No. 716,992. Patented Dec. 30, 1902.

P. DOOLING.

DITCHING PLOW.

(Application filed Apr. 26, 1902.)

(No Model.) 3 Sheets—Sheet 1.

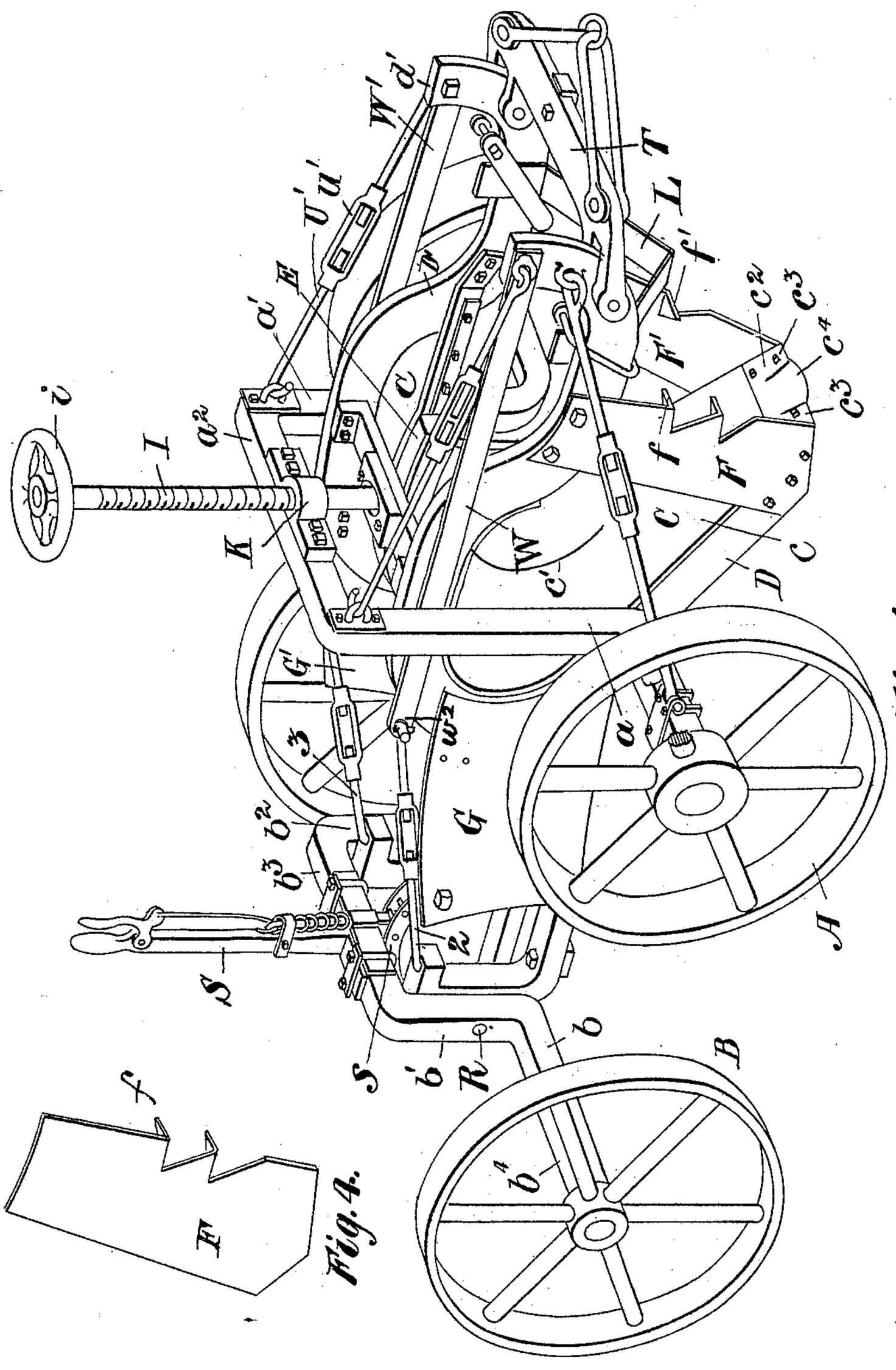

Fig. 1.

Fig. 4.

Witnesses
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3 Sheets—Sheet 2.

