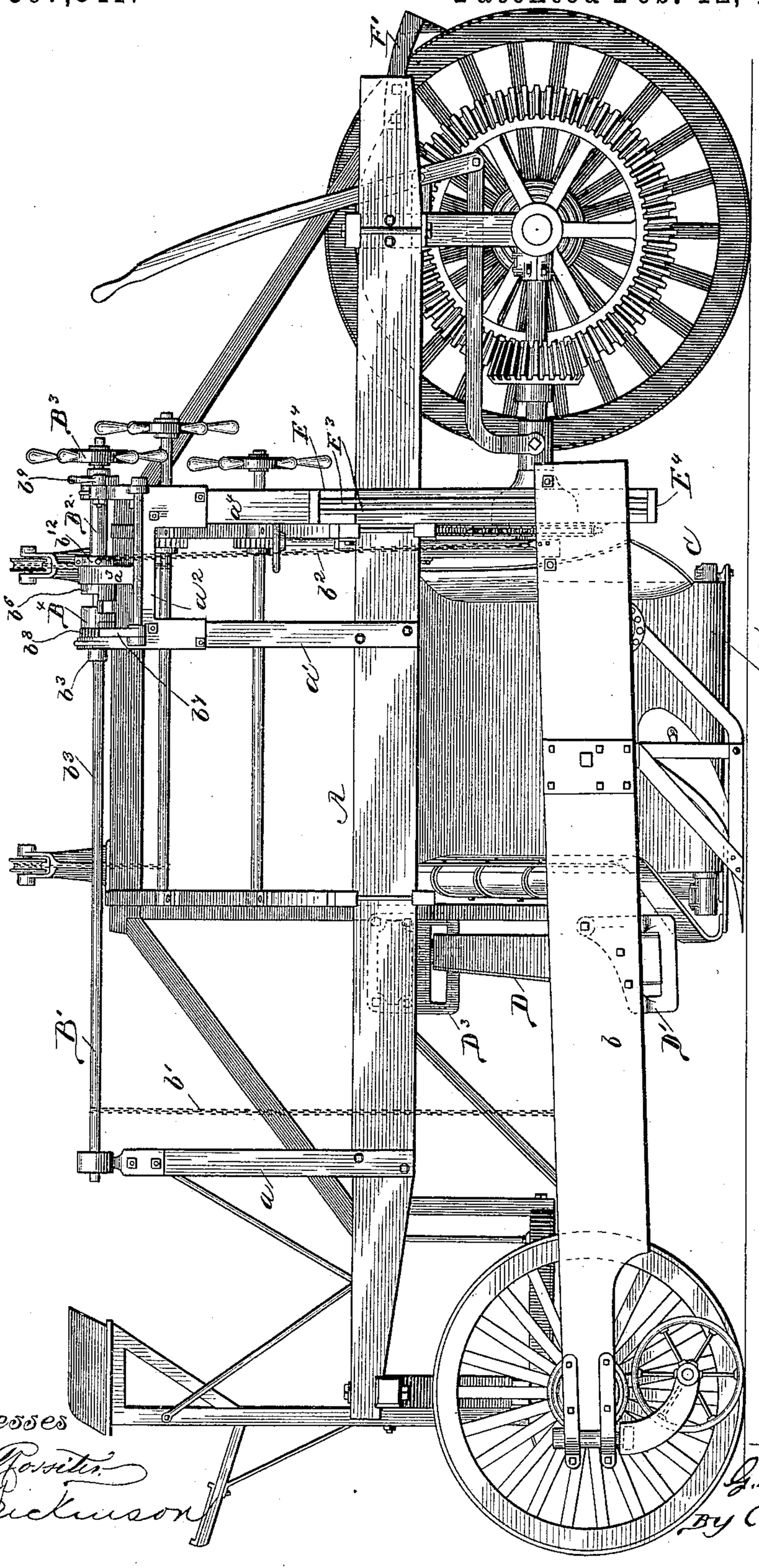
(No Model.) 5 Sheets—Sheet 1.

G. B. DURKEE.

GRADING AND DITCHING MACHINE.

No. 397,841. Patented Feb. 12, 1889.



Witnesses
W. Positer.
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Fig. 1.

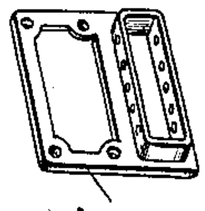

Fig. 1a.

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G. B. DURKEE.

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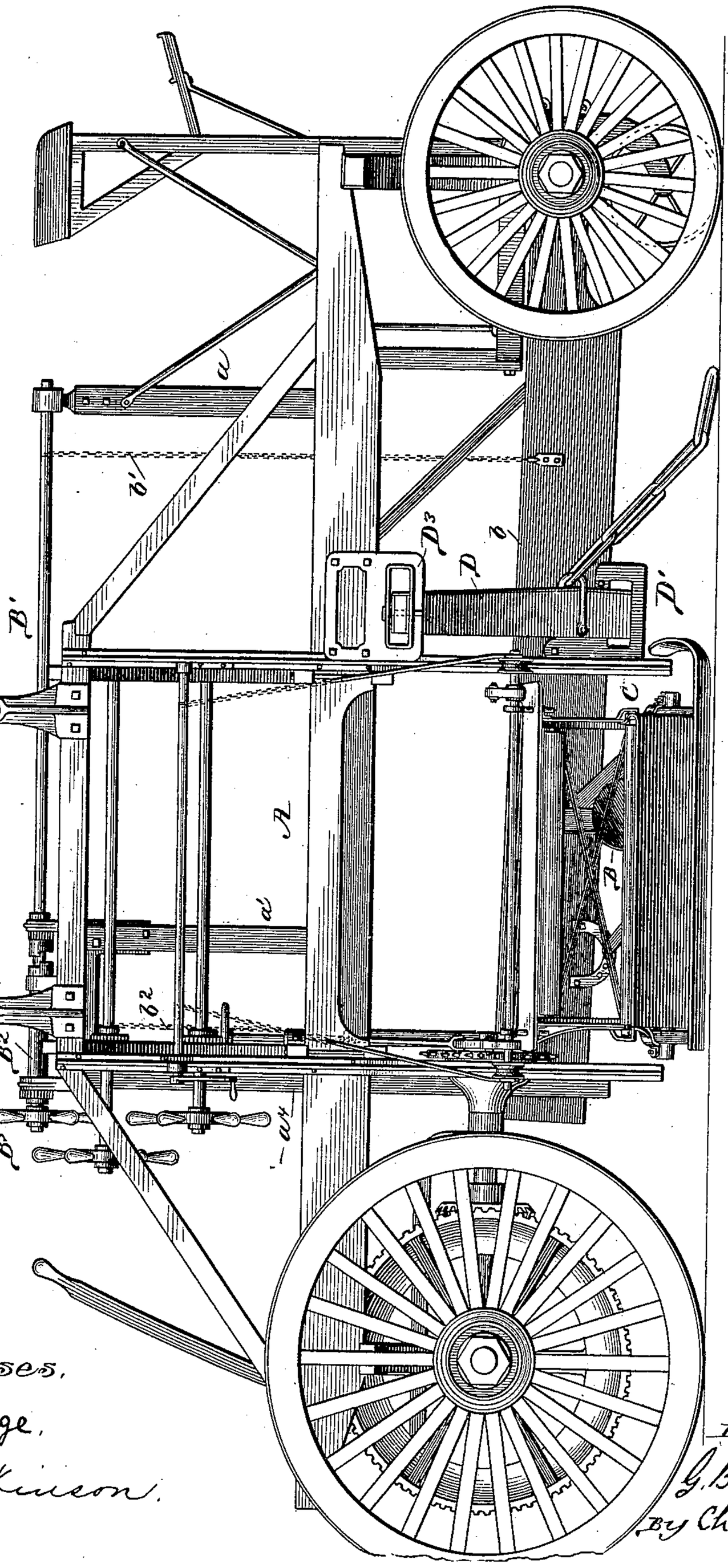

