July 22, 1924. 1,502,081

F. D. WILSON ET AL

HIGHWAY MAINTENANCE MACHINE

Filed July 6, 1923 6 Sheets-Sheet 1

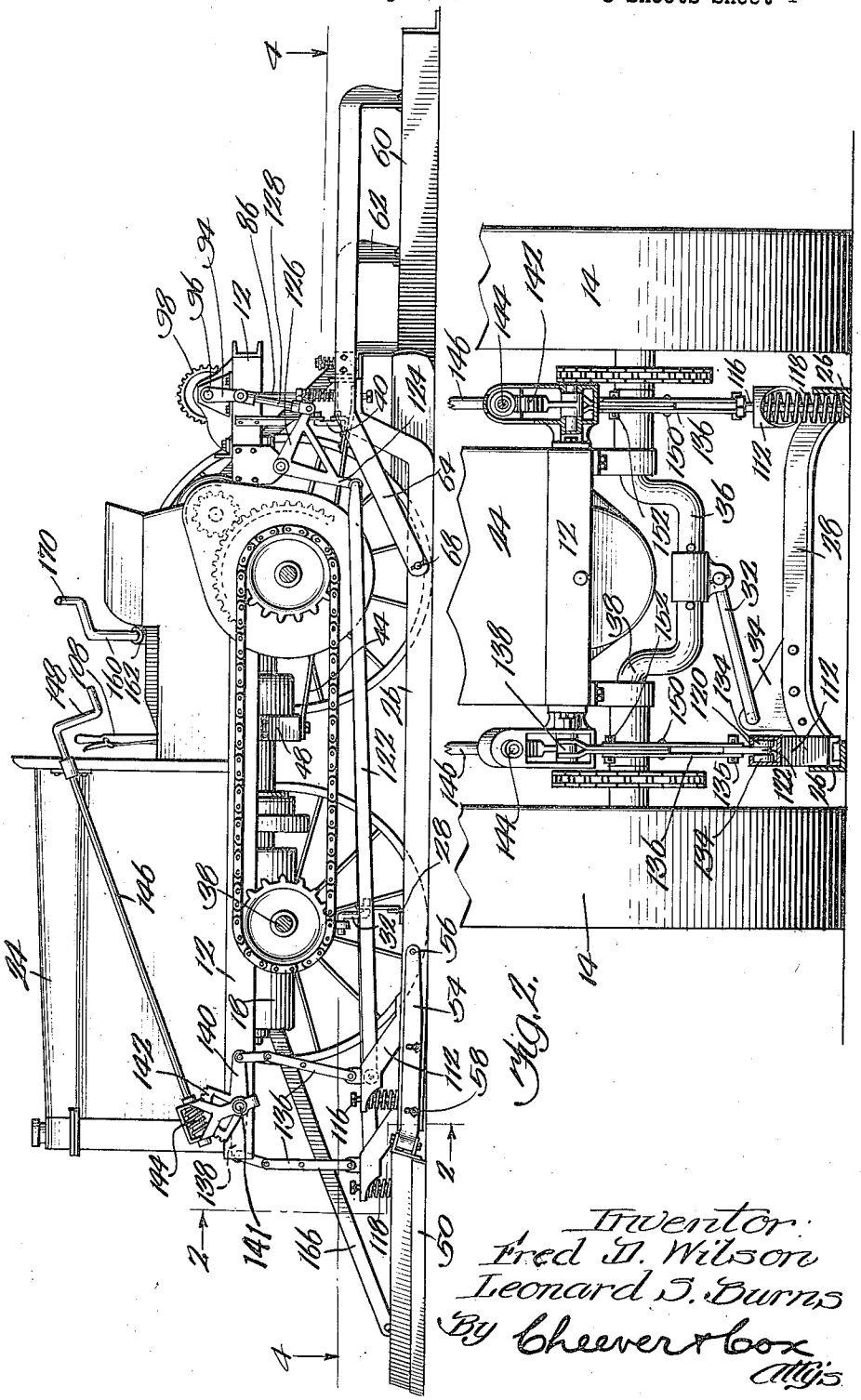


Fig. 1.

Fig. 2.

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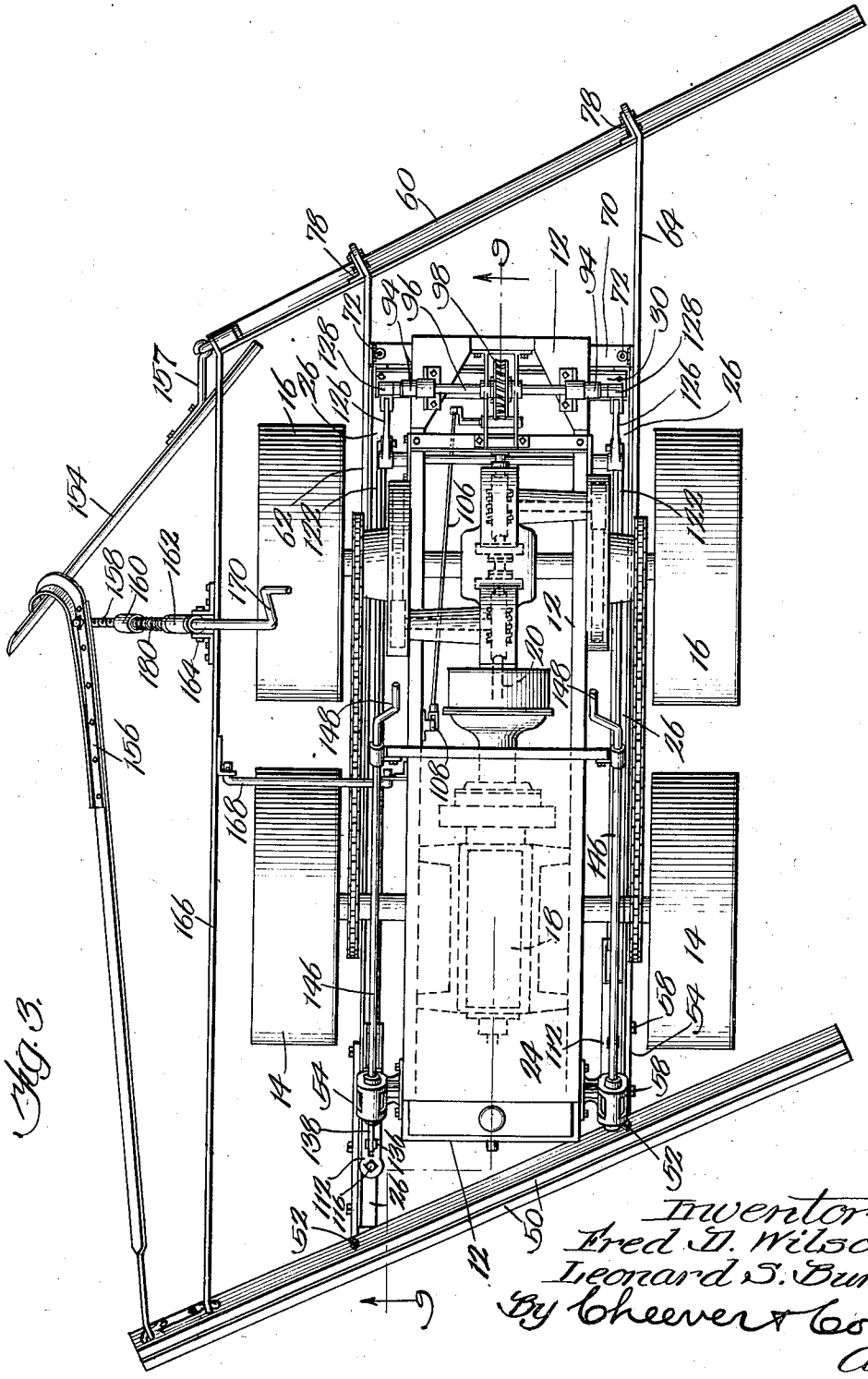


