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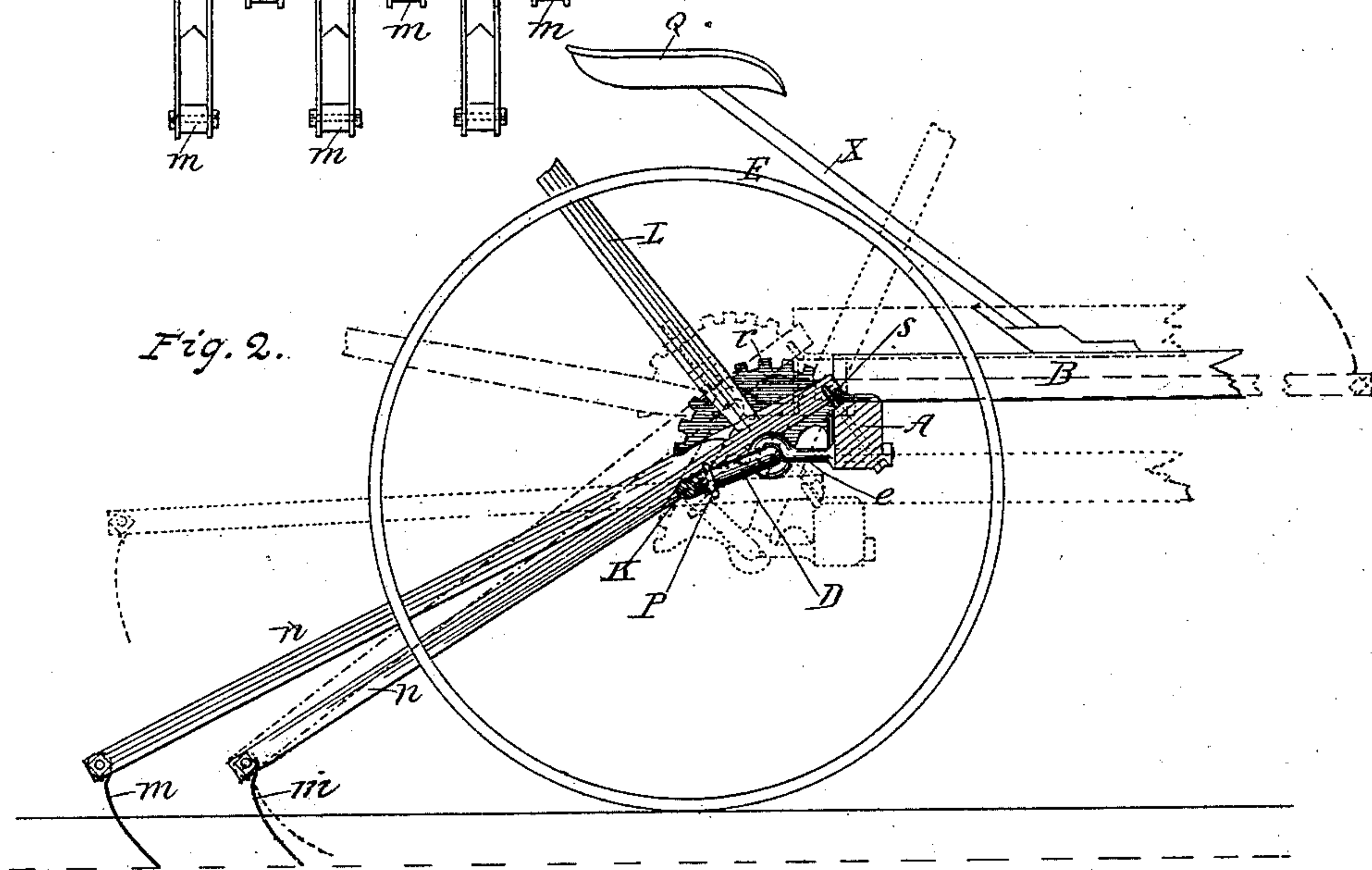
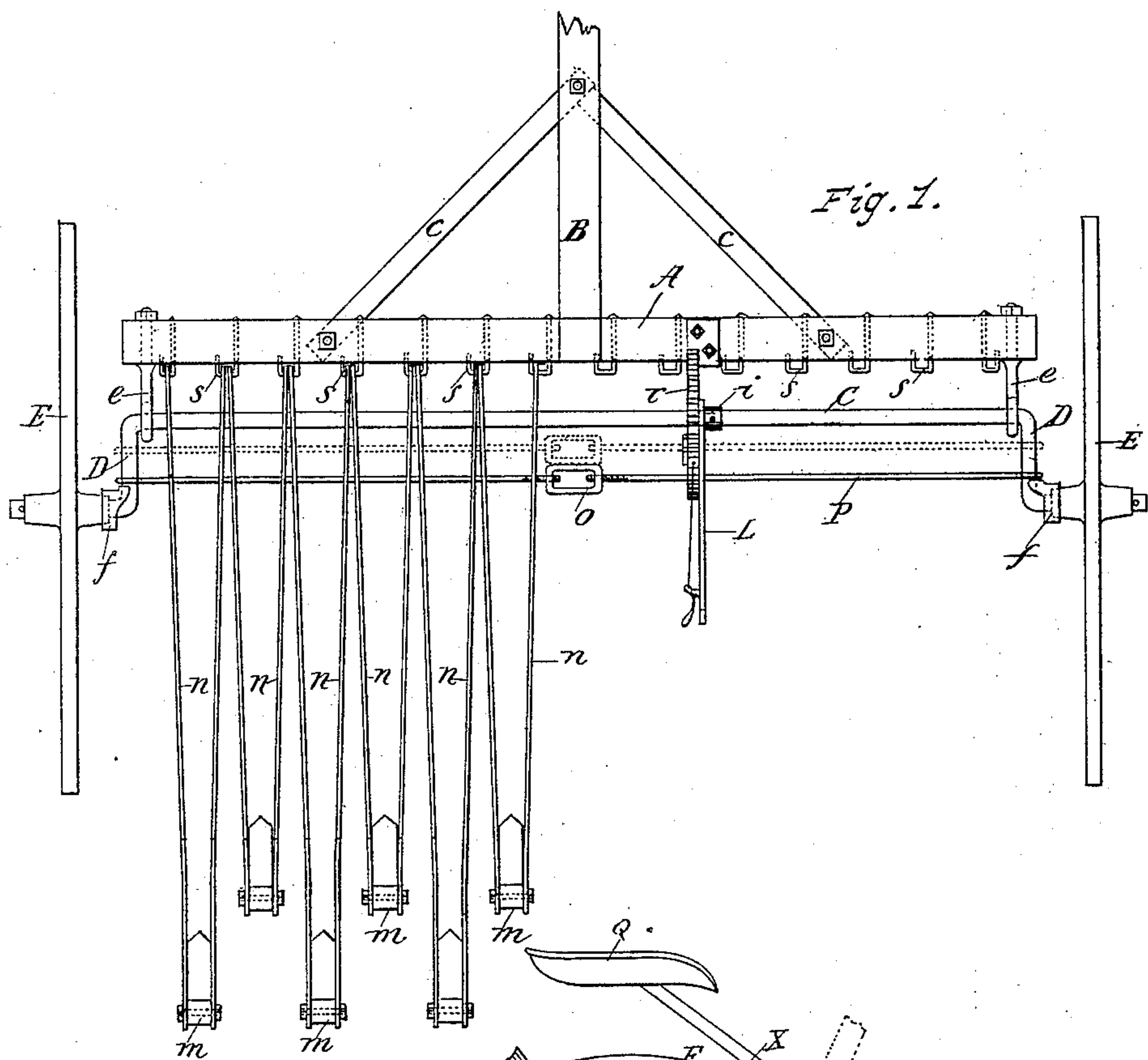
3 Sheets—Sheet 1.

