Dec. 12, 1972 J. L. MITCHELL Re. 27,530

LAND LEVELING IMPLEMENT

Original Filed Sept. 1, 1967 2 Sheets-Sheet 1

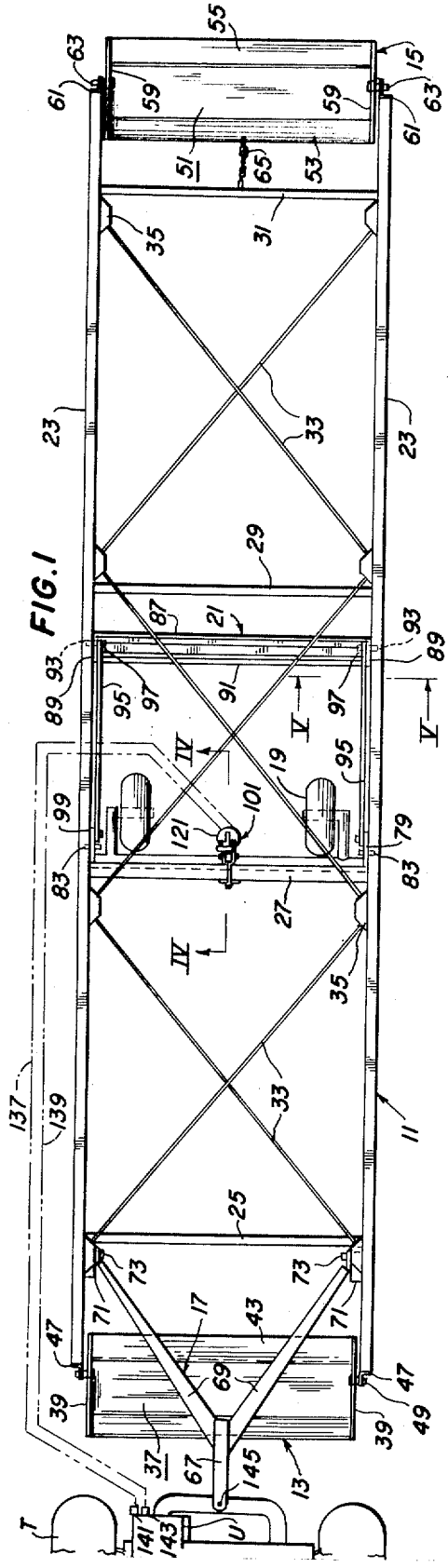


FIG. 1

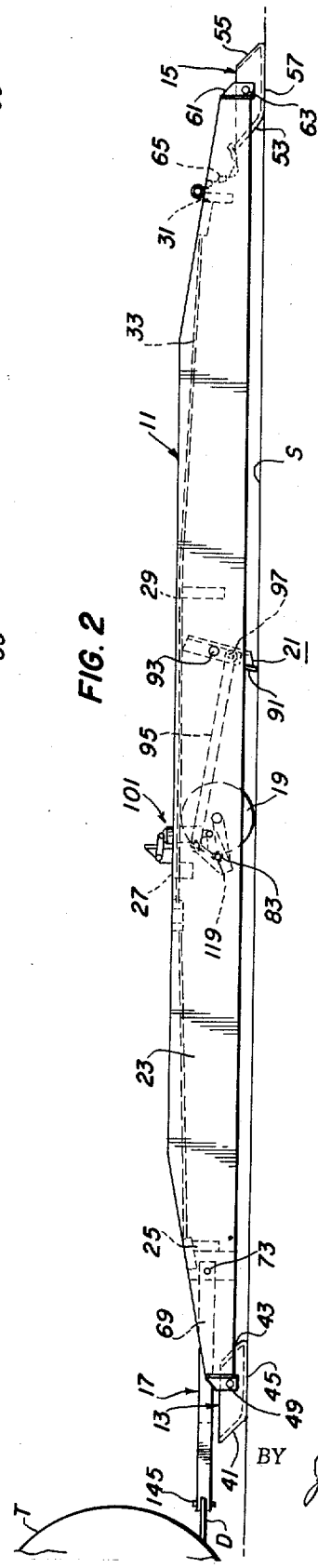


FIG. 2

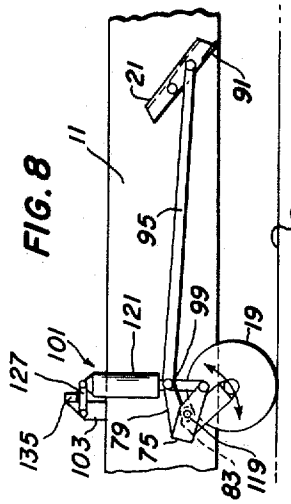


FIG. 8

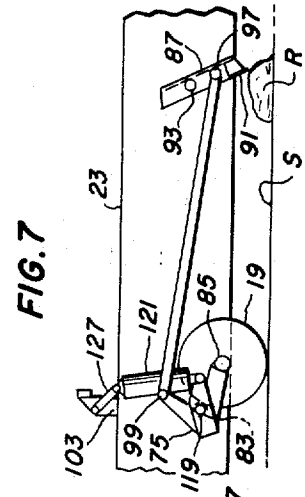


FIG. 7

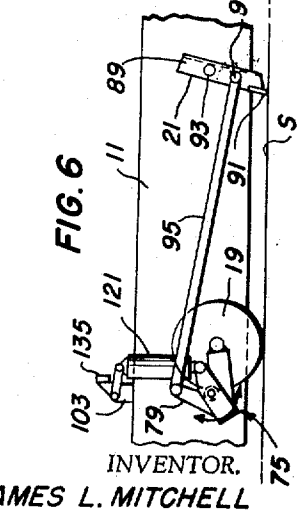


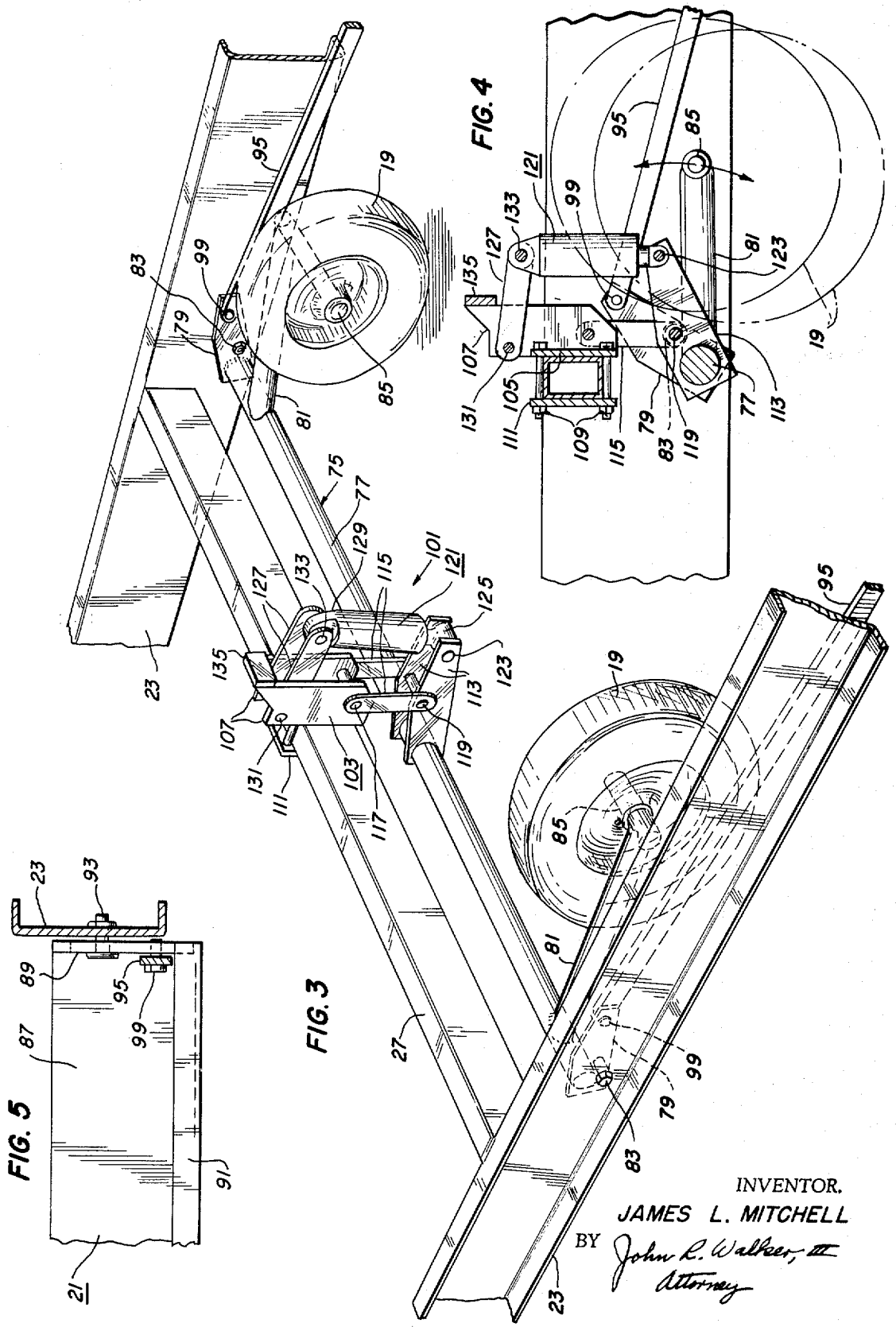
FIG. 6

INVENTOR.
JAMES L. MITCHELL
BY John L. Walker, III
Attorney

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LAND LEVELING IMPLEMENT

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LAND LEVELING IMPLEMENT

James L. Mitchell, Meridian, Miss., assignor to Midland Manufacturing Co. Inc., Memphis, Tenn.

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Int. Cl. E02f *3/76*

U.S. Cl. 172—780 10 Claims

