

April 16, 1940.

C. STRASSER ET AL

2,197,369

POWER LIFT MECHANISM

Filed Nov. 10, 1937

3 Sheets-Sheet 1

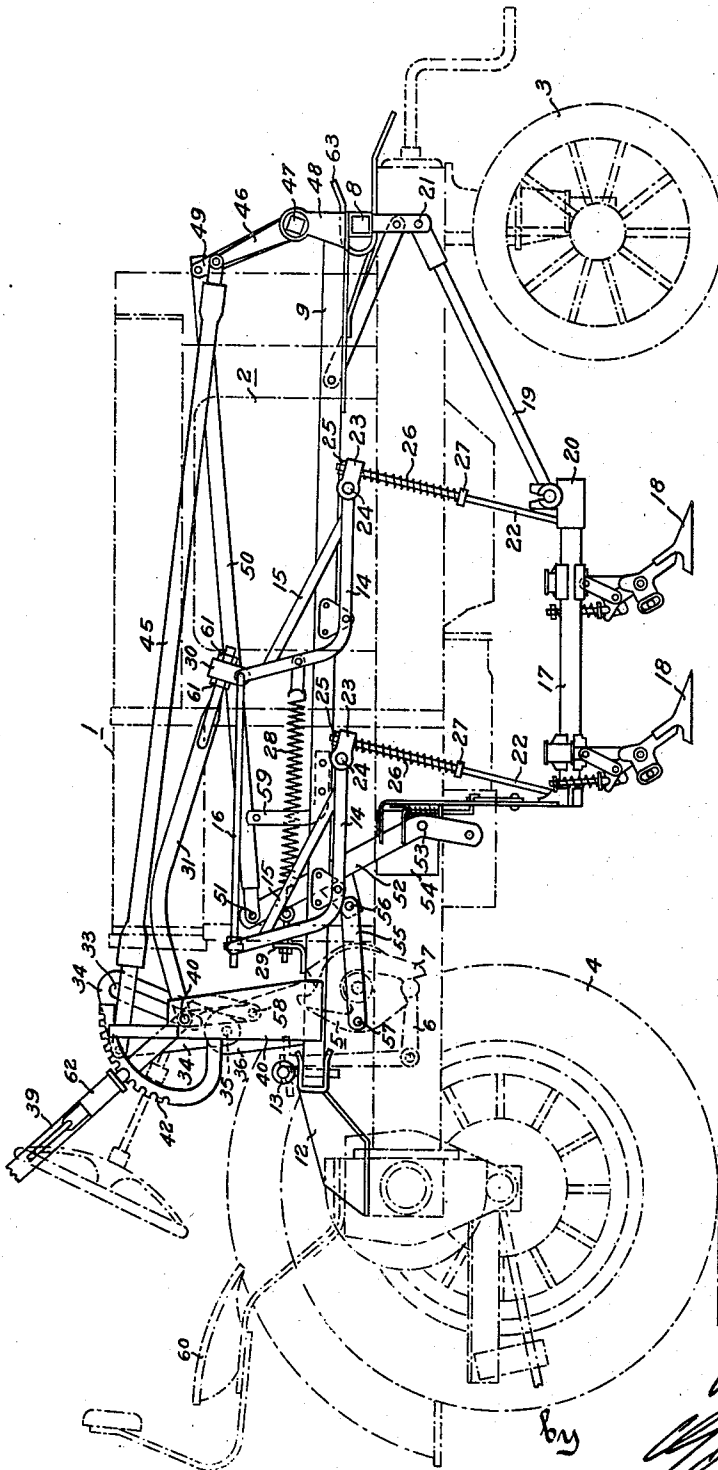


Fig. 1

