(No Model.) 2 Sheets—Sheet 1.

A. STEWART.

DITCHING MACHINE.

No. 363,560. Patented May 24, 1887.

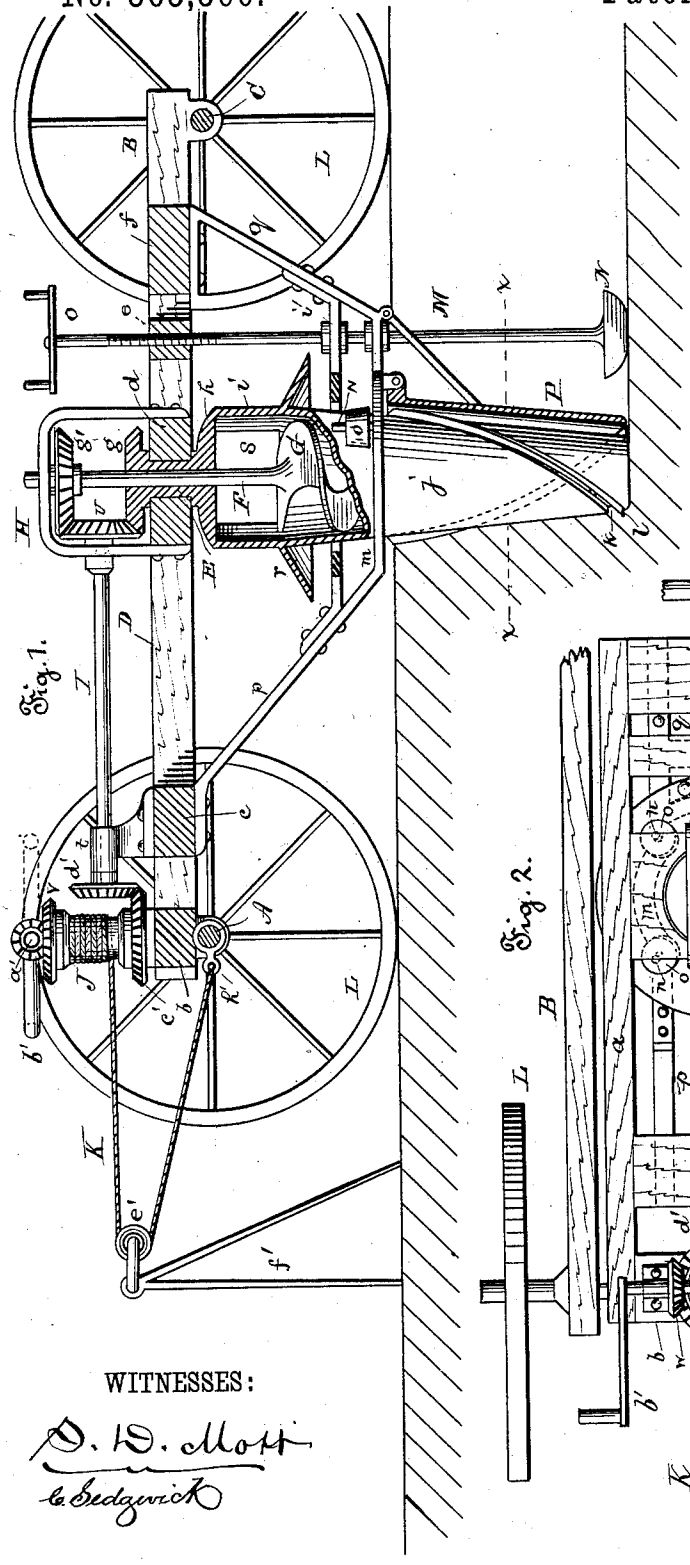


Fig. 1.

