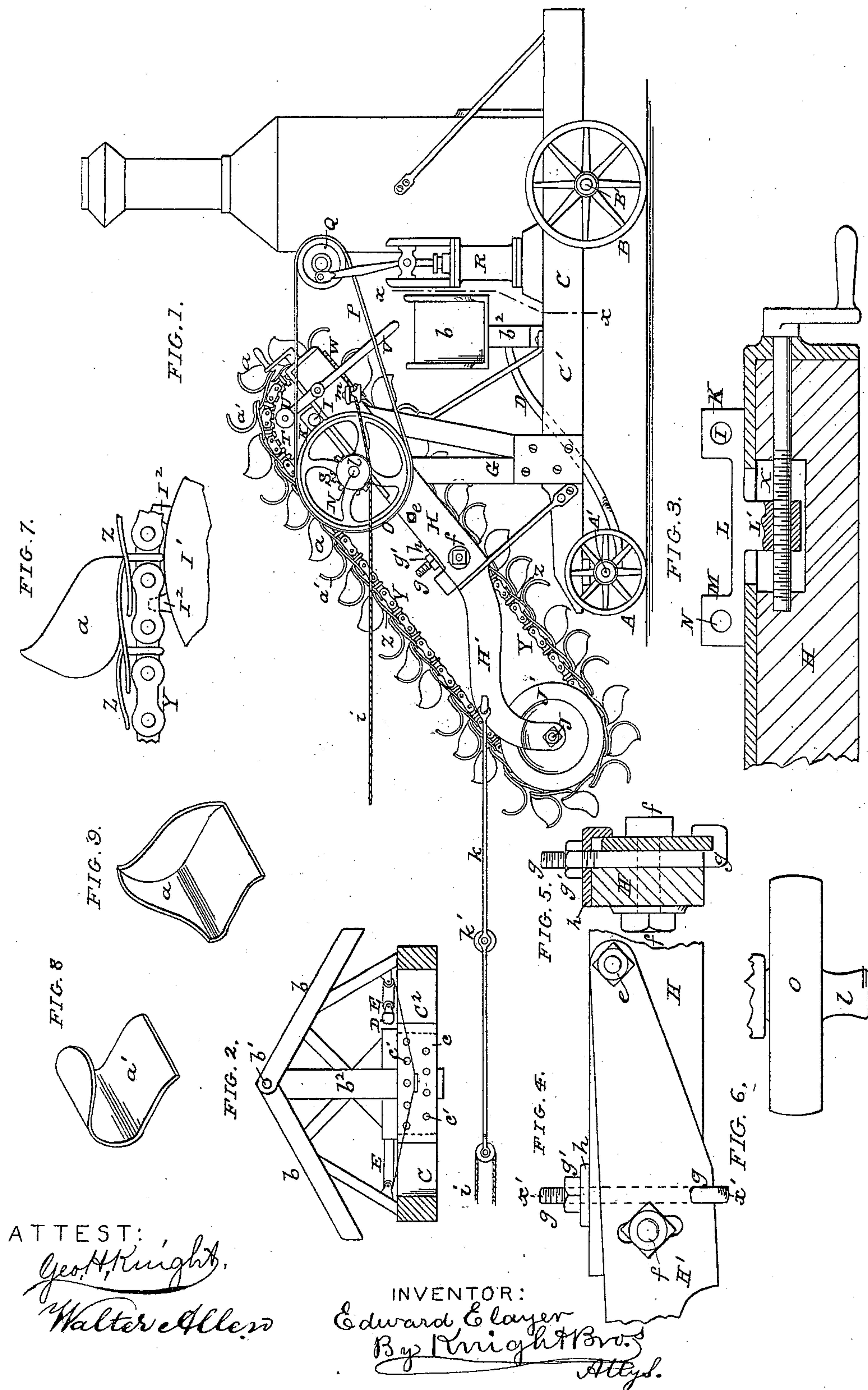


E. ELAYER.
Ditching Machine.

Patented July 13, 1880.



UNITED STATES PATENT OFFICE.

EDWARD ELAYER, OF ST. LOUIS, MISSOURI.

DITCHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 229,878, dated July 13, 1880.

Application filed May 11, 1880. (No model.)

To all whom it may concern:

Be it known that I, EDWARD ELAYER, residing at the city of St. Louis, in the State of Missouri, have invented Improvements in Ditching-Machines, of which the following is a specification.

My improvement relates to that class of ditching-machines which run along the bottom of the ditch or trench; and it consists in the adjustable character of the lower drum upon which the endless apron runs to regulate the depth of cut.

It also relates to the construction of the endless apron, the same consisting of chains to which are connected overlapping plates, as shown. The elevating-shovels are attached to these plates, the latter being secured to each chain at a single point, so as not to interfere with the flexibility of the apron; also, to further details, as described and claimed.

In the drawings, Figure 1 is a side view of the machine. Fig. 2 is a transverse section at $x x$, Fig. 1, showing a back view of the earthshed. Fig. 3 is a section, on a larger scale, of a detail hereinafter described. Fig. 4 is an enlarged detail of the joint of the arms supporting the lower drum. Fig. 5 is a section at $x' x'$, Fig. 4. Fig. 6 is a top view, showing the driving-pulley and the concave pulley on which the rope is coiled to move the machine forward when in operation. Fig. 7 is an enlarged detail side view of the endless apron. Figs. 8 and 9 are perspective views of the shovels.

A A and B B are the ground-wheels. The axles A' and B' have a length less than the width of the ditch to be cut, so that the wheels will run along the bottom of the ditch, the width of the endless apron carrying the shovels being about equal to that of the ditch to be cut, and the shovels thereon clearing the way for the wheels.

