(No Model.) 3 Sheets—Sheet 1.

F. C. WOODARD.

COMBINED TILE DITCHER AND GRADER.

No. 347,282. Patented Aug. 10, 1886.

Fig. 1.

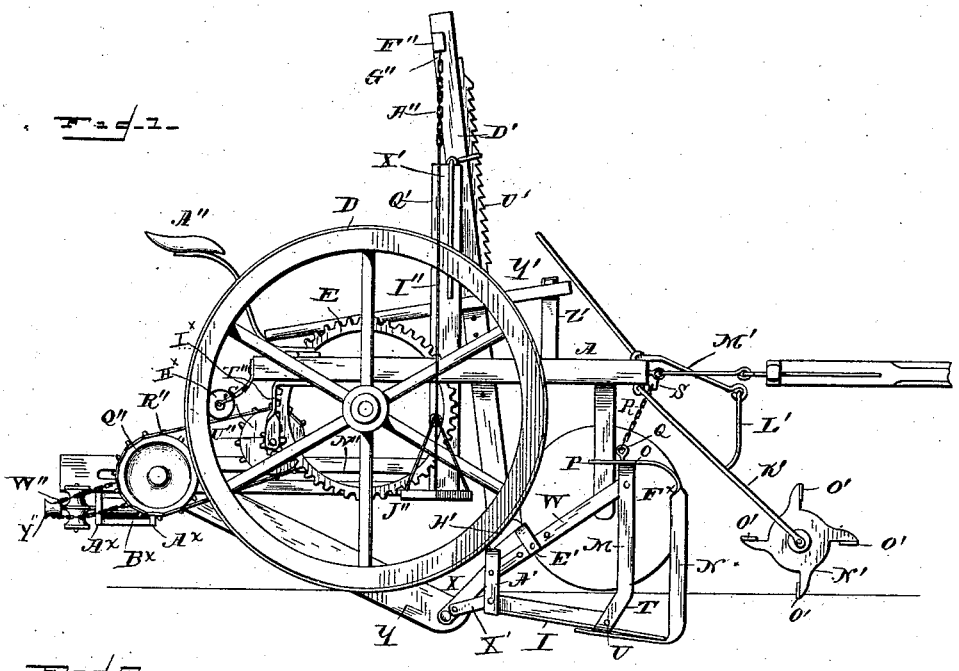
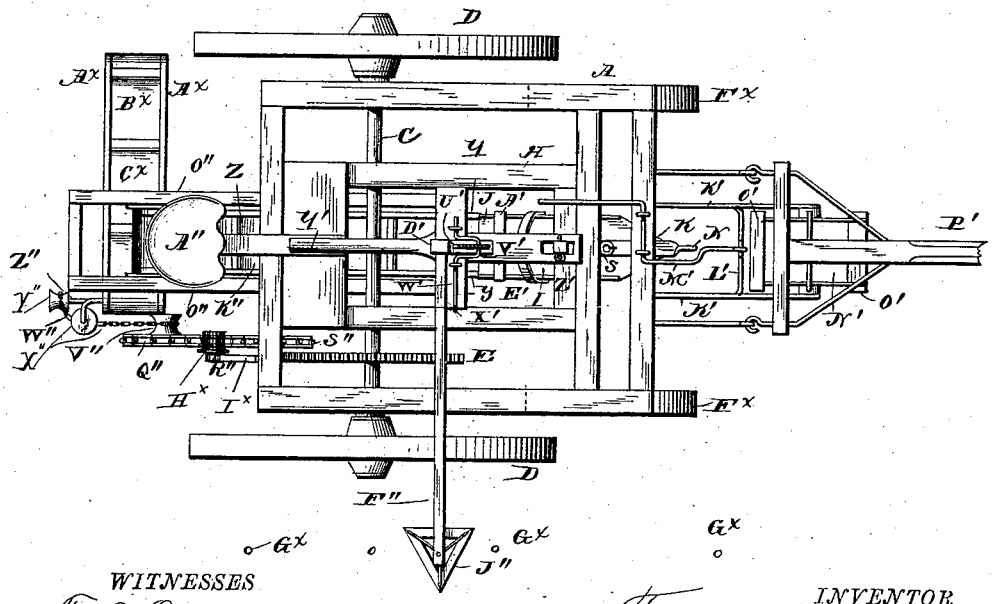


Fig. 2.



