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LAND LEVELER

3,034,239

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2 Sheets-Sheet 2

FIG. 4

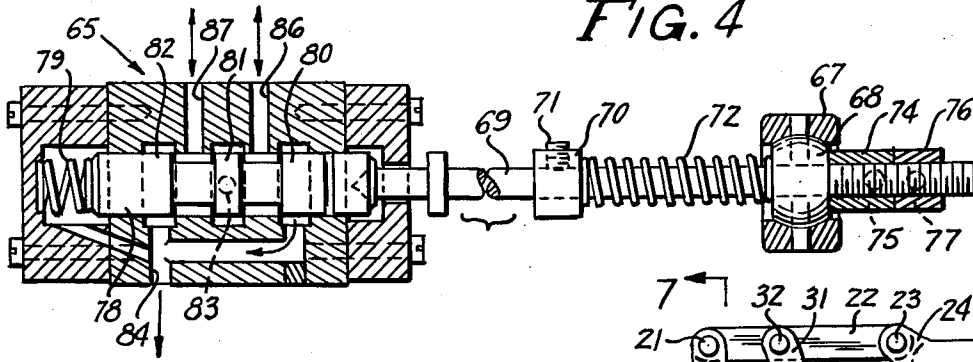


FIG. 6

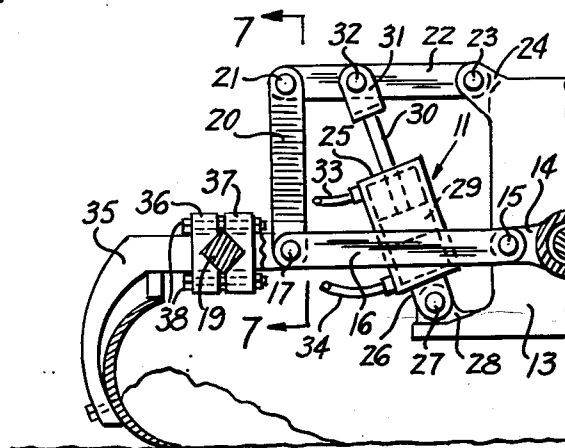


FIG. 5

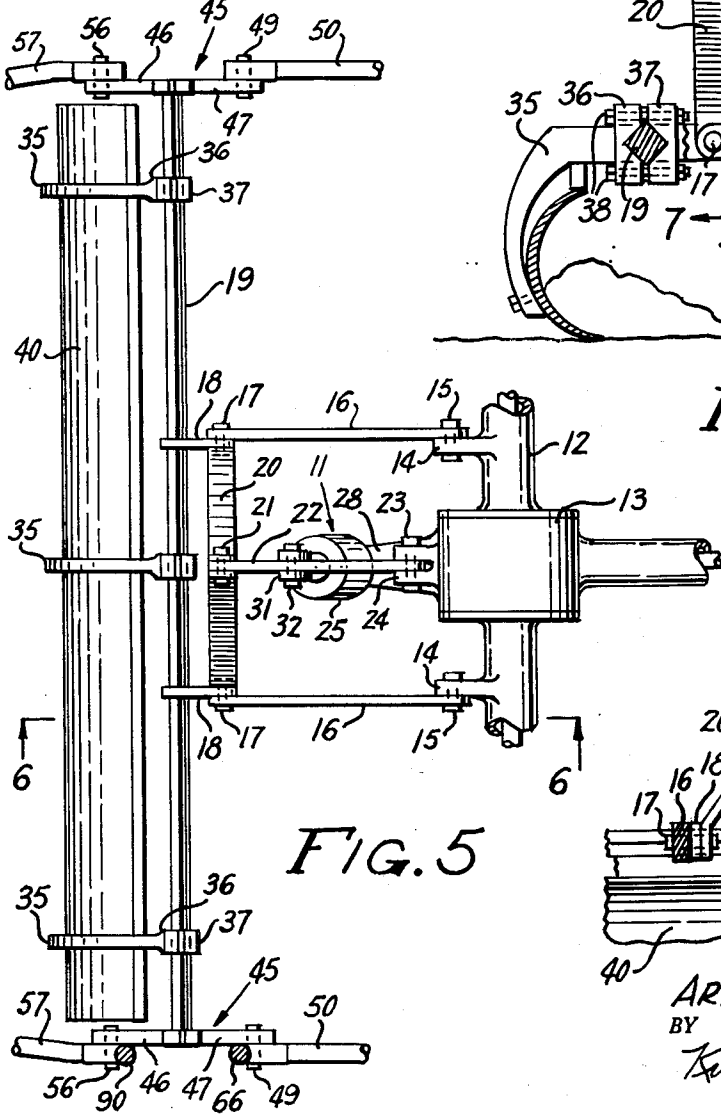
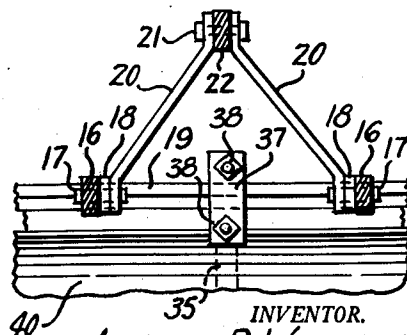


FIG. 7



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LAND LEVELER

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1 Claim. (Cl. 37—180)

This invention relates to a land leveler and has as its primary object the provision of an improved tractor mounted scraper blade having automatically actuated means for varying the height of the blade in accordance with the contour of the ground.

