J. L. CUSTER.

Ditching-Machine.

No. 217,073. Patented July 1, 1879.

Fig. 1.

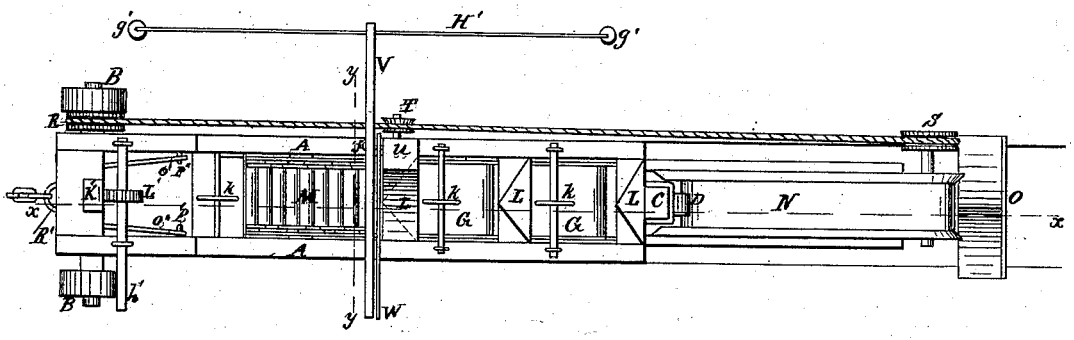


Fig. 2.

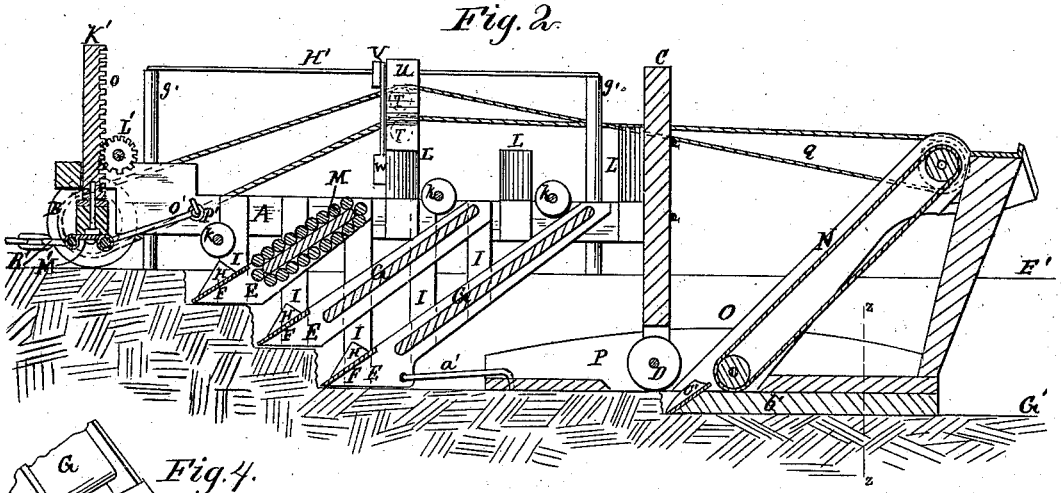


Fig. 4.

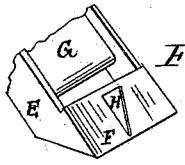


Fig. 3.

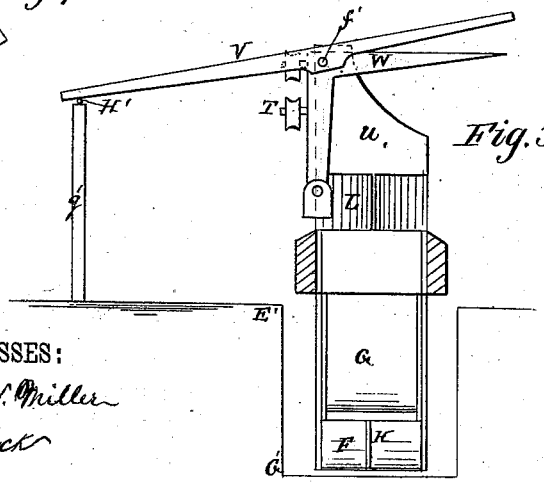
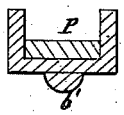


Fig. 5.



