No. 624,967. Patented May 16, 1899.

H. PAULSON.

HARROW.

(Application filed Dec. 15, 1898.)

(No Model.) 3 Sheets—Sheet 1.

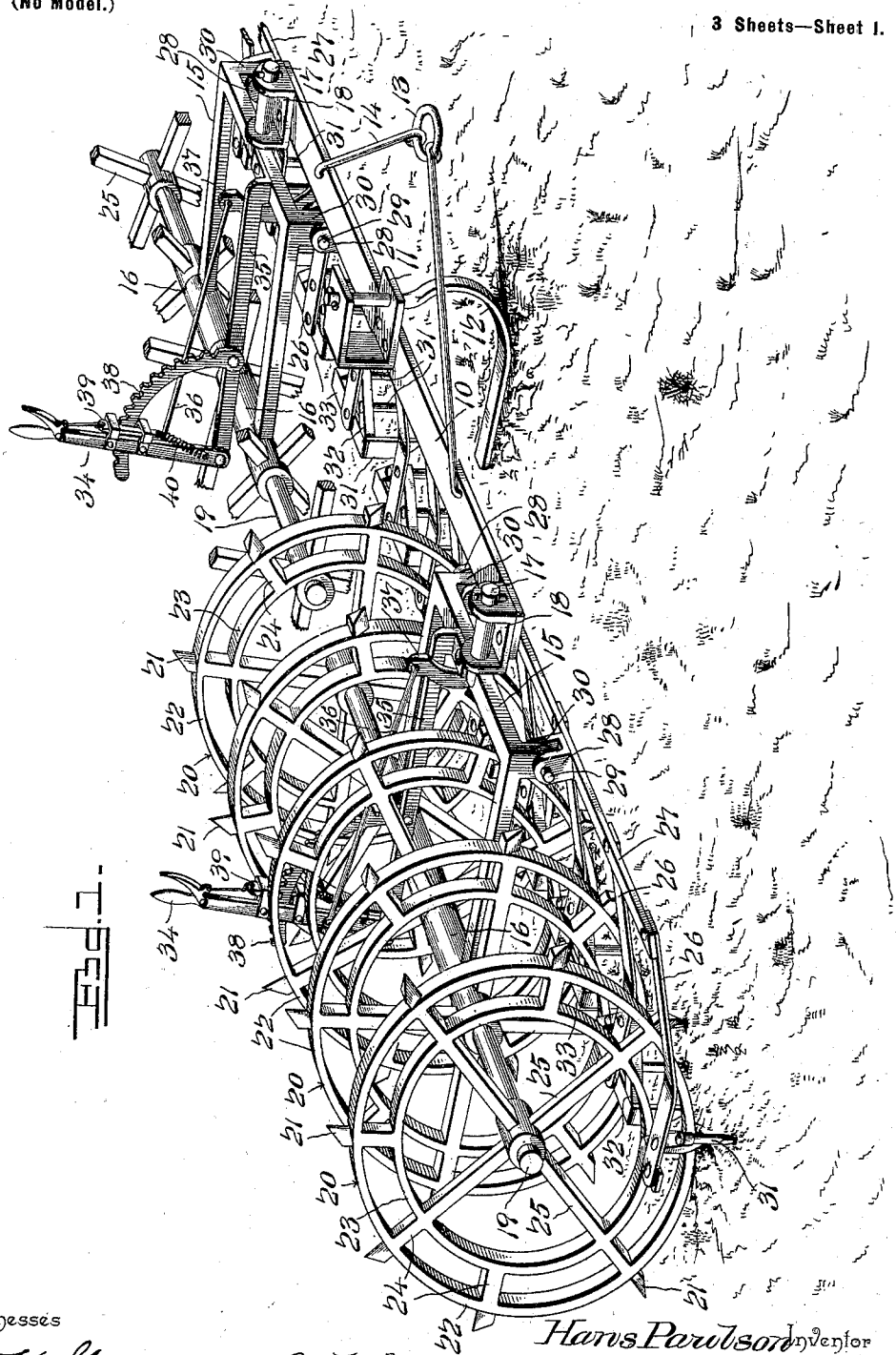

Fig. 1.