The fore axle, A', is connected to the frame C by a fifth-wheel or king-bolt connection, so as to allow the axle A' to be turned on this pivot for guiding the machine. The axle is turned by means of a lever, D, extending backward from the axle and operated by a cord and pulleys, E E, as shown, or by other suitable means.

Upon the side timbers, C', of the frame C are standards G, giving support to an upper frame,

H, that supports the drums I' and J', over which the endless apron is stretched.

Each end of the shaft I of the drum I' has bearing in boxes K, secured to an adjustable bar or plate, L, (see Fig. 3,) to which bar L is also secured the box M, in which the shaft N has bearing. The shaft N carries a pulley, O, at one end, over which passes a belt, P, also passing over a pulley, Q, driven by a steam-engine. (Shown at R.)

Motion is communicated to the drum-shaft I by a spur-pinion, S, on the shaft N engaging with spur-wheels T at each end of the drum-shaft I.

U is an idler bearing upon the top of the belt P. The idler has bearing at the upper end of the lever V, held in position by a ratchet-rack, W, to hold the idler down upon the belt P.

The bar or plate L has a lug, L', which works in a slot in the side bar of the frame H. The lug L' has a screw-hole in it, which turns on adjusting-screw X, having collar-bearing at the end of the side timber or frame, H. By turning the screw X the position of the boxes K and M may be changed to alter the position of the upper drum-shaft, I, with its drum or wheel I'. The drum or wheels I' give support to the chains Y of the endless apron, said chains also passing around the drum or wheels J' upon the shaft J. The drum I' is provided with teeth I², engaging the chains Y, to prevent their slipping on the drum. The chains Y may be two or more in number, and may be constructed of solid links, as shown, or in any other suitable manner. Upon the links are fastened metal plates Z, extending the whole width of the apron and attached to the chain by staples embracing the chain, there being only one point of attachment of each plate to each chain, so that the plates will not interfere with the proper flexibility of the chains in bending around the drums or wheels I' and J'.

$a a'$ are the shovels, firmly attached to the plates Z, and so formed as to scrape up the earth and carry it to the upper part of the machine and discharge it, as they are inverted, in the passage of the endless apron around with the drum I'. The earth from the shovels falls upon an inclined shed or chute, b , by which it is thrown to one or both sides, as may be

desired. The shed *b* is shown consisting of two wings throwing the earth outward. These wings may be hinged at the middle, as shown at *b'*, Fig. 3, so that either wing can be raised at the outer end and all the earth be shot to one side; or the chute or shed may be made to incline in one direction only, so as to shoot the earth all in one direction.

The post *b²*, on which the shed *b* is supported, is made movable laterally to throw more or less of the earth to one side. I have shown as a means of accomplishing this movement a slot, *c*, (see dotted lines, Fig. 3,) in the cross-bar *C²* of the frame *C* receiving the bottom of the post. The post may be held in position by a pin or pins in holes *c'*, passing through the cross-timber and the post.

The lower drum-shaft, *J*, has bearing in arms *H' H'*, pivoted to the side bars of the frame *H* at *e*, and slotted for the passage of a set-screw, *f*, which also passes through the side bars of frame *H*. (See Fig. 4.) The arms rest in the hooks of hanger-bolts *g*, whose upper ends pass through bracket-plates *h*, attached to the side bars, *H*.

Nuts *g'*, screwing on the bolts *g*, bear upon the top of bracket-plates. These hanger-bolts *g*, with their nuts, give means for the adjustment of the arms *H'* on their pivots *e*, to regulate the depth to which the shovels cut by means of lowering the shaft *J'*, which is done while the set-screws *f* are loose.

The apparatus is drawn forward by a rope, *i*, strung through pulley-blocks, one of which is anchored in advance of the machine, the other one, *j*, of which is attached to the rods or chains *k*, secured to the arms *H'*, and meeting in front of the machine at the point of attachment of the pulley-block. The rods or chains are supported on a roller, *k'*, whose gudgeons have bearing in the same, and which rolls on the surface of the ground. From the anchor-block the rope passes to a concave pul-

ley, *l*, at the end of shaft *N*. The rope is coiled around the concave pulley with one or more turns, and the end is held by the operator, so that the pulley *l* operates in the manner of a capstan to pull the rope and move the machine forward. Between the capstan-pulley *l* and the person holding the end of the rope it may pass over a guide-pulley in a turn-head, *m*, to prevent the rope coming in contact with the pulley *O* or the belt *P*.

The shovels *a*, at the edges of the endless apron, are formed with two cutting-edges, the one upon the outside being parallel with the edge of the apron, and whose office it is to cut the sides of the ditch, whereas the other edge cuts, like the edges of the inner shovels, *a'*, to clear the bottom of the ditch and make the advance cut.

I claim as my invention—

1. The combination, in a ditching-machine, of an endless apron supported on two shafts and carrying shovels *a a'*, drive-wheels *T*, frame *H*, with adjustable arms *H'*, frame *C*, earth-shed *b*, and wheels *A* and *B*, constructed to run on the bottom of the ditch.

2. The combination, with the supporting-frame *H H'* and endless apron, of the joints having pivots *e*, set-screws *f*, passing through the fixed bars *H* and through slots *h'* in the arms *H'*, and hanger-bolt *g*, for the purpose set forth.

3. The earth shed or chute *b*, when made adjustable laterally, for the purpose set forth.

4. An endless apron for excavating-machines, having endless chains *X* and transverse overlapping plates *Z*, loosely connected to the chains and carrying shovels *a a'*, substantially as set forth.

EDWARD ELAYER.

Witnesses:

GEO. H. KNIGHT,
P. STANTON.