

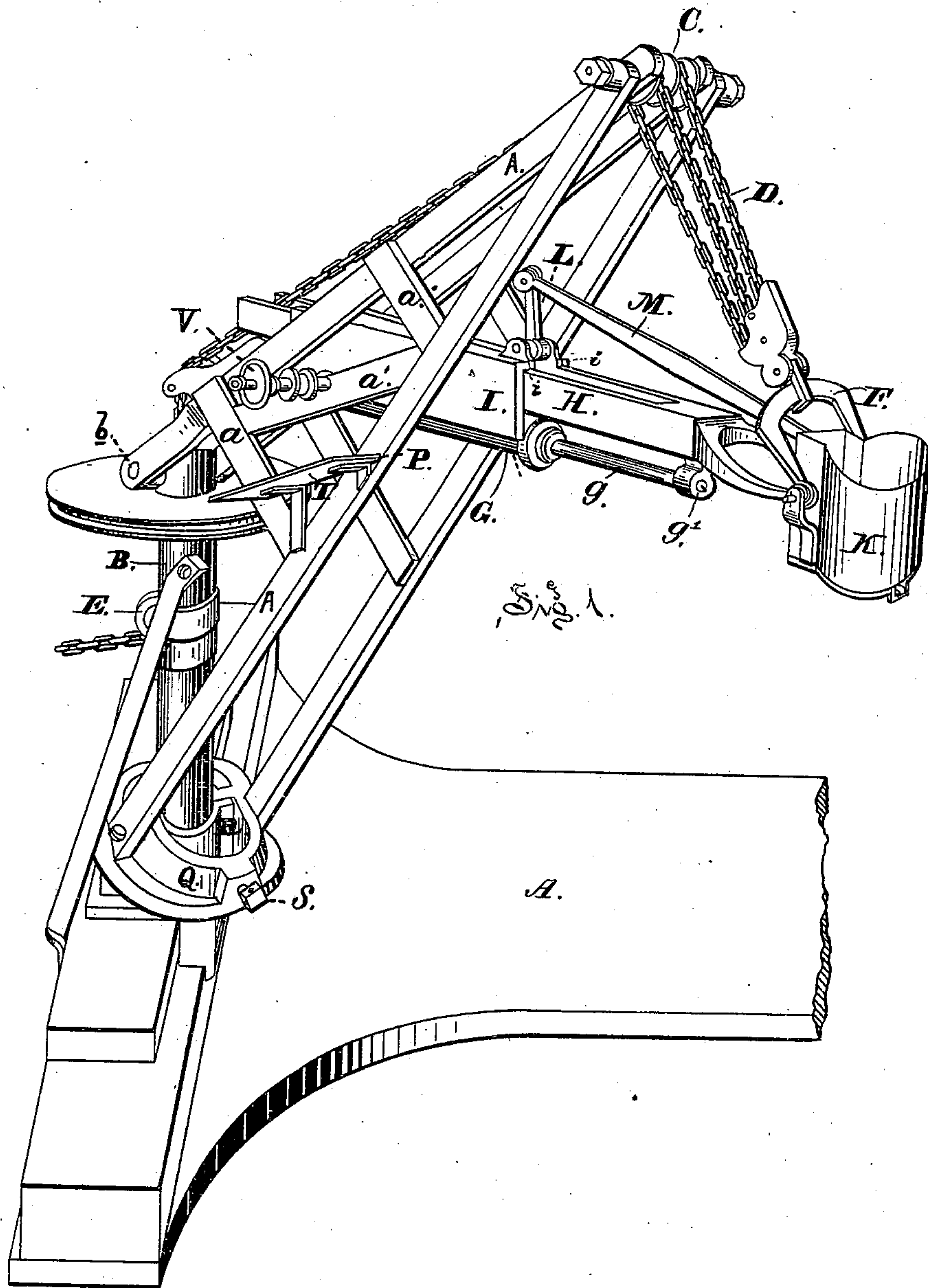
(No Model.)

3 Sheets—Sheet 1.

T. DILL.
Excavating-Machine.

No. 227,222.

Patented May 4, 1880.



