No. 665,963. Patented Jan. 15, 1901.

W. S. GRAHAM.

LISTER CULTIVATOR.

(Application filed Aug. 30, 1900.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1.

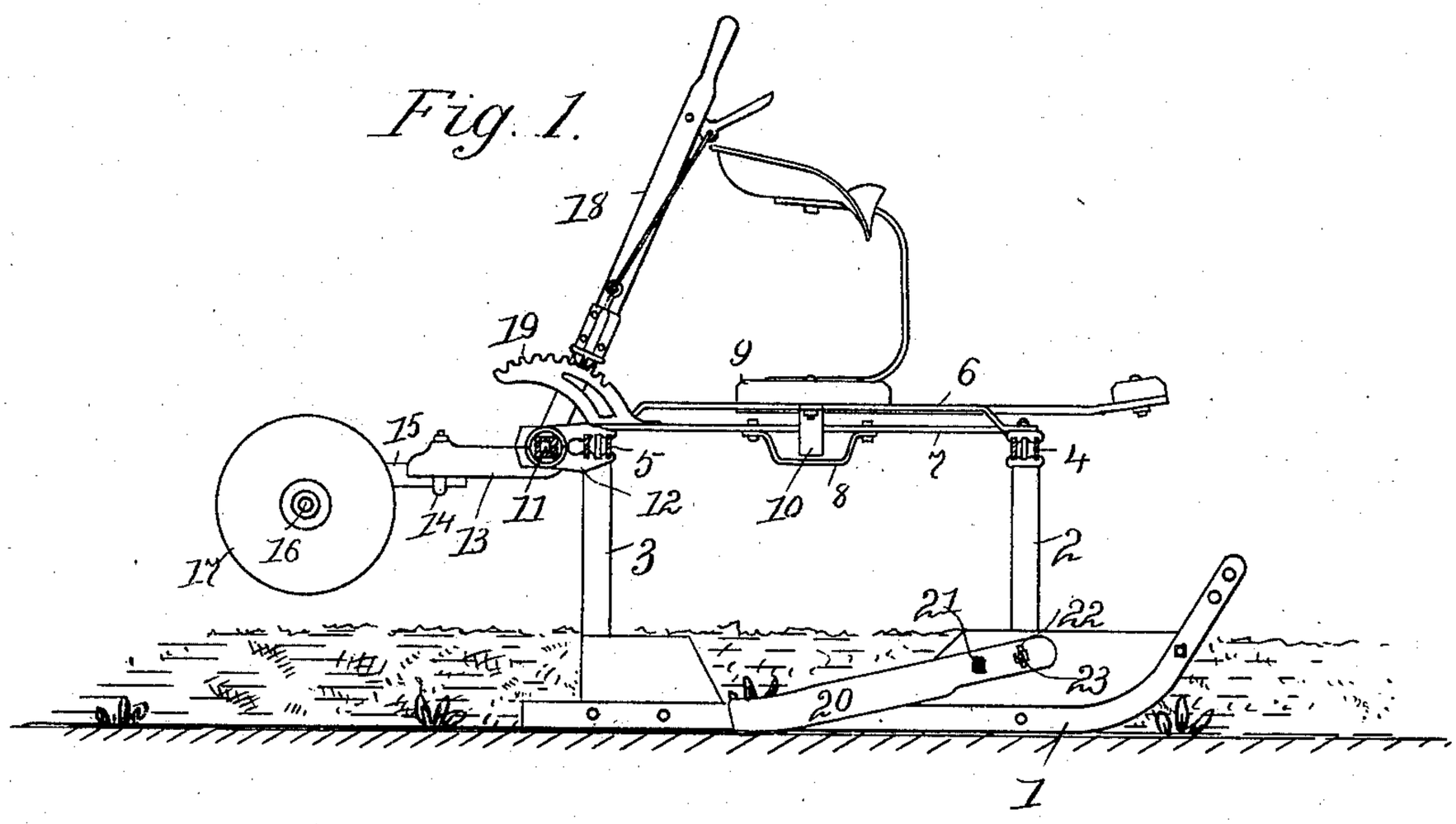
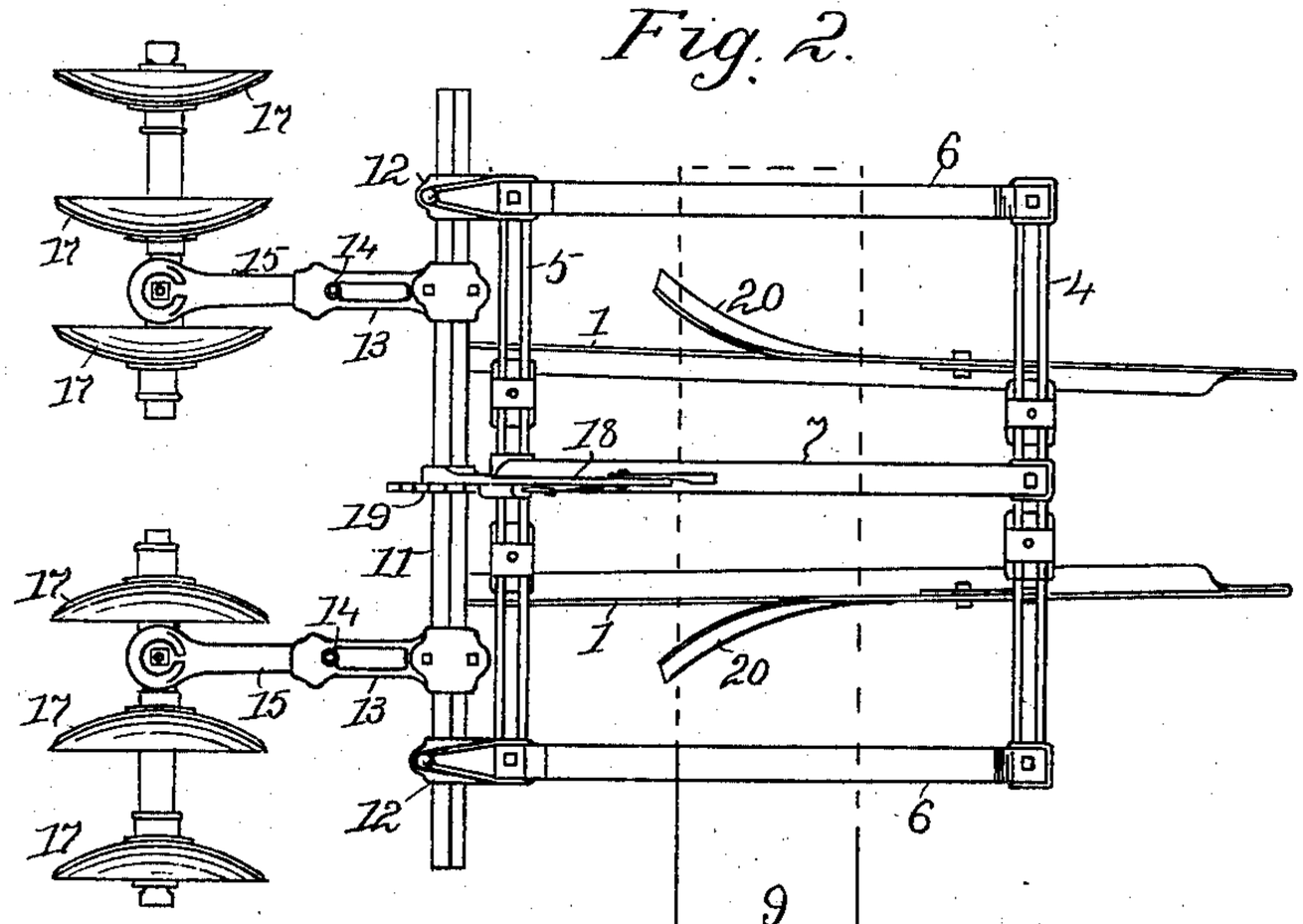


