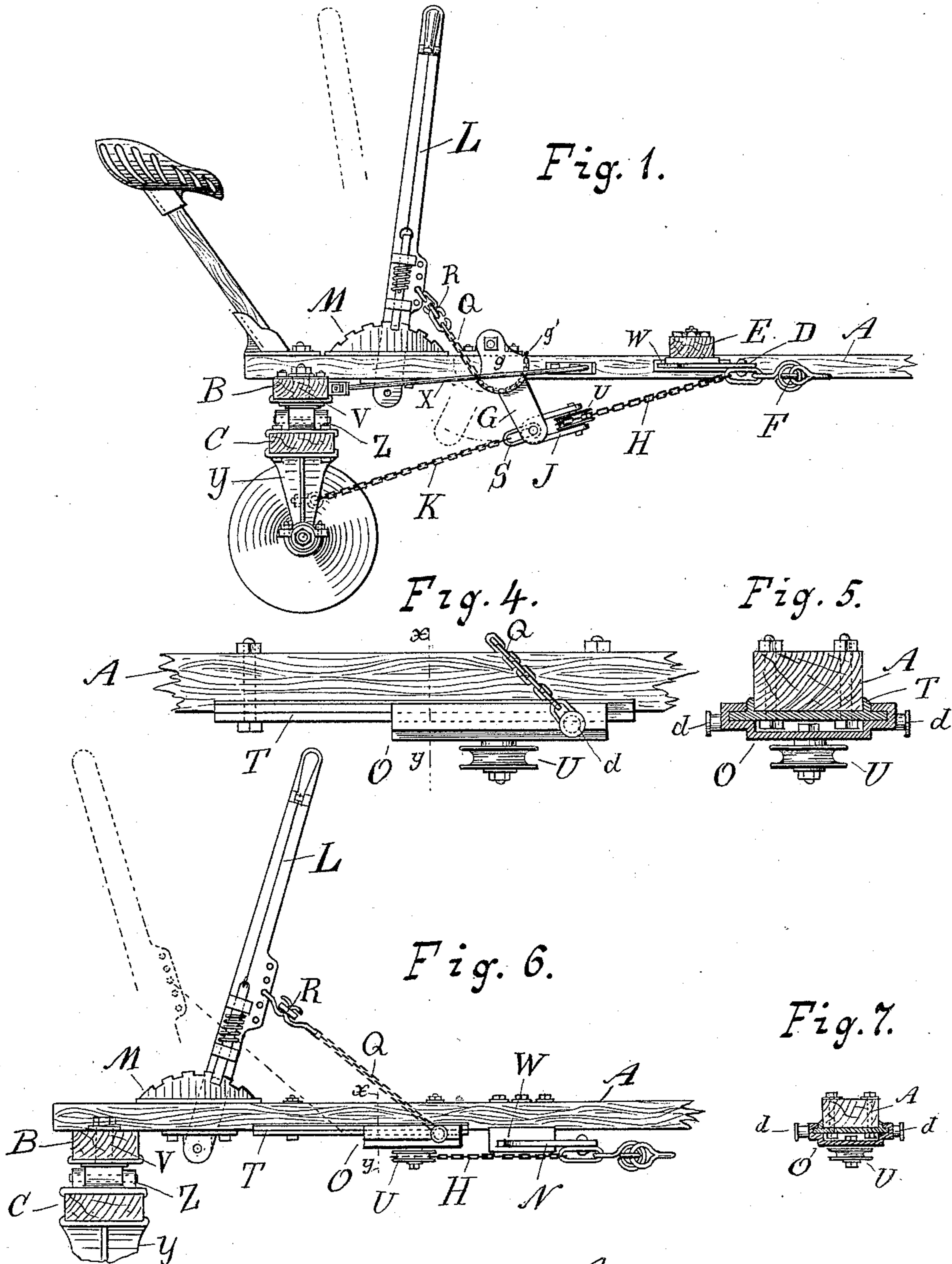


R. W. HARDIE.

DISK HARROW.

No. 401,745.

Patented Apr. 23, 1889.



