

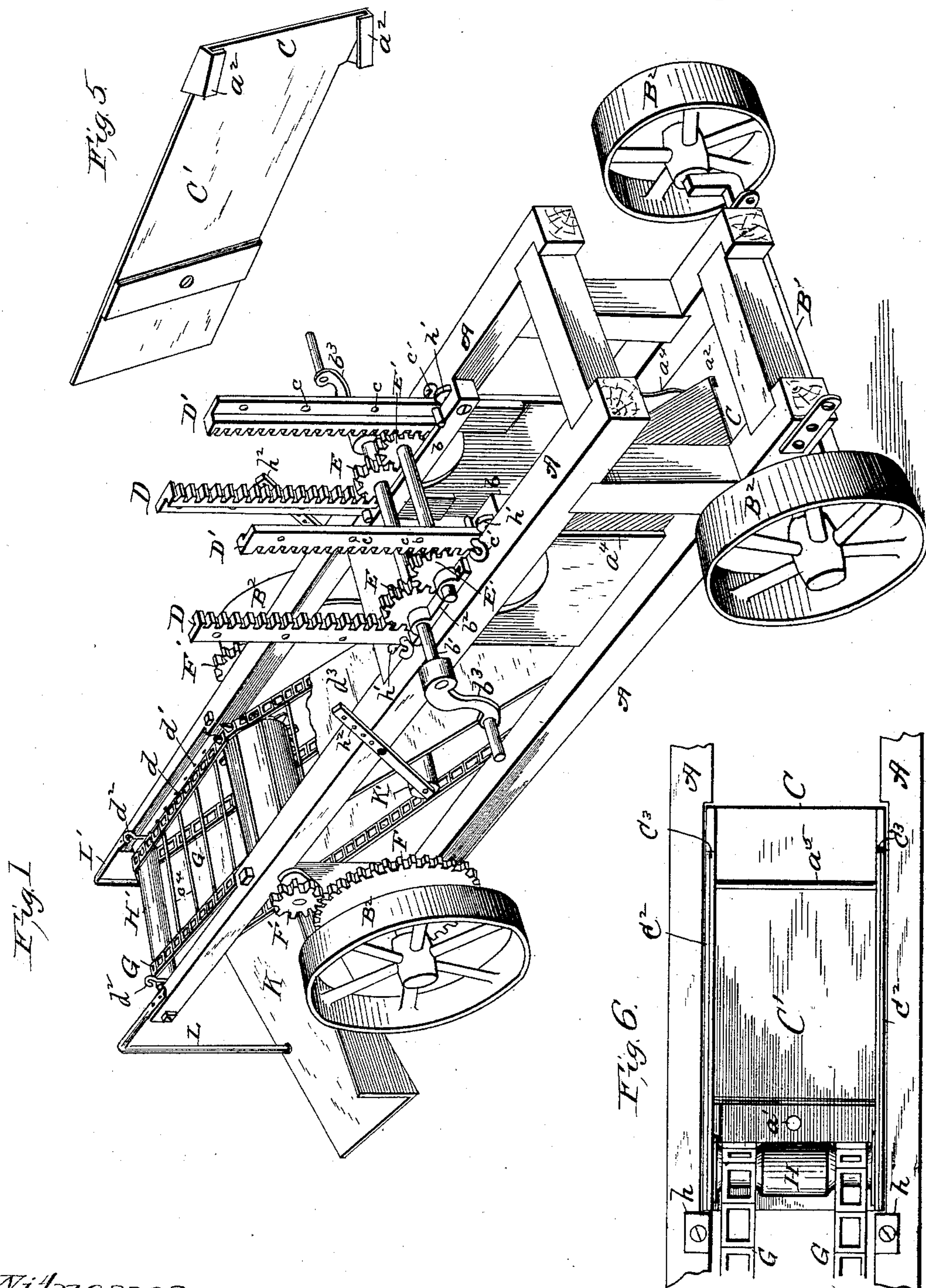
(No Model.)

3 Sheets—Sheet 1.

W. EMSLIE.  
DITCHING MACHINE.

No. 348,624.

Patented Sept. 7, 1886.



