Oct. 21, 1952 J. V. HOWARD 2,614,346

LAND LEVELER

Filed July 9, 1948 4 Sheets-Sheet 1

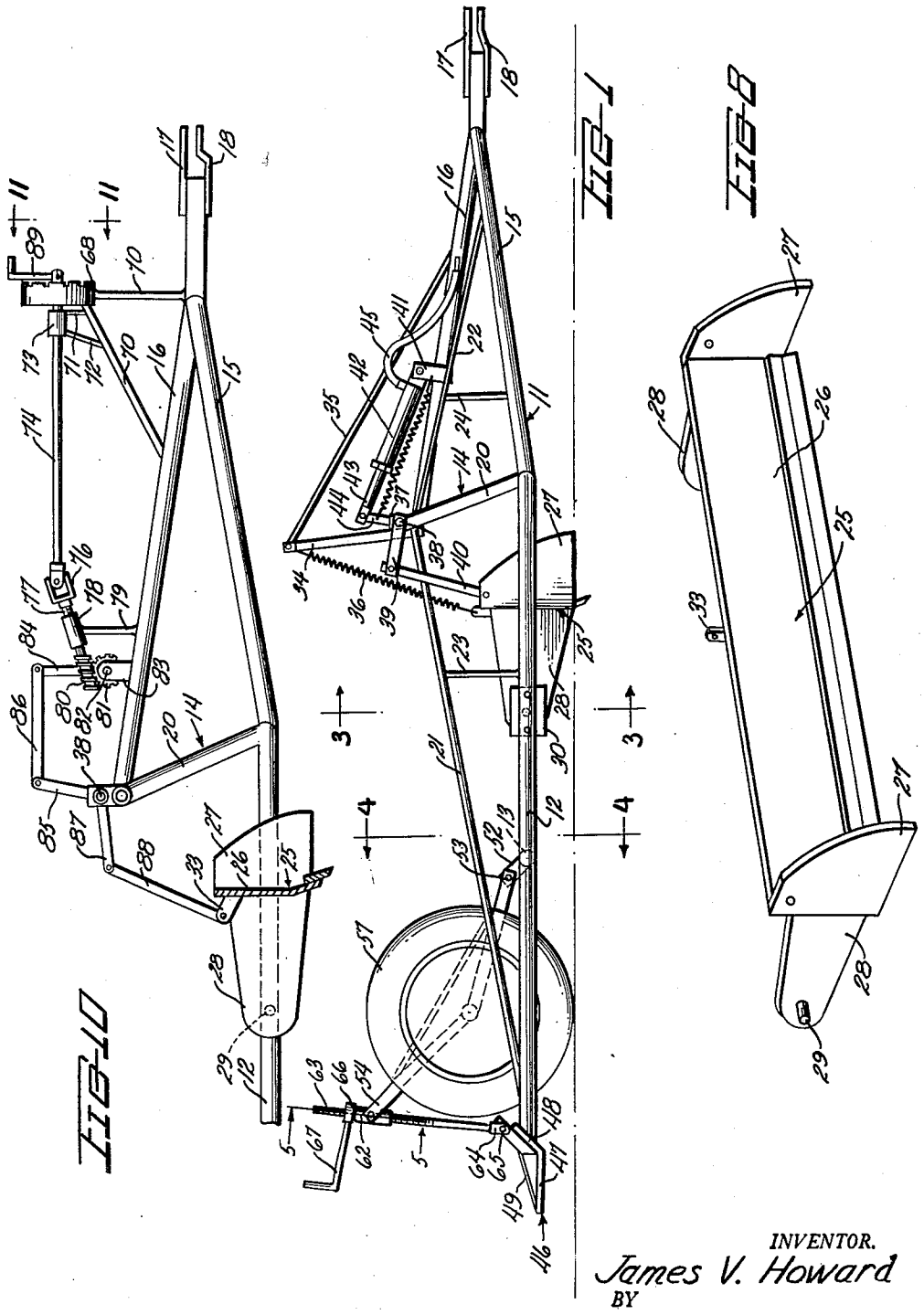


FIG. 1

FIG. 8

FIG. 10

