July 10, 1962 K. KOBER 3,043,034

LEVELER

Filed May 3, 1961 4 Sheets-Sheet 1

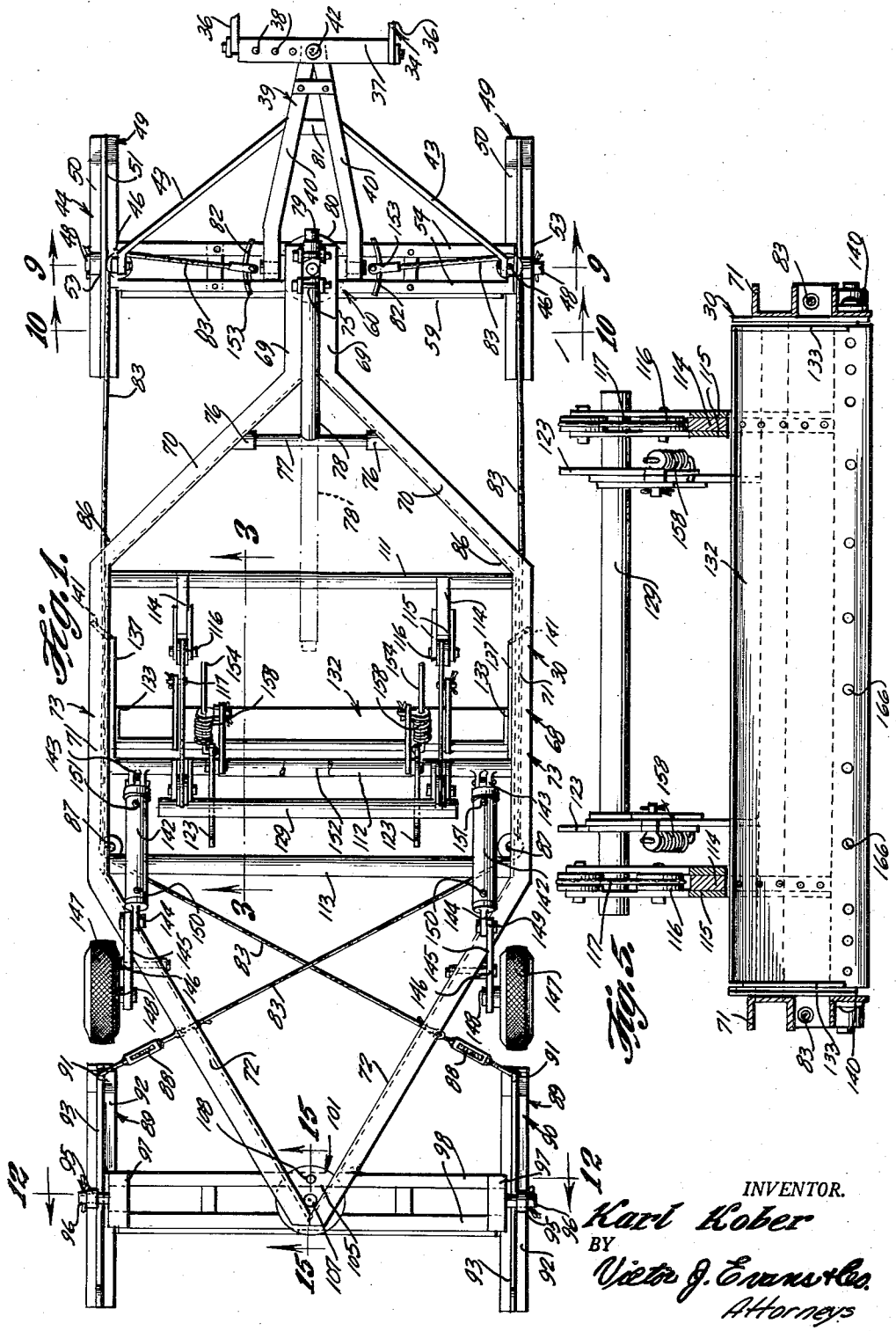


Fig. 1.

Fig. 2.

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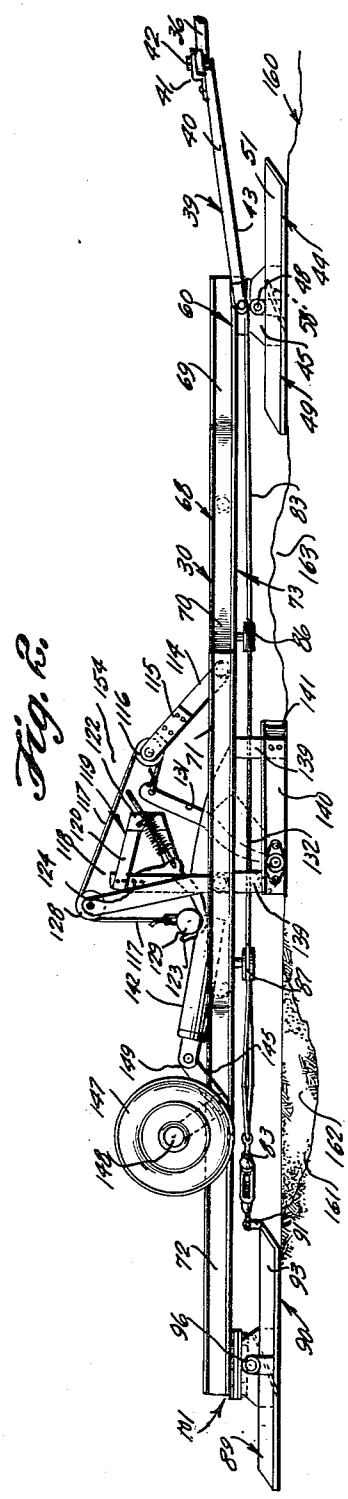


Fig. 3.