Witnesses
E. K. Stewart.
C. C. Hoyt.

Hans Paulson Inventor
By Wood Brothers Attorneys,
C. A. Snow & Co.

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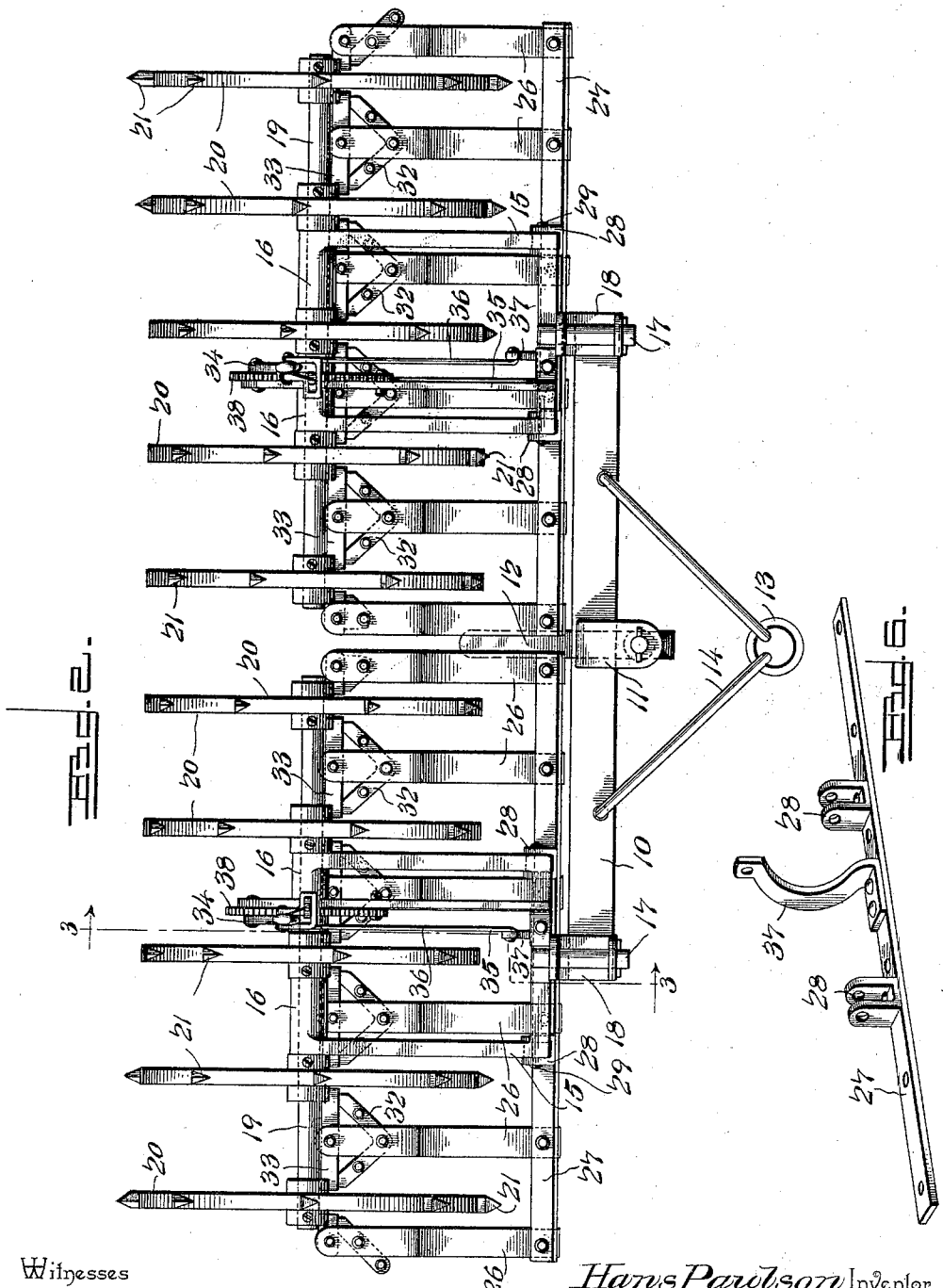

Fig. 2.