Fig. 2.



9

Witnesses,
Nora Graham.
Ina Graham.

Inventor,
William S. Graham
by L. R. Graham
his attorney.

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3 Sheets—Sheet 2.

Fig. 3.

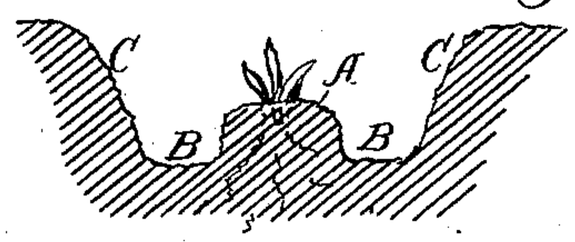


Fig. 4.

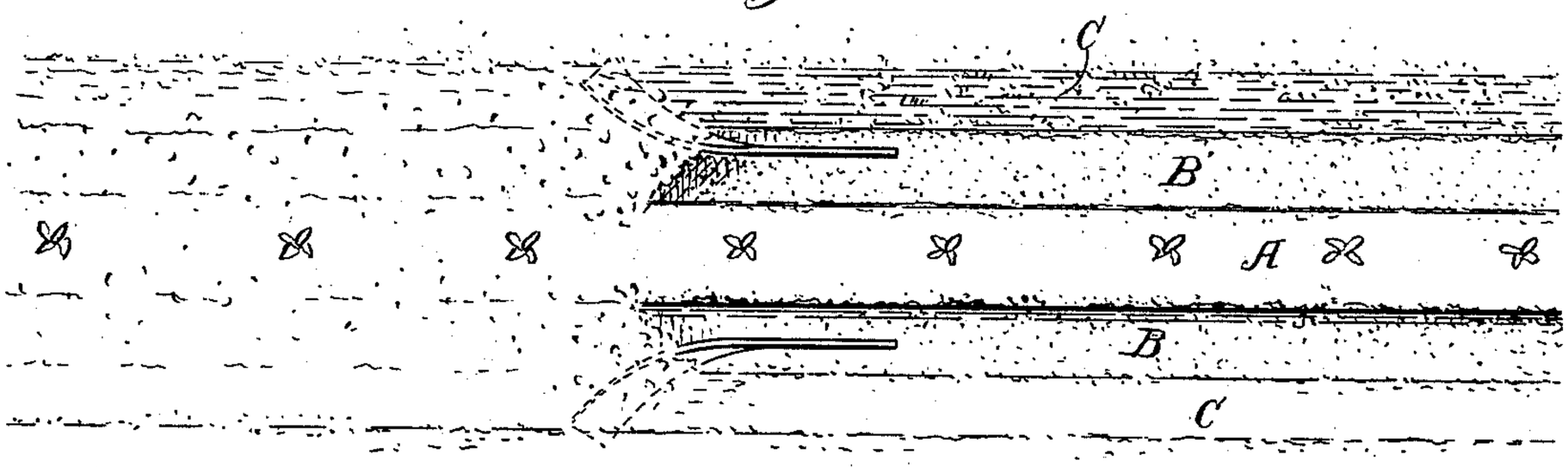


Fig. 5

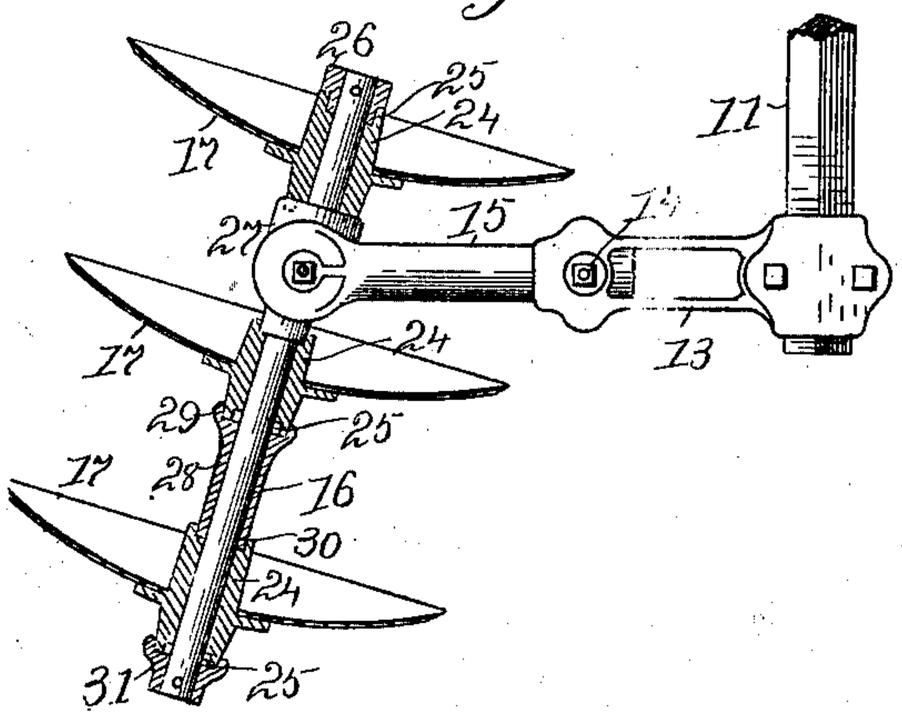
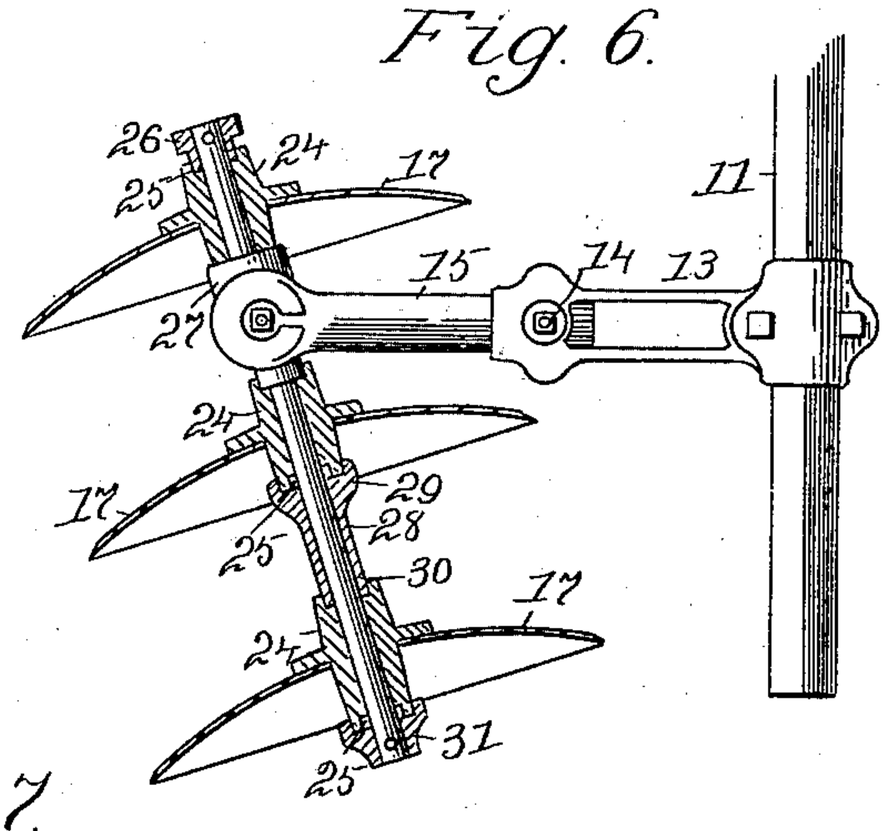


Fig. 6.

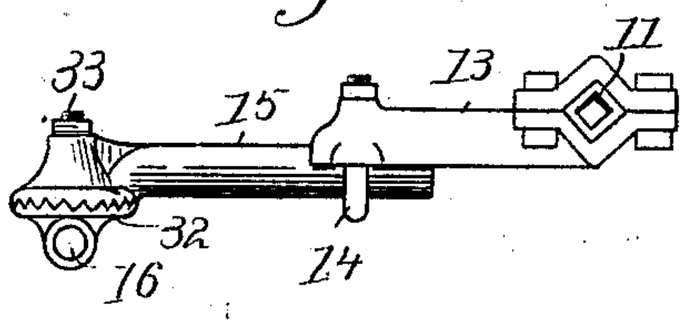


Witnesses.

Nora Graham.

Ina Graham.

Fig. 7.



Inventor,

William S. Graham,

by L. R. Graham

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No. 665,963. Patented Jan. 15, 1901.

W. S. GRAHAM.

LISTER CULTIVATOR.

(Application filed Aug. 30, 1900.)

(No Model.) 3 Sheets—Sheet 3.

Fig. 8.

