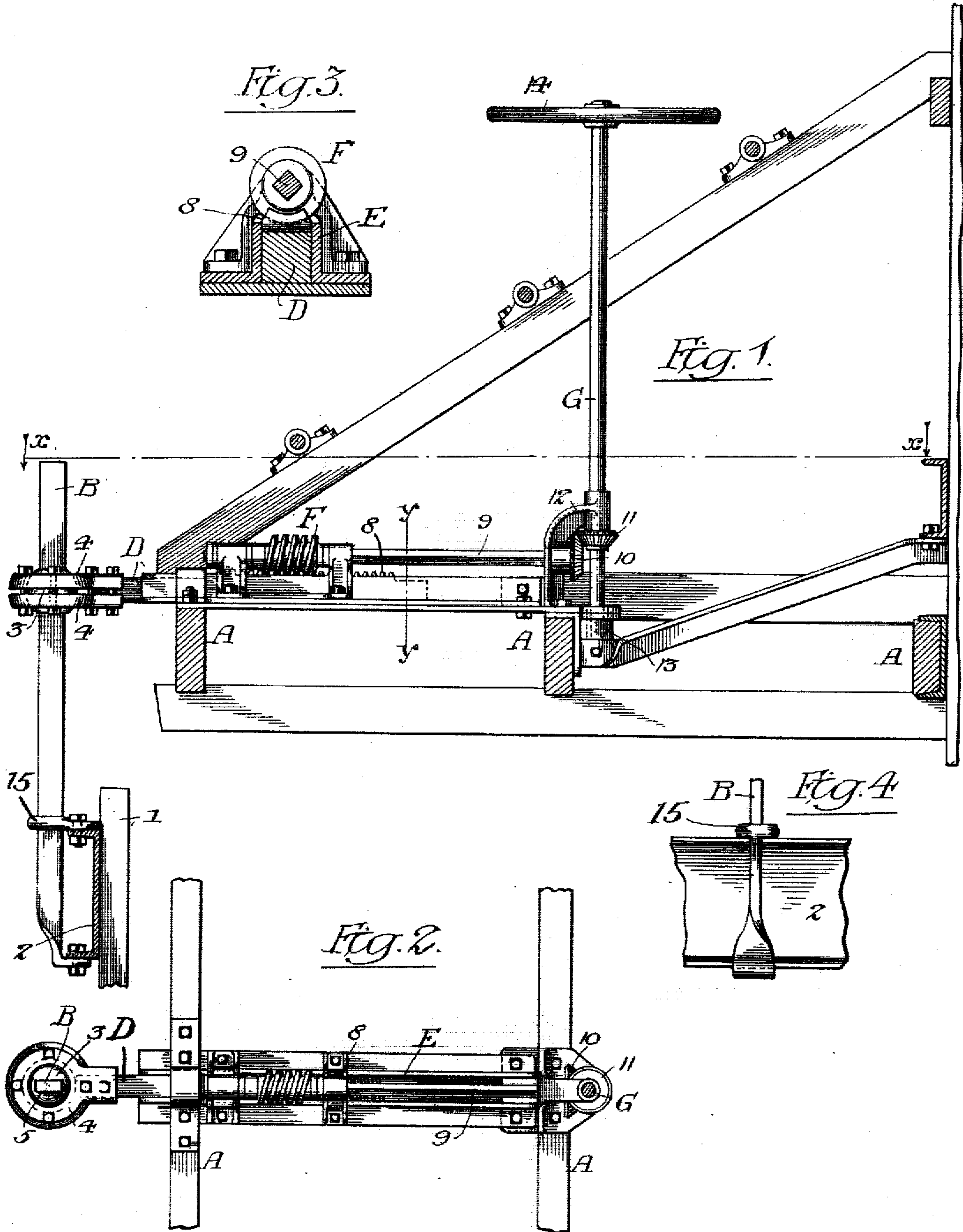


S. E. FREEMAN.
GRADING AND DITCHING MACHINE.

APPLICATION FILED DEC. 1, 1904.