Matter enclosed in heavy brackets [ ] appears in the original patent but forms no part of this reissue specification; matter printed in italics indicates the additions made by reissue.

ABSTRACT OF THE DISCLOSURE

A land leveling implement adapted to be trailingly drawn by a tractor. The implement includes a long frame, slide type runner members on the forward and rearward ends of the frame, an earth working member mounted at the middle of the frame, and trip means or unloader means including land running wheels for raising the earth working member when the tractive effort or draft force on the implement reaches a certain point.

BACKGROUND OF THE INVENTION

(1) Field of the invention

Relates to land leveling apparatus principally employed for preparing farm land for cultivation. The invention may also relate to industrial earth moving apparatus and such as may include scraper blade members or scarifiers and other toothed earth engaging members.

(2) Description of the prior art

The typical land leveler is continuously supported at its forward and rearward end portions of the leveler frame; a leveler commonly includes forwardly and rearwardly arranged sets of wheels which run on the land surface continuously whether the leveler is working or in transport. Prior leveler apparatus being tandemly attached to a tow tractor was difficult to turn or manipulate properly in a field being leveled; considerable field area and working time was required to turn the apparatus.

Another problem in prior art levelers was that of effectively regulating the depth of cut of the blade or earth working element of the leveler. There also was the problem of providing an effective release or trip means for raising the blade or earth working element when the element struck a fixed object such as a stump or stone.