Fig. 3.

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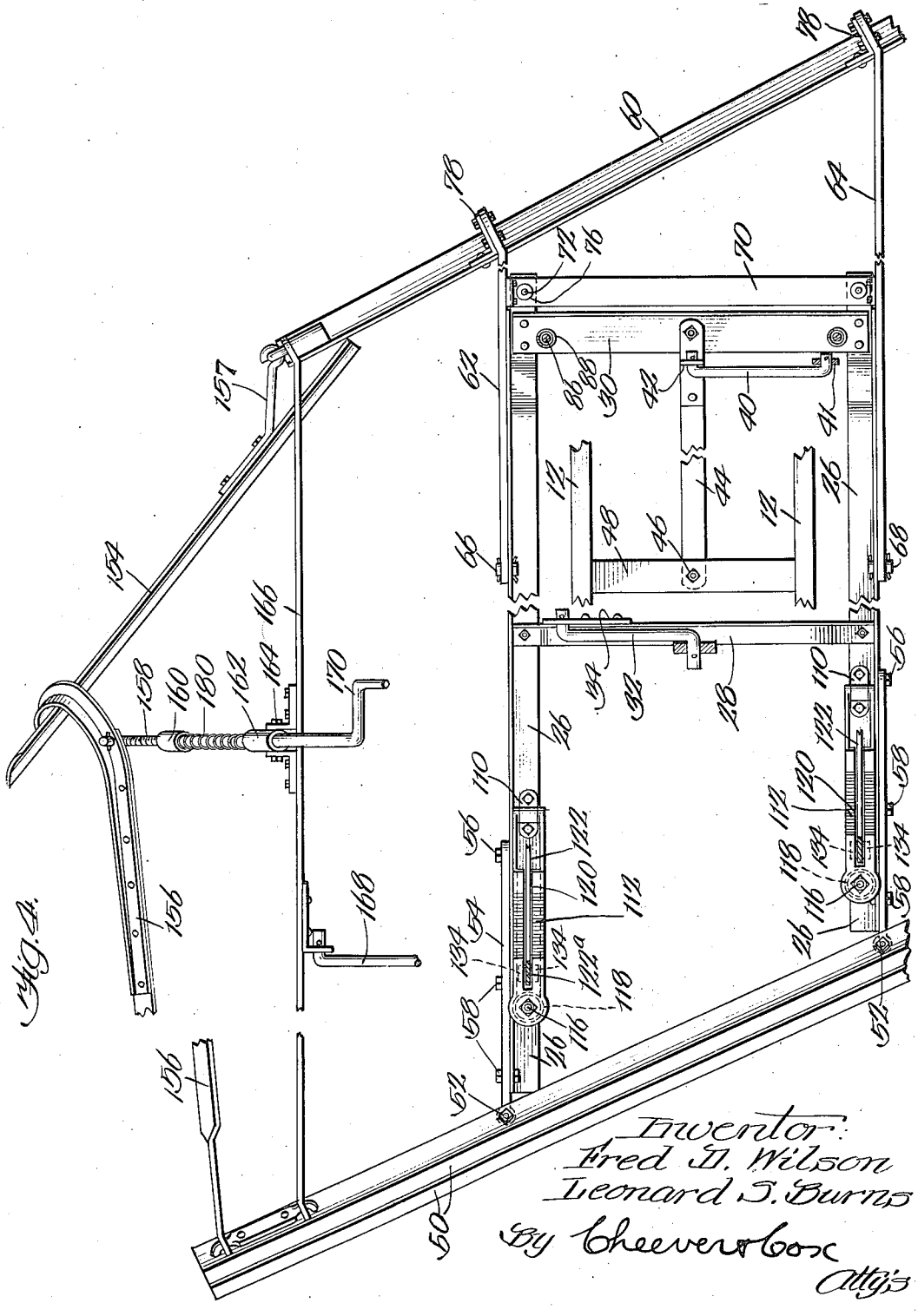


Fig. 4.

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Filed July 6, 1923 6 Sheets-Sheet 4