Fig. 2.

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(No Model.) 5 Sheets—Sheet 3.

G. B. DURKEE.

GRADING AND DITCHING MACHINE.

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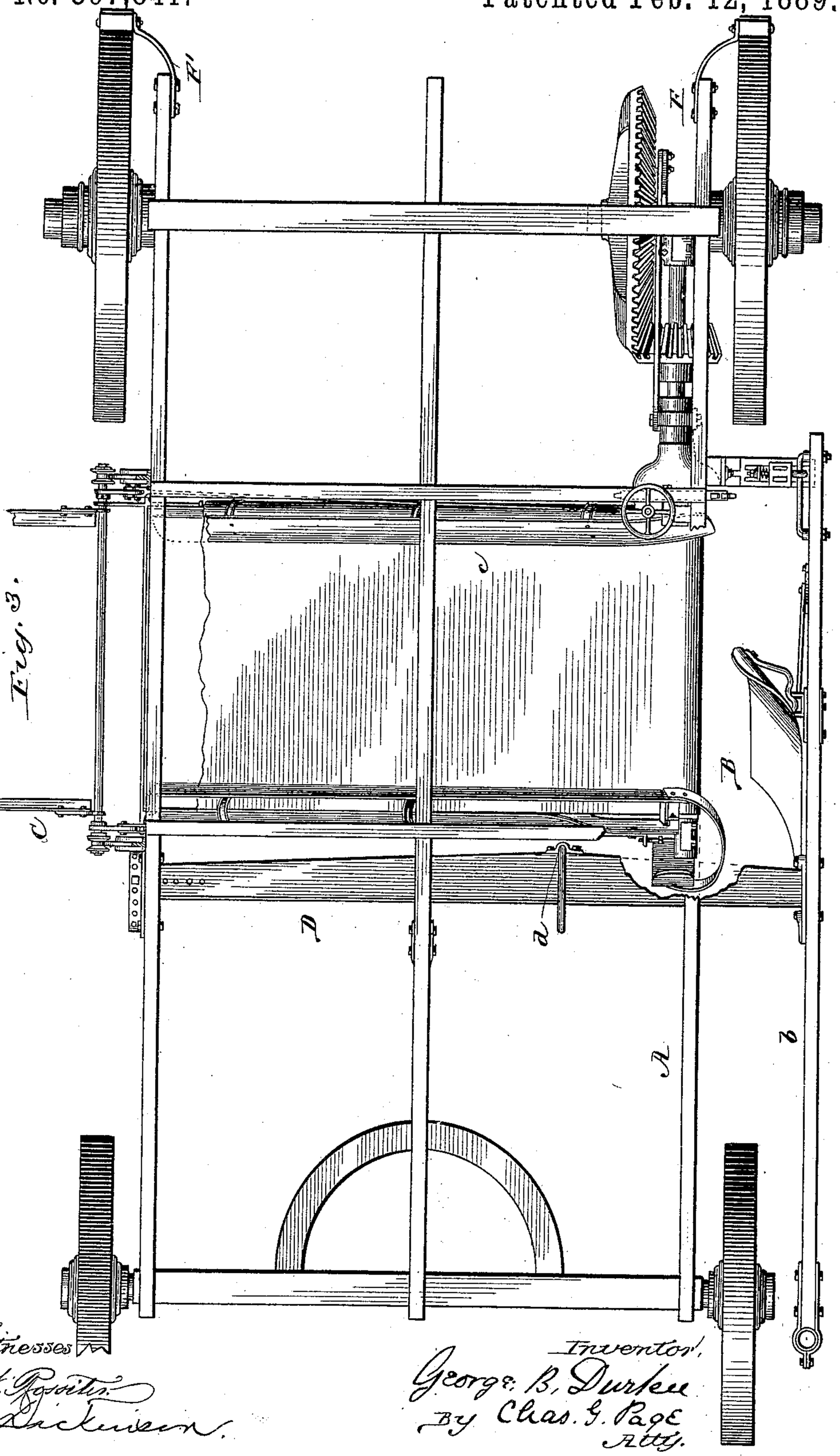

Fig. 3.

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(No Model.) 5 Sheets—Sheet 4.

G. B. DURKEE.

GRADING AND DITCHING MACHINE.

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Fig. 4.

