(No Model.)

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C. LA DOW.

CULTIVATOR, HARROW, AND MARKER.

No. 269,070. Patented Dec. 12, 1882.

Fig. 1.

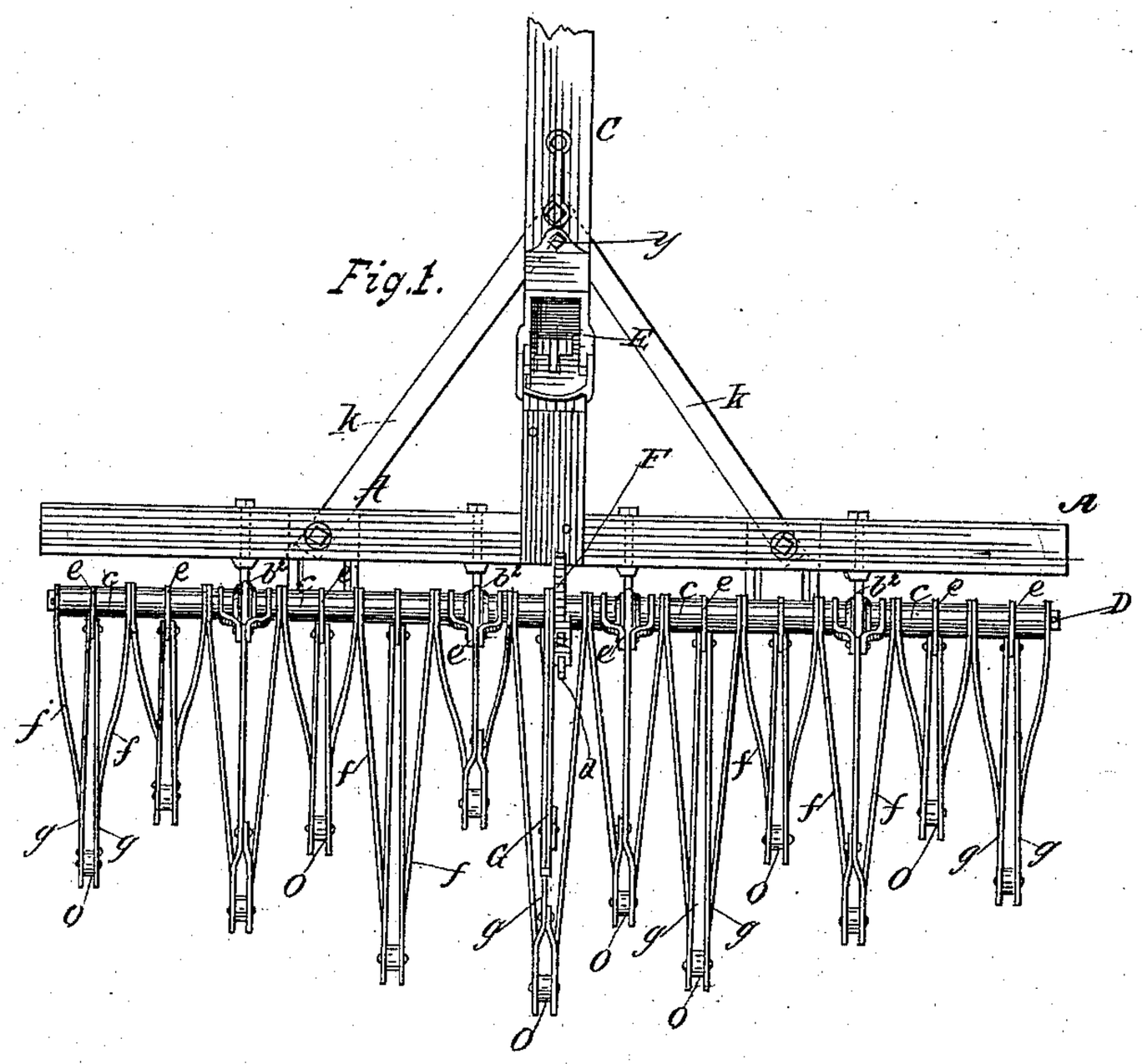
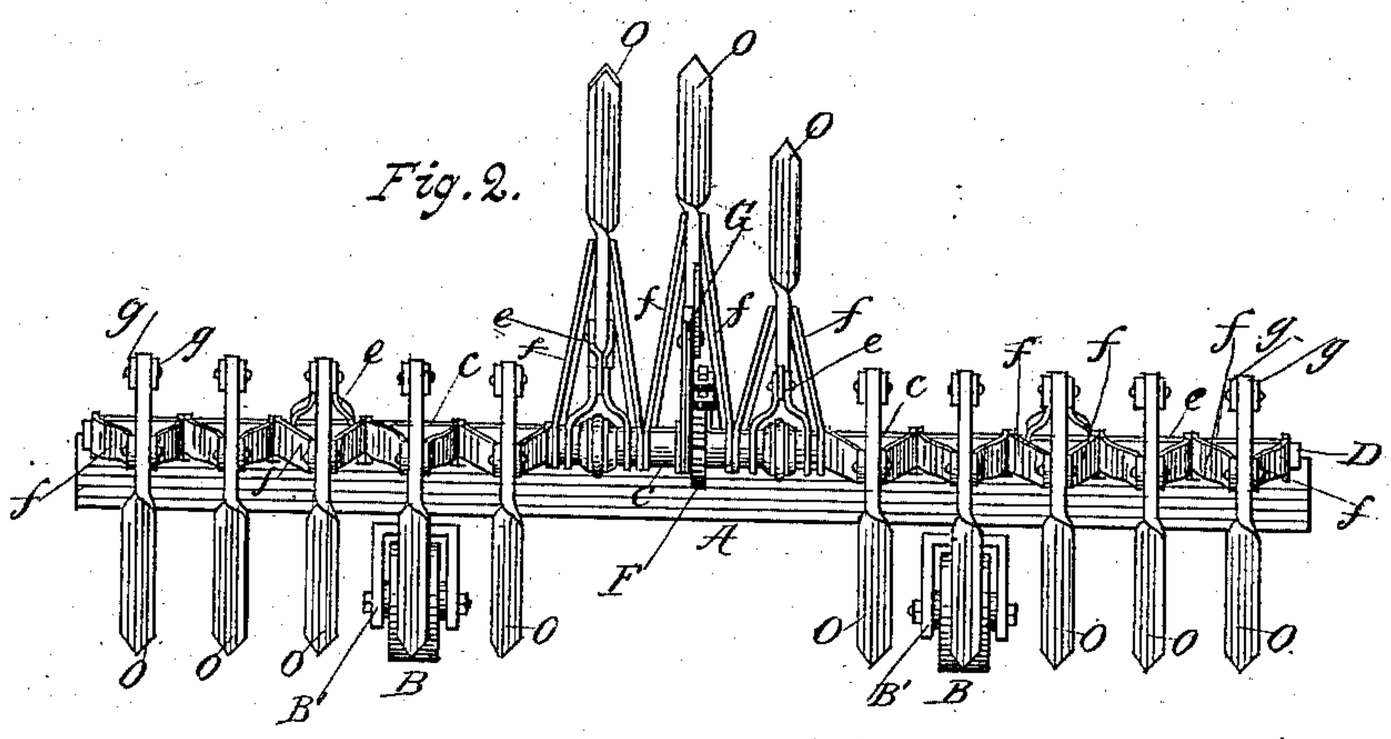