2 SHEETS—SHEET 1.



Witnesses:
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D. C. Freiburg

Inventor:
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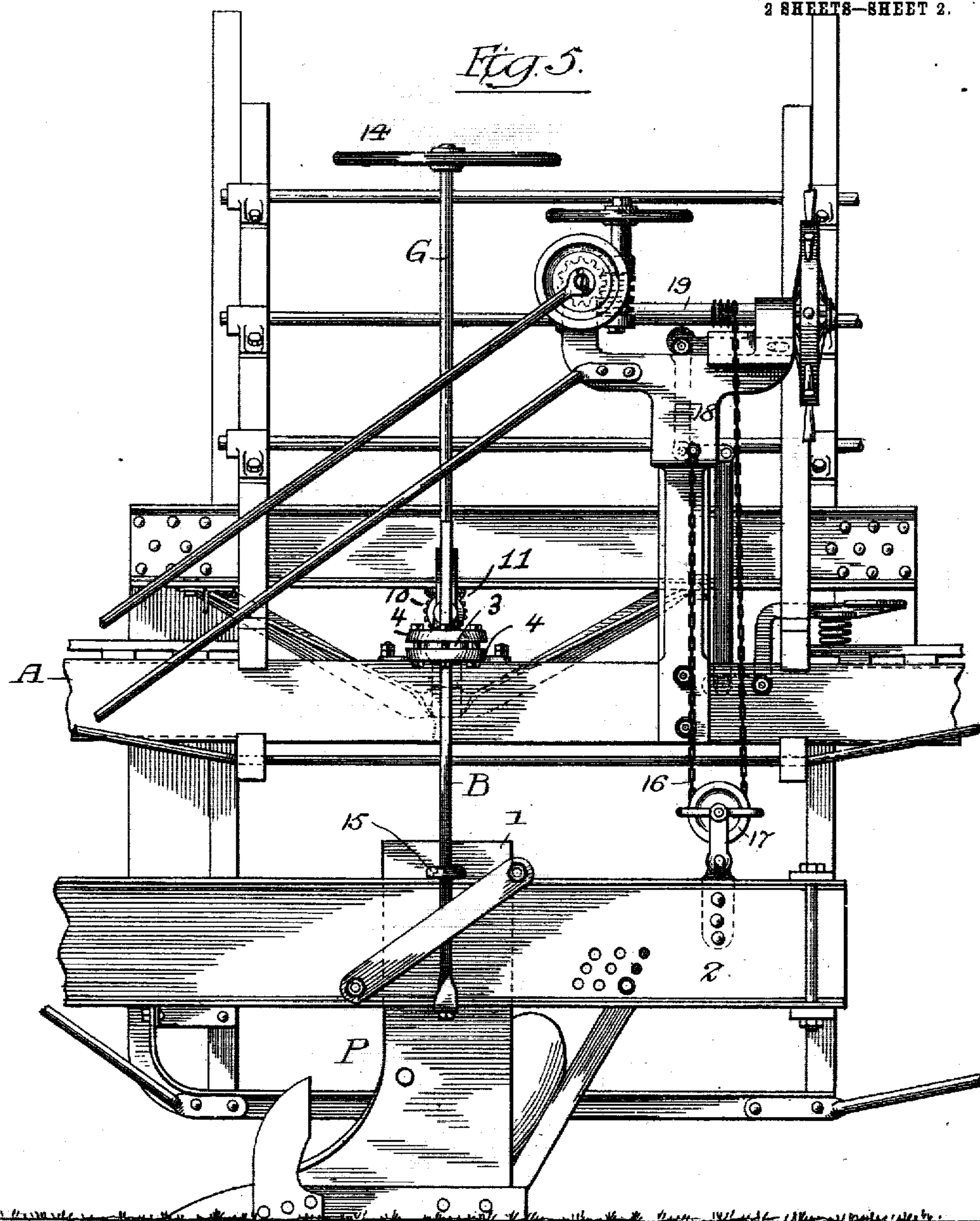
No. 825,450.

PATENTED JULY 10, 1906.

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2 SHEETS—SHEET 2.



Witnesses:

Louis M. V. Whitehead

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UNITED STATES PATENT OFFICE.

STUART E. FREEMAN, OF BARBERTON, OHIO, ASSIGNOR TO NATIONAL
DRILL & MANUFACTURING COMPANY, OF CHICAGO, ILLINOIS, A COR-
PORATION OF WEST VIRGINIA.

GRADING AND DITCHING MACHINE.

No. 825,450.

Specification of Letters Patent.

Patented July 10, 1906.

Application filed December 1, 1904. Serial No. 235,063.

To all whom it may concern:

Be it known that I, STUART E. FREEMAN, a citizen of the United States, residing at Barberton, in the county of Summit and State of Ohio, have invented certain new and useful Improvements in Grading and Ditching Machines, of which the following is a specification.

My invention relates to grading and ditching machines in which a plow is suspended for side tilt and other movements—such, for example, as in patent to T. J. Gray, No. 743,487, dated November 10, 1903—the plow being preferably arranged and suspended by chains or cables, substantially as in said patent, which also includes means for laterally tilting the plow.

More specifically, my invention concerns the plow-tilting means.

Objects of my invention are to provide simple and efficient means for laterally tilting the plow and to permit it to have such other movements as it is understood to be capable of when thus suspended.