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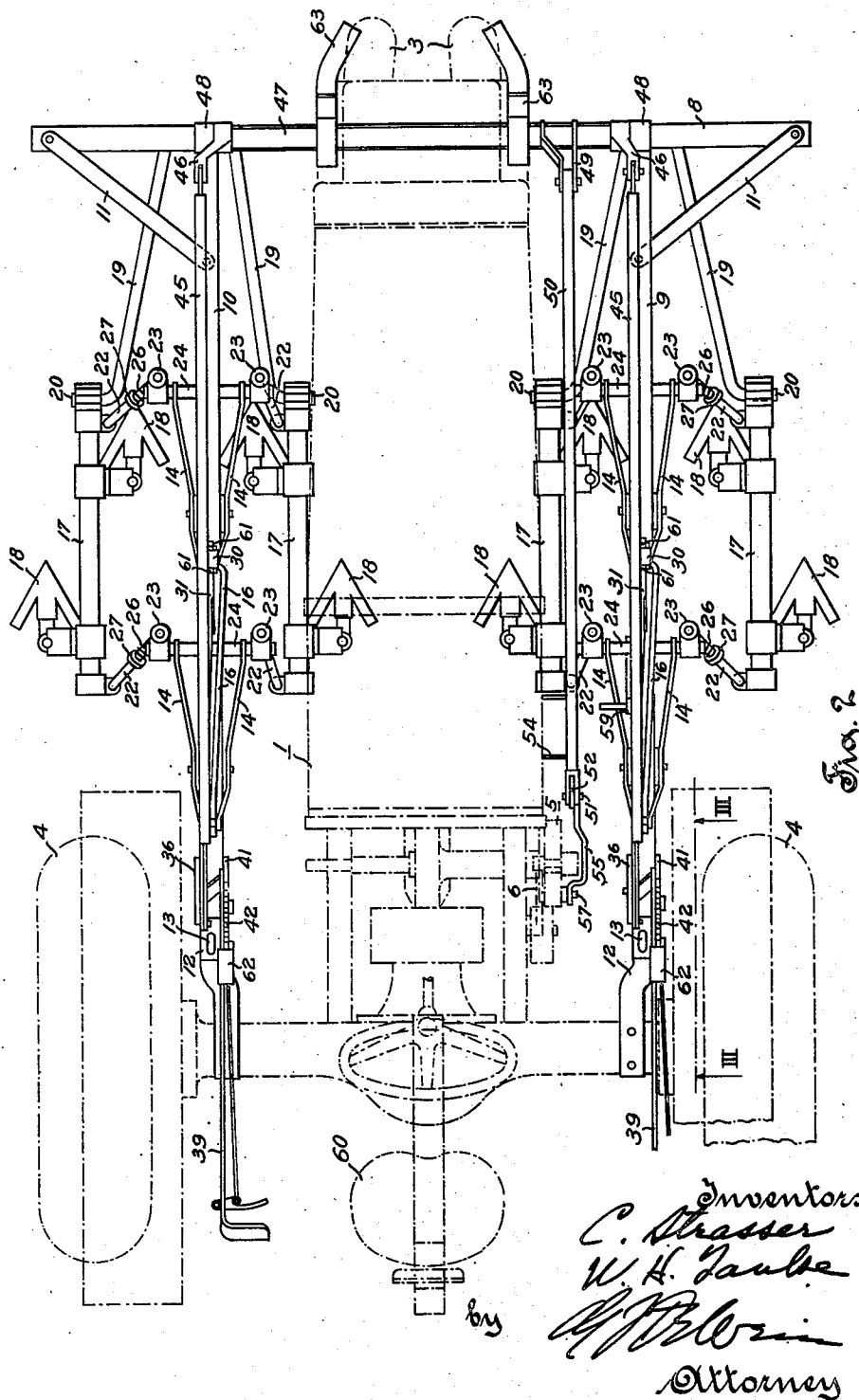
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3 Sheets-Sheet 3

