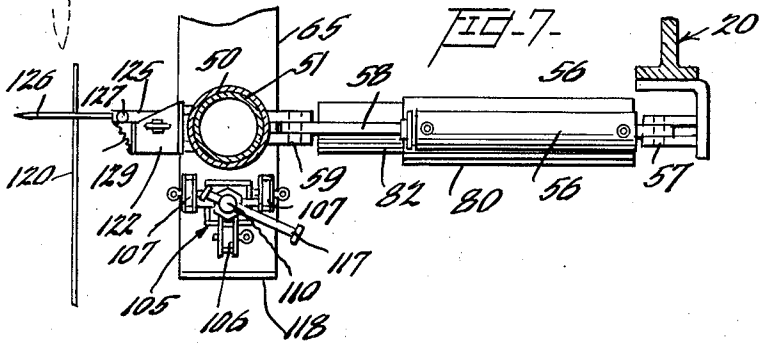


FIG. 7.



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Sept. 8, 1959 V. SCHIAVI 2,902,908

FORM-GRADING AND PRESSING MACHINES FOR ROADWAYS

Filed Jan. 12, 1955 9 Sheets-Sheet 6

FIG. 8.

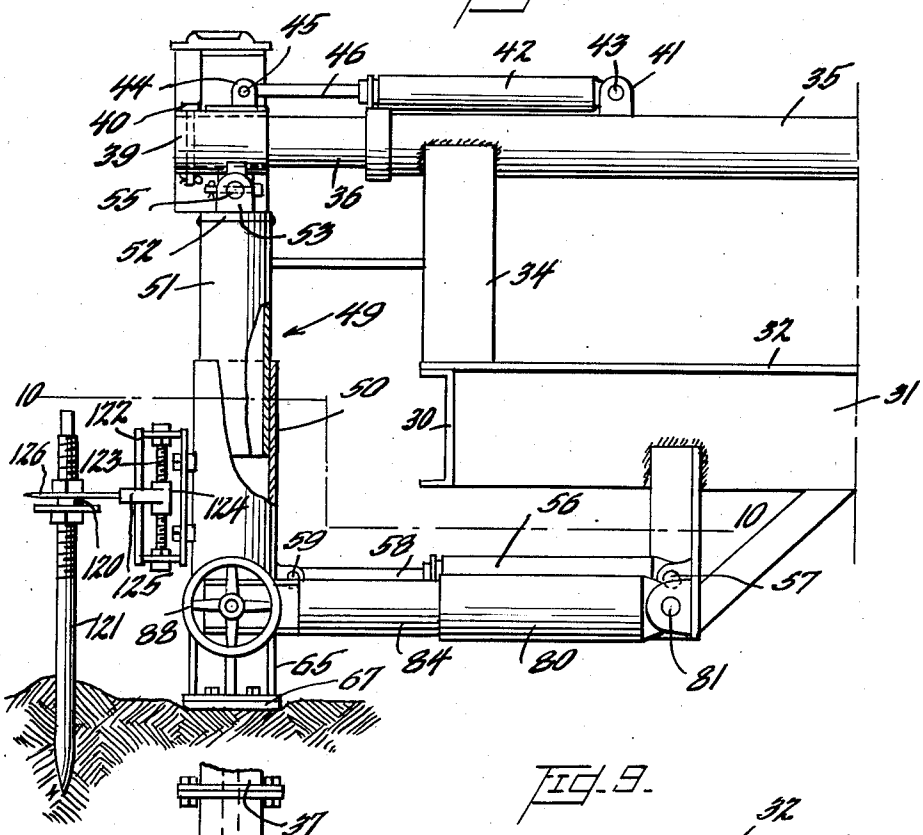


FIG. 9.