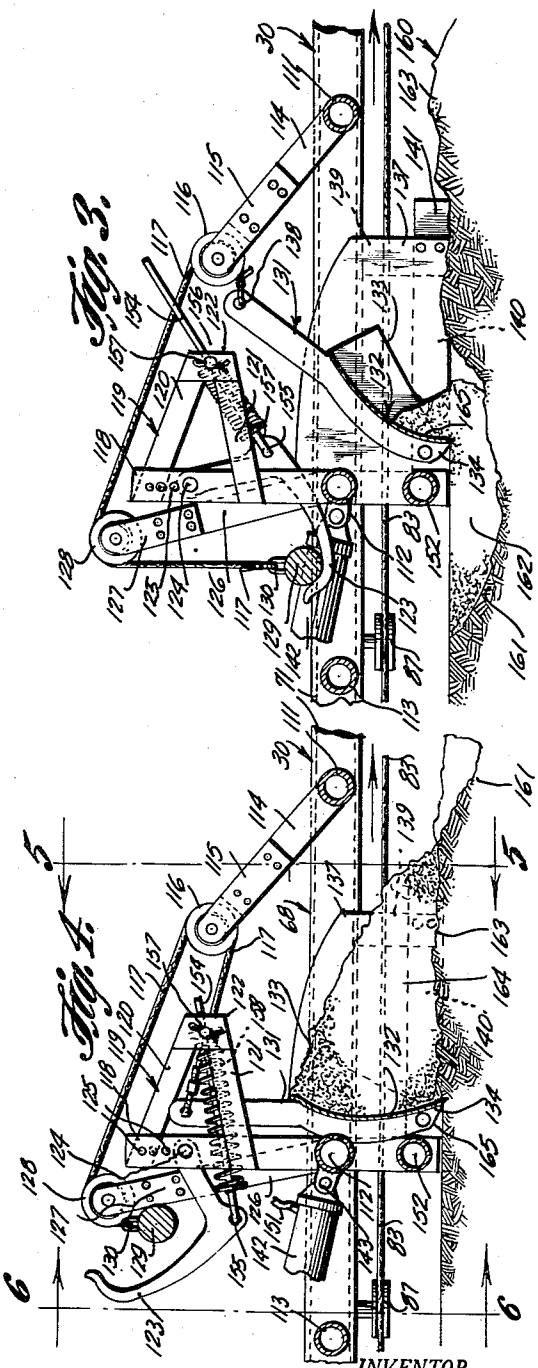


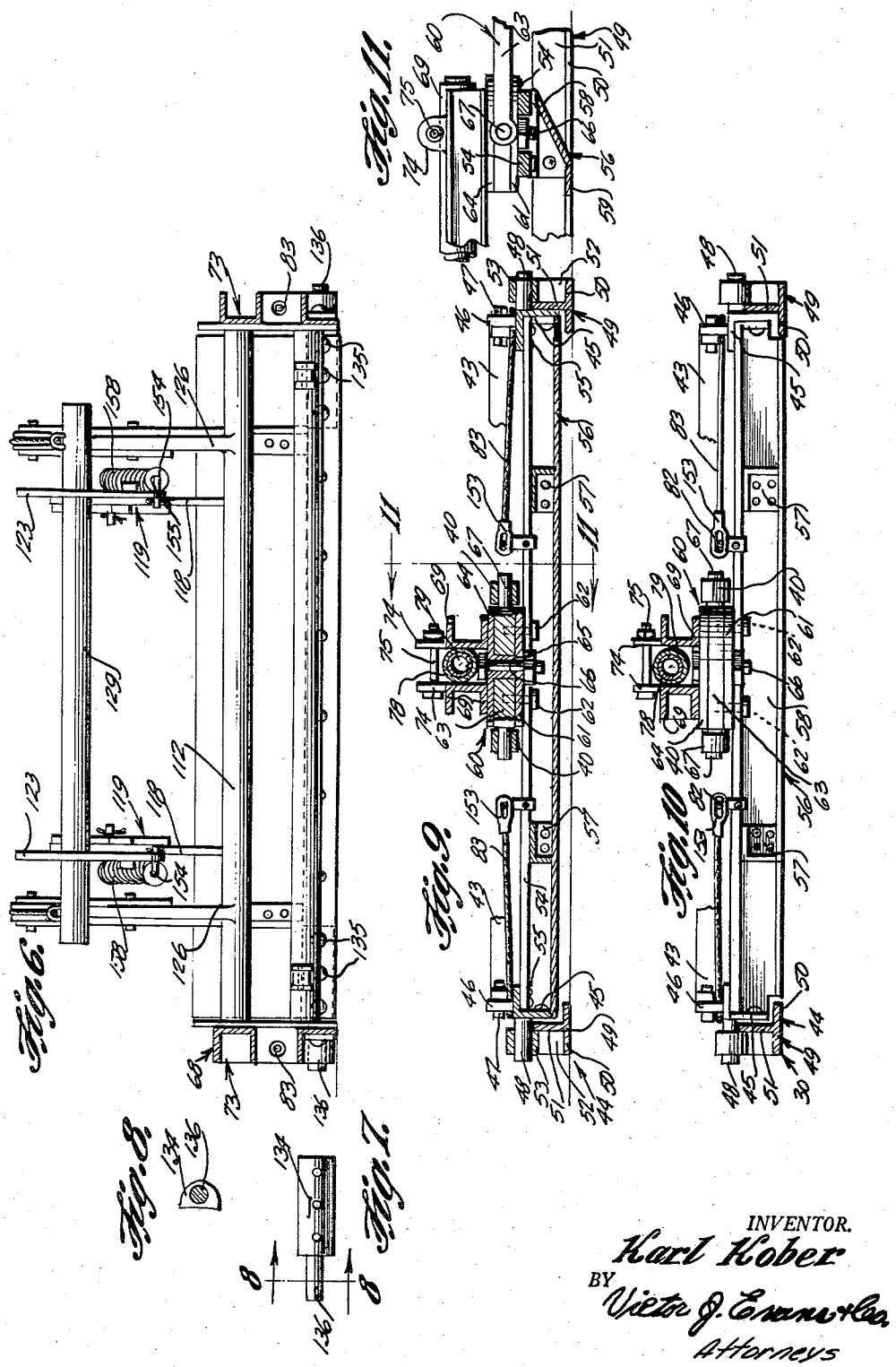
Fig. 4.