WITNESSES:

Chas Konimann

Walter Muller

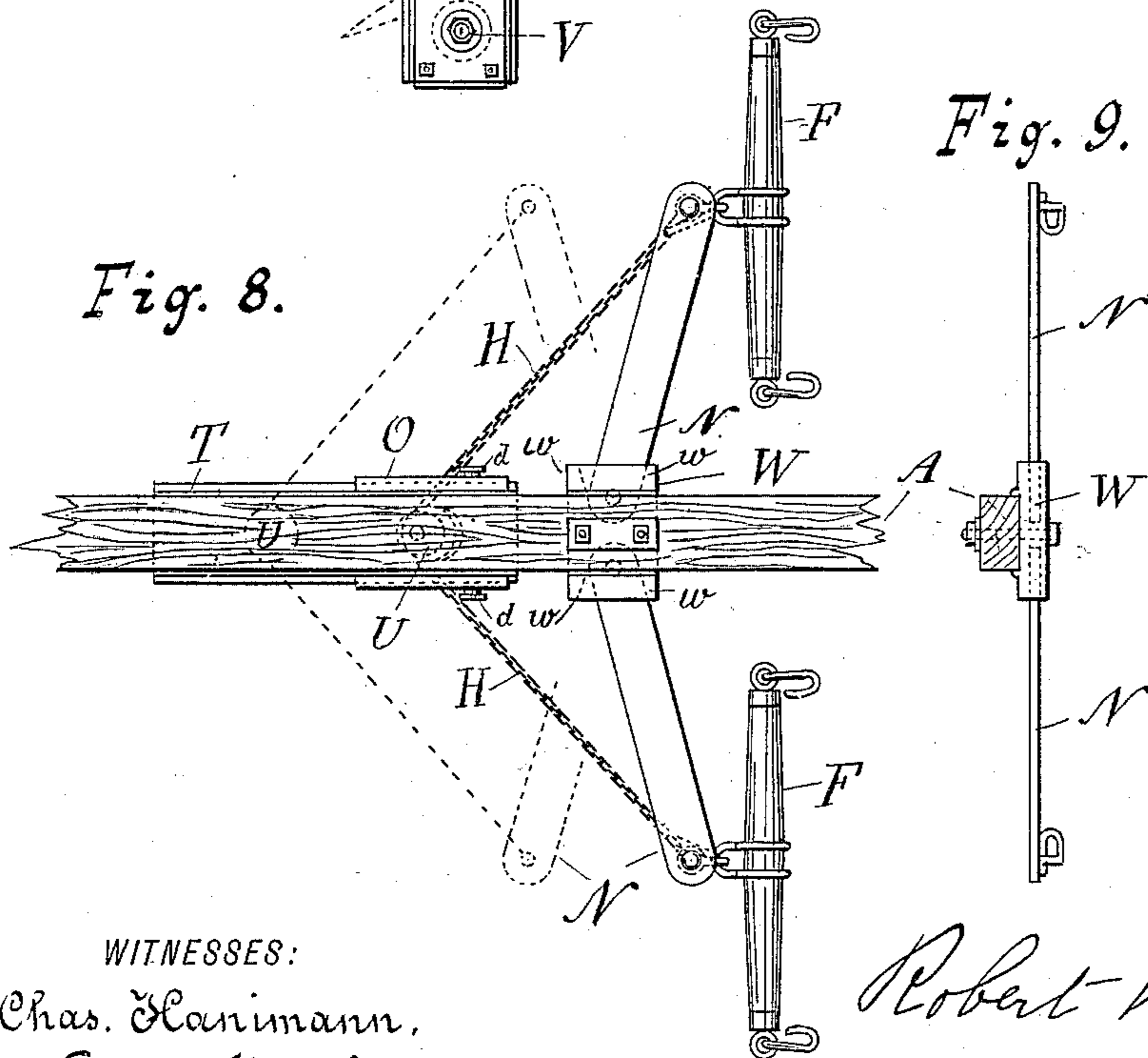
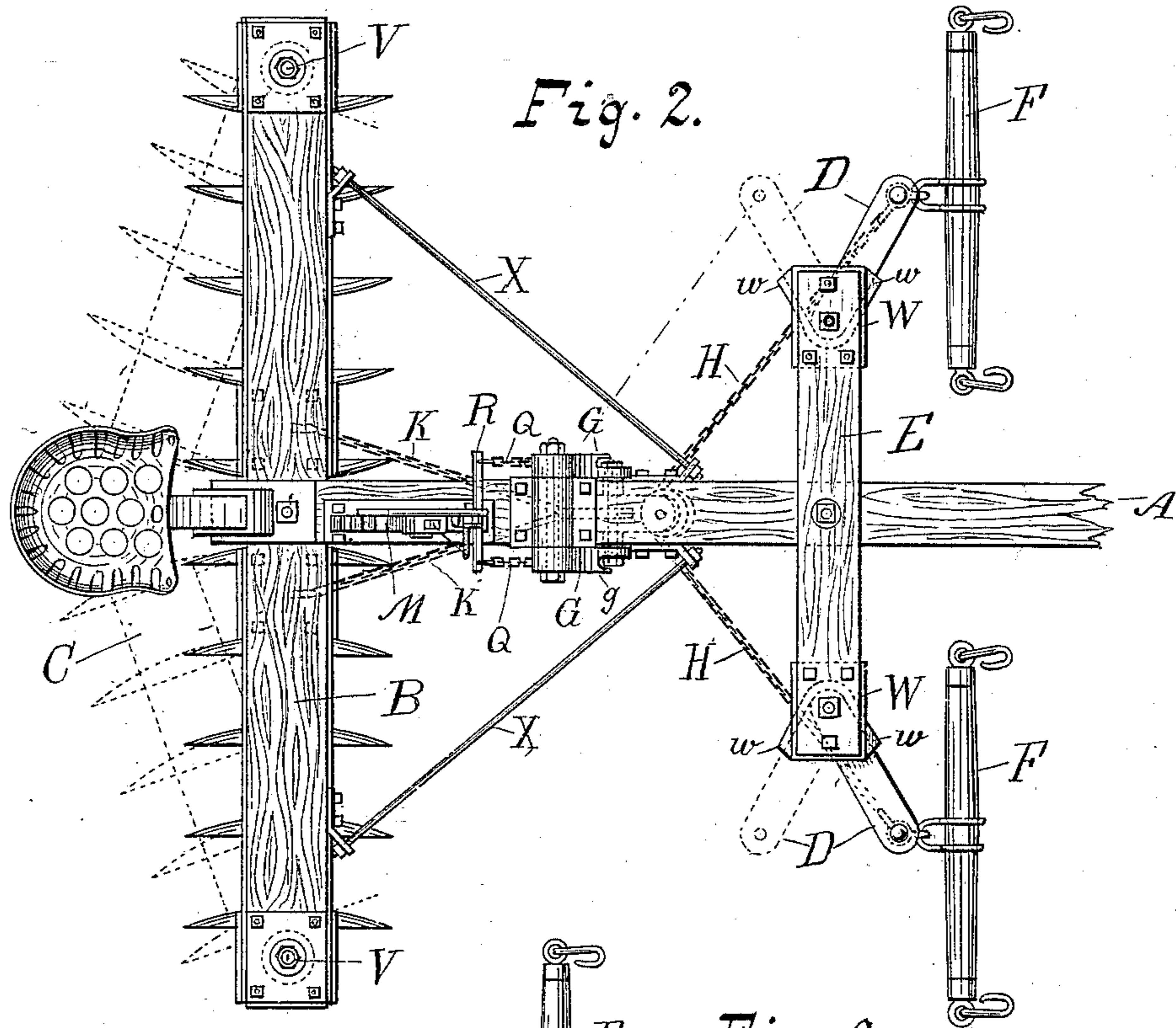
INVENTOR,

