(No Model.)

4 Sheets—Sheet 1.

C. C. EDWARDS.

DITCHING MACHINE.

No. 394,682. Patented Dec. 18, 1888.

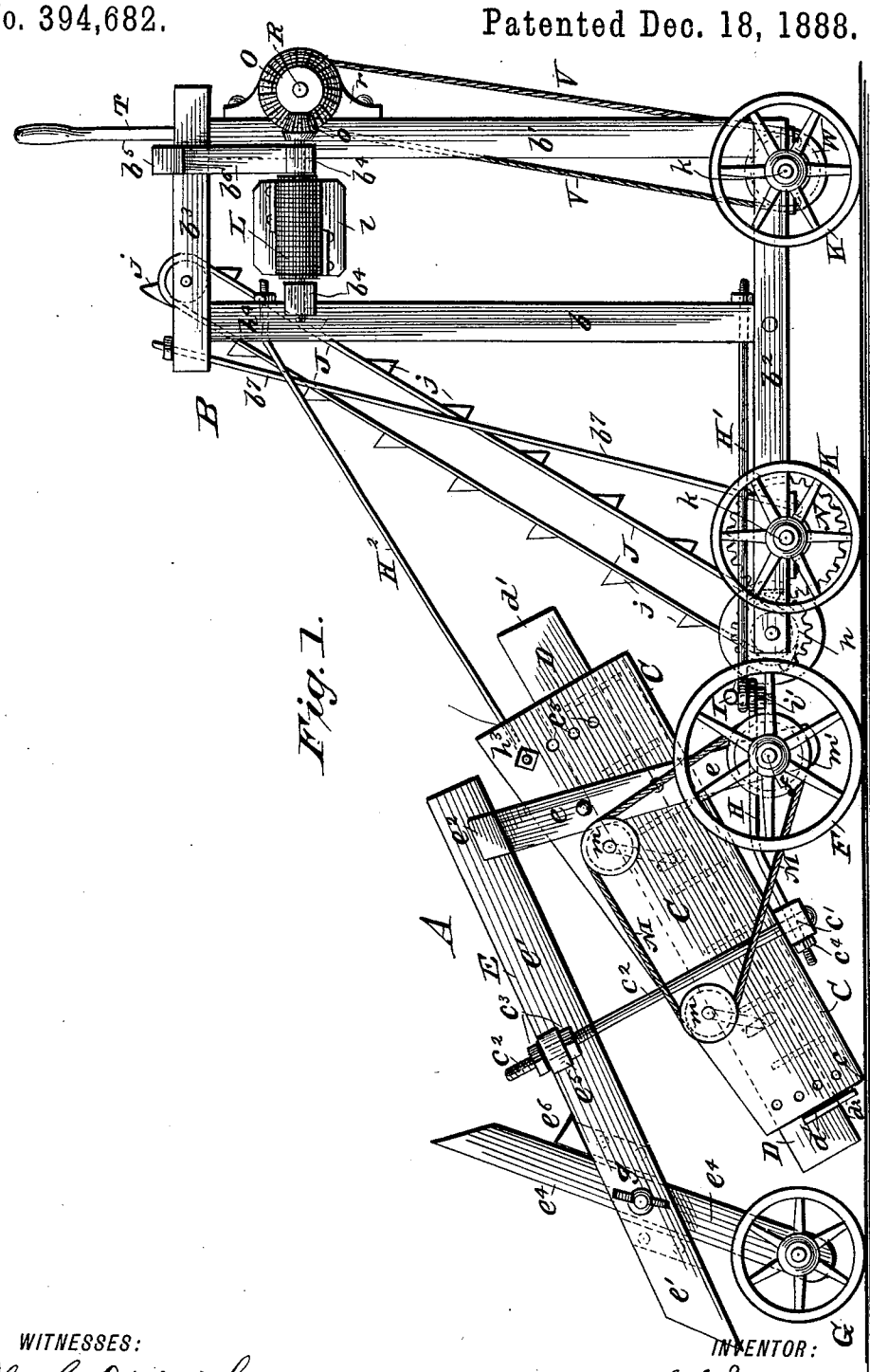


Fig. 1.

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(No Model.) 4 Sheets—Sheet 2.