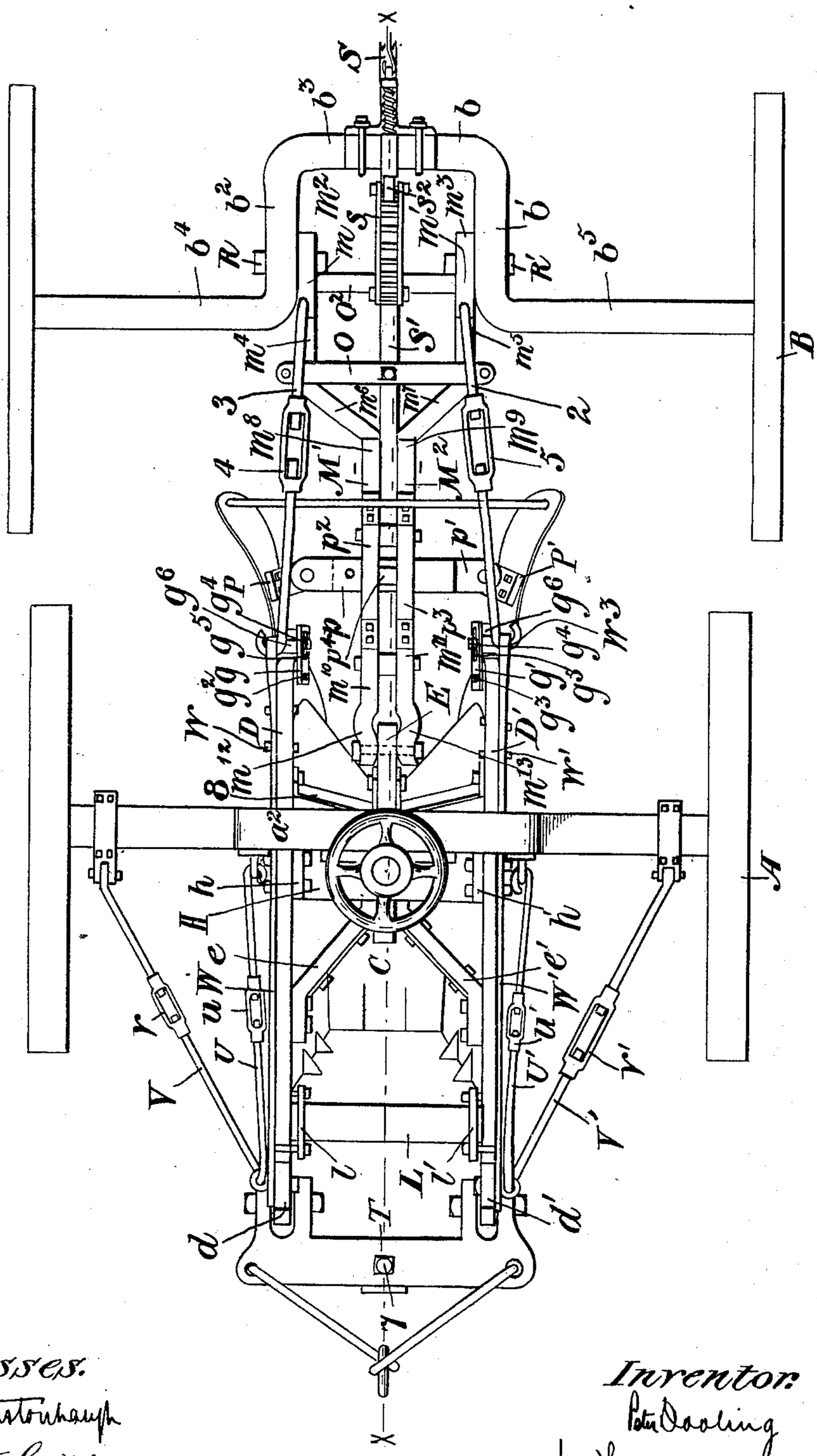

Fig. 2.