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LAND LEVELER

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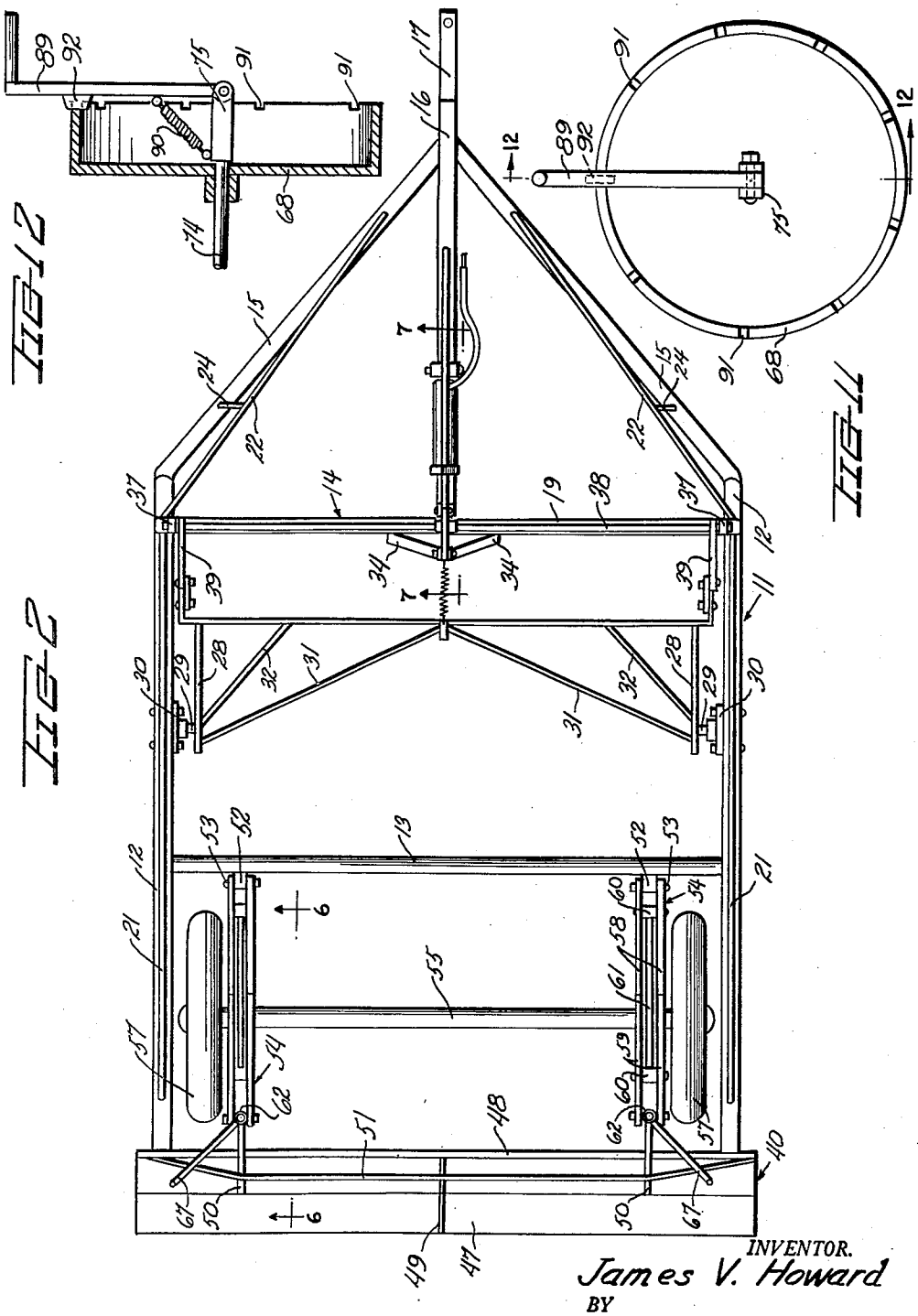