WITNESSES

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(No Model.)

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Fig. 3.

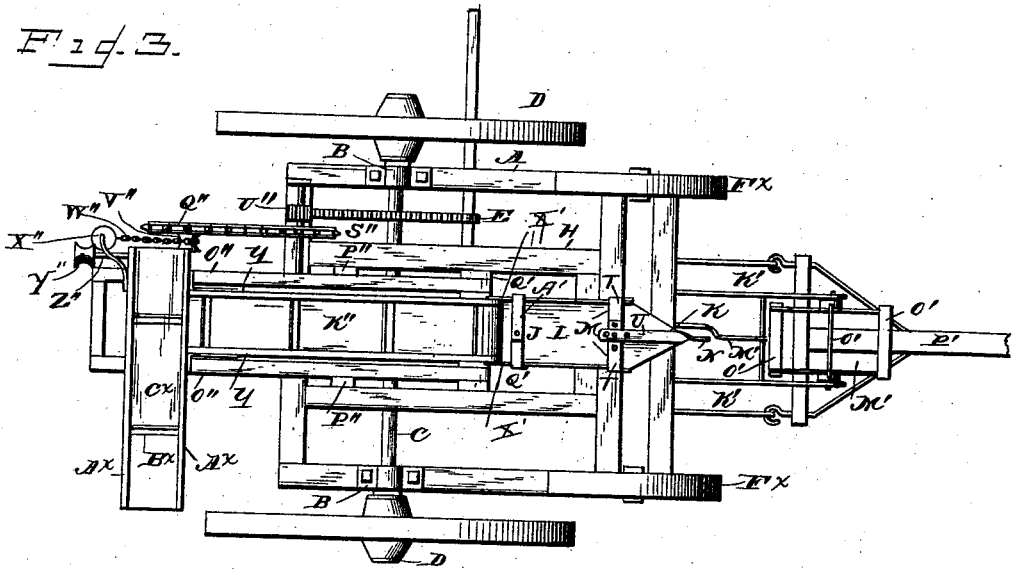


Fig. 7.

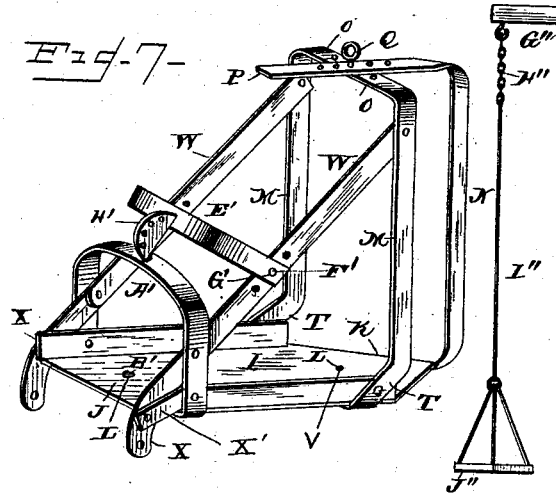
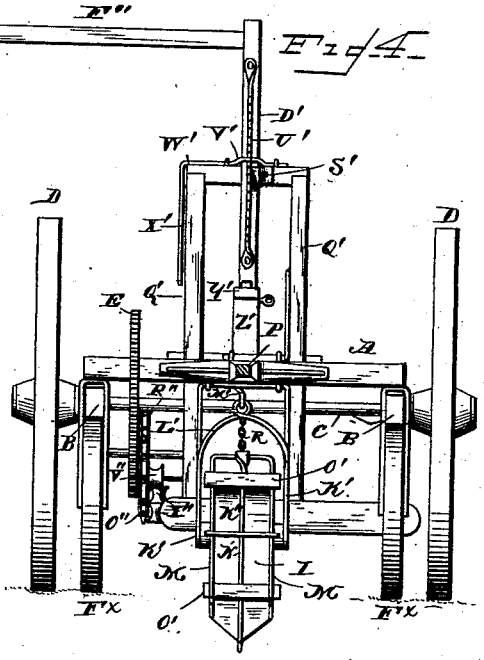