Fig. 6.

Witnesses

E. F. Stewart

O. E. Hoyt

Hans Paulson Inventor

By Wm. S. Attorneys,

C. A. Snow & Co.

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(No Model.) 3 Sheets—Sheet 3.

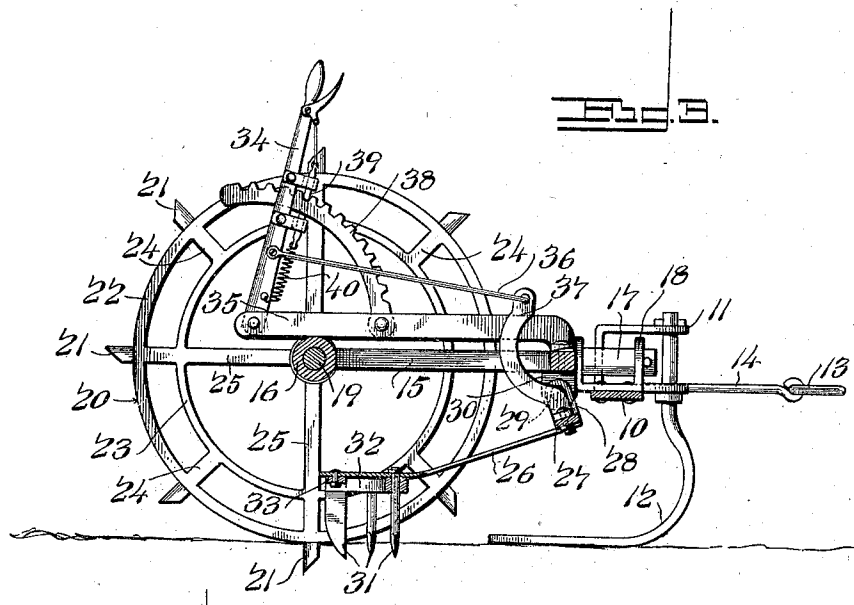

Fig. 3.

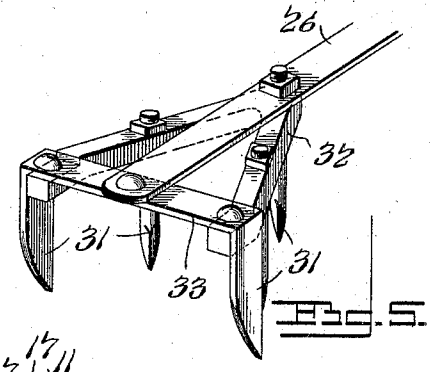

Fig. 5.