FIG-12

FIG-2

FIG-7

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Oct. 21, 1952 J. V. HOWARD 2,614,346

LAND LEVELER

Filed July 9, 1948 4 Sheets-Sheet 3

FIG-3

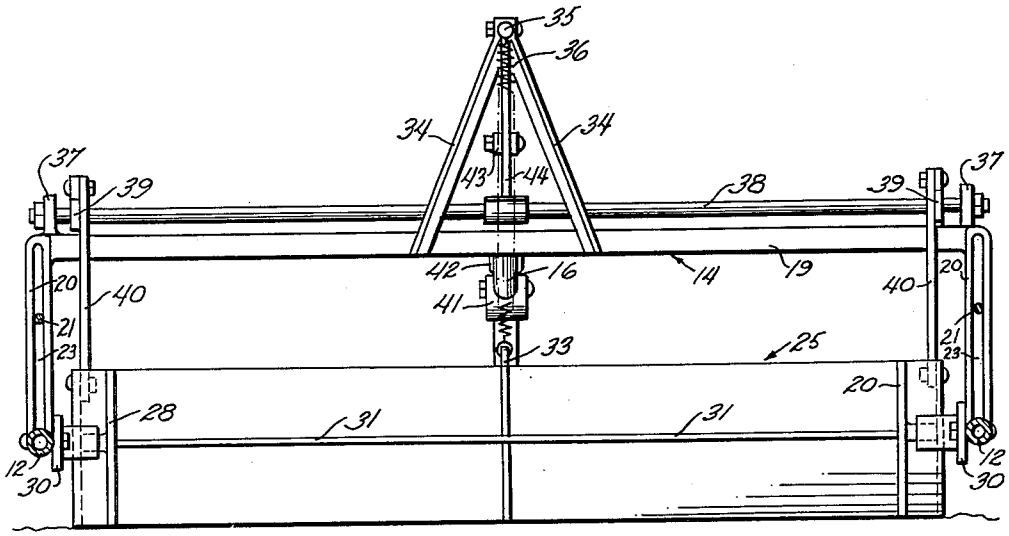


FIG-5

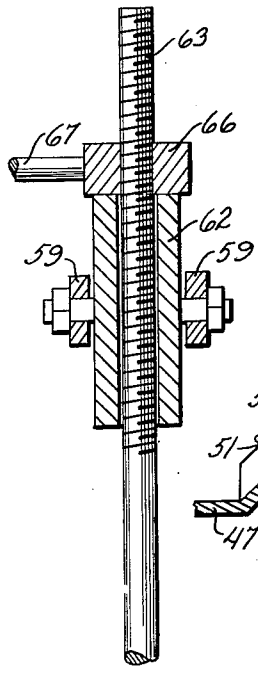
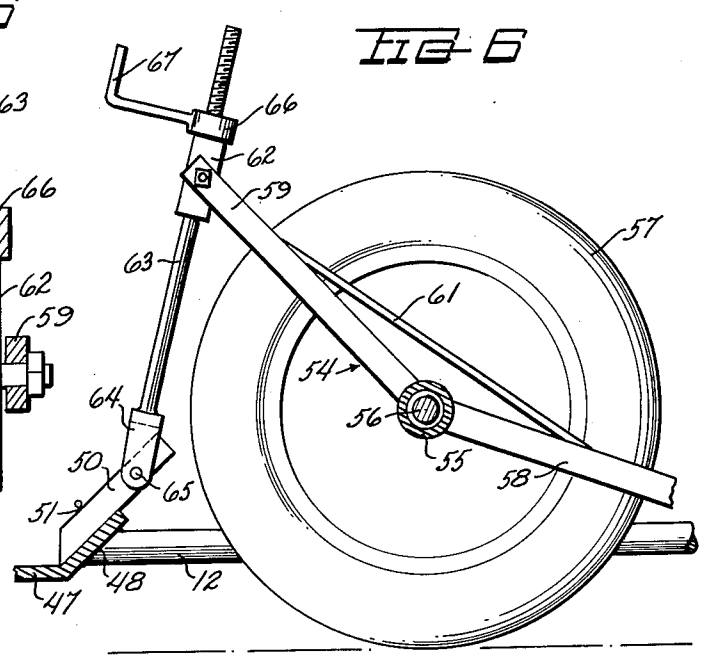