An additional object of the invention is the provision of a device of this character particularly adapted for fine work in leveling minor protuberances and humps in ground to be leveled after the coarse leveling has been accomplished by other conventional means.

A further object of the invention is the provision of a front and rear feeler element, each of the feeler elements being provided with a tracer wheel and so arranged that when the front tracer wheel strikes a high or low area the depth of the blade will be automatically varied one-half the amount of the raise or fall of the tracer wheel.

A further object of the invention resides in the provision of a rear feeler element carried by a tracer wheel so that the means controlling the elevation of the blade will remain unaffected when traveling over substantially straight smooth ground either inclined upwardly or downwardly.

As conducive to a clearer understanding of this invention, a conventional land plane or leveler comprises a long and very rigidly braced frame carried by four caster wheels with wide steel rims. Midway from front to back is a scraper blade mounted adjustably up and down. This adjustment may either be manual or hydraulic. If hydraulic, it is controlled from the tractor seat, and a stop, or indicator, visually showing the operator. When the blade has been lowered to a point where the cutting edge on the bottom of the scraper is in line with the lowest point on all wheels, if the ground is somewhat soft due to the weight on the wheels, they may sink in enough to cause the scraper to overload and stall the tractor pulling the plane. In this case, the scraper is adjusted upward to a point where the scraper will load and unload as it goes along. This then is ideal. A plane of this type, if fifty to sixty feet long, and the longer the better, will weigh from three to five tons, and would require a crawler tractor.

This invention obviates many of the above difficulties by providing a tractor with three point hitch and its own hydraulic pressure supply, to which is attached a scraper blade which is adapted to connect to the three point hitch on the tractor, the depth of the scraper blade being automatically controlled by feeler elements carrying front and rear tracer wheels.

A further object of the invention is the provision of an improved servo mechanism actuating a hydraulic piston and linkage therefor to accomplish the elevating and lowering of the blade in accordance with irregularities in the ground contour.

Another object of the invention is the provision of a device of this character which is sturdy and durable in construction, reliable and efficient in operation, and relatively simple and inexpensive to manufacture and utilize.

Still other objects reside in the combination of elements, arrangements of parts, and features of construction, all as will be more fully pointed out hereinafter and disclosed in the accompanying drawings wherein:

FIGURE 1 is a side elevational view of the device of the instant invention shown in association with a conventional tractor or the like.

FIGURE 2 is a top plan view of the apparatus of FIG. 1 taken substantially on line 2—2 of FIG. 1.

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FIGURE 3 is an enlarged end elevational view of a portion of the mechanism taken substantially along the line 3—3 of FIG. 2 as viewed in the direction indicated by the arrows.

FIGURE 4 is an enlarged sectional view taken substantially along the line 4—4 of FIG. 3 as viewed in the direction indicated by the arrows.

FIGURE 5 is an enlarged plan view, partially in section, taken substantially along the line 5—5 of FIG. 1 as viewed in the direction indicated by the arrows.

FIGURE 6 is a sectional view taken substantially along the line 6—6 of FIG. 5 as viewed in the direction indicated by the arrows; and

FIGURE 7 is a sectional view taken substantially along the line 7—7 of FIG. 6 as viewed in the direction indicated by the arrows.

Similar reference characters refer to similar parts throughout the several views of the drawing.

Having reference now to the drawings in detail, there is generally indicated at 10 a conventional tractor or the like which is provided with a hydraulic lift mechanism generally indicated at 11. The tractor includes a rear axle 12, and a differential housing 13. Extending from the rear axle 12 on opposite sides of the differential housing are a pair of lugs 14, to which are pivotally secured, as by means of pivots 15, links 16 which in turn are pivotally connected as by pivots 17 to projecting lugs 18, which are clampingly engaged about a square shaped tool bar 19. Also engaged by pivot 17 are inclined upwardly extending arms 20 which are pivotally connected at their converging upper ends by means of a pivot 21 to a link 22 which, at its other end, is pivotally connected by means of a pivot 23 between a pair of lugs 24, the top of the differential housing 13.

A self locking hydraulic cylinder 25 having an extending lug 26 at one end is pivoted as by means of a pivot pin 27 to a projection 28 extending from the bottom of the differential housing 13. The cylinder contains a piston 29 which has a piston rod 30 extending therefrom, the rod 30 terminating in a clevis 31 which is pivotally connected as by a pivot 32 to an intermediate point of link 22. Fluid under pressure is supplied to the cylinder through an upper line 33 which tends to retract the piston in a lower line 34 which serves to extend the piston, the piston being actuated in a manner to be more fully described hereinafter.

