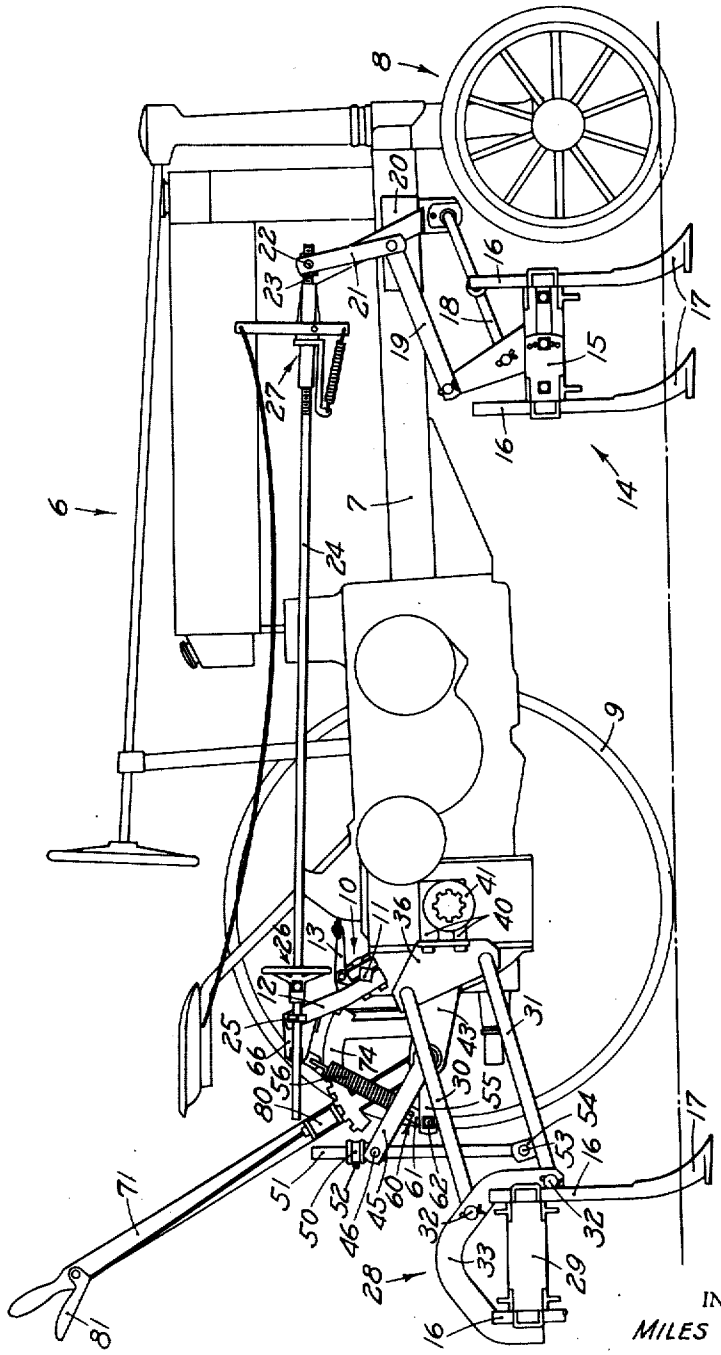
Oct. 3, 1939. M. H. TUFT 2,174,808

LIFTING MECHANISM

Filed Nov. 8, 1937 3 Sheets-Sheet 1

FIG-1



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Oct. 3, 1939. M. H. TUFT 2,174,808