Various earth working element and directional control means have heretofore been designed: U.S. Pat. Nos. 2,314,888 and 2,779,113 show articulated frame means for use in directional control and blade depth control in a leveler apparatus. U.S. Pat. Nos. 2,646,850 and 2,688,811 illustrate respectively rear wheel and front wheel steering means in a leveler. U.S. Pat. Nos. 2,994,143 and 3,081,567 illustrate four wheel or front and rear wheel steering means for directional control of a leveler. U.S. Pat. Nos. 3,043,034 and 3,141,250 include means for regulating the depth of cut of the earth working elements. Although many concepts are shown in the prior art, most are structurally complicated.

SUMMARY OF THE INVENTION

The land leveler of the present invention utilizes a pair of land wheels mounted at the middle of the leveler and includes leverage mechanism operable between the wheels and earth working element to cause the wheels to press downwardly and by reactive action to lift the leveler frame and earth working blade: tractor draft on the implement

causes the wheels to move downwardly relative to the frame and progressively raise the blade element. This automatically reduces the depth of cut in the land surface. Likewise, when the blade strikes a solid object (a stump or stone) in the earth, the above described action will cause the leveler frame and blade to raise quickly and to trip over the object.

The leveler of the present invention is quickly and easily manipulated whether at work or in transport. The same land running wheels which function (as described above) to automatically regulate the depth of cut of the blade element also serve as the supporting wheel members for transporting the implement on the field or road surface or for lifting and maneuvering the leveler in the field.

The leveler includes jack means adapted to be detachably coupled to the hydraulic power system of a towing tractor and includes means for supporting the implement in an elevated level disposition. The leveler includes a pivotally mounted tongue, and the weight of the leveler rearwardly of its road wheels is greater than the weight of the leveler forwardly of its wheels. By this arrangement, as the jack means is actuated, sequentially, the forward runner end of the leveler raises abuttingly against the underside of the tongue, then as the jack means moves to a fully extended disposition, the rearward runner end of the frame is raised, and the leveler is arranged in a level elevated arrangement supported only by its road wheels. In this arrangement, the leveler is readily manipulated in a forward or rearward direction.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a top view of the land leveling implement of the present invention and also shows a fragmentary portion of the tractor vehicle.

FIG. 2 is a side elevational view of the implement.

FIG. 3 is a perspective view of the midpart of the leveler implement illustrating the land wheels and jack means.

FIG. 4 is a vertical plane sectional view taken as on the line IV—IV of FIG. 1.

FIG. 5 is a vertical plane sectional view taken as on the line V—V of FIG. 1.

FIGS. 6 and 7 schematically illustrate respectively the arrangement of the leveler in a normal working disposition and in a tripping or unloading disposition.

FIG. 8 schematically illustrates the arrangement of the leveler in an elevated transportable disposition.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The land leveling implement is long and laterally symmetrical and includes a frame **11**; forward and rearward runner assemblies **13, 15**; an earth working member **21**; land wheels **19, 19**; and a tongue **17**.

Frame **11** includes a pair of channel-sectioned rail members **23, 23** rigidly boxed in parallel arrangement by parallel cross members **25, 27, 29, 31**. Brace rods **33** tensioned respectively between frame brackets **35** prevent relative longitudinal displacement of rail members **23, 23** and provides rigidity of the frame.

Each assembly of forward and rearward runner assemblies **13, 15** may be constructed or modified from that shown in the drawings. Simplified runner assemblies are shown in the drawing for purposes of clarity; forward runner assembly **13** includes a body **37** and end plates **39, 39** fixedly secured in parallel arrangement at the opposite ends of body **37**. Runner assembly **13** is open-topped and includes parallel inclined front and rear walls **41, 43** and a bottom wall **45**. Runner brackets **47, 47** and pins **49, 49** pivotally mount forward runner assembly **33** transversely on the forward end of frame **11**. Coaxial pins **49, 49** fixed respectively in end plates **39, 39** project oppositely

and extend respectively through pivot apertures in brackets **47, 47.**

Rearward runner assembly **15** is preferably of the same size and configuration as front runner assembly **13** and in like manner includes an open-topped runner body **51** including front, rear and bottom walls **53, 55, 57** and end plates **59, 59** secured parallel on opposite ends of body **51.** Paired angle brackets **61, 61** fixed respectively on the end portions of frame rails **23, 23** and pins **63, 63** projecting oppositely from plates **59, 59** pivotally secure runner assembly **15** transversely on the rearward end of frame **11.** A check chain **65** is secured at its opposite ends to cross member **31** and front wall **53** of runner assembly **15.** Check chain **65** permits limited rocking movement of rearward runner assembly **15** and keeps the runner assembly in a proper attitude relative to the land surface.