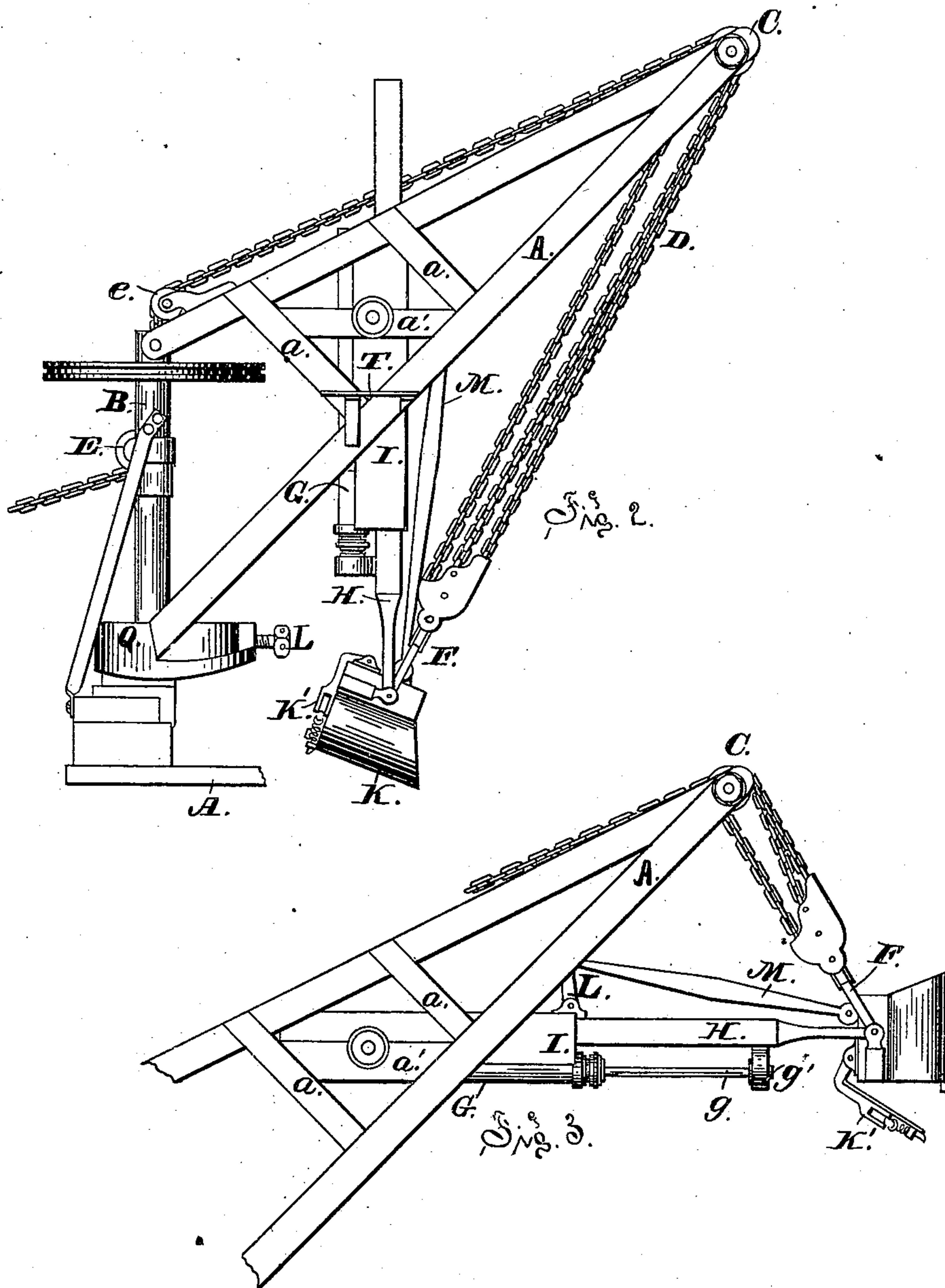
Attest:
Jas. E. Hutchinson.
P. J. Rutherford

Inventor:
Thos. Dill,
by James L. Norris,
Att'y.