LIFTING MECHANISM

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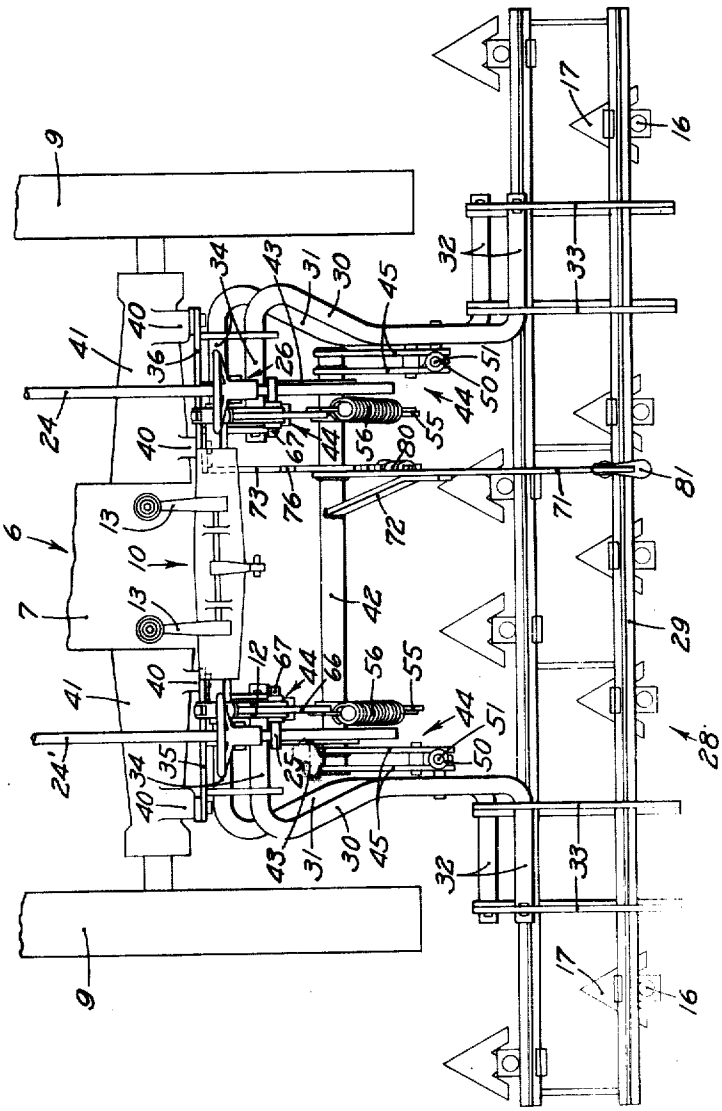


FIG-2

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Oct. 3, 1939. M. H. TUFT 2,174,808

