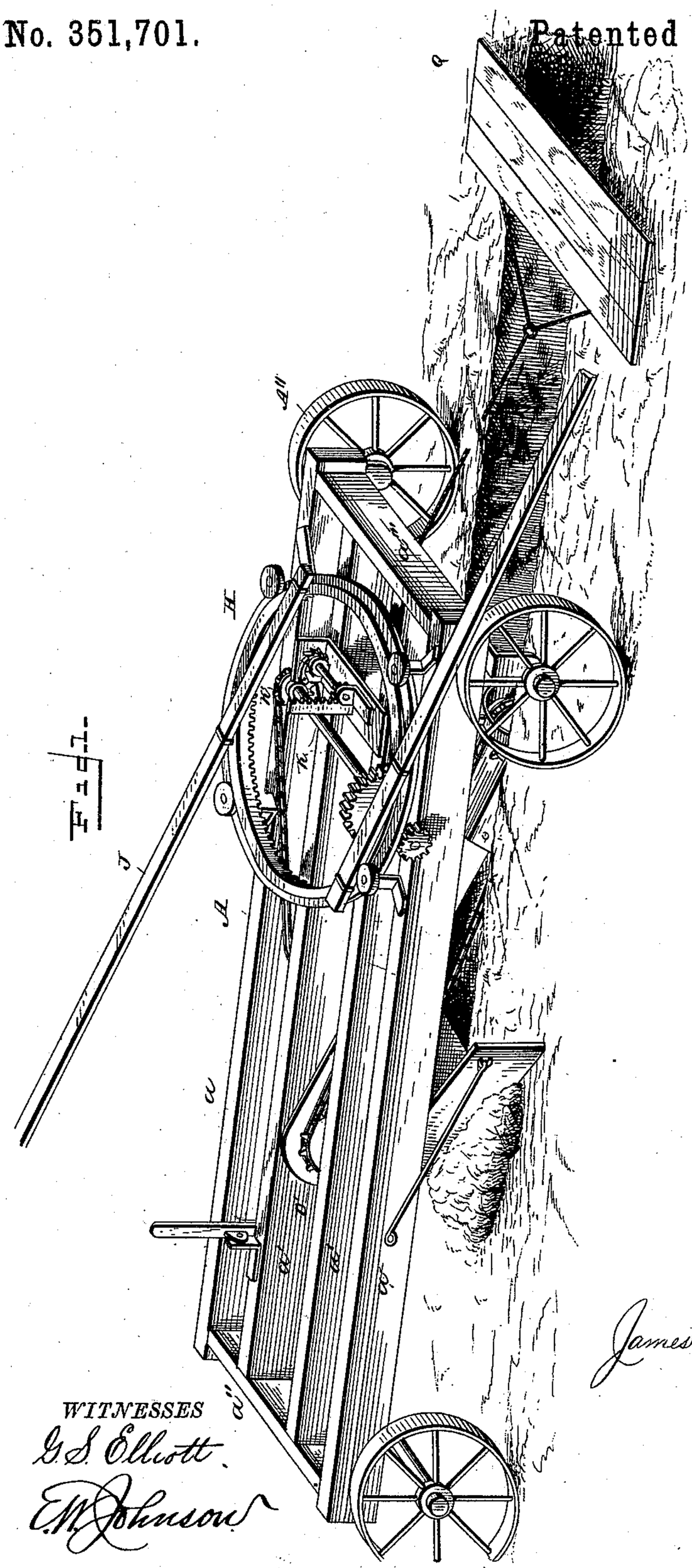
(No Model.) 3 Sheets—Sheet 1.

J. W. HUMPHREYS.

DITCHING MACHINE.

No. 351,701. Patented Oct. 26, 1886.



WITNESSES

G. S. Elliott.

E. M. Johnson

James W. Humphreys.

INVENTOR

Attorney

(No Model.) 3 Sheets—Sheet 2.

J. W. HUMPHREYS.

DITCHING MACHINE.

No. 351,701. Patented Oct. 26, 1886.

