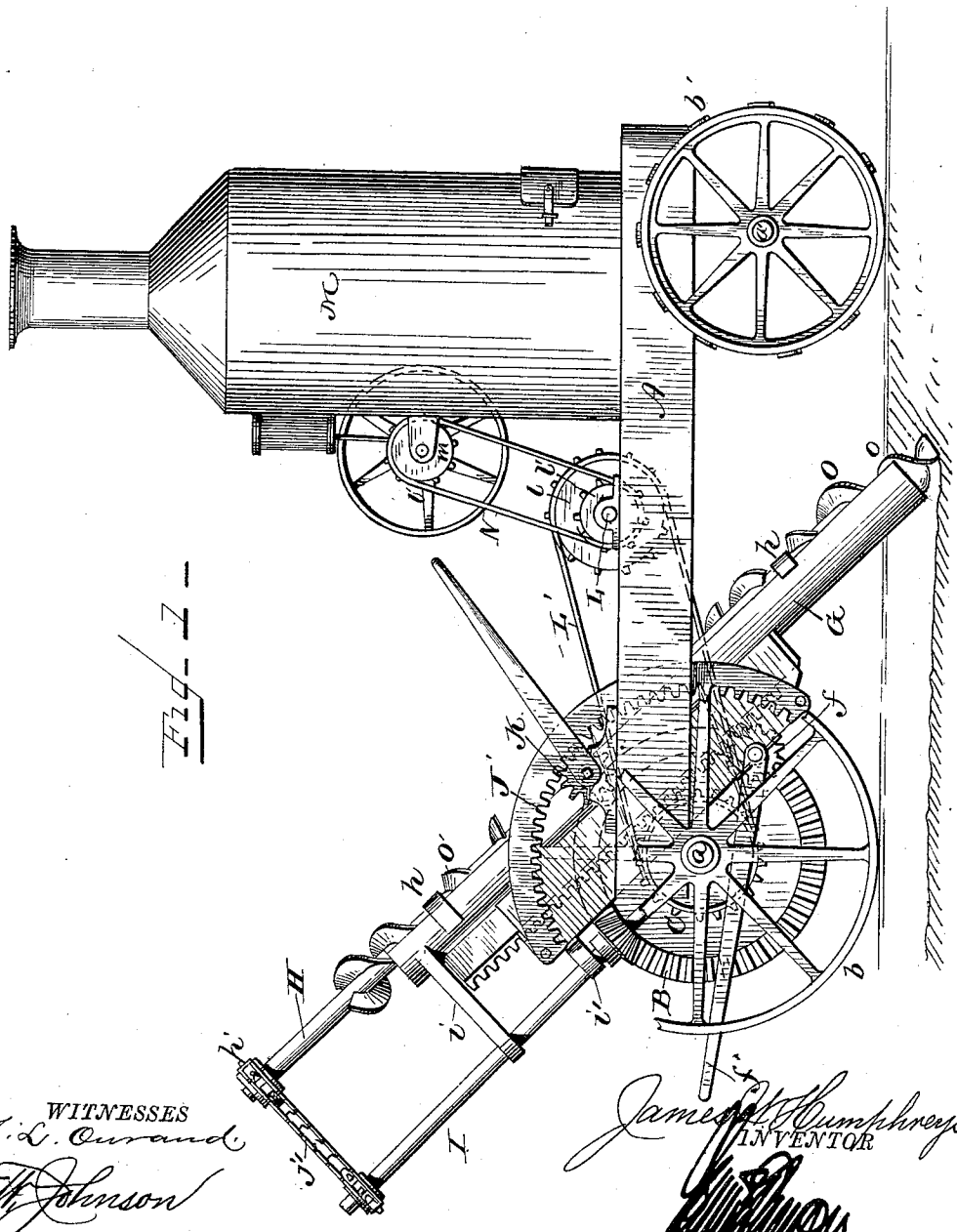
(No Model.) 2 Sheets—Sheet 1.

J. W. HUMPHREYS.

DITCHING MACHINE.

No. 328,407. Patented Oct. 13, 1885.



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(No Model.) 2 Sheets—Sheet 2.

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Fig. 2.