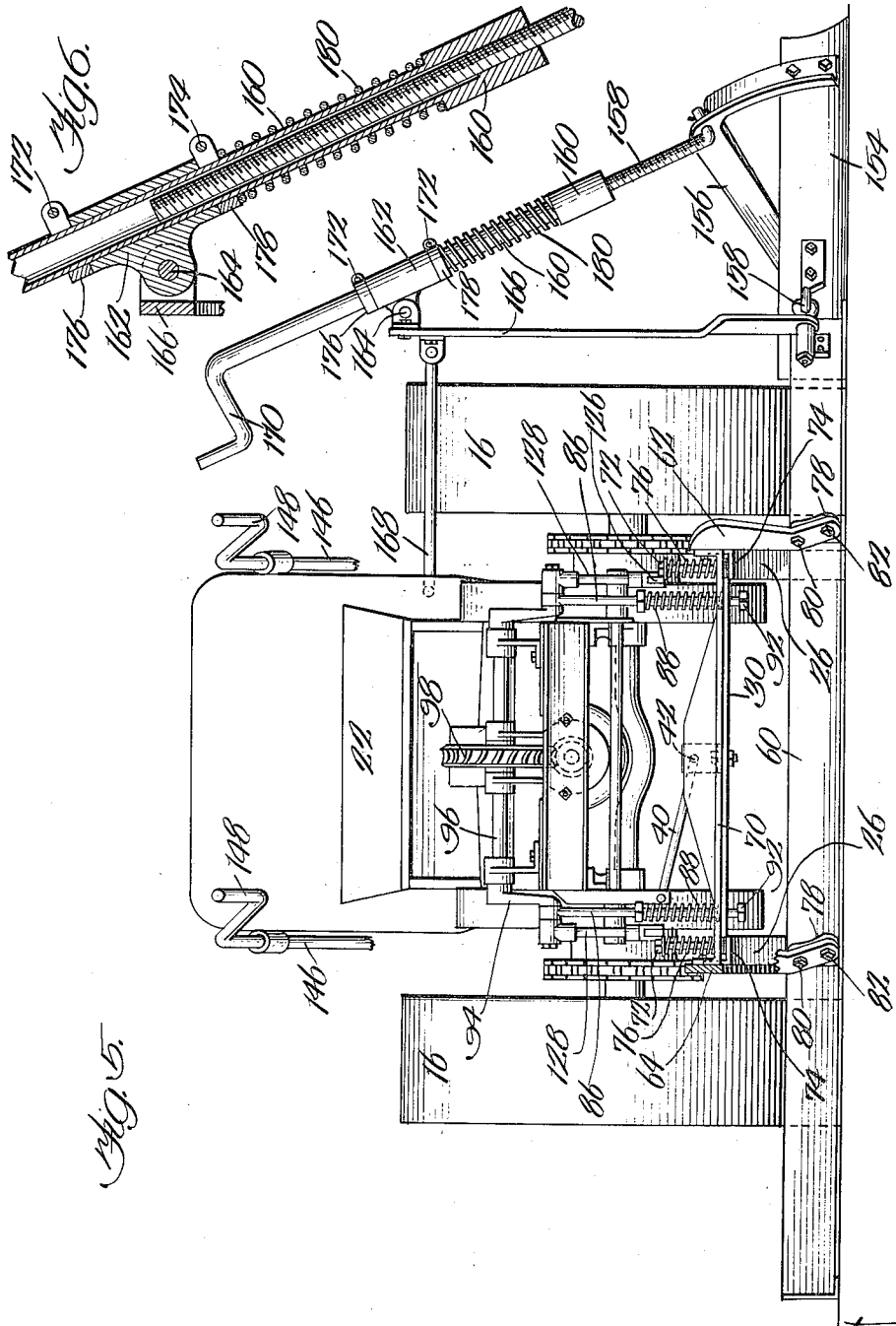


Fig. 6.

Fig. 5.

Inventor:
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HIGHWAY MAINTENANCE MACHINE

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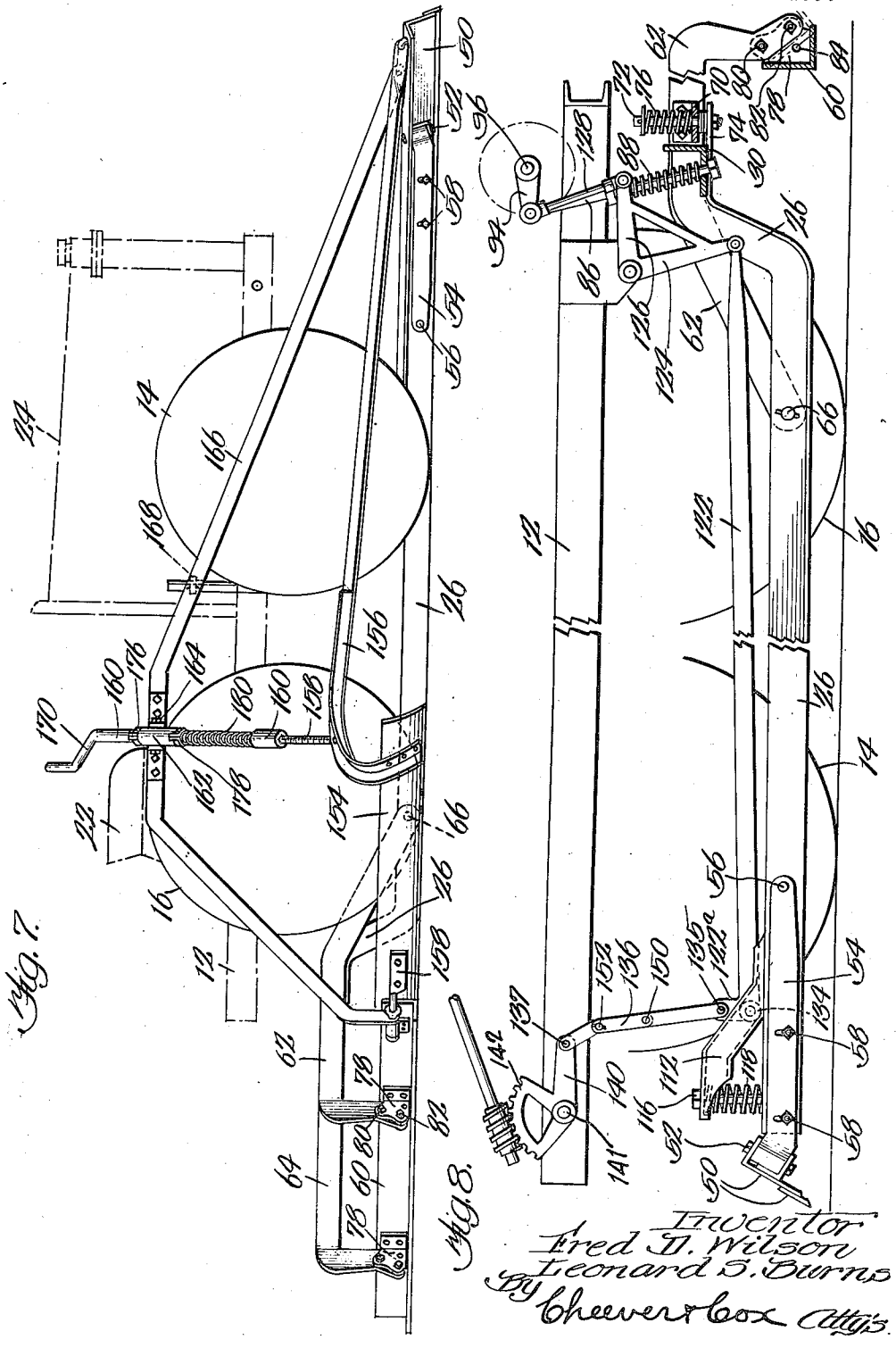


Fig. 7.