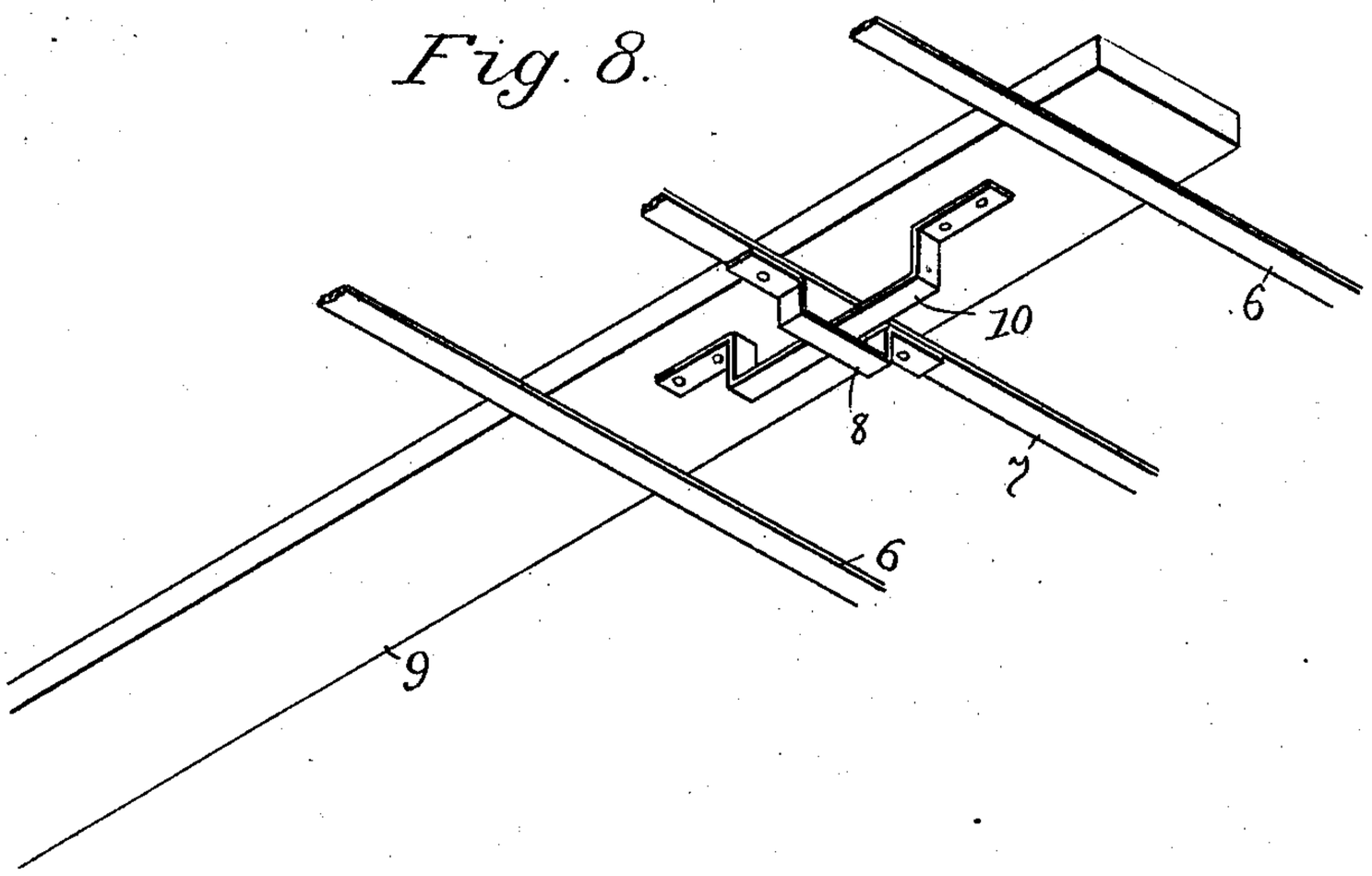


Fig. 9.