C. LA DOW.

CULTIVATOR AND SEEDER.

No. 354,556.

Patented Dec. 21. 1886.



Witnesses:
O. W. Davidson.
Stellie L. Holmes.

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by his attorneys
Balducci, Hopkins & Peyton

(No Model.)

3 Sheets—Sheet 2.

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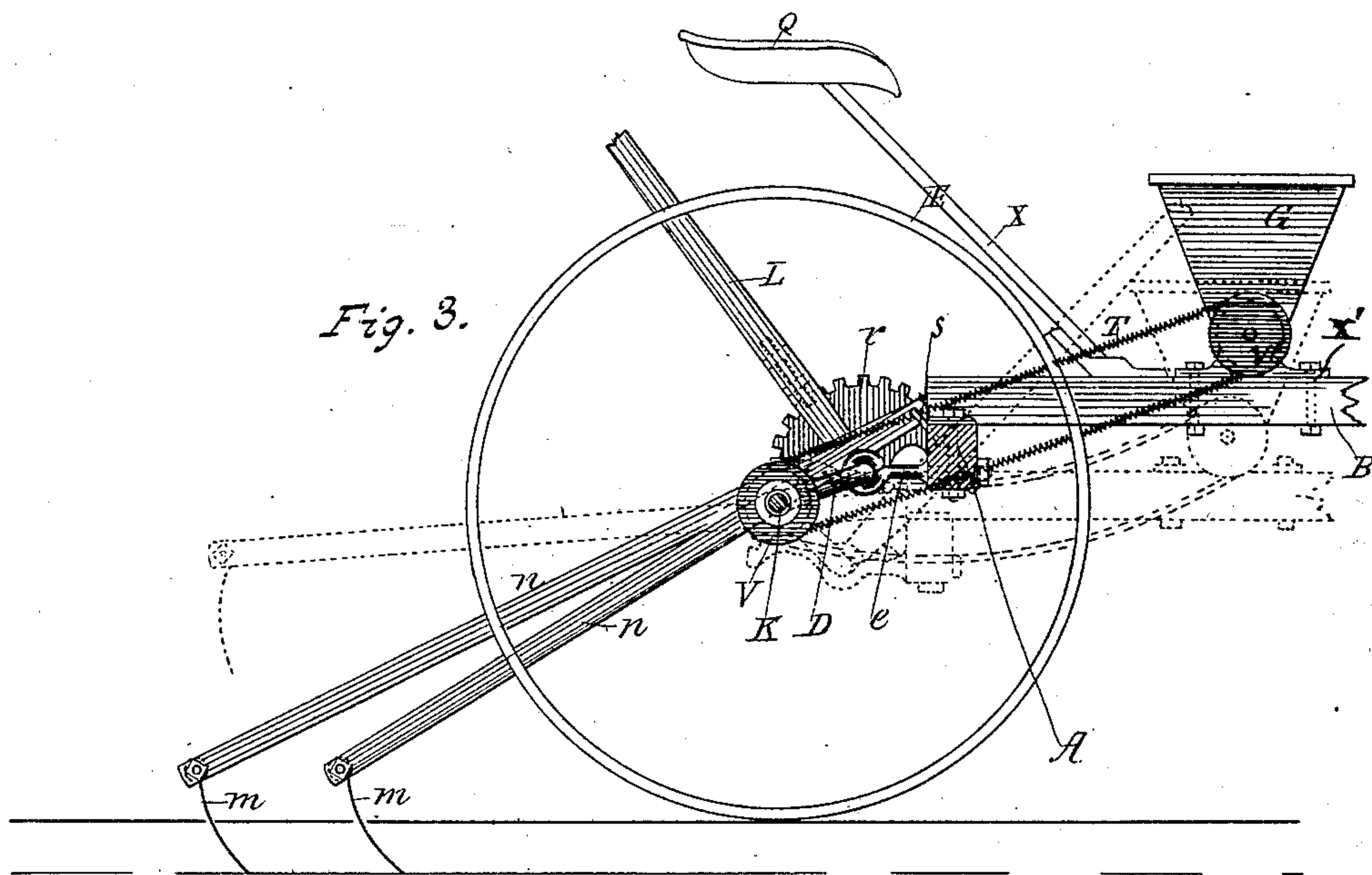