Fig. 8.

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HIGHWAY MAINTENANCE MACHINE

Filed July 6, 1923 6 Sheets-Sheet 6

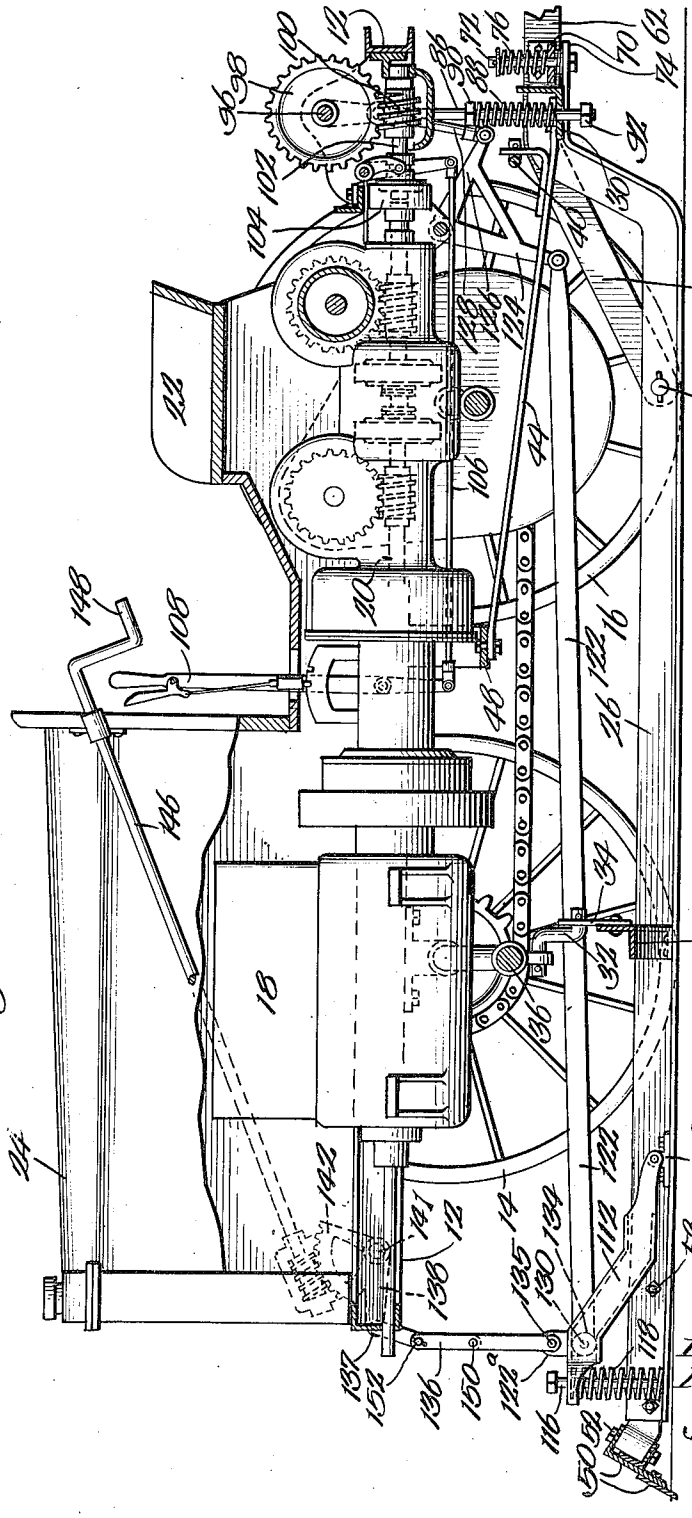


Fig. 5.

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Patented July 22, 1924. 1,502,081

UNITED STATES PATENT OFFICE.

FRED D. WILSON AND LEONARD S. BURNS, OF HARVEY, ILLINOIS, ASSIGNORS TO AUSTIN MANUFACTURING CO., OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

HIGHWAY-MAINTENANCE MACHINE.

Application filed July 6, 1923. Serial No. 649,832.

To all whom it may concern:

Be it known that we, FRED D. WILSON and LEONARD S. BURNS, citizens of the United States, residing at Harvey, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Highway-Maintenance Machines, of which the following is a specification.

This invention relates to self-propelled machines for maintaining modern highways in good condition. Objects of the invention are to provide a machine of this class equipped with a maintainer blade, a scraper blade or both for working on the highway, with power mechanism for vertical adjustment of said earth moving element or elements; to provide means by which one or more of the earth engaging elements may be selectively manually, as well as motor, adjusted, while another of such elements can only be motor adjusted; to provide means for temporarily partially disconnecting one or more of the earth engaging elements from its propelling mechanism so that said earth engaging element can float or ride the road under its own weight only; and to provide means for vertically adjusting one or more of the earth engaging elements with reference to depth gauge mechanism which supports and controls it upon the ground.

The invention consists in mechanism capable of attaining the foregoing and other objects; which can be comparatively easily and cheaply made; which is satisfactory in use and is not readily liable to get out of order; also, in numerous features and details of construction which will be hereafter more fully set forth in the specification and claims.

Referring to the drawings in which like numerals designate the same parts throughout the several views:

Figure 1 is a side elevation of a machine illustrating this invention in its preferred form.

Figure 2 is a front view of the mechanism of Figure 1 taken on the irregular line 2—2 of that figure.

Figure 3 is a plan view of the essential operating parts of the mechanism of this invention, taken with the engine, hood and driver's seat mechanism removed.

Figure 4 is a detail plan view of the earth moving element carrying frame taken on the line 4—4 of Figure 1.

Figure 5 shows the rear of the machine.

Figure 6 is a sectional view through the operating handle mechanism appearing at the extreme right hand side of Figure 5.

Figure 7 is a right hand side view of the entire machine.

Figure 8 is a left hand side view of the mechanism carrying and controlling the earth engaging elements of Figure 1, showing the parts in extreme elevated position.

Figure 9 is a side elevation, partially in section, on the irregular line 9—9 of Figure 3.