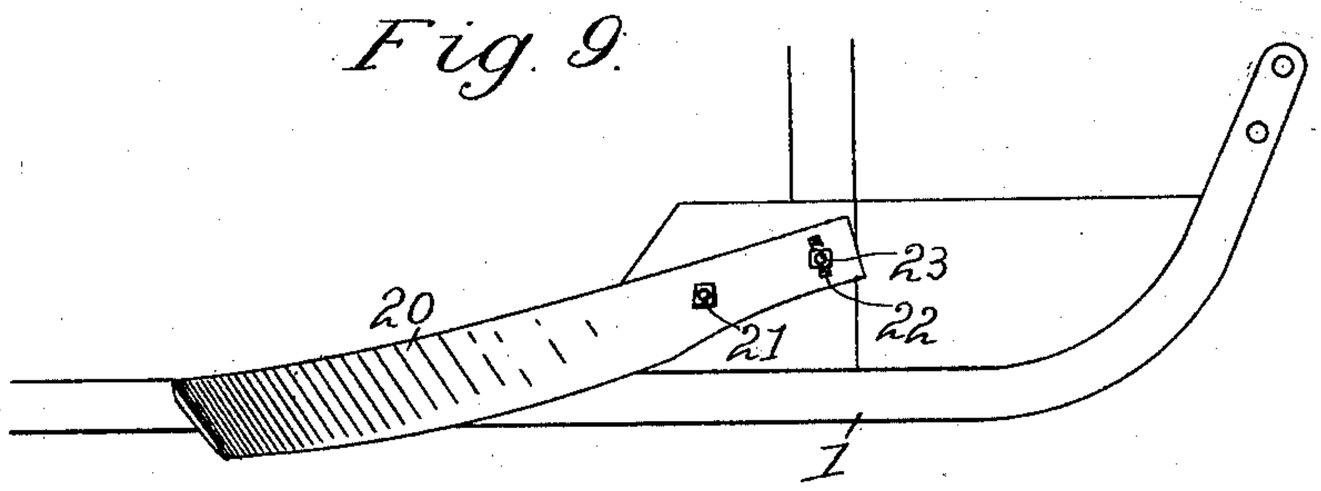
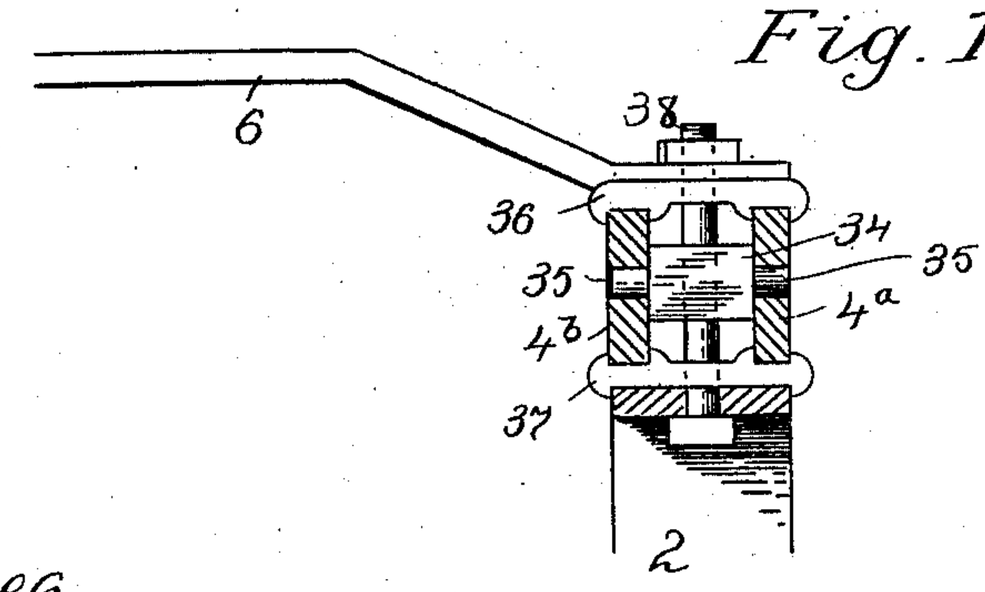


Fig. 10.



Witnesses,
Nora Graham.
Ira Graham.

Inventor,
William S. Graham
by L. R. Graham
his attorney

UNITED STATES PATENT OFFICE.

WILLIAM S. GRAHAM, OF CANTON, ILLINOIS, ASSIGNOR TO THE PARLIN & ORENDORFF COMPANY, OF SAME PLACE.

LISTER-CULTIVATOR.

SPECIFICATION forming part of Letters Patent No. 665,963, dated January 15, 1901.

Application filed August 30, 1900. Serial No. 28,585. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM S. GRAHAM, of the city of Canton, county of Fulton, and State of Illinois, have invented certain new and useful Improvements in Lister Cultivators, of which the following is a specification.

