

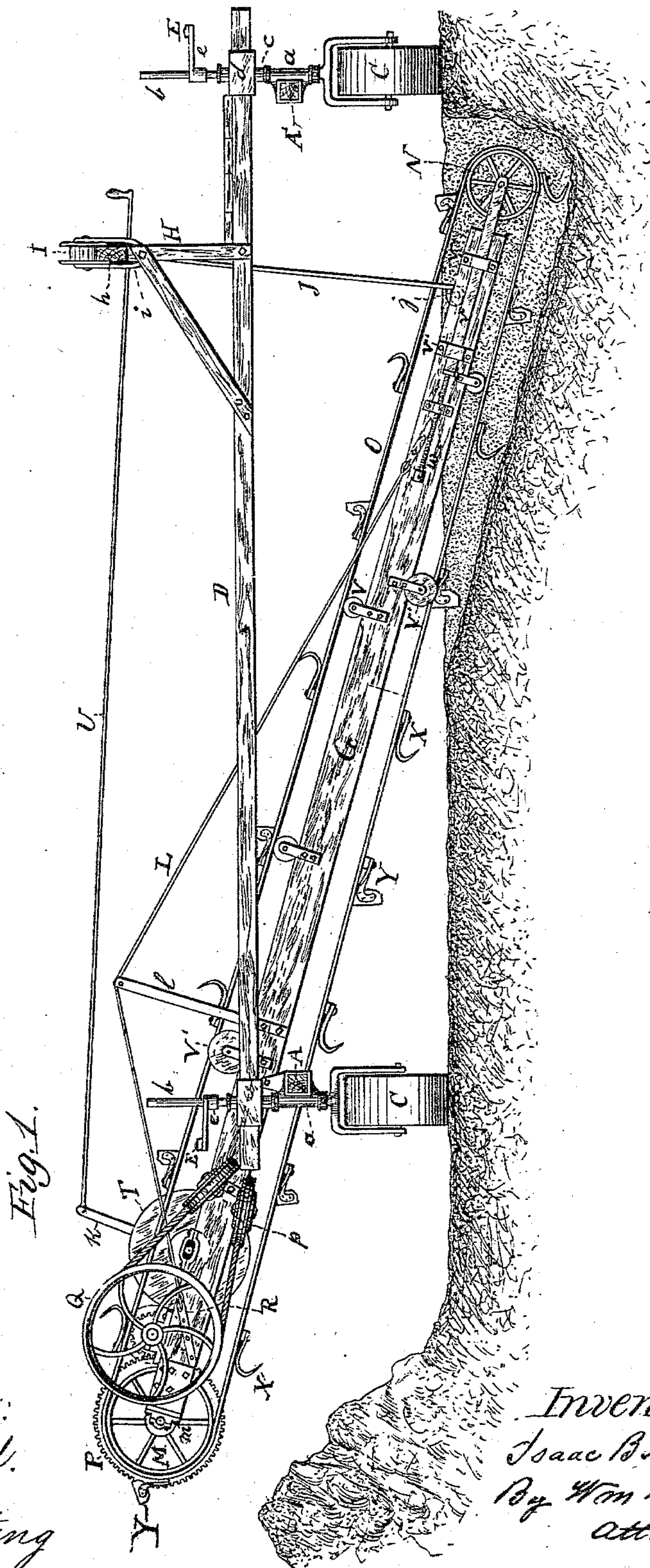
(No Model.)

3 Sheets—Sheet 1.

I. B. HAMMOND.
DITCHING AND GRADING MACHINE.

No. 295,247:

Patented Mar. 18, 1884.