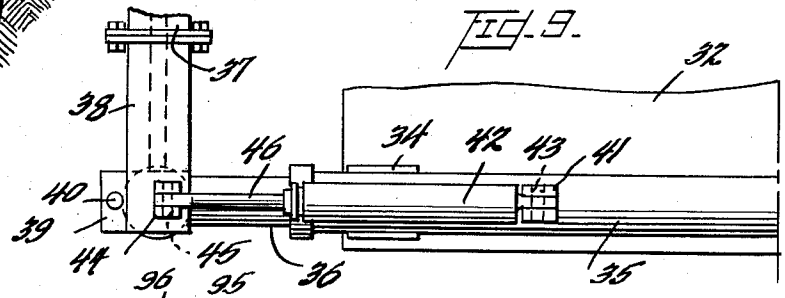
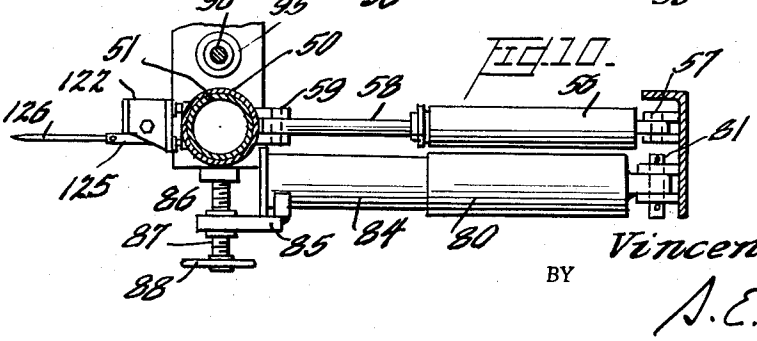


FIG. 10.



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Sept. 8, 1959 V. SCHIAVI 2,902,908

FORM-GRADING AND PRESSING MACHINES FOR ROADWAYS

Filed Jan. 12, 1955 9 Sheets-Sheet 7

FIG. 11.

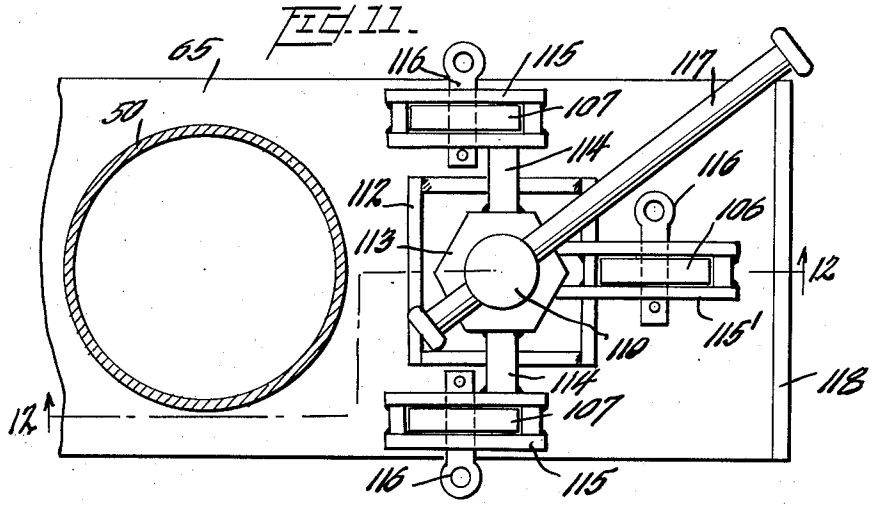


FIG. 12.

