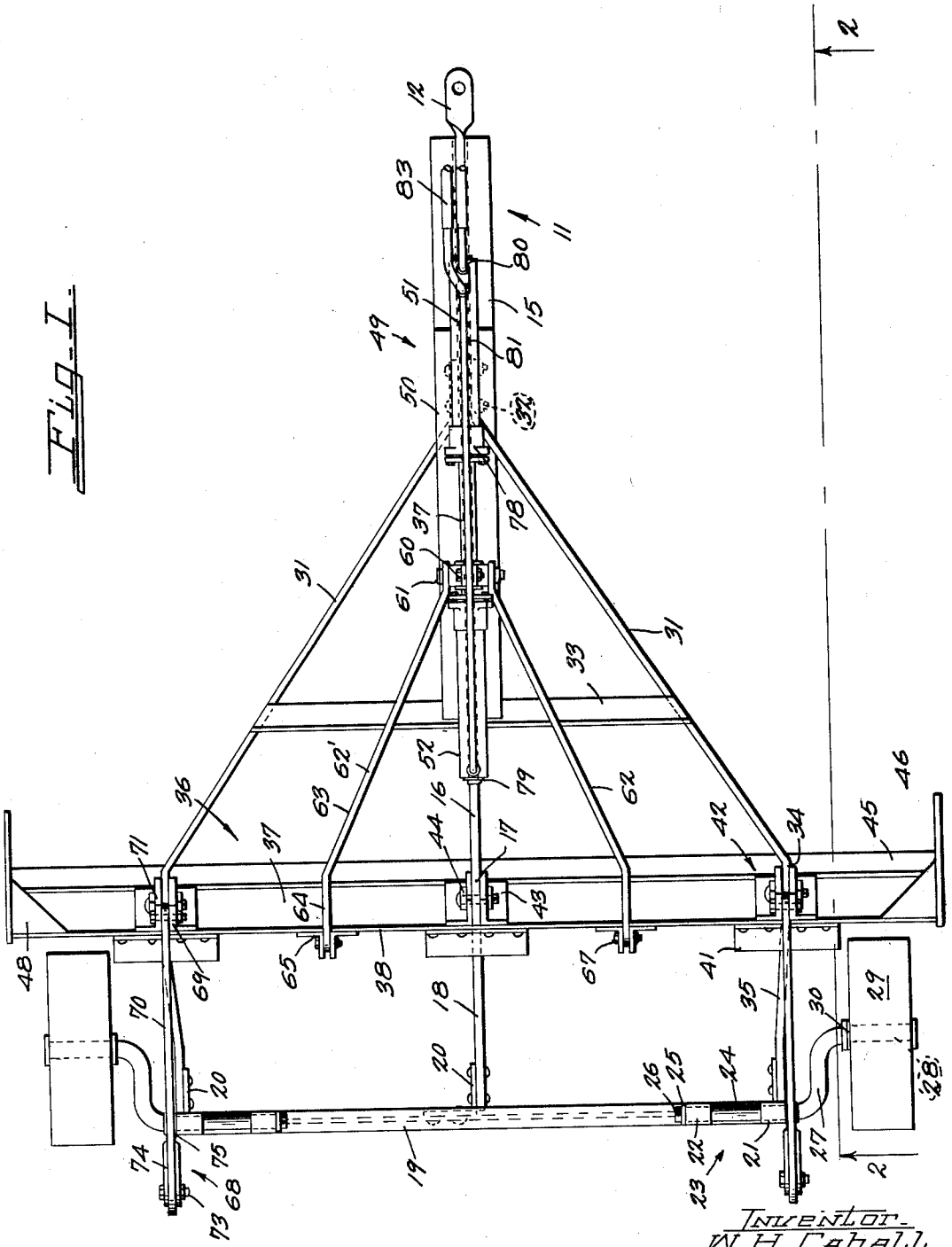
April 10, 1934. W. H. CAHALL 1,954,282

LAND LEVELER

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Fig. 1.