The mechanism of this invention may be applied to any sort of an auto-motive device capable of traveling over a street or other surface to be worked. It is shown in the drawings as applied to a conventional form of tractor having a main frame 12 supported on pairs of wheels or rollers 14—16 and sustaining a conventional form of an engine 18 having a main drive shaft 20 equipped with the usual conventional mechanism of such a tractor, the operative parts being covered by a conventional driver's seat 22 and engine hood 24.

In order to carry out this invention, a road working tool carrying frame is provided between the wheels of the tractor comprising broadly two parallel shoes or runners 26 rigidly connected by transverse cross-members 28 and 30. This frame is mounted for vertical movement between the wheels of the tractor. At its front end, it is held against substantial lateral movement away from parallelism with the central axis of the tractor by the use of a horizontally disposed crank 32, interposed between a lug 34 on cross-member 28 and a U-shaped bend 36 in the axle 38 belonging to the front wheels 14. It is similarly held against sidewise movement by a horizontally disposed crank rod 40 pivoted at one end 41 on the side of the frame of the machine and at the other end 42 to a draw-bar rod 44 carried at one end by transverse member 30, heretofore referred to. The opposite end of the draw-bar rod 44 is pivotally connected at 46 to cross-bar 48 mounted on the main frame

12. This draw-bar 44 performs the function of transmitting the pulling or pushing force of the tractor proper to these frame members 26 of the depth gauge mechanism.

Diagonally disposed across the front of the machine and attached by any suitable mechanism preferably that hereafter described, at the forward ends of the two runners 26, is a cutting or maintainer blade 50. In the preferred form of construction here shown, this maintainer blade mechanism 50 is carried by means of pivotal bolts 52 on comparatively short lever arms 54 pivoted at suitable points 56 to the rear of the forward ends of the depth gauge runners 26 and is vertically adjustable about said pivots by pin and slot bolt connections 58 of conventional form (Figure 8). By properly loosening the bolts in these connections, the levers 54 carrying the maintainer blade may be elevated or depressed as the case may be the length of the slots shown in Fig. 8 and the bolts thereupon tightened to permanently secure the blade in its new angular position with reference to the depth gauge runners.

Similarly disposed across the rear or right hand end of the machine, as viewed in Figures 4 and 8, is an earth moving member, specifically a scraper 60, so angularly positioned that when the road surface cut by maintainer blade 50 reaches it, the dirt is slipped cross-wise of the machine to either the center or side of the road in conventional manner. This blade is connected by any suitable means to a pair of links 62 and 64, pivoted at aligned pivots 66 and 68 on opposite runners 26. These links are rigidly connected by a cross-bar 70 perforated to receive (as shown in Figure 8) vertical bolts 72 rigidly secured at their lower ends to extension members 74 on the rear ends of blades 26. These bolts 72 carry conventional compression springs 76 so mounted that under normal conditions they force the links 62 and 64 down onto members 74.

The blade 60 is provided with outwardly extending plates 78 pivotally mounted at 80 on the rear ends of links 62 and 64, respectively. These plates 78 and consequently the blade 60 are adjustable about these pivots 80 by properly positioning bolts 82 passing through the extreme ends of the links in selected holes 84 properly angularly positioned in the plates 78. The spring mechanism 72—76 heretofore described is provided in order to allow the blade 60 to spring upward without disturbing the runners 26 should said blade 60 in passing over the road strike some obstacle, such as a brick, or the like, which does not interfere with the runners themselves.

Means for powerfully lifting the rear end of the depth gauge mechanism, including the scraper blades 60, and for powerfully pressing it upon the ground is provided through the use of parallel connecting rods 86, reciprocatably moving at their lower end portions through perforations in cross-member 30, heretofore described, each connecting rod being engaged by a compression spring 88 bearing at its upper end against a nut 90 or the like on the adjacent connecting rod. Each connecting rod carries at its lower end a nut 92 which prevents its being entirely withdrawn from engagement with the cross-member 30 and connected runners. The upper ends of the connecting rods 86 are pivotally attached to cranks 94 on a shaft 96 motor driven in any conventional manner as for instance the gear 98 and the worm 100 on a shaft 102 detachably connected by a suitable clutch mechanism 104 with main drive shaft 20, heretofore referred to. This clutch 104 is conventionally operatable by a clutch control rod mechanism 106, extending forward to a conventional form of control lever 108 located in front of and within reach of an operator seated upon seat 22, heretofore described. The result of the construction just described is that the operator can by manipulating lever 108 and consequently clutch 104 cause the connecting rods 86 to move as desired to the position shown in Figure 9 in which the springs 88 forcibly drive the rear end of the earth working tool carrying frame 26 onto the ground or to the position shown in Figure 8 in which the rods 86 are moved up to the point where the nuts 92 carry the rear end of the frame with the blade 60 entirely clear of the road surface. Whether the operator reverses the engine 18 at each alternate movement just described, thereby causing crank 94 to rock between the positions of Figures 8 and 9 or obtains the result by completely rotating shaft 96 and gear 98 is wholly immaterial to this invention.

Pivotally attached to a bracket 110 on the forward end of each depth gauge runner 26 is a diagonally disposed cam enclosing lever 112, having its forward or swinging free end entered by a vertical bolt 116 located at the extreme front end of the adjacent runner 26, there being on each such bolt 116 a compression spring 118 for the purposes hereafter described. The upper surface of lever 112 is provided with an elongated slot 120 entered by a long rod 122 extending to the rear of the machine and there connected to one arm 124 of a bell crank whose opposite arm 126 is suitably attached to a connecting rod 128 operatively connected to crank 94, heretofore described, on shaft 96. The forward end of each rod 122 carries a shaft 130 sustaining spaced rollers 134 traveling on cam tracks inside of cam lever 112 shown in dotted lines, Fig. 9, on opposite sides of slot 120. The forward end of each

rod 122 on each side of the machine has an upwardly extending L-shaped lug 122ª, pivotally connected at 135 to a conventional "broken link" 136 which is in turn pivoted at 137 to its own crank arm 138 or 140, as the case may be, on a shaft 141 on the frame of the machine. Each crank 138 and 140 carries its own segmental gear 142 driven by its independent worm 144 on its independent control shaft or rod 146, manipulatable by its own crank 148 located adjacent to the operator's seat 22. The result of the construction just described is that the operator can by manipulating a particular crank 148 cause the member 136, now rigid, to either press member 122ª and member 122 integral with it downward to the position of Figure 9, thus compressing spring 118 and forcing the adjacent portion of maintainer blade 50 onto the ground or, assuming the crank is rotated in the opposite direction, to lift that particular part of the maintainer blade with reference to other parts of the ground engaging mechanism. If the operator manipulates both cranks 148 simultaneously, he can manually raise or lower the maintainer blade 50 from one position to another parallel with itself.