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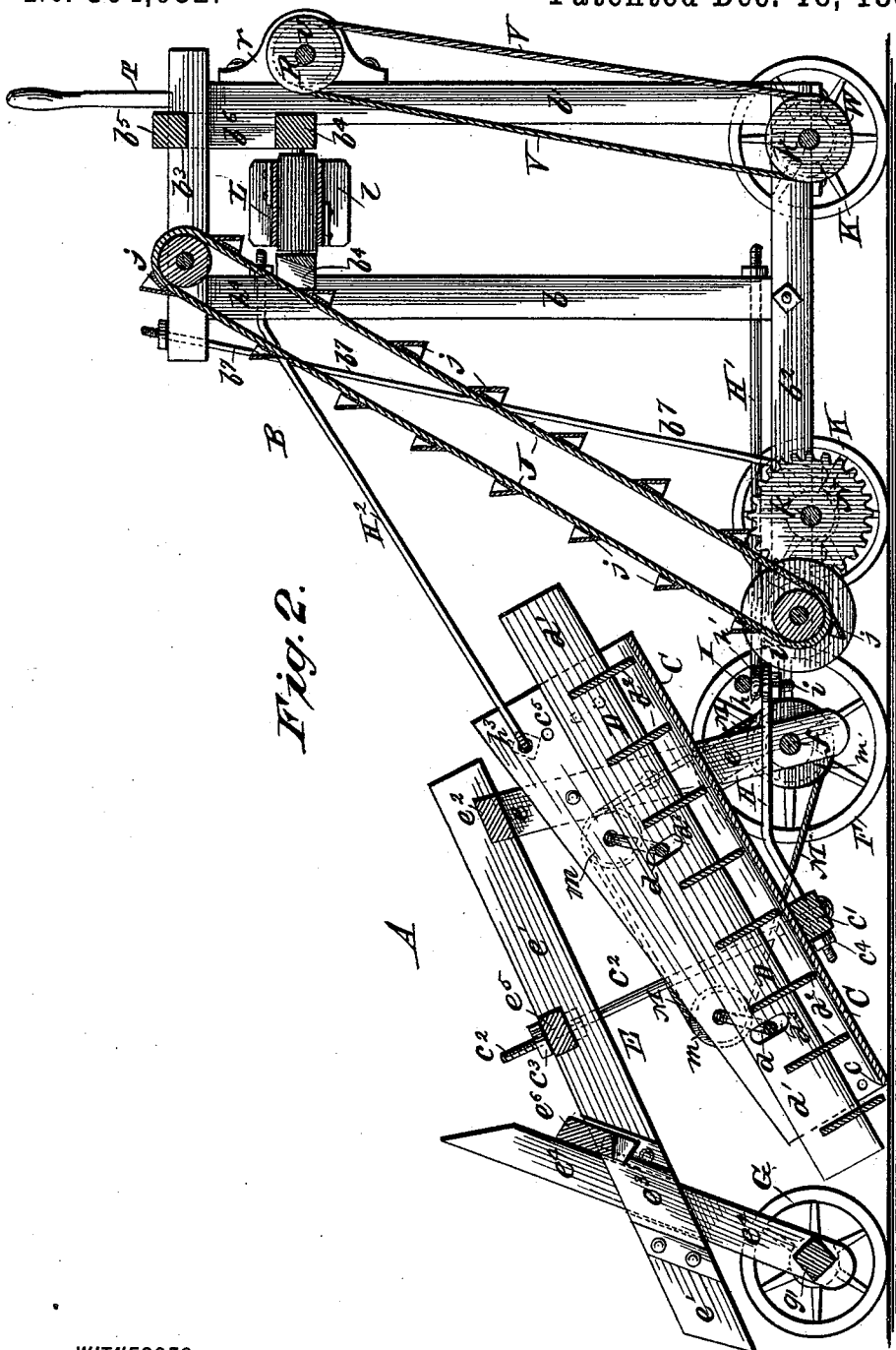


Fig. 2.