In the accompanying drawings, Figure 1 mainly illustrates my improved plow-tilting device in elevation, the plow-beam and certain bars or sills of the body-frame being shown in cross-section on a vertical plane at one side of the plow-tilting device. Fig. 2 is a top plan of the plow-tilting device, the hand-wheel shaft being in section on a horizontal plane indicated by line *x x* in Fig. 1. Fig. 3 is a detail view produced by a section on line *y y* in Fig. 1, the scale of Fig. 3 being larger than in Fig. 1. Fig. 4 is a detail showing in side elevation a portion of the plow-beam and the lower portion of the upright arm or bar secured thereto. Fig. 5 is a side elevation of a portion of a grading and ditching machine embodying my invention.

The portion of the body-frame illustrated comprises sills A, which are longitudinally arranged as to the length of the machine and elevated relatively to the plow P. The plow has its standard 1 secured to the plow-beam 2.

The plow is provided with an upwardly-extending arm B, formed by a rod or bar, the plow-beam 2 and the arm B being rigidly held together by suitable means. The arm or bar B extends upwardly from the plow and is connected with a horizontally-arranged slide-bar D, supported and guided by a suit-

able guideway E, arranged and secured upon the longitudinal sills A of the body-frame of the machine. The arm B has an articulated connection with the slide-bar D, which latter constitutes a shifter or reciprocative member for laterally tilting the arm B, so as to laterally tilt the plow. As a preferred arrangement the rod or arm B is connected with the bar D by a universal joint consisting of a ball-and-socket joint, the ball 3 being arranged in a socket formed within socket-pieces 4 4 on the bar D. The ball 3 is also formed with a diametric opening 5, in which the arm B is fitted, the arm and said opening being polygonal—for example, rectangular, as shown.

As a means for shifting the reciprocative member D longitudinally it is provided with a line of teeth 8, engaged by a worm F on a rotary worm-shaft 9, arranged over the said member D. The worm and its shaft can be supported in any suitable mechanical way, and the said shaft 9 is provided at one end with a bevel-gear 10, which engages a bevel-gear 11 on an upright rotary shaft or rod G. The shaft is conveniently mounted in bearings 12 and 13, supported on the body-frame, and the upper end of the shaft G is provided with some suitable device, whereby it can be manually operated—such, for example, as a hand-wheel 14.

An attendant standing upon the usual platform on the body-frame can readily operate the shaft G, and thereby shift the reciprocative member D in either direction, according to the direction in which the shaft G is turned. The movement of the slide-bar or reciprocative member D serves to tilt the arm B, and thereby tilt the plow laterally to the line of progression, and the ball-and-socket joint permits the plow to have other movements incident to a plow in a grading and ditching machine in which the plow is suspended by chains or cables, it being understood that the plow is thus suspended. The ball or socket joint also permits the arm B to tilt, while the member D moves longitudinally. As illustrated, the lower end of the flat bar forming arm B is bent and bolted to the lower flange of a channel-iron forming the plow-beam, said arm being also secured to the upper flange of the beam by a bracket 15.

In Fig. 5 the rear end of the plow-beam is shown suspended by a chain 16 passing under

a sheave 17 on the plow-beam, one end of the chain being attached to a bracket 18 on the body-frame of the machine and the other end of said chain being attached to a winding-shaft 19, mounted upon the bracket 18.

It is understood that the plow-beam is also suspended at a point forward of the plow by another chain, and as chains for such purpose are common in the art and shown, for example, in patent to Gray, hereinbefore mentioned, special illustration of a suspending-chain forward of the plow is omitted.

What I claim as my invention is—

1. A plow-tilting device for grading and ditching machines comprising an arm secured to the plow and extending upwardly therefrom; a reciprocative member with which the said arm has an articulated connection, and an operating gear device engaging teeth upon the reciprocative member.

2. A plow-tilting device for grading and ditching machines comprising an arm secured to and extending upwardly from the plow; a reciprocative member arranged laterally to

said arm and having an articulated connection therewith; a worm-gear engaging worm-teeth with which the reciprocative member is provided and means for operating the worm-gear.

3. A plow-tilting device for grading and ditching machines comprising an arm secured to and extending upwardly from the plow; a reciprocative member having an articulated connection with said arm and provided with worm-teeth; a worm-gear engaging the worm-teeth on the reciprocative member, and a rotary shaft or rod gear connected with the worm-shaft.

4. In a grading and ditching machine, a reciprocative member supported on the main frame; an arm B having a ball-and-socket connection with said reciprocative member; and a plow having its beam attached to the arm below the socket.

STUART E. FREEMAN.

Witnesses:

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