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JOHN L. CUSTER, OF BONAPARTE, IOWA.

IMPROVEMENT IN DITCHING-MACHINES.

Specification forming part of Letters Patent No. **217,073**, dated July 1, 1879; application filed March 7, 1879.

To all whom it may concern:

Be it known that I, JOHN LEATHERMAN CUSTER, of Bonaparte, in the county of Van Buren and State of Iowa, have invented a new and Improved Ditching-Machine, of which the following is a specification.

Figure 1 is a plan of the machine. Fig. 2 is a sectional elevation on line *x x*. Fig. 3 is a sectional elevation on line *y y*. Fig. 4 is a perspective view of a plowshare and cutter. Fig. 5 is a vertical section on line *z z*, Fig. 2.

Similar letters of reference indicate corresponding parts.

The object of this invention is to provide a machine for excavating ditches to a true water-line and finishing them for the laying of drain-tile.

The invention consists, first, of the stout timber frame A, whose front end rests on trucks B B, while the rear end is supported on the standard C, whose lower end is provided with a truck or wheel, D. Rigidly fixed between the sides of the frame are three chutes, E E E, inclining downward and forward at an angle of thirty degrees, or thereabout. These chutes are of different lengths, the forward one being the shortest, and the rear one the longest, so that in excavating a ditch they come in contact with the earth on different planes.

The lower end of each chute is formed of a plowshare, F, so placed as to leave an open space between it and the termination of the mold-board or floor G of the chute, so that the endless series of rollers and apron may pass through.

Fixed vertically on the middle of the face of each plowshare is a triangular cutter, H, to divide the furrow into two parts as it starts up the chute. The side cutters, I I, of the plows serve to cut the sides of the ditch evenly and to support the chutes in position. As a furrow is moved up a chute its upper surface, if it be thick enough, is forced in contact with a rolling cutter, *k*, to complete its separation into two parts. Reaching the upper end of the mold-board, the furrow of earth comes in contact with the wedge-shaped device L, which causes it to separate into two parts, that then fall off, one on one side of the ditch, and one on the other side.

On and around the mold-boards, and reaching entirely across them, are sets of rollers M M, linked closely together, as shown in the forward chute in the drawings, and covering them is an endless belt, as shown in the chute of the finisher O, that forms part of this invention.

The finisher is attached, by rods *a' a'*, to the rear plow, and follows behind it in the bottom of the ditch. It is in effect a long plane, P, carrying an elevator and chute like those already described, and having securely attached longitudinally along the central line of its under face a half-round strip of wood, *b'*, carrying on its front end a shoe, *c'*, shaped like a scoop, and projecting slightly beyond the lower part of the chute. The object of this finisher is to groove and level the bottom of the ditch, so that tiles may be laid therein.

The strip and shoe must have a cross-section of the diameter of the tiles or pipes to be laid, and they may be detached and other sizes substituted for them, as occasion may demand, to suit different sizes of tiles or pipes. As the earth cut by this shoe *c'* will ordinarily be loose and crumbling, the elevator, consisting of chute, rollers, and endless apron, as shown, is required to convey it away.

Motion is given to the rollers and apron by the belt Q, that passes over pulley R on the axle of the truck and pulley S at the head of the finisher-chute. This belt, cord, or chain, as it stretches from R to S, is supported and guided by pulleys or travelers T T, that are secured to the upright U.

When in operation the machine is drawn forward by means of a windlass and cable, and as the wheels B B run on the surface of the ground and revolve motion is transmitted by the belt Q to the pulley S.