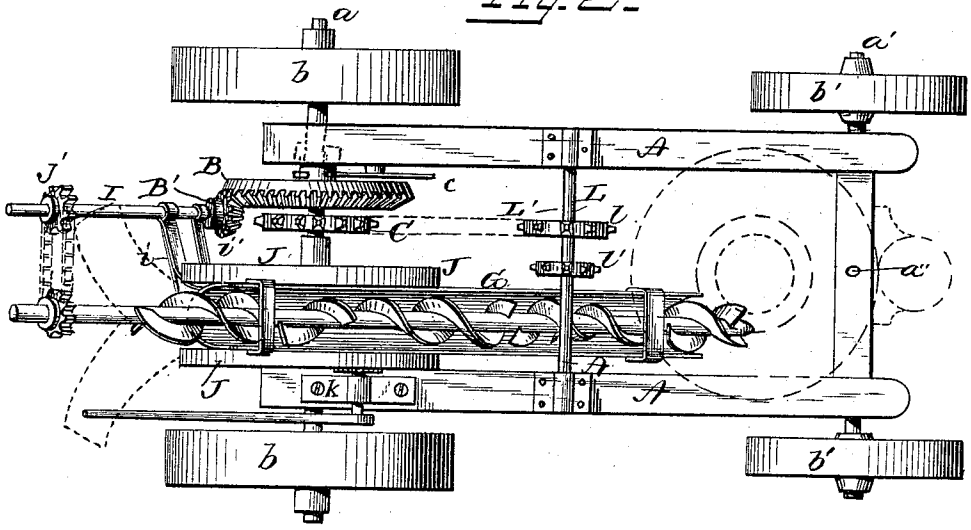


Fig. 3.

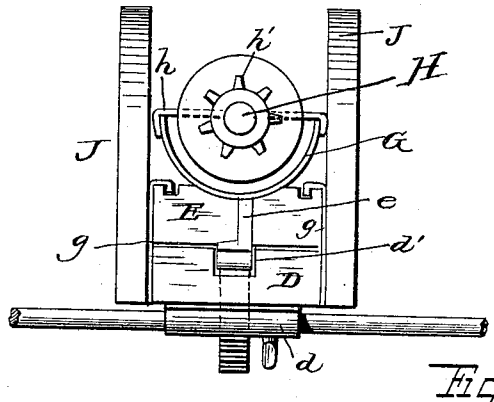
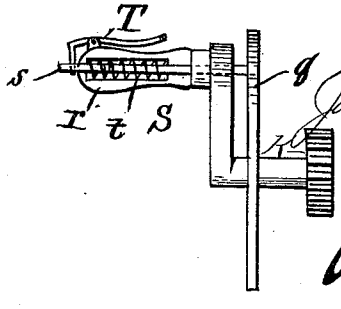


Fig. 4.



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UNITED STATES PATENT OFFICE.

JAMES W. HUMPHREYS, OF IROQUOIS, ILLINOIS.

DITCHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 328,407, dated October 13, 1885.

Application filed November 13, 1884. Serial No. 147,900. (No model.)

To all whom it may concern:

Be it known that I, JAMES W. HUMPHREYS, a citizen of the United States of America, residing at Iroquois, in the county of Iroquois and State of Illinois, have invented certain new and useful Improvements in Ditching-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

My invention relates to certain new and useful improvements in ditching-machines, the object being to provide a machine of this class with a device for opening the ditch, said device having spiral blades for removing the earth, and above said blades conveyers for elevating the earth, the diggers and conveyers being secured to a shaft which is mounted above a concave trough, said trough being attached to an adjusting means and operating devices, all as will be hereinafter more fully set forth, and specifically pointed out in the claims.

My invention also consists in the construction and combination of the parts, as will be hereinafter claimed.

In the annexed drawings, which illustrate my invention, Figure 1 is a side view; Fig. 2, a plan view; Fig. 3, an end view of the trough and its frame. Fig. 4 is a detailed view.