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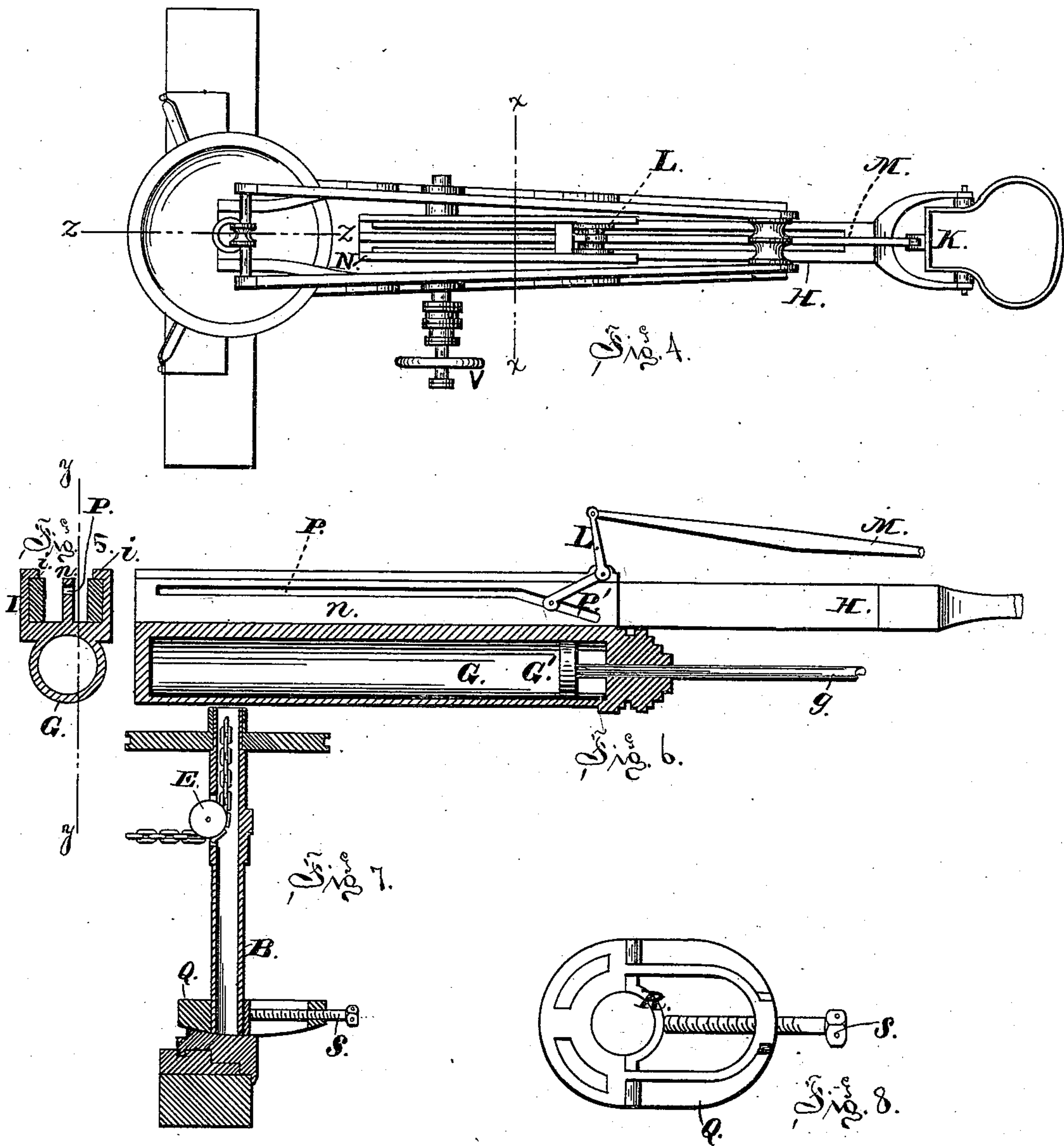
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UNITED STATES PATENT OFFICE.

THOMAS DILL, OF BAY CITY, ASSIGNOR TO JAMES CLEMENTS, OF ANN ARBOR, MICHIGAN.

EXCAVATING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 227,222, dated May 4, 1880.

Application filed March 9, 1880. (No model.)

To all whom it may concern:

Be it known that I, THOMAS DILL, of Bay City, Michigan, have invented new and useful Improvements in Excavating-Machines, of which the following is a specification.

My invention relates to excavating-machines; and it consists, first, in the combination of the dipper hinged upon the end of a sliding stock or handle with a bell-crank lever, a connecting-rod between the bell-crank and the hinged dipper, and a slotted way or bearing adapted to cause the vibration of the bell-crank as the dipper-handle is reciprocated by the stroke of the piston, whereby the dipper will be tilted so as to present its cutting-edge to the earth, or the dipper be righted into position for dumping, according to the direction of the stroke of the piston; second, in the combination of the hinged dipper and sliding dipper-handle with a bell-crank lever mounted upon the dipper-handle, a connecting-rod between the bell-crank and the dipper, a piston with its rod attached to the dipper-handle for moving the same, and a casing formed upon the steam-cylinder and provided with a slotted way for vibrating the bell-crank lever, whereby the dipper-handle will be reciprocated by the stroke of the piston and the bell-crank lever simultaneously vibrated to tilt the dipper; third, in the combination of the sliding dipper-handle, bell-crank lever, and casing upon the steam-cylinder, the said casing being adapted to guide and support the sliding dipper-handle, and being also provided with a central longitudinal partition having a slot running in a horizontal plane a portion of its length and then terminating in an inclined slot; fourth, in the combination of the mast with a shoe surrounding it at its base and having a partial bearing upon the mast, also an independent semi-cylindrical collar applied against the mast as a continuation of the bearing of the shoe, a screw-bolt being arranged to tighten up the parts, and the crane being rigidly secured to the shoe and hinged to the mast, whereby, by loosening the screw, the crane may be tilted; fifth, the combination of the crane hinged to the mast and rigidly secured to an independent shoe with proper means for tightening the bearing of the shoe against the