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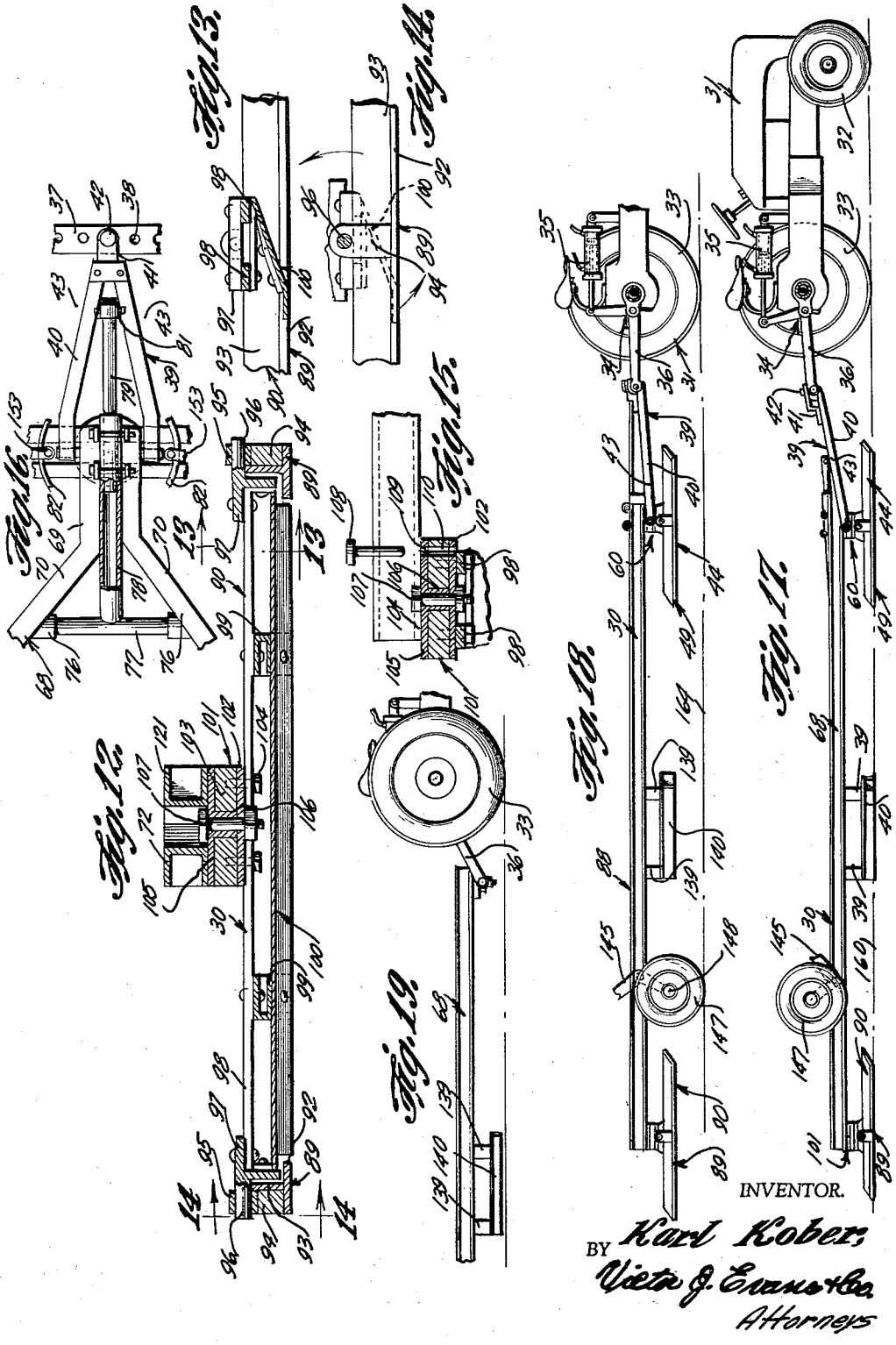


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United States Patent Office

3,043,034

Patented July 10, 1962

3,043,034

LEVELER

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Filed May 3, 1961, Ser. No. 107,528
1 Claim. (Cl. 37—148)

The present invention relates to an earth working implement or machine, and more particularly to a land leveler.

The primary object of this invention is to provide a land leveler which is adapted to be mounted rearwardly of and attached to a towing vehicle such as a tractor whereby land can be efficiently and effectively graded or leveled.

Another object is to provide a land leveler which includes a scraper blade that is adapted to automatically move to the proper position in order to insure that irregular surfaces encountered by the leveler will be properly smoothed or leveled as the present invention moves along a surface being worked on.

A still further object is to provide a land leveler which includes a novel means for supporting and guiding the device, and wherein when the device is not being used for leveling land, the parts can be moved to a position in order to facilitate the transporting thereof over a road surface or the like.

Still another object is to provide such a land leveler that is economical to manufacture and efficient in operation and which is rugged in structure and foolproof in use.

Another object is to provide an apparatus of the character described that may be utilized speedily and efficiently and with precision by even inexperienced operators, and further objects and advantages are to provide improved elements and arrangements thereof in a device of the character described that is economical to operate, durable in form, and conducive to the most economical use of materials and uniformity of members formed therefrom.

Still further objects and advantages will become apparent in the subsequent description in the specification.

In the drawings:

FIGURE 1 is a top plan view of the leveler of the present invention.

FIGURE 2 is a side elevational view of the leveler with the parts in the position shown in FIGURE 1.

FIGURE 3 is an enlarged sectional view taken on the lines 3—3 of FIGURE 1 and showing a low place in the ground being filled.

FIGURE 4 is a view similar to FIGURE 3 but showing the parts in a different position.

FIGURE 5 is a sectional view taken on the line 5—5 of FIGURE 4.

FIGURE 6 is a sectional view taken on the line 6—6 of FIGURE 4.

FIGURE 7 is a detailed view of one of the trunnions for hingedly mounting the scrapper and scoop.

FIGURE 8 is a sectional view taken on the line 8—8 of FIGURE 7.

FIGURE 9 is a sectional view taken on the line 9—9 of FIGURE 1.

FIGURE 10 is a sectional view taken on the line 10—10 of FIGURE 1.

FIGURE 11 is a sectional view taken on the line 11—11 of FIGURE 9.

FIGURE 12 is a sectional view taken on the line 12—12 of FIGURE 1.

FIGURE 13 is a sectional view taken on the line 13—13 of FIGURE 12.

FIGURE 14 is a sectional view taken on the line 14—14 of FIGURE 12.

FIGURE 15 is a sectional view taken on the line 15—15 of FIGURE 1.

FIGURE 16 is a plan view, with parts broken away, showing the pivoted yoke locked from upward movement and with the parts in a position corresponding to that shown in FIGURE 18.

FIGURE 17 is a diagrammatic side elevational view showing the machine being pulled by a tractor and in working position.

FIGURE 18 is a view similar to FIGURE 17 but showing the machine raised for transportation.

FIGURE 19 is a view similar to FIGURE 17 but illustrating a modification wherein the front runner section or sled unit is removed.