The operation just described presupposes that both conventional bolts 150 and 152 in the broken link 136 are rigidly set in place in a conventional manner so that the member 136 is a rigid push or pull member. The "broken link" member is provided so that the operator can, if desired, loosen bolts 150 and 152, remove one of them, as 152, and thus destroy the downward pushing action of the broken link and consequently the manual control of the maintainer blade and thus allow the forward end or maintainer blade to float, i. e., follow the ground, a condition which is required under some conditions of road work.

When the rollers 134 are at the tops of the cam levers 112 in the position of Figures 1 and 9, the road working mechanism rests upon the road surface as shown. When the operator manipulates the motor to rotate shaft 96 to throw the bell crank 124—126 from the position of Figure 1 to that of Figure 8, broken links 136, whether rigid or not, rocking on pivots 137, the rollers 134 travel down the cam surface inside of members 112 with the result that the frame being rigid against longitudinal movement on the machine by virtue of the rod 44, the cam levers 112 have to travel up these rollers with the result that the forward end of the depth gauge frame is elevated as shown. As rotation of shaft 96 thus elevates the forward and rear end of the frame in the manner described, the entire frame is elevated from the position of Figures 1 and 9 to that of Figure 8. Moving the shaft 96 in the opposite direction, of course, allows the parts to return to the normal working position of Figures 1 and 9.

It is desirable to provide a mechanism of this character with an independent ditch-making blade which is adjustable in various ways and this is accomplished in the machine here illustrated by mounting a suitable angularly disposed blade 154 on the right hand side of the tool carrying frame, heretofore described, said blade being sustained by suitably disposed links 156 and 157 of suitable length and position to sustain the blade 154 as desired. The link 156 is preferably arched as shown so as to allow dirt engaged by the blade 154 to pass under it. Detachably connected near the top of this arch is a screw 158 extending upwardly and into a threaded sleeve 160 slidably mounted in a block 162 pivoted at 164 on a frame support 166 braced from the main frame of the machine by a rod 168. The upper end of the sleeve 160 is provided with a crank handle 170, located conveniently to the driver's seat, by which the operator can rotate the sleeve on the screw 158 and thus elevate or depress member 156 and consequently blade 154. When the operator has made this adjustment, he under one system of operation tightens up bolts 172 and 174 on lug collars 176 and 178 at opposite ends of member 162, heretofore referred to, and thus fastens the blade in permanent angular position. If, however, the operator desires to allow blade 154 to "ride the road" he loosens bolts 172 and 174 and moves the collar 178 to a position sufficiently remote from member 162 so that the sleeve can within limits slide through member 162 to allow compression of spring 180 if blade 152 is forced upward. Spring 180, enclosing the sleeve, is provided for use under these last conditions to engage member 162 (through lower member 178) and thus yieldingly hold the blade on the ground.

From the foregoing, it will be seen that the operator sitting on the seat 22 can by operating the handle 108 cause the engine to powerfully raise the frame, carrying the tools 50 and 60; that he can at will by manipulating one of the handles 148 raise or lower either front corner of the frame as desired, and that the adjustment when once so made at a front corner is not changed by subsequent elevation or depression of the entire frame. The ability to thus adjust the device and have it stay adjusted is important when the machine is operating along a road where it is necessary to raise the tool carrying frame in going over a crossing or like obstruction, and it is necessary or desirable to have the working tools resume work in the same relative position with reference to the road after they pass the crossing.

The lengths of the screw 158 and the

sleeve 160 are such that blade 154 may be both elevated above or depressed below the position of Figure 5 in which it is on the same level as the depth gauge runners and the blades 50 and 60. In other words, the outer point of blade 154 may be made to travel in the earth at the side of the road at a substantial depth below the level of the road on which the machine is traveling, should this be required in properly ditching the road.

Owing to the fact that the rods 32 and 40 and the push bar 44 permit vertical movement of the depth gauge frame with reference to the vehicle but prevent any other sort of movement between these parts, it is obvious that when the rods 122 pull the rollers 134 along the cam surfaces of levers 112, the front end of the frame is forced upward, or allowed to descend as the case may be, without reference to the connecting devices 136 at the front end of the machine.

As shown in the drawings, with the blade 50 low for dirt working, the device is essentially a summer or good weather machine. It may be readily converted into a snow plow or winter machine by substituting a higher, properly formed blade for blade 50. For snow plow work, it would probably be preferable to entirely remove the blade 60 by ditching its supporting frame 62—64—70 at 66—68. By making this substitution of front blades, cities in the North owning the machine could do effective work with the one machine instead of buying conventional, separate dirt road working and snow plow machines.

Having thus described our invention, what we claim as new and desire to secure by Letters Patent is:

1. In combination with a power driven vehicle, a vertically movable cutting blade in front of the vehicle, power operated means for raising and lowering said blade, and manually controlled means for independently vertically positioning an end of the blade.

2. In combination with a power driven vehicle, a vertically movable cutting blade in front of the vehicle, power operated means communicated from the rear of the vehicle for raising and lowering said blade, and manually controlled means for independently vertically positioning an end of the blade.

3. In combination with a power driven vehicle, a vertically movable cutting blade in front of the vehicle, power operated means for raising and lowering said blade, and independently operable manual means for selectively vertically positioning opposite ends of said blade.

4. In combination with a power driven vehicle, a vertically movable cutting blade in front of the vehicle, power operated means communicated from the rear of the vehicle for raising and lowering said blade, and independently operable manual means for selectively vertically positioning opposite ends of said blade.

5. In combination with a power driven vehicle, a vertically movable cutting blade in front of the vehicle, power operated means for raising and lowering said blade, manually controlled means for independently vertically positioning an end of the blade, a driver's station on the vehicle, means there located for controlling said power means and for manipulating said manual means.

6. In combination with a power driven vehicle, a vertically movable cutting blade in front of the vehicle, power operated means communicated from the rear of the vehicle for raising and lowering said blade, manually controlled means for independently vertically positioning an end of the blade, a driver's station on the vehicle, means there located for controlling said power means and for manipulating said manual means.