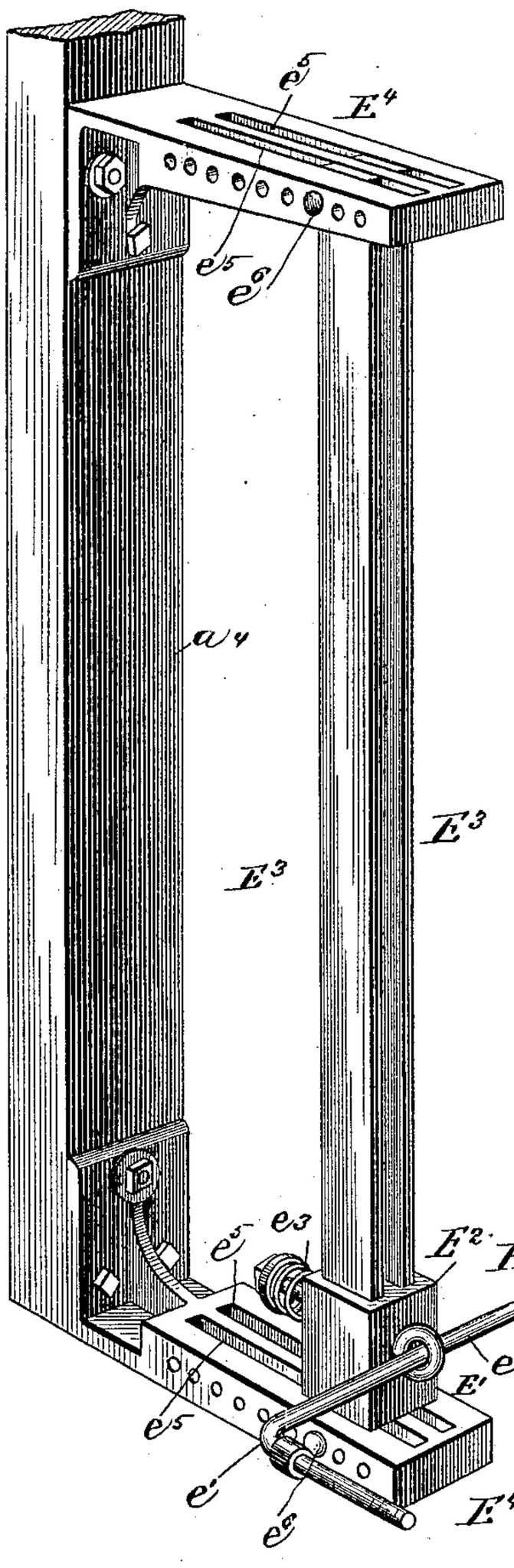
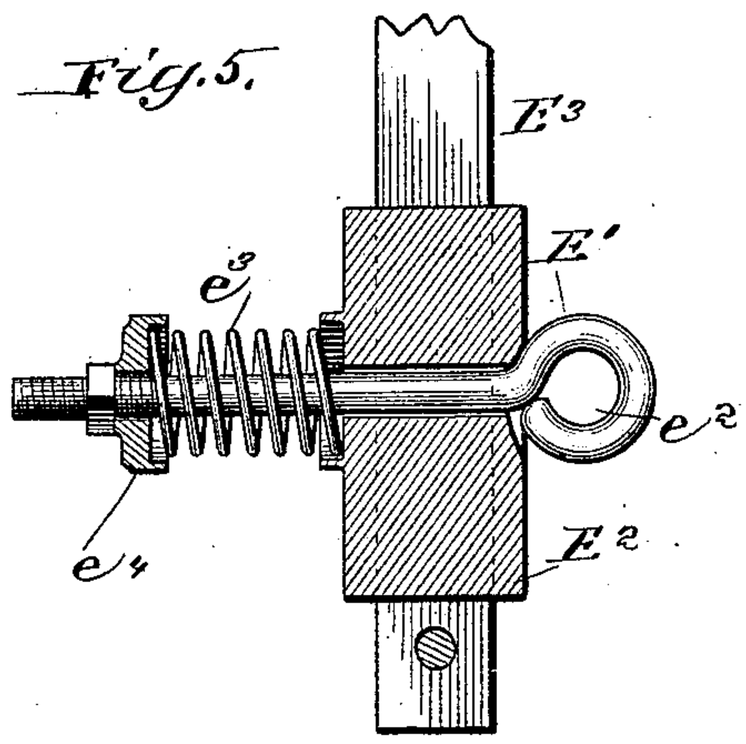


Fig. 5.



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(No Model.) 5 Sheets—Sheet 5.

G. B. DURKEE.

GRADING AND DITCHING MACHINE.

No. 397,841. Patented Feb. 12, 1889.

Fig. 6.