Tongue **17** includes a medially arranged body **67** and a pair of rearwardly and outwardly projecting legs **69, 69** fixedly secured on the rearward end of body **67.** A pair of tongue brackets **71, 71** are secured respectively on the inward sides of rail members **23, 23** slightly forwardly of cross member **25.** Coaxially arranged pins **73, 73** extending respectively through the terminal portions of tongue legs **69, 69** and brackets **71, 71** pivotally secure tongue **17** about a horizontal axis.

Tongue **17** is vertically spaced from forward runner assembly **13** when the leveler is in a working disposition (see FIG. 2); when runner assembly **13** is raised from the land surface, the upper edge of runner wall **43** is adapted to engage the undersurface of tongue legs **69, 69** and thus provide check means for runner assembly **13.** The engagement of runner wall **43** with the undersurface of tongue **17** keeps the runner assembly in a proper attitude relative to the land surface when frame **11** is raised by land wheels **19, 19.**

A U-shaped yoke member **75** pivotally mounted between frame rails **23, 23** provides means for mounting wheels **19, 19.** Yoke member **75** is integrally fabricated and includes a barlike body **77;** platelike pivot arms **79, 79** secured on the opposite ends of body **77,** and a pair of wheel arms **81, 81.** Pivot pins **83, 83** extending respectively through arms **79, 79** and fixed coaxially in frame members **23, 23** pivotally secure yoke member **75** between rail members **23, 23.** Yoke member **75** is adapted for pivotal rocking movement about the pivot axis of pins **83, 83.** Convergingly projecting stub axles **85, 85** fixed respectively on the distal ends of wheel arms **81, 81** journal wheels **19, 19** in laterally spaced apart arrangement.

Earth working member **21,** like forward and rearward runner assemblies **13, 15** is also shown in simplified structure. For the purpose of clarity in description, a substantially simple blade type earth working member is illustrated in the drawing and will be described as the preferred type earth engaging component of the leveler.

Earth engaging or earth working member **21** is of generally planar configuration and includes basically a back panel **87,** end plates **89, 89** fixedly secured in parallel arrangement on the opposite end portion of back panel **87** and an earth engaging portion or blade **91** extending between the end plates and along the lower portion of back panel **87.** A pair of coaxial pivot pins **93, 93** extending respectively through side rails **23, 23** and end plates **89, 89** pivotally secure earth working member **21** transversely and slightly rearwardly of the midsection of frame **11.** Blade **91** is adapted for swinging pivotal movement generally forwardly and rearwardly relative to frame **11.**

A pair of linklike connectors **95, 95** pivotally interconnect earth working member **21** and yoke member **75.** Connectors **95, 95** extend longitudinally and are arranged respectively along the inward sides of rail members **23, 23.** Pivot pins **97, 97** extend respectively through earth working member end plates **89, 89** and through the rearward end portions of connectors **95, 95.** Pivot pins **99, 99** extend respectively through the distal end portions of yoke member pivot arms **79, 79** and through the forward

end portions respectively of connectors **95, 95.** With reference to the drawing, it will be noted that the pivot axes of pins **97, 97** are below the stationary pivot axis of pivot pins **93, 93** and the pivot axes of pins **99, 99** are above the stationary pivot axis of yoke member supporting pins **83, 83.** Rearward movement of blade **91** thus causes downward movement of land wheels **19, 19** relative to frame **11.**

Jack means **101** is provided for urging land wheels **19, 19** downwardly relative to frame **11;** the downward movement of wheels **19, 19** by reactive action through yoke member **75** is adapted to simultaneously raise the frame and earth working member away from the land surfaces.