LIFTING MECHANISM

Filed Nov. 8, 1937 3 Sheets-Sheet 3

FIG-3

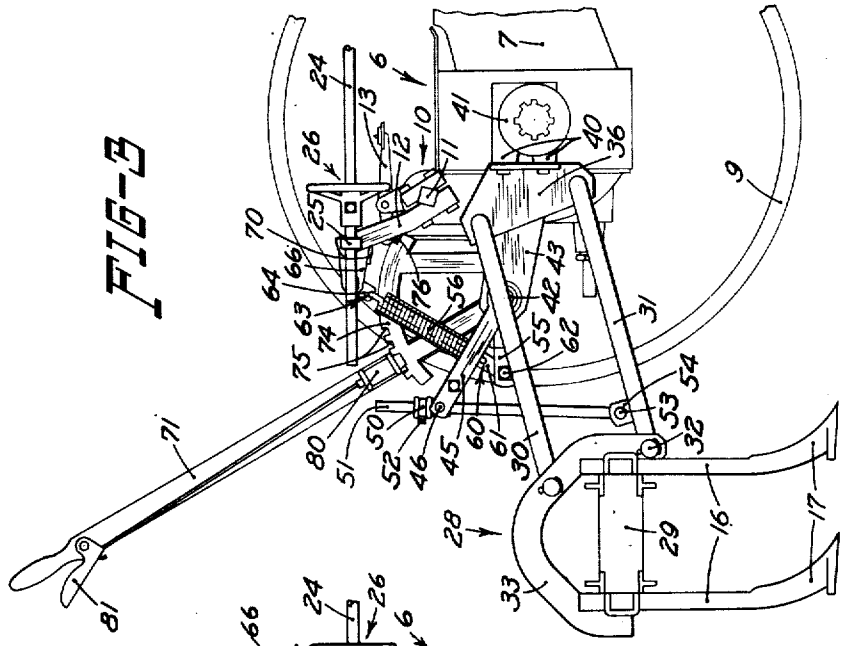


FIG-4

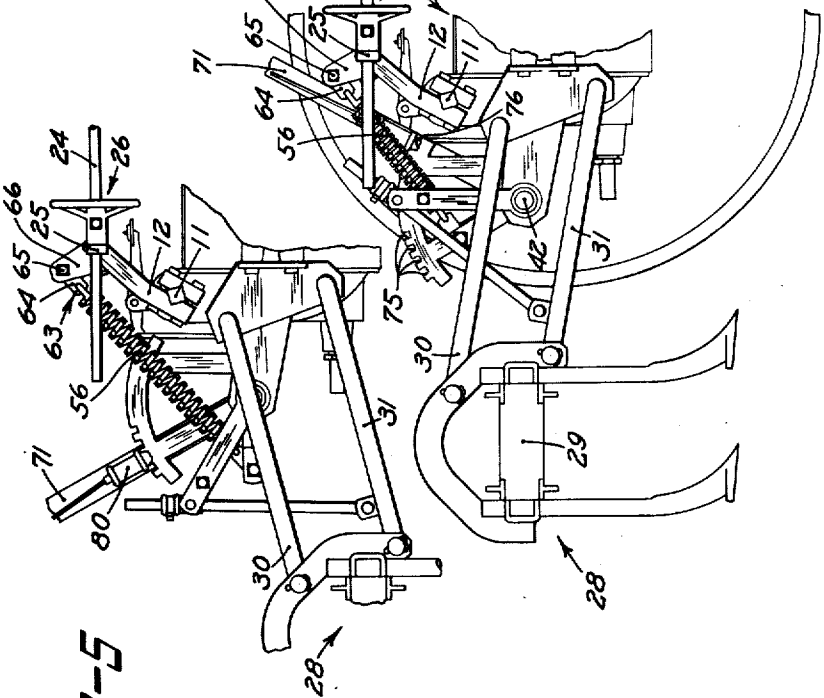


FIG-5

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Patented Oct. 3, 1939

2,174,808

UNITED STATES PATENT OFFICE

2,174,808

LIFTING MECHANISM

Miles H. Tuft, Moline, Ill., assignor to Deere & Company, Moline, Ill., a corporation of Illinois

Application November 8, 1937, Serial No. 173,393

23 Claims. (Cl. 97—50)

The present invention relates to lifting mechanism for implements and more particularly to lifting means for tractor mounted implements whereby energy derived from the power lift or other engine actuated mechanism is stored against future use and released, at option, to actuate the aforesaid lifting means.

The invention is particularly adapted for use in connection with tractor mounted cultivators of the type employing one set of cultivator rigs disposed adjacent to the front end of the tractor and another set of rigs disposed adjacent to the rear end thereof. Heretofore, in the transmission of power lift energy from the tractor to these rigs, both sets of rigs have been raised to inoperative position substantially simultaneously, and also lowered to operative position substantially simultaneously. This has been found to be objectionable, because in lifting the rigs at the ends of the rows the rear rigs will not have advanced as far as the front rigs before lifting, and hence these ends of the rows will be cultivated only by the front rigs. Likewise, in lowering the rigs at the start of each new set of rows, the front set of rigs will not enter the soil as far back as the rear set, and consequently these ends of the rows will be cultivated only by the rear set of rigs.

The principal object of the present invention, therefore, has to do with the provision of improved lifting means energized by the engine driven power lift mechanism for raising or lowering two or more ground engaging elements selectively or simultaneously at option. That is to say, by the use of the present invention, the lifting of the rear set of rigs may be delayed after the lifting of the front set until the tractor has advanced the distance between the two sets of rigs. Likewise, the lowering of the rear set of rigs may be delayed after the lowering of the front set until the tractor has advanced the same distance.

The principles of this invention have another application to the cultivation of pointed rows in contour farming. In this case the several laterally spaced tools can be raised, one at a time as each in turn reaches the end of its respective row, from energy stored by a single actuation of the tractor power lift mechanism.

In accomplishing this object, energy derived from the engine driven power lift mechanism is stored in a spring or other suitable means to be released at option to actuate the lifting mechanism and raise the ground working tool. In the preferred embodiment shown and described herein, a helical spring is interposed between the lifting arm on the power lift rock shaft and the implement lifting device so that as the power lift rock shaft is rocked, the spring is stressed and held under tension. Detent mechanism holds the implement lifting device against the pull of the spring until the operator wishes to raise the tools, at which time the detent mechanism is released and the lifting mechanism actuated by energy stored in the stressed spring.

These and other objects and advantages will become apparent after a consideration of the following detailed description of an embodiment of my invention, reference being had to the appended drawings, in which

Figure 1 is a side elevation of a tractor mounted cultivator illustrating the principles of my invention. The rear tractor wheel on the near side has been removed to show the invention more clearly.

Figure 2 is a plan view of the rear portion of the implement shown in Figure 1.

Figure 3 is a side view of the rear cultivator rig and lifting mechanisms with the tools in ground-engaging position. As in Figure 1, the near tractor wheel has been removed to show structural detail more clearly.

Figure 4 is similar to Figure 3 except that the ground working tools are shown in the raised or transport position, and

Figure 5 is a view of the lifting mechanism, showing the power lift rock shaft in the raised position with the spring stretched.