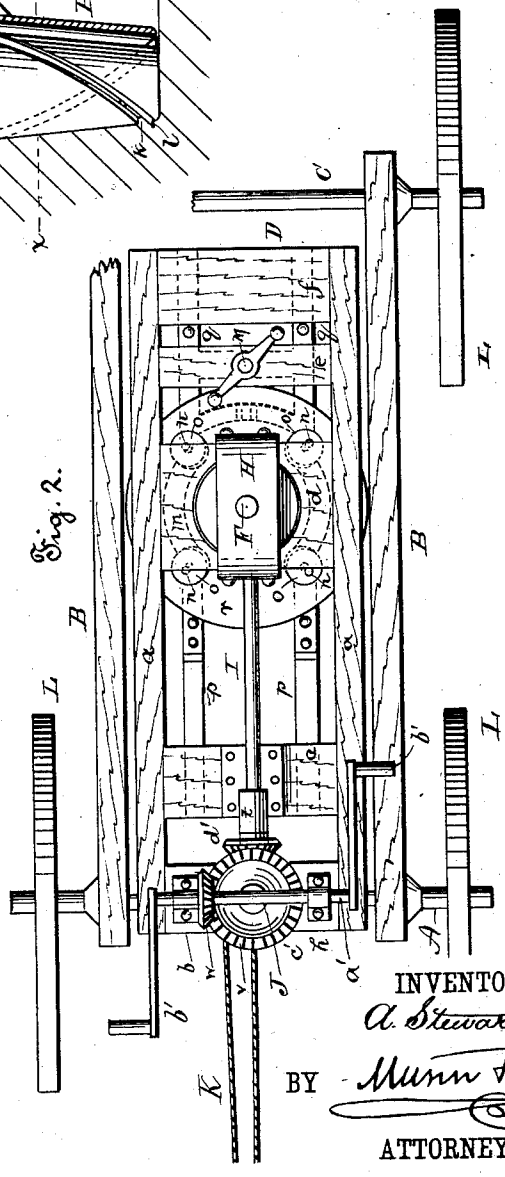


Fig. 2.

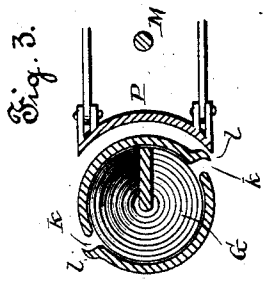


Fig. 3.

WITNESSES:

D. D. Mott

E. Sedgwick

INVENTOR:

A. Stewart

BY Munn & Co

ATTORNEYS.

N. PETERS. Photo-Lithographer. Washington, D. C.

(No Model.) 2 Sheets—Sheet 2.

A. STEWART.

DITCHING MACHINE.

No. 363,560. Patented May 24, 1887.

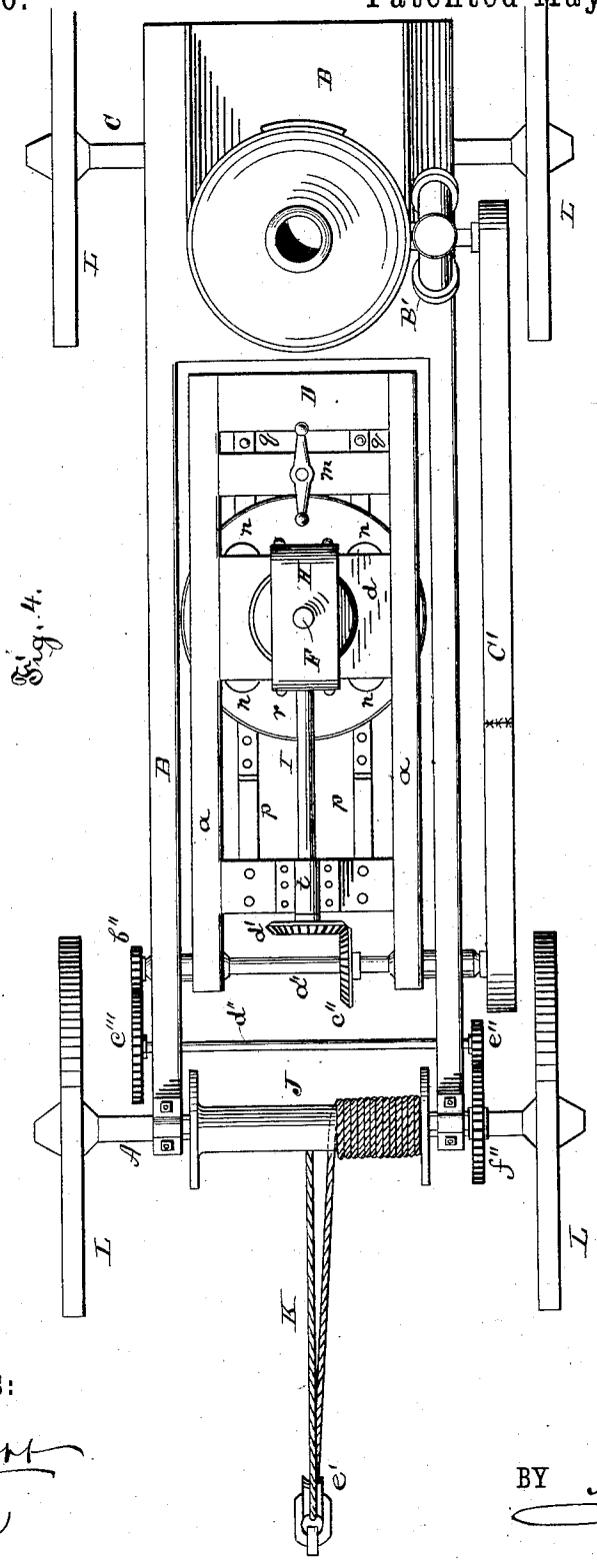


Fig. 4.