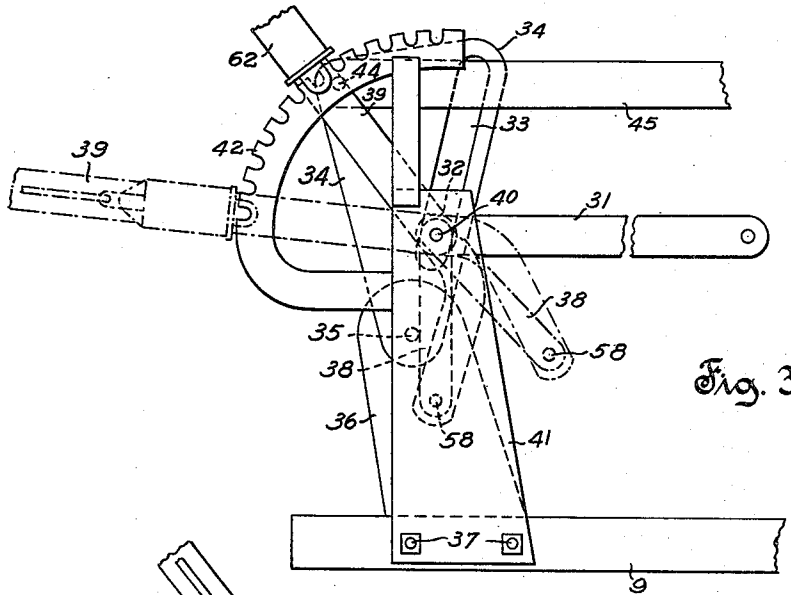


Fig. 3

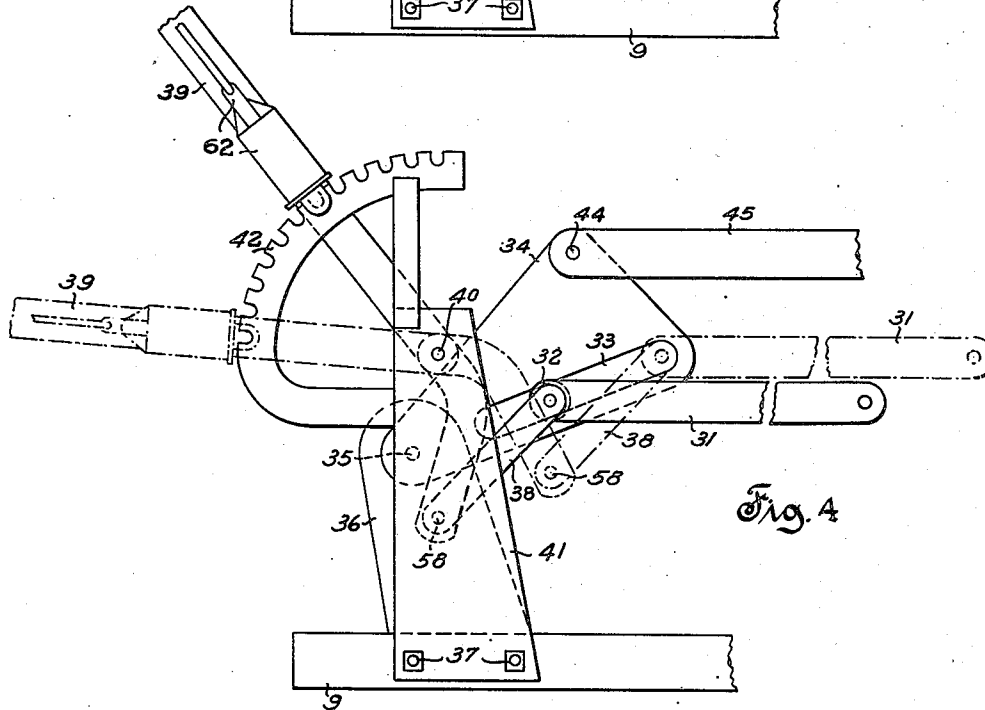


Fig. 4

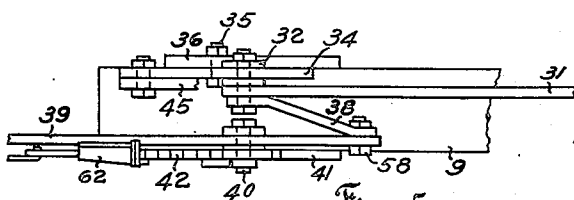


Fig. 5

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UNITED STATES PATENT OFFICE

2,197,369

POWER LIFT MECHANISM

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Application November 10, 1937, Serial No. 173,766

14 Claims. (Cl. 97—50)

The invention relates to lifting devices for agricultural implements or other machines having a tool or tools adjustable to working and non-working positions.

5 Agricultural implements such as cultivators and the like have heretofore been equipped with what is known as a "constant height lift device," that is, with a device comprising a manually operable element and another element, usually operable by power, for lowering the tool or tools from a predetermined non-working position to different working positions selectable by adjustment of the manually operable element, and for raising the tool or tools from any selected 10 working position to said predetermined non-working position by operation of said other element. It is an object of the invention to provide an improved constant height lift device of the mentioned character.

20 More specifically, it is an object of the invention to provide a constant height lift mechanism which is operable by power to lower a tool or tools from a predetermined non-working position to different working positions selectable by adjustment of a manually operable element, and to return the tool or tools to their predetermined non-working position independently of movement of the manually operable element. In other words, during the power movement of the mechanism which raises the tool or tools and during the power movement of the mechanism which lowers the tool or tools, the manually operable element is to remain stationary in any position of adjustment to which it may have been moved in order to determine the working position into which the tool or tools are moved by the lowering power movement of the mechanism. The fact that the position of the manually operable element, for instance of a hand lever, is not affected by the power movement of the mechanism is very desirable for safety reasons because the operator of the machine would be exposed to injury by the hand lever if the power movement of the mechanism would rock the hand lever and the operator could be struck by the rocking hand lever. Moreover, in a mechanism as contemplated by the invention, the hand lever is to be so arranged that it will always be within convenient reach by the operator.

50 Another object of the invention is to provide a constant height lift mechanism for a plurality of tool rigs, wherein the tool rigs may be moved collectively from a predetermined non-working position to different working positions, the working position of each rig being controlled

by a hand lever individual to each rig, and wherein all of the rigs may be raised collectively by power independently of movement of the hand levers.

A further object of the invention is to provide an improved constant height lift mechanism for the tools of an implement which may be readily attached to and detached from a tractor. In this connection the invention contemplates a constant height lift mechanism which is entirely mounted on the implement frame and has an operating link readily connectable with and disconnectable from an actuating element on the tractor selectively operable by power derived from the tractor motor. The operating link may be disconnected from the power actuated element on the tractor and secured on a suitable portion of the implement frame whereupon the implement together with the entire lift mechanism may be readily removed from the tractor.