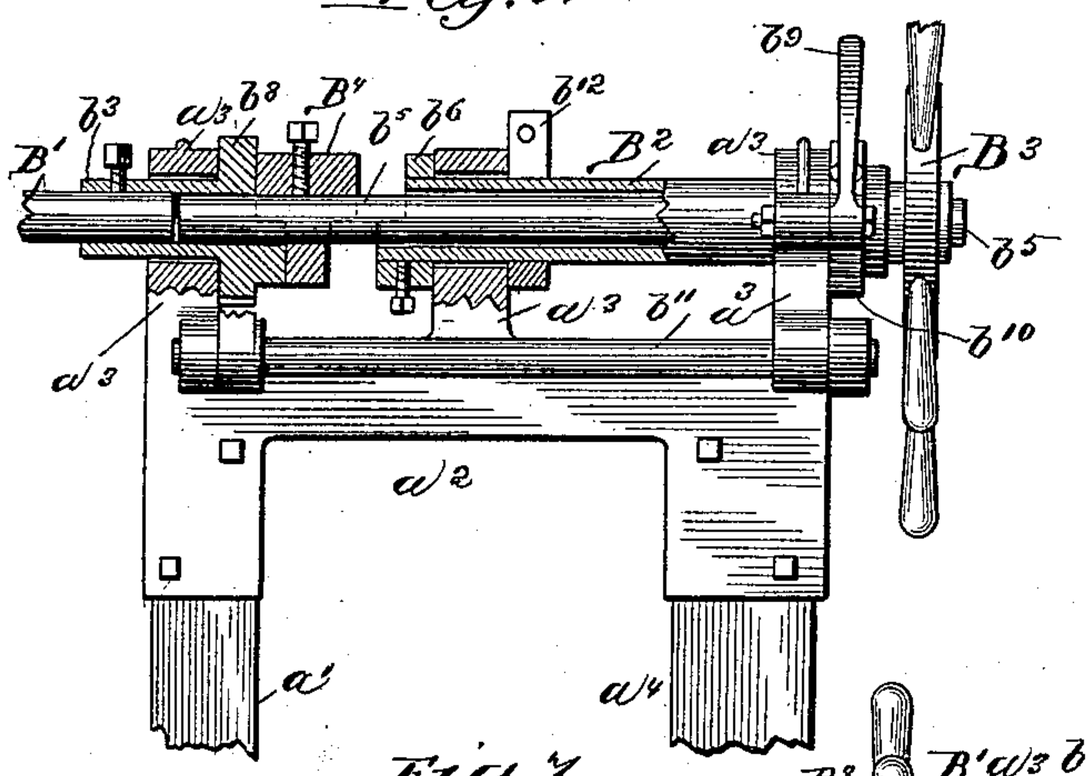


Fig. 7.

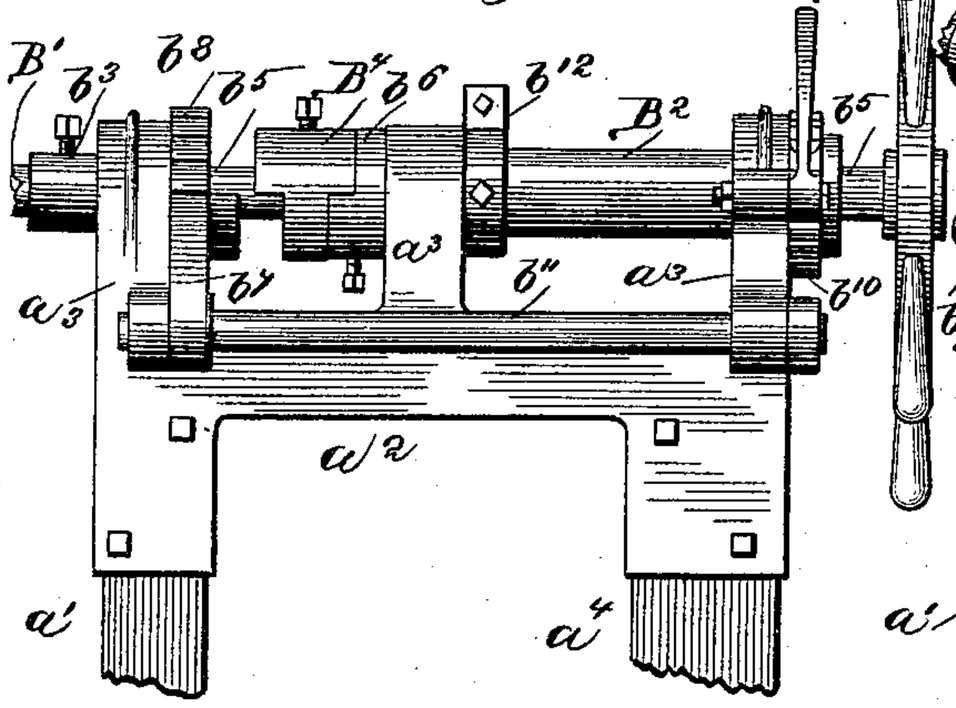


Fig. 8.

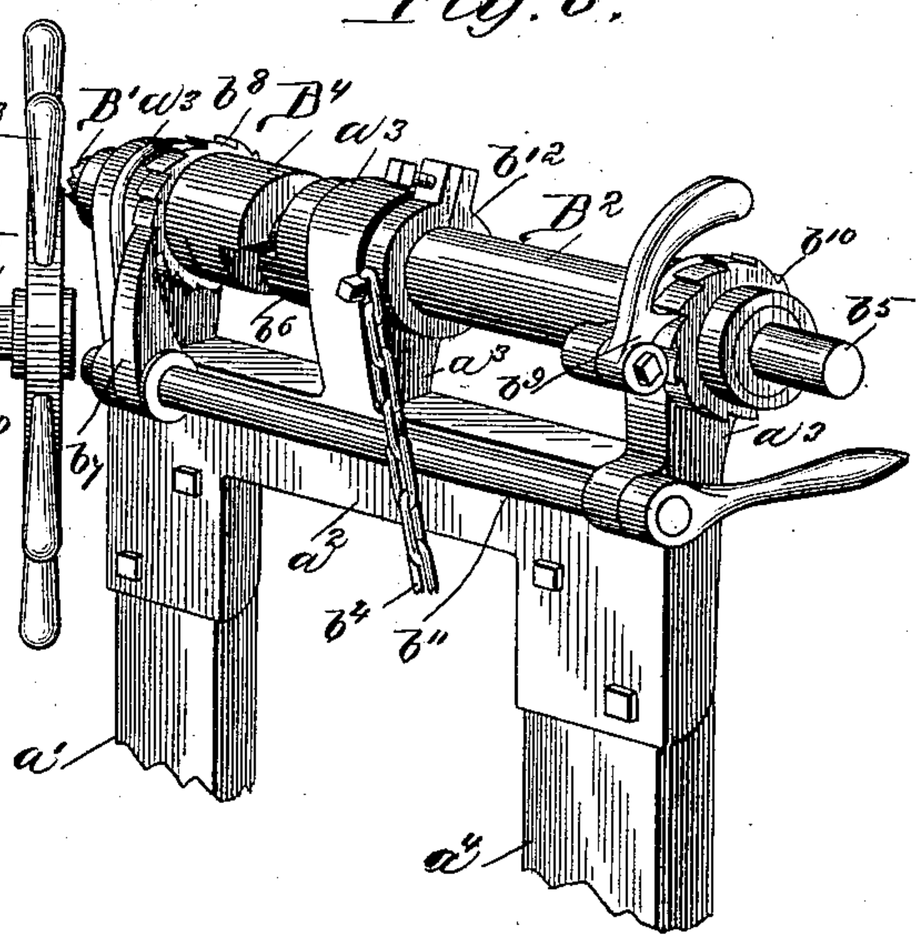


Fig. 9.