Fig. 4.



WITNESSES

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Fig. 5.

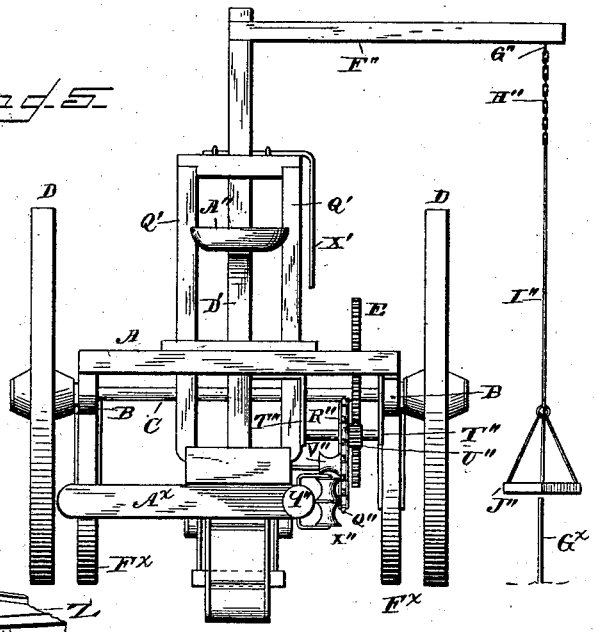


Fig. 8.

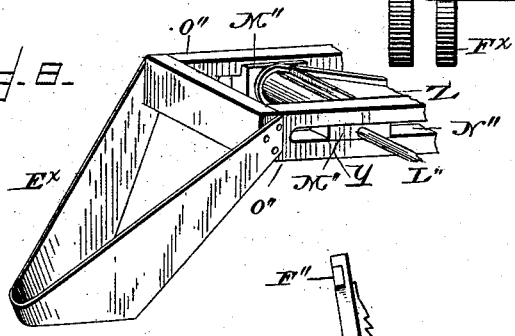
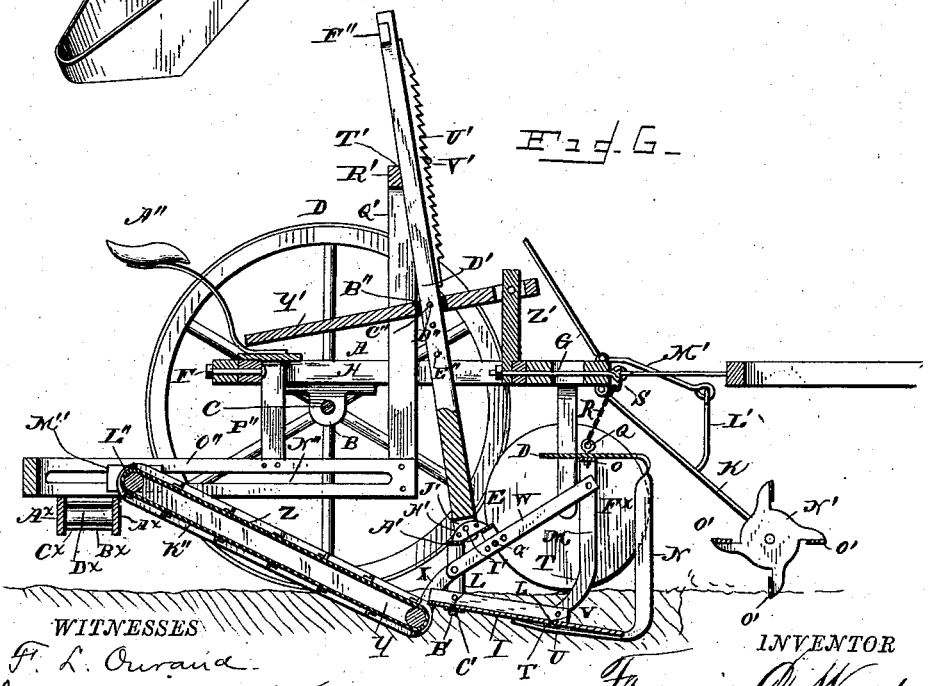