Witnesses:
C. E. Gaylord.
Louis Kolting

Inventor:
Isaac B Hammond
By Wm H Lotz
Attorney

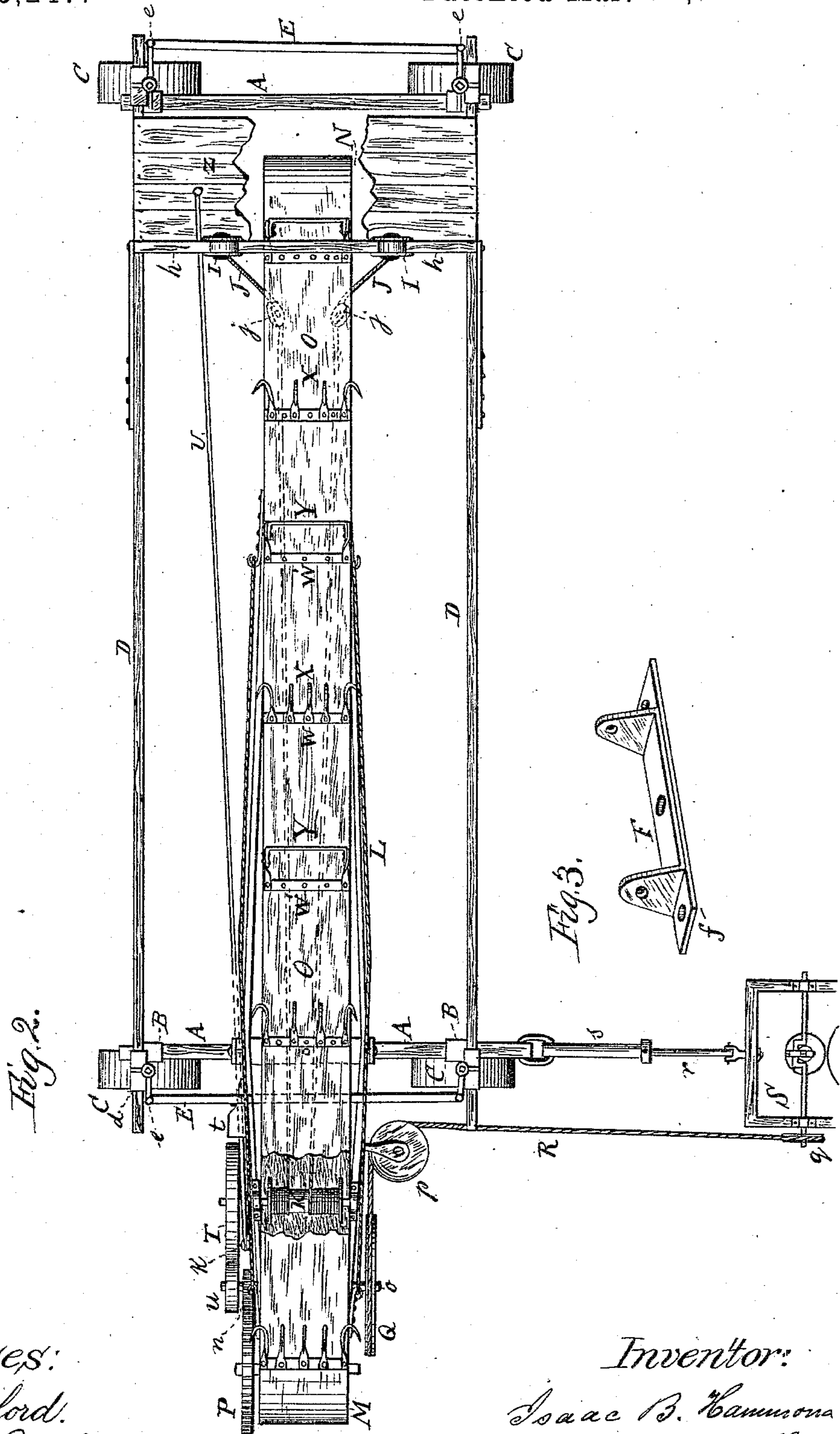