The invention further contemplates an implement attachment of the mentioned character in which the tool or tools may be adjusted vertically with respect to the implement frame not only while the implement is attached to the tractor but also after the implement has been detached from the tractor.

Another object of the invention is to provide a constant height power lift mechanism which is simple and compact in construction, efficient in operation and which may be manufactured at low cost.

These and other objects and advantages of the invention will be apparent from the following description. A clear conception of an embodiment of the invention and of the operation of a device constructed in accordance therewith, may be had by referring to the drawings accompanying and forming a part of this specification, in which like reference characters designate the same or similar parts in the several views.

Referring to the drawings:

Fig. 1 is a side view of a tractor propelled cultivator having a constant height lift mechanism embodying the invention.

Fig. 2 is a top view of the tractor propelled cultivator shown in Fig. 1.

Fig. 3 is an enlarged section on line III—III of Fig. 2 showing parts of the mechanism in a first position of adjustment.

Fig. 4 is a view similar to Fig. 3 showing the same parts in another position of adjustment.

Fig. 5 is a top view of the parts shown in Fig. 3.

The reference numeral 1 in Fig. 1 designates

a tractor shown in dotted lines having a motor 2, front wheels 3 and rear wheels 4. Mounted at the right side of the tractor as shown in Figs. 1 and 2 is a half revolution clutch 5 and a trip lever 6 for controlling operation of the half revolution clutch. Clutches of this type are in common use on agricultural implements and it is believed unnecessary to describe the construction and operation of the clutch in detail, reference being made to U. S. Patent 1,868,474, July 19, 1932, W. F. Strehlow, Tractor, for a fuller disclosure of a half revolution clutch as indicated by the reference character 5 hereof. For the purposes of the present description it will suffice to say that the clutch 5 has a rotary driven member 7 which is held against rotation by the trip lever 6 but which upon tripping of the lever 6 will be engaged with a driving member deriving its power from the tractor motor. After the driven member 7 has been rotated through a half revolution it is automatically disconnected from its driving member and locked in position by the trip lever 6. Renewed tripping of the lever 6 will cause rotation of the driven member 7 through another half revolution which returns the driven member to its original position in which it will again be locked by the trip lever 6. For a fuller disclosure of the arrangement of the half revolution clutch on the tractor and its driving connection with the tractor motor reference is made to U. S. Patent 2,073,613, March 16, 1937, C. E. Frudden and W. F. Strehlow, Motor vehicle, and it will suffice to say that the driving member of the clutch has a worm and gear connection with the propeller shaft of the tractor so that power for operating the driving and driven members of the clutch will be available as long as the tractor is in motion, but when the tractor is stopped such power will no longer be available although the tractor motor may be kept running.

Mounted on the tractor is a cultivator attachment of the drive-in type, an attachment of this type being disclosed in U. S. Patent 1,906,430, May 2, 1933, W. F. Strehlow, Agricultural implement. The attachment comprises an implement frame having a front cross bar 8 supported on the tractor in brackets 63, a right side bar 9 and a left side bar 10. The side bars are secured at their forward ends to the cross bar and suitably braced by braces 11 and the rear ends of the side bars are received in brackets 12 mounted on the rear axle housing of the tractor. Pins 13 are inserted through the brackets and the rear ends of the side bars in order to secure the implement frame in fixed position on the tractor. Pivotally mounted on each side bar of the implement frame at opposite sides of the tractor are two lifting forks 14 suitably reinforced by braces 15 and connected at their upper ends by connecting rod 16 permitting swinging of the two lifting forks on each side bar in unison. The lifting forks serve to raise and lower cultivator rigs at opposite sides of the tractor, these rigs being the same on each side of the tractor and the description of one will also apply to the other. Referring to Figs. 1 and 2, the rig at the right side of the tractor comprises a pair of gang bars 17 carrying cultivator shovels 18 and a draft yoke having arms 19 to which the gang bars 17 are pivotally connected at 20. The forward end of the draft yoke is hinged on a drag shaft 21 mounted at the under side of the cross bar 8, there being one drag shaft at each side of the tractor. The lifting forks 14 are connected with the gang bars 17 by rods 22,

each gang bar having a rod pivotally connected thereto at its rear end and another rod pivotally connected thereto at its forward end near the pivot connection 20. The upper ends of the rods extend through knuckles 23 supported on cross shafts 24 at the forward ends of the lifting forks. The rods 22 have stops 25 on the upper ends so that they may be lifted by upward swinging movement of the lifting forks, and compression coil springs 26 are placed around the rods between the knuckles 23 and collars 27 adjustably secured to the rods 22, the springs 26 permitting yielding upward movement of the gang bars but being strong enough to transmit substantial downward thrust upon the gang bars. A tension spring 28 extending between the forward lifting fork 14 and a bracket 29 on the side bar of the frame assists in raising the cultivator rigs.