FIG-6



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Oct. 21, 1952 J. V. HOWARD 2,614,346

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FIG-4

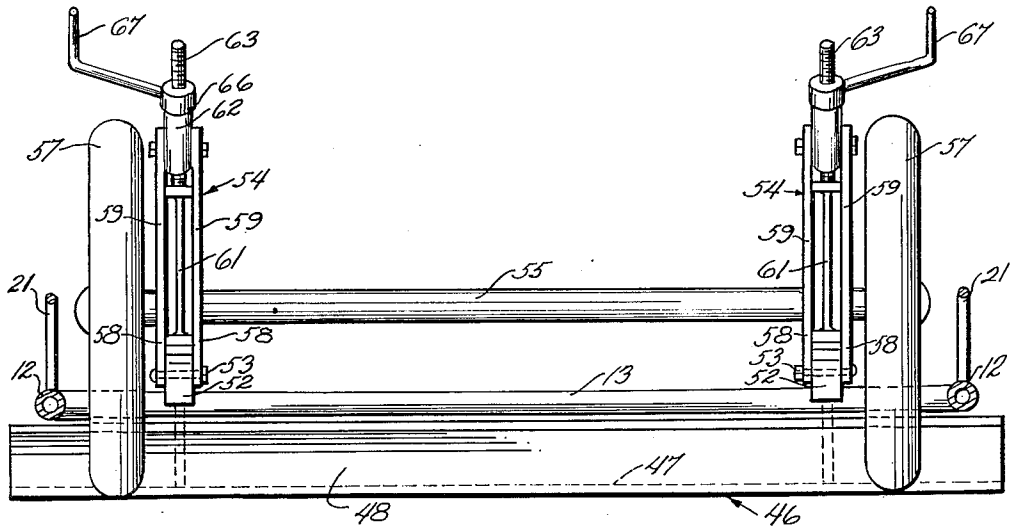
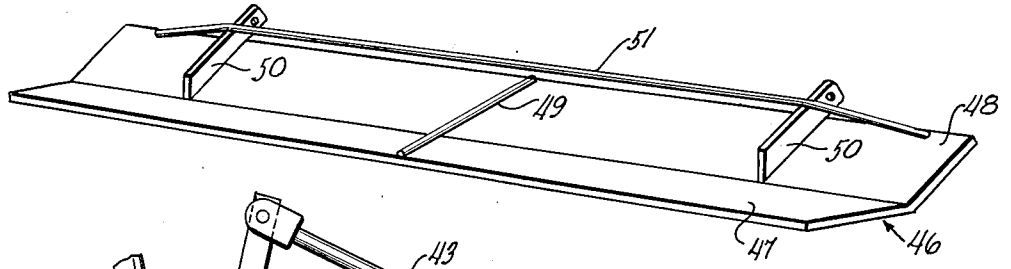