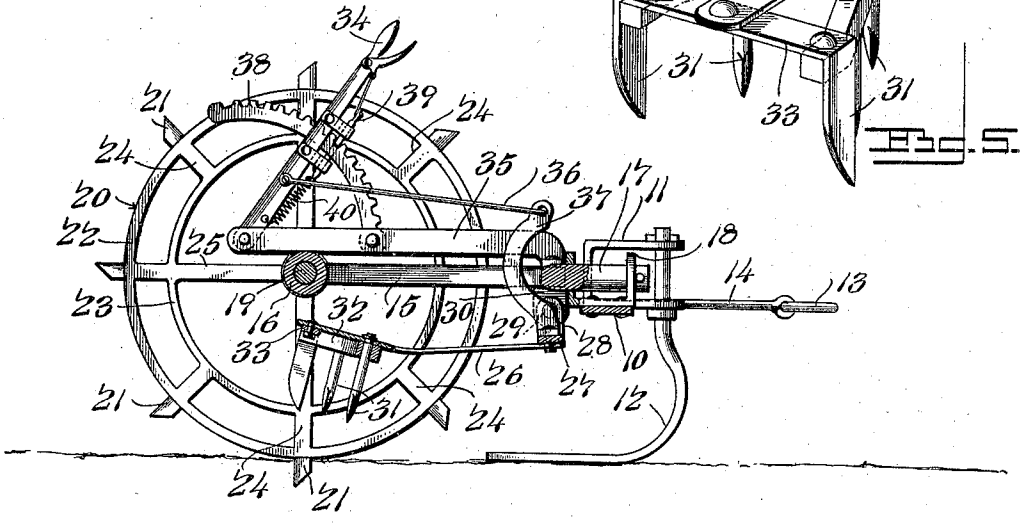

Fig. 4.

Witnesses

E. F. Stewart.

O. D. Boyle

Hans Paulson Inventor

By Wood & Attorneys,

C. A. Snow & Co.

UNITED STATES PATENT OFFICE.

HANS PAULSON, OF SUMNER, WASHINGTON.

HARROW.

SPECIFICATION forming part of Letters Patent No. 624,967, dated May 16, 1899.

Application filed December 15, 1898. Serial No. 699,369. (No model.)

To all whom it may concern:

Be it known that I, HANS PAULSON, a citizen of the United States, residing at Sumner, in the county of Pierce and State of Washington, have invented a new and useful Harrow, of which the following is a specification.

My invention relates to cultivators of the harrow type, and particularly to a gang-harrow; and the object in view is to provide a machine of this class wherein the operations of clod-breaking wheels and drag-teeth are so combined as to insure efficiency in granulating or breaking the soil, and, furthermore, to provide a simple and efficient construction and arrangement of automatic and manually-operating adjusting devices whereby the machine is caused to adapt itself to the contour of the soil traversed and also may be readily moved from one point of operation to another.

Further objects and advantages of this invention will appear in the following description, and the novel features thereof will be particularly pointed out in the appended claims.

In the drawings, Figure 1 is a perspective view of a cultivator constructed in accordance with my invention, portions of the clod-breaking wheels in one gang being partly broken away. Fig. 2 is a plan view of the cultivator. Fig. 3 is a vertical sectional view on the plane indicated by the line 3 3 of Fig. 2, the drag-tooth frame being shown in its depressed or operative position. Fig. 4 is a similar view showing the drag-tooth frame elevated as when the machine is being transported from one point of operation to another. Fig. 5 is a detail view in perspective of one of the arms of the drag-tooth frame. Fig. 6 is a similar view of the arm-connecting bar of one of the drag-tooth frames.

Similar reference characters indicate corresponding parts in all the figures of the drawings.

The cultivator forming the subject-matter of my invention embodies a draft-frame consisting of a transverse bar 10, from a clip 11 at the center of which depends a swiveled runner 12, together with a draft-ring 13 and rearwardly-divergent hounds 14 or the equivalents thereof, by which forward motion may be imparted to the draft-frame in operation. In connection with this draft-frame I employ one or more rockers consisting of armed yokes 15, provided at the rear ends of the arms with transversely-alined bearing-sleeves 16 and at the centers of their front ends with forwardly-projecting spindles 17, mounted in suitable bearing-clips 18 on said cross-bar 10 of the draft-frame, whereby the yokes are adapted to rock in transverse planes to cause the disposition of the operating or clod-breaking elements in operative relation with the surface of the soil traversed by the machine, as will be hereinafter more fully explained.