Witnesses:

*W. H. McNamee*

*G. B. Towles*

Inventor:  
*William Emalie*  
by *W. P. Purvis*

*Atty*

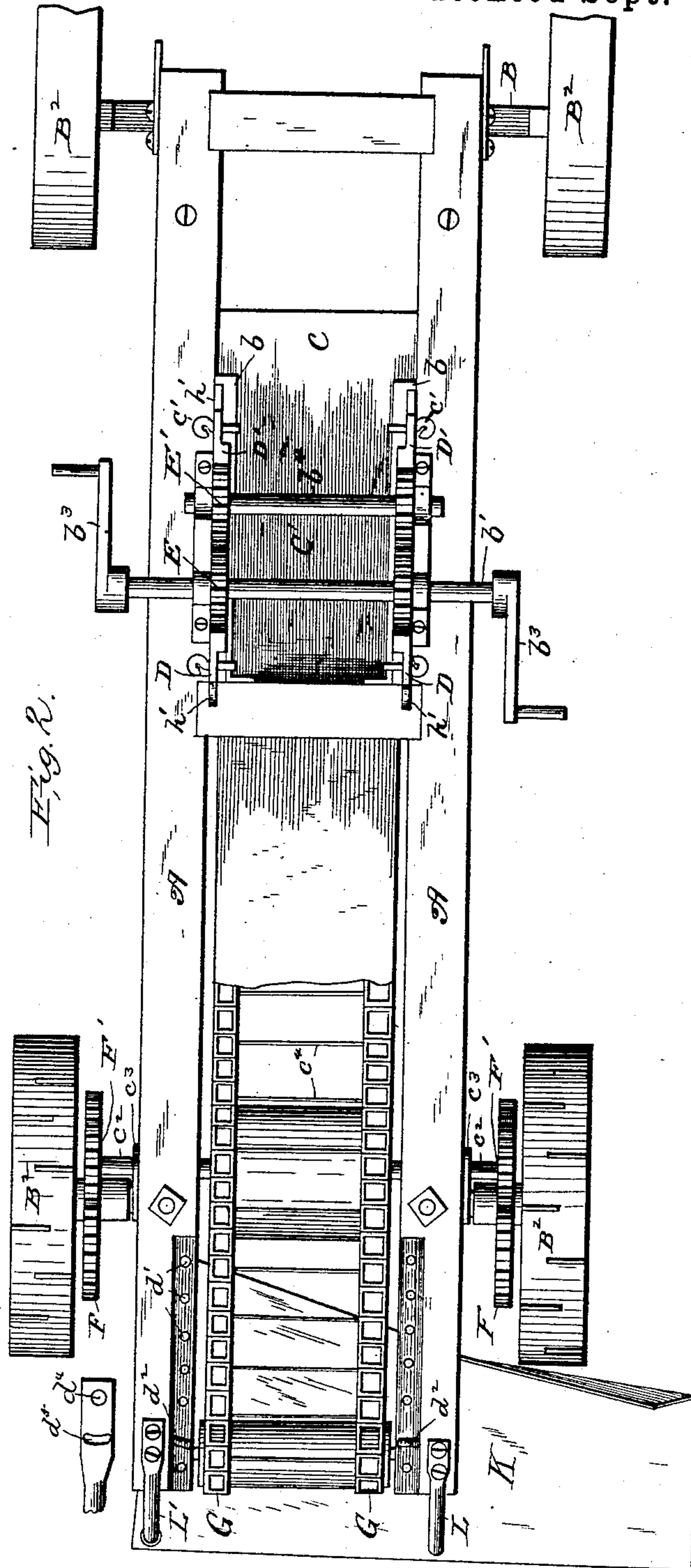
(No Model.)

3 Sheets—Sheet 2.

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Witnesses:  
W. H. H. H. H.  
G. B. Tooles.

