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F. THOMPSON

2,189,185

DRILL CULTIVATOR

Filed Aug. 17, 1938

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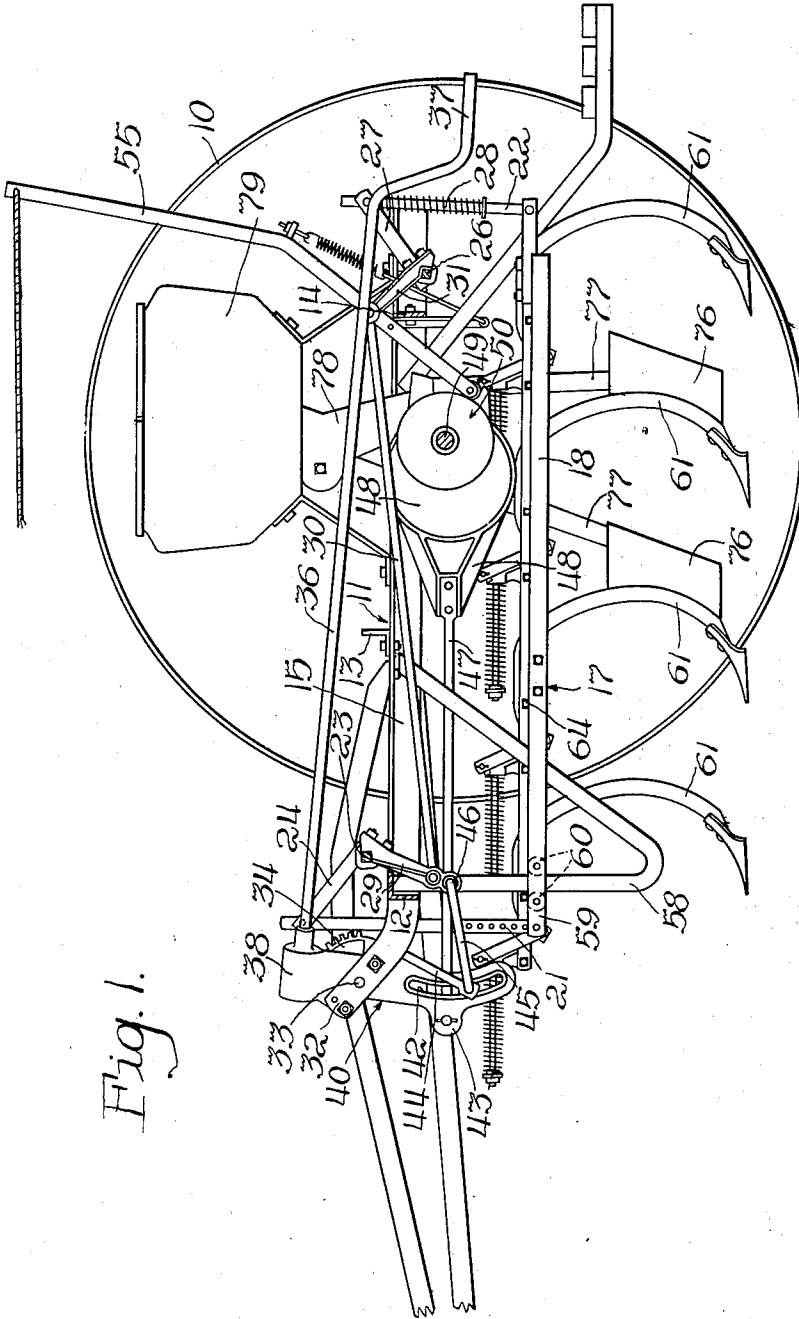


Fig. 1.

