Feb. 14, 1933. H. RICKS, JR 1,897,498

LEVELING DEVICE

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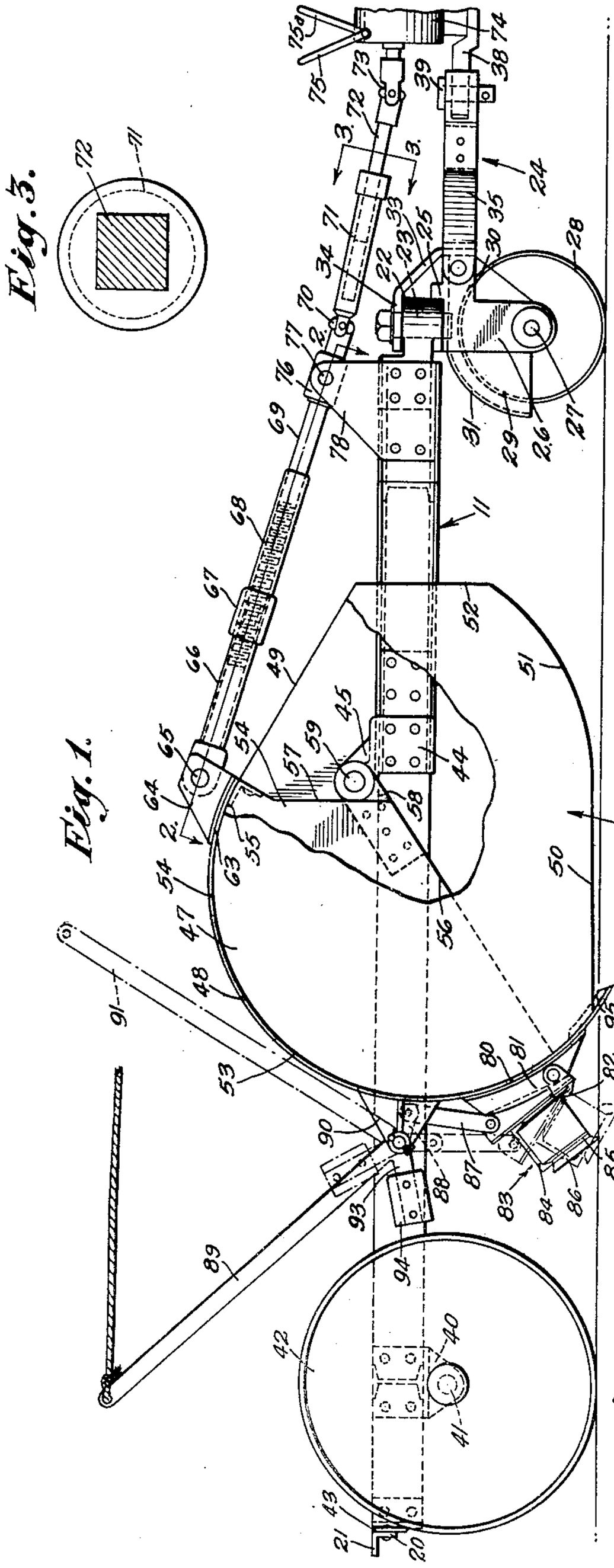

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Fig. 5.

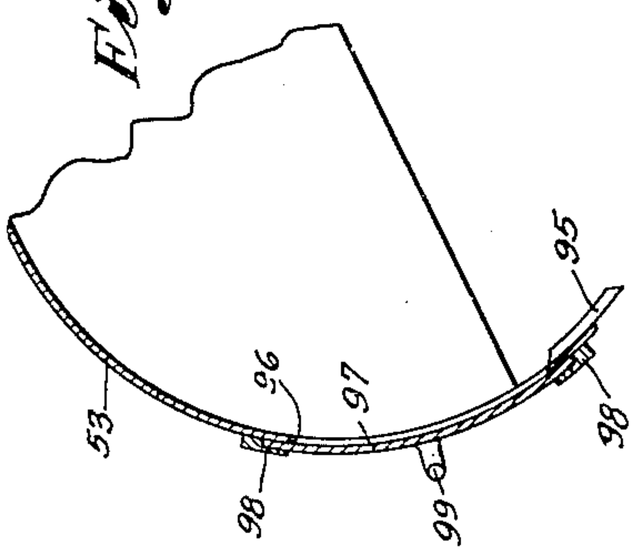

Fig. 4.