Inventor:  
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by W. Purris Atty



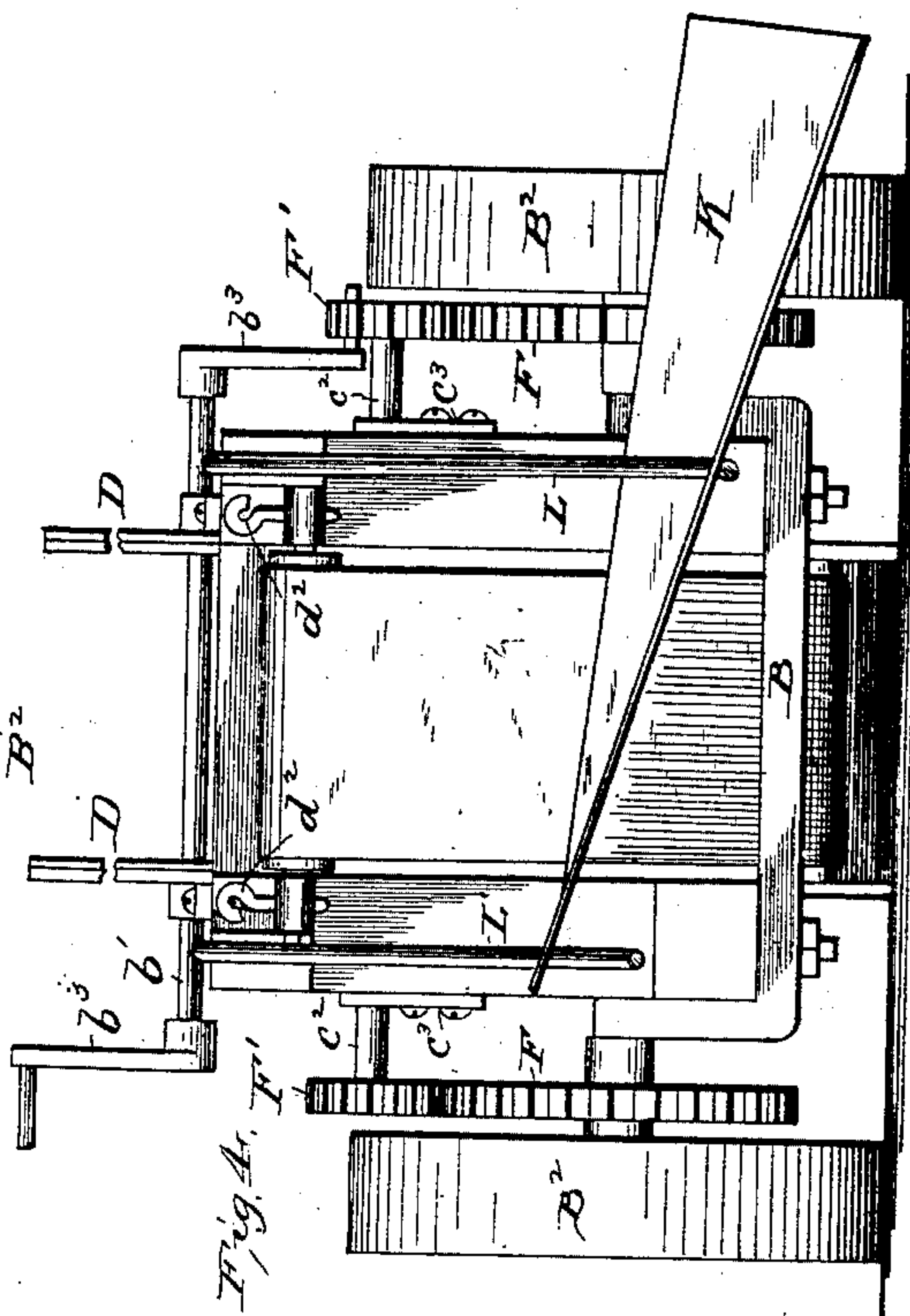
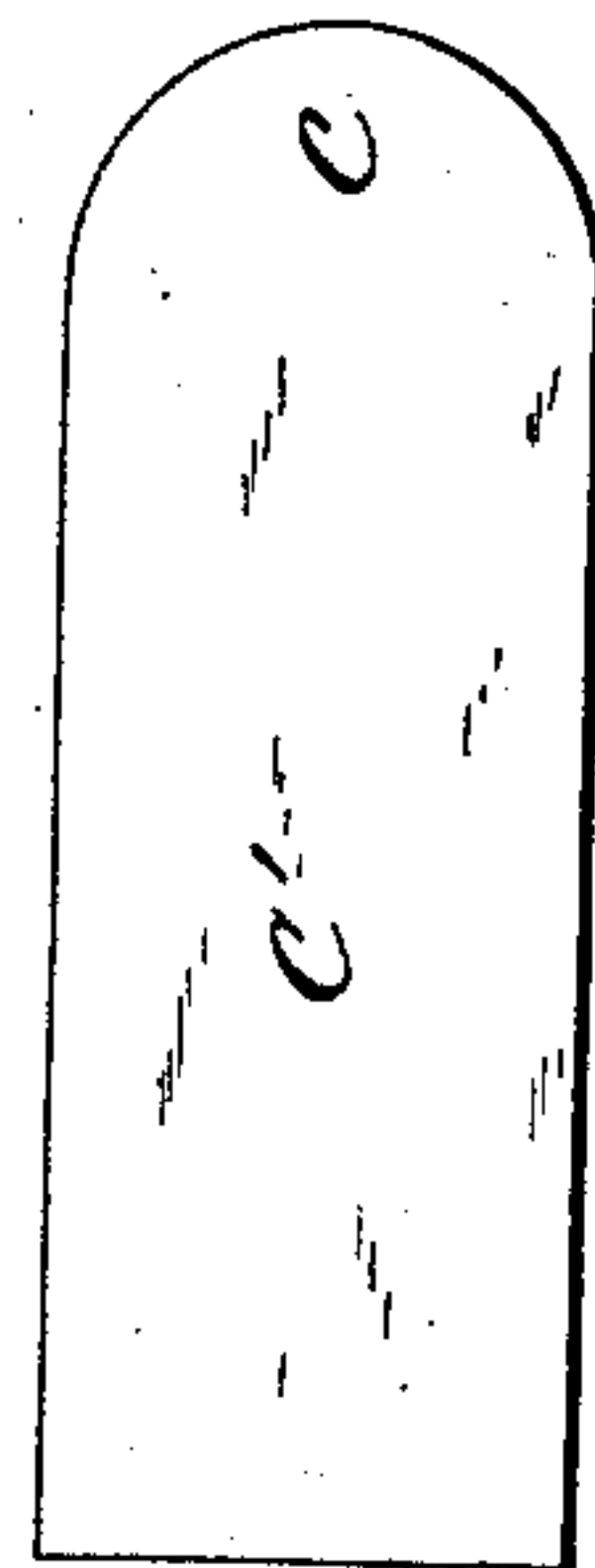
