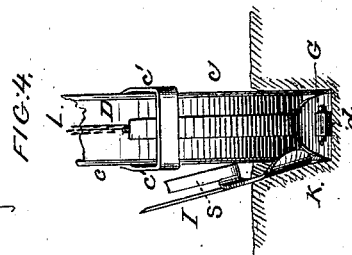
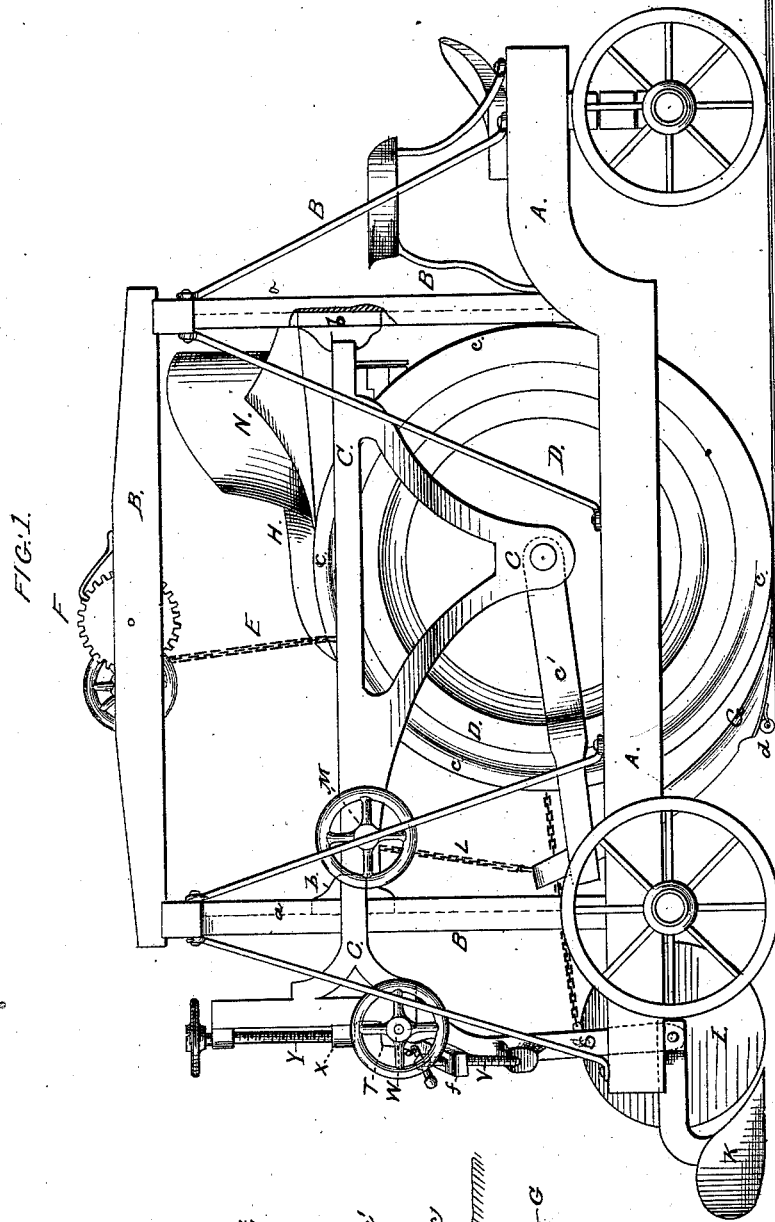


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Ditching-Machine.

No. 216,709.

Patented June 17, 1879.



WITNESSES:

*John F. C. Prinkert*  
*Amos W. Hart*

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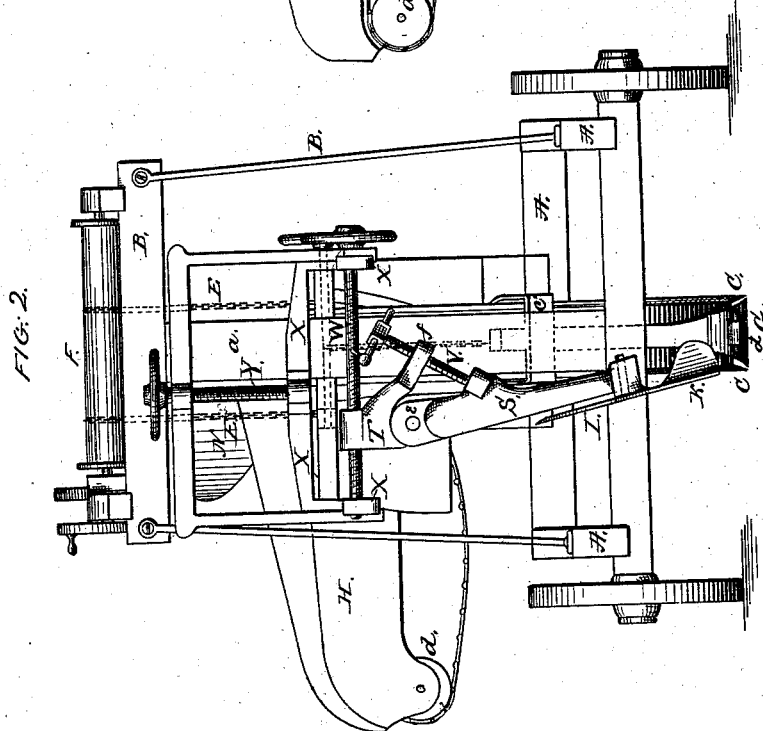
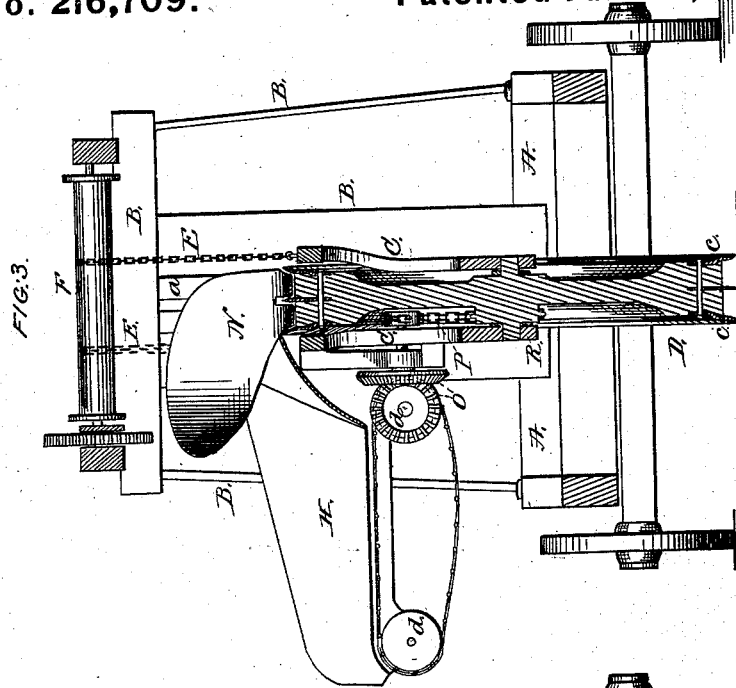
*Wm. L. E.*

ATTORNEYS.

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**WITNESSES:**

John F. C. Frankfort  
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**INVENTORS:**

E. J. Toops  
Jos. Braddock  
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**ATTORNEYS.**

# UNITED STATES PATENT OFFICE.

EMORY D. TOOPS AND JOSEPH BRADDOCK, OF WAVERLY, OHIO, ASSIGNORS  
TO THEMSELVES AND VAN H. BOND, OF SAME PLACE.

## IMPROVEMENT IN DITCHING-MACHINES.

Specification forming part of Letters Patent No. **218,709**, dated June 17, 1879; application filed  
March 7, 1879.

*To all whom it may concern:*

Be it known that we, EMORY D. TOOPS and JOSEPH BRADDOCK, of Waverly, in the county of Pike and State of Ohio, have invented a new and Improved Ditching-Machine; and we do hereby declare that the following is a full, clear, and exact description of the same.

Our invention is an improvement in the class of ditching-machines in which a revolving and circumferentially grooved or channeled wheel is employed.

The construction and arrangement of parts are as hereinafter described, and illustrated in accompanying drawings, in which—

Figure 1 is a side view of our improved machine. Fig. 2 is an end view, and Fig. 3 is a vertical central cross-section. Fig. 4 is a detail, showing the operation of the circular cutter and plow.

The working parts of the machine are attached to and supported by a rigid frame, A B, which is mounted on a four-wheeled running-gear. The upper portion, B, of the frame has two vertical posts, *a*, which are grooved lengthwise on their inner sides to adapt them to receive the guides *b* of an adjustable frame, C, in whose pendent arms the ditching-wheel D has its bearing. Said frame C is suspended, and also raised and lowered vertically, by means of the chains E and windlass or winding-drum F, which latter is arranged transversely in the upper part of the fixed frame B. We may, however, employ toggle-levers in place of the windlass for adjusting the said frame C.