Fig. 2.



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(No Model.)

4 Sheets—Sheet 2.

C. LA DOW.

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Fig. 5.

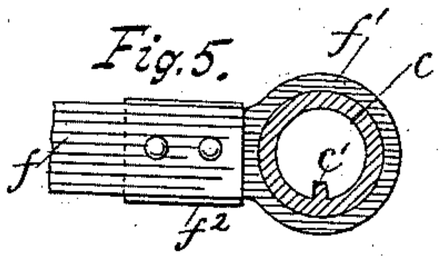

Fig. 6.

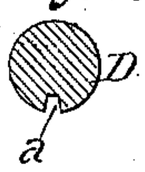

Fig. 7.

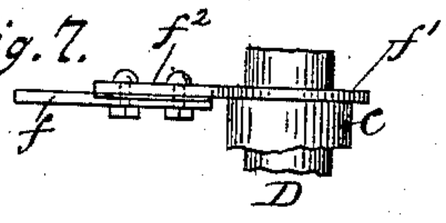

Fig 8.

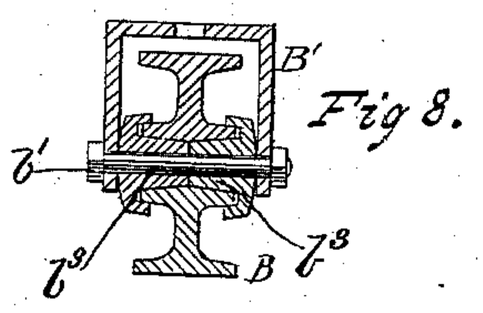

Fig. 3.

Fig. 4.

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Fig. 9.