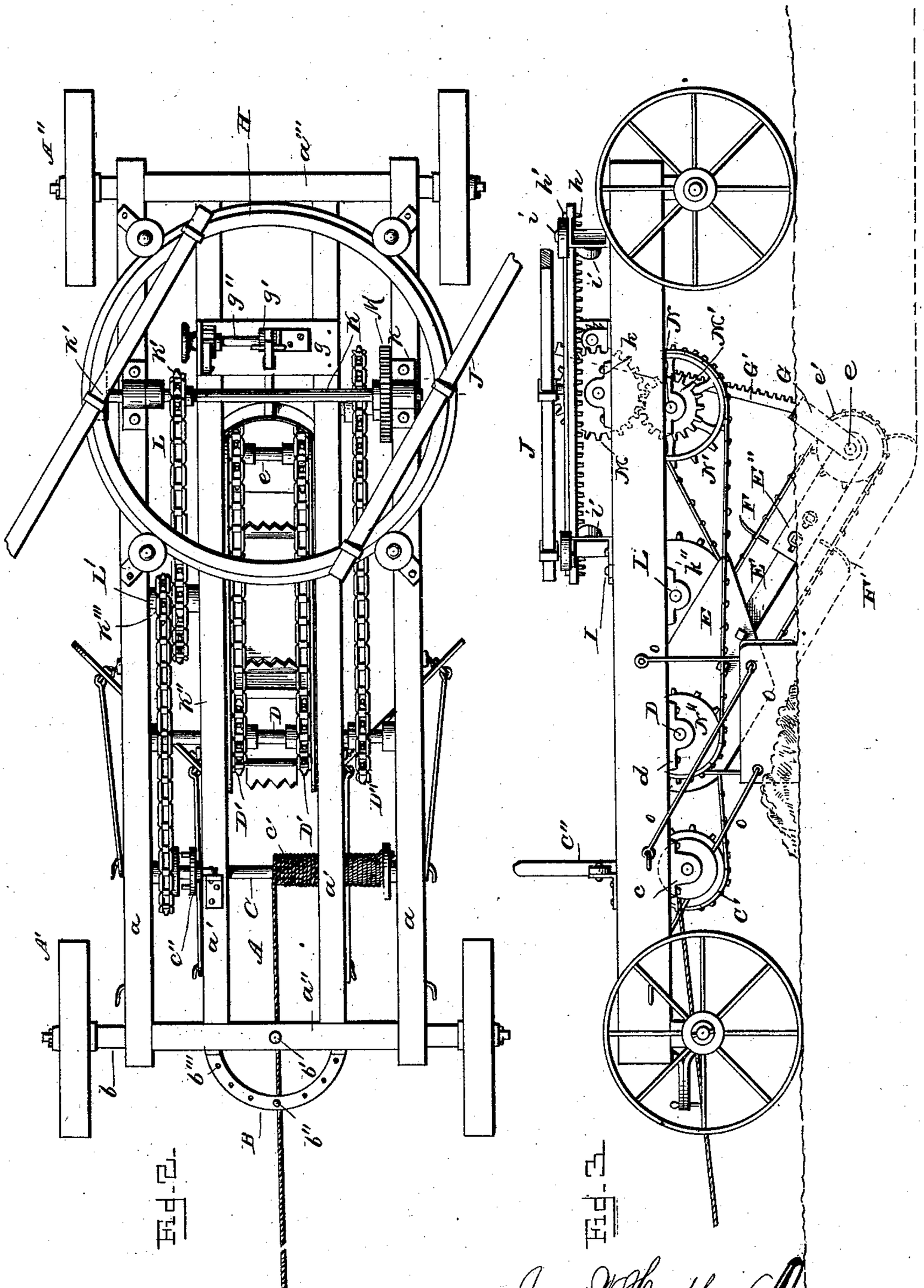


FIG. 2.

FIG. 1.

WITNESSES

F. L. Ourand.

E. W. Johnson

James W. Humphreys.

INVENTOR

Attorney

(No Model.) 3 Sheets—Sheet 3.

J. W. HUMPHREYS.

DITCHING MACHINE.

No. 351,701. Patented Oct. 26, 1886.