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UNITED STATES PATENT OFFICE

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LEVELING DEVICE

Application filed January 28, 1931. Serial No. 511,747.

My invention relates to earth leveling devices, and particularly to a leveling device having a novel mechanism for controlling the position of the scraping element.

In the leveling of earth with an inclined surface, or in the grading of earth to an inclined surface, as in the formation of a crowned road bed, it is often necessary to change the inclination of the ground being worked upon, and this may be best accomplished by causing one portion of the leveling blade to take a deeper cut than other portions.

It is an object of my invention to provide a leveling device in which either end of the scraping element may be moved relative to the surface of the ground and independently of the other end of the cutting element.

It is a further object of my invention to provide a leveling device in which such a change in the position of the scraping element may be effected from the seat of a tractive vehicle drawing the leveler.

To accomplish the foregoing purposes I provide as a part of my invention a frame supported upon wheels and having pivoted thereto a bowl with a scraping element. To produce a change in the elevation of one end of the scraping element independently of the other of its ends, I provide plows adapted to cut furrows in front of the wheels supporting the frame so that a furrow being cut in front of one wheel, that side of the frame and that side of the bowl and its associated scraping element will be lowered relative to the surface of the ground and independently of the other side of my leveling device. It is desirable that these plows be adapted to be moved into or out of their cutting positions with slight manual effort.

It is an object of my invention to provide a leveling device which includes plows adapted to dig a furrow in front of either wheel supporting the bowl and scraping element, these plows being adapted to be moved into or out of their digging positions by the application of slight manual force.

In addition to the capability for the movement of either end of the scraping element independently of the other of its ends, it is desirable that a leveling device should include means for changing the position of the scraping element in its entirety relative to the surface of the ground.

It is a corresponding object of my invention to provide a leveling device which includes means for changing the position of the scraping element as a whole with relation to the surface of the ground.

Inasmuch as this change in the position of the scraping element of a leveler as described requires considerable force, it is a purpose of my invention to provide a leveling device in which the position of the scraping element relative to the surface of the ground may be changed by a power take-off associated with the tractive vehicle and operable therefrom.

It is sometimes desirable to permit the earth cut by the scraping edge to be discharged continuously adjacent the surface being leveled, and it is sometimes desirable to convey this earth so removed some distance from the leveled surface.

It is a purpose of my invention to provide a scraping device of the class described which is adapted either to discharge the earth removed adjacent the surface leveled or to collect and convey it to some distance from the surface leveled.

Further objects and advantages will be made evident in the following description which may be better understood with reference to the accompanying drawings in which:

Fig. 1 is a side elevational view of the leveler of my invention.

Fig. 2 is a fragmentary view taken as indicated by the line 2—2 of Fig. 1.

Fig. 3 is a fragmentary view taken as indicated by the line 3—3 of Fig. 1.

Fig. 4 is a plan view of the leveler of my invention.

Fig. 5 is a fragmentary view taken as indicated by the line 5—5 of Fig. 4.

Referring to the drawings in detail, the numeral 11 of Fig. 1 indicates a main frame or draft frame. This draft frame 11 includes a central bar 12 to which are connected diverging side bars 13. Connected to the rearward ends of the diverging side bars 13 and to the rearward end of the central

bar 12, is a cross bar 14. Extending rearwardly from the juncture of the cross bar 14 and the diverging bars 13 are side bars 15 which are connected near their rearward ends by a rearward cross bar 16. Bracing means for the cross bars 14 and 16, respectively, may be provided in the form of a plate 17 secured to the forward ends of the side bars 15, the diverging side bars 13 and to the cross bar 14, and bracing bars 18 secured to the side bars 15 and rearward cross bar 16. The rearward ends of the side bars 15 are connected by an end bar 19 to which there is secured a channel 20 having end portions 21 extending beyond the side bars 15.