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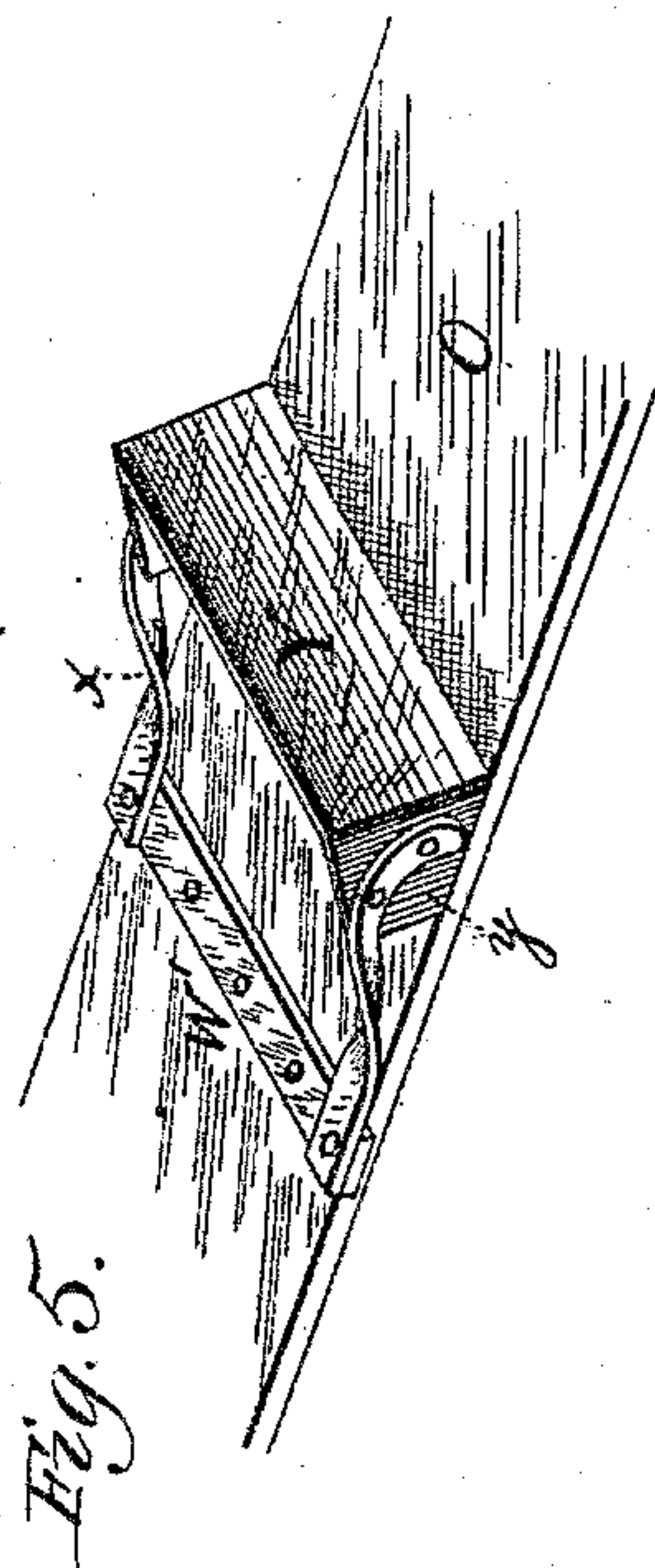