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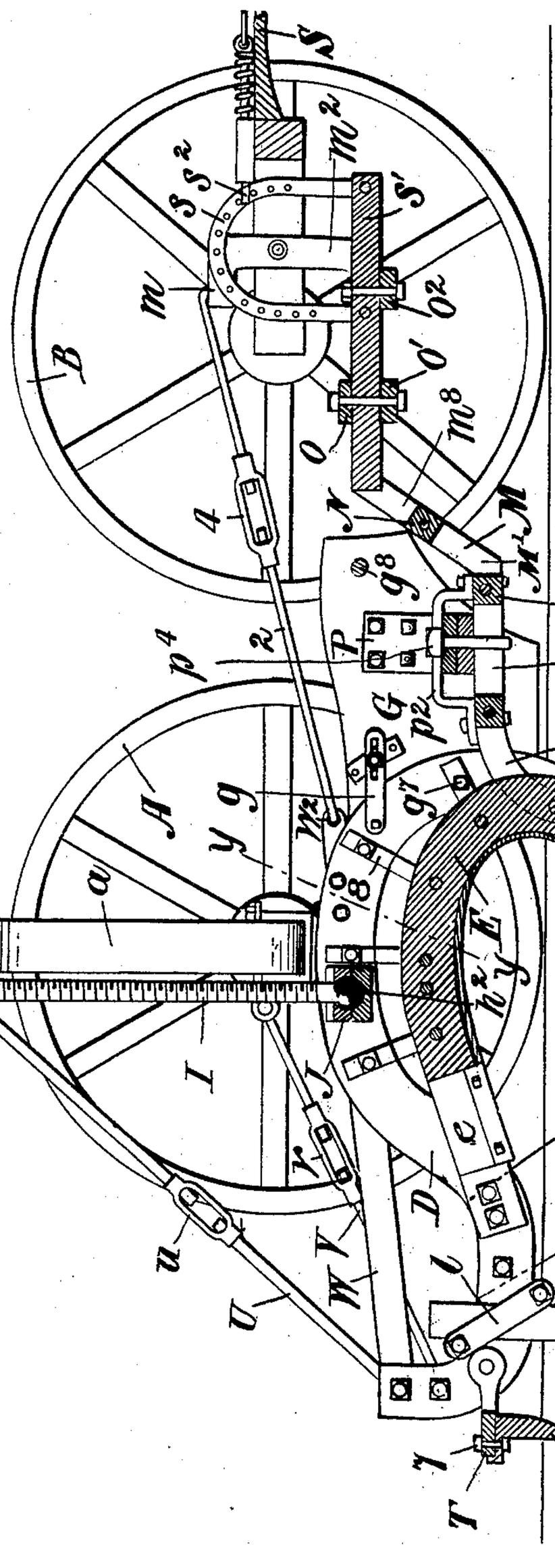

Fig. 3.

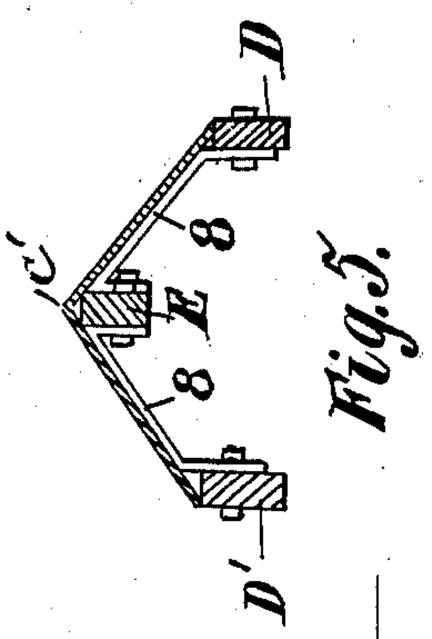

Fig. 5.

Witnesses.
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UNITED STATES PATENT OFFICE.

PETER DOOLING, OF DOUGLAS, CANADA, ASSIGNOR OF ONE-HALF TO JOHN McEACHEN, OF DOUGLAS, CANADA.

DITCHING-PLOW.

SPECIFICATION forming part of Letters Patent No. 716,992, dated December 30, 1902.

Application filed April 26, 1902. Serial No. 105,035. (No model.)

To all whom it may concern:

Be it known that I, PETER DOOLING, contractor, of the village of Douglas, in the county of Renfrew, Province of Ontario, Canada, have invented a new and useful Ditching-Plow, of which the following is a specification.