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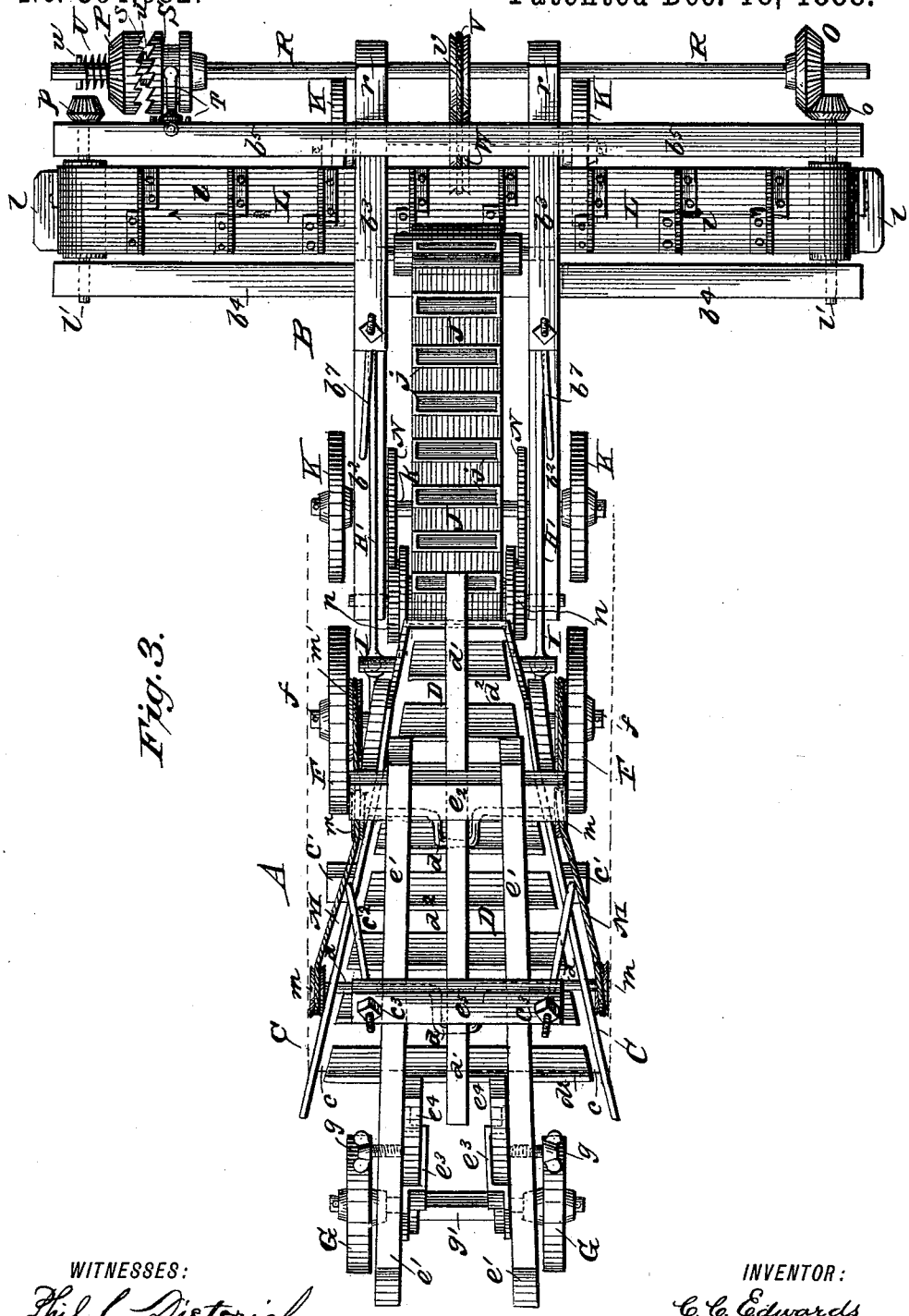


Fig. 3.

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DITCHING MACHINE.

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Fig. 4.

