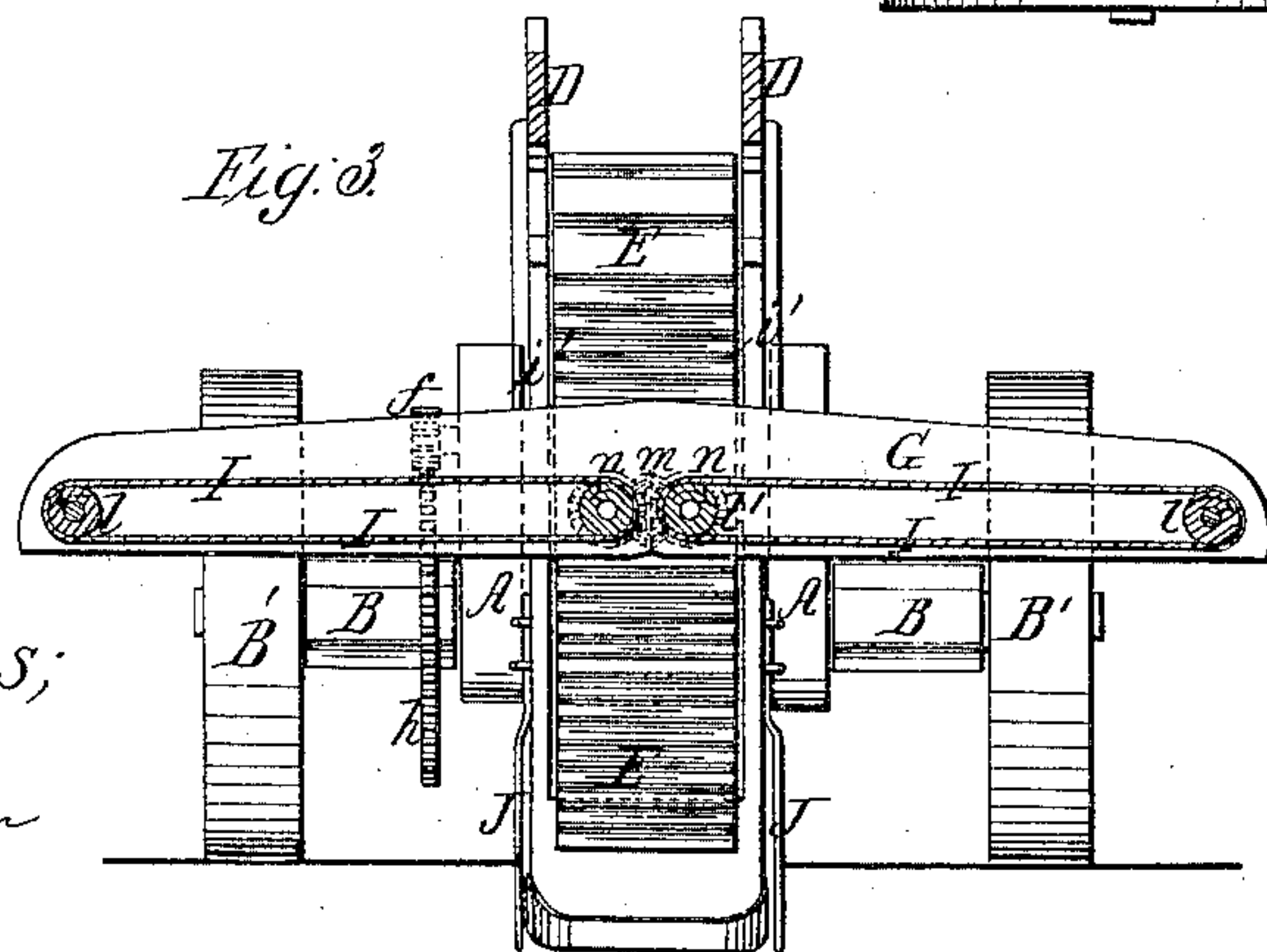