My invention relates to improvements in ditching-plows; and the object of my invention is to devise a ditching-plow by means of which a continuous ditch, trench, gutter, or drain may be cut at a single operation, a further object being to make such a machine adjustable for digging ditches of different depths and also to construct the plow in such a way that it may be quickly and easily moved from place to place; and it consists, essentially, of a curved plowshare for throwing up the earth from the ditch, said share being secured to suitable plow-beams and mounted on a suitable frame provided with wheels, means being provided for altering the position of the plowshare to bring it either into position for use or for moving from place to place, means being also provided for steering the plow and for varying the depth of the ditch which is being cut, further means being provided for throwing aside the earth removed from the ditch and suitable knives being provided for cutting the sides of the ditch, the various parts being constructed and arranged in detail, as hereinafter more particularly described.

Figure 1 is a perspective view of my ditching-plow in position for being moved from place to place. Fig. 2 is a plan view of my ditching-machine in position for work. Fig. 3 is a vertical longitudinal section through the plow on the line X X, Fig. 2, when in the position for work. Fig. 4 is a preferable form of knives for cutting the sides of the ditch. Fig. 5 is a section through the plow-beams and plowshare on the line Y Y, Fig. 3.

In the drawings like characters of reference indicate corresponding parts in each figure.

A represents the front wheels, and B are the rear wheels, of the plow. The front wheels A are journaled on a substantially crank-shaped axle comprising the vertical parts a a' and the horizontal part a^2.

b is the axle for the rear wheels, which is also in the form of a double crank comprising the end pieces b' b^2 and the cross-piece b^3, the wheels B being journaled on short outwardly-extending portions b^4 b^5.

C is a plowshare which is formed, preferably, of sheet metal and is secured at its sides to the side plow-beams D D'. A central plow-beam E is provided, and the plowshare C is secured to this central beam by suitable means, the means which I employ being hereinafter more particularly described. The plowshare curves first in a general rearwardly direction, then in a downwardly direction, and finally runs into a straight downwardly and forwardly slanting portion c, and a central ridge c' is formed thereon to throw aside the earth which is being loosened from the ditch being cut. The cutting edge at the lower end of the plowshare is preferably formed of a piece of specially-hardened steel c^2. This cutting edge may be curved or straight or of any other suitable form; but the cutting edge which I prefer to use is provided with flat side portions c^3 c^3 and a central depression c^4, the object of this being to cut a channel along the center of the bottom of the ditch, so as to leave a higher, and consequently drier, portion at each side thereof, and thus a person working in the ditch may stand on the higher portion without getting wet, and, further, if pipes are to be laid in the ditch they will immediately assume the straight central position.

Suitable knives F F' are provided for cutting the sides of the ditch, and these knives are suitably bolted or otherwise secured at their lower ends to the lower portion of the side plow-beams and at their upper ends to the upper and forward portion of the said side plow-beams. When the earth in which the ditching is being done is comparatively loose and free from roots or other obstructions, the form of knife used will have a straight cutting edge; but where it is necessary to break the earth to a certain extent the form of knife is as shown in Figs. 1 and 3, in which the edges are indented, and portions thereof are bent up to form the horizontal cutters f f'.

G G' are moldboards of any suitable form,

which are secured to the side plow-beams D D′ by the following means: Slotted hangers g g' are secured by bolts g^2 g^3 to the inner side of the plow-beams D D′. Bolts or thumb-screws g^4 pass through the slots g^5 into the blocks g^6, which are in turn suitably riveted or otherwise secured one to each of the moldboards G. Bolts g^7 pass through the lower portions of the moldboards and the side plow-beams, and thus the moldboards are securely fastened to the plow-beams, but are allowed a certain amount of swing in a vertical sense. The moldboards G G′ may be braced together by a rod g^8, secured by a nut at one end to the moldboard G and by a nut at the other end to the moldboard G′.

I will now proceed to describe the means provided for raising and lowering the plowshare to bring it into position for work, to adjust the depth of the ditch, or to raise it entirely above ground for moving from place to place.

The central plow-beam E is secured to the side plow-beams D D′ by means of suitable ribs e e', the said ribs being secured to the central plow-beam and to the side plow-beams by suitable bolts.