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LAND LEVELER

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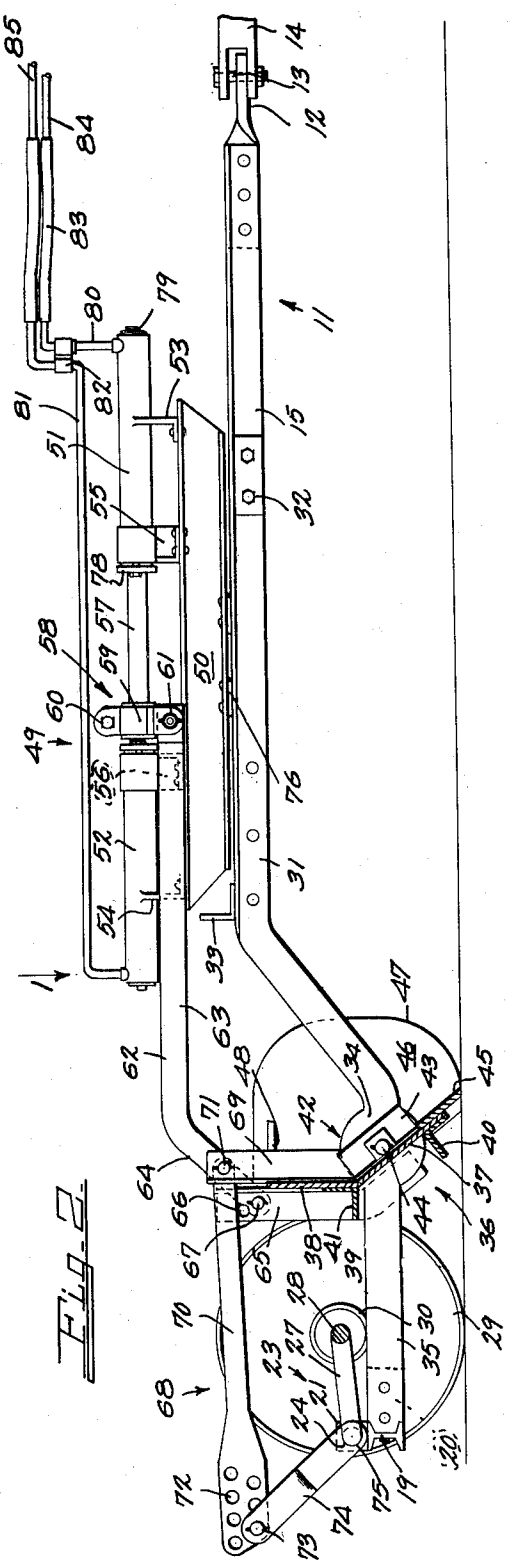


Fig. 2.

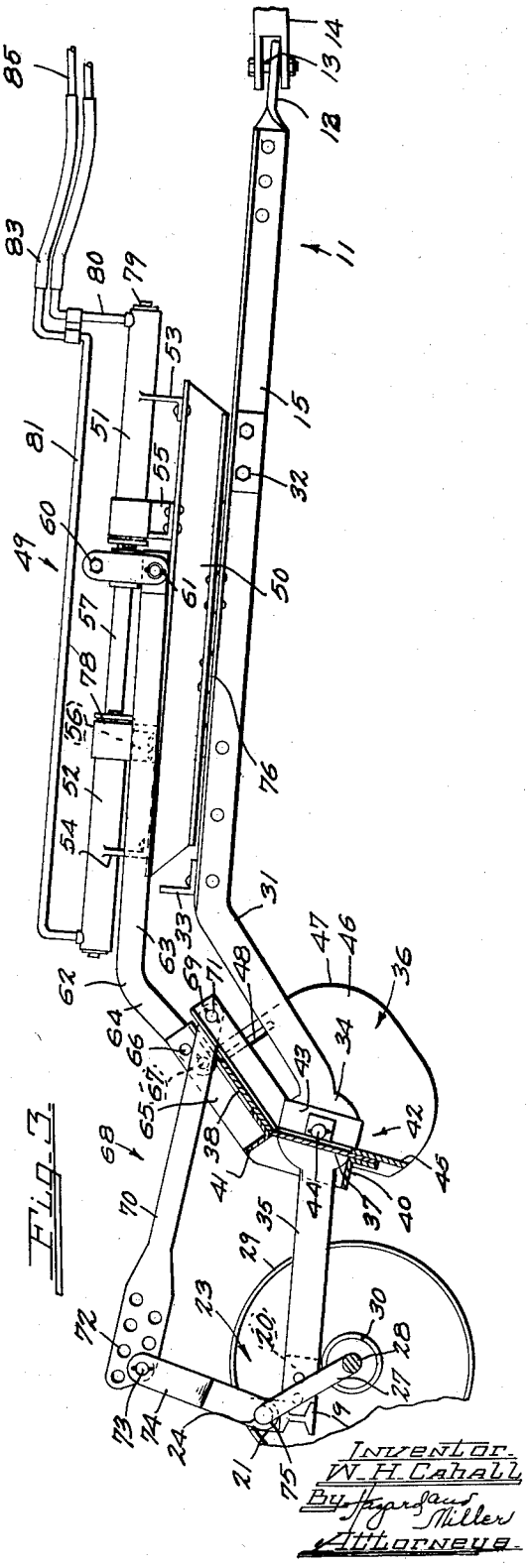


Fig. 3.