FIG-9



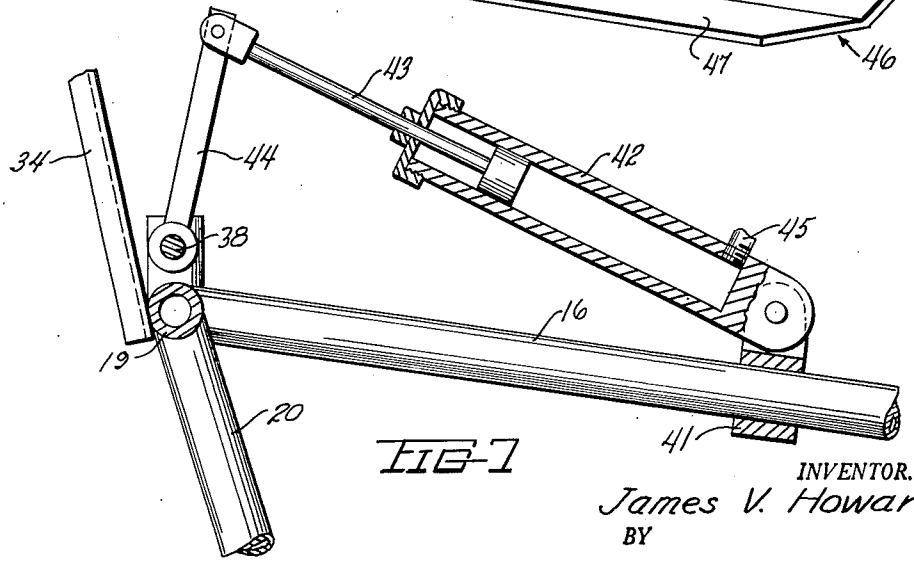


FIG-7

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UNITED STATES PATENT OFFICE

2,614,346

LAND LEVELER

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Application July 9, 1948, Serial No. 37,868

3 Claims. (Cl. 37—169)

1

This invention relates to earth grading implements and more particularly to a levelling machine of the tractor-drawn type.

A main object of the invention is to provide a novel and improved levelling machine of the type having a front scraping blade and a rear drag or float, said machine being simple in construction, easy to operate, and having means to provide variable pressure on the float to meet different soil conditions and to raise the float above ground level for transport of the machine.

A further object of the invention is to provide an improved levelling machine of the tractor-drawn type wherein a substantial portion of the weight of the machine is applied to the tractor drawbar, improving the traction of the tractor, reducing the amount of tractor power required to pull the machine, and providing an improved cutting and filling action, the machine having means for selectively controlling the manner in which the rear portion of the machine is supported on the ground, whereby the proper feathering action for any soil condition may be obtained.

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

Figure 1 is a side elevational view of a land levelling machine constructed in accordance with the present invention.

Figure 2 is a top plan view of the machine of Figure 1.

Figure 3 is a transverse cross-sectional view taken on line 3—3 of Figure 1.

Figure 4 is a transverse cross-sectional view taken on line 4—4 of Figure 1.

Figure 5 is an enlarged cross-sectional detail view taken on line 5—5 of Figure 1.

Figure 6 is an enlarged cross-sectional detail view taken on line 6—6 of Figure 2.

Figure 7 is an enlarged cross-sectional detail view taken longitudinally through the hydraulic operating cylinder for the scraper blade regulating mechanism of the machine of Figure 1, said view being taken on line 7—7 of Figure 2.

Figure 8 is an enlarged perspective detail view of the scraper blade employed in the machine of Figure 1.

Figure 9 is an enlarged perspective detail view of the float blade employed in the machine of Figure 1.

Figure 10 is a longitudinal cross-sectional view taken through the forward portion of a modified form of levelling machine in accordance with

2

the present invention, showing a manually operated elevating mechanism for the scraper blade rather than a hydraulic mechanism as shown in Figure 1.

Figure 11 is an enlarged detail view taken on line 11—11 of Figure 10 showing the crank locking drum and the scraper blade elevating crank.

Figure 12 is a cross-sectional view taken on line 12—12 of Figure 11.

Referring to the drawings, 11 designates the frame of the machine, said frame comprising parallel tubular side members 12, 12 rigidly connected together by spaced tubular cross members 13 and 14, the side members 12, 12 terminating at their forward ends in convergent portions 15, 15 which are rigidly connected to a hitch bar member 16. Secured to the forward end of hitch bar member 16 are the vertically spaced apertured hitch plates 17 and 18 adapted to receive the end of a tractor drawbar therebetween and to be hitched thereto by a conventional hitch pin.