H is a connecting member having upwardly-bent ends h h', which are suitably bolted to the side plow-beams D D′. A screw-shaft I, provided with a hand-wheel i, is secured to the connecting member H, preferably by a ball-and-socket joint, which may be of any suitable form; but the form which I have adopted is as follows: In the central portion of the connecting member H a semicircular depression h^2 is formed. A cap J is provided having a corresponding semicircular depression in its under side and a hole from said depression through the upper portion of the said cap. The lower portion of the screw-shaft, on which is a ball, is inclosed in the said depression between the connecting member H and the cap J.

K is a threaded bearing for the screw-shaft I and is suitably bolted or otherwise secured to the horizontal portion a^2 of the double-crank-shaped axle A. This, however, is only one of the ways in which the threaded bearing for the screw-shaft may be formed, and I might employ any one of several other different ways, if found preferable. It will now be seen that by turning the screw-shaft I the plow-beams, plowshare, knives, and moldboards will be lowered into a position for work, as shown in Figs. 2 and 3, or may be raised therefrom when it is desired to move to a different place.

My device is provided with a central forward V-shaped colter L, the lower portion or angle of the V extending down to about half the depth of the ditch which is being dug, and the upper portion of the V is secured to the side plow-beams by any suitable means, such as clevises l l'. The frame of the rear portion of the machine consists of a double beam M, comprising the two halves M′ M². These beams, commencing at their rearward ends, consist of the forwardly-extending horizontal portions m m', the vertical portions m^2 m^3, the forwardly-extending portions m^4 m^5, the converging portions m^6 m^7, the downwardly-sloping portions m^8 m^9, the long horizontal portions m^{10} m^{11}, and the downwardly-curved portions m^{12} m^{13}, these downwardly-curved portions embracing between them the rear end of the central plow-beam E, and a bolt e^3 passes through the portions of said double beam and through the rear of the central plow-beam, pivotally securing them together. The halves of the double beam M are separated by blocks N, and cross-pieces O O′ O² extend between the horizontal portions m^4 m^5 and are bolted thereto. In order to secure the moldboards G G′ to the double beam M, angle-irons P P′ are secured to the moldboards, and to the angle-iron P a bar p is pivotally secured. The bar p overlaps the bar p' and both rest upon the double beam M. Suitable yokes or covers p^2 p^3 are screwed to the beams, and a bolt p^4 passes down between the yokes p^2 p^3 and between the two portions m^4 m^5 of the double beam, and passing through holes in the bars P P′ hold the said bars in any desired position to which they may be adjusted.

It may here be mentioned that the upright portions m^2 m^3 of the double beam M are pivotally secured to the portions b' b^2 of the crank-axle b by means of suitable pivotal bolts or pins R R′.

S is a lever which is rigidly and strongly secured to the horizontal portion b^3 of the rear axle. A segment s of any suitable form is secured to the rearwardly-extending bar s', which is supported by and bolted to the cross-pieces O O′ O². A spring-bolt s^2, provided with a connecting-rod and finger-grip of ordinary form, is slidably secured to the lever S and is designed to engage the teeth or detents of the segment s, and thus hold the rear axle in the position shown in Fig. 1, in which the rear portion of the machine is raised, or in the position shown in Figs. 2 and 3, in which the rear portions of the machine are lowered into position for work, or in any intermediate position.

T is a draw-bar of suitable form and is secured by suitable means to the upright portions d d' of the plow-beams D D′, and the means for drawing the plow is suitably attached to the said draw-bar.

U U′ are braces extending from the upright portions d d' of the plow-beams to the top of the forward axle and are suitably secured thereto. Screw-swivels u u' are provided on said braces for the purpose of lengthening or shortening them, according to the position of the plow.

Braces V V′ extend from the lower portions of the forward axle to the upright portions d d' of the plow-beams and are secured to said

upright portions and to said forward axle by suitable means. On these braces screw-swivels *v v'* are also provided, whereby the said brace may be lengthened or shortened.

W W' are braces secured at their forward ends to the upright portions *d d'* of the plow-beams and at their rearward ends are secured by bolts *w w'* to the curved portions of the plow-beams. Eyes w^2 w^3 are formed on the rear extremities of the braces W W', and braces 2 3 are secured at one end in the said eyes and at their opposite ends are secured in eyes formed, preferably, in the horizontal portions *m m'* of the double plow-beam M. These braces are also provided with screw-swivels 4 5. A grass-cutting colter 6 of suitable form is secured to the draw-braw T by means of a suitable bolt 7. Ribs 8 are used for securing the plowshare to the plow-beams where the plowshare has the central ridge *c'*. The flat portion of the plowshare *c* is secured to the side plow-beams by suitable angle-irons 9.