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WITNESSES:  
Chas. Konimann,  
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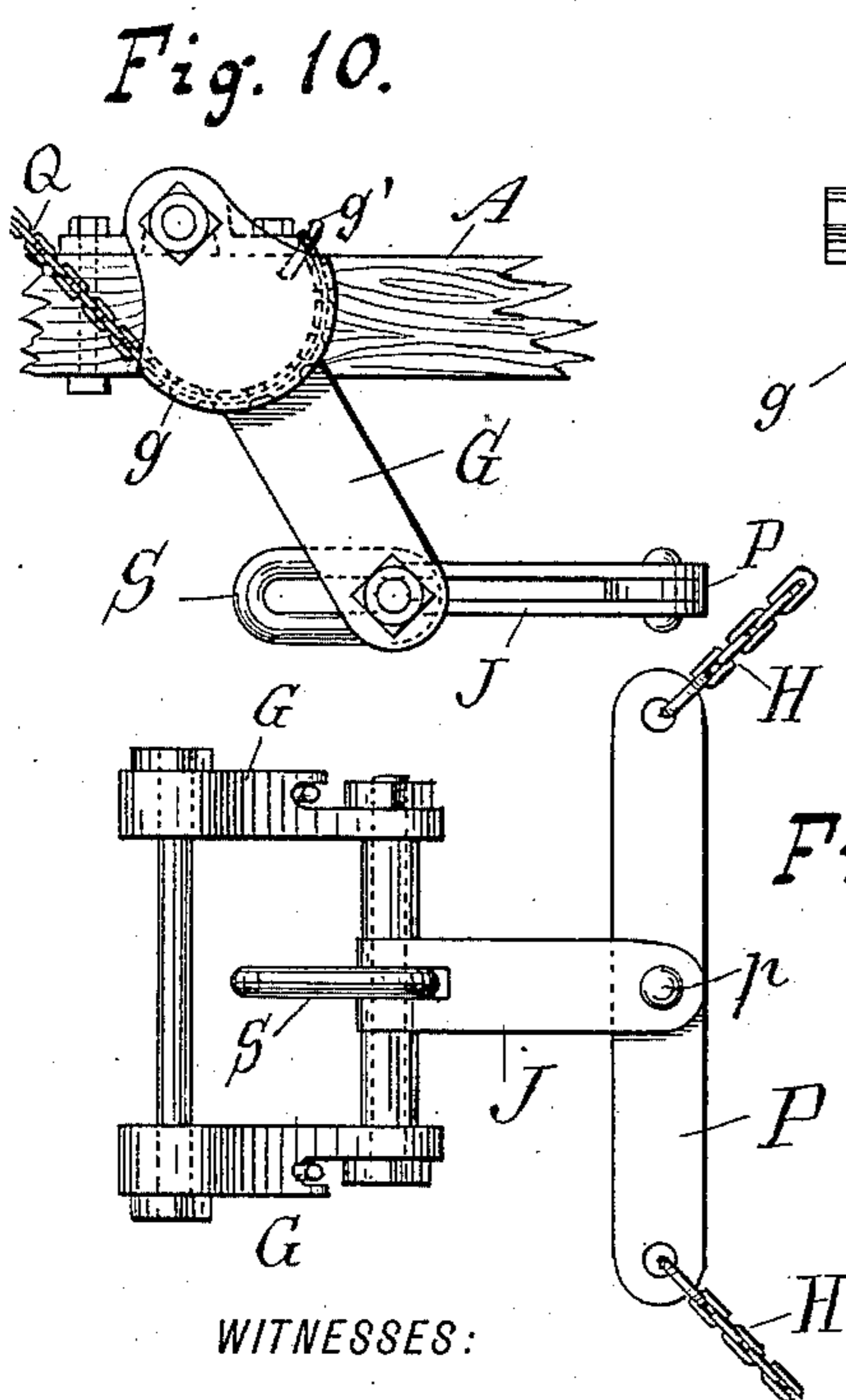
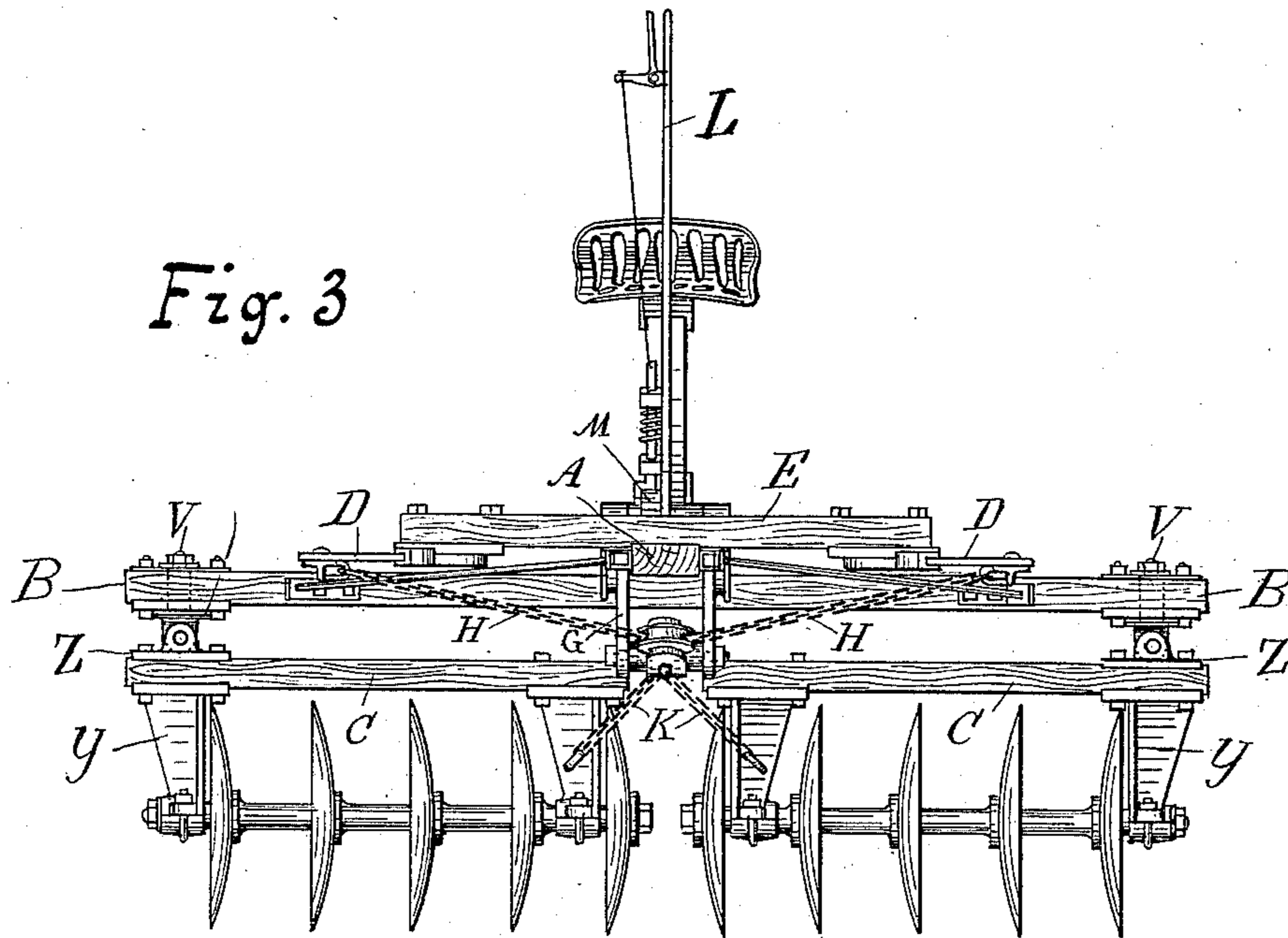
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WITNESSES:

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# UNITED STATES PATENT OFFICE.

ROBERT W. HARDIE, OF ALBANY, NEW YORK.

## DISK HARROW.

SPECIFICATION forming part of Letters Patent No. 401,745, dated April 23, 1889.

Application filed September 15, 1888. Serial No. 285,553. (No model.)

*To all whom it may concern:*

Be it known that I, ROBERT W. HARDIE, a citizen of the United States, and a resident of Albany, in the county of Albany and State of New York, have invented certain new and useful Improvements in Disk Harrows, of which the following is a specification.

My invention relates, generally, to that class of harrows which have gangs of revolving cutters adapted to be moved backward and forward at an angle with the line of draft.

The general object of my invention is to provide such harrows with means whereby the cutter-gangs may be adjusted at an angle to the line of draft by the power of the team and the resistance of the earth.

My invention consists, broadly, in providing a harrow having backwardly and forwardly movable gangs of revolving cutters with whiffletrees adapted to be moved together backward and forward independently of a pole, doubletree, or cross-bar, and in further providing such a harrow with draft-equalizing mechanism of any suitable construction, connecting the whiffletrees and the free ends of the cutter-gangs, whereby a backward or forward movement of both whiffletrees causes a backward or forward movement of the free ends of the cutter-gangs.

My invention consists, further, in providing means for moving backward or forward said whiffletrees, draft-equalizing mechanism, and also in providing means for locking or securing the whiffletrees and the free ends of the cutter-gangs in any desired position, and in further providing means for limiting the movement of the cutter-gangs and the whiffletrees.

In the drawings, Figure 1 represents a side view of a harrow having backwardly and forwardly movable cutter-gangs pivoted to a cross-bar, independently backwardly and forwardly movable whiffletrees, and draft-equalizing mechanism connecting the whiffletrees with the free ends of the cutter-gangs, and means for drawing the whiffletrees backward and locking them in any desired position. Fig. 2 represents a plan view of a harrow containing the parts shown in Fig. 1. Fig. 3 represents a front view of the same. Fig. 4 represents a side view of a portion of a pole having a track mounted thereon, a slide carrying