Fig. 6.



WITNESSES

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INVENTOR

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UNITED STATES PATENT OFFICE.

FRANCIS C. WOODARD, OF GRIDLEY, ILLINOIS.

COMBINED TILE-DITCHER AND GRADER.

SPECIFICATION forming part of Letters Patent No. 347,282, dated August 10, 1886.

Application filed November 6, 1885. Serial No. 182,040. (No model.)

To all whom it may concern:

Be it known that I, FRANCIS C. WOODARD, a citizen of the United States, and a resident of Gridley, in the county of McLean and State of Illinois, have invented certain new and useful Improvements in Combined Tile-Ditchers and Graders; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification, and in which—

Figure 1 is a side view of my improved ditching and grading machine. Fig. 2 is a top view of the same. Fig. 3 is a bottom view. Fig. 4 is a front view. Fig. 5 is a rear view. Fig. 6 is a longitudinal vertical section of the machine. Fig. 7 is a perspective detail view of the plow; and Fig. 8 is a similar view of the rear end of the elevator, showing the filling device attached.

Similar letters of reference indicate corresponding parts in all the figures.

My invention has relation to that class of ditching-machines which are provided with a plow, which cuts the bottom and sides of the ditch and forces the dirt up upon an elevator, which carries the dirt to the surface, depositing it at the side of the ditch; and it consists in the improved construction and combination of parts of such a machine which will cut a ditch of any desired width and having its bottom perfectly graded, and which will cut to any desired depth without the necessity of plowing up the sod before the machine, and which may be used for grading roads, cutting a shallow ditch at the side of the road, and filling the dirt upon the middle of the road, as hereinafter more fully described and claimed.

In the accompanying drawings, the letter A indicates a rectangular frame having transverse bearings B B in its side pieces, in which bearings the axle C is journaled, the said axle having the drive-wheels D D and a cog-wheel, E, secured upon it. Longitudinal bolts G and F pass through the middles of the front and rear end piece of the frame, and a rectangular plow-frame, H, rocks with the middles of its end pieces upon the inner ends of the said bolts, so that the plow-supporting frame-pieces which project from this frame may always occupy a vertical position. The plow I has a rectangular inner portion, J, and a triangular point, K, and is formed with two perforations, L L, one near its rear end and one at the base of the triangular point, and the forward end of the plow is supported by means of two side pieces, M M, and a front piece, N, all three pieces having their forward edges sharpened to cut through the soil. The upper ends, O O, of the side pieces and the upper end, P, of the front piece are perforated and bent toward each other, the ends of the side pieces being bent inward and the end of the front piece being bent rearward, and the three bent ends are secured together upon a bolt, Q, having its upper end formed into an eye, into which a chain, R, is secured, which is adjustably secured to a hook, S, upon the front piece of the main frame. The lower portions of the side pieces are curved slightly rearward, whereupon the ends are perforated and bent inward, as shown at T, and the lower end of the front piece is bent rearward and perforated, as shown at U, and all these three bent and perforated lower ends of the plow-supporting frame are secured to a nutted bolt, V, passing through the forward perforation in the plow. Two rearwardly-inclined braces, W W, are secured at their forward ends near the upper ends of the side pieces and at their rear ends to two flat bars, X X, the rearmost ends of which are secured to the foremost ends of the side pieces, *y y*, of the elevator Z. Two short bars, X′ X′, connect the rear ends of the pieces X X with the sides of the plow. An arched piece, A′, is secured at its ends to the bolt B′, passing through the rear perforation in the plow, the said ends being bent inward and perforated, as shown at C′; and the middle of this arched piece is secured to the lower end of a vertical adjusting-bar, D′, through a means which will be described later, and another arched piece, E′, is secured at its ends to the inclined braces W of the plow-supporting frame, having bolts F′ passing into two of a series of perforations, G′, in the said braces. The middle of this arched piece and the middle of the arched piece A′ are connected by means of a perforated segmental bar, H′, which is secured adjustably upon a bolt, I′, passing through the sides of