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UNITED STATES PATENT OFFICE

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LAND LEVELER

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Application August 11, 1932, Serial No. 628,356

22 Claims. (Cl. 37—169)

My invention is a power operated land leveler in which the ground is dug or excavated by a bowl which may be towed, the dirt being moved with the bowl in its digging position to the position for dumping, the bowl then being dumped under power control.

In a ground leveler of this type, one of the objects and features of my invention is locating the wheels rearwardly of the excavating, carrying, and dumping bowl and inwardly from the ends of this bowl. This allows excavating close to objects and is valuable especially in orchard work, as the wheels do not interfere with the trees and excavation can be made closer to the trees.

Another object of my invention relates to the draw bar construction which, at its forward end, may be connected to a tractor and, at its rearward end, to a movable axle, this axle having the wheels rotatably mounted thereon. Together with this I employ mechanism for raising and lowering the main part of the axle relative to the wheels for dumping of the scraper bowl.

Another feature of my invention in this regard is forming the axle of the wheels with a crank at each end, the wheels being rotatable on the ends of the crank, and the center portion of the axle may be raised or lowered to bring the bowl into excavating and digging position or dumping position.

Another feature of my invention relates to the manner of pivotally mounting the excavating bowl or shovel on the draw bars, such draw bars having a central bar and two lateral branches. The bowl is made with an excavating blade which may be renewable, a sloping plate forming gradually a continuation of the blade and what I term a vertical back, which builds up the load and prevents this from flowing over the back of the bowl. With this bowl, side or end plates are used to confine the dirt in front of the excavating bowl. The movement of the bowl or shovel is controlled by a pulling or actuating beam which is connected to a crosshead on a hydraulic ram, this ram preferably having two cylinders in alignment, with a piston rod operating between the cylinders, each cylinder having its own piston. The crosshead may be reciprocated and thereby reciprocate the actuating beam in a front to rear direction, and this beam, having a pivotal connection to the bowl, may tilt the bowl from a digging or excavating position to a dumping position.

Another detailed feature of my invention relates to mounting the hydraulic ram on the draw bar. The excavating bowl is raised or lowered through the medium of a link pivotally connected to the upper portion of the bowl, this link having an arm pivotally connected thereto at its rear end, which arm is mounted on the axle so that it raises the center part of the axle up and down during the excavating and dumping procedure. This raises the bowl as a whole with reference to the wheels when in an upper position and allows dumping of the load.

My invention is illustrated in the accompanying drawings, in which:

Fig. 1 is a plan taken in the direction of the arrow 1 of Fig. 2 with the bowl in its excavating position.

Fig. 2 is a vertical longitudinal section on the line 2—2 of Fig. 1 in the direction of the arrows, the bowl being in the excavating position.

Fig. 3 is a similar section with the bowl in its dumping position.

The supporting frame comprises a central draw bar 11 formed of two angles. This has a horizontal strap end 12 which may be connected to a towing pin 13 on a rear portion 14 of a tractor. The draw bar has a main horizontal section 15 which is formed of two angles back to back, a downwardly and rearwardly inclined portion 16 formed of a strap, an enlarged hub section 17, a trailing horizontal section 18, which is rigidly connected to a non-rotatable section 19 of the axle. This is illustrated as an I beam, the connections being by means of angles 20. This I beam at each end has a pair of bearing blocks 21, 22, the bearing block 21 being at the end of the I beam and the bearing block 22 spaced inwardly therefrom.