WITNESSES:

D. D. Mott

C. Sedgwick

INVENTOR:

A. Stewart

BY Munn & Co

ATTORNEYS.

N. PETERS. Photo-Lithographer. Washington, D. C.

UNITED STATES PATENT OFFICE.

ARCHIBALD STEWART, OF KEOTA, IOWA.

DITCHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 363,560, dated May 24, 1887.

Application filed May 15, 1886. Serial No. 202,276. (No model.)

To all whom it may concern:

Be it known that I, ARCHIBALD STEWART, of Keota, in the county of Keokuk and State of Iowa, have invented a new and useful Improvement in Ditching-Machines, of which the following is a specification, reference being had to the annexed drawings, forming a part thereof, in which—

Figure 1 is a side elevation, partly in section, of my improved ditching-machine. Fig. 2 is a partial plan view. Fig. 3 is a horizontal section taken on line *x x* in Fig. 1. Fig. 4 is a plan view showing the application of steam power to the machine.

Similar letters of reference indicate corresponding parts in the different figures of the drawings.

The object of my invention is to construct a ditching-machine which may be drawn forward over the ground and simultaneously form the ditch by a continuous operation.

My invention consists in a hollow cone provided with spiral slots, with knives arranged along the edges of the slots, an elevating-screw or auger placed within the cone for raising the earth cut away by the knives of the cone, and means for imparting motion to the cone elevating-screw.

It also consists in the combination, with the cone, of a conical circular table surrounding the cone for discharging the earth raised by the elevating-screw beyond the edges of the ditch.

It also consists in the combination, with the cone, of a crummer partly enveloping the hollow cone, and adapted to follow it and gather and break up the earth which escapes the spiral knives and cause it to be carried into the hollow cone.

It also consists in means for varying the depth of the cut of the machine, all as hereinafter more fully described.

Upon the forward axle, A, between the side bars, B, connecting the forward axle with the rear axle, C, is pivoted the frame D, so that its free end may be raised or lowered, with the axle A as a pivotal center. The frame D consists of side bars, *a*, and cross-bars *b c d e f*. In the cross-bar *d* is journaled a sleeve, E, carrying above the cross-bar a bevel gear-wheel, *g*, and below the cross-bar a head, *h*, to which is attached a hollow cylinder, *i*, connected with a hollow cone, *j*. The hollow cone *j* is provided with spiral slots *k*, and along the corresponding edge of each slot is arranged a spiral knife, *l*, which projects beyond the surface of the cone and is inclined in the direction of the rotation of the cone.

Surrounding the cone, above the upper edges of the knives *l*, there is a plate, *m*, which supports studs *n*, upon which rest conical rollers *o*, which touch the periphery of the cone *j* and serve to form a lower bearing for the cone, the plate *m* being supported by the braces *p q*, which extend to the front and rear portions of the frame D. At the juncture of the cone with the cylinder *i*, and surrounding the cylinder, there is an annular plate, *r*, which is inclined downward, and between the table and the top *h* apertures *s* are formed for the delivery of the earth displaced by the cone *j*.

In the sleeve E is journaled a shaft, F, carrying at its upper end a bevel-wheel, *g'*, and having at its lower end a screw or auger, G, which extends to the bottom of the cone *j* and nearly fills it. The upper end of the shaft F is journaled in a yoke, H, which is secured to the cross-bar *d* of the frame D. A horizontal shaft, I, journaled in the yoke H and in a support, *t*, carries a bevel-pinion, *u*, which engages the bevel-wheels *g g'* and causes them to rotate in opposite directions.

Upon the forward cross-bar, *b*, of the frame D is supported a windlass, J, provided with the bevel-wheel *v*, which is engaged by a bevel-pinion, *w*, on the driving-shaft *a'*. The shaft *a'* is provided with hand-cranks *b'*, by which it is turned.