Referring in detail to the drawings, the numeral 30 indicates the land leveler of the present invention which is adapted to be towed behind a vehicle such as a conventional tractor 31, FIGURE 17, and the tractor 31 includes the usual front wheels 32 and rear wheels 33, and in FIGURE 17 the numeral 34 indicates the usual lift mechanism for the tractor 31 which is adapted to be hydraulically operated as for example by means of the hydraulic cylinders 35. The lift mechanism 34 includes the usual rearwardly disposed spaced apart arms 36 that are arranged so that their rear ends are connected together together by a crosspiece 37, and the crosspiece 37 may have a plurality of openings 38 therein, FIGURE 1, in order to permit the desired adjustment of the parts. As shown in FIGURE 1, the leveler 30 includes a forwardly disposed hitch which is indicated generally by the numeral 39, and the hitch 39 embodies a pair of side elements 40 which are suitably joined together, and an offset tongue 41 on the front portion of the hitch 39 is adapted to be connected to an opening 38 in the crosspiece 37 by means of a suitable locking pin 42. The numeral 43 designates each of a pair of angularly arranged braces, and the front portions of the braces 43 are secured as by welding to the side elements 40.

There is further provided a front runner section or front sled unit which is indicated generally by the numeral 44, and as shown in FIGURE 9 for example, the front runner section 44 includes a pair of horizontally disposed spaced parallel short angle irons 45 which have upstanding ears, pegs or lugs 46 secured thereto or formed integral therewith. The rear ends of the braces 43 are pivotally connected to the ears 46 by means of pivot pins 47. The front runner section 44 further includes a pair of spaced parallel horizontally disposed runners 49 which each have an inverted T shape in cross section, so that in effect each of the runners 49 embodies an upstanding or vertical section 51 as well as a horizontal section 50. Brackets or blocks 52 are secured to the runners 49, and bearings 53 are supported by the blocks 52, and these bearings 53 swivelly receive or engage trunnions 48 that are suitably affixed to the angle irons 45. The front runner section 44 further includes a pair of horizontally disposed spaced parallel bars 54 which have their end portions secured to the angle irons 45 as at 55, and the numeral 56 indicates a front smoothing blade that is mounted below the bars 54, and the smoothing blade 56 may be fastened or held in place as for example by means of clamps or brackets 57. As shown in FIGURE 11 the smoothing blade 56 includes an inclined portion 58 in a lower horizontally disposed portion 59 that is rearwardly disposed of the inclined portion 58.

There is further provided a front turntable which is indicated generally by the numeral 60, and the turntable 60 embodies a lower plate 61 that is secured to the bars 54 as for example by means of bolts or securing elements 62, and the turntable 60 further includes an intermediate body piece 63 that is arranged above the lower plate 61, and there is provided an upper plate 64 above the body piece 63. The body piece 63 and lower plate 61 are firmly secured together or formed integral, and the pieces 61 and

63 are capable of independent rotation or movement relative to the upper plate 64, and this movement is accomplished due to the provision of a king pin or pivot pin 66 which extends through a central bushing 65 in the turntable 60. Diametrically opposed trunnions 67 are secured to or formed integral with the intermediate body piece 63, FIGURE 9, and the rear ends of the side elements 40 are swivelly or pivotally connected to the trunnions 67.

The leveler of the present invention further embodies a main frame which is indicated generally by the numeral 68, and the main frame 68 is shown to comprise in FIGURE 1 a pair of generally similar side members which are channel shaped in cross section, and the side members 73 are constructed so that there is provided for the main frame forwardly disposed spaced parallel front or first portions 69 as well as angularly arranged second portions 70 that are positioned rearwardly of the first portions 69, and the main frame 68 further includes spaced parallel horizontally disposed third portions 71 which have angularly arranged fourth portions 72 positioned rearwardly thereof. As shown in FIGURE 9, the front or first portions 69 of the frame 68 are secured as by welding to the upper plate 64 of the turntable 60, for a purpose to be later described.

Extending upwardly from the front or first portion 69 of the frame 68 and secured thereto or formed integral therewith are vertically disposed spaced apart apertured ears or lugs 74, FIGURE 9, and pins or bolts 75 are adapted to be selectively extended through these lugs 74. As shown in FIGURE 1, diametrically opposed bearing elements 76 are secured as by welding to the inner surfaces of the second portions 70 of the frame, and the numeral 77 indicates a cross element that is pivotally or swivelly supported by the bearing elements 76, and the numeral 78 indicates an outer hollow or tubular member which is arranged at right angles with respect to the cross element 77 and which is secured thereto or formed integral therewith. This tubular member 78 is adapted to selectively be positioned between the first portions 69 of the frame 68, as for example when the parts are in the position of FIGURES 9 and 10. The numeral 79 indicates an inner tubular member that is slidably or adjustably mounted in the outer tubular member 78, and a hand gripping element 80 is connected to the outer end of the element 79 for faciliating the manual movement thereof. At times the inner member 79 may be moved outwardly with respect to the member 78 so that the member 79 may rest on or be arranged contiguous to the upper surface of a cross brace 81 that extends between the side elements 40 of the hitch 39.

There is further provided a steering mechanism for the leveler which includes arcuate brackets or quadrants 82 that are affixed to the bars 54 in any suitable manner, and a pair of cables 83 are swivelly connected to the brackets or quadrants 82 as at 84. The rear portions of the cables 83 are arranged in criss-cross relation with respect to each other, as shown in FIGURE 1. Portions of the cables 83 engage the pegs 46 that are supported adjacent the ends of the front runner section 44. The cables 83 are also arranged in engagement with pulleys 86 and 87 on the main frame 68, and the rear portions of the cables 83 have adjustable turn buckles 88 thereon, and the rear ends of the cables 83 are connected to pegs or anchor pins 91 on the front ends of rear runners 89 that form part of a back or rear runner section 90. The cables 83 are arranged so that a portion thereof extends below the rear ends of the braces 43 and portions of these cables 83 extend around the pegs 46 and these members function as a cable pulling shoulder arrangement. The front truck of the leveler can be turned ninety degrees while the rear truck is turned about fifty degrees. The purpose of the quadrants 82 is to maintain a central cable hook-up after the cable is free from its peg 46 in a straight line from the frame pulley such as the pulley 86 to the front truck master pivot after the front truck is turned more than fifty degrees for short turns.