Jack means **101** includes a boxlike base **103** fixedly secured on the rearward medial section of frame cross member **27.** Base **103** includes a back plate **105** and side plates **107, 107** secured together in generally U-sectioned configuration. Back plate **105** abuttingly engages the rearward wall surface of frame member **27.** Bolts **109, 109** arranged across the upper and lower surfaces of frame member **27** extend respectively through base back plate **105** and spanner plate **111** and rigidly clamp base **103** on cross member **27.**

A pair of parallel arms **113, 113** are fixedly secured on and extend radially from yoke member body **77.** A pair of pinned support struts **115, 115** provide center bearing means for yoke member **75.** Upper and lower pins **117, 119** extending respectively through the upper and lower end portions of struts **115, 115,** base **103** and arms **113, 113** provides a center support bearing for yoke member **75.** With reference to the drawing, it will be noted that lower pivot pin **119** is in coaxial arrangement with pivot pins **83, 83** extending through yoke member pivot arms **79, 79.**

A piston-cylinder assembly **121** is pivotally connected at its lower end by a pin **123** passing through the distal end portions of arms **113, 113** and piston rod **125.** A pair of jack links **127, 127** interconnect the upper end of piston-cylinder assembly **121** with base **103.** Pins **131, 133** passing respectively through the opposite end portions of jack links **127, 127,** through base side plates **107, 107** and base end **129** of cylinder assembly **121** articulatingly interconnect cylinder assembly **121** with base **103.** A stop bar **135** fixedly bridging the upper portions of base side plates **107, 107** is adapted to abuttingly engage jack links **127, 127.** When piston-cylinder assembly **121** is actuated to an extended disposition (see FIG. 8), link members **127, 127** pivotally move upwardly and abuttingly engage the undersurface of bar **135.** The articulated connection of cylinder assembly **121** with base **103** permits the cylinder assembly to freely move upwardly and downwardly when it is in a retracted disposition (see FIGS. 6 and 7). Conduits **137, 139** (schematically shown) extend forwardly from piston-cylinder assembly **121** and terminate respectively in coupling members **141, 143.**

The leveler implement is adapted to be detachably attached to a tractor indicated T in FIGS. 1 and 2. A pin **145** extending through the distal end of tongue **117** is adapted to engage with drawbar D of tractor T. Conduit coupling members **141, 143** are adapted to engage and be coupled with hydraulic power unit U of tractor T to cause selective extension and retraction of piston-cylinder assembly **121.**

The working disposition of the land leveling implement of the present invention is as shown in FIG. 6 in which it will be seen the piston-cylinder assembly **121** is in a retracted position, and the blade **91** is in a forward position, wherein it is angled downwardly and forwardly. As the implement travels over the ground, if the forces against blade **91** exceed a given amount, as for example, if the composition of the surface is too hard, the rearward pull against blade **91** which is transmitted through the links **95** causes the yoke member **75** to rotate clockwise as viewed in FIG. 6, and the wheels **19** to press downwardly, there-

by raising the frame **11** and automatically reducing the depth of the cut in the land surface, or if the blade **91** strikes a solid object, as illustrated by the rock R in FIG. 7, the above described action will cause the frame **11** to raise quickly and the blade to be angled rearwardly, as seen in FIG. 7, which will aid the blade in passing over the rock or the like. It will be understood that the rearward pull against blade **91** must be greater than the effect of the weight of frame **11** and its associated parts, or the raising of frame **11** will not take place and the implement will remain in the normal working disposition shown in FIG. 6. In addition, it will be understood that when it is desired to transport the implement of the present invention, the piston-cylinder assembly **121** is extended which causes the parts to move into the position shown in FIG. 8 with the frame **11** and blade **91** spaced substantially above the land surface S.