A represents a suitable frame, which is provided at its ends with transverse axles *a a'*. Upon the ends of said axles are mounted supporting-wheels *b b b' b'*. The forward axle, *a'*, is attached to the front cross-bar of the frame by a king-bolt, *a''*, so that the same may turn upon the frame; and, if desired, said axle may be provided with a segmental rack with which will mesh a gear-wheel which is provided with a vertical shaft which terminates in a hand-wheel for turning said axle and guiding the machine, as is common in traction-engines.

The rear axle, *a*, has the supporting-wheels *b b* rigidly attached to the outer ends of the same, and adjacent to one side of the frame this axle is provided with a beveled gear-wheel, B, which is provided with a feather or spline which enters a groove in said axle *a*, so that when said beveled gear-wheel B is thrown to one side by the clutch-lever *c* it will rotate freely on the axle and be thrown out of gear with the beveled pinion B'.

A sprocket-wheel, C, is rigidly attached or secured to the axle *a*, and around this sprocket-wheel the drive-chain passes. To one side of this sprocket-wheel is pivotally secured to the axle a frame or structure which carries the spiral diggers, the conveyers, and the means for adjusting the same.

The frame or structure before referred to is provided with a base-piece, D, which is attached near its central portion by a clip, *d*, to the axle, so that the same may be tilted thereon. This base-piece is provided centrally with a longitudinal groove, *d'*, in which slides a rack-bar, *e*, which is attached centrally to a sliding block, E. This sliding block E is adjusted by means of a pinion, *f*, which passes through an opening in the lower under side of the base-piece D, said pinion being provided with a crank-shaft, *f'*, for turning the same, said crank-shaft being provided with means for locking the same, so as to prevent the rotation of the pinion. The means for locking the crank-shaft may consist of a serrated circular plate attached to the side of the base-piece D, said circular plate having serrations with which will engage a spring-actuated stop-pin attached adjacent to the handle of the crank-shaft. The upper part of the sliding block E is provided with longitudinal grooves with which engage the downturned ends of plates *g g*, which are attached to the sides of the base-piece D. The upper face portion of the sliding block E is concave, and rigidly attached to the same above this concave portion is a semicircular trough, G, which is provided near its ends with transverse straps *h*, to which are attached journals, through which pass, so as to support the same, a shaft, H, which is provided at its upper end with a pinion, *h'*.

To the upper end of the trough G is rigidly attached, so as to project at an angle therefrom, an arm, *i*, at the end of which is formed a bearing through which passes the shaft I. A similar brace, *i'*, is also attached near the upper end of the base-piece D.

The shaft I is provided at its upper end with

a pinion, *j*, and the upper part of said shaft is provided with a groove, within which fits a feather on said pinion, so that said pinion can slide longitudinally on the shaft, so that when the shaft H is elevated or depressed the pinions *h' j* will not be thrown out of line. Said pinions are connected to each other by a drive-chain, *j'*.

To the upper and lower ends of the base-piece D are attached arched bars J, one of said curved bars being provided on its inner side with teeth J', with which engages a pinion, K, which is mounted upon a block, *k*, on the upper side of one of the longitudinal beams of the frame A. The shaft of said pinion terminates in a crank-handle, which is provided with means for locking the same, so as to prevent the rotation of the pinion, when desired.

While in Figs. 1 and 2 I have represented only a lever for operating the shaft of the pinion K, by reference to Fig. 4 a modified device will be seen adapted not only to effect rotation of said pinion, but to lock the same in position, as before referred to. In said figure *q* represents the standard, in which the shaft of the operating-pinion *k* is journaled, and the said shaft carries at its other end the operating-crank S, the handle *r* of which is independent from the rest of the crank, but is supported upon a bolt, *s*, which plays through said handle, the vertical portion of said crank, and has its end entering a perforation mounted in the standard *q*. The said handle is interiorly recessed to contain an expanding-spring, *t*, which is attached to one end of said bolt, and has its bearing against the interior end face of said handle, thereby normally tending to hold the end of said bolt in engagement with the perforation in the standard *q*. A portion of said bolt projects beyond the outer end of said handle, and is vertically perforated to engage the depending portion of the angle-lever T, centrally pivoted on said handle.