Secured to the forward end of the central bar 12 is an eye 22 adapted to receive a king pin 23 carried by a draft member 24. The draft member 24 includes a horizontal bar 25 in the center of which the king pin 23 is mounted. The ends of the horizontal bar 25 are bent downwardly to form forks 26, at the lower ends of which inwardly extending trunnions 27 are provided. The trunnions 27 are adapted to be received centrally in a cylindrical wheel 28 which supports the forward end of the draft frame 11. The draft member 24 also includes segmentary side plates 29, the outer periphery of which is curved with substantially the same degree of curvature as the periphery of the wheel 28. The side plates 29 are attached to the forks 26 and to forwardly extending projections 30 formed on each of the forks 26 adjacent the horizontal bar 25. Connecting the side plates 29 at their peripheries is a cover plate 31 which extends from the rearward side of the forks 26 to the lower rearward extremity of the side plates 29, which is substantially upon the horizontal plane passing through the axis of the wheel 28.

The projections 30 at their outer ends are bent inwardly to form a front horizontal cross bar 32, to the center of which there is attached an upwardly inclined connecting member 33. The upper end 34 of the connecting member 33 is horizontal and, as best shown in Fig. 1, is provided with an opening adapted to coincide with the eye 22 in the forward end of the draft frame 11. Secured to the sides of the projections 30 are converging bars 35, the forward ends of which are attached to an eye plate 36 having an eye 37. The eye plate 36 is adapted to be connected to a draw bar 38 of a tractive vehicle, not shown, as by a pin 39 passing through the eye 37 and the draw bar 38.

Secured to the ends of the rearward cross bar 16 are downwardly extending triangular plates 40, to which are secured outwardly extending trunnions 41. Adapted to be mounted upon each of the trunnions 41 is a cylindrical wheel 42, which wheels support the rearward end of the draft frame 11. The end portions 21 of the channel 20 extend outwardly to the outer sides of the wheels 42. Attached to each of the end portions 21, on its forward side, is a plate 43 in close proximity to the surface of the wheel 42 and adapted to scrape therefrom earth which is collected upon the wheel.

Attached to each of the side bars 15 of the draft frame 11 near the rearward end of the plate 17 is a plate 44 having a portion 45 extending upwardly and rearwardly, and adapted to pivotally support a scoop 46.

The scoop 46 includes a pair of end plates 47, the outline of which includes a substantially arcuate portion 48, a straight portion 49 inclining forwardly and downwardly from the upper terminus of the arcuated portion, a straight portion 50 extending forwardly from the lower and rearward terminus of the arcuated portion 48, and a curved portion 51 extending forwardly and upwardly from the forward end of the straight portion 50 to the lower end of a vertical straight portion 52, the upper end of which joins the lower end of the inclined straight portion 49. Connecting the two end plates 47 over the circular portion 48 is a back member or bowl 53.

Secured to the back member 53 between the end plates 47 and equidistant from the axis of the main frame 11, are intermediate plates 54. As best illustrated in Fig. 1, each of the intermediate plates 54 has a curved portion 55 extending substantially the full length of the curved portion 48 of the back member 53, and a straight side 56 inclining forwardly from the lower terminus of the curved portion to a vertical straight side 57 which connects to the upper terminus of the curved portion 55. Secured to each of the intermediate plates 54 at the intersection of the straight sides 56 and 57, is an arm 58 which inclines forwardly. The arm 58 is adapted to be pivoted to the portion 45 of the plate 44 as by a pin 59 so that the scoop 46 is adapted to be swung upon the pivots 59 relative to the frame 11.

As best illustrated in Fig. 4, the scoop 46 extends to each side beyond the side bars 15 and the wheels 42, and is provided with bracing members 60 connecting the forward portion of the end plates 47 to a horizontal bracing bar 61, which is connected to the upper end of the circular portion of the back member 53. The back member 53 is provided with openings 62 so that the side bars 15 may pass through the scoop 46. These openings 62 are elongated sufficiently to permit the scoop 46 to freely swing relative to the frame 11 from inoperative to operative position.

Secured to the outside of the back 53 near its upper terminus are two plates 63 having upwardly extending portions 64 which are connected by a pin 65. Swingably mounted upon the pin 65 is one end of a hollow rod 66, the other end of which is threadedly secured

in a sleeve 67. Threaded through the other end of the sleeve 67 is one end of a second hollow rod 68 into which the threaded end of a connecting rod 69 extends. The other end of the connecting rod 69 is connected by a universal joint 70 to a bar 71, the other end of which has a square opening adapted to receive one end of a rod 72, square in cross-section, which is connected through a universal joint 73 to a power take-off 74 operated by the tractive vehicle, not shown. The power take-off 74 is provided with levers 75 and 75*a*, operable from the seat of a tractive vehicle to impart forward or reverse motion through the universal joint 73 to the rod 72 and its associated mechanism.