Each rotatable or moving axle 23 has the horizontal section 24 extending through the bearings 21 and 22, there being a washer 25 adjacent the inner end and a pin 26 to retain this live axle in position. Each live axle has a crank section 27 and is provided with a horizontal lateral extension 28 on which one of the wheels 29 rotate, such wheels having hubs 30 journaled on the wheel axle sections 28. By this construction the wheels are connected by a central draw bar pull to the tractor. In addition to the central draw bar, there are a pair of lateral draw bars 31 connected to the central draw bar by a bolted connection 32. These are also connected to each other by a transverse plate 33. These lateral draw bars have an enlarged hub section 34 and a trailing section 35, there being a lateral bend to permit these lateral draw bars to converge at the central draw bar at 32.

The digging or excavating bowl 36 is formed with a sloping plate 37 and a vertical plate 38, these being formed integral and having an obtuse angle bend at 39. Angles 40 and 41 reinforce the metal of the blade, these angles running transversely. The blade is journaled on the hub sections of the draw bars by means of journal sections 42. Each of these journal sections is formed of a pair of angles 43 secured to the plate 37, and through these angles and through the hub extend axle bolts 44. The plates 37 are thus

pivoted or hinged to the draw bars at three points, and the plate 37 is provided with three slots, through which extend the central draw bars and lateral draw bars. The reinforcing lower angle 40 extends the full length of the blade but the upper angles 41 are short and form reinforcements back of the hub sections 42. These angles 41, however, are attached to the vertical plate 38. A digging or excavating blade 45 is secured to the lower edge of the plate 37 and to the angle 40. At the end of the blade there is provided an end dirt-confining plate 46 having a rounded edge 47 at the bottom to facilitate partly rolling on the ground in dumping. The edges otherwise conform to the angle of the plates 37 and 38. A gusset 48 at each end of the bowl stiffens the confining plates 46.

The control construction designated by the assembly 49 employs a beam, preferably an H beam 50, which is mounted on the central draw bar over the section 15. This supports a forward and a rearward hydraulic cylinder 51, 52, these being indicated as supported on brackets 53 and 54 adjacent substantially the middle portions of the cylinders and brackets 55 and 56 adjacent the ends of these cylinders. A piston rod 57 operates in these two aligned cylinders, the piston rod having pistons in the cylinder. A crosshead 58 is secured to the piston rod 57, this being in the form of a clamp 59 having a clamping bolt 60 at the top and a pin 61 at the bottom. The pin 61 forms a pivot for the control or operating beams 62 and 62', which extend rearwardly and laterally above the rear portion of the section 15 of the central draw bar and the downwardly inclined section 16 of the same draw bar. These beams, therefore, have what might be termed horizontal sections 63 and downwardly inclined ends 64. These lower ends are pivoted to pairs of angle arms 65 which are rigidly attached to the top plate 38 of the excavating bowl or shovel. A pair of perforations 66 in each of the arms 65 allow changing the position of the coupling pins 67, as hereinunder detailed. This gives a central connection between the control bar, the hydraulic ram, and the excavating and dumping bowl 36.

The live or moving axles are connected to the excavating and dumping bowl as follows, this being by an assembly designated the elevating assembly 68. Pairs of arms 69, preferably formed of angles, are secured to the front of the plate 38 of the bowl 36 and have links 70 pivoted thereto by the pivot pins 71. Each link has a series of perforations 72 at its rear end and in any one of these perforations a pin 73 pivotally connects an arm 74. These arms are rigidly connected to the sections 24 of each live axle as indicated at 75, this being a substantial, welded connection, the arms being outside of the bearings 21.

The beam 50 is illustrated connected to the angle section 15 of the draw bar by means of cross plates 76, these beams being braced also by a transverse angle 33. The cylinders 51 and 52 are illustrated as having packing glands 78 to form a leakproof connection at the piston rod 75 and having removable heads 79 at the opposite ends.

The control for the cylinders comprises feed pipes 80 and 81 connected to the outer ends of each of the cylinders, these being secured together by means of a clamp 82. Flexible hose connections 83 lead to feed pipes 84 and 85, which lead to a suitable control valve and pump on the tractor by which the hydraulic fluid may be forced under pressure to one cylinder and released from the other, and vice versa, under the control of the driver of the tractor. This control means does not form any part of my immediate invention.

The operation of the land leveler is as follows:

When used in the excavating position, the bowl and the other mechanism, as illustrated in Fig. 2 with the excavating blade 45 adjacent the ground level, are digging into the ground. In this position the crosshead 58 is in its rearwardmost position. This brings the operating beams 62 and 62' rearwardly, the plate 38 with the arms 65 and 69 being substantially vertical. The links 70 extend in their rearwardmost and lowermost position so that the arms 74 slope upwardly from the live axles and rearwardly therefrom. This brings the live part of the axles below the hubs 30 of the wheels 29. The earth piles up in front of the bowl 36 and in this position is drawn by the tractor to the position for dumping.