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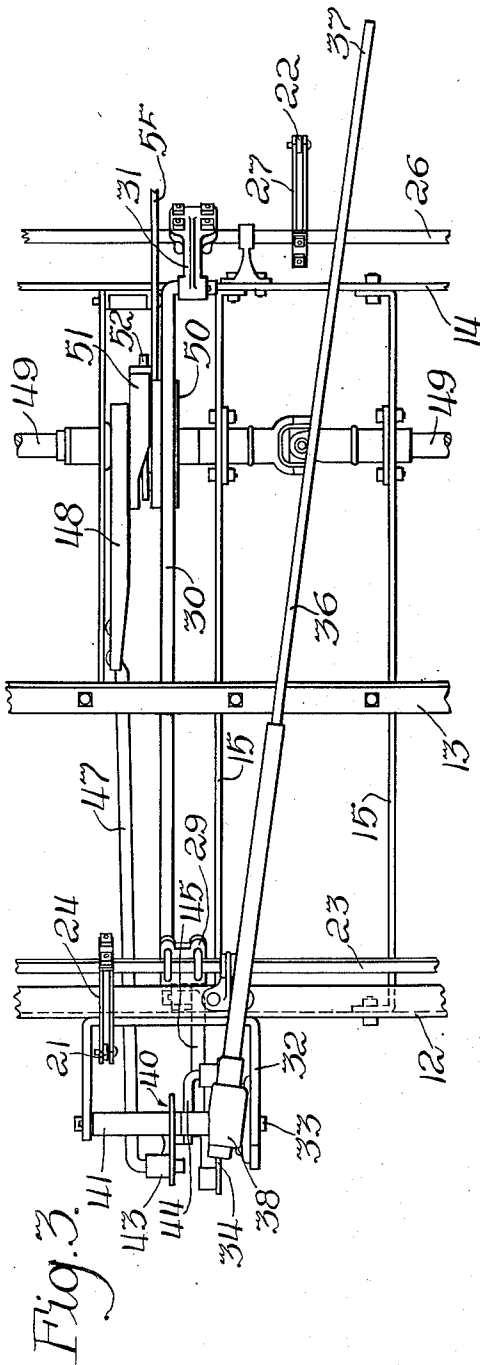
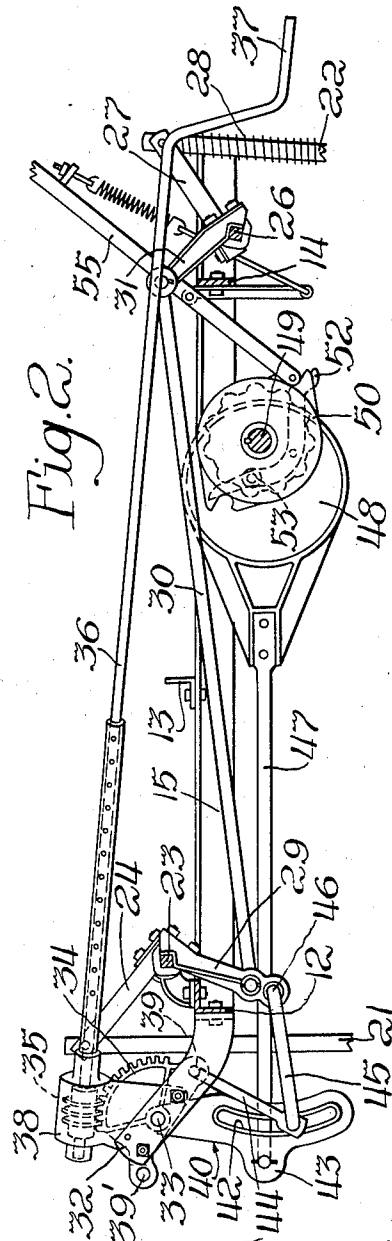
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3 Sheets-Sheet 3