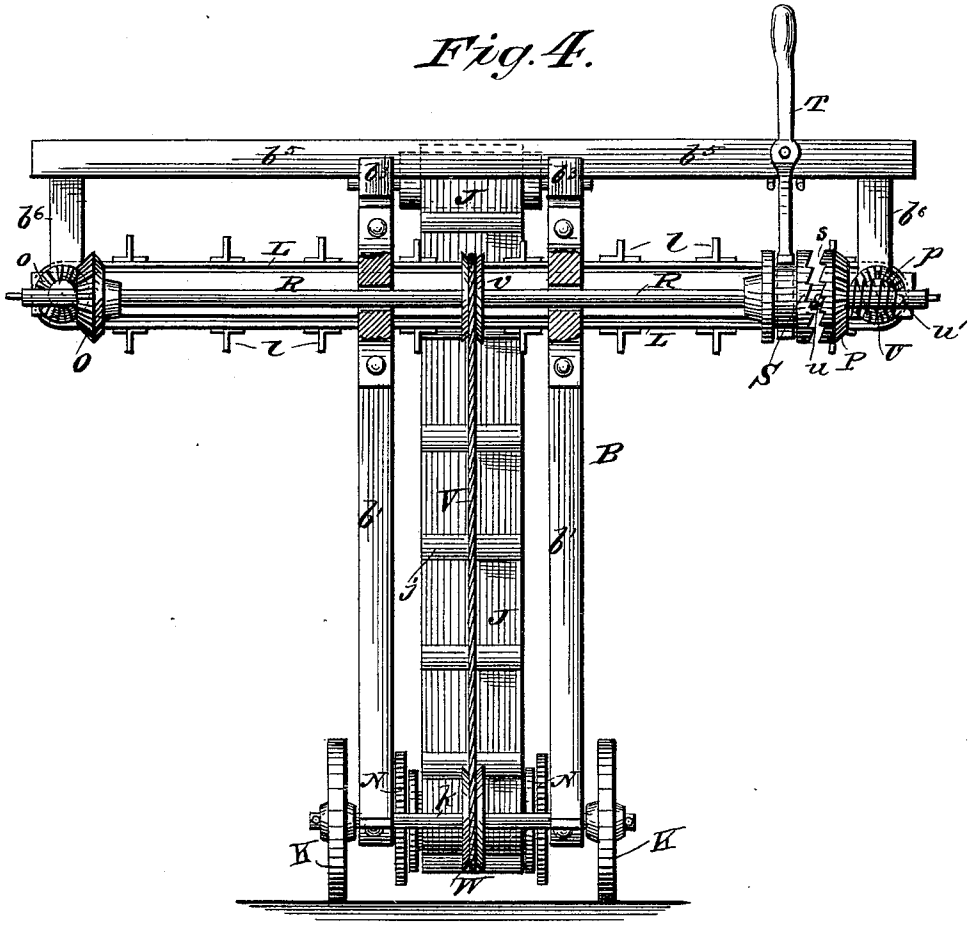
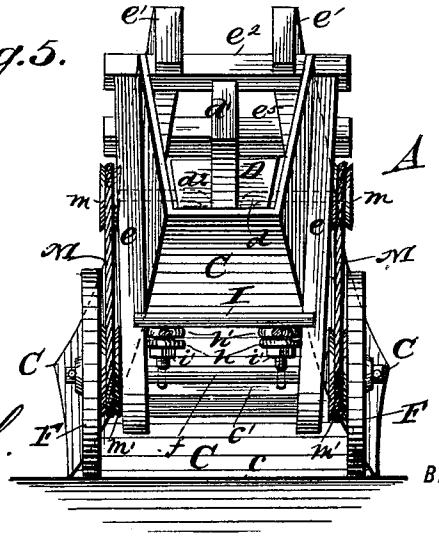


Fig. 5.



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UNITED STATES PATENT OFFICE.

CHARLES CLARK EDWARDS, OF AMORILLO, TEXAS.

DITCHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 394,682, dated December 18, 1888.

Application filed July 11, 1888. Serial No. 279,662. (No model.)

To all whom it may concern:

Be it known that I, CHARLES CLARK EDWARDS, of Amorillo, in the county of Potter and State of Texas, have invented a new and Improved Ditching-Machine, of which the following is a full, clear, and exact description.

My invention relates to a machine for digging ditches or trenches of any desired depth or width, for purposes of irrigation or drainage or pipe-laying, or for building earth fences on lands, for throwing up fortifications, or for making other excavations of like general nature; and the invention has for its object to provide a simple, inexpensive, and efficient apparatus of this character, by using which this class of work may be accomplished with economy of time and labor.

The invention consists in certain novel features of construction and combinations of parts of the ditching-machine, all as hereinafter described and claimed.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a side elevation of my improved ditching-machine. Fig. 2 is a central vertical longitudinal section thereof. Fig. 3 is a plan view thereof with a few parts removed. Fig. 4 is a rear view of the rear earth elevator and carrier of the machine, partly broken away and in section; and Fig. 5 is a rear view of the forward digger and conveyer of the apparatus.