While the implement illustrated is a preferred embodiment, it is to be understood that the present invention is not intended to be limited to the particular implement or structure disclosed but is applicable to any implement having two or more ground engaging elements which are individually movable between operative and inoperative positions and which are raised separately or simultaneously at option.

Referring now to the drawings, the tractor to which the implement is attached is indicated in its entirety by the reference numeral 6 and is of conventional type comprising a generally longitudinal frame 7 supported at the front end on a dirigible truck 8 and at the rear end on a pair of laterally spaced traction wheels 9. Mounted on the rear end of the frame 7 is an engine driven power lift mechanism 10 which includes a transverse rock shaft 11 and a pair of lifting arms 12 clamped at opposite ends

thereof. The power lift mechanism 10 is controlled by operating pedals 13.

The implement itself comprises two tool holding structures, one of which shall be referred to as the forwardly mounted cultivator rig, and the other as the rearwardly mounted cultivator rig. The forwardly mounted rig, indicated in its entirety by the reference numeral 14, is of the type disclosed in full detail in my co-pending application, Serial No. 99,047, filed September 2, 1936, and in general comprises a transversely disposed tool carrying frame 15 to which are clamped in laterally and longitudinally spaced relation, the tool shanks 16 of cultivator shovels 17. The frame 15 is connected by means of forwardly extending parallel link draft members 18, 19 to a mounting bracket 20 which is fixed to the tractor frame 7 just behind the front supporting truck 8. The draft members 18, 19 are pivotally connected to both the tool carrying frame 15 and the mounting bracket 20, thereby permitting vertical swinging movement of the frame and attached tools while at the same time maintaining them in a horizontal plane regardless of position. Lifting of the rig and adjustment for depth are made by means of a lifting arm 21 which is rigidly fixed to the upper draft link 19. Pivotally connected at 22 to the upper end of the lifting arm 21 is a collar 23 which is secured to one end of a rearwardly extending rod 24. A similar connection is made on the opposite side of the tractor to a second rod 24'. The lifting arm 12 of the power lift mechanism 10 is provided with an eye bolt 25 through which the rear end of the rod 24 extends. In the operation of the power lift 10, the lifting arm 12 is rocked, causing the eye bolt 25 to engage the hub of a hand wheel 26, rigidly fixed on the rod 24, thereby effecting a forward movement of the rod 24. Depth adjusting mechanism 27 is carried on the rod 24 adjacent the lifting arm 21. For details of construction and operation of the depth adjusting mechanism 27, reference may be had to my co-pending application, Serial No. 93,836, filed August 1, 1936.

The rearwardly mounted cultivator rig, indicated in its entirety by the reference numeral 28, is similar in construction to the forward rig 14, comprising a transverse tool holding frame 29 disposed to the rear of the traction wheels 9, to which are clamped in laterally and longitudinally spaced relation, the shanks 16 of the cultivator shovels 17. The rig 28 is coupled to the tractor 6 by means of two laterally spaced pairs of forwardly extending parallel link draft members 30, 31. The rear ends of the draft members 30, 31 are bent outwardly to form crank portions 32 and are journaled in U-shaped bracket members 33 which are fixed, as by welding, to the frame 29. The forward ends of the draft members 30, 31 are bent inwardly at 34 and journaled in brackets 35, 36, which are bolted to bosses 40 formed on the back side of the tractor axle housing 41.

The frame 29 and attached tools are raised by means of a transverse rock shaft 42 which is disposed behind the tractor 6 and journaled in two laterally spaced brackets 43 which are fixed to the brackets 35, 36 and extend rearwardly therefrom. Disposed at each end of the rock shaft 42 is a lifting arm 44 comprising two spaced, rearwardly extending members 45 which are fixed to the shaft 42. Carried between the lifting arm members 45 and pivotally connected thereto by means of trunnions 46 is a collar 50 which is secured to a connecting rod 51 by a set screw 52. The lower end of the rod 51 is bent laterally outward, as at 53, and journaled in a bracket 54 which is fixed to the draft member 31 adjacent the U-shaped bracket members 33. Also rigidly fixed to the rock shaft 42 are two laterally spaced lever arms 55, the outer ends of which are connected to the power lift mechanism in a manner to be described shortly.