a pulley moving on said track, and a chain connected to said slide adapted to be connected with a hand-lever, the whole being a modification of means adapted to move the whiffletrees backward and forward. Fig. 5 represents a cross-section of the same parts, taken on line *x y* of Fig. 4. Fig. 6 represents a side view of the parts shown in Fig. 4 connected with swinging arms to which whiffletrees are attached, adapted to be moved together backward and forward by means of a lever attached to the pole. Portions of the cross-bar and the upper end of the cutter-gang beam are also shown. Fig. 7 represents a cross-section taken on line *x y* in Fig. 6. Fig. 8 represents a plan view of a pole, sliding mechanism attached to its under surface, arms pivotally attached to the pole at their inner ends, whiffletrees connected with the outer ends of said arms, and means for connecting the whiffletrees together. Fig. 9 represents a cross-section of a pole, with a front view of the swinging arms shown in Fig. 8. Fig. 10 represents a side view of swinging arms pivotally attached at their upper end to a pole and carrying on their lower end a link, and a yoke which supports a bar pivotally attached to the yoke and extending transversely thereto. Fig. 11 represents a cross-section of a pole and a front view of the parts shown in Fig. 10, the chain being removed. Fig. 12 represents parts similar in construction to those shown in Fig. 10, the swinging arms being drawn back. Fig. 13 represents a plan view of the parts shown in Fig. 10 removed from the pole. Fig. 14 represents a plan view of the parts shown in Fig. 12 removed from the pole, with a chain engaging with the pulley.

In the drawings, A represents a pole attached to a cross-bar, (represented by B.) Braces X extend from the cross-bar to each side of the pole and brace it against strains of any kind. Attached to the pole is a cross-bar or doubletree, E. This bar may be pivotally connected with the pole by means of a bolt and nut or similar device, so as to have a slight motion on said pivot, the same as a doubletree of ordinary construction. I prefer, however, to securely fasten said bar to the pole, so that it will be simply a cross-bar, perfectly rigid and incapable of any kind of

movement on the pole. To the ends of this doubletree or cross-bar whiffletrees F are attached in any suitable manner which will permit said whiffletrees to be moved backward or forward together independently of any movement of the doubletree or cross-bar.

In the drawings, arms D, adapted to move in the arc of a circle, are pivotally attached to the ends of the doubletree or cross-bar. To the outer ends of said swinging arms the whiffletrees are attached, adapted to move backward and forward on said doubletree or cross-bar independently thereof. Castings W are attached to the ends of the cross-bar or doubletree, and are provided with ribs *w*, which serve as stops to limit the backward and forward movement of the whiffletrees. The cross-bar or doubletree is shown in this instance placed upon the upper surface of the pole. A chain, H, connects with each of the whiffletrees and passes around a pulley, U, which is pivotally connected with a yoke, J. This yoke J moves freely upon a pin connecting the lower ends of the swinging arms G. The same pin supports a link, S. To this link are attached chains connected with the free ends of the cutter-gangs. Instead of chains, other mechanism having similar capabilities may be used. The upper portions of these arms are thicker than the lower portions, forming offsets. The lower extremity of each offset terminates in a sector, as shown by *g*. The edge of the sector is shown grooved, adapted to hold in said groove a chain, Q, which connects the swinging arms G with a hand-lever, L, pivoted to the pole. Pins may be inserted in the edge of the sector, with which links of a chain may be made to engage. These arms are pivotally connected at their upper ends to a pole by means of a bolt or pin passing through the upper ends of the arms and the casting *e* on the pole.

The chain Q is shown connected to the sides of the swinging arms G by means of a pin, *g'*. The other ends of these chains are connected with a cross-rod, R, which is loosely attached to the hand-lever. The hand-lever is shown provided on its forward edge with a series of holes, through which the bolt or pin may be passed which supports the cross-rod R upon the lever. By changing said pin and cross-rod from one hole to another the connection between the lever and the movable equalizing mechanism is made adjustable, so as to allow the lever to be inclined in a position suited to the length of the arm of the operator. A latch and a sector, M, may be used to lock the lever in any desired position. When the hand-lever is locked in position, the forward movement of the swinging arms G is limited.

Instead of swinging arms G, a track, T, may be fastened to the pole. A slide, O, may be placed upon the track, and a hand-lever may be connected with the slide by means of chains Q, or devices having similar capabilities, as shown in Fig. 6. A pulley, U, may be attached

to the slide, and the chain H passed around the surface of the pulley and connected to the whiffletrees, as shown in Fig. 6.

To the upper surface or end of the cutter-gang beam C a joint is attached, which will permit both vertical and lateral motion of the gang-beam. In this instance the joint is shown to consist of ears Z, attached to the upper surface of the beam. Between the ears the head of an eyebolt, V, is placed. A pin passing through the ears and the head of the bolt forms a hinge adapted to allow vertical motion of the gang-beam. The shank of the bolt V, which extends up through the cross-bar B, forms a pivot on which the cutter-gang is adapted to move backward and forward. A joint that will permit only a backward and forward movement of the cutter-gangs is sufficient for the operation of my invention. I prefer, however, to use a joint having the capabilities possessed by the one shown herein.