7. In combination with a power driven vehicle, a vertically movable cutting blade in front of the vehicle, power operated means for raising and lowering said blade, independently operable manual means for selectively vertically positioning opposite ends of said blade, a driver's station on the vehicle, means there located for controlling said power means and for manipulating said manual means.

8. In combination with a power driven vehicle, a vertically movable cutting blade in front of the vehicle, power operated means communicated from the rear of the vehicle for raising and lowering said blade, independently operable manual means for selectively vertically positioning opposite ends of said blade, a driver's station on the vehicle, means there located for controlling said power means and for manipulating said manual means.

9. In combination with a power driven vehicle, a vertically movable cutting blade in front of the vehicle, power operated means for raising and lowering said blade, and means for selectively applying a part of the vehicle weight to the blade to hold it on the road and allowing the blade to float under its own weight and that of its immediately associated parts.

10. In combination with a power driven vehicle, a vertically movable cutting blade in front of the vehicle, power operated means communicated from the rear of the vehicle for raising and lowering said blade, and means for selectively applying a part of the vehicle weight to the blade to hold

it on the road and allowing the blade to float under its own weight and that of its immediately associated parts.

11. In a machine of the class described, a depth gauge frame comprising runners resting on the ground, a blade across the frame at one end, a second blade carrying supplemental lever-frame mechanism pivoted adjacent to the other end of the first frame, and yielding means pressing the second blade toward the ground.

12. In a machine of the class described, a depth gauge frame comprising runners resting on the ground, a blade across the frame at one end, a second blade carrying supplemental lever-frame mechanism pivoted adjacent to the other end of the first frame, and means for adjusting the angular position of the second blade with reference to the vertical.

13. In combination with a traveling vehicle, an earth working tool carrying frame below the vehicle, means engaging the frame at a plurality of separated points for elevating and depressing it, and means independently adjusting one of said points.

14. In combination with a traveling vehicle, an earth working tool carrying frame below the vehicle, means operated by a single instrument adjacent to an operator on the vehicle engaging the frame at four separated points for elevating and depressing it, and means independently vertically adjusting one of said points.

15. In combination with a traveling vehicle, an earth working tool carrying frame below the vehicle, means power operated through turning of a single shaft engaging the frame at separated points for elevating and depressing it, and independent means for increasing and decreasing the pressure at one of said points.

16. In a machine of the class described, in combination with a depth gauge frame, a forwardly inclined ditching blade carried on and protruding from the side of the frame.

17. In a machine of the class described, in combination with a depth gauge frame, a ditching blade carried on and forwardly protruding from the side of the frame, and means for angularly vertically adjusting the ditching blade.

18. In a machine of the class described, in combination with a depth gauge frame, a ditching blade carried on and forwardly protruding from the side of the frame, and means operated from a driver's seat on the machine for angularly vertically adjusting the ditching blade.

19. In a machine of the class described, in combination with a vehicle having wheels traversing the ground and a vertically adjustable depth gauge frame between the wheels, a ditching blade outside the vehicle wheels carried on and protruding forwardly from the side of frame.

20. In a machine of the class described, in combination with a vehicle having wheels traversing the ground and a depth gauge frame between the wheels, a ditching blade outside the vehicle wheels carried on and protruding from the side of frame, and means for angularly vertically adjusting the ditching blade.

21. In a machine of the class described, in combination with a vehicle having wheels traversing the ground and a depth gauge frame between the wheels, a ditching blade outside the vehicle wheels carried on and protruding forwardly from the side of the frame, and means operated from a driver's seat on the machine for angularly vertically adjusting the ditching blade.

22. In a machine of the class described, in combination with a depth gauge frame, a ditching blade carried on and protruding from the side of the frame, means for angularly vertically adjusting the ditching blade, said adjusting means including a pair of concentric members screw-threaded together, one being connected to the blade to be elevated, the other being rotatably mounted at a fixed point on the machine and equipped with means for rotating it.

23. In a machine of the class described, in combination with a vehicle having wheels traversing the ground and a depth gauge frame between the wheels, a ditching blade outside the vehicle wheels carried on and protruding from the side of the frame, and means for angularly vertically adjusting the ditching blade, said adjusting means including a pair of concentric members screw-threaded together, one being connected to the blade to be elevated, the other being rotatably mounted at a fixed point on the machine and equipped with means for rotating it.

24. In a machine of the class described, in combination with a depth gauge frame, a ditching blade carried on and protruding from the side of the frame to move material toward the frame, and means for angularly vertically adjusting the ditching blade, said adjusting means being supported on a supplemental vertical frame (166) tied to the upper portion of the main machine, arranged as shown and described.

25. In a machine of the class described, in combination with a vehicle having wheels traversing the ground and a depth gauge frame to move material toward the frame between the wheels, a ditching blade outside the vehicle wheels carried on and protruding from the side of the frame, and means for angularly vertically adjusting the ditching blade, said adjusting means being supported on a supplemental vertical frame (166) tied to the upper portion of the main

machine, arranged as shown and described.

26. In combination with a vehicle and a slidable depth gauge beneath said vehicle, a ditching blade hinged to the gauge so as to be capable of vertical movement for working at points both below and above the level of the depth gauge, and means for so selectively positioning the blade.

27. In combination with a vehicle and a depth gauge below it, a blade carried by the gauge, means for selectively independently positioning two separated points on the blade with reference to the vehicle and means for raising and lowering said entire depth gauge and blade without destroying the adjusted relationship of said two blade points.

28. In combination with a vehicle and a depth gauge below it, a blade carried by the gauge, means for selectively independently positioning two separated points on the blade with reference to the vehicle, and power driven means for raising and lowering said entire depth gauge blade without destroying the adjusted relationship of said two blade points.

29. In combination with a vehicle and a depth gauge below it, a blade carried by the gauge, means for selectively independently positioning two separated points on the blade with reference to the vehicle, means for raising and lowering said entire depth gauge and blade without destroying the adjusted relationship of said two blade points, and means permitting disconnection of said first mentioned positioning means without interfering with the elevating of the entire frame.

30. In combination with a vehicle and a depth gauge below it, a blade carried by the gauge, means for selectively independently positioning two separated points on the blade with reference to the vehicle, power driven means for raising and lowering said entire depth gauge blade without destroying the adjusted relationship of said two blade points, and means permitting disconnection of said first mentioned positioning means without interfering with the elevating of the entire frame.

31. In mechanism of the class described, a depth gauge frame, a blade across it, means for adjusting the blade vertically of the frame, and clamp bolts for locking the adjusting means to said gauge frame.