As shown in Figure 3, the cross member 14 is of inverted U-shape and comprises a horizontal top arm 19 and depending side arms 20, 20 which are rigidly connected to the longitudinal side bars 12, 12. The hitch bar member 16 is rearwardly and upwardly inclined and is rigidly connected at its rear end to the midportion of the arm 19. The frame 11 also includes inclined tie rods 21, 21 connecting the top ends of arms 20, 20 to the rear end portions of side bars 12, 12 and inclined tie rods 22, 22 connecting the top ends of said arms 20, 20 to the forward end portions of the respective convergent extensions 15, 15. The tie rods 21 and 22 are further braced by rod elements 23 and 24 connecting them to the respective frame members 12 and 15.

Designated generally at 25 is a transverse scraper blade having a main vertical blade portion 26 and forwardly extending side wings 27, 27. Extending rearwardly from the end portions of scraper blade 25 are parallel arms 28, 28 provided at their end portions with laterally projecting pivot pins 29. Pivot pins 29 are rotatably received in bearing brackets 30, 30 secured inwardly of the frame side members 12, 12, whereby the scraper blade 25 is transversely positioned rearwardly adjacent cross member 14 in the intermediate portion of frame 11. The arms 28 are braced to the rear transverse wall surface of blade 25 by brace rods shown at 31, 31 and 32, 32.

Projecting upwardly from the mid-point of the top margin of blade portion 26 is an apertured lug 33. Secured to the horizontal arm 19 of cross member 14 are upwardly extending convergent

struts 34, 34 fastened together at their top ends and braced to bar member 16 by a tie rod 35 connecting the junction of struts 34, 34 to the forward portion of said bar member 16. A heavy coiled spring 36 connects the junction of the struts 34, 34 to the apertured lug 33 of the scraper blade 25, biasing said scraper blade upwardly.

Designated at 37, 37 are apertured lugs projecting upwardly from the respective ends of transverse arm 19 and pivoted in said lugs is a transverse shaft 38. Secured to said shaft inwardly adjacent the respective lugs 37, 37 are rearwardly extending arms 39, 39. The ends of arm 39, 39 are connected to the upper portions of the side wings 27, 27 of the scraper blade 25 by link bars 40, 40.

Secured to the intermediate portion of bar member 16 is a bracket 41 and pivoted to said bracket is a rearwardly extending hydraulic cylinder 42. The plunger rod of said cylinder, designated at 43, is pivotally connected to an upwardly extending arm 44 secured to the mid-portion of shaft 38. Extension of plunger rod 43 from cylinder 42 rotates the shaft 38 counterclockwise, as viewed in Figure 1, causing a downward force to be exerted on scraper blade 25 by means of arms 39, 39 and the link bars 40, 40, thereby depressing the scraper blade against the biasing force of the spring 36. Cylinder 42 is provided with a fluid admission conduit 45 which may be connected to the usual fluid pressure source carried by the conventional tractor. By means of the control valve of said fluid pressure source the operator may therefore regulate the raising and lowering of the scraper blade 25. Plunger rod 43 is biased inwardly of cylinder 42 by a spring connecting arm 44 to bracket 41.

Rigidly secured to the rear ends of the side frame bars 12, 12 is a float blade 46 known in detail in Figure 9. Blade 46 comprises a flat ground-engaging member 47 and an angled supporting member 48 rigid with member 47 and braced thereto by a tie rod 49 connecting the edges of the members 47 and 48 at their mid-portions. Secured to the angled member 48 are apertured cleat members 50, 50, said cleat members being further braced to member 48 by a tie rod 51 overlying and secured to the cleat members and being secured at its ends to the respective end portions of member 48.