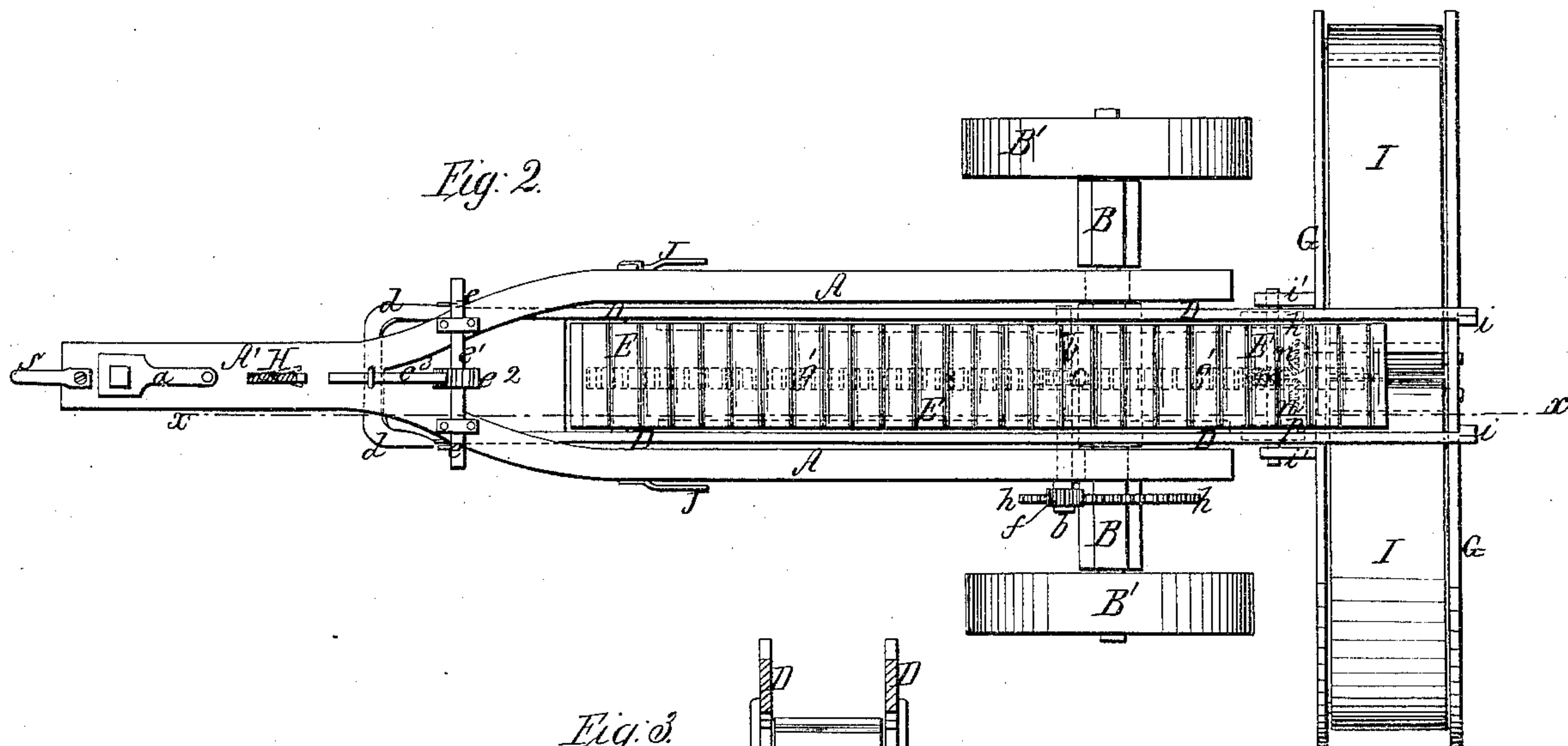