This invention relates to various details in a cultivator adapted for cultivating listed crops. It is exemplified in the structure hereinafter described, and it is defined in the appended claims.

In the drawings forming part of this specification, Figure 1 is a side elevation of so much of a cultivator as is needed to explain my invention. Fig. 2 is a plan of an end of a cultivator, showing one complete appliance for cultivating a single row and showing in partly-broken lines the seat-board used to connect two such appliances. Fig. 3 is a cross-section through a furrow in which corn has been listed. Fig. 4 is a plan of a listed furrow, illustrating the action of my cultivator thereon. Fig. 5 is a detail, partly in section, illustrating the cultivating-disks set to throw soil toward the row. Fig. 6 is a similar detail showing the disks set to throw the soil from the row. Fig. 7 is a detail in side elevation of a disk-sustaining arm. Fig. 8 is a detail in perspective of the under side of an end of the seat-board, showing the means employed to connect the seat-board with the cultivator-frames. Fig. 9 is a detail in side elevation of a cultivating-blade which constitutes a part of my invention. Fig. 10 is a detail, partly in vertical section, of a part of the frame structure.

Runners 1 carry uprights 2 and 3, on the upper ends of which cross-bars 4 and 5 are supported. The cross-bars extend beyond the runners. Bars 6 connect the ends of one cross-bar with the ends of the other cross-bar, and central bar 7 also extends from one cross-bar to the other. The seat-bar 9, which extends from the cultivating appliance to a duplicate thereof, (not shown,) has a loop-bar 10 on its under side parallel with its length, and such loop-bar embraces bar 7 of the cultivator-frame. A loop-bar 8 on the under side of frame-bar 7 embraces loop-bar 10 crosswise thereof, and the two loops connect the seat-bar to the cultivator-frame in a manner permitting a limited amount of horizontal swing and endwise motion in the seat-bar independent of the cultivator-frames, or the reverse. The opposite end of the seat-bar is connected with the opposite cultivator-frame in a manner similar to that shown and described. A cross-shaft 11 is journaled in bearings 12, which extend rearward from the ends of cross-bar 5, and adjustable arms mounted on the rock-shaft 11 carry the cultivating-disks. The arms each consist of a member 13, fastened onto shaft 11 at right angles therewith, and a member 15, forming a continuation of member 13 and axially adjustable with relation thereto. A ring-clamp 14 embraces the forward end of member 15 of the disk-supporting arm and provides means whereby the disk-shaft may be tilted, so as to raise either end above the other end. The under surface of the rear end of member 15 is disk-formed and radially corrugated, as shown in Fig. 7, and an opposing disk 32 carries a shaft 16 for the cultivating-disks 17 and is secured to member 15 of the cultivator-arm by means of a bolt 33. The disk-shaft is turned, so as to bring one end in front of the other, by loosening bolt 33, making the required swing of the shaft 16, and retightening the bolt. The arms are adjustable lengthwise of the shaft 11, and the shaft may be rocked to raise and lower the disks 17 to any desired extent. A hand-lever 18 is fastened onto the rock-shaft 11, and it has a lock adapted to engage the teeth of a rack 19. By means of the rack and the lock-lever the disks may be held raised, as shown in Figs. 1 and 2, to facilitate turning around at the ends of the field, and the disks may also be lowered to any desired extent and secured in such lowered position.

The hubs 24 of the cultivating-disks 17 are each recessed in each end adjacent to shaft 16, as shown at 25 in Figs. 5 and 6, and spools, as 27 and 28, interposed between the hubs of the wheels, have each a diminished end to fit into a recess of a hub and an enlarged recessed end to fit over the end of a hub. The enlarged and recessed end of spool 28 is shown at 29 and the diminished end is shown at 30. The cultivator operates in a furrow, with the disks acting on the sides of the furrow and so the outer end of a shaft 16 is always higher than its inner end. It is desirable to exclude

dust and dirt from the bearings of the disks to the greatest possible extent, and I have found that it is advantageous in this connection to cover the upward-presented ends of the hubs. If the disks were always used to throw the soil in one direction, either toward or from the corn, it would be a simple matter to protect the upward-presented ends of the hubs; but it requires special provision to protect either end of a hub that may be presented upward, and in this instance such provision is embodied in the recessed ends of the hubs and in the spools, one end of each of which is enlarged and recessed to receive a hub, while the other end is diminished. The end cap 31 and the end stop 26 hold the hubs and the spools in proper position on the shaft 16.