a slot, J′, in the lower end of a vertical adjusting-bar, D′. Two arms, K′ K′, are hinged at their upper ends to the front end piece of the main frame, and are connected by means of an arched piece, L′, to which is pivoted the lower end of a lever, M′, fulcrumed upon the end piece of the main frame, the said lever serving to raise or lower the arms, and a reel, N′, having transverse peripheral cutter-blades O′, is journaled in the lower ends of the pivoted arms, serving to cut the sod transversely in front of the plow. The tongue P′ is hinged or otherwise secured to the front end piece of the main frame, the draft being transferred from the said frame to the plow by means of the chain attached to the upper end of the plow-supporting frame. Two uprights, Q′ Q′, are secured to the side pieces of the pivoted plow-frame H, and the upper ends of these uprights are connected by means of a cross-piece, R′, having a notch or recess, T′, in which the vertical adjusting-bar D′ slides, the said bar being confined within the said notch by means of a clip or lip, S′; and the front side of the vertical adjusting-bar is provided with a serrated or notched strip, U′, which may be engaged by a bail, V′, formed by a rock-shaft, W′, rocking upon the cross-piece and provided at one end with a hand-lever, X′, by means of which the bail may be thrown in or out of engagement with the notches in the strip. A lever, *y*′, is fulcrumed at its forward end upon an upright, Z′, upon the front end piece of the rocking plow-frame, and has its rear end projecting near the seat A″ of the driver, which seat is secured upon the rear end piece of the rocking plow-frame. The middle of this lever is formed with a slot, B″, through which the vertical adjusting-bar D′ passes, and the sides of this slot are formed with perforations C″, through which passes a bolt, D″, which passes through one of a series of perforations, E″, in the vertical adjusting-bar, so that the bar may be adjusted in the slot of the lever to any desired depth and be raised or depressed by the lever. An arm, F″, projects at a right angle to one side from the upper end of the adjustable bar D′, and is provided at its outer end with a hook, G″, from which a chain, H″, is suspended, the said chain having a bar, I″, secured to its lower end, from the lower end of which bar a triangular frame, J″, is suspended. An endless apron, K″, passes over rollers at the ends of the side pieces of the elevator, and the ends of the shaft L″ at the rear end of the elevator revolve in blocks M″, which slide in horizontal slots N″ in two rearwardly-projecting horizontal side pieces, O″, which are secured to the lower ends of the uprights Q′ of the plow-frame, and to downwardly-projecting posts P″ from the rear end of the plow-frame. One end of the rear elevator-shaft L″ is provided with a sprocket-wheel, Q″, over which passes a sprocket-chain, R″, passing over a sprocket-wheel, S″, upon a short shaft journaled in hangers T″ from the rear end piece of the main frame, which shaft is provided with a pinion, U″, which meshes with the cog-wheel E upon the drive-shaft. Inside the sprocket-wheel, upon the rear elevator-shaft, is secured a smaller chain-wheel, V″, over which passes a chain, W″, which passes over two guide-pulleys, X″, and over a wheel, Y″, upon the end of a shaft, Z″, placed at a right angle to the rear elevator-shaft. This shaft Z″ is journaled in the inner ends of the side pieces, A×, of an elevator or delivery frame, B×, which is supported from the rear ends of the elevator side pieces at a right angle to the same, and an endless apron, C×, passes over a roller upon shaft Z″, and over a roller, D×, in the outer end of the side pieces. A V-shaped metallic strip, E×, may be secured to the rear ends of the elevator side pieces when it is desired to fill the ditch immediately after opening it and placing the tile in the same, the said strip scraping the raised dirt back into the ditch. The front end of the main frame is supported upon caster-wheels F×, swiveled at the forward corners of the said frame, so as to turn in all directions, enabling the machine to be turned at a very short space.