Projecting upwardly and rearwardly from the cross member 13 and spaced inwardly short distances from the respective frame side bars 12, 12 are apertured arms 52, 52. Pivotally connected to said arms at 53, 53 are the forward ends of respective triangular frame assemblies 54, 54, said frame assemblies being rigidly connected together at their apex portions by a transverse axle bearing sleeve 55 in which is journaled an axle 56. Secured to the ends of said axle are the respective ground-engaging wheels 57, 57. Each frame assembly comprises parallel bar elements 58, 58 and 59, 59 secured on opposite sides of spacer blocks 60, 60, said blocks being connected by a tie bar 61. The axle sleeve 55 is rigidly joined to the inner ends of the bar elements 58 and 59. The outer ends of bar elements 58, 58 straddle the arms 52 and are pivotally secured thereto by the bolts 53. Pivotally secured between the outer ends of the bar elements 59, 59 at the rear ends of the frame assemblies 54, 54 are the respective sleeve members 62, 62. Extending slidably through the sleeve members 62, 62 are the respective threaded rods 63, 63. Each rod 63 carries a fork member 64 at its lower end, the fork members 64 straddling the respective cleat members 50, 50 and being pivotally secured thereto at 65. Threaded onto the upper portion of each rod 63 is a nut 66 formed with a crank handle 67 for rotating same. By rotating the crank handles 67, 67 clockwise, as viewed in Figure 2, the nuts 66, 66 may be advanced on the threaded rods 63, 63, moving the sleeves 62, 62 toward the float blade 46. This rotates the frame assemblies 54 downwardly with respect to the frame side bars 12, 12 and places the weight of the rear portion of the machine on the ground-engaging wheels 57, 57, whereby the float blade 46 may be elevated above the ground level, as where the machine is to be towed from one location to another.

The float blade 46 may be lowered by rotating the crank handles 67, 67 counter-clockwise, as viewed in Figure 2, to a position where any desired proportion of the weight of the rear portion of the machine is imposed on said float blade, as required by the condition of the soil to be levelled. By sufficiently elevating the nuts 66, 66 on the rods 63, 63, the sleeves 62, 62 may be allowed to move upwardly on said rods until the entire weight of the rear portion of the machine is imposed on the float blade 46 and no load whatsoever is carried by the wheels 57, 57.

Figures 10, 11 and 12 disclose a modified form of control mechanism for the main scraper blade 25 wherein the elevation and depression of the scraper blade is performed manually instead of by means of a hydraulic cylinder. Designated at 68 is a vertical, transversely oriented drum member secured to bar member 16 by an upstanding supporting bar 10 and an inclined brace bar 70. Rigidly secured to bar 70 by rod elements 71, 72 is a bearing sleeve 43 axially aligned with drum member 68. Journaled in drum member 68 and in sleeve 73 is a shaft 74, said shaft having a shouldered portion 75 abutting the inside surface of the main wall of drum member 68. Connected to the rear end of shaft 74 by a universal joint 76 is a worm shaft 77 journaled in a bearing sleeve 78 carried on an upstanding arm 79 secured to bar member 16. The worm, designated at 80, meshes with a worm gear 81 carried on a transverse shaft 82 rotatably mounted in brackets 83 projecting upwardly from member 16; and secured to shaft 82 is an arm 84. The transverse shaft 38 carries an upstanding arm 85 at its mid-portion which is connected to arm 84 by a link bar 86. Said shaft also carries a rearwardly extending arm 87 at its mid-portion which is connected to lug 33 of the scraper blade by a link bar 88.

Pivotally secured to the shoulder element 75 of shaft 74 is a crank handle 89 which is biased toward the rim of drum 68 by a spring 90 connecting said crank handle to the inner portion of the shoulder element 75. Said rim is formed with spaced notches 91 and the crank handle 89 is formed at its rearwardly facing surface with a lug 92 lockingly engageable in the notches 91. Spring 90 normally holds the crank handle 89 locked with respect to the rim of drum 68, the lug 92 being engaged in one of the notches 91. The handle 89 may be released by pulling forwardly thereon against the tension of spring 90. By rotating said handle while maintaining sufficient tension thereon to prevent locking thereof the worm 80 may be rotated to thereby rotate gear 81 and shaft 82. Rotation of shaft 82 is transmitted to shaft 38 by arm 84, link bar 86 and arm 85. The scraper blade 25 is thus moved upwardly or downwardly by arm 87 and link bar 88 responsive

to rotation of shaft 38, the direction of movement of the scraper blade depending upon the direction of rotation of crank handle 89. The blade may be locked in adjusted position by allowing the lug 92 of the handle 89 to engage in one of the drum rim notches 91.