Pivotally secured to the upper end of the forward lifting fork 14 is a knuckle 30 for connecting a lifting bar 31 to the forward lifting fork 14. The lifting bar 31 extends through the knuckle 30 and is held in fixed position thereon by nuts 61. There is one lifting bar 31 on each side of the tractor and a mechanism for actuating each lifting bar is mounted on the implement frame at each side of the tractor, both mechanisms being identically constructed as follows: Mounted on the rear end of the lifting bar 31 is a roller 32 which is guided in a slot 33 of a plate 34. The plate 34 will hereafter be referred to as a lifting arm and it is pivoted at 35 on a bracket 36 secured to the side bar of the implement frame at the respective side of the tractor. The side bar is of square cross section and the bracket 36 is secured to the inner side of the side bar by bolts 37 extending through the bracket and side bar. Pivotally connected with the rear end of the bar 31 on the axis of roller 32 is one end of a link 38, the other end of the link being pivotally secured at 58 to the lower end of a hand lever 39. The hand lever has a pivot axis 40 on a bracket 41 secured to the side bar of the implement frame at the respective side of the tractor, the bracket being seated against the outer side of the frame bar and retained thereon by the same bolts 37 which retain the bracket 36 on the frame bar. Mounted in fixed position on the bracket 41 is a quadrant 42 concentric with the pivot axis 40 of the hand lever, and the hand lever has the usual detent mechanism 62 for holding the hand lever in any one of a plurality of adjusted positions into which it may be swung by hand around its pivot axis 40. Pivotally connected to the lifting arm 34 at 44 is an actuating bar 45 which extends forwardly along the side of the tractor.

The actuating bar 45 at the right side of the tractor and the actuating bar 45 at the left side of the tractor are connected at their forward ends to rocker arms 46 which are non-rotatably secured on a rock shaft 47 on the forward end of the implement frame. The rock shaft is rotatably mounted in suitable bearings 48 on the front cross bar 8 of the implement frame and the rock shaft carries an arm 49 which is pivotally connected with the forward end of a power lift bar 50. The rearward end of the power lift bar 50 has a pivotal but readily detachable connection 51 with the upper end of an arm 52 which is pivoted at 53 on a bracket 54 secured to the right side of the tractor forwardly of the half revolution clutch 5. A link 55 is pivotally connected at one end with the arm 52 on a lug 56 and with the driven clutch member 7 of the half revolution clutch 5 on a stud 57 mounted on the driven

clutch member 7 in eccentric relation to the axis of rotation of the clutch.

In Fig. 1 the cultivator shovels are shown in their highest elevated position above the ground which is the predetermined position from which they are to be lowered into selected positions more or less deeply in the ground, and to which predetermined position the shovels are to be raised by power from any lowered position independently of movement of the hand levers 39. Upon tripping of the trip lever 6 the driven member 7 of the half revolution clutch 5 is rotated through a half revolution, which will cause the following movements: The link 55 will be pushed forwardly causing forward swinging movement of the arm 52 which is transmitted through the power lift bar 50 to the rock shaft 47 and the latter will therefore be rotated through a predetermined angle in its bearings 48. This rotation of the shaft 48 causes forward movement of both rocker arms 46 which will be transmitted through the actuating bars 45 to the lifting arms 34. The lifting arms will therefore be swung through a predetermined angle in a forward direction from the position in which they are shown in Fig. 1. Forward swinging movement of the arms 34 in the mentioned manner is transmitted to the lifting bars 31 through the rollers 32 causing advance movement of the lifting bars 31 and consequent swinging of the lifting forks at the right and left sides of the tractor in a direction to lower the cultivator shovels towards the ground from their predetermined position above the ground. The length of the downward travel of the shovels caused by the mentioned forward swinging movement of the lifting arms 34 depends on the setting of the hand levers 39. In the position of the hand lever shown in Fig. 1 the shovels at the right side of the tractor will be moved by the mentioned forward swinging of the arm 34 at said side into a position well within the ground as indicated at 18' by dotted lines in Fig. 1.

Referring to Figs. 3 and 4 it will be noted that these figures show the hand lever 39 in full lines in the same position on the quadrant 42 in which the hand lever is shown in Fig. 1. Fig. 3 shows the arm 34 in the position which it occupies when the member 7 of the half revolution clutch 5 is in the position shown in Fig. 1, and Fig. 4 shows the lifting arm 34 in the position which it occupies after the driven member 7 of the half revolution clutch has been rotated through a half revolution. In the position of the lifting arm 34 as shown in Fig. 3 the center line of the slot 33 coincides with a plane through the pivot axis 35 of the lifting arm 34 and the pivot axis 40 of the hand lever 39, and the roller 32 occupies a position in the slot in which its axis coincides with the pivot axis of the lever 39. The link 38 has pivotal connection with the bar 31 coaxially with the roller 32 and the distance between this pivotal connection of the link 38 with the lifting bar 31 and the pivotal connection of the link 38 with the lever 39 at 58 is equal to the distance between the pivot axis 40 of the hand lever 39 and its pivotal connection with the link 38 at 58. In other words, the effective length of the link 38 is equal to the effective length of the lower arm of the lever 39, and in the position of the arm 34 shown in Fig. 3, which position corresponds to the raised position of the gang bars 17, a line through the pivotal connection 58 and the axis of the roller 32, and a line through the pivotal connection 58