Fig. 6.

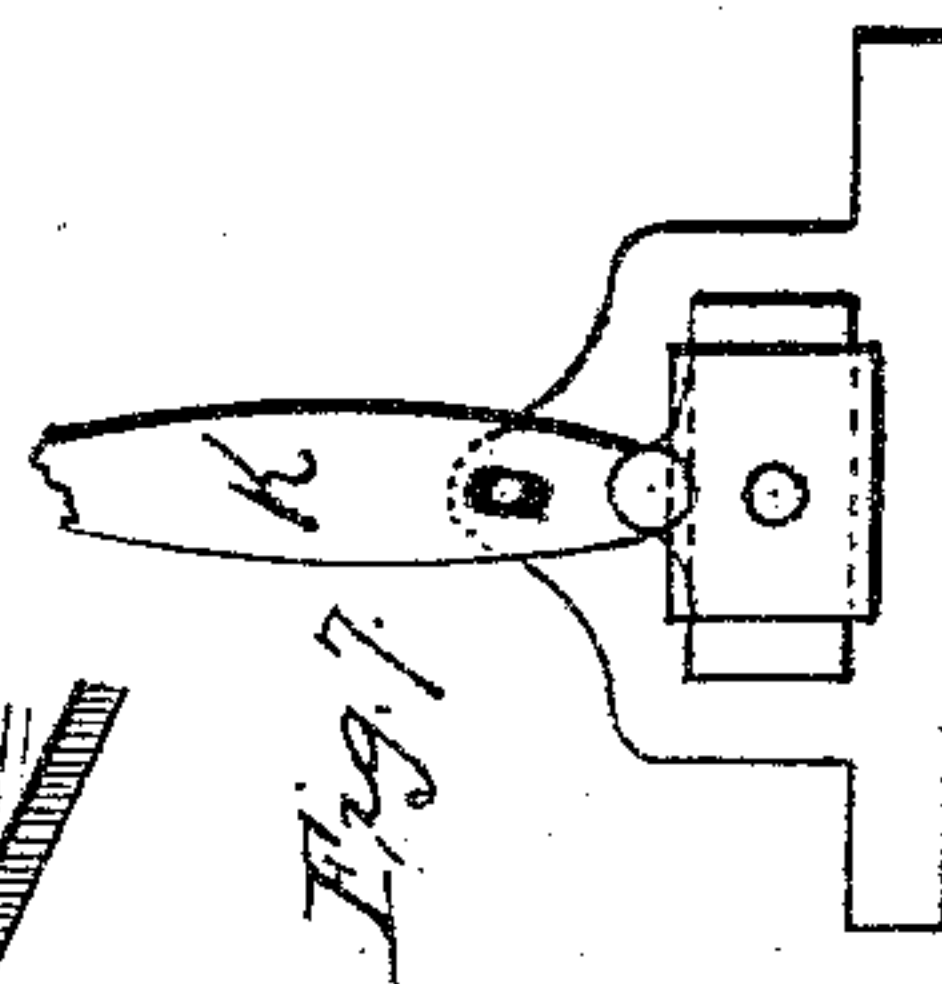