Now, while I have shown and described an exemplary embodiment of the present invention, it will be understood that various modifications and rearrangement of components and elements of structure may be made without departing from the scope of the invention as defined in the attendant claims.

I claim:

1. A land leveling implement adapted to be trailingly drawn by a tractor comprising a long horizontal frame, frame support means arranged at the opposite ends of said frame adapted for running engagement with the land surface, an earth working member having an earth engaging surface, means pivotally securing said earth working member from said frame with said earth engaging surface thereof being guidingly constrained in pivotal movement generally forwardly and rearwardly relative to said frame about an axis substantially transverse relative to said frame, at least two land wheels adapted to run on the land surface, wheel mounting means mounting said wheels from said frame generally intermediate the length of said frame and with each wheel being journaled on an axle guidingly constrained in upward and downward movement relative to said frame, and means interconnecting said wheel mounting means and said earth working member at a place on said earth working member below said axis for causing said wheels to move downwardly relative to said frame in response to a rearward pull on said interconnecting means caused by movement of said earth engaging surface rearwardly relative to said frame.

2. The implement of claim **1** wherein said frame support means includes a forward and a rearward runner each having undersurfaces adapted to slidingly engage the land surface, and including pivot means pivotally securing said forward and rearward runners each on a pivot axis lying transversely of said frame respectively on the forward and rearward end portions of said frame.

3. The implement of claim **1** wherein said earth working member includes a generally planar blade having an earth engaging surface defining a horizontal edge adapted for cutting or scraping the land surface.

4. The implement as defined in claim **1** and additionally including means for simultaneously forcibly moving the axles of said land wheels downwardly relative to said frame for raising said frame away from the land surface.

5. A land leveling implement adapted to be trailingly drawn by a tractor equipped with a hydraulic power system, the implement comprising a long horizontal frame, a forward and a rearward runner each having an undersurface adapted to slidingly engage the land surface, pivot means pivotally securing said forward and rearward runners each on a pivot axis lying transversely of said frame respectively on the forward and rearward end portions of said frame, an earth working member having a generally horizontal earth engaging surface, means pivotally supporting said earth working member from said frame with said earth engaging surface thereof being guidingly constrained in pivotal arced movement forwardly and rearwardly relative to said frame, at least two land wheels adapted to run on the land surface, a yoke member journaling said wheels laterally spaced apart and in relatively fixed arrangement, means pivotally supporting said yoke member from said frame intermediate the length of said frame and forwardly of said earth working member and with the axle of each wheel being guidingly constrained in pivotal arced movement upwardly and downwardly relative to said frame, at least one long connector arranged longitudinally of said frame, means pivotally securing the rearward end of said connector with said earth working member at a location below the earth working member supporting pivot axis, means pivotally securing the forward end of said connector with said yoke member at a location above the yoke member supporting pivot axis, and jack means connectable with the hydraulic power system of a tractor for pivotally urging said land wheels downwardly relative to said frame and against the land surface; the jack means being actively operative to urge the land wheels downwardly against the land surface, and by reactive action through the yoke member, to raise the frame and earth working member away from the land surface.

6. The implement of claim **5** wherein said jack means includes arm structure rigidly fixed on said yoke member and projecting radially and generally rearwardly from the yoke member supporting pivot axis, a hydraulic double-acting piston-cylinder assembly having oppositely movable attachment points, means pivotally securing one of said attachment points on the distal end of said arm structure, at least one jack link, pivot means at the opposite ends of said jack link pivotally securing said jack link interconnectingly respectively to the other one of said piston-cylinder assembly attachment points and to said frame, conduit means extending from said piston-cylinder assembly adapted for connection with the hydraulic power system of the tractor, and stop means abuttingly engageable with said jack link for stopping the pivotal travel of said jack link upon actuation of said piston-cylinder assembly to an extended disposition.