The ditching-wheel is made concave, or provided with a recess in each side, so that the sides of its periphery will alone work in contact with the sides of the ditch. This form, in conjunction with the flare of the outer cutters or flanges, *c*, reduces friction to a minimum. Said flanges *c* have a square shoulder, to adapt them for attachment to the wheel proper, and yet give the requisite flare, as shown in Fig. 3. The frame C has three important attachments besides the ditching-wheel—to wit, a spade or cutter, G, a dirt-carrier, H, and a circular cutter, I, and plow K. The spade G is placed immediately behind and below the wheel D, being attached to the axis of the latter by radial arms *c'*,

which permit its adjustment vertically, or rather parallel, to the periphery of the wheel D by means of chain L and winding-shaft M. The function of said spade is to sever from the soil the slice whose sides are cut by the peripheral flanges *c* of the ditching-wheel, and its adjustment independently of the latter enables the thickness of the soil-slice to be varied as desired. A roller, *d*, is attached to the under side of the spade G, to roll, level, and smooth the bottom of the ditch, and also to relieve the spade of friction so far as practicable.

The soil-slice is divided into two equal parts by the central cutter of the ditching-wheel, and carried up and removed from the channels of the latter by the spirally-curved wing or clearer N, and by it delivered upon the traveling carrier H, which consists of an endless belt passing around pulleys or drums *d*, forming the bottom of a trough which projects laterally from the machine.

Motion is imparted to the carrier or belt by gearing O and a chain, P, which runs on a chain-pulley, R, formed on the hub or axis of the ditching-wheel.

The function of the third attachment of the ditching-wheel D above mentioned—to wit, the circular cutter I and plow K—is to widen the ditch made by the wheel, which is effected by the cutter shaving the left side of the ditch, and the plow turning the slice so cut into the ditch. For this purpose the plow practically requires to be nothing more than a curved share or a mold-board with a vertical and beveled point, which follows directly behind the cutter.

The cutter I rotates free on an axis fixed in the shank or bar S, which is pivoted at *e* to a bracket, T. The share K is also attached to a rigid arm of said shank. The bracket T has a divergent arm, *f*, through which passes a screw, V, whose lower end is jointed to the shank S. By turning said screw the shank is adjusted on its hinge *e*, thus setting the cutter I and shank K at any desired angle to the plane of the ditching-wheel, and causing them to bevel the edge of the ditch more or less.

The bracket T is adjusted laterally by a horizontal screw, W, which passes through it, and

it is attached to a frame, X, which is adjusted vertically by a screw, Y. The said cutter and share may thus be adjusted in three ways, to give any required bevel to the ditch, to widen it more or less by severing a thicker or thinner slice, and to cut deeper or shallower.

When the machine is used it is placed at the required point, and the frame C lowered until the cutters or flanges of wheel D enter the soil. The machine is then drawn along the line of the proposed ditch, and the slice severed by the flanges and spade G is carried up by the wheel D as it rotates, and transferred by clearer N to the carrier H, and by it delivered on the side of the ditch. By running the machine several times along the ditch and lowering the wheel D before beginning each cut, the ditch will be cut to the required depth.

We do not claim, broadly, a ditching-machine whose cutting-wheel and speed are adjustable vertically.

What we claim is—

1. In a ditching-machine, the combination of the following elements: the laterally-adjust-

able cutter for slicing or shaving the side of the ditch, the vertically-adjustable frame to which said cutter is attached, the frame C, also made vertically adjustable, the ditching-wheel having its bearings in said frame C, and a wheeled transporting-frame, A B, all substantially as shown and described.

2. In a ditching-machine, the combination, with a ditching-wheel, of the slicing-cutter I, placed in rear thereof, and the shank S, which is laterally and vertically adjustable independently of the wheel, all as shown and described, for the purpose specified.

3. In a ditching-machine, the combination of screw W with frame X and bracket T and cutter I, as shown and described.

4. In a ditching-machine, the combination of the incline screw V, the divergent arm *f* of bracket T, and the cutter I and its hinged shank S, substantially as specified.

EMORY DAVID TOOPS.  
JOSEPH BRADDOCK.

Witnesses:

F. E. DOUGHERTY,  
T. J. JONES.