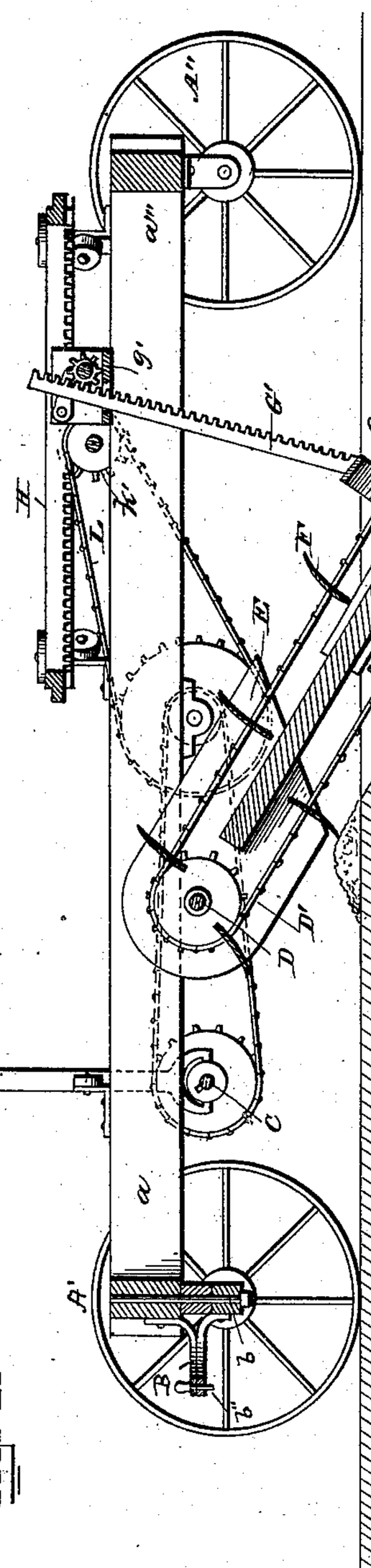


Fig. 4.

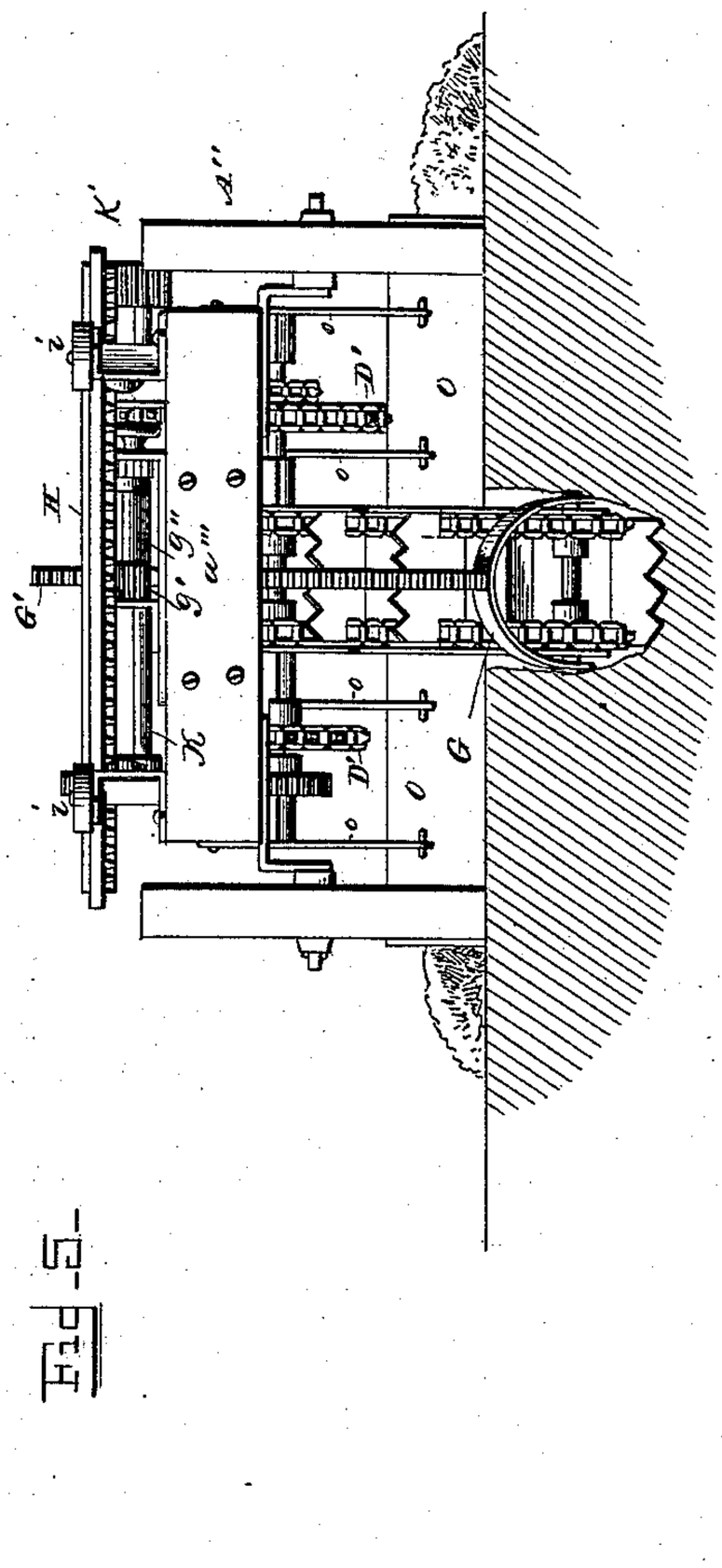


Fig. 5.