Operatively connecting the rock shaft 42 with the power lift mechanism 10 are two tension springs 56. The lower end of each spring is hooked through an aperture at 60 in a short strap 61 and the latter is pivotally connected by means of a pin bolt 62 to the end of the lever arm 55. The upper end of each spring 56 is likewise hooked through an aperture at 63 in a strap 64, and this strap is pivotally connected by means of a pin bolt 65 to a link 66 which is carried on the end of the corresponding power lift lifting arm 12. The link 66 is journaled on the shank 67 of the eye bolt 25 and is provided with a stop 70 which bears against the back side of the lifting arm 12 to limit the counterclockwise rotation of the link, as viewed in Figures 3, 4, and 5, while permitting free rotation in a clockwise direction. Thus, when the spring 56 is under tension, the link 66 is maintained rigid relative to the lifting arm 12. However, when the distance between the points 62, 65 tends to become less than the combined lengths of the relaxed spring 56 and the two strap members 61, 64, as when the lever arm 55 is in its extreme position to the right and the lifting arm 12 is in its extreme position to the left, the link 66 swings upwardly to accommodate the shortened distance and prevents the spring 56 from buckling.

The rock shaft 42 is held against rotation by means of a hand lever 71 which is fixed to the rock shaft and extends upwardly therefrom. A bracing member 72, also fixed to the rock shaft 42 and to the hand lever 71, provides lateral rigidity for the latter. Extending rearwardly from the bracket 36 is a supporting arm 73 in which the rock shaft 42 is journaled adjacent the hand lever 71. Formed integrally with the supporting arm 73 is a sector 74 having a number of notches 75 cut in the periphery of the rear portion thereof and a single notch 76 cut in the forward end. A conventional latch 80 on the hand lever 71 engages the notches 75, 76, and locks the lever 71 in position, thereby holding the rock shaft 42 against rotation. The latch 80 is disabled, or released from the notches 75, 76, by means of a grip lever 81 disposed at the handle end of the lever 71.

The operation of the implement is as follows: When the tools of the forwardly mounted cultivator rig 14 reach the end of a row, the power lift actuating pedals 13 are depressed by the operator, causing the lifting arm 12 to rock forwardly. The eye bolt 25 bears against the hub of the hand wheel 26 effecting forward movement of the rod 24 which rocks the lever arm 21 and raises the attached tool holding frame 15. At the same time, the springs 56 are stretched, but the rock shaft 42 is held against rotation by the hand lever 71 and latch mechanism 80 which is engaged with one of the notches 75 in the sector 74. The position of the various members at this point is shown in Figure 5. The rear tools are held down into the ground until they have advanced to the same point at which the forwardly mounted tools were raised. The operator then closes the grip lever 81, disengaging the latch 80 from the sector 74 and permitting the rock shaft

42 to rotate under the pull of the spring 56 to lift the rear cultivator rig 28 to the position shown in Figure 4. In this position the latch mechanism 80 engages the notch 76 on the sector 74, locking the rear rig up in transport position.

At the start of a new row, the power lift actuating pedals are depressed again, causing the lifting arms 12 to rock back to their original position and permitting the forward rig 14 to drop of its own weight into the ground. When the rear rig 28 has advanced to the point at which the front rig was lowered into the ground, the grip lever 81 is again closed by the operator, unlocking the rock shaft 42 from the notch 76 in the sector 74 and permitting the frame 29 and attached tools to drop into the ground of their own weight. If it is desired to raise or lower both the forwardly mounted rig 14 and the rearwardly mounted rig 28 simultaneously, the grip lever 81 is closed at the same time the power lift actuating pedals 13 are depressed. In this case, the spring 56 is only stretched to the extent of supporting the weight of the rear rig, and acts substantially as a resilient connection between the lifting arm 12 and the lever arm 55. Each time that the rear rig is lowered into the ground, the depth at which the tools are to work is adjusted by locking the detent mechanism 80 with the proper notch 75. By virtue of the depth adjusting mechanism 27, the tools on the forwardly mounted rig drop to the proper depth each time.

By using a sufficiently heavy spring 56, the lifting action for the rearwardly mounted cultivator rig 28 can be speeded up to the point where it is substantially instantaneous. Many tractor mounted engine driven power lifts are slow acting, requiring an appreciable time to raise the implement completely out of the ground. As there are times when it is advantageous to lift the implement more quickly than the power lift mechanism is capable of doing, it will be seen that the present invention provides a highly satisfactory means for accomplishing this result.

What I claim as my invention is:

1. In an implement the combination of a frame, a tool connected with said frame for vertical movement relative thereto, power lift mechanism, means connected with said tool for storing energy received from said power lift mechanism when the latter is actuated and exerting a lifting force on said tool, and optionally releasable for restraining said tool against the lifting force exerted by said energy storing means.