As shown in FIGURE 12 for example the rear runner section 90 includes the spaced parallel horizontally disposed runners 89 which each have a generally inverted T-shape so that each runner 89 embodies a horizontally disposed lower section 92 as well as an upstanding intermediate section 93, and brackets or blocks 94 are suitably affixed to the runners 89, the blocks 94 serving as a support for bearings 95 that swivelly engage trunnions 96 which project outwardly from the short angle irons 97, and a pair of spaced parallel horizontally disposed bars 98 extend between the angle irons 97 and are secured thereto in any suitable manner. A smoothing blade 100 is mounted below the bars 98 as for example by means of clamps or brackets 99.

There is further provided a rear turntable which is indicated generally by the numeral 101, and the turntable 101 includes a lower plate 102 and an intermediate base piece 103 which are secured to the bars 98 as for example by means of securing elements 104. The numeral 105 indicates an upper plate that is arranged above the body piece 103, and the body piece 103 and lower plate 102 are capable of independent rotation and movement relative to the upper plate 105. This independent movement is accomplished by the provision of a bearing or bushing 106 that has a king pin or pivot pin 107 extending therethrough, FIGURE 12. The rearwardly disposed fourth portions 72 of the main frame 68 are secured as by welding to the upper surface of the plate 105. As shown in FIGURE 15 a removable lock pin 108 is adapted to selectively engage apertures or openings 109 and 110 in the plate 105 and elements 103 and 102 for selectively preventing movement of the various parts of the turntable 101 when desired or required.

Attention is now directed to FIGURES 3 and 4 of the drawings, wherein it will be seen that first, second and third horizontally disposed spaced parallel tubular support members 111, 112, and 113 extend between the third portions 71 of the frame 68 and is secured thereto as by welding. A pair of spaced parallel upwardly inclined support pieces 114 are secured as by welding to the support member 111, and the support pieces 114 have brackets 115 affixed thereto in any suitable manner, and these brackets 115 have pulleys 116 journaled therein, and a pair of cables 117 engage the pulleys 116. Vertically disposed uprights 118 are secured as by welding to the support member 112, and the pair of uprights 118 each include a yoke 119 suitably affixed thereto, and it will be seen that each yoke 119 includes upper and lower pieces 120 and 121 that are connected together by a vertical element 122. There is further provided a pair of swingably or rockably mounted cradles 123 that have their upper ends pivotally or hingedly connected to the uprights 118 by means of pivot pins 124, and there is provided in the uprights 118 a plurality of spaced apart openings or apertures 125 whereby the pivot pins 124 can be arranged in engagement with different of these openings 125 in order to provide a means for adjusting the mechanism.

There is further provided a pair of inclined upwardly extending support pieces 126 that are secured as by welding to the support member 112, and brackets 127 are affixed to the support pieces 126, and these brackets 127 have pulleys 128 journaled therein, and the cables 117 are trained over the pulleys 128, and the cables 117 each have an end connected as at 130 to a counterweight 129, and the counterweight 129 is adapted to selectively engage the pair of cradles or support units 123 as the leveler is being used in order to automatically help control the operation of the leveler.

The numeral 131 designates each of a pair of spaced parallel beams which are connected as at 138 to the cables or lines 117, and as shown in FIGURES 3 and 4, a scraper blade 132 is suitably affixed to the lower

portions of the pair of beams 131, and there is provided a pair of vertically disposed spaced parallel guide members 133 which are secured to the end portions of the scraper blade 132. With reference to FIGURES 6, 7 and 8, the numeral 134 indicates each of a pair of bearing members which are provided with outwardly arranged trunnions 136, and the bearing members 134 are adapted to be secured to the scraper blade 132 as at 135.

The numeral 137 designates each of a pair of vertically disposed side pieces that are secured to the inner surfaces of the third portions 71 of the frame 68, and the side pieces 137 have the trunnions 136 pivotally or swivelly connected thereto so that a rocking or swinging movement of the scraper blade can take place. Vertically disposed brace units 139 are secured adjacent the outer surface of the side pieces 137, and the numeral 140 indicates each of a pair of spaced parallel horizontally disposed base pieces which are suitably secured adjacent the lower portions of the side pieces 137 and brace units 139, and the front end portions of the base pieces 140 are turned outwardly as at 141.

There is further provided hydraulic cylinders 142 which are connected as at 143 to the support member 112, and piston rods 144 are adjustably connected to the hydraulic cylinders 142. Bell crank levers 145 are connected to the piston rods 144 as at 149, and the bell crank levers 145 are hingedly or pivotally connected to the fourth portions 72 of the frame 68 by means of pivot pins 146. The numeral 147 designates each of a pair of wheels that are connected as at 148 to the bell crank levers 145. The cylinders 142 are adapted to be connected to a suitable source of supply of hydraulic fluid under pressure as by means of hoses or conduits 150 and 151.

With further reference to FIGURE 3, the numeral 152 indicates a horizontally disposed tubular element that is arranged below the support member 112.

There is further provided the rods 154 which are connected as at 155 to the cradles or hook members 123, and these rods 154 are slidably or adjustably supported in bearing units 156 that are pivotally connected as at 157 to the elements 122, and coil springs 158 are circumposed on the rods 154, and these coil springs 158 abut stop pieces 159.

From the foregoing, it is apparent that there has been provided a leveler which is especially suitable for use in grading or leveling ground such as the ground as indicated by the numeral 160 and in FIGURES 3 and 4 the numerals 161 indicate depressions or holes in the ground which are adapted to be filled with dirt as indicated by the numeral 162, and the numeral 163 indicates raised humps or hills that are adapted to be leveled by the machine of the present invention. In FIGURE 18 the numeral 164 indicates a road surface or the like over which the leveler is being transported.

When the leveler is being used, the parts are arranged as shown in the drawings, and for example with the parts arranged as shown in FIGURE 17, the leveler 30 is adapted to be pulled or towed behind a suitable towing machine such as the tractor 31, and the tractor 31 includes the usual hydraulic mechanism 35 for raising or lowering or adjusting the lift mechanism 34 of the tractor 31. Since the crosspiece 37 of the lift mechanism 34 is connected as at 42 to the hitch 39 of the leveler 30, it will be seen that by adjusting the hitch 34 up or down by means of the hydraulic cylinders 34, the effective height of the front portions of the leveler can be adjusted or regulated as desired.