In the alined bearings at the rear ends of the yoke-arms are mounted wheel-shafts 19, supporting peripherally-spurred clod-breaking wheels 20, which are spaced apart upon the shafts preferably at uniform intervals, a plurality of wheels being arranged upon each shaft for simultaneous rotation and for peripheral contact with the soil. Any suitable construction of spurs 21 may be employed upon the peripheries of these clod-breaking wheels; but in practice I prefer to employ supports which are wedge-shaped in plan to form front cutting edges, by which they are caused to cut into the soil to bring the rim 22 into contact with the surface of the soil, and thus perform a rolling or crushing function. The preferred construction of wheel embodies the above-described outer rim 22 and an inner rim or ring 23, spaced from the outer rim and held at the desired interval by radial braces 24, arranged, respectively, in alinement with the spurs 21, the wheel-spokes 25 being in turn arranged in alinement with certain of said braces, but being preferably of a less number, as shown.

Mounted for swinging movement in longitudinal planes or planes perpendicular to the transverse planes of movement of the rockers and respectively mounted upon and carried by said rockers are drag-tooth frames having rearwardly-extending drag-tooth-carrying arms 26, arranged, respectively, in the intervals between the planes of the wheels 20, whereby said wheels and drag-tooth-carrying arms are alternately disposed, said arms being connected by front cross-bars 27, having pivotal connection with the above-described rockers 15. In the construction illustrated the cross-bars 27 of the drag-tooth-carrying frames are provided with ears 28, connected by pivots 29 with ears 30, depending

from said rockers, and hence while the drag-tooth-carrying frames are capable of oscillation or swinging movement in longitudinal planes independently of the rockers the oscillatory movement of the rockers in a transverse plane is communicated to the drag-tooth-carrying frames. The arms 26 are provided approximately in the transverse planes of the centers of alined axes of the clod-breaking wheels 20 with drag-teeth 31, preferably supported by rearwardly-divergent tongues 32, connected by cross-bars 33 and suitably bolted or otherwise secured to the arms 26, the teeth 31 being spaced upon the tongues 32 at greater or less intervals to suit the requirements of the machine, and the spread of the tongues 32 toward their rear ends being such as to locate the rearmost teeth 31 in planes adjacent to the wheels 20. Inasmuch as the drag-teeth are disposed approximately in the vertical plane of the axes of the wheels 20, it will be seen that they operate upon the soil approximately in a common transverse plane with said wheels, whereby when the machine is in use the wheels and drag-teeth coöperate upon a transverse line and combine to break the soil uniformly throughout a transverse width equal to that of the machine. I have found in practice that the combined operation of the rolling breakers or wheels and drag-teeth insures the efficient breaking or granulation of the soil, and hence the satisfactory preparation of the soil for planting or sowing.

The drag-tooth-carrying arms 26 are resilient or of yielding construction, preferably consisting of spring metal, whereby the teeth are adapted to yield in passing over obstructions which cannot be broken without risk of injury to the machine, and in order that the downward pressure of the drag-teeth may be varied I preferably employ in connection with each swinging frame an operating device, which in the construction illustrated consists of a hand-lever 34, fulcrumed upon the supporting-arm 35, which extends rearwardly from the front bar of the rocker or yoke, and a connecting-rod 36, which is connected to an upwardly-extending arm 37, attached to the cross-bar 27 of a tooth-carrying frame. Said hand-lever operates in a plane parallel with and adjacent to a rack or toothed segment 38 and is provided with a locking-pawl 39, whereby it may be secured at the desired adjustment, said pawl being actuated by a spring 40. Also when it is desired to transport the machine from one point of use to another without causing the operation during transportation of the teeth 31 I am enabled by means of the adjusting device above described to elevate each tooth-carrying frame, as indicated in Fig. 4; but in practice said frames should not be elevated sufficiently to raise the lower extremities of teeth 31 above the lowermost points of the inner rims 23 of the wheels. Obviously with yielding or resilient tooth-carrying arms there is liable to be more or less transverse vibration of the arms, particularly in traversing rough soil, and by limiting the elevation of the arms 26 so that the lower extremities of the teeth 31 do not rise above the lowermost points of the inner rims 23 the latter are adapted to perform the functions of guards, by which the said teeth are prevented when the arms 26 vibrate from entering the wheels between the spokes and becoming caught. In other words, said inner rims perform the functions of stops, which limit the lateral vibration of the tooth-carrying ends of the arms 26 and maintain the teeth in their proper planes of operation between the wheels.