Instead of attaching the whiffletrees to a cross-bar or doubletree, the cross-bar or doubletree may be entirely dispensed with, and the arms D may be lengthened, as shown by N in Fig. 8, and pivoted directly to the pole.

Castings W, provided with stops *w*, similar to those shown in Fig. 2, may, if desired, be attached directly to the pole to limit the backward and forward movement of the swinging arms N. These lengthened arms N, pivoted at one end to the pole and carrying a whiffletree on the other, may be used in connection with a slide attached to the pole, as shown in Fig. 8, or with the swinging arms G, carrying a yoke, J. Stop mechanism of any kind may be placed between the gang-beam and the cross-bar to limit the upward movement of the gang-beam.

Instead of the pulley, a bar, P, may be pivoted either to the slide O or the yoke J. A chain or flexible connections of any kind may connect the ends of the pivoted bar P with the whiffletrees. Rods may be used with such a bar instead of chains.

Chains or rods having similar capabilities may be used to connect the whiffletrees directly with the hand-lever, and a yoke similar to J, supporting a pulley, may be attached to the hand-lever instead of the cross-rod R. The whiffletrees are held at the same relative distance from each other by means of connections of any kind, as the chain H, which connects the whiffletrees together.

When all the parts of the harrow are together and the hand-lever leans forward, as shown in Fig. 1, the chains Q, which connect the hand-lever with the swinging arms G under the pole, being loosened, the swinging arms will be free to move forward. The whiffletrees and the arms attached to the doubletree or cross-bar or to the pole direct will also be free to be moved forward.

When the forward movement of the arms D, carrying the whiffletrees, is limited by the stops *w*, the forward movement of the swing-

ing arms G ceases. Stop mechanism of any kind may be attached to the swinging arms G or the slide O to limit the backward and forward movement of the said arms or slide.

5 When it is desired to place the cutter-gangs at an angle to the line of draft, the team is first drawn backward. The arms D, carrying the whiffletrees, will then be free to move backward. By drawing back the hand-lever 10 the chain-connections Q between the lever and the swinging arms G will draw back the swinging arms G and the whiffletrees. The chain-connections K between the swinging arms G and the free ends of the cutter-gangs 15 will then be slackened. The hand-lever may then be locked in position, and when the team is started up, the forward movement of the swinging arms G and the whiffletrees having been stopped by the locking of the hand-lever, 20 the body of the harrow and the ends of the cutter-gangs, which are pivoted to the cross-bar B, will move forward, while the free ends of the cutter-gangs are held back by the resistance of the earth until they take the 25 position shown by the dotted lines in Fig. 2. The chain-connections K between the free ends of the cutter-gangs and the swinging arms G under the pole will then become tightened, and the free ends of the cutter-gangs move forward with the other portions 30 of the harrow. When it is desired to bring the gangs back again into a line at right angles to the line of draft, the lever is first moved forward and locked in position. The 35 chain-connections Q between the lever and the swinging arms G will then be loosened, and the swinging arms G and the arms carrying the whiffletrees will be free to move forward. When the team is started in motion, 40 they will draw forward with them the whiffletrees and the swinging arms G. When the swinging arms G are drawn forward, they draw with them the free ends of the cutter-gangs. The forward movement of these parts 45 may be continued, while the remaining portions of the harrow remain stationary, until the disk-gangs are at a right angle with the line of draft.

I do not desire to be limited to the specific 50 construction of any of the several parts shown and described herein. I claim, broadly, whiffletrees adapted to be moved backward and forward together independently of a double-tree, cross-bar, or pole, in combination with 55 draft-equalizing mechanism having a bodily movement forward and backward in the line of draft, with suitable draft-connections flexibly uniting such equalizing mechanism with the free ends of the cutter-gangs, whereby a 60 backward or forward movement of the whiffletrees will cause a backward or forward movement of the free ends of the cutter-gangs, whether the whiffletrees be attached to the outer ends of a doubletree or to a cross-bar 65 rigidly secured to a pole or mounted on arms pivoted to a pole.