and the pivot axis 40 of the hand lever 39 extend in the same direction. Therefore, in the position of the arm 34 shown in Fig. 1 the hand lever 39 may be moved to any position on the quadrant 42 without imparting any movement 5 whatever to the lifting bar 31. Referring to Fig. 4, it will be noted that at the end of the forward swinging of the arm 34 the link 38 has been moved about its pivot connection 58 on the lever 39 and the lifting bar 31 has been pushed 10 forwardly. The length of the forward movement of the bar 31 depends on the setting of the lever 39. If the lever is set to the full line position shown in Figs. 3 and 4 the roller 32 will be guided by the link 38 and by the slot 33 15 during the forward swinging movement of the arm 34, and when the arm 34 has arrived at the end of its forward movement as shown in Fig. 4 the roller will occupy a position in the slot 33 farther away from the pivot axis 35 than it occupied at the start of the forward swinging movement of the arm 34 as shown in Fig. 3. Assuming that the hand lever has been moved into its lower extreme position as indicated by dash-dotted lines in Figs. 3 and 4, forward move- 25 ment of the arm 34 will move the roller still farther away from the pivot axis 35 of the arm 34, and if the hand lever 34 has been set into its upper extreme position forward movement of the arm 34 will move the roller 32 closer to 30 the pivot axis 35. No matter to which position the hand lever has been adjusted, the arm 34 will swing the link 38 from a non-angular to an angular position relative to a plane through the pivot axis 40 of the hand lever 39 and its 35 pivotal connection 58 with the hand lever, and such movement of said arm 34 will always advance the lifting bar 31 in a forward direction, the advance movement being a maximum if the hand lever has been set to its lower extreme position as indicated in dash-dotted lines in Figs. 3 and 4, and a minimum if the hand lever has been set to its upper extreme position. The minimum advance movement of the lifting bar 31 will bring the shovels just into contact with the 40 ground and the maximum advance movement of the lifting bar will force the shovels into a position of maximum soil penetration.

Considering now a movement of the lifting arm 34 from the position shown in Fig. 4 into the position shown in Fig. 3 it should be noted that such return movement of the lifting arm is effected by rotation of the driven member 7 of the half revolution clutch through the second half revolution following the first half revolution 55 which has caused forward swinging of the arm 34. During the return or backward swinging of the arm 34 the roller will again be guided by the link 38 and the slot 33 and moved into the position shown in Fig. 3 irrespective of whether 60 the hand lever is in its upper or lower extreme position or in any other position, and the return movement of the arm 34 is entirely independent of any movement of the hand lever. In this manner the cultivator shovels will always 65 be returned to their predetermined position, that is, to a constant height above the ground independently of swinging movement of the hand levers.

It should also be noted that the right and left 70 cultivator rigs may be adjusted independently of each other to different depths of soil penetration by manipulation of the hand levers, for instance, the right cultivator rig may be adjusted deeper than the left rig and both rigs 75

will nevertheless be raised to the same level above the ground by operation of the half revolution clutch independently of movement of the hand levers. It should also be noted that the hand levers 39 in their upper as well as in their lower extreme positions and in any other position of adjustment are always within easy reach by an operator seated on the tractor seat 60.

Finally, it should be noted that the rigs may be adjusted by hand when power lift movement is not available at the clutch 5, and that the rigs may also be adjusted by the hand levers after the implement attachment has been removed from the tractor by backing the tractor out of the attachment frame. When the implement is to be detached from the tractor the hand levers are adjusted to their extreme upper positions and the rigs are lowered by operation of the half revolution clutch so as to bring the cultivator shovels in contact with the ground. The power lift bar 50 is then detached at 51 from the arm 52 and secured to a bracket 59 on the right side bar of the implement frame. The further procedure for detaching the implement frame from the tractor by backing the tractor out of the implement frame will then be the same as described in the mentioned U. S. Patent 1,906,430. After the implement has been detached and it should be desired to adjust the implement frame relative to the ground in order to bring it into correct position for reattachment to the tractor, this may be done by manipulation of the hand levers 39.

It should be understood that it is not intended to limit the invention to the exact details of construction herein shown and described, for various modifications may be made without departing from the scope of the appended claims.