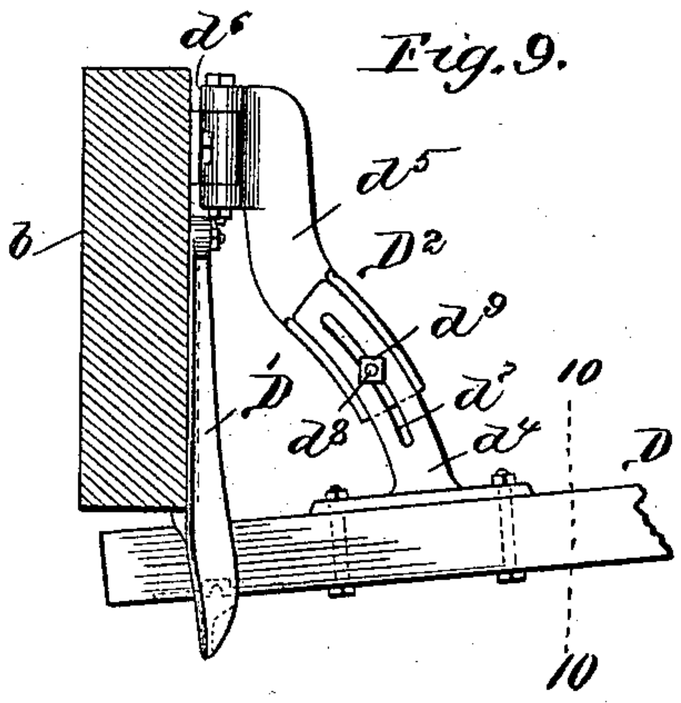


Fig. 10.

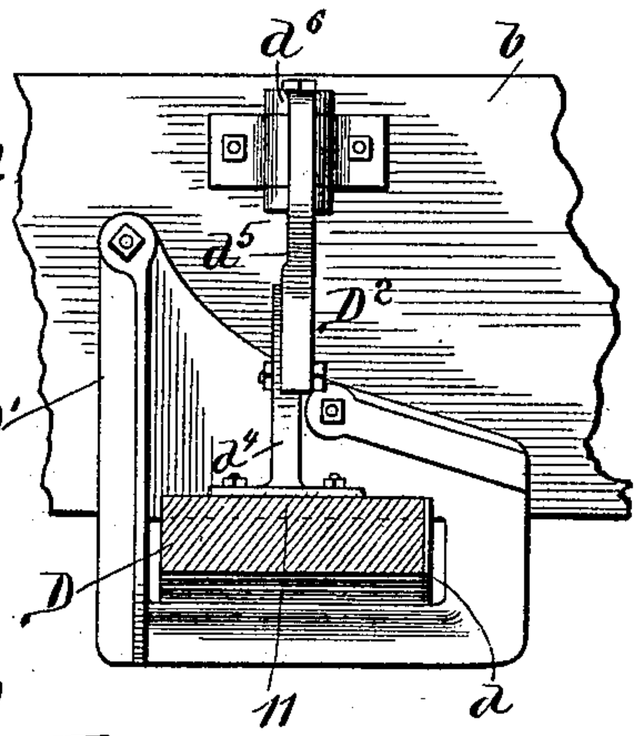
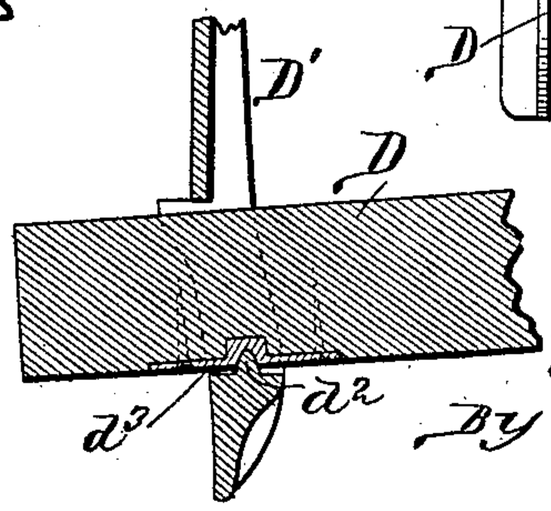


Fig. 11.



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UNITED STATES PATENT OFFICE.

GEORGE B. DURKEE, OF CHICAGO, ILLINOIS, ASSIGNOR TO FREDERICK C. AUSTIN, OF SAME PLACE.

GRADING AND DITCHING MACHINE.

SPECIFICATION forming part of Letters Patent No. 397,841, dated February 12, 1889.

Application filed June 11, 1888. Serial No. 276,746. (No model.)

To all whom it may concern:

Be it known that I, GEORGE B. DURKEE, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Grading and Ditching Machines, of which the following is a specification.

In a grading and ditching machine characterized by my improvement the plow-beam is suspended by ordinary cords or chains, which can be drawn up or let down, so as to raise the plow-beam at either end or raise or lower both ends of the plow-beam simultaneously. It has heretofore been proposed to attach one suspending-chain to the plow-beam in advance of the plow, and to attach another suspending-chain to the plow-beam in the rear of the plow, and to provide for such two chains two separately-arranged elevated winding-shafts, each provided with and operated by its own hand-wheel. This has necessitated the arrangement of one winding-shaft at right angles to the other and the frequent transferment of the attention of an attendant from one hand-wheel to the other, whereby difficulty arises in operating both hand-wheels simultaneously to raise or lower both ends of the plow-beam synchronously. Some further difficulty has also been experienced under said arrangement, since the points from which the chains are suspended were not both over the plow-beam, and hence one chain tended to draw the plow-beam toward the body-frame. To obviate such objections, I provide a couple of winding-shafts, which can be readily connected or disconnected, at the will of an attendant, and I further provide a single hand-wheel, of which the winding-shafts can either be alternately or simultaneously operated. I also arrange one of said winding-shafts in alignment with the other, whereby the line of shafting comprises two separate rotary winding-shafts arranged parallel with and over the plow-beam, thereby bringing over the plow-beam the points from which both of the suspending-chains are hung.

A further object of my invention is to provide an improvement in the mode of connecting a draft-bar with the plow-beam, as hereinafter set forth.