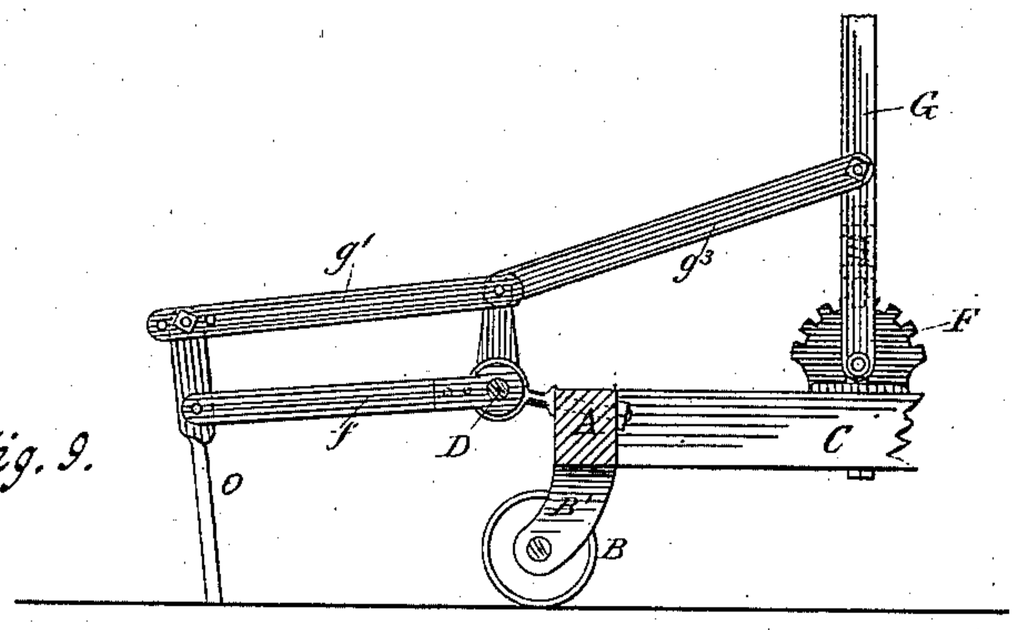


Fig. 10.

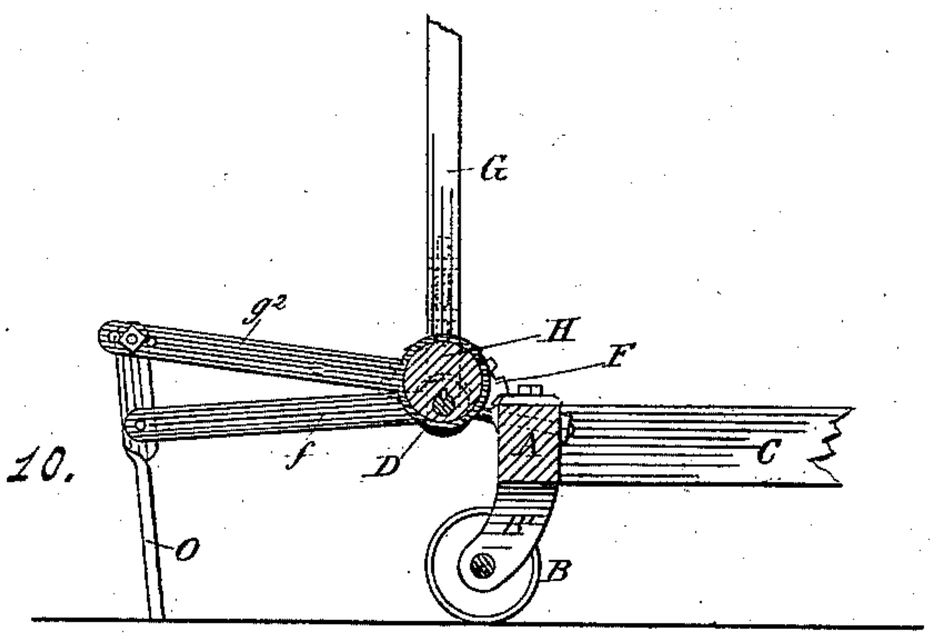


Fig. 11.