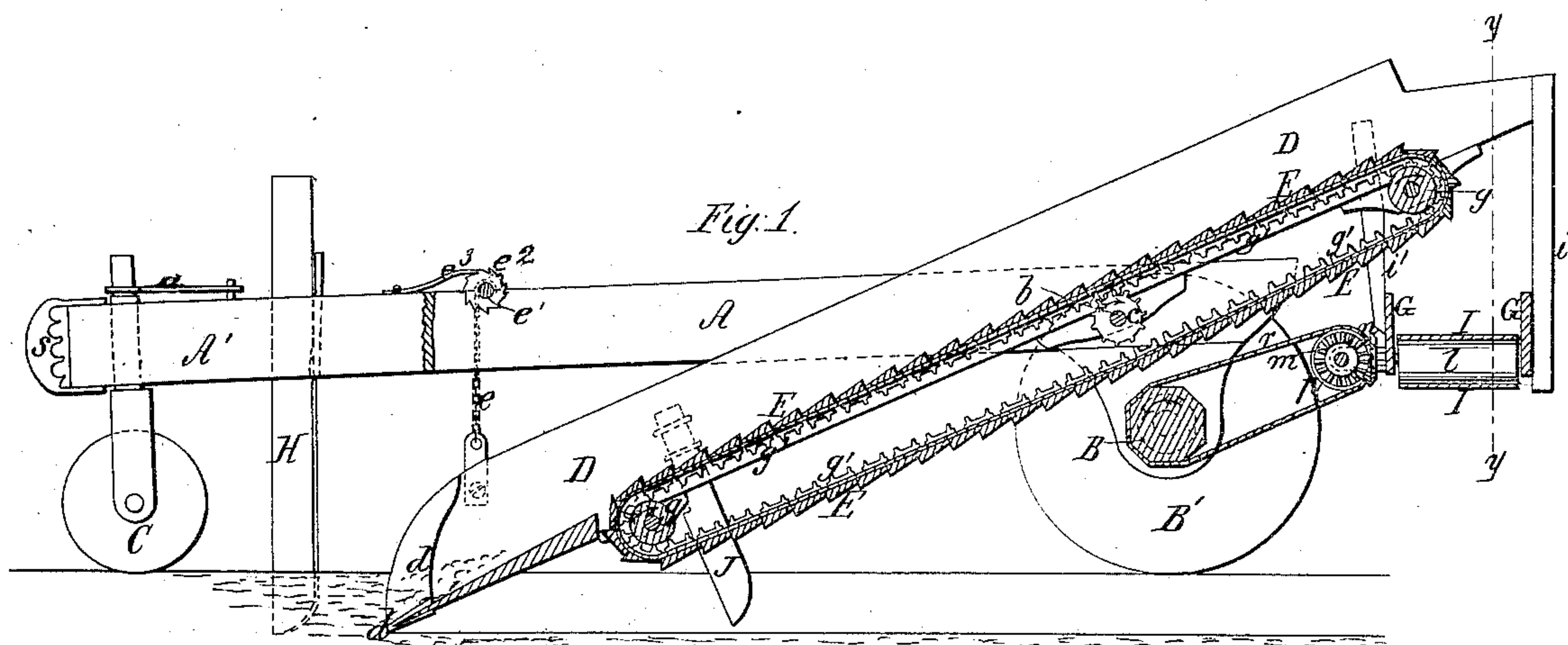