To the lower end of the drum of the windlass is secured a bevel-wheel, *c'*, which engages a wheel, *d'*, secured to the forward end of the shaft I. A rope, K, connected with the drum of the windlass J, extends forward around a sheave, *e'*, supported by a removable post, *f'*, and is returned to the machine and secured to an eye, *h'*, on the axle A. The axles A C are supported by suitable wheels, L, and the rear end of the frame D is supported by a screw-threaded rod, M, turning in a nut in the cross-bar *e* and journaled in bearings in the plate *m* and cross-bar *i'*. The lower end of the rod M carries a shoe, N, which travels along on the surface of the ground at the bottom of

the ditch, and the upper end of the rod M is provided with a double handle, O, by which it may be turned to adjust the height of the frame D and the cone *j*, and thus regulate the depth of the ditch.

Behind the cone *j* is supported a concave plate, P, which I call a "crummer." The office of the concave plate P is to follow the cone *j* and prevent the loose earth from falling away from the cone and partly filling the ditch. It confines the loose earth, so that it is coarsely pulverized by the knives *l*, so that it may enter the slots *k* of the cone and be carried upward.

By fixing the post *f'* on the line of the ditch, with the rope K unwound from the windlass J, and turning the windlass by means of the cranks *b'*, rotary motion is imparted to the cone *j* and screw G in opposite directions, and at the same time the rope K is wound upon the drum of the windlass, causing the ditching-machine to advance, while the earth is cut away by the knives *l* and delivered to the interior of the cone, where it is received by the screw G and carried upward to the openings *s*, through which it is discharged upon the spreading-table *r*, which carries the earth beyond the borders of the ditch.

When the machine is to be transferred from one place to another, the cone *j* and the rod M are raised out of the earth by tilting the frame D on the axle A, and held in an elevated position by a cross-bar inserted between the cone *j* and the side bars, B, or in any other convenient way.

In Fig. 4 I have shown a horizontal shaft, *a''*, journaled in the frame B and forming the pivot of the frame D. The shaft *a''* receives motion from an engine, B', on the rear end of the frame B through the belt C', and the shaft *a''* carries a miter-wheel, *c''*, which engages the wheel *d'* on the shaft I, as in the other case, and a pinion, *b''*, on the shaft *a''* engages a spur-wheel, *c'''*, on the intermediate shaft, *d''*, which carries a pinion, *e''*, meshing into the spur-wheel *f''* on the shaft of the windlass J, the windlass in the case being arranged in a horizontal position.

I do not limit or confine myself to any particular way of turning the windlass J or the shaft I, as various methods are practicable and might be adopted.

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

1. In a ditching-machine, the combination of a hollow cone provided with spiral knives and spiral slots for cutting and removing the earth with a screw, G, revolving in the hollow cone, and means, substantially as described, for supporting, guiding, and operating the cone and screw.

2. In a ditching-machine, the combination of the hollow cone *j*, provided with spiral knives *l* and slots *k*, the screw G, arranged to turn in the hollow cone, the inclined annular table *r*, for receiving the earth from the screw and delivering it beyond the sides of the ditch, with the concave plate P, supported behind the hollow cone *j*, substantially as herein shown and described.

3. In a ditching-machine, the combination of the pivoted frame D, the sleeve E, journaled therein and carrying the bevel-wheel *g*, head *h*, hollow cylinder *i*, and hollow cone *j*, provided with slots *k* and knives *l*, the shaft F, journaled in the sleeve E, carrying at its lower end the screw G and at its upper end the bevel-wheel *g'*, the inclined annular table *r*, the guide-rollers *o*, the pinion *u*, engaging the bevel-wheels *g g'*, and means for imparting motion to the pinion *u*, substantially as herein shown and described.

4. The combination, with the cone *j*, provided with the spiral slots *k* and spirally-arranged knives *l*, of the concave plate P, rigidly supported near the hollow cone *j*, substantially as herein shown and described.

5. The combination, with the frame D and revolving cone *j*, carried thereby, of the adjustable rod M and shoe N, attached thereto, substantially as herein shown and described.

6. The combination, with the cone *j*, screw G, and bevel-wheels *g g'*, of the pinion *u*, engaging the bevel-wheels *g g'*, the shaft I, bevel-wheel *d'*, the windlass J, provided with the bevel-wheels *v c'*, the shaft *a'*, and pinion *w*, the rope K, and fixed sheave *e'*, substantially as herein shown and described.

ARCHIBALD STEWART.

Witnesses:
CHARLES S. CAPRON,
ALFRED B. JONES.