It will now be seen that I have accomplished the objects which I had in view in devising a ditching-plow, for the plow which I have devised will at a single operation cut a clean ditch as deep as is necessary, throwing aside all the earth removed therefrom, and when the work at any particular place is completed the plow may readily be raised above the level of the earth, and the machine may then be moved to any other place and recommence work with a minimum loss of time.

It will of course be understood that certain variations in the details of my device may be made without departing from the spirit of my invention. For example, the eyes shown for securing the ends of the braces U U' V V' to the forward axle may be dispensed with and other connections used. Similarly the means of connecting the knives F F' to the plow-beams may be changed, if desired; also, their exact shape may be varied. The lever and segment *s* for raising and lowering the rear portions of the machine might be dispensed with and other suitable means employed in their stead. I may further point out that although the braces 2 and 3 are secured at their rearward ends to the portions M M' of the double beam they might be secured, if desirable, to the cross-bar O in order to permit of the rear crank-shaped axle being turned completely around. It may further be mentioned that the position of the various parts of the machine relative to each other might be considerably changed. For example, the point of the plow as shown is considerably ahead of the center line of the front wheels; but in order that the depth of the ditch should be kept perfectly even I might arrange the machine in such a way that this point will come directly in the center line of the front wheels.

What I claim as my invention is—

1. In a ditching-plow the combination of a plowshare, a central plow-beam and side plow-beams to which said plowshare is secured, side knives secured to said side plow-beams, and a suitable portable frame to which said side plow-beams are secured.

2. In a ditching-plow the combination of the plowshare, a central plow-beam and side plow-beams to which said plowshare is suitably secured, side knives secured to said plow-beams, a portable frame to which said plow-beams are secured, and means for raising and lowering said plowshare and plow-beams relatively to said frame as and for the purpose specified.

3. In a ditching-plow the combination of a plowshare, a central plow-beam and side plow-beams to which said plowshare is suitably secured, side knives secured to said side plow-beams and a portable frame to which said plow-beams are secured and suitable auxiliary colters for breaking the earth ahead of said plowshare as and for the purpose specified.

4. In a ditching-plow the combination of a plowshare, a central plow-beam and side plow-beams to which said plowshare is suitably secured, side knives secured to said side plow-beams and a portable frame to which said plow-beams are secured and means for throwing aside the earth removed from the ditch as and for the purpose specified.

5. In a ditching-plow the combination of a plowshare, a central plow-beam and side plow-beams to which said plowshare is suitably secured, side knives secured to said side plow-beams and a portable frame mounted on suitable front and rear axles and to which said frame is suitably secured, and means for bracing together the various parts of the plow as and for the purpose specified.

6. In a ditching-plow the combination with the central plow-beam and side plow-beams the plowshare secured to said plow-beams, the side knives and moldboards secured to said side plow-beams, a portable frame, and means for raising and lowering said plow-beams, share, moldboards and knives and means for bracing together the various parts of the plow as and for the reasons specified.

7. In a ditching-plow of the class described the combination with the plowshare and plow-beams, of a suitable portable frame including forward wheels and the forward double-crank-shaped axle, a vertical screw-shaft and a screw-bearing for said shaft carried by said axle and means for connecting said screw-shaft to said plow-beams as and for the purpose specified.

8. In a ditching-plow of the class described the combination with the plowshare and plow-beams, of a suitable portable frame including forward wheels and the forward double-crank-shaped axle, a vertical screw-shaft and a screw-bearing for said shaft carried by said axle, a connecting member secured to the said plow-beams, and means for connecting

the lower end of said screw-shaft to said connecting member as and for the purpose specified.

9. In a ditching-plow of the class described the combination with the plowshare the plow-beams, the suitable portable frame including forward wheels and a forward double-crank-shaped axle of a vertical screw-shaft and a screw-bearing for said shaft secured to said axle, and a connecting member secured to the side plow-beams and a ball-and-socket joint between the lower end of said screw-shaft and said connecting member as and for the purpose specified.