2. In an implement the combination of a supporting structure and a tool holding structure, means connecting said tool holding structure with said supporting structure for relative vertical movement, power lift mechanism, lifting means carried on one of said structures and adapted to act against the other of said structures to lift said tool holding structure, spring means connecting said lifting means with said power lift and operative to exert an actuating force on said lifting means when stressed by said power lift, and optionally releasable means for locking said lifting means against the actuating force exerted by said stressed spring means.

3. In an implement the combination of a frame, a tool holding structure connected with said frame for vertical movement relative thereto, lifting means for raising said tool holding structure, power lift mechanism, means operatively connected with said lifting means for storing energy received from said power lift mechanism, and means for applying said stored energy to actuate said lifting means.

4. An implement comprising, in combination, a frame, a tool holding member, draft means connecting said tool holding member with said frame for vertical movement relative thereto, lifting means on said frame connected with said draft means to raise said tool holding member, an engine driven actuating member, operating connections between said actuating member and said lifting means including a spring operative to exert an actuating force on said lifting arm when stressed, and releasable detent mechanism for holding said lifting means against operation while said spring is stressed by said actuating member.

5. An implement comprising, in combination, a frame, a tool holding member supported on said frame for vertical movement relative thereto, lifting means for raising said tool holding member, spring means connected at one end thereof to said lifting means, engine driven means connected to the other end of said spring means for stressing the latter, and optionally releasable dent mechanism for holding said lifting means against operation urged by said stressed spring means.

6. An implement comprising, in combination, a frame, a tool holding member supported on said frame for vertical movement relative thereto, lifting means comprising a rotatable member journaled on said frame and adapted to act against said tool holding member to raise the latter, power lift mechanism, spring means operatively connecting said power lift with said rotatable member, said spring means being stressed by operation of said power lift, and releasable detent mens for holding said rotatable member against rotation urged by said stressed spring means.

7. An implement comprising, in combination, a frame, at least two ground engaging tool carrying members, means connecting said tool carrying members to said frame for independent vertical movement, lifting means associated with each of said tool carrying members for raising either of said members independent of the other, power lift mechanism, operating connections between said power lift and said lifting means, including means for storing energy received from said power lift mechanism, and means for actuating said lifting means with said stored up energy to raise said tool carrying members separately.

8. An implement comprising, in combination, a frame, a plurality of ground engaging tool holding members, draft means for coupling said tool holding members to said frame for independent vertical movement, independent lifting means associated with each of said tool holding members, engine driven actuating mechanism, link means operatively connecting said actuating mechanism with certain of said lifting means and spring means operatively connected with others of said lifting means, said spring means being stressed by operation of said actuating mechanism, and means for applying the stored energy in said stressed spring to actuate said spring connected lifting means separately from said link connected lifting means.

9. An implement comprising, in combination, a frame, a plurality of ground engaging tool carrying members, draft means for coupling said tool carrying members to said frame for independent vertical movement, independent lifting means associated with each of said tool carrying members, power lift mechanism, link means operatively

connecting certain of said lifting means with said power lift mechanism, spring means connected with others of said lifting means and adapted to be stressed by action of said power lift mechanism, and means for applying the stored energy in said stressed spring to actuate said spring connected lifting means separately from said link connected lifting means.

10. In combination with a tractor having engine driven power lift mechanism, an implement comprising at least two ground engaging tool holding members, draft means for coupling said tool holding members to said tractor for independent vertical movement, lifting means for raising each of said tool holding members separately, link means operatively connecting one of said lifting means with said power lift mechanism, spring means connecting another of said lifting means with said power lift mechanism, means for holding the last mentioned lifting means in fixed position whereby energy received from said power lift mechanism is stored in said spring, and means for applying said stored energy to actuate said spring connected lifting means at option.

11. In combination with a tractor having engine driven power lift mechanism, an implement comprising a tool holding member, draft means for coupling said tool holding member to said tractor for vertical movement relative thereto, lifting means for raising said tool holding member, means for storing energy received from said power lift mechanism, said last named means being operatively connected with said lifting means, and means for applying said stored energy to actuate said lifting means.

12. In combination with a tractor having power lift mechanism including an engine actuated rock shaft and a lifting arm fixed thereto, an implement comprising a tool holding member, draft means for coupling said tool holding member to said tractor for relative vertical movement, lifting means for raising said tool holding member, spring means operatively connected at one end to said lifting means and at the other end thereof to said lifting arm, means for locking said lifting means in lowered position whereby said spring means is stressed by rocking of said power lift rock shaft, and means for releasing said locking means to release the energy stored in said stressed spring means to actuate said lifting means.