Fig. 4.

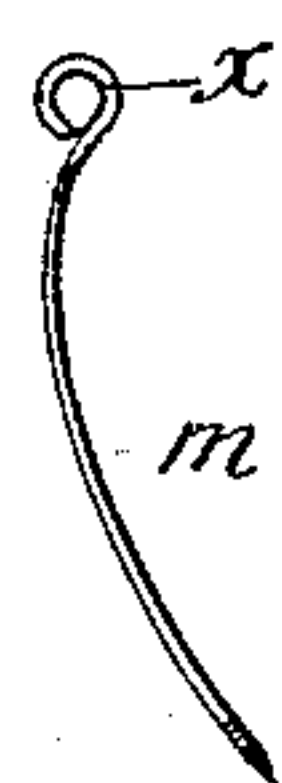


Fig. 5.

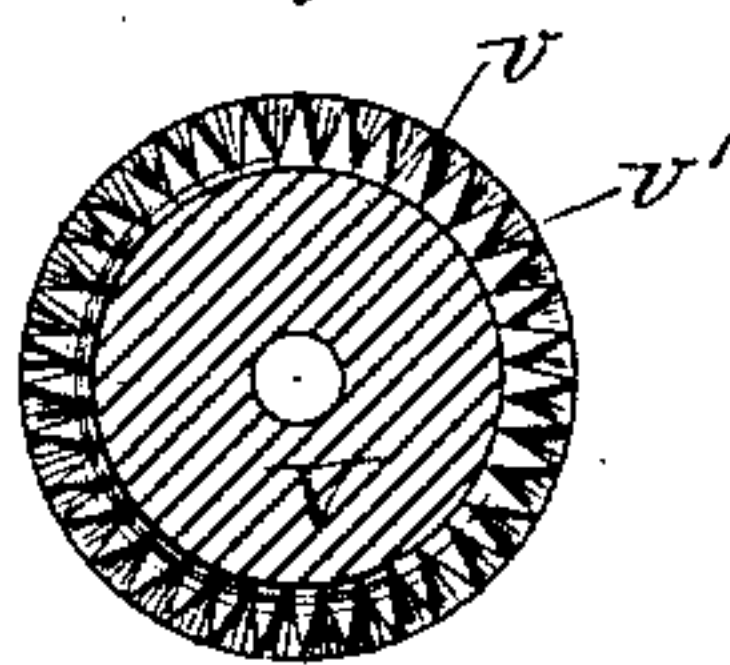


Fig. 6.