This improved ditching-machine comprises a front earth digging and conveying apparatus, A, and a rear earth elevator and carrier apparatus, B, which receives the earth from the digging apparatus and discharges it at either side of the ditch being cut and as the operator or attendant may desire.

I will first describe the general structure of the digger A and carrier B and their immediate connections, which draw the carrier from the digger, and then explain more fully the details of construction of the machine.

The digger A is made with an earth-scoop, C, in which is hung by two crank-shafts, *d d*, an earth-conveyer, D, which is reciprocated by the cranks of the shafts, so as to carry the earth dug by the nose *c* of the scoop up its inclined bottom and discharge the earth from the upper rear end of the scoop onto the front elevator of the carrier B, as hereinafter more fully explained.

The scoop C is held or fastened by bolts or otherwise at the rear part of its opposite sides to rear uprights, *e e*, of the digger-frame E, and these uprights are supported from the axle *f* of the two rear wheels, F F, of the digger. The two upper bars, *e' e'*, of the frame E are secured to a cross-bar, e^2, which connects the tops of the uprights *e e* and extend downward and forward, and are provided with keepers e^3 e^3, in which are fitted to slide a pair of front inclined frame-bars, e^4 e^4, to the lower ends of which the forward wheels, G G, are journaled by their axle *g'*. Cross-bars e^5 e^6 connect the upper bars, *e' e'*, of the frame. Set-screws *g g*, threaded into the side bars, *e' e'*, of the frame E provide for locking the front wheel-frame at the keepers at any required height relatively to the scoop, thus allowing the forward wheels, G, to be set higher or lower, to allow the scoop to cut deeper or shallower in the earth as the available power for drawing the machine forward may require. The draft will be applied by hooking or otherwise engaging draft chains or bars into holes made in the forward parts of the sides of the scoop.

The body of the scoop rests upon a cross-bar, *c'*, which is hung by bolts c^2 from the upper cross-bar, e^5, of the digger-frame, and the nuts c^3 of these bolts may be turned on them to regulate the height of the nose of the scoop to a limited extent, this adjustment, however, being made, mainly, by the vertical adjustment of the forward wheels or truck of the digger, as above explained. Draft-bars H, connected by nuts c^4 with the lower cross-bar, *c'*, of the scoop, extend rearward, and at their back ends are provided with eyes *h*, into which lap eyes *h'* of draft-bars H', which are connected by nuts with uprights *b* of the frame of the carrier apparatus B. There are two draft-bars, H H', or one pair at each side of the digger and carrier frame. The draft-bar eyes *h h'* receive two bolt ends, *i i*, which are formed upon a metal cross-bar, I, and nuts *i'*

on the bolt ends below the eyes hold the bars H H′ to each other in pairs, which the cross-bar I space apart, so that they cannot interfere with the operation of the earth-elevator J of the carrier. Upper draft-bars, H^2 H^2, have bent threaded ends, which are passed through opposite holes c^5, made in the sides of the scoop near the rear end, and receive nuts h^3 thereat, and the rear ends of the bars H^2 extend to the upper parts of the uprights b b of the carrier-frame and receive nuts h^4 at the backs of the uprights. With this construction it is obvious that the entire carrier B will be drawn forward on its truck-wheels by the draft of the bars H H′ H^2 as the digger A is drawn forward, and by simply removing the nuts i' h^3 the digger and carrier may be separated to allow connection of another digger which will cut a deeper ditch than the first one used, should this be required. This separable connection of the digger and carrier also promotes convenience in housing the apparatus when out of use. The draft-bars H′ H^2 may be connected to the carrier-frame by hooking around the uprights b b thereof, if preferred.

The frame of the carrier B consists of the above-named front uprights, b b, and two other uprights, b' b', directly behind them, all four uprights being framed into sill-timbers b^2 b^2, which have support on axles k k of the front and rear pairs of truck-wheels, K K, on which the carrier travels behind the digger. The front and rear pairs of frame-uprights b b' are connected by cross-bars or head-pieces b^3 b^3, and below these cross-bars a pair of laterally-ranging parallel timbers, b^4 b^4, are secured to the uprights and form supports for the laterally-traveling endless earth-discharge belt L of the carrier, and the frame of this endless carrier-belt is braced by an upper laterally-ranging timber, b^5, which is fixed to the cross-bars b^3 b^3, and is connected to the rear timber-support, b^4, of the belt by short uprights or stay-bars b^6 b^6. The top cross-bars, b^3 b^3, and consequently the entire head parts and uprights of the carrier-frame, are stayed to its sill-timbers by metal rods or bars b^7 b^7, one at each side of the machine, and all as shown in the drawings.