When the line of the ditch is laid out and the slope of its water-line determined, stakes are set up along the side of the proposed ditch, and parallel with it from one end to the other. They may or should be set about one hundred feet, or the length of the cable that draws the machine, apart, and be so set that the top of each one of them will be as high above the proposed bottom of the ditch at that point as the pivot *f'*, on which the indicator V rests, is above the under side of the lowest or rear plow

of the machine. These stakes must be set about four feet, (more or less,) or about the length of the indicator-arm, from the proposed side of the ditch.

In the drawings, E′ represents the ground-line, and G′ the bottom, of the ditch. *g′ g′* represent the stakes above referred to.

It is evident, then, that when the stakes are set as above described, the line of their tops must be exactly parallel with the proposed bottom of the ditch, and will consequently show the degree of fall of the same.

When the machine is in motion the long and slightly-heavier arm of the indicator rides on the wire H′, that is stretched perfectly straight from the top of one to the top of another stake. When the machine is cutting the proper depth the opposite arm of the indicator will remain parallel with the horizontal arm of the weighted square W, that swings on the same pivot as does the indicator; but if the machine is cutting too deep, the lighter arm of the indicator will dip below that of the square, or point above if the machine is working too shallow. Thus the indicator tells the operator how much too deep or too shallow the machine is cutting.

For adjusting the depth of the cut the stout vertical stanchion K′ is mortised through the cross-timber at the forward end of the machine, and pivoted on the center of the axle of the trucks B B, and on the rear face of this stanchion is a rack, O′, in which the pinion L′ engages. The pinion is keyed on a shaft, *h′*, that revolves in bearings on the sides of the frame A, and may be operated by a train of back-gear, and secured by a pawl and ratchet, as is customary.

The axle of the trucks has a strong iron plate, M′, bolted with two or more bolts to its under side, and from this plate two iron rods or chains, *o′ o′*, extend to staples or hooks P′ P′, that are secured to the sides of the frame A.

When it is desirable to lower or raise the axle and trucks to suit the depth of the ditch to be cut, the rods or chains are detached from the staples or hooks, when they can be raised or lowered by the action of the stanchion K′ and pinion L′, after which the rods or chains are again secured to the staples or hooks on the sides of the frame. To compensate for the shortening or lengthening of the said rods or chains, so as to allow the truck to be raised or lowered, several staples or hooks may be attached to each side of the frame, or extra rods of the required length may be used. At the rear of the machine the standard C is also adjustable, or the rear of the machine is adjustable on the standard, by rack and pinion and pawl and ratchet, or by staples and pins, as shown, Figs. 1 and 2.

It will be seen, then, that both ends of the machine are adjustable, and can be raised or lowered at will, so that any desired inclination can be readily given to it.

Attached to the plate M′ is a strong clevis, R′, to which the cable for drawing the machine is to be secured.

For convenience in removing the machine from one place to another, I prefer to secure the plate M′ to the axle of the truck by three bolts, so that by removing the two outside ones the axle is left free to move upon the center bolt. A tongue is then attached to the axle-tree, and the plows elevated out of the ground by means of the stanchion K′ and standard C, and the machine is then ready to be drawn by a team of horses on its own wheels.

In starting a ditch, the forward end of the machine must be lowered to the axle of the trucks. Each plow will then rest upon the ground. Then, as the machine is moved along, the plows will cut down an incline, and when the indicator shows that they are deep enough, the rear standard, C, must be so operated as to arrest their further progress downward.

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

1. In the construction of a ditching-machine, the plane P, strip *b′*, and shoe C′, substantially as herein shown, and for the purpose described.

2. In the construction of a ditching-machine, the combination of the standard or upright U, indicator V, and weighted square W with stakes *g′ g′* and wire H′, substantially as and for the purpose described.

3. In the construction of a ditching-machine, the combination of chutes E E, plows F F, triangular cutters H H, mold-boards G G, side cutters, I I, revolving circular cutters K K, and wedge-shaped pieces L L with the linked rollers M M, endless apron N, plane P, strip *b′*, and shoe C′, substantially as herein shown and described.

JOHN LEATHERMAN CUSTER.

Witnesses:
H. H. CHAPMAN,
A. L. CHRISTIAN.