WITNESSES

F. L. Ourand.

E. W. Johnson

James W. Humphreys INVENTOR

Attorney

UNITED STATES PATENT OFFICE.

JAMES W. HUMPHREYS, OF IROQUOIS, ILLINOIS.

DITCHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 351,701, dated October 26, 1886.

Application filed January 28, 1886. Serial No. 190,075. (No model.)

To all whom it may concern:

Be it known that I, JAMES W. HUMPHREYS, a citizen of the United States of America, residing at Iroquois, in the county of Iroquois and State of Illinois, have invented certain new and useful Improvements in Ditching-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

My invention relates to certain new and useful improvements in ditching-machines, the object of the same being to provide an excavating apparatus or ditcher which can be operated by the circular horse-power mounted on the main frame, said horse-power being for the purpose of operating an endless ditcher, and also for moving the machine forward when desired; and to this end my invention consists in the construction and combination of the parts, as will be hereinafter fully set forth, and specifically pointed out in the claims.

In the accompanying drawings, which illustrate my invention, Figure 1 is a perspective view of an excavating or ditching machine constructed in accordance with my improvement. Fig. 2 is a plan view. Fig. 3 is a side view. Fig. 4 is a longitudinal sectional and Fig. 5 is an end view.

A represents the main frame, which preferably consists of four longitudinal beams, *a a a' a'*, which are rigidly connected to transverse end beams, *a'' a'''*, the aforesaid beams being rigidly connected to each other in a substantial manner. To the rear corners of the main frame are attached stub axles, upon which are mounted the rear supporting-wheels, A', the front supporting-wheels being secured upon a pivotal axle, *b*, which is attached to the main frame by a king-bolt, *b'*. Said axle and the front cross-beam of the main frame have each rigidly attached thereto similarly-shaped semicircular plates B, said plates being attached to the cross-beam and axle. These plates have a series of corresponding perforations, B''', whereby they can be secured to each other by a bolt, *b''*, so as to maintain the axle and wheels at an angle with the front cross-beam of the frame.

Rear of the front axle the main frame A is provided with bearings *c*, within which is journaled a shaft, C, said shaft carrying centrally a drum, *c'*, around which is wound a rope or flexible connection which passes forwardly under the front axle and beyond the same, where it is secured to a pin, so that when the shaft C is rotated in the proper direction the apparatus will be drawn forward.

The shaft C carries near one end a sprocket-wheel, C', which is loosely mounted on the shaft C, and adjacent thereto a clutch, *c''*, is mounted on the shaft, this clutch having outwardly-projecting pins which engage with perforations in the sprocket-wheel, and the same moves laterally on the shaft over a spline or feather. This clutch may be drawn in and out of gear by means of a lever, C'', which is pivotally attached to one of the longitudinal beams, *a'*, of the main frame.

D refers to a shaft which is journaled in bearings *d*, which are secured to the side pieces, *a a*, of the frame, said shaft having rigidly attached thereto sprocket-wheels D' and D'', the first-mentioned sprocket-wheels being located between the longitudinal beams *a'*. Metal plates or fenders E are pivotally attached to said shaft between the sprocket-wheels D' and the beams *a'* of the frame, and to said fenders or plates E is rigidly secured a beam, E', said beam at its lower ends carrying extensible metallic side pieces E'', the ends of which are perforated for the passage of a short shaft, *e*, which carries sprocket-wheels *e'*. Over the sprocket-wheels D' of the shaft D and *e'* of the shaft *e* pass endless chains F, which are connected to each other at suitable intervals by cross-pieces, which carry cutting-blades or excavators F', said cutting-blades or excavators being serrated at their ends which contact with the earth, and are bent slightly forward, as shown. The frame which carries the shovels F' is pivotally attached to the shaft D, and the end pieces E'' of said frame can be adjusted by suitable bolts, so as to take up any slack which may occur in the chain F, which carries the cutters. A bent bar or bail, G, having perforated ends, is secured over the shaft *e*, be-

yond the extension E″, and to the upper portion of this bail G is rigidly attached a rack-bar, G′, which extends upwardly and passes through an opening in the plate *g*, which is attached to the bars *a′*. The teeth of this rack-bar engage with a pinion, *g′*, which is secured on the shaft *g″*, said shaft being provided with a ratchet-wheel and pawl, and one end thereof is also provided with a hand-wheel for rotating said shaft.