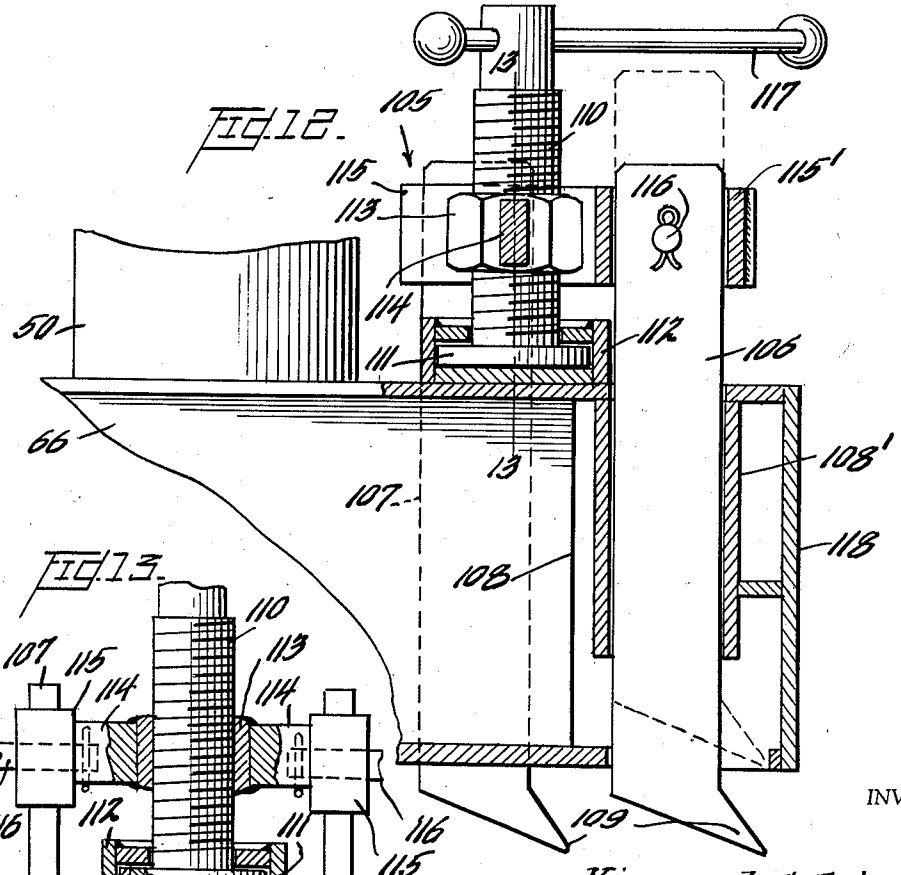


FIG. 13.

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Sept. 8, 1959 V. SCHIAVI 2,902,908

FORM-GRADING AND PRESSING MACHINES FOR ROADWAYS

Filed Jan. 12, 1955 9 Sheets-Sheet 8

FIG. 14.

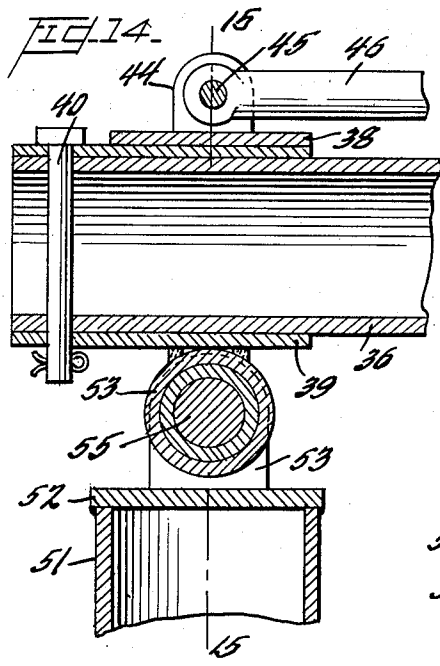


FIG. 15.

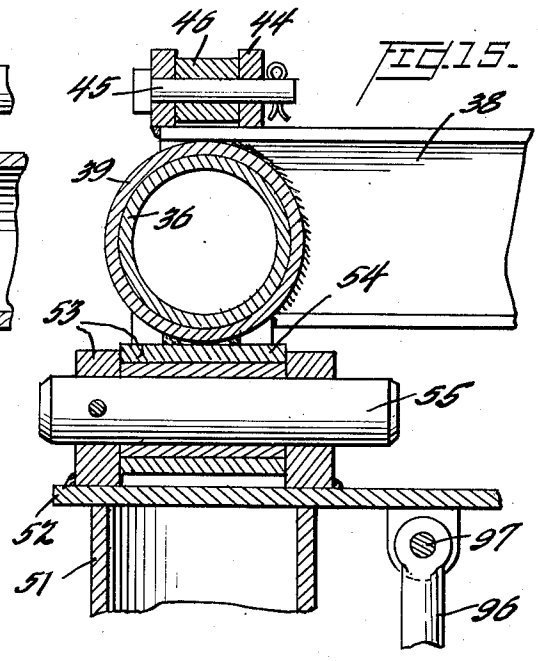
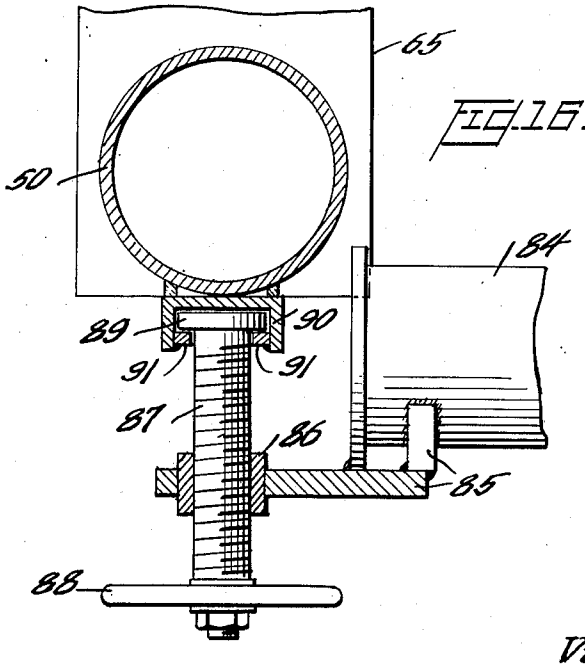