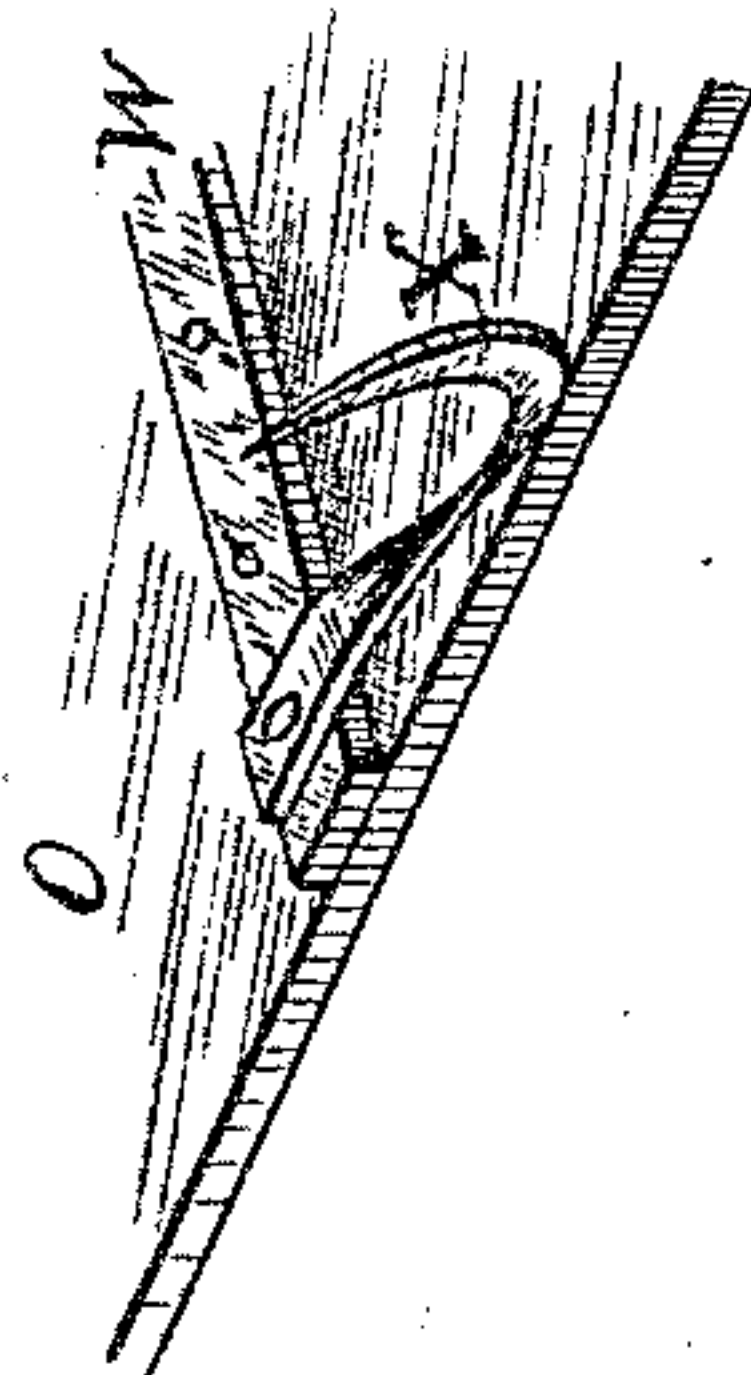
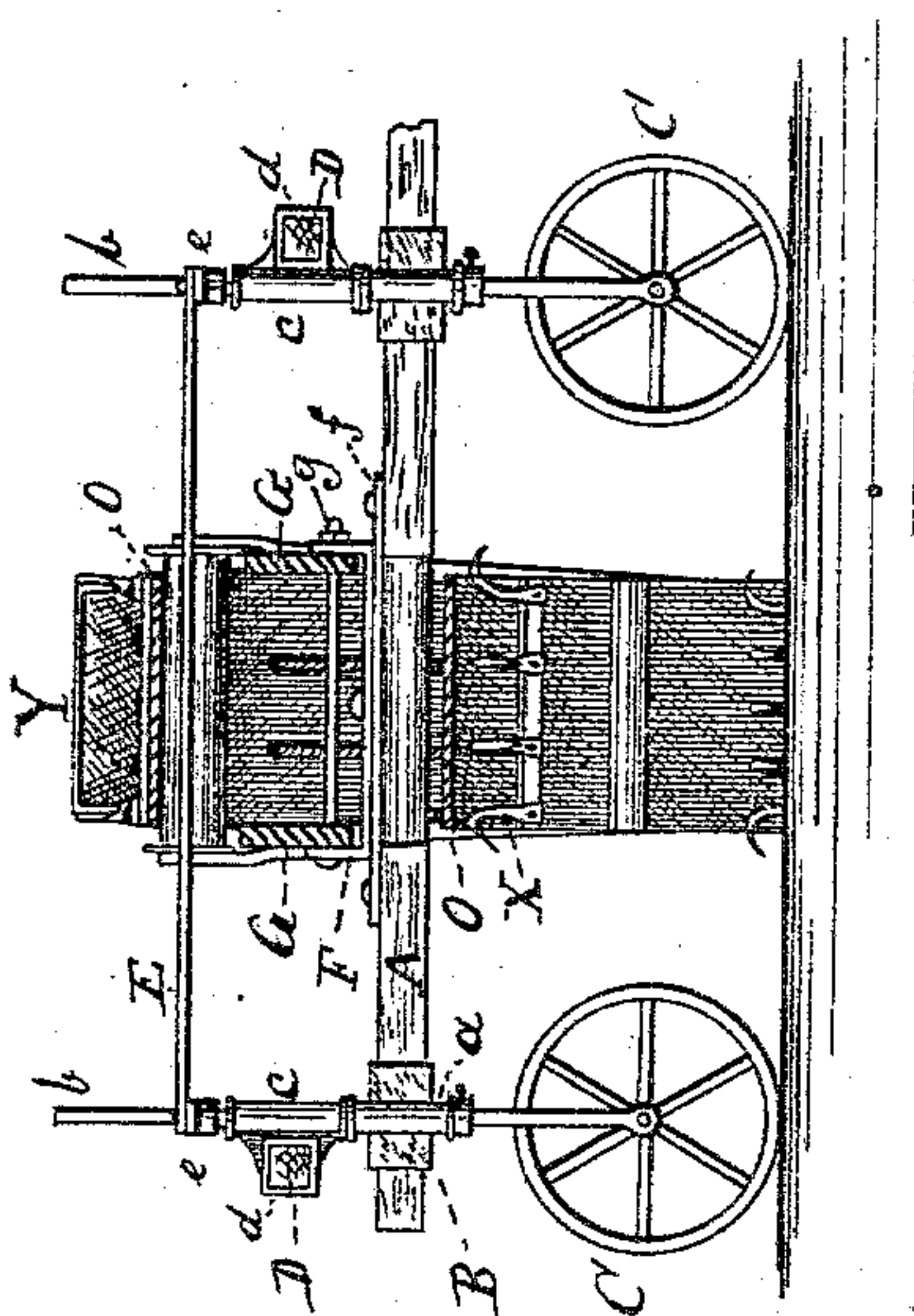