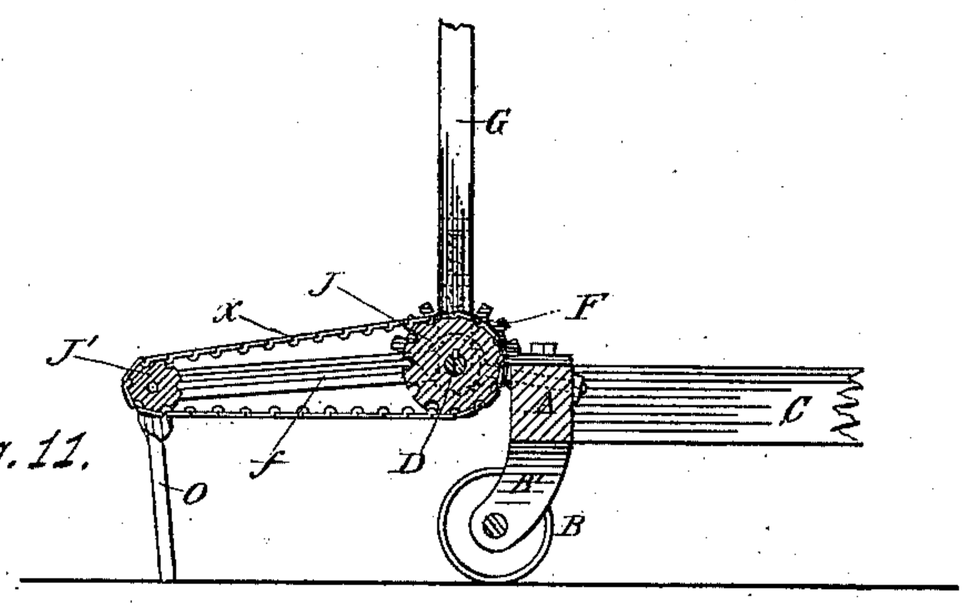
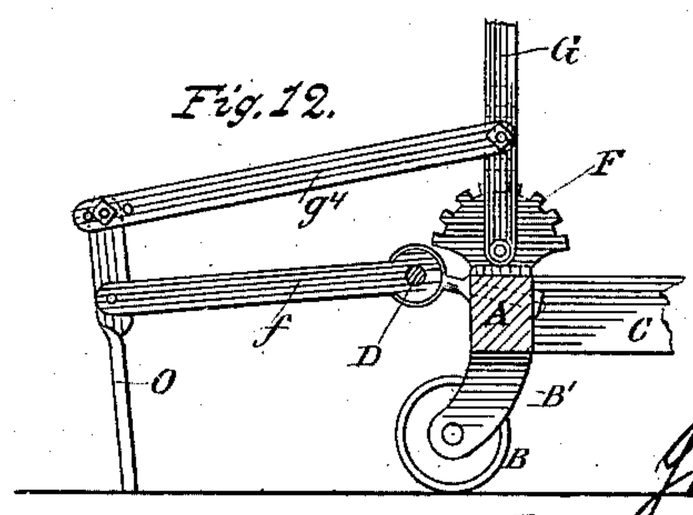


Fig. 12.



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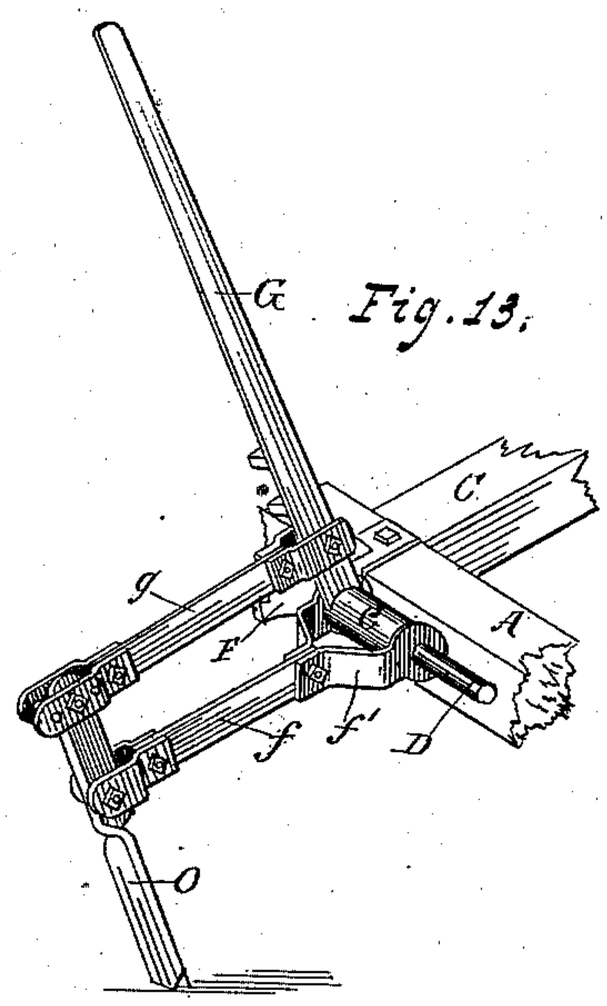

Fig. 13.