A further object of my invention is to dispense with an arrangement or rear-controlling-bar (shown attached to the plow-beam in the rear of the plow in Patent No. 275,614, heretofore granted to W. J. Edwards and myself,) and to provide means for permitting easier movement on the part of the plow and a greater reliability in guiding the same, as hereinafter more particularly described.

In the accompanying drawings, Figure 1 represents in side elevation a grading and ditching machine embodying my invention, the side represented being the plow side of the machine. In said view the rear wheel at the said plow side of the machine is omitted for convenience of illustration. Fig. 1ª represents a bracket by which one end of the draft-bar can be supported. Fig. 2 is a view similar to Fig. 1, but shows in elevation the delivery or opposite side of the machine. In this view the swinging extension portion of the elevator is removed for convenience of illustration. Fig. 3 is a top plan view with a portion of the machine that is above the horizontal sills of the body-frame removed. Fig. 4 represents in perspective, on a somewhat larger scale, certain devices for connecting the plow-beam in the rear of the plow with the body-frame of the machine. Fig. 5 represents a section through the movable bearing E^2 of Fig. 4, and serves to more clearly show the connection of the sliding pivot or pintle E′ with said bearing. Fig. 6 represents in part elevation a raising and lowering mechanism for the chains by which the plow-beam is suspended, the greater portion of the winding-shaft B′ being, for convenience of illustration, broken away. Fig. 7 represents said raising and lowering mechanism in elevation, and shows the clutch in position to connect the winding-shaft B^2 with the rotary shaft b^5, whereas in Fig. 6 said clutch is in position to connect the shaft b^5 with the winding-shaft B′. Fig. 8 represents said raising and lowering mechanism in perspective. Fig. 9 represents a section taken transversely through the plow-beam *b* at a point convenient to show in elevation a portion of the draft-bar D and connections between the draft-bar and the plow-beam. Fig. 10 represents a section taken through Fig. 9 on the line 10 10. Fig. 11 is a section through

the bracket and a portion of the draft-bar on line 11, Fig. 10.

A indicates a suitably-constructed wheel-supported body-frame adapted to provide supports or bearings for various operative members of the grading and ditching machine.

The plow B is attached in any ordinary or suitable way to the plow-beam *b*, which latter is so suspended as to place the plow in position for plowing up the soil and delivering the same onto the elevating-conveyer *c* of an elevator, C. The plow-beam is suspended by a couple of ropes or chains, *b'* and b^2, that are connected with the plow-beam respectively in advance of and to the rear of the plow, whereby the plow-beam can be raised at either end or lifted bodily, so as to raise both ends simultaneously, according to the way in which the chains are operated. As a means for permitting the ready and convenient operation of said suspending-chains either alternately or simultaneously, at the will of an attendant standing upon the machine, the two chains are respectively attached to one and the other of a couple of rotary shafts, B' and B^2, which can be either connected or disconnected by a clutch. In either case, however, the shafts may be and preferably are operated by a single hand-wheel, B^3, arranged within convenient reach of the attendant.

The horizontally-arranged rotary shaft B', whereon the chain *b'* may be wound, is arranged substantially over and parallel with the plow-beam, and is supported at a suitable height above the same by means of standards *a* and *a'*, which rise from and are secured to the body-frame.

The winding-shaft B' is at its rear arranged to extend part way through the bore of a hub or collar, b^3, which is secured to the said shaft and arranged to turn in a suitable bearing upon one of the standards, as best shown in Fig. 6. In the rear of and preferably in alignment with the winding-shaft B is a shaft, b^5, which is both rotative and longitudinally movable. The shaft b^5 carries at its rear end a hand-wheel, B^3, and at its forward end has a bearing in the hub or collar, b^3, wherein it may both turn and slide independently of the said collar, and hence independently of the winding-shaft B', with which latter, however, it can be connected by a clutch, so that the winding-shaft B' can be operated by turning the hand-wheel. The winding-shaft B^2 is made hollow and arranged as a sleeve upon the shaft b^5, which latter can be either moved endwise through or rotated independently of the hollow winding-shaft.

The hollow winding-shaft B^2 may be supported in any suitably-arranged bearings—as, for example, in bearings which, like the bearing for the collar b^3, can be formed upon a cross-piece, a^2, herein shown—provided with bearings a^3 for the foregoing-mentioned purposes, and secured upon standards *a'* and a^4, that rise from the main body-frame.

The rotary and sliding shaft b^5 is provided with a double clutch gland or clutch member, B^4, which can be adapted for engagement with the winding-shaft B' and the hollow winding-shaft B^2 in any suitable mechanical way. As herein shown, the double clutch member is simply a shouldered block secured upon the shaft b^5, and adapted to engage with either a shouldered end portion of the collar b^3 or with a like shouldered end portion of a collar, b^6, which is secured upon the end of the rotary winding-shaft B^2, that is opposite the shouldered end of the hub b^3, the engagement of the double clutch member with either one of said collars which constitute the clutch members being dependent upon the direction in which the shaft b^5 is shifted endwise. The width of the shoulders or engaging portions of the clutch members and the distance apart of the collars b^3 and b^6 will be such that when the double clutch member occupies a position midway between said collars it will be in engagement with both, whereas by shifting it in either direction from its middle point it can be brought into engagement with but one of the collars or clutch members.

As a result of the foregoing-described arrangement of raising and lowering mechanism the plow-beam can be raised and lowered at either end, or it can be raised and lowered at both ends at one and the same time. Thus the attendant by taking hold of the hand-wheel B^3 can push the shaft b^5 forward to an extent to place the double clutch member thereon in engagement solely with the collar b^3, that is fixed upon the forwardly-arranged rotary winding-shaft B, so that by then turning the hand-wheel the two winding-shafts that are thus temporarily connected to form in effect a single shaft can be turned so as to either wind or unwind the chain *b'*, and hence raise or lower the plow-beam from its forward end. In like manner the attendant can pull the shaft b^5 back to an extent to place the double clutch member solely in engagement with the collar or the hollow winding-shaft B^2, so that by turning the hand-wheel said hollow shaft can be turned by operating the shaft *b*, with which it is held in engagement by the clutch. The winding-shaft B^2 can therefore be operated separately from the forward winding-shaft section, B', so as to raise and lower the plow-beam from its rear end. On the other hand, however, by adjusting the shaft b^5 so as to bring the double clutch member B^4 in its intermediate position, both winding-shafts will be in rigid connection, so as to permit the two chains to be simultaneously wound or unwound, it being understood that when the double clutch gland B^4 occupies its intermediate position it may engage both the collar or clutch member b^3 that is fixed on the shaft B' and the collar or clutch member that is fixed upon the winding-shaft B^2, whereby the two shaft-sections b^5 and B' will be temporarily connected as a single shaft through the medium of the clutch, which will likewise

connect such shaft with the hollow winding-shaft B^2.