FIG. 16.



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Sept. 8, 1959 V. SCHIAVI 2,902,908

FORM-GRADING AND PRESSING MACHINES FOR ROADWAYS

Filed Jan. 12, 1955 9 Sheets-Sheet 9

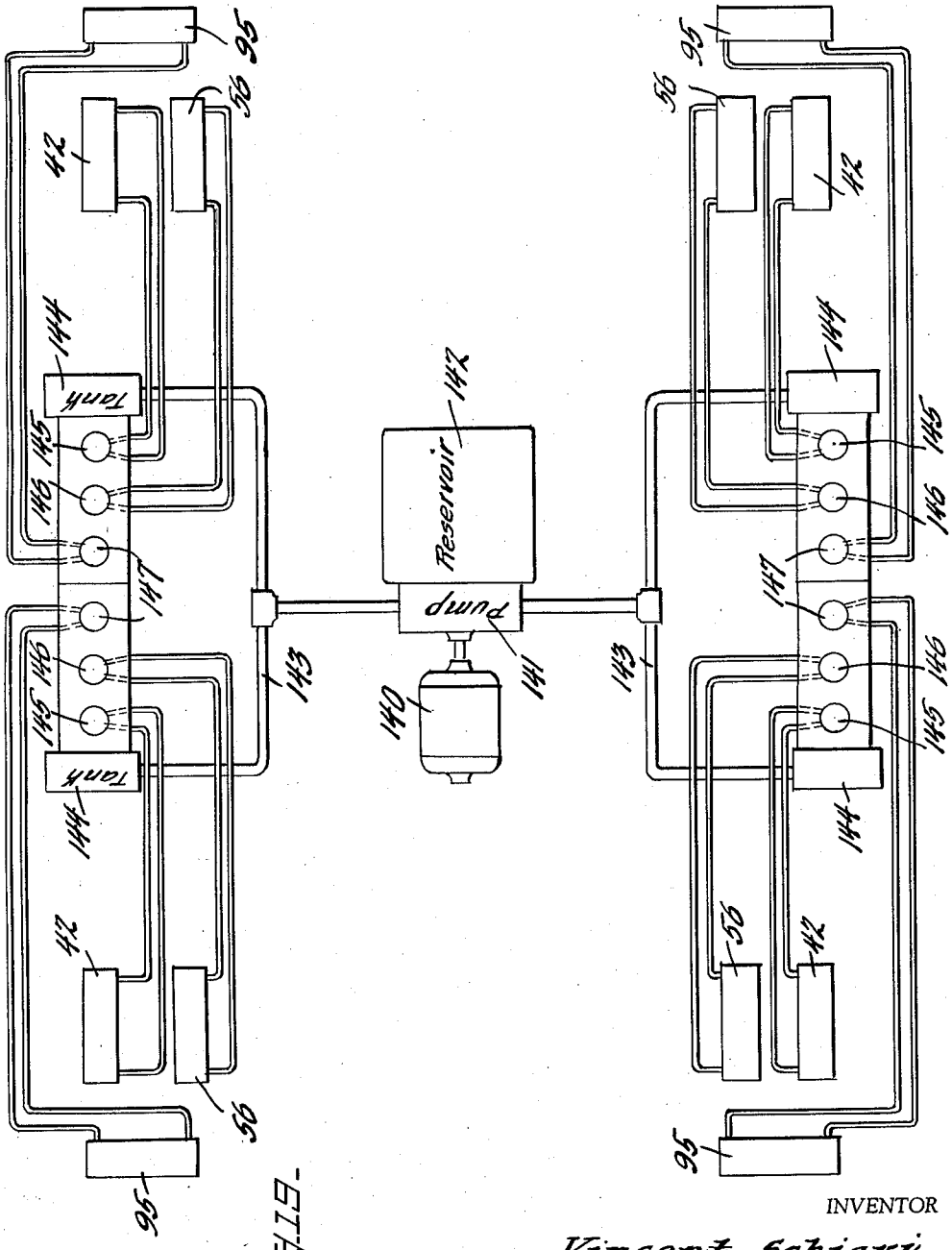


FIG. 15.