When the machine is to be used for digging a ditch, the plow-supporting frame is adjusted to fit a plow of the desired width, the perforated bent ends of the several pieces of the said frame being adjusted upon the bolts passing through the perforations in the plow and upon the eyed bolt having the draft-chain for the plow, and the pitch of the plow is set by means of the forward arched piece, E′, of the plow-supporting frame, being adjusted with its forward ends in the perforations in the inclined braces and with its segmental bar in the slot in the lower end of the adjusting-bar. The vertical adjusting-bar D is secured by means of the bail V′ and its notched strip U′ to the desired depth, the lever *y*′ of the said adjusting-bar serving to raise or depress the bar, as occasion may demand, and the triangular frame J″, at the end of the laterally-projecting arm T″, is adjusted to be suspended so as to strike the tops of a row of rods, G×, planted at the sides of the line of ditch, the tops of the said rods being in a line parallel with the level desired for the ditch, so that if the triangular frame passes exactly over the tops of the rods the plow will be at the desired level in the ditch. The pivoted plow-frame H will allow the plow-supporting frame to swing transversely, so as always to cause it to make a ditch having vertical sides, and the elevator will carry the dirt up from the bottom of the ditch, where it is cut loose by the plow, and have it transferred to the side of the ditch by the conveyer. The rear end of the elevator with its sliding blocks will be drawn closer forward as the plow is adjusted deeper, and for the purpose of taking up the slack thus caused in the sprocket-chain a pulley or idler, H×, is supported by a spring, I×, which will cause the said idler to take up all the slack in the chain. The front and side cutters of the

plow-supporting frame will cut the soil vertically in the ditch, while the plow cuts the bottom of the ditch, and the bottom of the ditch may be made concave so as to fit the tile placed in the same by increasing the pitch of the plow, so that its point will cut out the middle of the bottom, and the lower curved ends of the side cutters will slip over stones in the ditch, so as to prevent the plow from being caught and stopped under a stone too large to be broken up by the plow. The revolving sod-cutter at the front of the machine will cut the sod transversely, whereupon the vertical cutters will cut it up lengthwise, so that the sod will be cut into small blocks, which may be easily carried up by the elevator and conveyer, thus doing away with the necessity of plowing up the sod before putting the ditching-machine into operation.

The machine may be used as a road-grading machine by adjusting the plow to cut a shallow ditch at the side of the road, and letting the elevator and conveyer carry the dirt from this ditch into the middle of the road, where it may be spread and packed to form a road, a wide plow being preferable for this purpose. Plows of any suitable width may be used, the plow-supporting frame being adjustable to receive plows of different widths, so that a ditch of any desired width and depth may be cut.

The plow and the sod-cutter may be raised when the machine is transported from one place to another, and the machine may be turned on a very small space, the caster-wheels turning in all directions, the said caster-wheels also serving to allow the machine to be easily guided and turned when at work.