From the foregoing it will be obvious that when the free end of the lever T is depressed its bent portion is moved out of engagement with the bolt S, thereby permitting the latter to be withdrawn from the standard *q*, after which it may be held in such withdrawn position by causing the depending portion of the lever T to engage another perforation in the said bolt. The handle can now be revolved, so as to cause the pinion K to effect necessary adjustment of parts, after which the pinion can be locked to hold the parts in any desired position by releasing the bolt *s*, and permitting the same to re-enter the perforation in the standard *q*.

At a suitable point upon the frame A is journaled a transverse shaft, L, which has mounted thereon two rigidly-attached sprocket-wheels, *l l'*. The sprocket-wheel *l* is on a line with the sprocket-wheel C, and is connected to the same by a chain, L'.

The front portion of the frame A carries an engine and boiler, M, the driving-shaft of which engine is provided with a sprocket-wheel, *m*, which will be on a line with the sprocket-wheel *l'* and the shaft L, and these sprocket-wheels are connected to each other by a chain, N.

The shaft H, which is journaled above the trough G, is provided at its lower end with spiral diggers *o o*, and above the same with spiral conveyers *o'*. These spiral conveyers do not continue spirally the whole length of the shaft, but are broken or disconnected, so that in conveying the earth upwardly it will be pulverized.

In the accompanying drawings I have shown one manner of carrying out my invention; but I do not wish to confine myself to the construction shown, more especially to those parts which relate to retaining the adjusting-pinions in position and throwing the operating mechanism in and out of gear; nor do I wish to limit myself to the use of a motive power mounted upon the apparatus.

The operation of my invention as illustrated is as follows: The trough and diggers are adjusted to the desired inclined position by turning the pinion K, which intermeshes with the curved rack-bar J', and the same is depressed to the desired depth of the ditch by turning the pinion *f*. When the engine is started, motion therefrom will be communicated to the shaft L, and from thence to the shaft *a*, through the intervention of the sprocket-wheels and chain belts hereinbefore described. The beveled wheel B being thrown into gear with the beveled pinion B' will cause the rotation of the shaft I, which rotary movement is communicated to the shaft H, which has the diggers and conveyers rigidly attached thereto. The spiral diggers coming in contact with the earth will remove and elevate the same into the trough, from whence it is carried upwardly and discharged from the other end. If desirable, the upper end may be provided with a section which will carry the earth to one side, so that it will not fall within the ditch.

I claim—

1. In a ditching-machine, an adjustable frame pivotally attached to the rear supporting-axle, and carrying a trough within which operates a shaft having at its lower end spiral diggers and spiral conveyers, and means for rotating said shaft, substantially as described, and for the purpose set forth.

2. In a ditching-machine, the spiral rotary diggers and conveyers mounted upon the same shaft, substantially as shown, and attached to a sliding block, E, having a central rack-bar, and a base-piece, D, pivotally attached to a support, and provided with curved braces J, said curved braces having on their inner sides rack-teeth and pinions for adjusting the base-piece D and sliding block E, substantially as shown, and for the purpose set forth.

3. In a ditching-machine, the axle *a*, having pivotally attached thereto a base-piece, D, sliding block E, supporting a trough, and shaft provided with a series of disconnected spiral diggers and conveyers, and adjusting means for said block, the shaft I, carrying near its upper end a sliding sprocket-pinion, journals for said shaft, and beveled pinion B′, meshing with the gear-wheel B, and means for rotating the axle *a*, the parts being combined and organized substantially as shown, and for the purpose set forth.

4. In a ditching-machine, the frame A, supported upon wheels, and carrying a motive power, in combination with the axle *a*, having the wheels *b b* rigidly attached thereto, a sprocket-wheel, C, for rotating said axle, and the gear-wheel B, adapted to slide upon the axle so as to be thrown in and out of gear, the base-piece D, pivotally attached to the axle A, and sliding block E, carrying a trough and a shaft with spiral diggers and conveyers, said shaft being capable of adjustment both angularly and vertically with respect to the frame A, and provided at its upper end with a pinion having a belt which passes over a sliding pinion mounted on the shaft I, which is rotated by the gear-wheel B, the parts being organized substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

JAMES W. HUMPHREYS.

Witnesses:
SAMUEL F. NOSKER,
GEORGE R. DUNNING.