The winding-shaft B′ can be temporarily locked against rotation by a pawl, b^7, arranged to engage a ratchet, b^8, on the hub or collar b^3, that is secured to said shaft, while, on the other hand, the winding-shaft B^2 can be conveniently locked against rotation by a pawl, b^9, arranged to engage a ratchet, b^{10}, upon said hollow winding-shaft. The pawl b^7 is secured upon a rock-shaft, b^{11}, having a handle within convenient reach of the attendant, while the pawl b^9 can be simply pivoted to one of the bearings a^3, so as to place its handle within convenient reach of the said attendant.

The winding-chain b^2 can be attached in any suitable way to the shaft B^2—as, for example, it may be connected with a clip, b^{12}, secured upon said shaft.

To the plow-beam is attached a draft-bar, D, which is arranged laterally to the length of the plow-beam and connected therewith at a point in advance of the plow. This draft-bar can be connected with either the forward axle or forward bolster or rear end of a tongue by a rod or chain attached at its rear end to the draft-bar, as at d, Fig. 3, and at its forward end connected with said axle or bolster or tongue of the machine in any suitable manner. The draft-bar is at one end pivoted in or upon any ordinary or suitable bracket, D^3, that is secured to the main body-frame, while at its opposite end the draft-bar is connected with the plow-beam by a pivotal connection. (Shown in Figs. 9, 10, and 11.) In said figures a bracket, D′, is secured to the plow-beam so as to depend therefrom, and is at a point below the plow-beam provided with a horizontally-arranged slot, d', adapted to receive the draft-bar and made somewhat longer than the width of said bar. At a point midway of the length of the lower edge of said slot the bracket is provided with a stud, d^2, which engages in a corresponding recess in a plate, d^3, that is secured to the under side of the draft-bar, thereby providing a knuckle-joint.

The draft-bar D is also connected with the plow-beam at a point in advance of the plow by an extensible arm, D^2, that is hinged to the plow-beam, so as to permit the latter to be shifted endwise. To such end the arm is divided into two parts, one part, d^4, being secured to the draft-bar and the other part, d^5, being attached to the plow-beam by a hinge, d^6, having a vertically-arranged pintle. One part of the arm is provided with a slot, d^7, for a set-screw or a bolt, d^8, secured to the other part of the arm and provided with a nut, d^9. In this way the arm can be adjusted in length after the nut has been loosened, after which the two parts of the arm can be held rigidly together by tightening up the nut. By adjusting the length of this two-part arm D^2 the plow-beam can be tilted laterally, it being sometimes desirable to effect such tilt—as, for instance, to set the plow for cutting sod.

The hinge d^6 and the stud or pivot d^2, which is directly below the hinge, permit the plow-beam to be shifted endwise, and the said stud d^2 is desirably rounded at its upper end, so as to permit the aforesaid lateral tilt on the part of the plow-beam and plow.

The draft-bar serves to guide and control the plow-beam in advance of the plow, while at a point in the rear of the plow I provide certain devices, hereinafter described, adapted not only to control and automatically guide the plow-beam, but also to adjust the same, so as to bring the plow nearer to or farther from the receiving end of the elevator.

With reference to said devices, which are best illustrated in Figs. 4 and 5, E indicates a staple-shaped rod which is secured to the plow-beam at a point back of the plow, as in Fig. 3, the effect of such arrangement being simply a horizontal rod or pintle, e, arranged alongside of and parallel with the beam, and provided at its ends or at other suitable points with stops or shoulders e'. Said pintle e is engaged by the eye e^2 of a pivot or eyebolt, E′, which serves to provide, in conjunction with the pintle e, a hinge-connection between the plow-beam and a block or bearing, E^2, wherein said pintle has its bearing. This arrangement of hinge construction between the plow-beam and the block E^2, that is understood to be supported from and arranged alongside of the body-frame, permits the plow-beam to be shifted endwise, so as to set the plow with reference to the elevator, and also permits the pintle e to turn in said eye e^2 of the pivot when the plow is tilted laterally.

In order to permit the rear portion of the plow-beam to have a certain latitude of side movement, whereby the plow may dodge obstructions, the eyebolt or pivot E′ has a sliding connection with the block or bearing E^2, and is subject to a spring, e^3. To such end the eyebolt passes through an opening in the block E^2, and is at one end provided with an adjustable nut, e^4, between which and the said block is arranged the spring e^3. This spring serves to maintain the plow in proper working order, but yields sufficiently to allow the plow to dodge obstructions.

The block E^2 is desirably fitted to slide along one or more, but preferably a couple, of vertically-arranged guide-bars, E^3, whereby the plow may be raised and lowered by the chains hereinbefore described, it being in this connection observed that the pivot or eyebolt E′ can turn about its axis, so as to adapt the hinge to the raising and lowering of either end of the plow-beam.

The upright guide-bars E^3 are at their upper and lower ends adjustably attached to horizontally-arranged brackets E^4, that are in turn secured to the standard a^4 on the main body-frame. Each bracket is provided with a horizontal slot, e^5, for an end of one of the guide-bars, which can be held at any desired

point along such slots by pins e^6, introduced through suitable holes in the brackets and extended through holes in the bars. By such arrangement the lateral adjustment of the plow-beam can be effected, it being understood that the draft-bar can also be provided with a line of holes for a removable pivot-pin, whereby said bar can be adjusted endwise along its bearing D^3 by changing such pin from one to the other of the holes in the draft-bar. By the foregoing arrangement the plow-beam is in effect connected with the body-frame by a sliding universal joint, which allows all of such movements as it may be desirable to permit on the part of the plow-beam.