G. Ives.
Excavator.

N^o 1,768.
3d, 772.

Patented Jul. 9, 1861.



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UNITED STATES PATENT OFFICE.

GEORGE IVES, OF DETROIT, MICHIGAN.

DITCHING-MACHINE.

Specification of Letters Patent No. 32,772, dated July 9, 1861.

To all whom it may concern:

Be it known that I, GEORGE IVES, of Detroit, in the county of Wayne and State of Michigan, have invented a new and Improved Ditching-Machine; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making a part of this specification, in which—
5 Figure 1, is a longitudinal section through the improved ditching machine, taken in the vertical plane indicated by the red line x, x , in Fig. 2. Fig. 2, is a plan view of the improved machine. Fig. 3, is an elevation of
15 the back part of Fig. 1.

Similar letters of reference indicate corresponding parts in the three figures.

This invention relates to improvements in ditching machines wherein the earth is carried from the bottom of the ditch, as fast as it is loosened, to the back part of the machine by an inclined endless carrier which deposits the earth on two other carriers which conduct it off some distance on each
20 side of the ditch out of the track of the wheels of the machine.

The nature of my improvement consists in a certain arrangement of colters attached to the sides of the machine some distance in the rear of the scooping plow and acting in connection with the latter in manner hereinafter more fully explained.

The frame which supports the trough of the endless carrier and dischargers, consists
35 of two strong beams A, A , terminating at their front ends in a central beam A' . This frame is mounted at its rear end on the axle-tree B , of carriage wheels B', B' , and at its front end on a caster wheel C , the shaft of which latter wheel passes perpendicularly
40 through the front end of portion A' , of the frame and receives a handle a , on its upper end by which wheel C , is turned so as to guide the machine. The shaft or post of
45 this caster wheel C , may be made adjustable vertically for regulating the depth which it is desired the machine should cut, at each passage through the ditch. Wheel C , runs in the middle of the bottom of the
50 ditch and precedes the cutting and plowing apparatus.

The carriage wheels B', B' , extend out from each side of the frame A, A , sufficiently far to run on the surface of the ground on each side of the ditch, these
55 wheels do not run along in the ditch like the caster wheel C . The axle-tree B , of the wheels B', B' , is secured to and turns with those wheels in suitable bearing boxes secured to each arm of the frame A, A , at, or
60 near, the rear end of said frame. The wheels B', B' , are thus made to serve as driving wheels for the main earth carrier as well as for the two dischargers on each side of this carrier, as will be hereinafter de-
65 scribed.

The apparatus for loosening the earth, elevating it above the surface of the ditch, and for finally discharging it on each side of the ditch, consists of a long trough D ,
70 having for its bottom a continuous slatted apron E , which apron extends the entire length of the trough D . This trough D , is arranged between the arms of the frame A, A , its front end being below this frame
75 A, A , and its rear end above the frame; and trough D , is connected to the rear end of frame A, A , by a horizontal transverse fulcrum shaft b , which carries a pinion spur wheel c , as seen in Fig. 1 of the drawings.
80 The front and lower end of trough D , is shod with a scoop shaped cutting plate d , which forms the plow for loosening, and taking up the earth to make the ditch. This forward end of the trough D , is suspended
85 from frame A, A , by chains e, e , which are connected to a transverse drum e' , having its bearing on the top of frame A, A . This drum e' , has a ratchet wheel e^2 , keyed to it into the teeth of which a spring pawl e^3 , en-
90 gages. The drum e' , is used to raise or depress the trough D , and the pawl e^3 , to keep the trough in the desired position. The continuous slotted apron E , passes over rollers g, g , at each end of the trough D , and
95 this apron E is revolved in the direction of the arrows in Fig. 1, by the pinion spur wheel c , which is keyed to fulcrum shaft b , the teeth of wheel c , engaging with rack g' on apron E . Shaft b , is rotated by a large
100 spur wheel h , on axle B , which engages with a small toothed wheel f , on the one end of

fulcrum shaft *b*. The sides of trough *D*, extend out at the rear of this trough beyond the apron *E*, and to the extreme ends of these extended sides, posts *i*, *i*, are secured
 5 which extend downward a suitable distance and connect the double inclined troughs *G*, *G*, to the main trough *D*. Two more posts *i'*, *i'*, are also used to assist in supporting the troughs *G*, *G*, and these four posts se-
 10 cure these troughs *G*, *G*, firmly to the main trough *D*.

Troughs *G*, *G*, project out from each side (underneath) of the main trough equal distances, and are inclined from the middle to
 15 their extreme ends. These two troughs *G*, *G*, run at right angles to the main trough *D*, and receive the earth which is carried up the inclined trough *D*, and discharge this earth on each side of the machine. For this pur-
 20 pose each trough *G*, *G*, has an endless apron *I*, arranged in its bottom, shown in Figs. 1 and 2, which aprons pass over rollers *l'*, *l'*, at each end of the troughs. The rollers *l'*, *l'*, of each apron are brought close together in
 25 the middle of the two troughs *G*, *G*, and these two rollers are turned in the direction of the arrows shown in Fig. 2, by a double bevel wheel *m*, which engages with bevel wheels *n*, *n*, on the shaft of each roller *l'* *l'*.
 30 The shaft of the double bevel wheel *m*, carries two pulley wheels *p*, *p*, and these wheels *p*, *p*, receive motion from the axle-tree *B*, through belts *r*, *r*, when the machine is moved along. It will thus be seen that the
 35 discharging troughs with their mechanism for carrying off the earth deposited on them from the main trough *D*, are connected to this main trough *D*, and are raised and depressed by the chains *e*, *e*, and windlass *e*.
 40 The fall of the earth from the three troughs will be the same at the commencement of digging the ditch as it is when the ditch has attained its greatest depth.