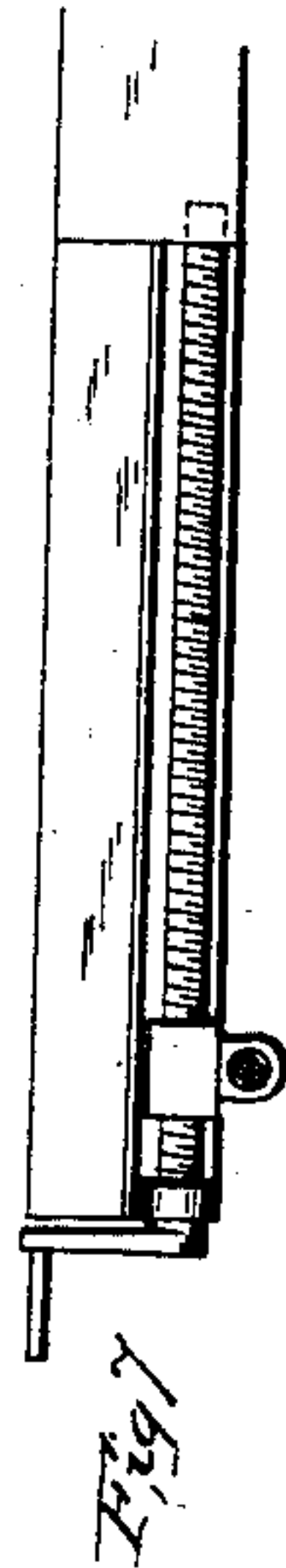
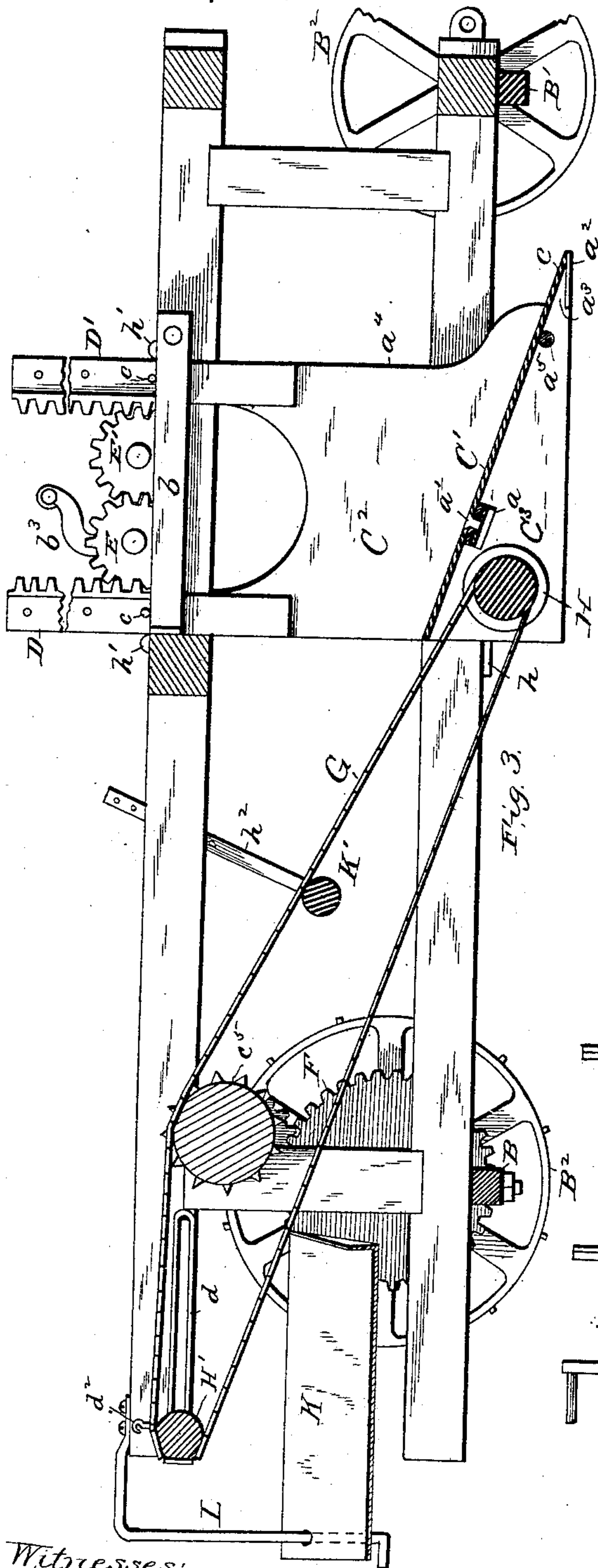
(No Model.)