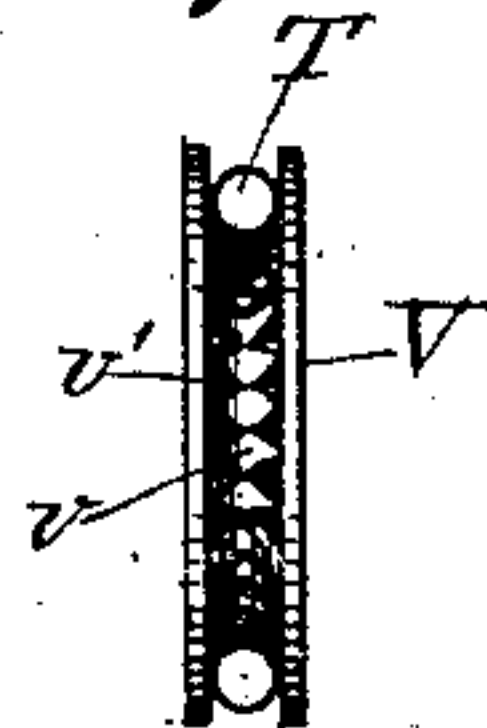
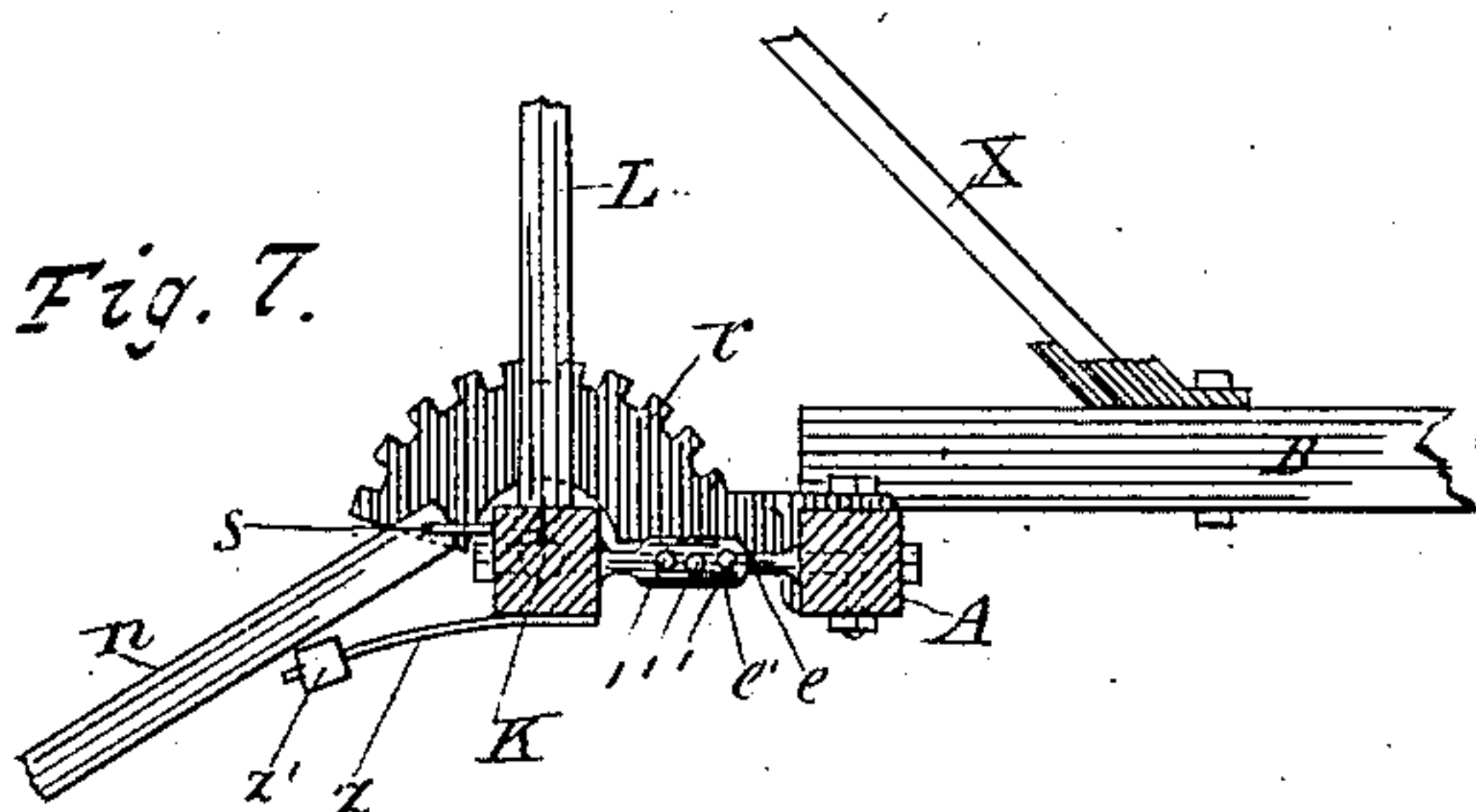


Fig. 7.



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(No Model.)