As best shown in Fig. 2, the connecting rod 69 is supported in a journal box 76 which is provided with trunnions 77. The trunnions 77 are secured in the upper ends of two plates 78, the lower ends of which are secured on either side of the central bar 12.

The sleeve 67 is provided with internal threads 79 adapted to engage the threaded end of the connecting rod 69.

Secured to the back member 53 near the lower terminus thereof and in front of each of the wheels 42, is a pair of plates 80 having outwardly extending flanges 81. Pivoted at its forward end between each pair of flanges 81 is a top plate 82 of a plow 83. As best illustrated in Fig. 1, each of the plows 83 includes a back plate 84 secured to the top plate 82, a bottom plate 85, and a cutting edge 86 attached to the bottom plate 85. The upper end of the top plate 82 of each of the plows 83 is pivoted to the lower end of a link 87, the upper end of which is pivoted to an arm 88 of a lever 89. Each of the levers 89 is swingably pivoted between a pair of plates 90 extending outwardly from the back member 53 of the scoop 46 substantially on the axis of the draft frame 11. The arm 88 makes such an angle with the lever 89 that when the lever 89 is swung forwardly to the position in which it is indicated by the dotted lines 91 of Fig. 1, the plow 83 is lowered to its cutting position, as indicated by the dotted lines 92 of the same figure, and the pivot between the link 87 and the arm 88 is substantially in the line passing through the pivot between the link 87 and the top plate 82 and the pivot between the lever 89 and the plates 90 so that a slight forward pull upon the lever 89 tends to retain the plow 83, the link 87, and the lever 89 in the positions in which they are indicated by the dotted lines of Fig. 1.

A counterbalance arm 93 is provided on each of the levers 89 adjacent its connection to the plates 90, and carries a weight 94 adapted to counterbalance the weight of the plow 83 to render the manual movement of the lever 89 less difficult. The cutting edge 86 of each of the plows 83 is so formed as to cut a furrow equal to the width of each of the wheels 42 and to move the earth thus cut to one side of this furrow so that when either of the plows 83 is in cutting position the corresponding one of the wheels 42 will roll in the furrow thus cut.

Having described the construction of the leveler of my invention, I will now describe its operation.

The leveler of my invention being assembled as it is illustrated in Fig. 1, it is connected to the draw bar 38 of a tractive vehicle by the pin 39. The rod 72 is connected through the universal joint 73 to the power take-off 74. The plows 83 being in inoperative position as illustrated in Fig. 1, as the leveler is being drawn forward by the tractive vehicle, a cutting edge 95 attached to the bottom of the back plate or bowl 53 throughout its length is carried adjacent the surface of the ground. The operating lever 75 may be operated so that the rod 72 is rotated in a forward direction, thus rotating the connecting rod 69. The rearward end of the rod 69 being threaded into the sleeve 67, this rotation of the connecting rod 69 through the second hollow rod 68 operates to cause the rearward end of the connecting rod 69 to advance towards the rear of the rod 66 and inside the rod 66 so that the distance from the pin 65 to the power take-off 74 is diminished and the scoop 46 is rotated about the pivots 59 in a clockwise direction, thus elevating the cutting edge 95 above the surface of the ground. This rotation of the rod 72 may be continued until the curved portions 51 of the end plates 47 are adjacent the ground, at which time no part of the scoop 46 engages the surface of the ground.

If it is desired to move the leveler into operative position, the operating lever 75*a* is moved so that the power take-off 74 causes the rod 72 to rotate in the opposite direction. This rotation of the rod 72 causes the connecting rod 69 to rotate in a reverse direction in the second hollow rod 68 and in the sleeve 67 so that the connecting rod 69 moves forwardly relative to the sleeve 67, and the distance between the pin 65 and the power take-off 74 is increased. This rotation of the rod 72 may be continued with its consequent rotation of the scoop 46 about the pivots 59 in a counter-clockwise direction until the cutting edge 95 is rotated sufficiently below the surface of the earth to give the desired leveling effect. When the cutting edge 95 is in this position the power take-off 74 is disconnected from driving engagement with the rod 72 and the scoop 46 retains this position with the scraping edge 95 cutting a ribbon of earth from the surface of the ground.