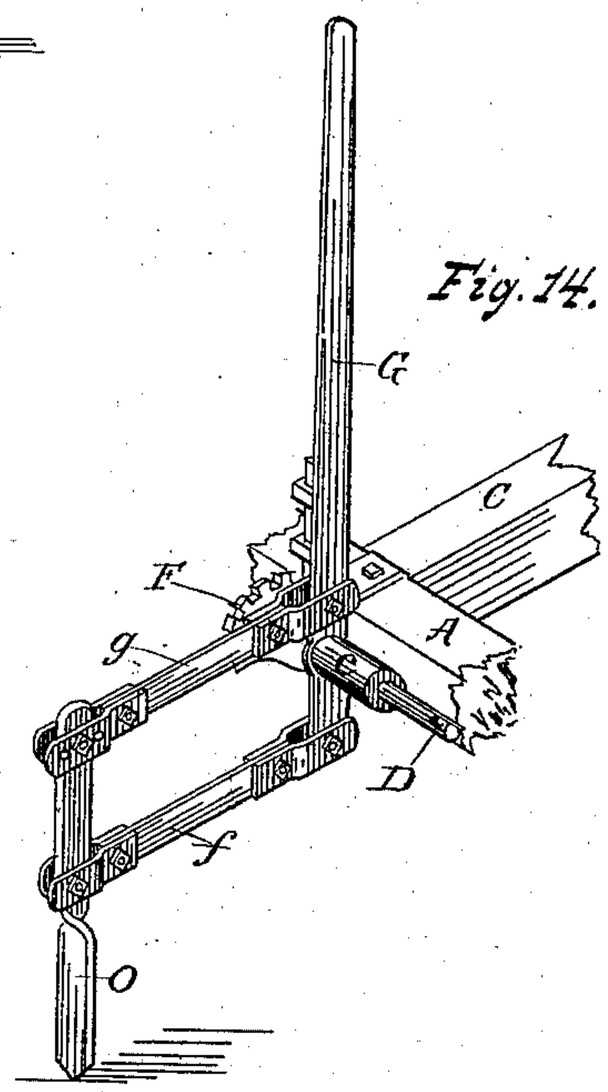

Fig. 14.

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UNITED STATES PATENT OFFICE.

CHARLES LA DOW, OF ALBANY, NEW YORK.

CULTIVATOR, HARROW, AND MARKER.

SPECIFICATION forming part of Letters Patent No. 269,070, dated December 12, 1882.

Application filed February 10, 1882. (No model.)

To all whom it may concern:

Be it known that I, CHARLES LA DOW, a citizen of the United States, residing in the city and county of Albany, and State of New York, have invented a new and useful Improvement in Cultivators, Harrows, and Markers, of which the following is a specification.

My invention relates to that class of cultivators which perform the office of either cultivators or harrows, and are mounted on wheels and provided with teeth arranged to conform each independently to the irregularities of the surfaces traversed; and to novel devices for varying and setting the angle of the teeth without stopping the progress of the implement; and to a new mode of carrying the teeth when not in use, and for arranging them to perform the functions of a cultivator of rowed crops, or for marking out the ground preparatory to planting, or for the general purposes of a harrow, with the teeth placed in such a relation to each other that they are less liable to clog and the ground is left more smooth than in machines heretofore made for this purpose.

The invention primarily consists in attaching one or more series of toothed arms to a suitable draft-frame in such manner that each tooth and its arm may oscillate freely up and down to any extent, and at the same time each tooth can be angularly adjusted in relation to its supporting-arm by means of a lever, and without stopping the progress of the implement in whatever vertical position the teeth may occupy.

The invention further consists in providing the arms and teeth with lever mechanism that will allow them unlimited movement vertically, but which will control and hold the teeth at any angle at which they may be set, and will also raise them from the ground, if desired.

The invention further consists in attaching the arms and teeth to the draft-frame in such manner that they may not only have free movement up and down when at work, and the teeth be angularly adjusted with respect to their carrying-arms, but also allows them to be raised until the teeth pass the center, to which their supporting-arms are hinged, when their weight will overbalance them, and they can be carried in a reversed position on the draft-frame from one field to another; also, enabling the operator to use all but the center teeth when cultivating rowed crops, or all but such teeth as stand at suitable distances apart for the width of row desired when marking out ground preparatory to planting.