I will now describe more in detail the construction of the digger-scoop and its conveyer, and the carrier-elevator and endless-belt discharge, and their operating mechanisms, as follows:

As best shown in Figs. 3 and 5 of the drawings, the scoop C is made broader at its forward lower end or nose than at its upper rear end, where it is only about the width of the endless elevator J of the carrier or its buckets j, into which the earth is discharged from the scoop by the conveyer D, which consists of a longitudinally-ranging beam, d', to which are fixed at their central upper parts a series of blades, d^2, which on the upward rearward stroke of the conveyer run along the bottom of the scoop, the beam d' having a couple of slots, d^3 d^3, into which enter the cranks of the shafts d d, which are journaled in the opposite side walls of the scoop. The slots d^3 in the conveyer-beam allow the conveyer-blades d^2 to accommodate themselves more or less to uneven masses or strata of earth which may be passing up the inclined bottom of the scoop, and without interfering with the free operation of the cranked shafts d d, which are actuated by belts M M, which run over pulleys m m on the shafts to pulleys m', which are fast to the wheels F or their axle f, one belt being used at each side of the machine. With this construction it is obvious that as the machine is drawn forward the earth cut or dug by the nose of the scoop will be carried upward by the conveyer D and dropped from the upper end of the scoop into the buckets j of the elevator J, which carries the earth upward and discharges it upon the endless belt L of the carrier, which may be operated in either direction to discharge the earth to either side of the ditch cut by the machine, as hereinafter more fully explained.

The elevator J comprises an endless belt, to which the buckets j are attached, and which runs over upper and lower rollers on the carrier-frame, said bucket-belt being operated by the engagement of gear-wheels N N on the front axle of the carrier-truck with gear wheels or pinions n n, fast on a shaft of the carrier, the elevator thus being operated automatically as the carrier moves forward.

The carrier L consists of an endless belt provided with conveyer-plates l and running over rollers fast on shafts l' l', journaled to and between the opposite ends of the parallel cross-beams b^4 b^4 of the carrier-frame. The roller-shafts are provided with bevel gear wheels or pinions o p, respectively, and the pinion o is adapted for engagement with a bevel-wheel, O, which is fast on a shaft, R, journaled in bearings r r on the carrier-frame. This shaft R also has fitted to it by a spline or feather connection a bevel gear-wheel, P, which is adapted to engage the pinion p on the carrier, and is provided at its inner face with a series of teeth or shoulders forming a half-clutch, s, with which a corresponding clutch device or wheel, S, which is fixed to the shaft, may be engaged by sliding the shaft endwise by means of a shipping-lever, T, which is fulcrumed to the adjacent bar b^5 of the carrier-frame, and may be fitted with any approved latch or stop devices to hold it at any position to which it may be adjusted. The gear-wheel P is normally held inward against a stop-pin, u, in the shaft R and out of engagement with the carrier-belt pinion p by a spring, U, placed on the shaft between a pin or collar, u', thereon and the gear-wheel, said pin u being arranged so as not to interfere with the proper engagement of the clutches. A belt, V, passes from a pulley, v, on the shaft R to a drive pulley or wheel, W, which is fast

to the hind axle of the carrier-frame, from which the shaft R will be automatically rotated as the machine moves forward.

It is obvious that when the bevel gear-wheel O on the shaft R is engaged with the pinion *o* of the carrier L the latter will be operated toward the right hand to discharge the earth deposited on it by the elevator J at the right-hand side of the ditch or trench being cut by the machine, and that when the shaft R is moved endwise, so as to engage the clutch S with the clutch-gear P and engage the latter with the carrier-pinion *p* and simultaneously disengage the gearing O *o*, the carrier will be operated in the reverse direction, or so as to discharge the earth received from the elevator J at the left-hand side of the ditch being cut by the machine.

I do not limit myself to the particular arrangement of the clutch mechanism herein shown and described, as two series of clutches and shipping-levers may be used to cause alternate engagement of gear-wheels on the shaft R with the carrier-shaft pinions *o p*; or other mechanism may be used to operate the carrier L in either direction, at the will of the operator, to discharge the earth at either side of the ditch or trench, as circumstances may require.