32. In mechanism of the class described, a depth gauge frame, a blade entirely across the front of it, lever arms supporting the blade, pivoted to the gauge at some distance from the blade, and means for securing said lever arms at different angular positions on the gauge.

33. In mechanism of the class described, a vehicle, a depth gauge frame on the ground beneath the vehicle, means connecting the frame to the vehicle for vertical movement with reference thereto only, an inclined cam at one point on the frame, power mechanism carried by the vehicle remote from said cam, a member traversing said cam and means operatively connecting said cam traversing member to the power mechanism, the whole arranged and so proportioned that operation of the power mechanism causes said traversing member to move along said cam to thereby cause the elevation and depression of the adjacent portion of the frame.

34. In mechanism of the class described, a vehicle, a depth gauge frame on the ground beneath the vehicle, means connecting the frame to the vehicle for vertical movement with reference thereto only, an inclined cam at one point on the frame, power mechanism carried by the vehicle remote from said cam, a member traversing said cam, means operatively connecting said cam traversing member to the power mechanism, the whole arranged and so proportioned that operation of the power mechanism causes said traversing member to move along said cam to thereby cause the elevation and depression of the adjacent portion of the frame, and direct lifting mechanism between another point on the frame more adjacent to the power mechanism whereby operation of the power mechanism lifts and lowers the entire frame.

35. In mechanism of the class described, a vehicle, a rectangular depth gauge frame on the ground beneath the vehicle, means connecting the frame to the vehicle for vertical movement with reference thereto only, a pair of inclined, spaced cams at one end of the frame, power mechanism carried by the vehicle remote from said cams, members traversing said cams and means operatively connecting said cam traversing members to the power mechanism, the whole arranged and so proportioned that operation of the power mechanism causes said traversing members to move along said cams to thereby cause the elevation and depression of the adjacent portions of the frame.

36. In mechanism of the class described, a vehicle, a rectangular depth gauge frame on the ground beneath the vehicle, means connecting the frame to the vehicle for vertical movement with reference thereto only, a pair of inclined, spaced cams at one end of the frame, power mechanism carried by the vehicle remote from said cams, members traversing said cams, means operatively connecting said cam traversing members to the power mechanism, the whole arranged and so proportioned that operation of the power mechanism causes said traversing members to move along said cams to thereby cause the elevation and depression of the adjacent portions of the frame, and direct

lifting mechanism between two other points on the frame more adjacent to the power mechanism whereby operation of the power mechanism lifts and lowers the entire frame.

37. In mechanism of the class described, a vehicle, a rectangular depth gauge frame on the ground beneath the vehicle, means connecting the frame to the vehicle for vertical movement with reference thereto only, a pair of inclined, spaced cams at one end of the frame, power mechanism carried by the vehicle remote from said cams, members traversing said cams and means operatively connecting said cam traversing members to the power mechanism, the whole arranged and so proportioned that operation of the power mechanism causes said traversing members to move along said cams to thereby cause the elevation and depression of the adjacent portions of the frame, a blade carried by the frame adjacent to said cams, and a pivotal spring controlled connection between said cams and said frame.

38. In mechanism of the class described, a vehicle, a rectangular depth gauge frame on the ground beneath the vehicle, means connecting the frame to the vehicle for vertical movement with reference thereto only, a pair of inclined, spaced cams at one end of the frame, power mechanism carried by the vehicle remote from said cams, members traversing said cams, means operatively connecting said cam traversing members to the power mechanism, the whole arranged and so proportioned that operation of the power mechanism causes said traversing members to move along said cams to thereby cause the elevation or depression of the adjacent portions of the frame, direct lifting mechanism between two other points on the frame more adjacent to the power mechanism whereby operation of the power mechanism lifts and lowers the entire frame, a blade carried by the frame adjacent to said cams and a pivotal spring controlled connection between said cams and said frame.

39. In mechanism of the class described, a vehicle, a depth gauge frame on the ground beneath the vehicle, means connecting the frame to the vehicle for vertical movement with reference thereto only, an inclined cam at one point on the frame, power mechanism carried by the vehicle remote from said cam, a member traversing said cam, means operatively connecting said cam traversing member to the power mechanism, the whole arranged and so proportioned that operation of the power mechanism causes said traversing member to move along said cam to thereby cause the elevation and depression of the adjacent portion of the frame, direct lifting mechanism between another point on the frame more adjacent to the power mechanism whereby operation of the power mechanism lifts and lowers the entire frame, and a cushion means interposed in said last mentioned direct lifting mechanism.

40. In mechanism of the class described, a vehicle, a rectangular depth gauge frame on the ground beneath the vehicle, means connecting the frame to the vehicle for vertical movement with reference thereto only, a pair of inclined, spaced cams at one end of the frame, power mechanism carried by the vehicle remote from said cams, members traversing said cams, means operatively connecting said cam traversing members to the power mechanism, the whole arranged and so proportioned that operation of the power mechanism causes said traversing members to move along said cams to thereby cause the elevation and depression of the adjacent portions of the frame, direct lifting mechanism between the two other points on the frame more adjacent to the power mechanism whereby operation of the power mechanism lifts and lowers the entire frame, and a cushion means interposed in said last mentioned direct lifting mechanism.

41. In combination with the frame of a vehicle, depending sustaining members at two points thereon, means on the vehicle for selectively vertically moving said sustaining members, cam track engaging members on the lower parts of said sustaining members, a blade carrying member below the vehicle, means permitting said blade carrying member to move to and from the vehicle only, diagonally inclined cams carried by the blade carrying member engaged by said cam engaging members and power means on the vehicle for forcing said cam engaging members to traverse said cams and correspondingly move the blade carrying member as predetermined by the selective positioning of the vertical members.

42. In combination with the frame of a vehicle, depending sustaining members at two points thereon, means by which said sustaining members can be made rigid or flexible, as desired, means on the vehicle for selectively vertically moving said sustaining members, cam track engaging members on the lower parts of said sustaining members, a blade carrying member below the vehicle, means permitting said blade carrying member to move to and from the vehicle only, diagonally inclined cams carried by the blade carrying member engaged by said cam engaging members and power means on the vehicle for forcing said cam engaging members to traverse said cams and correspondingly move the blade carrying member as predetermined by the selective positioning of the vertical members.

In witness whereof, we have hereunto subscribed our names.

FRED D. WILSON.
LEONARD S. BURNS.