The invention further consists in hinging the arms to the cross-bar or draft-frame, and in pivoting the teeth to said arms and to a link, which is connected at its forward end to movable fulcra, whose motion or throw is not coincident with the center of oscillation of the teeth, and in causing said link to govern the cutting pitch of the tooth.

The invention embraces other novelties of construction and new arrangement of parts, hereinafter described in detail, and specifically pointed out in the claims.

In the accompanying drawings, Fig. 1 represents a top view of my invention. Fig. 2 represents a rear view, showing some of the teeth thrown over on the cross-bar in the position for using the machine for cultivating rowed crops. Fig. 3 represents a side view of my invention, showing the teeth at work; also showing the manner of attaching the seat-standard S to the socket E and holding it there in position by means of the spur *x*. Fig. 4 represents an end view of my invention, showing by shaded lines the normal position of the lever and tooth; also showing by dotted lines the positions which the teeth occupy when set by the lever for smoothing the ground, when raised by the lever for discharging accumulated rubbish, and when thrown forward and overbalanced on the cross-bar for transportation. Fig. 5 represents a sectional side view of the front end of the draw-bar, illustrating the manner of attaching the draw-bar *f* to the enlarged eye-bearings f^2; also an end view of the spool *c* and its feather *c'*. Fig. 6 represents an end view of the rod or pintle D, having the groove *a*, adapted to receive the feather *c'* of the spool *c*. Fig. 7 represents a top view of a section of the rod D, spool *c*, draw-bar *f*, and eye-bearing f^2. Fig. 8 represents a section of the wheel B, the support in which it is mounted, the taper journal-bearings entering from each side and meeting near the center of the wheel, and the clamping-bolt for

locking the parts together. Figs. 9, 10, 11, and 12 represent modifications of the method of attaching the teeth to the frame, in which Fig. 9 shows the adjusting-lever, mounted on a center separate from the center around which the teeth oscillate, and connected to the arm of the spool by a link, g^3. Fig. 10 shows an end view of the spool *c*, having an eccentric thereon for imparting motion to the tooth by means of the link g^2, one end of which is attached to the upper end of the tooth and to the eccentric at the other end. Fig. 11 shows the tooth and spool connected by a chain-belt, by which the tooth is set at angles more rapidly than the motion of the lever, as a smaller gear is on the tooth than is used at the lever. The small gear is fastened securely to the tooth, so that as the gear is revolved the tooth must follow its motion. By this device the teeth may be folded or sheathed between the draw-bars, or set with their points upward, or at any desired angle relatively to the bar by means of the lever. Fig. 12 shows the tooth and adjusting-link operated by levers entirely removed from the center around which the teeth oscillate. Fig. 13 shows a broken perspective view of the single draw-bar and link, each provided with forked ends to brace the teeth against side strains. Fig. 14 shows a view of the spool *c*, having two arms, the upper arm having the link attached thereto and the draw-bar articulating from the lower one. The lever is shown in this view as being an extension of the arm *e*.

Referring to the drawings, the draft-frame is composed of the pole C and cross-bar A, which are held in proper position relatively to each other by the braces K K.

B B are wheels, secured to the cross-bar by means of the stirrup B′ in such a manner that the wheels may act as "caster-wheels," on which to swerve the machine from traveling in a direct line when desired.

b b are taper journal-bearings, around which the wheel revolves. The hole in the ends of the hub of said wheel is also tapered to fit the journal-bearings, which abut near the middle of the hub. The outer ends of the hub are inclosed by the annular fins on the journal-bearings, which effectually prevent dirt getting to the wearing-surface of the bearings.

b′ is a clamping-bolt, for securely fastening the bearings to their stirrup, so that they cannot revolve with the wheel. These bearings are made longer than the wheel-hub, so that the wheel may revolve freely when the stirrup and bearings are clamped together.

b^2 b^2 b^2 b^2 are eyebolts, which are secured to the cross-bar and have their eyes fitted into a groove in their corresponding spools, *c*, which spools are thus supported at a point between their ends, in order that they may all be of an equal length.

D is a rod, held at a proper distance from the cross-bar by the eyebolts. The rod D is grooved on one side of its entire length, as indicated at *a* in cross-section in Fig. 6. The spools *c* are strung on the rod D. Each spool has a feather, as indicated at *c′* in cross-section in Fig. 5, projecting into the groove in the rod D. Each spool is provided with an arm, *e*, and when it is desired to rock the rod D the groove in said cord coacting with the feather on the spools compels all the spools and their arms to be rocked uniformly, the eyebolt b^2 allowing the spools to turn therein. A rod having a square or any irregular surface may be used with spools of corresponding surface, instead of the grooved rod D and spools *c*; or a round rod may be used, with spools pinned through cross-section to the said rod, if desired.