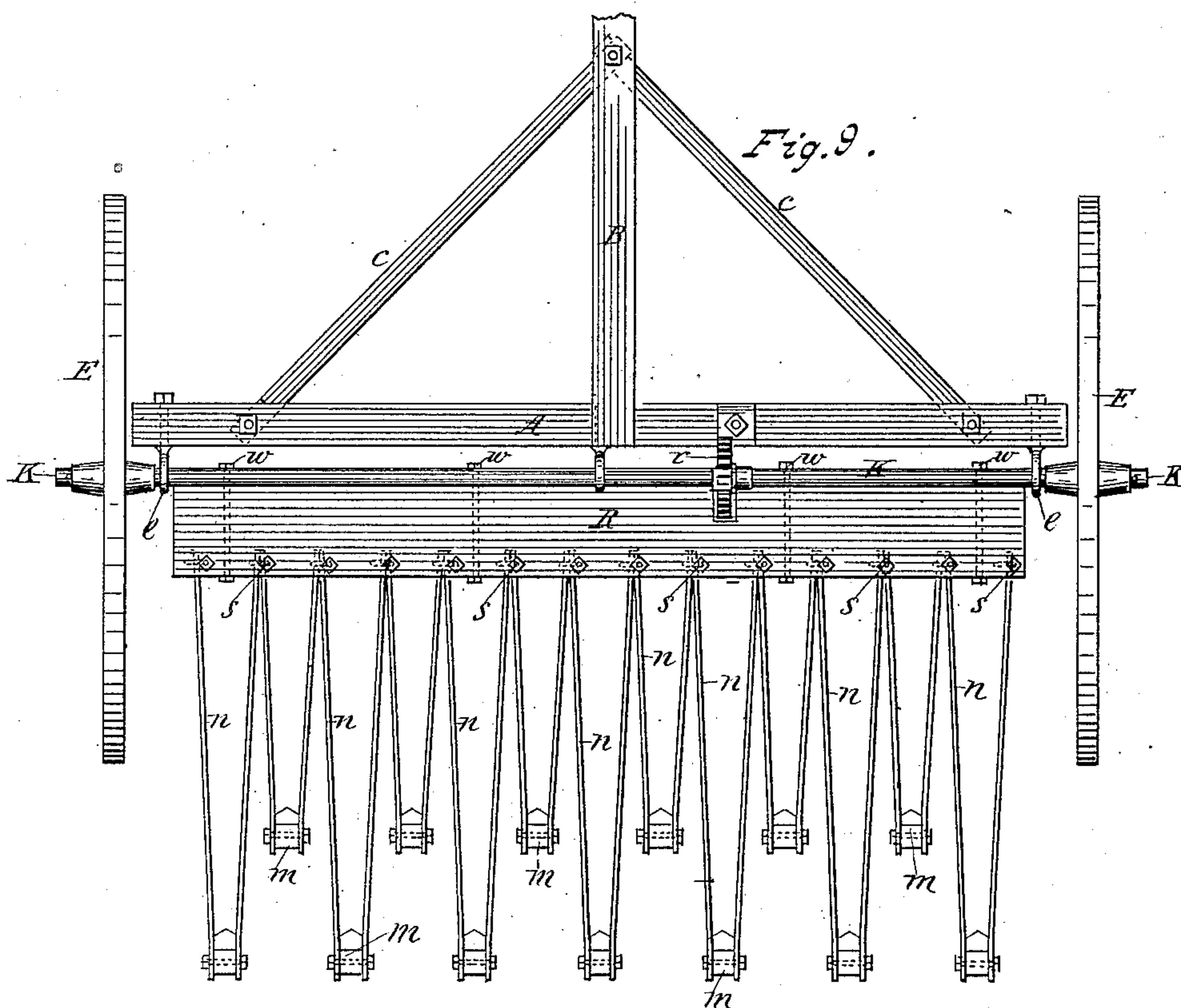
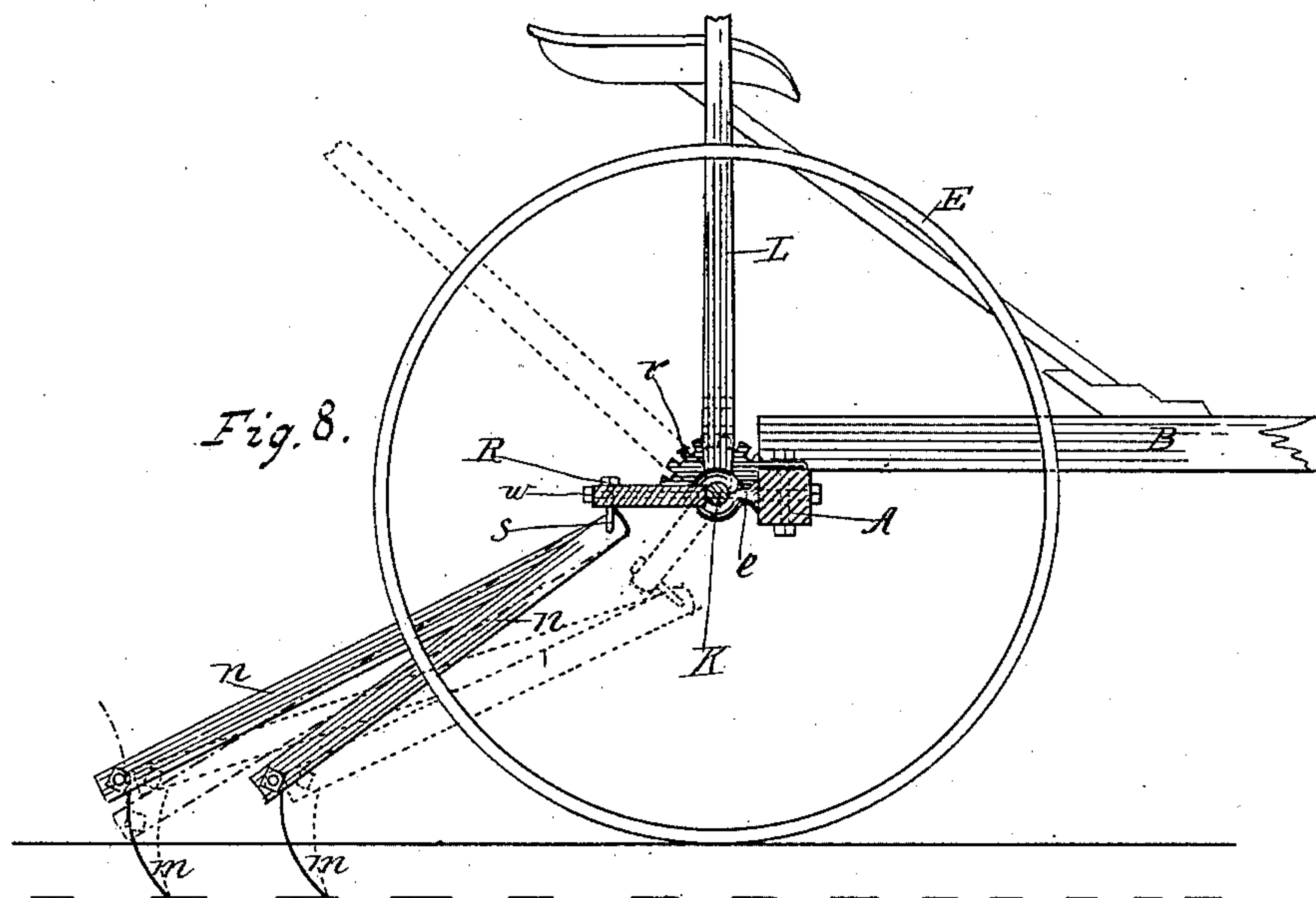
3 Sheets—Sheet 3.