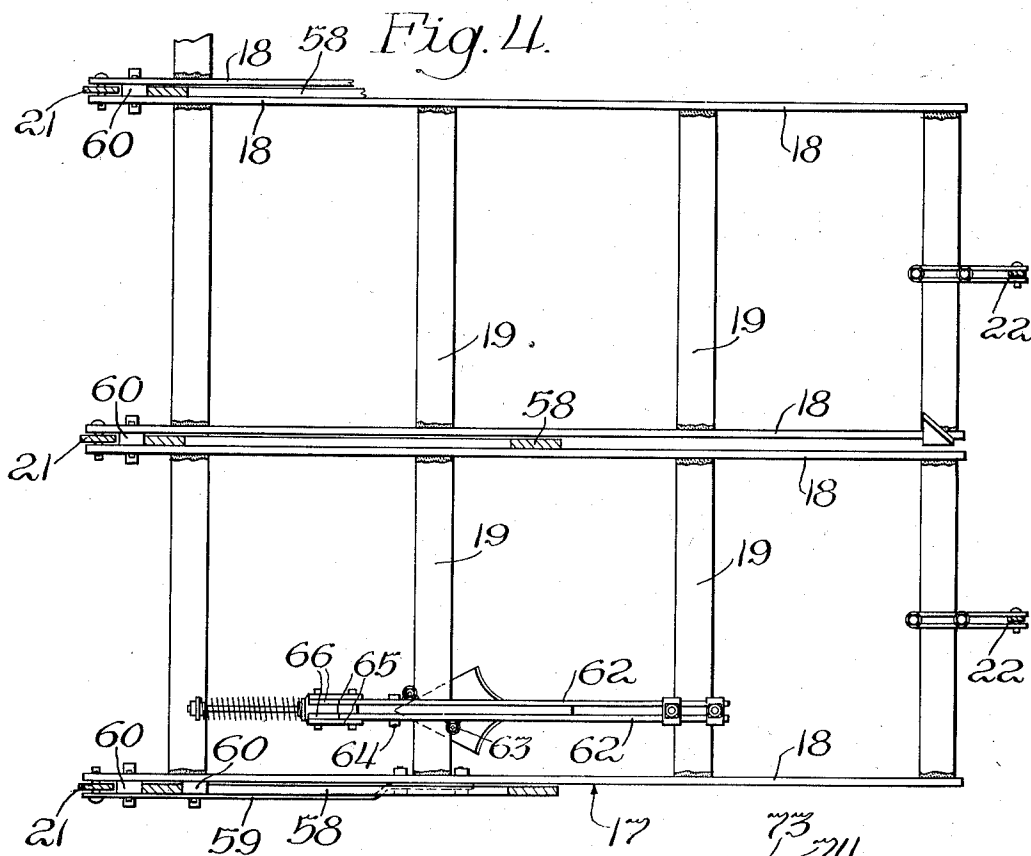
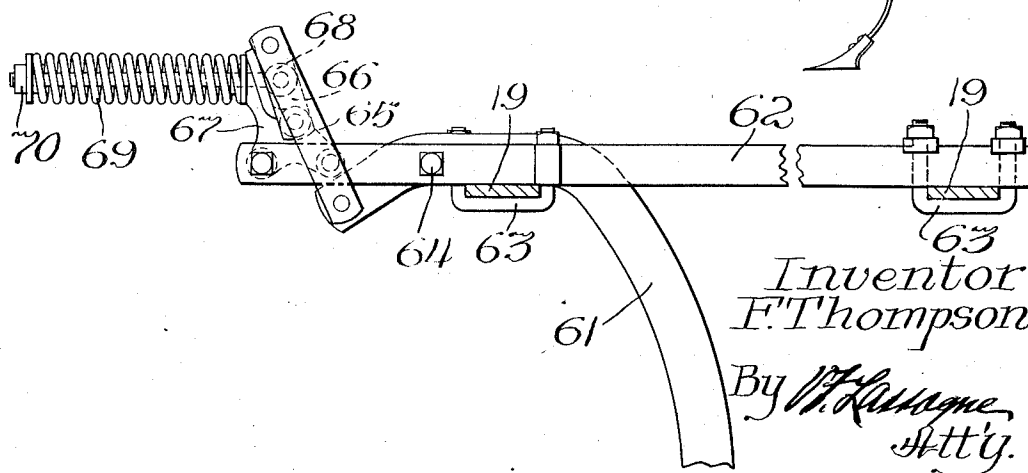


*Fig. 5.*

*Fig. 6.*



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## UNITED STATES PATENT OFFICE

2,189,185

## DRILL CULTIVATOR

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Application August 17, 1938, Serial No. 225,322

2 Claims. (Cl. 97-244)

This invention relates to a drill cultivator. More specifically it relates to a cultivator that is provided with a frame carrying cultivating elements and connections for parallel lifting of the frame and for lifting it to a predetermined elevated position from any one of a plurality of lowered positions.