It is claimed and desired to secure by Letters Patent:

1. In a lift mechanism, a lever pivotally adjustable to different positions, a link pivoted on said lever, a lifting bar pivoted on said link at a distance from its pivotal connection with said lever equal to the distance between the pivot axis of said lever and its pivotal connection with said link, and means operable independently of said lever for swinging said link, in any position of adjustment of said lever, from an angular, to a substantially non-angular position relative to a plane through the pivot axis of said lever and its pivotal connection with said link.

2. In a lift mechanism, a lever pivotally adjustable to different positions, a link pivoted on said lever, a lifting bar pivoted on said link at a distance from its pivotal connection with said lever equal to the distance between the pivot axis of said lever and its pivotal connection with said link, and means for swinging said link, in any position of adjustment of said lever, from an angular to a substantially non-angular position relative to a plane through the pivot axis of said lever and its pivotal connection with said link, said means comprising a pivoted arm operatively connected with said link and swingable independently of said lever.

3. In a lift mechanism, a lever pivotally adjustable to different positions, a link pivoted on said lever, a lifting bar pivoted on said link at a distance from its pivotal connection with said lever equal to the distance between the pivot axis of said lever and its pivotal connection with said link, and means for swinging said link, in any position of adjustment of said lever, from an

angular to a substantially non-angular position relative to a plane through the pivot axis of said lever and its pivotal connection with said link, said means comprising a pivoted arm swingable independently of said lever, and means on said link cooperating with said arm to secure said link at its point of pivotal connection with said bar to said arm for movement longitudinally thereof.

4. In a lift mechanism, a lever pivotally adjustable to different positions, a link pivoted on said lever, a lifting bar pivoted on said link at a distance from its pivotal connection with said lever equal to the distance between the pivot axis of said lever and its pivotal connection with said link, an arm pivoted on an axis in transversely spaced relation to the pivot axis of said lever, means on said link cooperating with said arm to secure said link at its point of pivotal connection with said bar to said arm for movement longitudinally of said arm, and means for swinging said arm into and out of a position in which said pivotal connection between said link and bar coincides with the pivot axis of said lever.

5. In a lift mechanism, a lever pivotally adjustable to different positions, a link pivoted on said lever, a lifting bar pivoted on said link at a distance from its pivotal connection with said lever equal to the distance between the pivot axis of said lever and its pivotal connection with said link, an arm pivoted on an axis in transversely spaced relation to the pivot axis of said lever, and having a slot extending radially of the pivot axis of said arm, means for guiding said link, at its point of pivotal connection with said bar, in said slot, and means for swinging said arm into and out of a position in which the axis of said slot coincides with a plane through the pivot axes of said lever and arm.

6. In a lift mechanism, a lever pivotally adjustable to different positions, a link pivoted on said lever at a fixed distance from its pivot axis, a lifting element connected with said link at a fixed distance from the pivotal connection between said lever and link, and actuating means operable between relatively fixed limits for rocking said link about its pivot axis on said lever, one of said operating limits of said actuating means being related to the pivot axis of said lever, and said fixed distances being proportioned so that, movement of said actuating means to said one operating limit places the connection between said link and lifting element into substantial coincidence with the pivot axis of said lever, whereby said lever may be moved through its entire range of adjustment without moving said connection between said link and lifting element from its position of substantial coincidence with the pivot axis of said lever.

7. In a lift mechanism, a support, a lever pivotally adjustable on said support to different positions, a lifting crank rockably mounted on said support, a lifting bar pivotally connected at one end with said lifting crank, connecting means between the other end of said bar and said lever adapted to retain said other end of said bar at a fixed distance from a portion of said lever radially spaced from the pivot axis of said lever, and actuating means operable between relatively fixed limits for transmitting endwise movement to said bar independently of pivotal movement of said lever, one of said operating limits of said actuating means being related to the pivot axis of said lever, and said fixed distance of said other end of said bar from said lever portion being

proportioned relative to the radial spacing of said lever portion from the pivot axis of said lever so that, movement of said actuating means to said one operating limit places said other end of said bar into substantial coincidence with the pivot axis of said lever, whereby said lever may be moved through its entire range of adjustment without substantially swinging said bar about its pivotal connection with said lifting crank.

8. In a lift mechanism, a support, an arm pivotally mounted on said support, a link having a pivotal connection with said arm guided thereon for straight line movement radially of the pivot axis of the latter, a lever pivotally adjustable on said support independently of said arm and having pivotal connection with said link at a fixed distance from the pivot axis of said lever, a lifting element connected with said link at a fixed distance from the pivotal connection between said link and lever, and means for rocking said arm back and forth between relatively fixed limits, one of said rocking limits of said arm being related to the pivot axis of said lever and said fixed distances being proportioned so that, at said one rocking limit of said arm, said line of movement of said pivotal connection between said arm and link substantially coincides with a line through the pivot axis of said lever and its pivotal connection with said link, and so that said pivotal connection remains at substantially the same position on said line while said lever is being moved through its entire range of adjustment.