In the drawings I have illustrated a double-gang cultivator wherein a plurality of rocker-frames respectively carrying drag-tooth frames are employed; but it will be understood that I do not desire to be limited to this duplication, as the machine may be constructed with a single rocker-frame; but the essential feature of the machine embodying my invention consists in the alternately-disposed rolling and dragging elements which operate in adjacent parallel planes and approximately upon a common transverse line or a line transverse to the path of movement of the machine, whereby the surface of the soil traversed is uniformly broken and granulated, the rolling and dragging elements being coöperative in accomplishing the desired result. Furthermore, it will be understood that I do not desire to be limited to any specific number of rolling and dragging elements carried by each rocking member of the machine, as the same may be varied to suit the general character of the soil to be worked and the strength of the team which is to be employed in connection therewith, and also that various other changes in the form, proportion, and the minor details of construction may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

Having described my invention, what I claim is—

1. In a cultivator, the combination with a draft-beam, of a rocker-frame mounted for swinging movement in a transverse plane and having a transverse axle, peripherally-spurred clod-breaking wheels secured at intervals to said axle, a drag-tooth-carrying frame mounted upon the rocker-frame, with its axis parallel with said axle, and provided with drag-tooth-carrying arms arranged in the vertical planes of the intervals between said wheels, and means for varying the position of the drag-tooth-carrying frame and securing it in an adjusted position, substantially as specified.

2. In a cultivator, the combination with a draft-frame, of a rocker-frame consisting of an armed yoke provided with a central longitudinal spindle mounted upon the draft-frame, and a transverse axle mounted in bearings upon the arms of the yoke, periph-

erally-spurred clod-breaking wheels fixed at intervals to said axle, a drag-tooth-carrying frame pivotally mounted upon the rocker-frame in front of said axle, and with its axis parallel with the axle, and provided with rearwardly-extending drag-tooth-carrying arms arranged in the vertical planes of the intervals between said wheels, and means for varying the position of the drag-tooth-carrying frame and securing the same in an adjusted position, substantially as specified.

3. In a cultivator, the combination with a draft-frame, of a rocker-frame consisting of an armed yoke provided with a central longitudinal spindle mounted upon the draft-frame, and a transverse axle mounted in bearings upon the arms of the yoke, peripherally-spurred clod-breaking wheels fixed at intervals to said axle between and beyond the side arms of the yoke, a drag-tooth-carrying frame pivotally mounted upon the rocker-frame in front of said axle, and with its axis parallel with the axle, and provided with rearwardly-extending drag-tooth-carrying arms arranged in the vertical planes of the intervals between said wheels, and means for varying the position of the drag-tooth-carrying frame and securing the same in an adjusted position, substantially as specified.

4. In a cultivator, the combination with a draft-frame, of a rocker-frame consisting of an armed yoke provided with a central longitudinal spindle mounted upon the draft-frame, and a transverse axle mounted in bearings upon the arms of the yoke, peripherally-spurred clod-breaking wheels fixed at intervals to said axle between and beyond the side arms of the yoke, said rocker-frame being provided at its front end with depending ears, a drag-tooth-carrying frame pivotally mounted upon said ears of the rocker-frame, with its axis parallel with said axle, and provided with rearwardly-extending drag-tooth-carrying arms arranged for swinging movement in the planes of the intervals between said wheels, and means for varying the position of the drag-tooth-carrying frame and securing the same in an adjusted position, substantially as specified.