13. In combination with a tractor having power lift mechanism including an actuating arm, an implement comprising a supporting frame connected to said tractor, a tool holding member coupled to said frame for vertical movement relative thereto, a lifting arm journaled on said frame for vertical swinging movement, means connecting said lifting arm with said tool holding member, spring means operatively connecting said lifting arm with said power lift actuating arm, and optionally releasable detent mechanism for holding said lifting arm against the urging of said spring means when said power lift is actuated.

14. In combination with a tractor having engine driven lifting mechanism including a transversely disposed rock shaft and a lifting arm fixed thereto, an implement comprising a support rigidly connected to said tractor, a tool holding member pivotally connected to said support and swingable vertically into and out of ground working position, a rock shaft journaled on said support parallel to said first named rock shaft, lifting arms fixed to said second named rock shaft, link means connecting said last named lifting arms to said tool holding member, a lever arm fixed to said second named rock shaft, spring means connecting said lever arm with said first named lifting arm, and optionally releasable means for holding said second named rock shaft against rotation urged by said spring, the latter being under stress when said lifting mechanism rock shaft has been rocked.

15. In combination with a tractor having an engine actuated rock shaft and a lever arm fixed thereto, a ground working tool carrying beam disposed transversely behind said tractor, draft means for said beam comprising a pair of laterally spaced forwardly extending cranks pivotally connected to said tractor, a rotatable member journaled on said tractor, lifting arms fixed on said rotatable member, link means connecting said tool carrying beam to said lifting arms, a lever arm fixed to said rotatable member, a helical spring connected at opposite ends thereof to the ends of said lever arms whereby said spring is stressed by rotation of said rock shaft, detent mechanism for holding said rotatable member against rotation, and means for releasing said detent mechanism.

16. In combination with a tractor having engine driven power lift mechanism mounted thereon and including a transversely disposed rock shaft actuated by said mechanism, a pair of laterally spaced lifting arms rigidly connected to said rock shaft, an implement frame fixedly mounted on said tractor, a tool holding member disposed transversely behind said tractor, draft means comprising two laterally spaced pairs of forwardly extending parallel crank arms, the rear ends of which are journaled in said tool holding member and the front ends of which are journaled in said frame, a transversely disposed rock shaft journaled in said frame parallel to said first named rock shaft and having a pair of laterally spaced lifting arms fixed thereto, link means connecting said last named lifting arms to said tool holding member, a pair of laterally spaced lever arms fixed to said second named rock shaft in longitudinal alignment with said first named lifting arms, a pair of helical springs each connected at one end to one of said first named lever arms and at the other end to the corresponding last named lever arms, a hand lever fixed to said last named rock shaft, and detent mechanism associated with said hand lever for holding said last named rock shaft in either extreme position of rotation or at any intermediate position.

17. In combination with a tractor having power lift mechanism including an engine actuated rock shaft and a lifting arm fixed thereto, an implement having at least two ground engaging structures each comprising a support rigidly connected to said tractor, a tool holding member, draft means for coupling said tool holding member to said support for vertical swinging movement, lifting mechanism including a rock shaft journaled on said support and having a lifting arm fixed thereto, link means connecting said last named lifting arm to said draft means for raising said tool holding member, a lever arm fixed to said last named rock shaft, link means connecting the aforesaid lever arm of at least one of said lifting mechanisms to said power lift lifting arm, spring means connecting the lever arm of another of said lifting mechanisms to said power lift lifting arm, said spring means

being adapted to receive and store energy from said power lift mechanism, means for retaining said energy in said spring means, and means for applying said stored energy to actuate said spring connected lifting mechanisms.

18. In combination with a tractor having power lift mechanism including a transverse engine-actuated rock shaft having a pair of laterally spaced lifting arms fixed thereto, an implement comprising a forwardly mounted ground engaging structure and a rearwardly mounted ground engaging structure, each comprising a frame rigidly connected to said tractor, tool holding means, draft means for coupling said tool holding means to said frame for vertical movement, lifting mechanism including a rock shaft journaled on said frame parallel to said power lift rock shaft, lifting arms fixed on said last named rock shaft and operatively connected with said tool holding means to raise the latter, lever arms fixed to said last named rock shaft, link means connecting the lever arms of the forwardly mounted structure with said power lift lifting arms, spring means connecting the lever arms of the rearwardly mounted structure with said power lift lifting arms, and optionally releasable detent mechanism for holding said spring connected lifting mechanism against urging of said spring.