Having thus described my invention, I claim and desire to secure by Letters Patent of the United States—

1. In a ditching-machine, the combination of a wheeled main frame, a frame pivoted within the main frame and having two uprights at its sides connected by a cross-piece formed with a notch in its forward side, a bar sliding in the said notch and having a notched strip upon its forward side, a ditching-plow secured to the lower end of the bar, a catch upon the cross-piece engaging the notches, and a lever pivoted at its forward end to the front end piece of the pivoted frame and having the sliding bar adjustably secured in a slot, as and for the purpose shown and set forth.

2. In a ditching-machine, the combination of a wheeled frame, a frame pivoted within the main frame and having two uprights at its sides connected by a cross-piece formed with a notch in its forward side and with a lip at the said notch, a ditching-plow, a bar secured to the plow at its lower end and having a notched strip upon its forward side and a series of transverse perforations, a rock-shaft journaled upon the cross-piece and having a bail engaging the notched strip and a lever at one end, and a lever pivoted at its forward end to the forward end piece of the pivoted frame and having a slot near its middle for the bar, provided with transverse perforations in its sides, and a bolt passing through the said perforations and through the sliding bar, as and for the purpose shown and set forth.

3. In a ditching machine, the combination of a wheeled main frame, a frame pivoted to rock transversely within the said frame, a bar having a ditching-plow secured at its lower end and sliding adjustably in the said frame, an arm projecting laterally from the upper end of the sliding bar, and a triangular frame suspended by a rod and chain from the outer end of the arm, as and for the purpose shown and set forth.

4. In a ditching-plow, the combination of a shaft revolved by the drive-wheels, longitudinally-slotted side pieces secured horizontally under the main frame, a vertically-adjustable ditching-plow having an elevator secured to its rear end and having the bearings of the rear shaft of the said elevator sliding in the slots in the side pieces, a sprocket-wheel upon the rear elevator-shaft, a sprocket-wheel upon the shaft revolved by the drive-wheels, a chain passing over the said wheels, and a pulley bearing against the said chain and secured at the end of a spring, forcing the pulley against the chain, as and for the purpose shown and set forth.

5. In a ditching-machine, the combination of a plow-blade consisting of a rectangular rear portion and a triangular point, and having a perforation near its rear end and a perforation at the base of the triangular point, an arched piece secured at its ends by means of a bolt passing through the perforation near the rear end, two side pieces having sharpened front edges and curved at their lower portions, and having their upper and lower ends bent inward and respectively secured to an eyed bolt and to a bolt passing through the forward perforation in the plow-blade, and a forward cutter having its forward edge sharpened and having its upper and lower ends bent rearward and secured upon the two bolts together with the side pieces, the bent ends of the said pieces or cutters having each a series of perforations, as and for the purpose shown and set forth.

6. In a ditching-machine, the combination of a plow-supporting frame having rearwardly-inclined braces formed with a series of perforations, a plow-supporting vertical bar having a slot at its lower end provided with a transverse bolt, a rear arched piece secured at its ends to the rear ends of the inclined braces and at its middle to the lower end of the bar, and an arched piece having perforated forward ends provided with bolts fitting into the perforations in the braces, and having a perforated segmental bar at its middle fitting upon the bolt in the slot at the end of the bar, as and for the purpose shown and set forth.

7. In a ditching-machine, the combination of an elevator supported from the frame, a plow-blade consisting of a rectangular rear

portion and a triangular point and having two perforations near its ends, sharpened side cutters having inwardly-bent perforated ends secured at the upper ends upon a bolt and at the lower ends upon a bolt passing through the forward perforation, a forward cutter having rearwardly-bent perforated ends secured upon the bolts securing the ends of the side cutters, side bars parallel with the side edges of the plow-blade, and two inclined braces secured to the upper ends of the side cutters and to the forward end of the elevator, and having the side bars secured to their rear ends, as and for the purpose shown and set forth.

In testimony that I claim the foregoing as my own I have hereunto affixed my signature in presence of two witnesses.

FRANCIS C. WOODARD.

Witnesses:

ROBT. J. RENN,

JACOB SALATHE.