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UNITED STATES PATENT OFFICE.

CHARLES LA DOW, OF ALBANY, NEW YORK.

CULTIVATOR AND SEEDER.

SPECIFICATION forming part of Letters Patent No. 354,556, dated December 21, 1886.

Application filed March 22, 1882. Serial No. 56,042. (No model.)

To all whom it may concern:

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

This invention relates to that class of cultivators which are mounted on wheels and provided with teeth for working the soil.

The objects of the invention are to provide the draft-frame with teeth which conform to the surface traversed; to mount the teeth in such manner on the draft-frame that they may oscillate up and down, and that the cutting angle or pitch of all the teeth may be varied simultaneously; to attach the teeth to the draft-frame in such manner that they may conform to uneven surfaces, may have their pitch simultaneously varied, and be raised and carried above the ground by mechanism provided for that purpose; to attach articulating-teeth to a draft-frame in such manner that they may work up and down and act on the soil in different planes across the path of the machine, and be elevated by suitable lever mechanism, with which the weight of the driver may coact to assist in raising the teeth; to provide a draft-frame with suitable teeth for working the soil, and attaching them to the frame by hinged connections which can be raised or lowered to vary the angle at which the teeth shall enter the ground; to provide a draft-frame with teeth which may conform to the inequalities of the surface, and be raised and carried above the ground at the will of the operator by mechanism which shall depress one end of the tooth-bars and elevate another over a fulcrum arranged across the path of the machine; to provide a draft-frame with a seed hopper or box whose seed-distributing shaft or agitator may be moved toward or from the driving-wheel center, and may be connected to said driving-wheel by a tension-belt which shall operate the said distributing-shaft when the teeth are at work, but shall automatically discontinue its action when the teeth are raised above the ground, which movement brings the centers around which the belt moves near enough together to slacken the tension of the belt; to provide a driving-wheel and driven

pulley with a circular groove having teeth adapted to mesh into the spaces of a spiral tension-belt made of coiled wire; to provide a draft-frame with a ratchet and lever for raising and lowering the center around which the teeth articulate, and for holding said center in its adjusted position relatively to the draft-frame; to attach the teeth to the draft-frame through the medium of long and short independently-articulating arms by means of hooked bolts capable of engaging a long bar of one tooth and a short bar of another, and allowing said bars and their teeth to work around said center in opposite directions; to combine a seed-distributing device with toothed arms which conform to the surface traversed, and with mechanism whereby the teeth may be quickly set at different angles.

The invention primarily consists in providing a draft-frame with teeth which conform with the surface traversed, for the purpose of pulverizing uneven ground equally as well as smooth land; second, in mounting the teeth in such manner on the draft-frame that they may oscillate up and down, and that the cutting-angle of all the teeth may be varied simultaneously for the purpose of quickly changing the suction or downward draft of the independently-articulated teeth into the earth; third, in attaching the teeth to the draft-frame in such manner that they conform to uneven surfaces, may have their pitch simultaneously varied, and be raised and carried above the ground by mechanism provided for that purpose, which shall enable the operator to quickly adjust the pitch and also the vertical position of the articulating teeth; fourth, in attaching articulating teeth to a draft-frame in such manner that they may work up and down and act on the soil in different planes across the path of the machine, and be raised by a suitable lever mechanism, with which the weight of the driver may coact to assist in raising the teeth, thereby enabling the operator to raise the teeth with greater ease; fifth, in providing a draft-frame with teeth and attaching them to the frame by hinged connections which can be raised or lowered to vary the angle at which the teeth shall enter the ground, affording a durable, rapid, and inexpensive arrangement for that

purpose; sixth, in providing a draft-frame with teeth which conform to the surface traversed, and which can be raised or carried at the will of the operator by mechanism which shall depress one end of the tooth-bars and elevate the other ends over a fulcrum arranged across the path of the machine, the forward ends of the tooth-bars forming levers with which to raise the rear ends of said bars and their attached teeth; seventh, in combining a draft-frame with a seed-hopper whose seed-distributing shaft may be moved toward the center of the driving-wheel simultaneously with the act of raising the teeth, for the purpose of automatically slacking the tension of the connecting-belt and stopping the discharge of the grain when the teeth are raised for turning the machine around; eighth, in providing pulleys with circular grooves having notches or teeth adapted to engage with the spaces of a spiral wire belt, for the purpose of flexibly gearing said pulleys together and insuring a more certain rotation of the driven pulley than could be obtained by frictional contact with said belt; ninth, in providing a draft-frame with articulated teeth and a movable center of motion for said teeth, and with ratchet-and-lever mechanism capable of either raising or lowering said center and holding the same in its adjusted position, for the purpose of simultaneously varying the cutting pitch or angle of all the teeth of the implement; tenth, in attaching teeth to a draft-frame through the medium of long and short independently-articulated arms by means of a hooked bolt capable of engaging a long bar of one tooth and a short bar of another, and allowing said bars to work in opposite directions, and affording a light and cheap hinge for the tooth-bars; eleventh, in combining a seed-dropper with toothed arms which conform to the inequalities of the surface, and with mechanism whereby the pitch or angle of all the teeth relatively to the ground may be simultaneously adjusted and held in any desired position at the will of the operator, for the purpose of covering the seed with the desired amount of earth, the quantity being regulated by the cutting-pitch of the tooth.