With the parts in a position such as that shown in FIGURE 17, it will be seen that as the tractor 31 moves along a ground surface as indicated by the numeral 160, the leveler 30 will be pulled therebehind since the hitch 39 of the leveler is connected to the crosspiece 37 of the lift 34. The hitch 39 includes the side elements 40 which have their rear ends swivelly connected to the trunnions 67 of the body piece 63 of the turntable 60, and the turntable 60 has its lower plate 61 secured as at 62 to the bars 64 of the front runner section 44. The provision and construction of the turntable 60 is such that as the tractor 31 turns, the upper pipe 64 can move independently of the intermediate plate 63 and lower plate 61 so that in effect the turntable 60 functions as a fifth wheel assembly in order to permit the desired turning or guiding of the leveler to take place. The front runner section 44 includes the pair of spaced parallel runners 49 which support the front portion of the leveler, and the rear ends of the braces 43 are swivelly connected to the lugs 46 on the angle irons 45 and at 47. Thus, as the hitch 39 is moved up or down by up and down movement of the lift 34, binding will be prevented due to the swivel or pivotal connection at the points 47. It will also be noted that the brackets 52 which are secured to the runners 49 support bearings 53 which have trunnions 48 journaled therein, and these trunnions 48 are secured to or formed integral with the angle irons 45 so that this construction provides a pivotal mounting or support for the runners 49 whereby the runners 49 can pivot up and down independently of each other as for example when irregular ground surfaces are encountered. Thus, the runners 49 will pivot or move up and down in order to smoothly travel over various irregular surfaces of the ground. In addition, the front runner section 44 carries the smoothing blade 56 which includes the inclined portion 58 and the lower horizontal section 59, FIGURE 11, and the purpose of the smoothing blade 56 is to help make a preliminary smoothing out of any hills or depressions that may be encountered as for example when such hills or depressions consist of soft earth.

There is further provided a steering mechanism which includes the cables 83 that have their front portions trained around the pegs 46, and the front ends of these cables 83 are connected as at 153 to brackets 82 that are suitably secured to the bars 54. These cables 83 are also arranged in engagement with pulleys 86 and 87 on the main frame 68, and as shown in FIGURE 1 the rear portions of these cables 83 are arranged in criss cross relation with respect to each other, and the rear ends of the cables 83 are connected to rear runners 89 of a rear runner section 90 as for example by means of pegs or anchor pins 91. Adjustable turn buckles 88 are provided in the cables 83 so that by adjusting the turn buckles 88 the effective length of the cables can be varied or regulated or changed as desired. The construction of these cables 83 and associated parts are such that as the leveler is being pulled behind the tractor, the various parts of the leveler will proceed in the proper direction in order to insure that the leveling or grading can be effectively accomplished.

The rear runner section 90 has a construction which is generally similar to the front runner section 44, and it will be seen that the rear runner section 90 includes the pair of spaced parallel horizontally disposed separate runners 89 which are pivotally connected to the short angle irons 97 as at 96, so that the runners 89 are free to swivel or move up and down in order to properly travel over the ground. A rear smoothing blade 100 is mounted below the bars 98 of the rear runner section 90 as for example by means of brackets or securing elements or clamps, and the rear portion 72 of the main frame 68 is swivelly connected to the rear runner section 90 by means of the turntable 101. Thus, with reference to the rear turntable 101, it will be noted that as shown in FIGURE 12, the upper plate 105 is secured as by welding to the portions 72 of the main frame 68, and the body piece 103 and lower plate 102 are fastened as at 104 to the bars 98 of the rear runner section 90 and there is also provided the king pin 107 which functions as a pivot pin in the same manner that the pin 66 functions as a pivot pin for the front turntable 60. Thus, with the lock pin 108 removed from the openings 109 and 110, it will be seen that the body piece 103 in the lower plate

102 are capable of independent rotation or movement relative to the upper plate 105, but when it is desired to prevent independent or separate movement of these parts, it is only necessary to insert the lock pin 108 down through the registering apertures 109 and 110 in order to prevent the body piece 103 and lower plate 102 from moving relative to the upper plate 105. Such a lock pin 108 can be used as for example when it is desired to prevent the rear runner section 90 from swiveling or turning on the rear end of the main frame 68.

With reference to FIGURE 18, it will be seen that when the machine of the present invention is not being used for leveling ground, and for example when it is desired to transport or move the leveler from one location to another, the wheels 147 can be moved or transported from a position such as that shown in FIGURE 17 to a position such as that shown in FIGURE 18 and this is accomplished by introducing hydraulic fluid into the cylinders 142 from a suitable source of supply, and such hydraulic fluid can be introduced into the cylinders 142 as for example through the hoses or conduits 150 and 151. By such action, the piston rods 144 can be caused to move outwardly of the cylinders 142, and since the piston rods 144 are connected as at 149 to the bell crank levers 145, and since the bell crank levers 145 are pivotally connected as at 146 to the portion 72 of the frame 68, it will be seen that this outward or extensible movement of the piston rods 144 by introduction of the hydraulic fluid into the cylinders 142 will cause the levers 145 to pivot in a counter-clockwise direction, FIGURES 1 and 17, and since the wheels 147 are connected as at 148 to the levers 145, it will be seen that this will result in the wheels 147 being moved to a lowered position as shown in FIGURE 18 whereby these wheels will engage the ground such as the ground 164 in order to raise the various runners or other parts of the leveler above the ground so as to permit the leveler to be conveniently moved from place to place as desired due to the provision of the lowered wheels 147. After the desired location is reached by the leveler, the previously described cycle of operation in connection with the wheels 147 can be reversed so that the wheels 147 can be moved from a lowered position as shown in FIGURE 18 to a raised position such as that shown in FIGURE 17 whereby when the leveler is being used it is supported on the runners in order to permit the desired action to take place.

An important aspect or feature of the present invention is the automatic operation or action of the scraper blade as indicated by the numeral 132, and for example as shown in FIGURES 2, 3 and 4, the scraper blade 132 can assume different positions automatically in order to perform the desired or necessary operation such as for example the scraper blade 132 as arranged in FIGURE 4 will cause dirt 164 to be moved along as for example with the parts in FIGURE 4 when the quantities or weight of the dirt 164 is sufficient to overcome the holding forces acting on the scraper blade 132, and the blade 132 can pivot from the position shown in FIGURE 4 to the position shown in FIGURE 3, and this pivotal action of the scraper blade 132 takes place due to the provision of the parts such as the trunnions 136 on the bearings 134, FIGURES 7 and 8. With the parts in the position of FIGURE 3, the dirt 164 being pushed or engaged by the scraper blade 132 can be dumped into an opening 161, and then as the leveler continues to move from left to right, FIGURES 3 and 4, the scraper blade 132 will engage a hump or hill such as the hill 163 so as to level off such hill and smooth or level the ground in the desired manner. The action or pivotal movement of the scraper blade 132 is automatic so that it is not necessary to make any manual adjustments whenever the dumping or scraping or leveling steps are to be accomplished.