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United States Patent Office 2,902,908
Patented Sept. 8, 1959

2,902,908

FORM-GRADING AND PRESSING MACHINES FOR ROADWAYS

Vincent Schiavi, Wilmington, Del., assignor to The Form-grading and Press Machine Corporation, Wilmington, Del., a corporation of Delaware

Application January 12, 1955, Serial No. 481,317

11 Claims. (Cl. 94—39)

The instant invention relates to a road-building machine and more particularly to what may be designated as a form-grading and pressing machine.

One of the primary objects of the invention is the construction of a mobile device of the character indicated that will prepare that portion of the road bed on which the forms are placed which serve to confine the plastic concrete mix used in building roads.

Still another aim is the making of a form-grading and pressing machine comprising a supporting vehicle, preferably self-propelled, having means for scarifying, compacting and levelling, in a substantially continuous manner, that portion of the road bed on which the concrete-confining forms are placed.

Yet a further purpose is the formation of a self-propelled apparatus of the above-described type having fluid-operated mechanism controlled by one or more operators on the vehicle, which will be efficient in operation and serve to conserve both labor and materials, and will expedite the placing of road forms in an efficient mechanical manner and supplant the present inefficient manual procedure now followed in performing this operation.

Cement concrete construction requires the placing of forms, usually metal, at various depths and widths to confine the fluid concrete when it is placed on the road bed. At the present time, a form-setting crew is employed to place such forms. Such a crew employing hand implements and relying on manual labor frequently is unable to keep ahead of the crew depositing the plastic concrete between the forms, resulting in delay or stoppage. Further, the grade is often not uniformly compacted so that the forms either sink or tilt resulting in unsatisfactory operation.

The difficulties set out in the preceding paragraphs are obviated by the instant invention as will be apparent from the detailed description hereinafter appearing when taken in conjunction with the appended drawings forming a part hereof to which attention is now directed and in which:

Fig. 1 is a side elevational view of a machine embodying the instant invention;

Fig. 2 is a plan view of the machine of Fig. 1;

Fig. 3 is a front elevational view rearwardly of the steering wheel;

Fig. 4 is a rear elevational view;

Fig. 5 is a side elevational view on an enlarged scale;

Fig. 6 is a front elevational view of the right side of the machine on a larger scale than Fig. 3;

Fig. 7 is a sectional view taken on line 7—7 of Fig. 6;

Fig. 8 is a rear elevational view of the left side of the machine on a larger scale than Fig. 4;

Fig. 9 is a plan view of Fig. 8;

Fig. 10 is a horizontal sectional view on line 10—10 of Fig. 8;

Fig. 11 is a horizontal sectional view on line 11—11 of Fig. 5 showing the scarifier;

Fig. 12 is a vertical sectional view taken on line 12—12 of Fig. 11;

Fig. 13 is a vertical sectional view taken on line 13—13 of Fig. 12;

Fig. 14 is a vertical sectional view of the pivotal connection at the upper left corner of the frame;

Fig. 15 is a vertical sectional view taken on line 15—15 of Fig. 14;

Fig. 16 is a horizontal sectional view of the adjustable connection between the vertical and horizontal frame members at the rear of the machine;

Fig. 17 is a horizontal sectional view of a grade line pointer taken on line 17—17 of Fig. 5;

Fig. 18 is a sectional view through a pressure beam taken on line 18—18 of Fig. 5;

Fig. 19 is a diagrammatic view of the hydraulic piping system.

My form and grading mechanism may be mounted on various types of well known self-propelled or otherwise actuated road working machines. In the drawings I have shown the skeleton of such a road working machine having a chassis 20, drive wheels 21, a front steering wheel 22 and a forward mold board 23. I have not shown details, such as the driving mechanism of the vehicle, as such features form no part of the present invention.