The flexible connections which unite the

whiffletrees together, consisting of a chain engaging with a pulley or an equivalent device— 70 such as rods or chains connected with a pivoted bar movable in a horizontal plane—constitute draft-equalizing mechanism. This mechanism is made movable bodily forward and backward in the line of draft by means 75 of a slide or a swinging arm pivoted to a pole. I am aware that it is old to use draft-equalizing mechanism wherein the flexible connection uniting the whiffletrees has a reciprocating motion crosswise of the line of draft, and I make no claim to such a construction, 80 broadly. In my device, in addition to said reciprocating crosswise movement of the flexible connection, there is a forward and backward movement of the entire draft-equalizing 85 mechanism in the line of draft independently of the reciprocating crosswise movement of the part before mentioned, whereby the whiffletrees may be brought closer together at will, and at the same time have a reciprocating 90 movement.

So far as I am aware I am the first to construct draft-equalizing mechanism having a bodily movement forward and backward in the line of draft independently of the crosswise reciprocating movement of certain of its 95 parts.

My invention is applicable to a variety of agricultural implements in addition to the kind shown herein, and particularly cultivators of the class known as "corn-cultivators" 100 and "straddle-row cultivators," wherein the team walk in furrows between lines of growing crops. By means of my peculiar construction the team may be brought closer together at will by drawing back the whiffletrees and 105 equalizing mechanism bodily, and the team be enabled to travel in furrows varying in distance from each other.

I claim—

1. In a disk harrow, the combination, with 110 a main frame and cutter-gangs pivoted thereto, of whiffletrees movable forward and backward together independently of a doubletree, draft-equalizing mechanism movable bodily forward and backward in the line of draft, 115 and draft-connections flexibly uniting said equalizing mechanism with the free ends of the cutter-gangs, substantially as shown and described.

2. In a disk harrow, the combination, with 120 a main frame and cutter-gangs pivoted thereto, of whiffletrees movable forward and backward together independently of a doubletree, draft-equalizing mechanism movable bodily forward and backward in the line of draft by 125 means of a swinging arm pivoted to the pole, and draft-connections flexibly uniting said swinging arm with the free ends of the cutter-gangs, substantially as shown and described. 130

3. In a disk harrow, the combination, with a main frame and cutter-gangs pivoted thereto, of whiffletrees movable forward and backward together independently of a doubletree,

flexible connections uniting said whiffletrees and engaging with a pulley flexibly attached to a swinging arm pivoted to a pole, and draft-connections flexibly uniting said swinging arm with the free ends of the cutter-gangs, substantially as shown and described.

4. In a disk harrow, the combination, with a main frame and cutter-gangs pivoted thereto, of whiffletrees mounted upon pivoted arms movable together forward and backward on their pivots, draft-equalizing mechanism movable bodily forward and backward in the line of draft, and draft-connections flexibly uniting said equalizing mechanism with the free ends of the cutter-gangs, substantially as shown and described.

5. In a disk harrow, the combination, with a main frame and cutter-gangs pivoted thereto, of whiffletrees mounted upon pivoted arms movable together forward and backward on their pivots, draft-equalizing mechanism movable bodily forward and backward in the line of draft, draft-connections flexibly uniting said equalizing mechanism with the free ends of the cutter-gangs, a lever pivoted to a pole, and flexible connections uniting said lever and draft-equalizing mechanism, substantially as shown and described.

6. In a disk harrow, the combination, with a main frame and cutter-gangs pivoted thereto, of whiffletrees mounted upon pivoted arms movable together forward and backward on their pivots, draft-equalizing mechanism movable bodily forward and backward in the line of draft by means of a swinging arm attached to a pole, draft-connections flexibly uniting said swinging arm with the free ends of the

cutter-gangs, a lever pivoted to a pole, and flexible connections uniting said lever and swinging arm, substantially as shown and described.

7. In a disk harrow, the combination, with a main frame and cutter-gangs pivoted thereto, of a swinging arm pivoted to a pole and provided with a sector, flexible draft-connections uniting said swinging arm with the free ends of the cutter-gangs, a lever pivoted to the pole, and flexible connections attached to said lever and engaging the edge of said sector, substantially as shown and described.

8. The combination, with a pole, of whiffletrees mounted upon pivoted arms, draft-equalizing mechanism movable bodily forward and backward in the line of draft, an adjusting-lever pivoted to the pole, a locking device connected therewith, and flexible connections uniting said lever and equalizing mechanism, substantially as shown and described.

9. The combination, with a pole, of whiffletrees mounted upon pivoted arms and movable together backward and forward in a horizontal plane, draft-equalizing mechanism consisting of flexible connections uniting said whiffletrees, engaging with a pulley flexibly attached to a swinging arm pivoted to a pole, an adjusting-lever attached to said pole and having a locking device connected therewith, and adjustable connections uniting said lever and swinging arm, substantially as shown and described.

ROBERT W. HARDIE.

Witnesses:

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