In order to prevent stalks or trash from being taken up by one of the rear wheels and carried forward to the hinge-joint in the rear of the plow, the body-frame is at one corner provided with a scraper, F, for freeing the rear wheel at said corner of the machine from trash. In like manner the body-frame can at its opposite rear corner be provided with a scraper, F′.

What I claim as my invention is—

1. In a grading and ditching machine, the combination, with the suspended plow-beam and the suspending cords or chains therefor, of a raising and lowering mechanism consisting of a couple of rotary winding-shafts, respectively, for one and the other of the suspending cords or chains, and a clutch adapted to connect and disconnect the winding-shafts, whereby the shafts may be either connected in order to simultaneously wind or unwind the cords or chains, or disconnected, so as to permit either chain to be wound or unwound separately from the other, as set forth.

2. In a grading and ditching machine, the combination, with the suspended plow-beam and the suspending cords or chains therefor, of separate winding-shafts for the suspending-chains, and a shaft which is both rotative and longitudinally movable, provided with a clutch device arranged to engage either of a couple of clutch portions with which the two winding-shafts are respectively provided, whereby the shaft carrying the clutch may be connected with either winding-shaft and then turned, so as to operate the same, substantially as and for the purpose set forth.

3. In a grading and ditching machine, the combination, with the plow-beam carrying a plow and the suspending-chains therefor, of a line of sectional shafting comprising a rotary shaft, B′, which serves as a winding-shaft for one of the chains, and a shaft, b^5, which is both rotative and longitudinally movable, a rotary winding-shaft from which the other suspending-chain is hung, and a double clutch member carried by the said rotary and longitudinally-movable shaft and arranged to be thrown into engagement with either of the two clutch members, respectively, upon one and the other of the said two chain-winding shafts, substantially as and for the purpose described.

4. The combination, with the suspended plow-beam carrying a plow and the suspending cord or chain b', of the rotary winding-shaft B′, for said cord or chain, the shaft b^5, which is both a rotative and a longitudinally-movable shaft, and a clutch member or portion fixed upon the shaft B′ in position to be engaged by a clutch member on shaft b^5, whereby the latter may by an end-thrust be either connected or disconnected from said chain-winding shaft, substantially as and for the purpose set forth.

5. The combination, with the suspended plow-beam and the suspending-chains therefor, of the rotary winding-shaft B′, the rotary and sliding shaft b^5, provided with a hand-wheel, the rotary winding-shaft B^2, sleeved upon the rotary and sliding shaft, clutch members upon the opposite ends of the winding-shafts, and a double clutch member upon the rotary and sliding shaft, for the purpose described.

6. The combination, substantially as hereinbefore set forth, in a grading and ditching machine, of the suspended plow-beam carrying a plow and the two cords or chains by which the plow-beam is suspended, with the two winding-shafts, one for each winding-chain, a clutch arranged to alternately connect the winding-shafts with a rotary shaft, which can be operated by an attendant on the machine to actuate either winding-shaft, according to the position of the clutch, and pawl-and-ratchet devices, substantially as set forth, to lock the winding-shafts against rotation.

7. In a ditching and grading machine, the combination, with the suspended plow-beam and suspending-chains therefor, of a couple of separate rotary chain-winding shafts arranged in alignment with one another and supported so as to lie over and substantially parallel with the plow-beam, for the purpose described.

8. In a grading and ditching machine, the combination, with the suspended plow-beam and suspending-chains therefor, of a couple of winding-shafts, both arranged on a line substantially over and parallel with the plow-beam, one of said shafts being hollow, whereby the power may be transmitted through the hollow shaft by shafting which can turn independently of the hollow shaft, for the purpose set forth.

9. In a grading and ditching machine, the combination, with the suspended plow-beam and the draft-bar D, of a hanger attached to the plow-beam and a knuckle-joint, such as set forth, pivotally attaching the draft-bar to the hanger.

10. In a grading and ditching machine, the combination, with the suspended plow-beam and the draft-bar D, of an extensible hinged arm connecting the draft-bar with the beam, substantially as and for the purpose set forth.

11. In a grading and ditching machine, the combination, with the suspended plow-beam and the draft-bar, of the extensible hinged arm connecting the draft-bar with the plow-beam and a pivotal connection between the draft-bar and a hanger attached to the plow-beam, substantially as and for the purpose set forth.

12. In a grading and ditching machine, the combination, with the suspended plow-beam and the draft-bar D, of a bracket, D′, secured to the plow-beam and having a slot wherein one end of the draft-bar is received, and a pivotal connection between the said bracket and the draft-bar, substantially as and for the purpose set forth.

13. In a grading and ditching machine, the combination, with the plow-beam, of a pivot connected with the plow-beam in the rear of the plow and movable longitudinally in a bearing connected with the body-frame, whereby both a lateral movement and tilting motion of the plow-beam is permitted, substantially as and for the purpose set forth.

14. In a grading and ditching machine, the combination, with the plow-beam, of a pivot connected with the plow-beam in the rear of the plow and movable longitudinally in a bearing connected with the body-frame, and a spring to which said pivot is subject in its movement, substantially as and for the purpose set forth.

15. In a grading and ditching machine, the combination, with the plow-beam, of a hinge-pintle attached to and parallel with the plow-beam in the rear of the plow, and an eyebolt supported from the body-frame and affording a bearing through which the said pintle is arranged to slide, substantially as and for the purpose set forth.

16. In a grading and ditching machine, the combination, with the suspended plow-beam, of a vertically-movable bearing connected with the plow-beam, with a hinge-joint and arranged to slide upon a guide that is carried by the body-frame, substantially as and for the purpose set forth.

17. In a grading and ditching machine, the combination, with the suspended plow-beam, of a vertically-movable bearing having a hinge-connection with the plow-beam, and a guide for said bearing adjustable in position toward or from the body-frame, substantially as and for the purpose set forth.

18. In a grading and ditching machine, the combination, with the suspended plow-beam, of the pintle *e*, secured to the plow-beam, the vertically-sliding bearing carrying an eyebolt that is connected with said pintle, and a guide, E^3, for said vertically-sliding bearing, substantially as and for the purpose set forth.

GEORGE B. DURKEE.

Witnesses:
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