Secured to the chassis 20 and extending laterally thereof just rearwardly of the mold board 23 is a fixed horizontal tube 25 having a central section 25a from which depend two vertical frame supports 26. Certain parts are secured to the lower ends of these supports which will be later described in detail. Sliding in the fixed tube 25 are two tubes 27, one extending from each end of the tube 25 and each having its outer end connected to a side frame member 28 of my improved device. The tubes 25 and 27 are thus telescopic and provide means for varying the width of the front of the machine.

Spaced longitudinally extending channels 30 are attached to the rear of the chassis 20, said channels connected at their rear ends by a transverse member 31, providing a frame structure constituting a platform 32 carrying an air compressor 33 and other mechanism. Rising from the platform 32 are three spaced uprights 34 supporting at their upper ends a fixed horizontal transverse tube 35 similar to the tube 25. Telescoping tubes 36 slide in the tube 35 and project one from each end thereof, and at their outer ends each tube 36 is connected to a side frame member 28. Thus, when the tubes 27 and 36 are moved by hydraulic or other means, relative to tubes 25 and 35, respectively, the width of the machine is varied.

Each side frame member 28 preferably is formed of three sections, a main section 37 extending longitudinally of the machine, and two shorter sections 38, each bolted, or otherwise fastened at one end to an end of the main section, see Fig. 5. Secured to the other end of each section 38 is a collar 39 and fixedly mounted in each collar is a tube 27 or 36. It will be understood that the construction at each corresponding corner of the machine is the same so a description of one will apply equally to both. A pin 40, Fig. 14, passes through each collar and its related tube so that there is no movement between the two. A pair of ears 41, Fig. 8, are welded to tubes 25 and 35 near the outer end of each tube, and a cylinder 42 is pivotally connected by a pin 43 to each pair of ears. Other ears 44, Fig. 15, are welded to each collar 39 and each pair has pivoted thereto by a pin 45, a piston rod 46 connected to a piston (not shown) sliding in a cylinder 42, Figs. 14 and 15. It will be now understood that when fluid is supplied to either end of each cylinder the width of the machine will be varied through the movement of the telescoping tubes. By having the tubes at each end alike and the corner connections between the tubes and side frame

members the same, a rigid structure is provided, and one in which the cost is minimized.

A vertical telescoping tube unit **49** is provided at each corner of the machine, said tube unit comprising a lower outer tube **50** and an upper inner tube **51**, Fig. 6. A plate **52** is welded to the top of tube **51** and integral with the plate are ears **53**. A sleeve **54** is welded to the under surface of collar **39** and a pin **55** passes through this sleeve and the ears **53** forming a pivotal connection between the collar and the vertical telescoping tube **49**. A cylinder **56** is pivotally connected to the frame of the road machine at **57** and a piston rod **58** of a piston (not shown) sliding in cylinder **56** is pivoted to the lower tube **50** as at **59**. When fluid is admitted to either end of the cylinder it will cause the piston to move and swing the vertical tube **49** about the pivot **55**.

A press or road-tamping beam **65**, Fig. 18, extends longitudinally on each side of the machine, each beam being secured to the bottom end of a front and rear tube **50** for pressing the ground and compacting it to receive the forms used in concrete road construction. The beam consists of an I-beam **66** having a replaceable shoe **67** held by nuts and bolts **68** to the undersurface of the lower flange of the I-beam. This shoe is the part that comes into contact with the ground being pressed, and is made easily replaceable because of wear. Vertical plates **69** are secured, as by welding or the like, between the upper and lower flanges of the I-beam to form a box-like structure and each plate has a series of cutout places **70** to allow easy access to the nuts **68**. To prevent earth and stones from getting into these cutouts, slidable channel plates **71**, having slots **72**, are secured to the plates **69** by bolts **73** and nuts **74**. When the machine is operating the plates **71** are in their lowered position, as shown by the dotted lines in Fig. 18, but when it is desired to get to the nuts **68** the plates **71** are raised, as shown in full lines in Fig. 18, and held there by the nuts **74**. In lieu of welding, press beam **65** may be formed of cast steel as a unit.

At each front corner of the machine is a hollow tube **80**, pivoted to the frame of the road machine at **81**, adjacent to the pivot **57**. A tube **82** slides in a tube **80** and, in turn, is pivoted to the press frame at **83**. At each rear corner a tube **84** telescopes into a tube **80** and has an articulated connection to the press frame which will now be described.