Drill cultivators of various types are well known. Some of these have provision for parallel lifting of the cultivator elements. Others provide for lifting of the various elements to a predetermined height. The cultivator of the present invention includes both of these features. It also has to do with a frame of such construction that either spring tooth elements or stump-jump elements may be mounted upon it.

An object of the present invention is the provision of an improved drill cultivator.

A further object of the invention is to provide a drill cultivator in which there is a parallel lifting of the cultivator elements to a predetermined height from any one of a plurality of lowered positions.

Another object of the invention is the provision of a frame of a drill cultivator, upon which may be mounted either spring tooth elements or stump-jump elements.

Still another object of the invention is the provision of a cultivator which embodies both of the aforementioned improvements, namely, the parallel lifting of cultivating elements to a fixed height, and the mounting of either spring tooth elements or stump-jump elements on the same frame.

According to the present invention, a drill cultivator is provided which includes a first frame supported by wheels, upon which frame a seed box is mounted. A second frame is adjustably supported on the first frame in such a way that it may occupy any one of a number of parallel positions with respect to the first frame. There is also provided a lifting means actuated by the rotation of the wheels for raising the second frame to a fixed height from any one of a plurality of lowered positions. The second frame carries a number of cultivating elements, which may be either of the spring tooth type or of the stump-jump type. Seed tubes connect the seed box mounted on the first frame and some of the cultivating elements.

Referring to the drawings—

Figure 1 is a side elevation in section of the novel drill cultivator;

Figure 2 is an enlarged view, showing in detail the arrangement by which parallel lift of the

cultivator element to a constant height is effected;

Figure 3 is a plan view of the parts shown in Figure 2;

Figure 4 is a detail view in plan, showing the way in which both spring tooth elements and stump-jump elements are attached to the frame of the cultivator;

Figure 5 shows a side view of the mounting of a stump-jump element; and,

Figure 6 is a similar view, showing the mounting of a spring tooth element.

The cultivator of the present invention has rear wheels 10, as well as front wheels, not shown. A frame 11 is supported upon the rear wheels 10 and includes a plurality of transverse members 12, 13 and 14, as well as longitudinal members 15. Beneath the frame 11 is a second frame 17 (Figure 4), which is composed of a plurality of longitudinally extending members 18 and a plurality of transverse members 19, which extend between pairs of the longitudinal members 18. The frame 17 is positioned beneath the frame 11 and is carried thereby by means of a plurality of upstanding members 21 at the front end and upstanding members 22 at the rear end (Figure 1). At the front end of the frame 11, there is a transverse rock-shaft 23, to which is fixed a plurality of arms 24, connected in turn to the various upstanding members 21. At the rear of the frame 11 and slightly beneath it, a rock-shaft 26 is carried, which has a plurality of arms 27 fixed thereto and connected to various upstanding members 22. A spring 28 is shown as surrounding each member 22, and the connection between the members 22 and 27 is yielding so as to allow yielding movement of the rear of the frame 18. A similar connection may be established between the members 21 and 24 to allow such a movement between the front of the frame, but this is not shown, since it forms no part of the present invention.

An arm 29 is secured to the front rock-shaft 23 and has connected thereto a link 30, which also is connected with an arm 31 secured to the rear rock-shaft 26. A U-shaped bracket 32 is secured to the front transverse member 12 of the frame 11 and rotatably supports a shaft 33. A gear segment 34, having oppositely disposed openings 39 and 39', is journaled upon the shaft 33 and meshes with a worm 35 secured to a crank 36 having a handle 37. A shield 38 partially houses the worm 35 and is supported by the bracket 32. A depending member 40 is journaled upon the shaft 33 and has an arcuate slot 42

therein and a lug 43. A link 44 is connected at one end to one side of the gear segment 34 in the opening 39, and at the other end to one end of a link 45 in engagement with the slot 42. The other end of the link 45 is connected at 46 to the arm 29 secured to the rock-shaft 23.