5. In a cultivator, the combination of a transverse draft-frame having spaced bearings of which the axes are parallel with the path of the cultivator, and rocker-frames carrying cultivating devices, each rocker-frame comprising a yoke having a front cross-bar and rearwardly-extending arms terminating in bearings, and a central spindle extending forward from said cross-bar and mounted in one of said bearings of the draft-bar, substantially as specified.

6. In a cultivator, the combination with a draft-frame, of alternately-disposed wheels and intermediate resilient drag-tooth-carrying arms, said wheels being provided with guards to limit the lateral vibration of said arms, substantially as specified.

7. In a cultivator, the combination with a draft-frame, of alternately-disposed wheels and intermediate resilient drag-tooth-carrying arms, said wheels being provided with inner rims arranged in the paths of lateral movement of the drag-teeth carried by said arms, substantially as specified.

8. In a cultivator, the combination with a draft-frame, of spaced peripherally-spurred clod-breaking wheels having spaced inner and outer rims, and rearwardly-extending resilient arms disposed respectively between the planes of said wheels and provided at their rear ends with drag-teeth, and means for adjusting said arms to arrange the drag-teeth in the planes of the inner rims of said wheels, substantially as specified.

9. In a cultivator, the combination with a draft-frame, of coaxial spaced wheels, a drag-tooth-carrying frame mounted for swinging movement in front of and axially parallel with said wheels, and provided with a plurality of rearwardly-extending independently-yielding drag-tooth-carrying arms arranged for swinging movement respectively in the planes of the intervals between said wheels, and means for varying the adjustment of the drag-tooth-carrying frame, substantially as specified.

10. In a cultivator, the combination with a draft-frame, of rocker-frames mounted upon the draft-frame for swinging movement in a transverse plane, a plurality of spaced wheels carried by each rocker-frame, a drag-tooth-carrying frame mounted upon each rocker-frame for swinging movement in a longitudinal plane, and provided with vertically-yielding tooth-carrying arms arranged respectively in the planes of the intervals between said wheels, and means carried by the rocker-frames for varying the adjustment of the tooth-carrying frames, substantially as specified.

11. In a cultivator, the combination with a draft-frame, of rocker-frames mounted upon the draft-frame for swinging movement in a transverse plane, a plurality of spaced wheels carried by each rocker-frame, a drag-tooth-carrying frame mounted upon each rocker-frame for swinging movement in a longitudinal plane and provided with rearwardly-extending vertically-yielding tooth-carrying arms arranged respectively in the intervals between said wheels, and means carried by the rocker-frames for varying the adjustment of the drag-tooth-carrying frames, substantially as specified.

12. In a cultivator, the combination with a draft-frame having a transverse bar and a runner, rocker-frames consisting of armed yokes provided at their front centers with spindles mounted in bearings upon said draft-frame, and adapted for swinging movement in a transverse plane, shafts mounted in bearings upon the arms of the yokes, spaced peripherally-toothed wheels carried by said shafts, drag-tooth-carrying frames mounted upon said yokes for swinging movement in longitu-

dinal planes, and having rearwardly-extending tooth-carrying arms arranged in the intervals between said wheels, and means for adjusting the drag-tooth-carrying frames with relation to the rocker-frames, substantially as specified.

13. In a cultivator, the combination with a draft-frame, of spaced coaxial wheels, adapted to traverse parallel paths, and tooth-carrying arms arranged respectively in the intervals between said wheels and provided at their extremities with rearwardly-divergent toothed tongues arranged approximately in the transverse planes of the lowermost or operative sides of said wheels, with the most remote teeth arranged adjacent, respectively, to the planes of the wheels upon opposite sides of the arm by which they are carried, substantially as specified.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

HANS PAULSON.

Witnesses:
J. R. BIGGAR,
J. H. VALENE.