H represents a metallic circle or rim, which is provided on its lower edge with gear-teeth *h*, and the upper edge thereof, adjacent to the periphery, is grooved, as shown at *h′*, and upon said groove rollers *i* bear, so as to prevent the upward movement of said rim. Rollers *i′* bear upon the under side of said rim, and by means of these rollers, which are pivotally attached to angle-bars I on the beams *a a* of the frame, the rim is held securely in position, and a central bearing is unnecessary. At suitable points the upper edge of the rim is provided with means for rigidly securing thereto poles J, which extend outwardly therefrom, and carry at their ends whiffletrees, to which horses are attached for rotating said rim.

K refers to a shaft, which is journaled in bearings *k*, located on the upper edge of the beams *a a*, and said shaft extends at one end beyond the frame, and is provided with a gear-wheel, K′, which meshes with the teeth *h* of the rim. The shaft K is also provided with a sprocket-wheel, *k′*, over which passes a chain, L, which connects the shaft K with a sprocket-wheel, *k″*, which is mounted rigidly on a shaft, L′. A similar sprocket-wheel, *k‴*, is also mounted on the shaft L′, and is connected to the sprocket-wheel C′ on the shaft C by means of a suitable chain, as shown.

The shaft K, hereinbefore referred to, has rigidly attached thereon a cog-wheel, M, which meshes with a cog-wheel, M′, on a short shaft, N, said shaft also carrying a sprocket-wheel, N′, over which passes an endless chain for communicating motion to the sprocket-wheel N″ on the shaft D, which when rotated operates the excavators.

Adjacent to the front portion of the endless excavators are pivotally attached scrapers O O, which incline inwardly, and said scrapers are attached to the main frame by means of rods *o o*, which are adjustable on said main frame, so that the vertical position and the angle thereof can be varied. These scrapers, after the earth has been elevated, remove the same from the sides of the ditch, and when the machine is not in use they may be elevated, so as not to contact with the ground. The front axle, *b*, may have secured thereto a tongue the hounds of which will pass around the semicircular plates, and the draft-cord may pass under said tongue and through suitable guide-rollers attached thereto.

The bars J, which are attached to the toothed rim H, are of sufficient length to allow the horses to pass entirely around the apparatus, and to the rear end of the main frame is attached, by means of a flexible connection, the plate Q, which is drawn by the main frame, so as to provide a bridge over the ditch upon which the horses may pass while walking around the apparatus to operate the same. Instead of using horse-power to operate the wheel, an engine may be mounted on the main frame and provided with suitable gearing to rotate the operating-shafts.

The operation of my invention is as follows: In commencing to excavate a ditch, the pivoted frame which carries the shovels F is adjusted so as to be at a slight angle or almost parallel with the surface of the ground, and said frame is lowered by means of the rack-bar G′ as the earth is carried out of the ditch. After the ditch has been dug to a sufficient depth the clutch *c″* is thrown in gear with the ratchet-wheel, which causes the rope upon said shaft to wind upon the drum, and after the machine has been moved a sufficient distance forward the clutch is loosened and the drum released, the rope is then carried forward and secured, when the digging may be proceeded with.

By means of this apparatus the earth is elevated but a slight distance above the surface of the ditch, and is removed from the edges thereof by the scrapers as the machine is moved forward.

When it is desired to remove the apparatus, the endless excavating-shovels may be elevated, so as to be entirely out of contact with the ground, and the scrapers may also be similarly elevated. The apparatus can then be moved from place to place.

I claim—

1. In a ditching-machine, an endless excavating-chain provided with shovels mounted on a pivoted frame, said frame having side pieces and means for vertically adjusting the same, scrapers connected to the main frame adjacent to the side pieces of the excavating-chain, substantially as shown, and for the purpose set forth.

2. In combination with the ditching-machine constructed substantially as described, an endless excavator consisting of side pieces, E, which are pivotally attached to the supporting-frame, a central bar, E′, secured thereto, and extensible end pieces or plates E″, and parallel endless belts connected to each other by cross-pieces having curved shovels connected thereto, substantially as shown, and for the purpose set forth.

3. In a ditching-machine mounted on supporting-wheels, a main frame provided with the semicircular perforated plate, in combination with the axle *b*, having a similar plate secured thereto, and a locking-pin, substantially as shown, and for the purpose set forth.

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

JAMES W. HUMPHREYS.

Witnesses:
WILLIAM H. MCCLAIN,
DAVID ELY.