7. The apparatus of claim **6** which includes means for supporting said frame in a raised level disposition with said forward and rearward runners being free of the land surface when said piston-cylinder assembly is actuated to an extended disposition including a tongue pivotally secured on a horizontal axis at its rearward end to the forward end portion of said frame and on a pivot axis extending transversely of said frame, stop means for stopping the downward pivotal travel of said tongue relative to said frame generally at a horizontal disposition, and relative weight means on the opposite or the forward and rearward sides of said pair of land wheels for causing the forward runner to be raised first when said piston-cylinder assembly is moved to an extended disposition: with said implement trailingly attached by its tongue to a tractor, and as said piston-cylinder assembly is actuated to an extended disposition, sequentially, the forward runner raises from the land surface, the tongue pivots downwardly against the stop means, and then the rearward runner raises from the land surface.

8. A land leveling implement adapted to be trailingly drawn by a tractor, the implement comprising a long horizontal frame, a forward and a rearward runner each having an under-surface adapted to slidingly engage the land surface, pivot means pivotally securing said forward and rearward runners each on a pivot axis lying transversely of said frame respectively on the forward and rearward end portions of said frame, an earth working member having a generally horizontal earth engaging surface, means pivotally supporting said earth working member from said frame with said earth engaging surface thereof being guidingly constrained in pivotal arced movement forwardly and rearwardly relative to said frame, at least two land wheels adapted to run on the land surface, a yoke member journaling said wheels laterally spaced apart and in relatively fixed arrangement, means pivotally

supporting said yoke member from said frame intermediate the length of said frame and forwardly of said earth working member and with the axle of each wheel being guidingly constrained in pivotal arced movement upwardly and downwardly relative to said frame, at least one long connector arranged longitudinally of said frame, means pivotally securing the rearward end of said connector with said earth working member at a location below the earth working member supporting pivot axis, and means pivotally securing the forward end of said connector with said yoke member at a location above the yoke member supporting pivot axis.

9. A land leveling implement adapted to be trailingly drawn by a tractor comprising a long horizontal frame, frame support means arranged at least at one end of said frame adapted for running engagement with the land surface, an earth working member having an earth engaging surface, means pivotally securing said earth working member from said frame with said earth engaging surface thereof being guidingly constrained in pivotal movement generally forwardly and rearwardly relative to said frame about an axis substantially transverse relative to said frame, at least two land wheels adapted to run on the land surface, wheel mounting means mounting said wheels from said frame generally intermediate the length of said frame and with each wheel being journaled on an axle guidingly constrained in upward and downward movement relative to said frame, and means interconnecting said wheel mounting means and said earth working member at a place on said earth working member below said axis for causing said wheels to move downwardly relative to said frame in response to a rearward pull on said interconnecting means caused by movement of said earth engaging surface rearwardly relative to said frame.

10. A land leveling implement adapted to be trailingly drawn by a tractor comprising a long horizontal frame having a forward end and a rearward end, means at said forward end of said frame for attaching said frame to a tractor, frame support means adjacent the rearward end of said frame adapted for running engagement with the land surface, an earth working member having an earth engaging surface, means pivotally securing said earth working member from said frame with said earth engaging surface thereof being guidingly constrained in pivotal movement generally forwardly and rearwardly relative to said frame about an axis substantially transverse relative to said frame, at least two land wheels adapted to run on the land surface, wheel mounting means mounting said wheels from said frame generally intermediate the length of said frame and with each wheel being journaled on an axle guidingly constrained in upward and downward movement relative to said frame, and means interconnecting said wheel mounting means and said earth working member at a place on said earth working member below said axis for causing said wheels to move downwardly relative to said frame in response to a rearward pull on said interconnecting means caused by movement of said earth engaging surface rearwardly relative to said frame.

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ROBERT E. PULFREY, Primary Examiner

E. H. EICKHOLT, Assistant Examiner

U.S. Cl. X.R.

172—261, 398, 452, 491