Fig. 4.



Witnesses:
C. E. Gaylord.
Louis Kottling

Inventor:
Isaac B. Hammond
By Wm H Lotz
Attorney

UNITED STATES PATENT OFFICE.

ISAAC B. HAMMOND, OF CHICAGO, ILLINOIS.

DITCHING AND GRADING MACHINE.

SPECIFICATION forming part of Letters Patent No. 295,247, dated March 18, 1884.

Application filed December 28, 1882. (No model.)

To all whom it may concern:

Be it known that I, ISAAC B. HAMMOND, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful
5 Improvements in Ditching and Grading Machines; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference
10 marked thereon, which form a part of this specification.

This invention relates to machines for digging earth and removing it, and more particularly to machines adapted for the grading of
15 railroad-beds; and it is an improvement on the machine described in Letters Patent of the United States No. 251,046, which were granted to me on December 20, 1881, the object being to construct a machine that is
20 mounted on wheels, which will travel on the intact ground, and that will consecutively, cut after cut, break up the soil, and scoop it up-hill until the proper ditch and slope of the railway-bed is formed, and that will deport
25 the earth thus removed, and will either dump it for fillings or deliver it into transport-wagons, the whole being arranged to be driven by steam-power. For this purpose my invention consists in the construction and arrangement
30 of the elements that will perform the designed functions, as hereinafter described, and specifically claimed.

In the accompanying drawings, Figure 1 represents a side elevation, and Fig. 2 a plan,
35 of the machine; Fig. 3, a perspective view of the trunnion-plate; Fig. 4, a sectional end elevation of the machine; Fig. 5, a detailed perspective view of part of the conveyer-belt with one of the scoops attached; and Fig. 6,
40 a similar view of part of the belt with one of the plow-hooks attached. Fig. 7 represents a side elevation of one of the sliding boxes hereinafter described.

Corresponding letters in the several figures
45 of the drawings designate like parts.

A and A' denote the main axle-trees, that upon their ends have sleeves B, provided with vertical tubes *a*, each forming the bearing for a vertical mandrel, *b*, that has a bifurcated bottom extension, between the prongs
50 of which is pivoted a wheel, C. Over each

vertical mandrel, *b*, is also placed a tube, *c*, that rests upon tube *a* of sleeve B, and is rigid with a square sleeve, *d*, and through these sleeves *d* are passed the ends of longitudinal
55 beams D. Upon the upwardly-projecting end of each mandrel *b* is secured a crank, *e*, and these cranks *e* of the forward end, as well as of the rearward end, are connected, each pair, by a bar, E, in such a manner that both cranks
60 of either end of the frame will be turned simultaneously, and both wheels C will thus be in a corresponding direction.

Upon the center of axle A is secured a plate, *f*, and upon this is coupled the trunnion-plate
65 F by a king-bolt passed through holes in the center of both plates and the axle A in a manner that such trunnion-plate F can turn thereon. Between the eyed end lugs of such trunnion-plate F are pivotally supported upon a bolt,
70 *g*, the side beams, G, that constitute the swinging frame, and are suitably braced together. This frame, as will be noticed, is thus supported near one end upon axle-tree A, while its other end reaches near to axle-tree A', and
75 each beam G is trussed by a rod, L, that is spanned over a strut, *l*, and is coupled with its ends to the opposite ends of such beam G.

Upon beams D are secured uprights H, that are steadied by braces, and are connected by
80 a bridge-tree, *h*, and upon bridge-tree *h* ride two pulleys, I, that have bifurcated hangers *i*, to which are coupled the end of ropes or chains J, that pass over sheaves *j* between near one end of beams G, and thence pass between
85 such beams to near the opposite end of the same, where such ropes J are secured to and wind upon a drum, K, that is pivoted between the beams G.