Plows may be run ahead of the ditching-scoop either by attaching them to the digger-frame or by using a separate plow or plows in advance of the operation of the ditcher, as the available draft-power or the nature of the work may make most desirable.

This ditching machine or apparatus may be used to advantage in cutting ditches or trenches of any required depth for purposes of irrigation or drainage, or for planting trees low down in plains to protect them from high winds and let their roots strike in deeply for moisture. The machine may also be used advantageously for rapidly throwing up fortifications in time of war, and for making fences between lands by digging a ditch and throwing up the earth therefrom to one side, and the machine would be serviceable in grading road-beds of railways and for building levees, or for other work involving the digging or removal of earth, as will readily be understood.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. A ditching-machine constructed with a digger and carrier operating one in front of the other, said digger made with a scoop digging the earth, and a reciprocating conveyer in the scoop working the earth rearward, and consisting of a beam hung on cranked shafts and a series of plates held transversely to the beam, and said carrier made with an elevator receiving the earth from the scoop, and a laterally-working conveyer receiving the earth from the elevator and discharging it at one side of the machine, substantially as herein set forth.

2. A ditching-machine constructed with a digger and carrier operating one in front of the other, said digger made with a scoop digging the earth and a reciprocating conveyer fitted in the scoop and working the earth rearward, and consisting of a beam hung on cranked shafts and a series of plates held transversely to the beam, and said carrier made with an elevator receiving the earth from the scoop, a laterally-ranging conveyer receiving the earth from the elevator, and mechanism, substantially as described, for operating said conveyer in either direction for discharging the earth at either side of the ditch formed by the machine, substantially as herein set forth.

3. In a ditching-machine, the digger made with a supporting-frame, an inclined scoop held thereto, and a reciprocating conveyer working in the scoop and comprising a longitudinal beam hung on cranked shafts, and a series of plates held transversely to the beam, substantially as herein set forth.

4. In a ditching-machine, the digger made with a wheeled frame, an inclined scoop held thereto, and a conveyer working in the scoop and comprising a beam hung on cranked shafts, and a series of plates held transversely to the beam, and said conveyer geared for operation by the digger-wheels, substantially as herein set forth.

5. In a ditching-machine, the digger made with a wheeled frame, an inclined scoop held thereto, and a conveyer working in the scoop and comprising a beam, *d'*, having slots d^3, shafts *d*, journaled to the scoop and having cranks entering the beam-slots d^3, and transverse plates d^2, held to the beam, substantially as herein set forth.

6. In a ditching-machine, the digger made with a frame, E, mounted on rear wheels, F, and forward wheels, G, fitted in vertically-adjustable standards, an inclined scoop, C, hung in the frame, and a conveyer, D, operating in the scoop and comprising a beam, *d*, transverse plates d^2 thereon, cranked shafts *d*, on which the beam is hung, and gearing operating the shafts from the digger-wheels, substantially as herein set forth.

7. In a ditching-machine, the earth-carrier made with a wheeled frame, an endless-belt elevator, J, thereon, gearing N *n*, operating said elevator from the frame wheels or axle, an endless-belt conveyer, L, on the frame, pinions *o p* on the opposite belt-rollers of the conveyer, a shaft, R, on the frame, belt and pulley gearing connecting said shaft with the frame wheels or axle, gear-wheels O P on the shaft L and adapted to the pinions *o p*, and clutch mechanism on the shaft adapted to engage the wheels O P with the pinions *o p*, substantially as herein set forth.

8. In a ditching-machine, a digger and carrier operating one in front of the other, said digger made with a scoop which digs the earth and leads it rearward, and said carrier made with an elevator receiving the earth from the scoop and discharging it, and said digger and carrier connected by draft-bars H H', having

eyes *h h'*, and a cross-bar, I, having parts *i* entering said eyes, substantially as herein set forth.

9. In a ditching-machine, a digger and carrier operating one in front of the other, and connected by lower draft-bars, H H', having eyes *h h'*, and a cross-bar, I, having parts *i* entering said eyes, and upper draft-bars, H^2, substantially as herein set forth.

CHARLES CLARK EDWARDS.

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J. T. HOLLAND.