In dumping the bowl or shovel it is only necessary to release the pressure on the hydraulic fluid and the cylinder 51 and to connect the cylinder 52 for charging because the leverage exerted by the load on the bowl tilts this on its axle 71. The action of tilting the bowl thrusts the control beams 62 and 62' forwardly, thus shifting the crosshead 58 from the position of Fig. 2 to that of Fig. 3. The action of tilting the bowl also exerts a pull on the links 70, which rocks the arms 74, thereby turning the crank axles 27 from the position of Fig. 2 to that of Fig. 3. This raises the beam axle 19, and hence elevates the main and lateral draw bars. The cutting blade of the bowl is thus raised above the ground, the bowl being tilted to dump its load as illustrated in Fig. 3. It will be understood that the amount of movement of the crosshead may be controlled by a suitable control valve on the tractor so that the lower cutting blade may be elevated to any desired distance above the ground surface in order to spread the load.

In some cases it may be necessary to use hydraulic power in the cylinders to tilt the bowl, particularly if it is desired to do this with the leveler at rest, and in which case the hydraulic fluid will be forced into the cylinder 52 and allowed to drain from cylinder 51. In order to move the excavating bowl from the dumping position of Fig. 3 to the excavating position of Fig. 2, the hydraulic fluid is forced into the cylinder 51 and allowed to drain from the cylinder 52. This tilts the bowl and lowers it into excavating position. All of these controls may be exercised by the driver of the tractor and operate through the hydraulic ram.

By changing the position of the pins 73 in the different perforations 72, it changes the relative position of the links 70 and the arms 74, thereby giving different positions and elevations to the excavating bowl. Also, the connection of the control beams 62 and 62' to the arm 65 may be changed by shifting the pins 67 into different perforations 66. This gives a different length of throw or movement to the crosshead and to the movement of the tilting bowl.

By means of changing the position of the links 70 and arms 74 by placing the pins 73 in different perforations 72, one side of the bowl may be raised relative to the other side, that is, a tilt may be given to the bowl relative to the wheels. This is of use when the leveler is working on sloping ground and following the contour of such ground. One of the uses of my invention is in

road work and in this case the tilt may be used for making a camber on the road.

A relatively important characteristic of my invention is that the beam 50 and the ram 49 with the crosshead, form a unit. The cross plates 76 are quite close together so that if the draw bar or the angle-shaped sections 15 of this should be bent, the supporting beam 50 will receive no injury. The draw bar is sometimes bent when an endless track type of tractor is making a sharp turn and one of the belts or tracks clamps against the draw bar. By having the ram in its support as a separate unit there is but little danger of the cylinders being forced out of alignment.

The clamp 58 is split but has the single clamping bolt 60 at the top. It is provided with two lower extensions at the bottom through which the bolt or pin 61 extends, to which the beams 62 and 62' forming links are attached.

A feature of forming the hub sections 17 and 34 of the draw bars with a circular contour is so that these hubs will substantially fill the slots through the plate 37 of the bowl 36 and thus prevent dirt from lodging in such slots or being forced through the slots.

Various changes may be made in the details of construction without departing from the scope of the invention as defined by the appended claims.

I claim:

1. A land leveler comprising, in combination, an axle having crank sections at the ends with wheels pivoted to the ends of the crank sections, a draw bar formed in a plurality of lateral sections, the sections of the draw bar being connected to the axle between the crank end sections, a bowl pivotally mounted on the draw bar sections, and means to simultaneously tilt the bowl and raise and lower the portion of the axle between the crank sections to thereby simultaneously partially rotate the bowl and to raise or lower the bowl in reference to the ground level, the means for raising and lowering the axle and turning the bowl comprising an operating device mounted on the draw bar and having a first link beam connected between said device and the upper portion of the bowl, and a link having a connection between the upper part of the bowl and the axle at the portions between the crank sections.