A rod 47 is connected at one end to the member 49 at the lug portion 43 and at the other end to an eccentric member 48 journaled upon a shaft 49, to which the rear wheels 10 of the cultivator are fixed. In parallel spaced relation to the eccentric member 48 is a member 50 fixed to the shaft so as to rotate with it. Fixed to the member 48 is a member 51 immediately adjacent the member 50. A pawl 52 is pivoted upon the member 51 and is under the action of a spring (not shown) so as to urge a roller 53 on the pawl into engagement with an internal grooved surface on the member 50. However, this is prevented by a lever 55, which is pivoted on the frame member 14 and is urged by a spring so as to be kept in contact with the end of the pawl 52. The apparatus just described is a power lift of a well known type. When it is desired to actuate the lift, the lever 55 is moved counter-clockwise, as viewed in Figure 2, so as to move same out of engagement with the pawl 52. This causes the roller 53 to come into engagement with an inner surface of the member 50 continuously rotating because of its being secured to the shaft 49. Consequently the member 51 is caused to rotate and, with it, the eccentric 48, so as to move the rod 47 either to the right or left. Movement of the rod 47 causes a movement of the member 40 and a consequent turning of the rock-shaft 23, because of the connection with the member 40 through the link 45 and member 29. Thus, there is an angular movement of the members 24 and, with them, of the upstanding members 21, so that the frame 17 is either raised or lowered. Because of the connection of the rock-shaft 26 with the rock-shaft 23 through the members 29 and 31 and link 30, the rock-shaft 26 rotates with the rock-shaft 23 and there is a raising or lowering of the rear of the frame 17 along with the raising or lowering of the front. Consequently, there is a so-called parallel lifting of the frame 17. In other words, the frame 17 in any one position is parallel to each other position that it may occupy. Adjustment for depth of the frame 17 is effected by a twisting of the crank 36, which, through the worm 35, effects an angular movement of the gear segment 34. The link 44 is moved with the gear segment 34 and causes the link 45 to move and swing the member 29 so as to rotate the shaft 23. Rotation of the shaft 23 effects the change in height of the frame 17. Corresponding rotation of the shaft 26 effects a like change in height of the rear of the frame 17.

With the arrangement of parts shown in Figure 2, namely, the gear segment 34, member 40 with the arcuate slot 42, the links 44 and 45 having a point of connection which moves in the arcuate slot, and a power lift connection with the member 40 through the rod 47, there is a lifting of the frame 17 to a fixed height, regardless of the position from which it is lifted. This arrangement is more fully described in the patent to Robinson No. 1,846,457, dated February 23, 1932.

Briefly, the theory of operation is as follows: When the cultivating elements are in lifted position, the lifting mechanism is as shown in Figure 2. The member 40 is always in the same position, since the power lift always moves the rod

47 the same amount. In this position, the point 46 is located at the center of the arc of the slot 42. Thus, regardless of the position of the ends of rods 44 and 45 in slot 42 because of the adjustment for depth, point 46 occupies a fixed position, and consequently the lifted position of the cultivating elements is the same.

As previously stated, the frame 17 is lifted in such a manner that the front and rear lift the same amounts. Means for guiding the lifting of the frame 17 with respect to the fixed frame 11 is provided in the form of V-shaped members 58 extending in parallel, spaced relation below the frame 11. These members 58 extend between closely spaced pairs of longitudinal members 18 of the frame 17 and between outside members 18 and straps 59 secured thereto. There is a single roller 60 between each pair of members 18 and pairs of rollers 60 between the outside members 18 and straps 59, which serve as guides for the members 58. Because the members 58 are spaced transversely of the frame 11 and fit fairly snugly between the closely spaced members 18, there can be no transverse movement of the frame 17 with respect to the frame 11, regardless of the height of the frame 17. Because the rollers 60 engage the members 58, there can be no longitudinal movement of the frame 17 with respect to the frame 11.