3 Sheets—Sheet 3.

W. EMSLIE.  
DITCHING MACHINE.

No. 348,624.

Patented Sept. 7, 1886.



Witnesses:  
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# UNITED STATES PATENT OFFICE.

WILLIAM EMSLIE, OF MONTEZUMA, IOWA.

## DITCHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 348,624, dated September 7, 1886.

Application filed February 9, 1886. Serial No. 191,341. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM EMSLIE, a citizen of the United States of America, residing at Montezuma, in the county of Poweshiek and State of Iowa, have invented certain new and useful Improvements in Ditching-Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to ditching-machines adapted for cutting trenches for draining or other purposes; and the invention consists in the improved construction and combination of the devices, as hereinafter fully set forth and claimed.

In the drawings, Figure 1 is a perspective of my improved machine. Fig. 2 is a top view of the same. Fig. 3 is a longitudinal vertical section. Fig. 4 is a back end elevation. Fig. 5 is a perspective of the plowshare and plate detached. Fig. 6 is a partial bottom view of the plow. Fig. 7 shows a modification of devices for adjusting the adjustable roller of the endless carrier apron and chains. Fig. 8 shows a curved excavating-share.

A designates the frame of the machine, mounted upon the crank-axes B B', and carried by the wheels B<sup>2</sup>, running upon spindles formed on or attached to the axles. The back portion of the frame is rigidly bolted to the rear axle, and the forward end of the frame is attached to the front axle by a central king-bolt, allowing the requisite oscillation of the axle for guiding and turning the machine.

C designates the excavating-plowshare, formed on or attached to the removable inclined plate C', made to fit closely between the inner sides of the vertical plates C<sup>2</sup>. The inclined share-plate has its bearings upon the top edges of supporting-plates C<sup>3</sup>, fastened to the inside faces of the side plates, C<sup>2</sup>, and upon the stay-bar a, fastened to the supporting-plates. The upper portion of the share-plate is fastened in place by the screw a', inserted through the plate and having its bearing in the threaded hole in the stay-bar a. The ends of the share are provided with loops a<sup>2</sup>, adapted to receive the tapered points a<sup>3</sup>, formed on the front and bottom portions of the vertical side plates. The front edges of the side plates, C<sup>2</sup>, are constructed to form the side colters, a<sup>4</sup>, of the plow, and the bottom portions of the

side plates and supporting-plates form the landsides of the plow. The side plates, C<sup>2</sup>, are firmly supported laterally by the stay-rod a<sup>5</sup> and the shaft of the lower roller, which stay-rod and shaft are extended through and firmly fastened in holes through the plates C<sup>2</sup> C<sup>3</sup>.

D D' designate toothed bars, attached at their lower ends to the upper portions of the side plates, C<sup>2</sup>, of the plow. The bars are arranged to slide vertically between the inner faces of the upper beams of the frame and the guide-plates b, attached to the beams. These toothed bars are made long enough to allow the requisite vertical adjustment of the plow, as hereinafter described.

E designates pinions mounted on the shaft b', journaled in bearings b<sup>2</sup> on the frame A, in position to cause the pinions to gear with the toothed bars D. This shaft b' is provided with a crank, b<sup>3</sup>, at each end.

E' designates pinions mounted on a shaft, b<sup>4</sup>, journaled in the bearings on the frame in position to cause the pinions to gear with the pinions E and with the toothed bars D'. The toothed bars are provided with the holes c to receive the keys c', for holding the bars and the plow in position vertically.

F F designate gear-wheels mounted on the inner portions of the hubs of the carrying-wheels B<sup>2</sup> of the machine.

F' F' are pinions mounted on the ends of a revolving shaft, c<sup>2</sup>, which is extended through the machine, and is journaled in bearings attached to the frame A, in position to cause the pinions to gear with the toothed wheels F F'.

G G designate endless chains, connected together by wires c<sup>1</sup>, and adapted to run over the rollers H H' and the sprocket-wheels c<sup>5</sup>. The roller H revolves upon a shaft fastened in the sides C<sup>2</sup>, under the rear portion of the inclined share-plate. The roller H' is constructed to revolve upon a shaft having its ends extended into the elongated bearings d, which are fastened in recesses in the top beams of the frame A, and this roller is adjustable in the different positions required to allow the plow to be adjusted vertically. The devices employed at present for adjusting this roller consist of the elongated bearings d, above named, having holes d', and stop-pins d<sup>2</sup> inserted through the holes in the bearings



to hold the roller-shaft in the required position. I contemplate that instead of the elongated perforated bearings and stop-pins, set-screws properly connected with adjustable bearings may be employed for adjusting the rollers in the required positions, as shown in Fig. 7 of the drawings. The endless chains and their connecting-wires may be constructed to form the carrying-apron; or, when constructed as shown, they may be covered with a web,  $d^3$ , of wire or any other suitable material adapted to carry and deposit the excavated earth to the chute.