2. A land leveler comprising, in combination, a draw bar having a central and two lateral sections, with means at the forward end for connecting to a tractor, a beam having a center portion rigidly connected to the rear ends of the sections of the draw bar and having crank-shaped end sections with wheels mounted on the end of said sections, a bowl formed of a metal plate and having slits for each of the draw bar sections to pass therethrough, the plate of the bowl being pivotally connected to the draw bar sections adjacent the slots, arms connected to the upper portion of the plate of the bowl, a beam forming a first link connected to one of said arms and extending forwardly over the draw bar, means mounted on the draw bar to operate said link, a second link connected to another of said arms and extending rearwardly, and an arm rigidly connected to one of the crank-shaped end sections and to said latter link.

3. A land leveler as claimed in claim 2, the means to operate the first link comprising a hydraulic ram having a pair of opposed cylinders with a common piston rod, a crosshead on said piston rod, one end of the first link being connected to said crosshead.

4. A land leveler comprising, in combination, a draw bar formed of a center and a pair of lateral sections, with means at the forward end for connection to a tractor, an axle having a center portion rigidly connected to the rear ends of the sections of the draw bar, said axle having two crank-shaped opposite ends with wheels mounted on the ends of the crank sections, a bowl formed of a plate bent to an obtuse angle and having three slots through which the sections of the draw bar extend, a pivotal connection between the bowl and the draw bars, the upper section of the bowl plate having arms extending upwardly, a first link beam pivotally connected to one of said arms and extending forwardly, a second link pivotally connected to another arm and extending rearwardly, an arm rigidly connected to one of the crank-shaped ends of the beam and pivotally connected to the rear end of the second link, a hydraulic ram comprising a pair of opposed cylinders mounted on the draw bar and having a common piston rod with a crosshead and a connection between the crosshead and the first link beam.

5. A land leveler as claimed in claim 4, the cylinders of the hydraulic ram being mounted on a beam extending longitudinally, and said beam being secured to the center section of the draw bar.

6. In a land leveler having a draw bar, wheels, a tilting and dumping bowl, a supporting beam mounted on the draw bar and having a hydraulic ram with a pair of aligned and opposed cylinders with a common piston rod, a crosshead on the piston rod, and a connection from the crosshead to the bowl and to the wheels to tilt and raise and lower the bowl in reference to the ground level.

7. A land leveler as claimed in claim 2, an adjustable connection between the second link and the arm connected to one of the crank-shaped end portions of the axle to permit raising of one end of the bowl to a greater extent than the opposite end, and raising of the rear end of one of the lateral sections of the draw bar to a greater extent than the other lateral sections.

8. A land leveler as claimed in claim 4, the second link having a series of perforations at its rear end to permit changing the adjustment of the second link and the arm which is connected to one of the crank-shaped ends of the beam whereby one end of the bowl may be raised to a greater extent than the opposite end and the rear ends of the lateral sections of the draw bar may be raised on one side to a greater extent than the opposite side.

9. In a land leveler having a draw bar formed with a central and two lateral sections, the rear ends of the central and lateral sections being rigidly connected to the center part of an axle, said axle having crank ends with wheels on the extremity of such ends, a dumping bucket pivotally mounted on the center and lateral sections of the draw bar, a link pivotally connected to an upwardly extending arm on the bowl, said link having perforations adjacent its rear end with a detachable connection to an arm, said arm being rigidly connected to a crank section of the axle, and a power means to tilt the bowl relative to the draw bars and thereby raise and lower the rear ends of the draw bars relative to the wheels, said perforations permitting changing the degree of raising one end of the bowl in reference to the other and the rear end of one of the lateral sections of the draw bar relative to the opposite lateral section.

10. In a land leveler as claimed in claim 9, the central and lateral sections of the draw bar ex-

tending through slots in a plate forming part of the bowl, the sections of the draw bar adjacent the slots having a partly circular periphery to form a close fit with the ends of a slot in tilting of the bowl on the draw bar.

11. In a land leveler having a draw bar with a connection at its rear end to a wheel axle, said draw bar having a hub with a partly circular periphery, a bowl having a plate with a slot, the hub fitting in the slot, a pivotal connection between said plate of the bowl and the draw bar at the center of the circular hub, and means to tilt the bowl relative to the draw bar.

12. In a land leveler having a draw bar with a connection at its rear end to a wheel axle, said draw bar having a hub with a partly circular periphery, a bowl having a plate with a slot, the hub fitting in the slot, a pivotal connection between said plate of the bowl and the draw bar at the center of the circular hub, and means to simultaneously raise the rear end of the draw bar with the wheel axle and to tilt the bowl.