A plate **85** is welded to each tube **84** and carries a nut **86** through which is threaded a rod **87** having a hand wheel **88** at its outer end. At its inner end the rod has a flange **89**. A channel member **90** is secured to the press beam and the flange **89** is held loosely in the channel against axial movement by ribs **91** (see Fig. 16). It will readily be seen that by turning hand wheel **88** the tubes **84** can be adjusted relative to the press beam.

To provide the pressure for the press beams, cylinders **95**, Fig. 5, are pivotally connected to each beam one near its front and rear edges, and a piston rod **96** is pivotally connected at **97** to the corresponding plate **52**. The piston rod is connected to a piston (not shown) in the cylinder **95**, and when fluid is forced into the lower end of the cylinder it will cause relative movement between it and the piston, thus applying pressure to the press beam **65** and will compact the earth. If desired a vibrator **98** may be mounted on each press beam as indicated in Fig. 1 and is fluid operated and controlled by a valve **99**, the latter having an operating handle **100** and being connected to fluid tank **101** by a pipe **102**. The vibrator will help pack the earth more tightly especially if stones are mixed with it.

A scarifier indicated generally by numeral **105**, Figs. 11 and 12, may be built into the front end of each press beam, the teeth of which may tear up the surface of the ground as the machine is moved forward from one position to the next, to permit the press beam to pack the ground firmer and smoother.

The scarifier includes three vertically movable teeth, one tooth **106** being located on the vertical longitudinal axis of the press beam and the other two teeth **107** being located on either side of the axis as may be seen in Fig. 11. The center web of the I-beam **66** may be cut away as at **108** in Fig. 12 to provide space for the tooth **106**, and a sleeve **108'**, welded to the I-beam, serves as a guide for the tooth. Similar sleeves may serve as guides for the other teeth. Each tooth is pointed and sharpened at its lower end **109** so as to easily scar the ground.

A threaded rod **110** is positioned above the press beam **65** and has a flange **111** rotatably mounted in a bearing **112** welded on the top of I-beam **66**. A nut **113** is threaded on rod **110** and has an arm **114** extending laterally from either side (see Fig. 11), an open frame **115** being being fastened to the outer end of each arm. A third frame **115'** extends forwardly from the nut, and the upper end of each tooth is secured in a frame **115** by a pin **116**. A handle **117** is attached to the end of rod **110** and it will readily be seen that as the rod is rotated by the handle, the nut **113** will be raised or lowered and through the frames **115** will raise or lower the teeth **106** and **107**. As will be seen by the dotted lines in Fig. 12, the lower ends **109** of the teeth may be brought within the confines of the press beam **65** when not in use or when the machine is moved from place to place. A plate **118** closes the front end of the press beam, being welded to the horizontal flanges of I-beam **66**.

To make sure that the road being worked is at proper grade, a line **120** is secured to stakes **121** driven into the road bed by surveyors. Mounted on each tube **50** is a frame **122**, having a threaded rod **123** rotatably journalled therein. Nuts **124** are threaded on the rod and welded to the nuts is a tube or hollow rod **125**. A pin **126** is adjustably secured in the rod **125** by a set screw **127** to cooperate with line **120**. The pin is urged forwardly against an edge **128** of the frame **122** by a spring **129** but may swing rearwardly without damage if it hits a stake **121** or some other obstruction.

After the line **120** has been set at the proper grade, the rods **123** are rotated until the pins **126** slightly touch the lines which shows the operator that the ground must not be packed down so as to cause the lines to curve downwardly. Levels **130** may be provided at the top of the machine attached to plate **52** and located near the operators' stands **135**, so that each operator can tell at all times if the machine is properly positioned.

An operator's stand **135** is provided on each side of the machine, above the rear wheels thereof, and is supported in any well known manner from the side frame member **28**.

Also supported on these frame members are a series of valves adapted to be controlled by the operators on the stands. In Fig. 19, I have shown a diagrammatic view of the fluid control system including all cylinders and their control valves.

A motor **140** drives a pump **141** connected to a reservoir **142**. Extending from either side of the pump is a pipe **143** connected to a reserve tank **144**, the latter, in turn, supplying fluid to one of the valves controlling the various cylinders. As shown in Fig. 19 each cylinder **42** is controlled by a valve **145**, each cylinder **56** by a valve **146**, and each cylinder **95** by a valve **147**. These valves are standard items, each having an operating handle **148**, and need not be described in detail. Various levels and gauges may also be employed to measure fluid pressures and to thus indicate the degree to which that part of the road bed being treated has been compacted, as will be understood.