F is a semicircular rack, which is rigidly attached to the draft-frame.

G is an extension of one of the spool-arms *e*, and forms a ratchet-lever to operate the teeth. *f f* are the draw-bars for the teeth. These draw-bars articulate freely on the rod D, and each pair of draw-bars is kept at a suitable distance apart at their forward ends by the spacing-spools *c*.

O are the teeth, which are made with a twist or half-turn near the middle of their length. Each tooth is pivoted at *v* to the draw-bars *f f*, the tooth being placed between the bars. The holes for pivoting the draw-bars to the tooth may be placed at any desired point between the ends of the tooth, and more than one hole may be used, if desired. *g* is a link pivotally connecting the upper end of each tooth to its corresponding arm, *e*, on the spools *c*. The angle of the teeth may also be varied by the holes *i i i* in the link *g*, if desired. These holes may also be used to adjust the pitch or angle of the teeth in one series relative to the angle of the teeth in the other series, so that the teeth on the short arms may work at the same angle as those on the long arms. The link *g* may be operated on the under side of the draw-bars *f f*, holes being placed in the teeth below their pivotal connection with draw-bars, and the arms on the spool *c* being turned downward for that purpose. As the machine is drawn forward the handle G′ of the lever G may be operated to draw the slide out of engagement with the rack F, and the lever G may then be moved in either direction, which causes a simultaneous and corresponding angular adjustment of all the teeth, and when the desired pitch of the teeth is ascertained the rack and slide will hold them as set in relation to their draw-bar.

Although the teeth can be simultaneously adjusted at different angles, they are independent as to their movements vertically, each tooth being free to rise and fall to any extent, according to the surface and obstructions passed over. The angle at which the teeth are set regulates their depth of cut, and, being free to rise and fall, the suction given them by drawing their points forward causes them to draw down into the ground deeper than when they stand vertical or are thrown backward.

The pairs of draw-bars *f f* are of different lengths, in order that the teeth may be in two series across the line of draft, and that the

teeth in each series may form a semicircular row, the object being to lessen the liability to clog with sticks or rubbish, and also to leave the ground more smooth than in machines whose adjacent teeth work in parallel planes across the line of draft. Should a pile of weeds or vines be encountered the lever may be rocked forward, and the teeth will slant backward until the link *g* will rest on the spool *c*, which then acts as a fulcrum, over which to raise the teeth by the continual forward movement of the lever G, which movement depresses the arms *e* of the spools *c*, carrying with them the forward ends of the links *g* sufficiently to raise the teeth above the rubbish and dump it out. The teeth may be carried in this position for transportation by the lever.

By means of the lever the teeth may be set in any desired position for harrowing or for smoothing the ground without stopping the progress of the implement, or interfering in any way with the independent vertical movements of the draw-bars and their teeth.

When it is desired to transport the implement for long distances the draw-bars may be lifted until they are reversed, in which position they will remain on the cross-bar, as they overbalance and will not fall back, their weight together with the weight of the teeth preponderating, so that the motion of the draft will not throw them backward to the ground.

When the implement is to be used for cultivating rowed crops as many of the middle teeth may be thrown over as will allow the row to pass without injury between the teeth at work. When used for marking out ground preparatory to planting, such teeth may be trailed as will bring the rows at desired distances apart, while the teeth not used may be overbalanced and carried on the frame. The lever G is of such length and so placed that it will allow the pair of draw-bars *f f* between which it is located to be reversed and overbalanced on the frame, as well as any of the others.

Should the operator deem the draft too heavy for the team, or certain conditions of soil require it, some or all of the teeth (and in any location) may be thrown forward and carried out of use, whereby the draft may be rendered as light as desired.

When the teeth are arranged for cultivating crops planted in rows the operator, when walking behind the machine, can readily grasp the lever G, and with it swerve the course of the machine bodily, so that the teeth may not injure such plants as may be out of line in the row, the caster-wheels aiding the side thrust of the lever to accomplish this result. Should the cultivator be too wide to work rows that were marked out by another implement, the outer teeth may be thrown over on the frame until the work of the operating teeth is narrowed down to the width desired. When the teeth at the center of the implement are to be thrown forward for cultivating, the seat, its standard, and socket E may be partially rotated on the bolt *y*, so that the seat will not prevent raising and overbalancing the teeth.

The seat-standard may be unhooked from the spur *x*, if desired, and without rotating the socket. The spur *x* may be on the standard, instead of being located on the socket.