Provided in the back member or bowl 53 adjacent its lower edge is a central opening 96 which is adapted to be closed by a door 97 arcuated with the same degree of curva-

ture as the bowl 53. As best illustrated in Fig. 5, two flanges 98 are attached to the outer surface of the bowl 53 adjacent the opening 96, and the door 97 is adapted to be slidably retained between these flanges 98 and the bowl 53. A handle 99 is provided on the outer surface of the door 97 to facilitate its lateral movement to open or close the opening 96.

If it is desired to retain the earth thus removed by the cutting edge 95 in the scoop 46, the door 97 is so positioned that it closes the opening 96. Should it be desired to discharge the earth cut by the cutting edge 95 during the cutting operation, the door 97 is moved laterally to open the opening 96 to the desired extent, thus permitting the earth cut by the cutting edge 95 to be discharged therethrough.

It should be apparent that the power take-off 74 may be so operated that the connecting rod 69 may be caused to occupy any desired position relative to the sleeve 67 so that the cutting edge 95 will make any desired cut. It should also be apparent that when the cutting edge 95 has been moved into the desired position it will be retained in this position, inasmuch as the connecting rod 69 is fixedly mounted in the sleeve 76, and thus the distance between the trunnions 77 and the pin 65 is affected by neither tension nor compression. The sliding contact between the rod 72 and the bar 71 gives the flexibility necessary to allow for any unevenness in the surface of the ground over which the tractive vehicle and the leveler of my invention must pass. The universal joints 70 and 73 give the flexibility necessary to permit the slope of the connecting rod 69, the hollow rod 66, and the second hollow rod 68 to be changed for the various positions of the scoop 46 and to permit the tractive vehicle to turn relative to the leveler of my invention while maintaining the desired power control over the position of the scoop. The location of the universal joint 70 over the king pin 23 operates to permit continued power control of the scoop 46 when the draft member 24 turns relative to the draft frame 11, and the universal joint 73, positioned over the pin 39, operates to permit the continuance of the power control over the scoop when the tractive vehicle turns relative to the draft member 24.

Should it be desired, one end of the cutting edge 95 may be lowered to cut deeper into the earth than the other of its ends. This is accomplished by pulling forwardly upon one of the levers 89. The forward movement of the lever 89 operates to rotate the arm 88 downwardly, thus permitting the lower end of the associated link 87 to move downward and lower the plow 83 until its cutting edge 86 is in engagement with the ground. It should be apparent that by moving the lever 89 forwardly to the desired extent, the cutting edge 86 of the corresponding plow 83 may be lowered to any extent desired relative to the surface of the ground between that position in which there is no cutting engagement between the plow 83 and the ground, and that position in which the plow 83 is illustrated by dotted lines 92 of Fig. 1. When the plow 83 is in this latter position, the pivot point between the upper end of the link 87 and the arm 88 has passed almost into the line through the pivot of the lever 89 to the plates 90, and the pivot of the lower end of the link 87 to the top plate 82 of the plow 83. This operates to permit the retention of the plow 83 in its extreme cutting position by the exertion of but a slight pull on the lever 89.

The plow 83, being in digging position, cuts a ribbon of earth from the surface of the ground and discharges it to one side of the plow 83 so that there is left a furrow of sufficient width to receive the corresponding one of the wheels 42. As the wheel 42 reaches and rolls in the furrow so cut, that side of the draft frame 11 is lowered so that the corresponding end of the cutting edge 95 is likewise lowered, so that a bevel cut is made.

As the wheel 42 rolls in the furrow cut by the plow 83 and lowers the corresponding side of the draft frame 11, the plow 83 is likewise lowered, cutting a deeper furrow in which the wheel 42 rolls. It should thus be evident that when the plow 83 cuts a furrow there is a tendency for this furrow to become of steadily increasing depth. When, therefore, the furrow is of such depth that the corresponding end of the cutting edge 95 is at the desired greater depth below the surface of the ground than the other end of the cutting edge 95, the lever 89 is permitted to move backward so that the cutting edge 95 retains this slanting position and the scoop operates to continue to cut upon this inclined plane.