A furrow in which corn has been planted by means of a lister-planter somewhat resembles the outline given in Fig. 3. In this figure the sides of the main furrow are shown at C. Supplementary furrows made to procure covering-soil are shown at B, and a central ridge in which the corn is planted is shown at A. The young corn stands on the ridge above the supplementary furrows, but below the sides of the main furrow, and it is well to take soil from the sides of the main furrow at the first cultivation to fill the supplementary furrows. This I effect by means of the curved cutter-blades 20, which cut into the bases of the walls C of the main furrow, as shown in Fig. 4, and turn the loosened and pulverized soil into the furrows B. The front end of each of the cutter-blades is in this instance vertical, and such front end is secured to a runner in a manner permitting vertical adjustment of the rear end. In this case a bolt 21 provides a pivot for the blade, and a bolt 23, extended through a slot 22 in the front end of the blade, provides means for securing the rear end of the blade more or less depressed. The blades extend outward from the runners, as shown in Fig. 1, and they incline upward and backward to convey the soil in the proper direction.

The cross-bars 4 and 5 are each composed of a pair of parallel bars, as 4^a and 4^b in Fig. 10, and the front-to-back bars are connected with the cross-bars by means of clips that spread the individual members of the cross-bars apart and hold the connections from sliding out of place. One of these clips consists of a strut-block 35, having trunnions, that engage holes in bars 4^a and 4^b, clip-plates 36 and 37, that embrace the bars above and below the strut-block, and a bolt 38, that extends through the clip-plates and the strut-block and secures all in place. The trunnions of the strut-block prevent motion of the clip lengthwise of the bars, while the clip-plates hold the bars from separating. The bolt 38 secures the clip-plates to the bars and holds them in line with the strut-block, and this bolt is also used to connect other bars of the structure with the divided cross-bars.

There are a plurality of disks on shafts 16, preferably three on each, and they are adjusted to conform to the sides of the furrow and gradually level the same down by repeated cultivation. At the first cultivation it is preferable to throw soil toward the corn by means of the cutting-blades and to set the disk to cut from the corn. In subsequent operations the blades may be dispensed with and the disks be set to throw soil toward the corn.

The connection between the seat-bar or spreader-board and the cultivator-frames enables the runners to freely track the furrows in which they are placed and advance at slightly-variant speeds without cramping the connections.

I claim—

1. In a lister-cultivator, the combination with a furrow-tracking frame, of cutter-blades curved outward and rearward from the frame with their lower edges in advance of their upper edges, whereby soil is cut out of the sides of the furrow and carried over the blades toward the row, and disks in the rear of the cutter-blades adapted to carry soil from the row, substantially as described.

2. In a lister-cultivator, the combination of a furrow-tracking frame, a rock-shaft journaled crosswise of the frame, arms on the shaft extended rearward therefrom, such arms being each composed of members axially adjustable with relation to each other, cross-shafts swingably adjustable on the rear ends of the arms, disks on the cross-shafts, and means for rocking the rock-shaft, substantially as described.

3. A lister-cultivator frame comprising runners, uprights, cross-bars and longitudinal bars, the cross-bars being composed of two members separated by trunnioned strut-blocks, the trunnions of which engage holes in the cross-bar members, clip-plates embracing the cross-bars and securing-bolts extending through the clip-plates and through the strut-blocks, substantially as described.

4. In a lister-cultivator, the combination of transverse disk-shafts, disk-hubs recessed at their ends, and spools each having one end enlarged and recessed to embrace an end of a hub and the other end reduced to enter the recess in the end of the hub, substantially as and for the purpose set forth.

5. In a lister-cultivator the combination of a furrow-tracking frame, a seat-bar or spreader-board, a loop-bar under the end of the spreader-board embracing a longitudinal bar of the furrow-tracking frame, and a loop-bar on such longitudinal bar of the furrow-tracking frame embracing the loop-bar of the spreader-board, substantially as described.

In testimony whereof I sign my name in the presence of two subscribing witnesses.

WM. S. GRAHAM.

Witnesses:
A. L. GARDNER,
R. A. HALL.