The numeral 165 indicates a narrow blade that is adapted to be attached to the lower portion of the scraper 132, as at 166, and the member 165 helps strengthen and reinforce the scraper.

The hitch 39 includes the previously described parts, and as shown in the drawings the outer member 78 has the inner member 79 telescopically arranged therein, so that when desired the member 79 can be extended outwardly with respect to the member 78 and this construction permits the member 79 to be extended sufficiently far forward so that the member 79 can rest on or above the cross brace 81 of the hitch 39. Thus, with the element 79 extended as for example as shown in FIGURE 16, when the lift of the tractor is caused to raise the hook 39, the entire main frame 68 can be raised or adjusted as desired. In addition, since the cross unit 77 is swivelly supported in the bearing 76, by disconnecting or removing the pins or bolts 75 from the lug 74, the member 78 and member 77 can be pivoted in a counter-clockwise direction relative to the bearing 76 so that for example the member 78 can be swung rearwardly from the solid line position of FIGURE 1 to the dotted line or broken line position of FIGURE 1.

The parts can be made of any suitable material and in different shapes or sizes.

The pre-leveling and final leveling plates or blades 56 and 100 each include a straight slanting or inclined portion as well as a lower horizontal portion which helps support the front and rear runners.

According to the present invention there is provided a true plane automatic leveler. By the expression automatic land leveler of a true plane principle it is meant that the blade 132 in the center of the implement which does the scarfing or dirt moving does not move its position below or does not raise its position above the plane of the leveler. By the plane of the level is meant the bottom portion of the overall length of the level as it rides the ground surface, and it is to be understood of course that the purpose of the land leveler is to remove high bumps or fill depressions and leave a smooth surface as it is drawn or pulled over a field having such irregularity in order to provide smoother land which is especially suitable and necessary in connection with irrigation, landscaping purposes or the like.

As shown in the drawings, the land leveler of the present invention consist of a main frame 68 that is mounted on two sled type truck frames 44 and 90 which determine the general level of the land between the two points of the rear sled runner and front sled runner. As the level is drawn over rough ground surfaces, any high humps that get in between the front runners and the blade that is arranged adjacent the middle portion of the level will be cut off by the blade 132 so that the dirt will be spread and depressions can be filled in so that depressions or low spots in the ground can be eliminated and wherein all portions of the ground will be substantially arranged at the same level that the rear and front sled trucks determine for the blade.

The blade or plate 56 is fastened as previously described adjacent to the front runners 49, and the blade 56 functions as a minor preleveling device for the front truck, and the blade 100 functions as a final smoothing member for the rear truck 90 and also serves as a plain base for either end.

The level frame 68 is mounted on the truck frames 44 and 90 by means of the turntables 60 and 101, and there is provided the flexible pull hitch 39 for use in conjunction with the front turntable 60. The rear turntable 101 has a construction somewhat the same as the front turntable 60, but the rear turntable 101 may use the lock pin 108 as for example when the front truck 44 is completely removed from the leveling machine and in such cases where a direct tractor hook-up for extremely rough ground is being used, and this is illustrated in FIGURE 19. With the parts arranged as shown in FIGURE 19 the truck 44 is completely removed from the level as for example when rough ground conditions are being en-

countered, and this permits the leveling machine to be raised and lowered by the hydraulic lift mechanism 34 of the tractor 31.

The blade 132 is provided with the guide members 133 on the ends thereof, and the blade 132 is pivotally connected to the side pieces 137 and base pieces 141 by means of the trunnions 136 of the bearings 134, and the pivot pins or trunnions 136 permit the blade 132 to pivot approximately thirty-five degrees forward from an upright position such as that shown in FIGURE 4 to a position such as that shown in FIGURE 3 and this is automatically controlled by the counterweight 129 together with the cables 117 and their associated parts.

In operation of the leveler, the high ground that is being cut by the blade creates pressure which actuates the blade 132 so as to force it back against the pipe level braces or members 112 and 152, as for example as shown in FIGURE 4 so that there is provided a final support for a maximum load. With the blade loaded with dirt as indicated by the numeral 164 in FIGURE 4, and with the counterweight 129 fastened to the cables 117, and with the cables 117 connected as at 138 to the beams 131 of the blade 132, the counterweight 129 will be pulled upwardly so as to hang freely for maximum weight, and this creates pressure on the blade 132 since the cables 117 will have a tendency to pull the blade beams or posts forwardly so as to help aid the blade to again lose its soil. As the counterweight 129 pulls the blade forward about fifteen degrees, the blade 132 will have lost its extreme pressure and the entire counterweight is not now needed, and the counterweight will settle into and be suspended in the weight release arms or cradles 123 as for example as shown in FIGURE 3, and these cradles 123 are pivotally connected as at 124 to the uprights 118. The action of the weight relief bars or cradles 123 are controlled by the coil springs 158 and push rods 154, and the rods 154 have a transverse end portion connected as at 155 to the cradles 123, and these rods 154 are slidable in bushings 156, and there is provided stop members 159 for maintaining the springs 158 in their proper location on the rods 154.

As the counterweight 129 settles downwardly as shown in FIGURE 3, it forces the arms or cradles 123 downward so as to create pressure on the coil springs 158 which increases as the counterweight moves further downward until it comes to rest in the places provided for a final stop, and at this point the blade 132 has tilted forward about thirty-five degrees so as to help the blade 132 lose as much material or soil as possible. In this position again if the blade 132 encounters a high hump to be cut and moved, the spring pressure on the cradles 123 begins to push the cradles and the counterweight upwards so as to relieve the weight whereby it will not restrict or retard movement of the blade 132 for rapid loading.

Another important aspect of the present invention is the action of the blade in conjunction with the angled scraper 141 that is secured to or formed integral with the front portions of the lower angle irons 140 which form part of a dirt box frame. The angled members 141 help scrape the dirt inward towards the center of the level and provides clearance for the blade axle boxing behind that is bolted on the same angle iron.