K designates an inclined chute, of any suitable material, attached to the rear portion of the machine-frame, in position to receive and convey the excavated earth to one side of the trench. This chute is adjusted and held at the required inclinations by the supporting rods L L', attached to the top beams of the machine-frame by two screws—one through a round hole,  $d^4$ , and the other through a slot,  $d^5$ , in the flattened end of each rod, as shown in Fig. 2 of the drawings—to allow the requisite lateral adjustment of the rods in adjusting the chute to the required inclinations to enable the earth to slide readily from the chute and to deposit the earth at the required position from the machine. It is believed that this inclined chute will be sufficient to convey away all the excavated earth; but I contemplate, if found necessary or desirable, the employment of revolving aprons constructed and arranged to receive from the endless apron and convey away the excavated earth.

The plow will usually be constructed to excavate a trench about one foot wide; but it is evident that it may be constructed any required width and of any suitable formation, the invention not depending upon the particular construction of the plow herein set forth.

Metallic plates  $h$  are attached to the bottom beams of the frame A, in position to form bearings for the heel of the plow during the excavating operation, and the machine may be provided with friction-wheels  $h'$ , located in position to form bearings for the outer edges of or the toothed bars to facilitate the movements of these bars in adjusting the plow vertically. K' designates a roller journaled in the pendants  $h^2$ , adjustably attached to the frame. This roller is located under the upper portion of the endless chains, in position to support them and the carrying-aprons, and the roller may be adjusted vertically to suit the vertical positions of the plow.

Trenches are excavated by this machine by successive furrows cut one after another by the plow being run successively in the same trenches until the required depth is obtained. By means of the cranks the pinions engaging with the toothed bars are revolved, raising or lowering the plow to the required positions, and the plow is held vertically in its adjusted positions by the keys  $c'$ , inserted in the holes through the toothed bars. When one furrow has been cut the entire length of a

trench, the endless chains are slackened by the proper adjustment of the adjustable roller H', and the plow is lowered, and secured by the keys in the required position for cutting another furrow in the same trench, and so on till the trench is excavated the required depth.

The depth of each furrow cut by the plow may be from four to eight inches, depending on the character and condition of the earth and the propelling force employed.

The cutting portion of the share C may be straight or curved, as shown in the drawings, and it may be varied in size and shape to suit the size and shape of the tiling to be laid in the ditch.

What I claim as new, and desire to secure by Letters Patent, is—

1. The devices for the vertical adjustment of the excavating-plow, consisting of the toothed bars D D', two of which are attached to each side plate, C<sup>2</sup>, of the plow, and are arranged to slide in suitable guides, in combination with the pinions E E', mounted upon the shafts  $b'$   $b^4$ , journaled in position to cause the pinions at each side of the excavator to engage with each other and with the toothed bars, and means for holding the plow in the adjusted positions, substantially as and for the purposes described.

2. The combination, with a vertically-adjustable excavating-plow, of the toothed bars D D', two of which are attached to each side plate, C<sup>2</sup>, of the plow, and are arranged to slide in suitable guides, the plates  $h$ , and friction-wheels  $h'$ , arranged to form bearings for the outer edges of the bars and plates, the pinions E E', journaled in position to engage with each other and with the toothed bars at each side of the excavator, and means for holding the plow in the adjusted positions, substantially as and for the purposes described.

3. The devices for conveying the excavated earth to the inclined chute or other device adapted to discharge the earth from the machine, consisting of the gear-wheels F F', mounted on the inner portions of the hubs of the rear carrying-wheels of the machine, the pinions F' F', mounted on the shaft  $c^2$  in position to gear with the wheels F, the endless-chain roller H on a shaft fastened to the sides of the plow under the rear portion of the inclined share-plate, the roller H', mounted on a shaft having adjustable bearings at the rear end of the machine, the endless chains G, carrying the endless apron and arranged to run over the rollers, and the sprocket-wheels attached to the revolving shaft  $c^2$  in position to drive the endless chains, all constructed and combined substantially as and for the purposes described.

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

WILLIAM EMSLIE.

Witnesses:

F. D. LIGHT,  
H. F. NORRIS.