10. A combination with the central and side plow-beams the plowshare and the forward double-crank-shaped axle said side plow-beams having upwardly-extending forward portions braces secured at their forward ends to said upwardly-extending portions and at their rearward ends to the upper portion of said double-crank-shaped axle and means for adjusting the length of said braces, as and for the purpose specified.

11. The combination with the central and side plow-beams and the plowshare secured thereto and the forward double-crank-shaped axle and the means for raising and lowering said plow-beams and plowshare, said side plow-beams having an upwardly-extending portion at their forward ends, of braces suitably secured to said upwardly-extending portions and to the upper portion of said double-crank-shaped axle, braces suitably secured to said upwardly-extending portions of the plow-beams and to the lower portions of said double-crank-shaped axle and means for adjusting the length of said braces as and for the purpose specified.

12. The combination with the central and side plow-beams the plowshare and the moldboards secured thereto, the front and back wheels and front and rear double-crank-shaped axles, of a double beam provided with upright rear portions pivotally attached to the end portions b' b^2 of the rear double-crank-shaped axle said double beam extending forwardly and being pivotally secured at its forward end to said central plow-beam, means for adjustably connecting said double beam to said moldboards and means for raising or lowering the rear portion of said double beam as and for the purpose specified.

13. The combination with the moldboards and the forwardly-extending double beam of adjustable moldboard-supports comprising angle-irons secured to said moldboards horizontal bars pivotally secured to said angle-irons and means for adjustably securing said bars to said double beam as and for the purpose specified.

14. The combination with the side plow-beams the moldboards and the double beam of slotted hangers pivotally secured to said side plow-beam blocks rigidly secured to said moldboards and suitable bolts or thumb-screws passing through the slots in said hangers and into said blocks, angle-irons bolted to said moldboards horizontal cross-bars pivotally secured to said angle-irons one of said cross-bars overlapping the other and both resting on said double beam, yokes bolted to said double beam and slidably securing said bars thereto and a central pin or bolt passing through holes in said cross-bars and between the havles of said double beam as and for the purpose specified.

15. The combination with the rear crank-shaped axle pivotally secured to the upright portions of the double beam of a central bar, cross-bars on which said central bar is supported said cross-bars being secured to said double beam a segment secured to said central bar and a spring-bolt secured to said double-crank-shaped axle and designed to engage said segment as and for the purpose specified.

16. The combination with the plow-beams, the plowshare and the front and rear crank-shaped axles and the double plow-beam of forward braces secured at their forward ends to upward-extending forward portions of said plow-beams and at their rearward ends to the curved portions of said plow-beams rearward braces secured at their forward ends to eyes at the rear of said forward braces and at their rear ends to the rear portion of said double beam as and for the purpose specified.

17. The combination with the plowshare the side plow-beams having upwardly-extending portions at their forward ends the forward and rearward double-crank-shaped axles and the double plow-beam, of side braces between the forward and the rearward part of said plow-beams and side braces between the rearward portions of said plow-beams and the rearward portions of said double beam and means for adjusting the length of said braces as and for the purpose specified.

18. The combination of a central plow-beam side plow-beams and plowshare secured to said plow-beams and a connecting member joining said side plow-beams, ribs firmly secured to said side plow-beams and said central plow-beam and to said plowshare as and for the purpose specified.

19. A plowshare for a ditching-plow of the class described, said plowshare being formed in a continuous curve, first in a general rearwardly direction and then the direction of the curve being downwardly, the plowshare then sloping in a downwardly and forwardly direction, said sloping portion being flat, said curved portion having a central ridge, and overhanging said flat portion as shown and for the purpose specified.

20. A side knife for a ditching-plow of the class described comprising a piece of sheet metal with a sharpened forward edge, and

having integral inwardly-extending horizontal blades formed thereon, at intervals substantially as shown and for the purpose specified.

21. The combination with the plowshare the said plow-beams the side knives and the V-shaped colter of a grass-cutting colter and means for securing said grass-cutting colter forward of said V-shaped colter and in a central position with reference to the plow as and for the purpose specified.

Signed at the city of Ottawa this 23d day of April, 1902.

PETER DOOLING.

Witnesses:
EDWARD P. FETHERSTONHAUGH,
FREDERICH W. SMITH.