The invention further consists in various other novelties of construction, new arrangements of parts, and new methods of operation, which will be hereinafter described, and pointed out specifically in the claims.

Referring to the drawings, Figure 1 represents a top view of my invention, showing the method of attaching the draw-bars to the draft-frame. Fig. 2 represents a side view of my invention, showing by shaded lines the normal position of the teeth, draft-frame, axle, and ratchet-lever, and showing by dotted lines the position of the same parts when the teeth are raised for turning the machine around, and showing by combined broken and dotted lines the position of said parts when the pitch of the teeth is adjusted by raising the forward end of the draw-bar, also showing by a broken

line the position occupied by some of the teeth when overbalanced on the draft-frame, enabling a row of plants to pass through between the teeth left remaining at work when the implement is used as a straddle-row cultivator. Fig. 3 represents a side view of my cultivator with seed-hopper attached, and showing by shaded lines the normal position of the working parts and by dotted lines the position of the teeth when thrown up for turning around, and also showing by dotted lines the seed-shaft pulley V' brought sufficiently near the driving-pulley V to slacken the tension-belt and thus automatically stop the discharge of the grain. Fig. 4 represents a side view of a tooth detached from its draw-bar. Fig. 5 represents a sectional side view of the grooved pulley having teeth adapted to engage with the spaces of a spiral wire belt. Fig. 6 represents a face or edge view of said grooved pulley with the coiled wire belt T in the groove. Fig. 7 represents a side view of a modification of my invention in which the crank-axle is dispensed with and the rocking through-axle substituted, also showing the means employed for adjusting the hinge of the pole-frame to enable a boy or other person of light weight to balance the weight of the teeth equally as well as the weight of a man. Fig. 8 represents a side view of another modification of my invention, showing a means for adjusting the angle, but in which the weight of the draft-frame and driver does not assist in raising the teeth, also showing by combined dotted and broken lines that the position of the teeth may be reversed without reversing the drag-bars themselves. Fig. 9 is a top view of this modification.

In the drawings, Fig. 1, A is the cross-bar or draft-frame; B, the pole. *cc* are the braces. C is the axle. DD are the crank-arms. KK are the crank-pins, around which the carrying-wheels EE revolve. *ee* are eyebolts, through the eyes of which the axle C may be rocked by means of the lever L, which is securely fastened thereto by the hub and pin *i*. The eyebolts *ee* are firmly secured to the cross-bar A. *r* is a segmental rack firmly secured to cross-bar A and adapted for engagement with the dog of lever L.

P is a rod in two parts, attached by arms to the crank-arms DD. The inner ends of rod P are provided with the turn-buckle O. Said rod P may be set and held firmly in any desired position on the crank-arms DD by simply loosening and retightening the turn-buckle O.

m m are the teeth, having an eye formed in cross-section at their upper ends. A clamping-bolt passes through said eye and through the rear of the draw-bars *n n*, the clamping-bolt allowing the tooth to be set at any desired angle relatively to the double draw-bar, and firmly holding it by frictional contact in its adjusted position between the opposing sides of said draw-bar. The forward ends of the draw-bars *n n* are hinged to the cross-bar

A by the hook-bolts S S. Each hook-bolt embraces a short arm of one draw-bar and a long arm of another, and allows said bars to work in opposite directions up and down, but prevents side movement.

When the lever L is rocked in opposite directions, the cross-bar A is correspondingly raised and lowered, carrying the forward ends of the draw-bars and their hinged connections along with it. This action simultaneously adjusts the cutting angle or pitch of all the teeth, thereby enabling them to present more or less suction to the resistance offered by the ground, according to the height at which their hinge is adjusted, the rule being the higher the hinge is raised the more suction the teeth will have, and vice versa. Consequently the seed can be covered with as much or as little earth as desired, the operator gaging the pitch of the teeth at will for that purpose, and being free to rise and fall independently, they will cover seed which falls into hollows at the same depth as if working on level land. When it is desired to raise the teeth for turning the machine around, the lever L is moved from the position shown by shaded lines in Fig. 2 to that shown by dotted lines in same figure, which action depresses the cross-bar A and the forward ends of the draw-bars *n* over the fulcrum-rods P and raises all the teeth simultaneously to the position shown by dotted lines in Fig. 2.

It will be observed that the seat *q* and seat-standard X are mounted on the pole B, and consequently the weight of the driver assists the action of the lever in depressing the cross-bar A and forward ends of bars *n n* over the rod P.