19. In an implement the combination of a tool, means supporting said tool for movement between operative and inoperative positions, power lift mechanism, spring means connecting said power lift with said tool supporting means for exerting a lifting force on said tool when the power lift is actuated, and optionally releasable means for restraining said tool against the lifting force of said spring means.

20. In combination with a tractor having an engine driven power lift, an implement tool connected to said tractor for relative vertical movement, spring means connecting said power lift with said implement tool and adapted to exert a lifting force on said tool, and releasable means for holding said tool against the lifting force of said spring means when said power lift is actuated.

21. In combination with a tractor having an engine, a tool holding member connected to said tractor for vertical movement relative thereto, lifting means for raising said tool holding member, means connected with said lifting means for storing energy received from said tractor engine, and means for applying said stored up energy to actuate said lifting means.

22. In combination with a tractor having an engine, a tool holding member connected to said tractor for vertical movement relative thereto, lifting means for raising said tool holding member, a spring operatively connected with said lifting means, means actuated by said tractor engine for stressing said spring, and means for applying the stored up energy in said stressed spring to actuate said lifting means.

23. In combination with a tractor having an engine, a tool holding member connected to said tractor for vertical movement relative thereto, lifting means for raising said tool holding member, means for locking said lifting means against movement, a spring operatively connected with said lifting means, means actuated by said tractor engine for stressing said spring, and means for disabling said locking means to release the energy stored in said stressed spring to actuate said lifting means.

MILES H. TUFT.

CERTIFICATE OF CORRECTION.

Patent No. 2,174,808. October 3, 1939.

MILES H. TUFT.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 3, first column, line 51, claim 1, after "releasable" insert means; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 31st day of October, A. D. 1939.

(Seal)

Henry Van Arsdale,
Acting Commissioner of Patents.

being adapted to receive and store energy from said power lift mechanism, means for retaining said energy in said spring means, and means for applying said stored energy to actuate said spring connected lifting mechanisms.

18. In combination with a tractor having power lift mechanism including a transverse engine-actuated rock shaft having a pair of laterally spaced lifting arms fixed thereto, an implement comprising a forwardly mounted ground engaging structure and a rearwardly mounted ground engaging structure, each comprising a frame rigidly connected to said tractor, tool holding means, draft means for coupling said tool holding means to said frame for vertical movement, lifting mechanism including a rock shaft journaled on said frame parallel to said power lift rock shaft, lifting arms fixed on said last named rock shaft and operatively connected with said tool holding means to raise the latter, lever arms fixed to said last named rock shaft, link means connecting the lever arms of the forwardly mounted structure with said power lift lifting arms, spring means connecting the lever arms of the rearwardly mounted structure with said power lift lifting arms, and optionally releasable detent mechanism for holding said spring connected lifting mechanism against urging of said spring.

19. In an implement the combination of a tool, means supporting said tool for movement between operative and inoperative positions, power lift mechanism, spring means connecting said power lift with said tool supporting means for exerting a lifting force on said tool when the power lift is actuated, and optionally releasable means for restraining said tool against the lifting force of said spring means.

20. In combination with a tractor having an engine driven power lift, an implement tool connected to said tractor for relative vertical movement, spring means connecting said power lift with said implement tool and adapted to exert a lifting force on said tool, and releasable means for holding said tool against the lifting force of said spring means when said power lift is actuated.

21. In combination with a tractor having an engine, a tool holding member connected to said tractor for vertical movement relative thereto, lifting means for raising said tool holding member, means connected with said lifting means for storing energy received from said tractor engine, and means for applying said stored up energy to actuate said lifting means.

22. In combination with a tractor having an engine, a tool holding member connected to said tractor for vertical movement relative thereto, lifting means for raising said tool holding member, a spring operatively connected with said lifting means, means actuated by said tractor engine for stressing said spring, and means for applying the stored up energy in said stressed spring to actuate said lifting means.

23. In combination with a tractor having an engine, a tool holding member connected to said tractor for vertical movement relative thereto, lifting means for raising said tool holding member, means for locking said lifting means against movement, a spring operatively connected with said lifting means, means actuated by said tractor engine for stressing said spring, and means for disabling said locking means to release the energy stored in said stressed spring to actuate said lifting means.

MILES H. TUFT.

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