While specific embodiments of a levelling machine of the tractor-drawn type has been disclosed in the foregoing description, it will be understood that various modifications within the spirit of the invention may occur to those skilled in the art. Therefore, it is intended that no limitations be placed on the invention except as defined by the scope of the appended claims.

What is claimed is:

1. A land levelling machine of the character described comprising a frame, a transverse depending scraper blade having rearwardly extending side arm portions, means pivotally connecting said side arm portions to the sides of the frame at the intermediate portion of said frame, spring means connecting the scraper blade to the frame and biasing the blade upwardly, fluid pressure means on the frame comprising a cylinder pivoted to the forward portion of the frame having a rearwardly extending plunger, linkage means connecting said plunger to the scraper blade, said linkage means being formed and arranged to depress the scraper blade responsive to extension of the plunger, a transverse float blade secured to the rear end of the frame, a pair of longitudinal arms pivoted at their forward ends to the frame forwardly of the float blade on a common transverse axis, a transverse bearing sleeve connecting the intermediate portions of said arms, an axle journaled in said sleeve, ground-engaging wheels carried at the ends of said axle, sleeve members pivotally secured to the rear ends of the respective arms, threaded rods passing slidably through the respective sleeve members and pivotally secured at their lower ends to the float blade, and nut members threaded on said rods above the sleeve members and engageable therewith, whereby the wheels may be raised or lowered with respect to the float blade.

2. A land levelling machine comprising a horizontally disposed main frame having one end adapted to be connected to a tractor, an axle positioned transversely of said frame adjacent to and spaced inwardly of the other end thereof, a pair of wheels carried by said axle, a scraper positioned transversely of said frame intermediate the ends thereof and facing said one end of said main frame and mounted on said main frame for movement into and out of engagement with a ground surface, a pair of frame assemblies positioned on said axle intermediate said wheels and each supported on said axle intermediate its ends, the lower end of each of said assemblies being pivotally connected to said main frame, an upstanding rod positioned adjacent each of said frame assemblies and having the lower end pivotally connected to said main frame adjacent the other end thereof, a sleeve slidably supported on each of said rods inwardly of the other end thereof, means connecting the other end of each of said frame assemblies to the sleeve adjacent thereto for rocking movement about an axis transverse of said sleeve, hand actuable means rotatably supported on each of said rods inwardly of the other end thereof and engageable with the sleeve adjacent thereto for effecting raising and lowering movement of said sleeves and to thereby raise and lower the other end of said main frame with respect to the ground surface, and manually actuable means operatively connected to said scraper for effecting the movement of the latter into engagement with the ground surface.

3. A land levelling machine comprising a horizontally disposed main frame having one end adapted to be connected to a tractor, an axle positioned transversely of said frame adjacent to and spaced inwardly of the other end thereof, a pair of wheels carried by said axle, a scraper positioned transversely of said frame intermediate the ends thereof and facing said one end of said main frame and mounted on said main frame for movement into and out of engagement with a ground surface, a pair of frame assemblies positioned on said axle intermediate said wheels and each supported on said axle intermediate its ends, the lower end of each of said assemblies being pivotally connected to said main frame, an upstanding rod positioned adjacent each of said frame assemblies and having the lower end pivotally secured to said main frame adjacent the other end thereof, a sleeve slidably supported on each of said rods inwardly of the other end thereof, means connecting the other end of each of said frame assemblies to the sleeve adjacent thereto for rocking movement about an axis transverse of said sleeve, hand actuable means rotatably supported on each of said rods inwardly of the other end thereof and engageable with the sleeve adjacent thereto for effecting raising and lowering movement of said sleeves and to thereby raise and lower the other end of said main frame with respect to the ground surface, manually actuable means operatively connected to said scraper for effecting the movement of the latter into engagement with the ground surface, and a float blade extending transversely of said main frame along and facing away from the other end thereof and fixedly secured to said main frame.

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