9. In combination with a tractor having constant cycle power take-off means, an implement frame detachably connected with said tractor, a plurality of vertically movable tool rigs mounted on said frame, a plurality of pairs of relatively adjacent lifting arms and levers, one pair for each tool rig, pivotally mounted on rearward portions of said frame at opposite sides of said tractor, adjustable means operatively connecting said pairs of lifting arms and levers with said tool rigs, a rock shaft mounted on a forward portion of said frame having crank arms at opposite sides of said tractor, means connecting said rock shaft with said power take-off means for rocking said rock shaft in opposite directions from one position to another, and relatively long bars respectively connecting said crank arms with said lifting arms, each of said adjustable means comprising a link of substantially the same effective length as the respective lever and pivoted thereto, a relatively short bar operatively connected at one end with the respective rig for raising and lowering thereof by endwise movement of said short bar, and pivot means connecting said link and short bar, guided on the respective lifting arm for movement longitudinally thereof, the lengths of said long bars being such that in one of said positions of said rock shaft, corresponding to a raised position of said tool rigs, the pivotal connections between said short bars and said links substantially coincide with the pivot axes of said levers.

10. In combination with a tractor having constant cycle power take-off means, an implement frame detachably connected with said tractor, a vertically movable tool rig mounted on said frame, constant height lift mechanism for said tool rig comprising a power actuated element mounted on said frame and operable by said power take-off means to raise and lower said rig, manually adjustable control means mounted on said frame cooperating with said power actuated element for vertically adjusting said rig after lowering there-

of by said power actuated element, an operating member for said power actuated element detachably connected with said power take-off means; and locking means for said power actuated element comprising a fixed element on said frame connectable with said operating member after detachment thereof from said power take-off means to lock said power actuated element on said frame in a position corresponding to the position into which said power actuated element is moved by said power take-off means to lower said rig.

11. In combination with a tractor having constant cycle power take-off means, an implement frame detachably connected with said tractor, a plurality of vertically adjustable tool rigs mounted on said frame, a plurality of constant height lift mechanisms on said frame, one for each of said tool rigs, each of said mechanisms comprising a power actuated element operable to raise and lower the respective tool rig, and manually adjustable control means cooperating with said power actuated element for vertically adjusting the respective rig after lowering thereof by said power actuated element; collective operating means for said power actuated elements of all of said mechanisms, comprising a rock shaft mounted on said frame, a plurality of bars, one for each mechanism, operatively connecting said rock shaft with said power actuating elements for operating the latter by rocking of said rock shaft, a link operatively connected at one end with said rock shaft and detachably connected at the other end with said power take-off means; and a fixed locking element on said frame connectable with said link after detachment thereof from said power take-off means for locking said rock shaft on said frame in a position corresponding to the position into which said rock shaft is moved by said power take-off means to lower said rigs.

12. In combination with a tractor having constant cycle power take-off means, an implement frame detachably connected with said tractor, a lifting arm and a lever mounted on said frame for pivotal movement independently of each other, a vertically movable tool rig mounted on said frame, a link pivoted on said lever, a lifting bar operatively connected at one end with said rig for raising and lowering said rig by endwise movement of said bar, pivot means connecting said link and bar shiftably mounted on said arm, means including a second link detachably connected at one end with said power take-off means for rocking said arm from a first position corresponding to a raised position of said rig to a second position corresponding to a lowered position of said rig, and a fixed locking member on said frame connectable with said second link after detachment of the latter from said power take-off means to lock said lifting arm on said frame in said second position thereof.

13. In an implement, the combination with a wheeled frame having soil working tools connected thereto, of means including a crank element rockably mounted on said frame operatively connected with said tools for raising and lowering said tools by rocking of said crank element, a lever pivotally adjustable on said frame to different positions, a bar pivotally connected at one end with said crank element, means serving as a connecting link between said bar and lever, pivoted on said bar at the other end thereof and having pivotal connection with said lever at a distance from the pivot axis of the latter substantially equal to the distance between the pivo-

tal connections at opposite ends of said link means, and actuating means operable between predetermined limits to swing said link means about its pivotal connection with said lever, one
5 of said operating limits of said actuating means being so related to the pivot axis of said lever that, while said actuating means are at said one operating limit, said pivot connection between
10 said link means and said bar substantially coincides with the pivot axis of said lever.

14. In an implement, the combination with a wheeled frame having soil working tools mounted thereon for up and down adjustment relative thereto, of a mechanism for raising and lowering
15 said tools, comprising a lever pivotally adjustable

on said frame to different positions, a link pivoted on said lever, an operating connection between said link and said tools including an element pivoted on said link at a distance from its pivotal connection with said lever substantially equal to
5 the distance between the pivot axis of said lever and its pivotal connection with said link, and means operable independently of said lever for swinging said link, in any position of adjustment
10 of said lever, from an angular to a substantially non-angular position relative to a plane through the pivot axis of said lever and its pivotal connection with said link.

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