The leveler of my invention may therefore be operated to cut an inclined surface, the difference in the elevations of the two sides of this surface not being limited directly to the depth of furrow which the plow 83 is capable of cutting. This surface may be inclined in either direction by operating one or the other of the levers 91 from the tractive vehicle.

If it is desired to cause the cutting edge 95 to cut a ribbon of earth from the surface of the ground, leaving the surface in a horizontal plane without operating the power take-off 74, this may be accomplished by pulling both the levers 89 forward simultaneously so that two furrows are cut by the plows 83 and both of the wheels 42 roll in these furrows. The rearward end of the draft frame 11 is then lowered, causing the cutting

edge 95 to be likewise lowered uniformly throughout its length to accomplish this desired result.

It should be apparent that by providing a leveler with the means of control disclosed herein I have provided one in which the scraping element may be of considerable length so that a great area may be subjected to the leveling action. I have also provided a leveler in which either end of the cutting element may be lowered relative to the other in order that the surface of the ground may be leveled to any inclination desired, this change in elevation being accomplished from the seat of the tractive vehicle.

Inasmuch as the elevation of the scraping element as a whole relative to the surface of the ground may be changed by the operation of the power take-off 74 or the simultaneous operation of the levers 89, it is apparent that I have provided a leveling device which includes means for changing the position of the scraping element as a whole with relation to the surface of the ground.

By providing a closable opening 96 in the bowl 53, I have provided a leveling device of the class described which is adapted either to discharge the earth removed adjacent the surface leveled or to collect and convey it to some distance from the surface leveled.

Moreover, by providing the counterbalance 94 and the linkage connecting the levers 89 to the plows 83 as described, I have provided a leveler the manual control of which requires but slight physical effort.

While that form of embodiment of my invention herein illustrated and described is fully capable of performing all of the objects primarily stated, there are other forms of embodiment which may be likewise adapted to perform these purposes, all coming within the scope of the claims which follow.

I claim as my invention:

1. In a leveler, the combination of: a frame adapted to be drawn by a tractive vehicle; wheels mounted upon and supporting said frame; a bowl pivotally attached to said frame, said bowl having slots through which said frame extends; power providing means operable by said tractive vehicle; and an extensible member attached to said bowl and said power providing means whereby said bowl may be rotated to operative or inoperative position.

2. In a leveler, the combination of: a frame adapted to be drawn by a tractive vehicle; wheels supporting said frame; a bowl pivoted upon said frame, said bowl having a closable opening whereby the earth cut by said bowl may be discharged; a power take-off means associated with and operable from said tractive vehicle; a universal joint attached to said power take-off means; and an extensible member attached to said bowl and to said universal joint and adapted to move said bowl to operative position by its extension or to inoperative position by its retraction.

3. In a leveler, the combination of: a frame adapted to be drawn by a tractive vehicle; wheels supporting said frame; a bowl pivoted upon said frame, said bowl having slots through which said frame extends and a closable opening whereby the earth cut by said bowl may be discharged; a power take-off means associated with and operable from said tractive vehicle; a universal joint attached to said power take-off means; and an extensible member attached to said bowl and to said universal joint and adapted to move said bowl to operative position by its extension or to inoperative position by its retraction.

4. In a leveler, the combination of: a rigid frame adapted to be drawn by a tractive vehicle; a bowl pivoted to said frame, said bowl having a closable opening through which the earth collected in said bowl may be discharged, and slots through which said frame extends; a cutting edge on said bowl; a pair of wheels connected to said frame in back of said bowl; a plow pivoted to said bowl in front of each of said wheels; two levers pivoted on said frame; links connecting said levers and said plows; and counterbalances so associated with said levers that the application of slight force to either of said levers moves the corresponding plow relative to the surface of the ground.

5. In a leveling device, the combination of: a frame adapted to be drawn by a tractive vehicle; a bowl pivotally attached to said frame, said bowl having openings through which said frame extends; power providing means operable by said tractive vehicle; and an extensible member attached to said bowl and said power providing means whereby said bowl may be rotated to operative or inoperative position.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 23rd day of January, 1931.

HYRUM RICKS, Jr.