Figures 4 and 5 show the way in which stump-jump cultivating elements 61 are secured to the frame 17. A pair of members 62 is secured to the adjacent transverse members 19 by means of U-bolts 63. A particular stump-jump element 61 extends across the front transverse member 19 and is pivoted at 64 between the members 62. At the very end of the element 61 is connected a long toggle link 65, to which, in turn, is connected a short toggle link 66, which is connected to a supporting member 67 carried between the members 62. The head of a bolt 68 is pivotally secured at a mid-point of the link 66 and extends through the support 67. There is a spring 69 surrounding the bolt 68, and a nut 70 on the end of the bolt holds the spring against the support 67. In operation of the stump-jump element 61, the lower end thereof is in engagement with the ground. When an obstruction is encountered, which exerts upon the tooth a force beyond a predetermined amount, the tooth swings in a counter-clockwise direction about the point 64 and pulls the toggle elements 65 and 66 out of the position shown in Figure 5. When the obstruction is passed, the force of the spring 69 causes the tooth to be returned to its original position.

Figure 6 shows a spring tooth element 72 secured upon the transverse member 19. The upper end of the tooth 72 extends across the transverse member 19 and is held thereagainst by means of a reinforcing member 73 and a U-bolt member 74, adjusted by means of a set screw 75. It will be seen that, because of the structure described for connecting both the stump-jump element 61 and the spring tooth element 72, either type of element may be connected to the same frame.

As will be seen from Figure 1, some of the cultivating elements have seed boots 76 attached to them with seed tubes 77 extending from spouts 78 on the under side of a seed box 79 carried by the frame 11.

Operation of the drill cultivator is as has been described. Figure 1 shows the frame 17 in lifted transport position. A pull upon the lever 55

causes the power lift to be actuated and lowers the frame so that the cultivating elements are in ground engaging position. The depth of the cultivating elements is determined by the angular position of the gear segment 34 actuated by the rod 36 through the worm 35. When the frame 17 is lifted by means of the power lift, it is raised to a fixed height, regardless of the original position from which it was lifted. The action of the seed drill in combination with the cultivating elements is well known and need not be described other than to say that seed is allowed to drop through the spouts 78 and tubes 77 and the seed boot 76 into the ground as the ground is being cultivated by the various elements.

The rod 36 extends to the rear of the cultivator in Figure 1. An operator stands at the rear of the cultivator controlling the rod from this point. The cultivator is operated thus when horse drawn. When it is tractor drawn, the unit comprising rod 36, worm 35, shield 38, and gear segment is removed from shaft 33 and turned around so that rod 36 extends to within reach of a tractor operator. In this position link 44 is connected in opening 39' in gear segment 39.

It will be apparent from the foregoing that a novel drill cultivator has been provided, on which there is means for parallel lifting of the cultivating elements to a constant height from any one of a plurality of lower positions. Along with this there is a novel construction by which either stump-jump elements or spring tooth elements are attached to the same framework.

The intention is to limit the invention only by the terms of the appended claims.

What is claimed is:

1. A cultivator comprising a support, a frame

including longitudinal members and transverse members to which spring tooth elements may be secured, pairs of closely spaced members secured to adjacent transverse members, elements pivotally mounted on the pairs of closely spaced members, mechanisms connecting the elements and pairs of members for allowing the elements to swing upon a predetermined pressure against the ground-engaging portions of the elements, seed boots connecting the seed box and some of the elements, and means for adjusting the frame to a plurality of parallel positions at different heights with respect to the support.

2. A cultivator comprising a support, a frame including longitudinal members and transverse members to which spring tooth elements may be secured, pairs of closely spaced members secured to adjacent transverse members, elements pivotally mounted on the pairs of closely spaced members, mechanisms connecting the elements and pairs of members for allowing the elements to swing upon a predetermined pressure against the ground-engaging portions of the elements, seed boots connecting the seed box and some of the elements, and means for adjusting the frame to a plurality of parallel positions at different heights with respect to the frame, said means including a pair of rock-shafts at the front and back of the support, connections therewith and with the front and back of the frame, links connecting the rock-shafts, a gear segment pivotally mounted on the support and connected with one rock-shaft, and a worm gear also mounted thereon and meshing with the gear segment.

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