13. A land leveler comprising in combination an axle having crank sections at the ends with wheels journalled to the ends of the crank sections, a draw bar formed in a plurality of lateral sections, the sections of the draw bar being connected to the axle between the crank end sections, a bowl pivotally mounted on the draw bar sections, means to simultaneously tilt the bowl and raise and lower the portion of the axle between the crank sections to thereby simultaneously partially rotate the bowl and to raise or lower the bowl in reference to the ground level, the means for simultaneously tilting the bowl and raising and lowering the axle portion between the crank sections comprising a hydraulic ram having a moving piston with a cross-head thereon, a first beam forming a link connected to the crosshead and pivotally connected to the upper portion of the bowl, and a second link pivotally connected to the upper portion of the bowl and having an arm rigidly connected to the portion of the axle at one of the crank sections, said arm having a pivotal connection to the rear end of the second link.

14. A land leveler comprising in combination an axle having wheels connected thereto, a draw bar having its rear end attached to the axle, a bowl pivoted to the draw bar, a first means extending along the draw bar to tilt the bowl, a secondary means connected to the bowl and operative through the medium of the wheels and axle to raise and lower the rear end of the draw bar.

15. A land leveler comprising in combination a draw bar, an axle having cranked ends with wheels connected thereto, a draw bar attached to the axle between the cranked ends, a bowl pivotally connected to the draw bar, means connected to the bowl to tilt the bowl, and a secondary means interconnected between the bowl and the cranked ends of the axles to raise and lower the rear end of the draw bar on tilting of the bowl.

16. A land leveler comprising in combination an axle having cranked ends with wheels thereon, a draw bar connected to the axle between the cranked ends, a bowl pivotally mounted on the axle, a first arm connected to the bowl and a first link connected thereto extending along the draw bar, a second arm connected to the bowl, a link extending rearwardly therefrom and an arm connected from said link to one of the cranked ends of the axle, and means for reciprocating the first link to tilt the bowl and through the medium of the second link raising and lowering the axle between the cranked ends hence the rear end of the draw bar.

17. A land leveler comprising in combination an axle having cranked ends, a draw bar having sections spaced apart and connected to the section of the axle between the cranked ends, a bowl pivotally connected to the axle, said bowl having slots through which the axle extends, a first link connected to the upper part of the bowl and extending longitudinally of the draw bar, a pair of secondary links pivotally connected to the upper part of the bowl and each having an arm pivotally connected thereto and each arm being rigidly connected to one of the cranked ends of the axle.

18. A land leveler as claimed in claim 17, the draw bar having a pair of opposed cylinders with a common piston rod, a crosshead connected to the piston rod, the first link being attached to the crosshead.

19. A land leveler comprising in combination a draw bar having a bowl pivotally mounted thereon and an axle connected to the rear end of the draw bar, a pair of opposed cylinders mounted on the draw bar having a common piston rod, a crosshead connected to said piston rod, and means for tilting the bowl and simultaneously raising and lowering the rear end of the draw bar operatively connected to said crosshead.

20. A land leveler comprising in combination a draw bar having a center and a pair of lateral branches, an axle having cranked ends with wheels thereon, the rear ends of the draw bars being rigidly connected to the section of the axle between the cranked ends, a bowl pivotally connected to the center and lateral portions of the draw bar, a beam mounted on the draw bar, a pair of opposed cylinders mounted on the beam having a common piston rod, a crosshead attached to the piston rod, and an operative means connecting between the crosshead the bowl and the cranked ends of the axle to simultaneously tilt the bowl and raise and lower the section of the axle between the cranked ends.

21. A land leveler comprising, in combination, a draw bar formed in a plurality of sections spaced laterally apart, a pair of wheels, a supporting connection between the rear end of the draw bar and the wheels, a bowl pivotally connected to the draw bar, and means to tilt the bowl in reference to the draw bar to simultaneously raise and lower the rear end of the draw bar in reference to the wheels to thereby raise and lower the bowl in reference to the ground, the means to tilt the bowl and to raise and lower the rear end of the draw bar having an adjustable connection for raising one side of the bowl more than the other and raising one of the outer sections of the draw bar higher than the other outer draw bar section.

22. In a land leveler having a draw bar with a connection at its rear end to a wheel axle, a bowl having a plate with a slot through said plate, said draw bar extending through the slot, a pivot-forming device attached to the plate adjacent the slot and forming a pivotal connection with the draw bar, and means to tilt the bowl relative to the draw bar.

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