Depending arcuate arms 35 are provided with end plates 36, which together with opposed plates 37 are clampingly engaged about the tool bar 19 by means of bolts 38. Any desired number of arms 35 may be provided, although in the illustrative embodiment three are shown, and to these arms is secured a longitudinally extending arcuate scraper blade 40, the latter being of conventional design. It will thus be seen that through the linkage previously described that the blade 40 is selectively raised and lowered in accordance with the travel of the piston 29 in the cylinder 25.

At each end of the tool bar 19 there is provided a normally horizontal control bar generally indicated at 45 which is comprised of two T-shaped elements 46 and 47 which are clampingly held about square tool bar 19 by means of bolts 48 with their stems extending in opposite directions. Secured to each of the forwardly extending stems as by means of a pivot 49 is a feeler element 50, the two forward arms converging at a point 51, well in advance of the front end of the tractor. At the point of the convergent feeler element 50 there is provided a sleeve 52 which rotatably mounts a post 53 having an offset fork 54 thereon which carries a tracer wheel 55. Correspondingly, to each of the members 46 there is pivotally mounted, as on a pivot 56, a rearwardly convergent tracer element 57, the rear members converging at a sleeve 58

which carries a post 59 at the lower end of which is a fork 60 which carries a rear tracer wheel 61.

The tracer wheels 55 and 61 thus serve through the tracer elements 50 and 57 as control elements for a hydraulic valve generally indicated at 65, best seen at FIG. 3, in a manner to be more fully described hereinafter.

Fixedly secured to the inner end of one of members 50 is an upright 66, which at its upper extremity is provided with a collar 67 which surrounds a ball member 68 (FIG. 4) mounted on a valve stem 69. A collar 70 is secured on the stem 69 by means of a set screw 71 and biases one end of a coil spring 72 against the ball member 68.

The end of stem 69 is threaded as at 73, and has an adjusting nut 74 provided with an operating handle 75 positioned thereon, whereby the tension exerted by the spring 72 against the ball member 68 will bias the valve stem 69 toward a valve spool 78 to overcome the compression of a spring 79. This causes blade 40 to raise to a point that centers a valve spool 78 in valve body 65. A lock nut 76 with an operating handle 77 is provided exteriorly of adjusting nut 74. The arrangement is thus such that as the forward tracer wheel 55 moves upwardly or downwardly the valve stem 69 is moved forwardly or backwardly. Interiorly of the valve assembly 65 the valve spool 78 is spring biased at one end as by means of the spring 79. When in central or neutral position the valve permits the flow of fluid about three valve members 80, 81, and 82, fluid under pressure being supplied to the interior of the valve through a passage 83 and returning through a line 84 to a suitable tank for hydraulic fluid carried by the tractor or other vehicle, there being thus no pressure then on piston 29. When the stem 69 is moved to the left as viewed in FIG. 4, for example, fluid is forced through an outlet 86 through the line 34 in a direction to move piston 29 to raise the blade 40. Similarly, when the valve body 65 is moved to the left as seen in FIG. 4, fluid flows through the outlet 87 into the line 33 to move the piston in the opposite direction and lower the blade.

The rear feeler element 57 is also provided at one end with an upright 90, which is fixedly secured to the valve housing 65, and when the rear tracer wheel 61 is raised or lowered the valve stem 69 remains stationary but the valve housing is moved relative thereto to effect a corresponding opening and closing of outlets 86 and 87, and a corresponding movement of the piston 29 to raise or lower the blade. The arrangement is thus such that when the

tracer wheel strikes a hump of earth, as indicated at 100, for example, in FIG. 1, the tracer elements 50 are tilted to lower the blade 40 to smooth out the hump, a similar hump being indicated in dotted lines at 101 to the rear of the scraper blade.

From the foregoing it will now be seen that there is herein provided an improved land leveler which accomplishes all the objects of this invention, and others, including many advantages of great practical utility and commercial importance.

As many embodiments may be made of this inventive concept, and as many modifications may be made in the embodiment hereinbefore shown and described, it is to be understood that all matter herein is to be interpreted merely as illustrative, and not in a limiting sense.

I claim:

A land leveler comprising in combination a prime mover, a scraper blade, a tool bar fixed to said blade, hydraulic means for moving said tool bar to raise and lower said blade, a forwardly extending feeler element, a caster tracer wheel carried by said feeler element, a rearwardly extending feeler element, a second caster tracer wheel carried by said rearwardly extending feeler element, a normally horizontal control bar fixed to each end of said tool bar, means pivotally mounting said forwardly extending feeler element to the forward ends of said control bars for vertical movement, means pivotally mounting said rearwardly extending feeler element to the rear of said control bars for vertical movement, valve means actuated by the tilting of said feeler elements, controlling said hydraulic means to raise and lower said blade in accordance with the contour of the terrain over which said tracer wheels pass, said valve means including a valve housing connected to one end of said rearwardly extending feeler element, and a valve stem connected to said forwardly extending feeler element, a valve connected to said stem in said housing, whereby tilting of either of said feeler elements moves said valve and housing relative to each other, and hydraulic fluid passages connected to said hydraulic means for controlling said hydraulic means in accordance with the relative position of said valve and housing.

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