To the opposite ends of beams G are arranged pulleys M and N, over which the endless rubber belt O is stretched. The shaft of pulley M is pivoted in boxes *m*, that are secured against the ends of beams G, and upon the overhanging end of such shaft is mounted
95 a gear-wheel, P, that meshes with the teeth of a pinion, *n*, mounted upon the driving-shaft *o*, and upon the opposite end of this driving-shaft is mounted, again, a grooved pulley, Q. An endless rope, R, is passed over this pulley
100 Q, is thence guided over two sheaves, *p*, and thence passed over the driving-pulley *q* of a

portable engine, S, the truck-frame of which has pivotally connected a rod, *r*, that telescopes into a tube, *s*, which, again, is pivotally connected with the end of axle-beam A, and in which such rod *r* is adjustably secured by a set-screw. By this device the ditching-machine frame is coupled to the engine-frame in a manner to vary the distance between such frames, for stretching the drive-rope R to be taut upon its pulleys, and to resist the tension of such rope while transmitting power from the engine to the ditching-machine.

Upon the driving-shaft *o* is also mounted a small friction-wheel, *u*, that engages with the face of a pulley, T, mounted upon the overhanging end of the shaft of drum K, which shaft is journaled in sliding boxes, as shown in Fig. 7 of the drawings, that are moved by a lever, K. By a rod, U, that is connected to the upper extremity of lever K and extends beyond the bridge-tree *h* at the opposite end of the machine, such lever K can be swung either to force the pulley T against the friction-wheel *u*, for starting the drum K, or to force the pulley T against a friction-shoe or block *t*, for stopping and braking the drum. Upon the beams D, over axle-tree A', is provided a platform, Z, upon which the operator will stand for handling rod U.

The shaft of the lower pulley, N, is pivoted between two eye-bars, *v*, which are guided in boxes *v'*, that are bolted against the sides of beams G in such manner that each of such bars *v* can be shifted longitudinally, and is adjusted by a screw, *w*, for stretching and tightening the belt O. The rubber belt O is guided and supported on a series of rollers, V, that are pivoted in suitable brackets upon and below the beams G, and a few of these rollers V' are provided with flanges that will tend to hold the belt central upon the pulleys M and N.

Upon the exterior surface of belt O are secured cross-bars W W' at equal distance apart. These cross-bars are of a length that is equal to the width of the belt, and are fastened to such belt by rivets or bolts. Consecutively upon every other bar W are secured, again by rivets or bolts, a series of plow-hooks, X, the exterior two of each row being curved outward to cut a sufficient clearance in the soil for the edges of the belt to remain intact. The intermediate bars, W', carry the scoops Y, that consist each of a steel plate having rectangular side flanges, *y*. (See Fig. 5.) Each such scoop is secured to its respective bar W' by two curved and half-twisted straps, *x*, that with one end are riveted to the side flanges, *y*, of the scoop, and with their opposite ends are bolted or riveted to the bar W'. The plow-hooks X will loosen the soil on their down passage, and the scoop, following each set of plow-hooks, will scrape such loosened soil downward into the bottom of the ditch, and thence, being carried over the pulley N, they will elevate such soil to rest upon belt O, that will convey it, and after reaching pulley M will dump the

soil either into a cart, for further transportation, or upon the road-bed. The construction of the scoops is such that with the surface of the belt they form buckets that will hold the soil, and by the peculiar device of connecting the scoops to the belt by bars W and by rigid straps *x*, where the belt passes over pulley M, the bucket will be turned away from the belt, whereby the soil is loosened and readily discharged therefrom by centrifugal force and by its own gravity.

By the arrangement for turning the wheels C in pairs to any desired direction, the machine can be transported over short curved roads, besides the advantage of changing the angle of the machine during the operation of the same to correspond with the line of the cut to be made.

The axle-trees A and the longitudinal beams D, that form the main or supporting frame, being pivotally connected by the mandrels *b* in the manner described, such main frame will accommodate itself to any desired angle, to change from a rectangular to a rhomboidal shape; and one end of frame G being pivotally supported on one of the axle-trees A, with its other end suspended to the main frame on rollers I, that ride upon bridge-tree *h*, such frame G can be swung to occupy any angular position relative to beams D inside of the main frame that may be desirable.