There is further insured a short turning principle as for example due to the provision of the cables or lines 83 which are connected to the final truck frame 90 as at 91, and these cables are connected to the front truck frame 44 with a rolling clevis arrangement as indicated by the numeral 153 and 82, and these cables also engage pulleys on the main frame. The cables 83 operate on a give and take principle and with this arrangement as the front truck 44 is turned ninety degrees to the left for example, the rear sled truck 90 will have turned a maximum of about 50 degrees which is sufficient for the contended purposes. When the front truck is turned a certain direction, this will result in proper movement of the cables and associated parts, and after the level turn has been completed and the leveler is again being pulled straight, the rear truck will be straight with the front truck.

When the leveler of the present invention is being transported, the rubber tired wheels 147 can be lowered as shown in FIGURE 18, and hydraulic rams or cylinders 142 are provided for moving these wheels 147. A remote control mechanism can be used for actuating the rams or cylinders 142 so that for example the operator of the tractor 31 can readily raise or lower the wheels 147 as desired or required. The hydraulic fluid for operating the rams 142 may be supplied from any suitable mechanism for the device, such as the hydraulic fluid pump and reservoir that are conventionally found on tractors. As the wheels are moved downwardly to engage the ground, they begin to raise the back part of the level upwardly until the piston rods of the cylinders will have completed their push and at that time the leveler will have attained sufficient clearance for the back part of the level.

The pipe or member 78 is adapted to selectively extend between the portion 69 of the frame 68, and there is provided in the member 78 the telescoping inner member 79, and this inner member 79 can be pulled forward or over the part 81 by manually gripping the element 80 so as to stabilize and give added hitch support. The pins 75 can then be inserted through the lugs 74 on top the level frame, whereby the level is now in position to have the front end raised for transport as for example by means of the tractor hitch lift mechanism which is integral and conventional of modern farm tractors, whereby the level is now in transport position so that it can be readily moved from place to place over road surfaces or the like as desired or required. The telescoping pipe or element 79 is pushed back into the member 78 when in operation so that there will be no interference or obstruction to the tractor that is pulling the leveler.

In addition, a narrow blade is adapted to be fastened to the lower portion of the blade 132 and such a narrow blade may be made of a reversible type so that it can be reversed or interchanged in order to achieve maximum economy.

The front portions of the frame 68 as indicated by the numeral 70 in conjunction with the portions 69 are arranged so as to provide sufficient clearance or room for the transport pipe or element 79 to fit therein. The portions 69 extend forward approximately the length of half the width of an ordinary farm tractor which ranges from fifty-two to fifty-eight inches, and this is necessary as for example when the front trucks are removed from the leveler in order to permit a direct tractor hook-up such as shown in FIGURE 19 in order to permit greater tractor turning freedom.

The leveler of the present invention is quite effective and efficient in use, and is extremely maneuverable and can be conveniently transported.

Although the invention herein described is fully capable of achieving the objects and providing the advantages hereinbefore mentioned, it is to be understood that it is merely illustrative of the presently preferred embodiment of the invention and that it is not to be limited to the details of construction herein described other than as defined in the appended claim.

What is claimed is:

A leveler comprising a hitch embodying a pair of side elements connected together, a pair of angularly arranged braces having their front ends affixed to said side elements, a front runner section providing a front truck comprising a pair of horizontally disposed short angle irons having upstanding ears thereon pivotally connected to the rear ends of said braces, trunnions extending outwardly from said angle irons, a pair of front runners having blocks affixed thereto and bearings on said blocks

swivelly receiving said trunnions; a pair of horizontally disposed spaced parallel bars extending between said pair of angle irons and secured thereto, a smoothing blade mounted below said bars and including an inclined portion and a lower horizontally disposed portion; a turntable mounted on said bars intermediate the ends thereof, trunnions affixed to said turntable, the rear portions of said side elements being connected to said last named trunnions, a main frame including a pair of similar side members, and said side members including spaced parallel forwardly disposed front first portions connected to said turntable, second portions arranged angularly with respect to said first portions, spaced parallel third portions arranged rearwardly of said second portions, angularly arranged fourth portions disposed rearwardly of said third portions, spaced parallel apertured lugs extending upwardly from the first portions of said frame, bearing elements on the inner surfaces of the second portions of the frame, a cross element pivotally connected to said bearing elements, an outer tubular member arranged at right angles with respect to said cross element and affixed thereto, and said tubular member adapted to selectively extend between the first portions of the frame, pins adapted to be selectively arranged above said outer tubular member and said last named pins adapted to engage said lugs, an inner tubular member slidably arranged in said outer tubular member, hand pieces connected to the outer end of said inner tubular member, a cross brace extending between the side elements of said hitch for selective engagement by the inner tubular member; a rear runner section defining a back truck comprising a pair of spaced parallel horizontally disposed back runners having blocks thereon with bearings affixed to said last named blocks, angle irons having trunnions swivelly engaging said last named bearings, a pair of spaced parallel horizontally disposed bars extending between said last named angle irons and secured thereto, a smoothing blade mounted between said last named angle irons and arranged below the last named bars, a rear turntable connected to the fourth portions of the main frame and also operatively connected to the rear runner section, a lock pin for said rear turntable, cables engaging said main frame and connected to said front and rear runner sections, first, second and third horizontally disposed spaced parallel tubular support members extending between the third portions of the frame and secured thereto, support pieces affixed to said first support member, brackets affixed to said support pieces, pulleys supported by said brackets; vertically disposed uprights affixed to said second support member, yokes affixed to said uprights and said yokes including upper and lower pieces interconnected by vertically disposed element, cradles pivotally connected to said uprights, support pieces affixed to said second support member and extending upwardly therefrom, brackets connected to said last named support pieces and said last named brackets having pulleys journaled thereon, a counterweight adapted to selectively engage said cradles, lines connected to said counterweight and engaging the last named pulleys, a pair of spaced parallel beams having said lines connected thereto, a scraper blade affixed to said beams, guide members mounted at the ends of the scraper blade, bearing members affixed to said scraper blade and said bearing members having trunnions thereon, a pair of spaced parallel side pieces affixed to the inner surfaces of the third portions of the frame and said side pieces having said last named trunnions pivotally connected thereto, base pieces connected to the lower surfaces of the side pieces, rods connected to said cradles, bearing units operatively connected to said rods and said bearing units being pivotally connected to said yokes, coil spring circumposed on said rods, hydraulic cylinders connected to said second support member, piston rods connected to said cylinders, bell cranks pivotally connected to the fourth portions of the frame, and said bell cranks being connected to said piston rods, and wheels connected to said bell cranks.

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