In operation, after the line **120** has been set at the proper grade, the valves **145** and **146** are actuated to bring presser beam **65** into position either on one or both sides of the machine. Also, the scarifier **105** may or may not be used, as desired. If employed, forward

movement of the machine into position with the presser or road-tamping beams off the ground has scarified that portion of the road bed which is to be graded and pressed. Actuation of valve **147** now causes cylinder **95** to force presser beam into contact with the scarified road bed. Handle **100** may then be operated to bring vibrator **98** into play. This is continued until pin **126** contacts line **120**, showing that the work is complete and the machine then moves forwardly to repeat the operation; the forward movement being such that the rear end of the presser beam slightly overlaps a completed portion of the form bed. A crew now places the forms **150** on the treated road bed **151** and each form will be on a uniform well-compacted base at the proper level and in proper upright position.

It will be apparent that the machine is symmetrical along a longitudinal axis; that in addition to the driver of the machine at the front, there is an operator on each stand **135**, an operator controlling one side of the machine, that is, one press beam **65**. If desired, only one press beam may be rendered operative and the operator by watching the fluid pressure gauges, levels, line **120**, pins **126**, when controlling valves **145**, **146**, **147** and vibrator control handle **100**, will bring that portion of the road bed **151** being treated to a proper level, compacted condition for receiving forms **150**.

Having described my invention, what I claim and desire to secure by Letters Patent is:

1. A form-grading and pressing machine comprising a vehicle for movement along a road bed, a frame member carried by the vehicle, said frame member supporting an elongated road-tamping beam on a side of the vehicle substantially parallel to the longitudinal axis thereof, guide means on the vehicle mounting the frame-supporting member for movement laterally of the vehicle, and power means carried by the frame-supporting member and secured to the beam to move the latter downwardly to compact a selected portion of the road bed to a predetermined extent.

2. The structure of claim 1, and retractable scarifier means secured to the leading edge of the road-tamping beam.

3. The structure of claim 1, and retractable scarifier means secured to the leading edge of the road-tamping beam, said means comprising a plurality of spaced, vertically extending teeth.

4. The structure of claim 1, a scarifier secured to the leading edge of the road-tamping beam, said scarifier comprising a plurality of spaced teeth, and means for vertically moving said teeth as a unit relatively to said beam.

5. A form-grading and pressing machine comprising a vehicle for movement along a road bed, means telescopically supporting an elongated road-tamping beam on a side of the vehicle substantially parallel to the longitudinal axis thereof, said supporting means comprising a tube fixed to the vehicle and a telescopic tube carried by the first tube and movable laterally of the vehicle, a side frame member secured to the movable tube, a vertically-extending tube hinged to the frame member, a second tube telescopically movable in said hinged tube, said road-tamping beam secured to said second tube, and hydraulic means on the vehicle for selectively actuating the movable one of each set of tubes.

6. The structure of claim 5, and grade indicating means carried by said second tube.

7. The structure of claim 5, said road-tamping beam comprising an I-beam and a tamping shoe removably secured to the lower flange of said I-beam.

8. The structure of claim 5, and grade-indicating means carried by said second tube, said grade-indicating means comprising a vertically-adjustable laterally-extending pointer.

9. The structure of claim 5, and grade-indicating means carried by said second tube, said grade-indicating means comprising a vertically-adjustable laterally-extending pointer, and means for resiliently holding said pointer in operative position.

10. The structure of claim 5, said hydraulic means comprising a valve-controlled pump system.

11. The structure of claim 5, and a vibrator carried by the road-tamping beam.

References Cited in the file of this patent

UNITED STATES PATENTS

1,662,257	Valerio	Mar. 13, 1928
1,724,054	Troyer	Aug. 13, 1929
1,840,970	Noble	Jan. 12, 1932
1,970,391	Nickerson	Aug. 14, 1934
1,987,398	Gardiner	Jan. 8, 1935
2,039,078	Hertwig	Apr. 28, 1936
2,128,889	Allen	Sept. 6, 1938
2,132,059	Trembly	Oct. 4, 1938
2,245,426	Baker	June 10, 1941
2,732,197	Cornett	Jan. 24, 1956
2,745,326	Green	May 15, 1956