H, is a perpendicular colter which passes
 45 through the front portion *A'*, of the frame, and is suitably keyed to the frame so that it may be raised or depressed at pleasure, and also secured in a rigid position. This colter *H*, precedes the plow *d*, on the elevating
 50 trough *D*, and being very wide at its rear edge it forms a wide channel in the center of the ditch and assists the plow *d*, in loosening the earth.

On each side of the trough *D*, and near
 55 the front end thereof, is a vertical colter *J*. These two colters *J*, *J*, are secured rigidly to the sides of trough *D*, and project down below the bottom of this trough, so that their lower ends will touch, or nearly touch, the
 60 bottom of the ditch. The cutting portions of these blades *J*, *J*, project out from the sides of the trough *D*, sufficiently far to cut away enough of the earth from the sides of the ditch to allow the trough *D*, to pass

freely through it during the operation of
 65 deepening the ditch.

The operation of the entire machine is as follows: The cutting parts of the machine are all elevated so that the wheels only will rest upon the ground, and in this condition
 70 the machine may be moved about from place to place by animals which are hitched to clevis *s*, on the front end of the machine. The ground is first properly laid off in the
 75 usual manner, and the machine is drawn to the place where the ditch is to be commenced, when the front end of trough *D*, is depressed a suitable distance by unwinding the chains
 80 *e*, *e*, from drum *e'*, pawl *e''*, then prevents the trough *D*, from being further depressed while the machine is in operation. When the
 85 colter *H*, has been properly adjusted the machine is moved along in the line marked out for the ditch. Colter *H*, cuts a wide channel in the earth and loosens the earth to some
 90 extent, besides clearing off a passage for the plow *d*, which succeeds the colter *H*, and scoops up the earth the full width of the ditch, as deep as it is found practicable to cut. This earth which is taken up by the
 95 plow is forced back on the elevating apron *E*, and as this apron revolves in the direction indicated by the arrows in Figs. 1 and 2, the earth is carried to the rear end of the
 100 trough and deposited in the middle of the double inclined troughs *G*, *G*, on the inclined revolving aprons *I*, *I*, in these troughs, which aprons carry off the earth and discharge it a proper distance from the sides of the ditch. The motion of the aprons *E*, and *I*, *I*, should
 105 be so regulated with reference to the quantity of earth taken up by the plow *d*, that the earth will be carried off as fast as it is loosened. The ditch is gradually deepened by passing the plow through it and depressing
 110 this plow so that at each passage of the machine the plow will take up a certain quantity of earth which is elevated and discharged on each side of the ditch as before described.

I am aware that ditching machines have previously been provided with side colters placed at front, abreast of or forming part of the scooping plow and extending laterally
 115 beyond any other portion of the machine within the ditch. Such machines are objectionable from liability to choke. On my machine the plow excavates chiefly at the bottom of the ditch, and the trough by which the earth is conveyed from the plow to the
 120 elevator retains its full width, so as to avoid choking and the side colters following widen the ditch sufficiently to permit the free passage of the plow. By this means the machine is made to operate with much better
 125 effect and is rendered much more easy of draft.

Having thus described my invention what

I claim as new and desire to secure by Letters Patent is:

In the described combination with the colter H, plow *d*, trough D, and elevator E,
5 of a ditching machine, the arrangement of the colters J, J, attached to the sides of the machine at a distance in the rear of the plow

and projecting laterally beyond the path of the latter, all as herein shown and explained and for the purposes set forth.

GEORGE IVES.

Witnesses:

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A. D. W. HOWARD.