A single draw-bar, as shown in Fig. 13, may be used instead of a double one for each tooth. Any of these styles of draw-bars may be constructed and arranged to articulate from a second arm on the spool *c*, as shown in Fig. 14, and the draw-bar may thus be made to contribute to the motion required to adjust the angle of the teeth, and also be made to re-enforce the action of the links when the teeth are raised by the lever and carried for transportation. The links may also be made single, if desired, and forked or simply pivoted to one side only of the tooth and arm *e* of the spool *c*.

The teeth may be arranged in semicircular rows, reversed from their present position, by placing the shortest draw-bars at the center and the longer ones at the ends of the implement. The taper journal-bearings, in two parts for the wheel B, may be supported by an arm projecting from one side only of a standard, instead of being fastened between the branches of a stirrup.

The implement may have only one series of teeth or several, and the teeth of each series may be arranged in parallel planes or otherwise, and the implement may be constructed as wide or as narrow as desired. The rod D may be in sections, and each section provided with a lever to operate the teeth. The spools *c* may be placed on a rod separate from the rod D, as shown in Fig. 12. The teeth are angularly adjusted, preferably from a center not coincident with their center of oscillation; but they may be adjusted from the pintles on which they oscillate, as shown in Fig. 11, if such arrangement be desired. Other modifications will readily suggest themselves for angularly adjusting oscillating teeth without altering the principles of my invention, which contemplates such organization of parts as shall be capable of angularly adjusting and holding teeth as set without preventing them from conforming to the inequalities of the surface traversed and without stopping the progress of the implement, whether said teeth are adjusted singly or in sectional groups, or simultaneously, or whether they are arranged to conform to the ground independent of the draft-frame, either singly, or in groups, or in one body.

This invention can be readily applied to operate the hoes of a grain-drill to vary their angle while at work, so that they will enter the ground and deposit the seed at any desired depth without interfering with or limiting their vertical movements, and is also capable of raising the hoes to discharge rubbish, which collects on and impairs the efficiency of drill-hoes as used in machines constructed heretofore.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination of a draft-frame, a toothed arm attached thereto and adapted to rise and fall to conform to the surface traversed, and mechanism for varying the angle of the tooth relatively to its supporting-arm as the implement proceeds.

2. The combination of a draft-frame, a toothed arm attached thereto and adapted to rise and fall to conform to the surface traversed, and mechanism whereby the operator can lift the tooth or vary its angle relatively to the arm without stopping the progress of the machine.

3. The combination of a draft-frame, an arm for connecting a tooth thereto, a pintle to which the arm is hinged, an arm projecting from the pintle, a link connecting the tooth to the arm on the pintle, and mechanism for rocking the pintle.

4. The combination of a draft-frame, an arm for connecting a tooth thereto, a pintle to which the arm is hinged, an arm projecting from the pintle, a link connecting the tooth to the arm on the pintle, and mechanism for rocking the pintle and holding it as adjusted.

5. The combination of a frame, a rod or pintle supported thereon, a toothed arm working freely around said rod or pintle, and a link connected at one end to the tooth on the arm, and at its other end to a movable fulcrum whose center of motion is out of coincidence with the center on which the toothed arm articulates for adjusting the angle of the tooth with respect to its supporting-arm.

6. A draft-frame, a series of tooth-arms hinged thereto and adapted to independently rise and fall, teeth on the arms, and a connection between the frame and tooth, whereby the angle of the teeth with reference to their hinged arms may be varied simultaneously without preventing their vertical movements.

7. In a cultivator, the combination of a draft-frame, toothed arms hinged thereto, caster-wheels, upon which the frame is mounted, and a lever connected with the teeth for varying the angle or pitch relative to their carrying-arms, and for laterally swerving the machine on the caster-wheels.

8. The combination of a draft-frame, articulated toothed arms adapted to rise and fall and be overbalanced and supported in a reversed position, and mechanism for adjusting the angle of the teeth with reference to their carrying-arms, whereby some of the toothed arms can be overbalanced without interfering with the angular adjustment of the teeth on the other arms.

9. The combination of the draft-frame, rod D, acting as a center around which the tooth and its draw-bar oscillate, the spool *c* or equivalent mechanism, and a connection between the tooth and spool for varying the angle of the tooth with respect to its draw-bar at any time during the progress of the machine.

10. The combination of the pole C, cross-bar A, rod D, spools *c*, arms *f*, teeth O, and link *g*, connected with the tooth and the rod for adjusting the angle of the tooth.

11. The combination of the draft-frame, arm *f*, tooth O, pintle D, armed spool *c*, and connection *g* between the pintle and the tooth for adjusting the angle of the latter.

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