If desired, all the draw-bars and teeth may be overbalanced and reversed on the draft-frame, and thus carried for transportation in the position shown by broken lines in Fig. 2, and as many or as few of the teeth as desired may be thus reversed and carried when the machine is used as a straddle-row cultivator. The combined broken and dotted lines in Fig. 2 show one of the positions taken by the draw-bars and teeth when adjusted for giving more suction to the teeth. Less suction may be given by lowering the frame slightly below the position shown by shaded lines in Fig. 2.

ff are washers having a band or flange projecting over the inner end of the wheel-hub, for keeping out dirt.

The tension-belt T is made of a continuous piece of spring-wire made into a coil of diameter suitable to afford the required strength or driving-power. The ends of said coil-belt are preferably joined by suitable hooks; but they may be confined in any other convenient manner. The belt passes over the pulleys V V', mounted, respectively, on the hub of the driving-wheel E and the feed-shaft of the grain-box. As the teeth are lowered for work the frame and seed-dropper are elevated, by which movement the seed-distributing-shaft recedes from the center of the driving-wheel E far enough to tighten the belt T and draw the teeth

of the pulleys into mesh with the spaces which are opened in the belt by passing around said pulleys. The pulleys are shown in Figs. 5 and 6, from which it will be seen they are grooved and provided with teeth *v v'* in the bottom of the groove. The coils of the wire fit into the spaces between the teeth. These teeth take firm hold of the belt and cause it to move uniformly, the teeth forming a geared connection with the belt. When the teeth are elevated for turning the machine around, the seed-distributing shaft approaches the center of the driving-wheel, and the tension of the belt is slackened sufficiently to allow the belt to slip around the pulleys, and the discharge of the seed is stopped automatically; but when the draft-frame is only raised or lowered slightly for the purpose of varying the angle of the teeth the tension-belt accommodates itself to the varying position of the pulleys and continues to rotate the seed-distributing shaft in all positions of the draft-frame which admits of the teeth continuing at work on the ground. The gear-connection between the teeth in the grooved pulleys and the belt causes the pulley V' on the grain-distributing shaft to rotate when the belt is moderately slack.

The seed-box is adjustably mounted on the pole B (slots being formed in the feet X' of the casting which supports the box) by loosening the bolts which pass through the pole and through said feet. The box may be moved forward or backward to properly balance the weight of the teeth and driver, the tension-belt conforming to the changes of location of the seed-hopper without shortening or lengthening the material of which said belt is composed. When the hopper is mounted on the frame shown in Figs. 8 and 9, a tightener-pulley is applied to give tension to the belt when the teeth are at work, and is thrown off to slacken the belt when the teeth are raised. These figures represent a modified construction in which the drag-bars are hinged to a plank or cross-piece bolted to the rear side of the axle, which in this case is straight. The angle of the teeth is varied by rocking the axle and cross-piece by means of the lever L, as will be understood. The teeth may be reversed by loosening the bolts which clamp them in the drag-bar forks and turning them up, as indicated in broken and dotted lines.

In Fig. 7 the draft-frame is hinged by the eyebolts *e e* to the slotted eyebolts *e' e'*, which are provided with holes 1 1 1, any one of which may be used according to the weight of the driver.

Z Z are bars attached to the bar A, for supporting the lifting-bar Z', which passes under the drag-bars and lifts them when the bar A is rocked by the lever L. It will be observed that the rack *r* and lever L will maintain the teeth at any elevation desired.

I am aware that cultivators have heretofore been made in which the frame could be raised and lowered relatively to the wheels; also,

that chains and leather belts have been used for rotating seed-distributing devices, which I do not claim; but this invention comprehends an organization of parts capable of varying the working pitch or angle of harrow-teeth by changing the vertical position of their hinge relatively to the draft-frame.

I am aware that in a machine of this class it is old to have a shifting driver's seat arranged to act upon the lifting-lever when the seat is pulled forward by the driver past its center of vibration, as shown, for instance, in patent of Roberts, No. 48,445.

I am also aware of the patent of Van Gorder, No. 148,585, which shows a machine without independently rising and falling drag-bars.

I am also aware of the patents of Carr, No. 100,500, and Davis, No. 152,343, and do not therefore claim the construction disclosed in those patents.

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

1. In a harrow, the combination of a draft-frame, teeth hinged thereto and arranged to rise and fall independently to conform to the surface traversed and act on the surface in different vertical planes, a driver's seat mounted on the machine, so that the direct weight of the driver normally tends to raise the teeth, and

a lever which coacts with the weight of the driver to elevate the teeth, substantially as set forth.

2. In a harrow, the combination of wheels, a draft-frame, teeth for digging the ground, attached to the frame and capable of being elevated or depressed by the rocking of the frame, a seed-hopper mounted on the draft-frame, a belt connecting the seed-box to a wheel of the draft-frame, and mechanism for rocking the frame to simultaneously loosen the tension of the belt and elevate the teeth, substantially as described.

3. The combination of carrying-wheels, a draft-frame, seeding devices secured on the draft-frame, mechanism for adjusting the frame, (the frame in its adjustments moving the seeding devices more or less to or from the axis of the carrying-wheels,) pulleys on the carrying-wheel and seeding mechanism, and an elastic belt connecting the driving-pulleys, substantially as and for the purpose set forth.

4. The combination of a draft-frame, drag-bars, and hook-bolts S S, adapted to hinge the drag-bars to the draft-frame and to each other.

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