As will be noticed from Fig. 1, one pair of wheels, C, is to ride upon the road-bed, while the other pair is intended, generally, to travel on the intact ground on the opposite side of the ditch to be cut; but in locations where it becomes necessary the sleeves *d* can be shifted toward the middle of beams D, so that all the wheels will ride upon the road-bed.

The machine being placed in position, it is set in motion, and the frame G is lowered by the hoist-drum K until the plow hooks and scoops will touch the ground, when the digging will commence, and will be continued until the ditch has been cut to the proper depth or the slope of the road-bed has been brought to the proper angle. The furrow thus cut will be of a width equal to the width of the scoops. Now, by means of the hoist-drum K, the frame G is lifted again until the plow hooks and scoops will clear the ground, when the machine will be moved forward just the width of a furrow, and another cut will be made, and so on in succession, cut after cut.

When it is desirable to give the road-bed a very steep slope, the axle A can be set higher above the wheels C by placing washers or thimbles over the mandrels *b* below sleeves *a*, for such sleeves to rest upon.

Fender-plates may be secured against the lower or swinging end of frame G, that will close the open spaces between the belt, to prevent loose soil from crowding between the belt and pulley N.

What I claim is—

1. In a ditching and grading machine, the scoops Y, rigidly connected by straps *x* to

bars W, which are secured upon an endless belt, O, that is stretched over pulleys M and N, all constructed and arranged as and for the purpose set forth.

5 2. In a ditching and grading machine, the combination of the supporting-frame, composed of axle-trees A A' and longitudinal beams D, independently swiveled upon mandrels b, and the wheels C, pivoted in the bifurcated shanks of mandrel b, substantially as and for the purpose set forth.

10 3. In a ditching and grading machine, the endless belt O, stretched over pulleys M and N of swinging frame G, and having alternate plow-hooks X and scoops Y, such pulley M being driven by a gear-wheel, P, pinion n, and pulley Q, and from the engine S by an endless rope, R, that is guided over sheaves p, all constructed and arranged substantially as described, to operate as specified.

20 4. In a ditching and grading machine, the axle-trees A A' and longitudinal beams D, pivotally connected each to the other by mandrels b, that have wheels C and cranks e, connected by bars E, all substantially as and for the purpose described and shown.

25 5. In a ditching and grading machine, the combination of main frame, composed of axle-trees A A' and longitudinal beam D, wheels C, pivoted in the bifurcated shanks of mandrel b, frame G, pivotally supported on bolt g upon plate F and plate f, all substantially as and for the purpose set forth.

30 6. In a ditching and grading machine, the main frame, consisting of axle-trees A and A' and longitudinal beams D, having uprights H,

with bridge-tree h, and supported on wheels C, in combination with swinging frame G, pivotally supported at one end on axle-tree A, and suspended at its opposite end by ropes J, that are coupled to hangers i of rollers I, passed over sheaves j, and thence wound upon drum K, all substantially as and for the purpose set forth.

45 7. In a ditching and grading machine, the combination, with the main frame having axle-trees A A', longitudinal beams D, and bridge-tree h, with rollers I and hangers i, of swinging frame G, having sheaves j, drum K, having its shaft journaled in sliding boxes, with pulley T, driving-shaft o, with friction-wheel u, brake-shoe t, shifting-lever k, with rod U and ropes J, coupled to hangers i, passed over sheaves j, and thence winding upon drum K, all constructed and arranged to operate substantially as described, for the purpose specified.

50 8. In a ditching and grading machine, the combination, with frame G, of driving-pulley Q and sheaves p, rope or belt R, main frame having axle-tree A, having tube s, portable engine S, having rod r, adapted to enter tube s and be adjustably secured therein by a set-screw, all substantially as and for the purpose set forth.

65 In testimony that I claim the foregoing as my invention I affix my signature in presence of two witnesses.

ISAAC B. HAMMOND.

Witnesses:

LOUIS NOLTING,
ADAM GEO. WHITE.