mast; sixth, in the combination of the mast and the crane with a shoe having the peculiar conformation hereinafter specified.

In the drawings, Figure 1 is a perspective view of my improved excavating-machine. 55 Fig. 2 is a side elevation of the same, showing the dipper in position for cutting into the earth. Fig. 3 is a side elevation of a portion of my machine, showing the bucket hauled up by the tackle-chain and in a vertical position, with its door open for dumping. Fig. 4 is a top or plan view of the machine. Fig. 5 is a section on the line *x x*, Fig. 4. Fig. 6 is a section taken on the line *y y*, Fig. 5. Fig. 7 is a vertical central section mainly of the mast and the shoe 65 at its base. Fig. 8 is a detached view of the shoe and its adjuncts.

I will here premise that I propose employing in connection with my improved machine an engine as the source of power, together with appropriate mechanism for turning the crane round. As I claim, however, no novelty in either the engine or its attachments, I have deemed it unnecessary to herein illustrate the same. 75

The machine is provided with the usual stage or platform A, upon which is mounted a hollow mast, B. The upper inclined timbers of the crane A are hinged to the mast-head, as at *b*, while the lower inclined timbers of the crane are secured at the base of the mast to a shoe, the functions of which will be presently described. 80

The crane is properly strengthened by cross-bars *a a* and diagonal timbers or rods *a'*, and it is provided at its jib-head with the requisite double pulleys *c* for the tackle-chains D. 85

The hauling-chain, which is wound upon a drum, (not herein shown,) enters the hollow mast under a pulley, E, and passes up and over a pulley, *e*, upon the crane near the mast-head, and thence to the double pulleys C at the jib-head, and round the blocks, to which the dipper is suspended by a hinged yoke, F. 90

In carrying out that part of my invention which relates to means for actuating the dipper-handle and dipper, I provide a steam-cylinder, G, with the usual auxiliaries for operating its piston G', and support the said cylinder upon the crane by means of suitable 100

trunnions, so that it shall be free to turn upon its bearings. The piston-rod *g* is connected at *g'* with the dipper-handle *H*, so that the latter will move simultaneously with the strokes of the piston. The dipper stock or handle *H* reciprocates in a casing, *I*, which is either cast with or secured upon the steam-cylinder. This casing, which is formed with ledges *i*, overlapping the upper edges of the handle, serves both as a guide and a support for the same.

It will be seen, by referring to Fig. 4, that the handle *H* is divided along that portion which works within the casing *I*, so that the two sides of such divided part will slide under the ledges *i* of the casing, as shown in Fig. 5.

The bucket *K* is journaled at the bifurcated front end of the handle *H*; and in order to tilt the dipper to the proper angle for presenting its cutting-edge to the earth and to right it into position for dumping, I employ a bell-crank lever, *L*, which, when vibrated about its axis, will tilt the bucket through the medium of a connecting-rod, *M*. This bell-crank lever is pivoted in suitable bearings upon the handle *H* and is vibrated simultaneously with the reciprocations of the handle. As one practical way in which this bell-crank lever may be actuated, I form its lower arm of two prongs, which straddle a central longitudinal partition, *n*, in the casing *I*, and from the said arms pass a pin through a slot, *P*, in the partition. This slot runs horizontally a portion of the length of the partition, and then inclines downwardly at the end nearest the dipper, as shown at *P'*, Fig. 6. When the handle *H* is retracted by the action of the steam against the piston the movement of the lower arm of the bell-crank lever in the slot will cause a vibration of the bell-crank lever, which, through the medium of the connecting-rod, will tip the dipper in position to cut when lowered, as shown in Fig. 2.

The admission of steam to the inner end of the piston thrusts the dipper into the earth and fills it, when it may be raised by the tackle in the ordinary manner, and when the piston reaches the outward end of its stroke the lower arm of the bell-crank lever is vibrated by the inclined portion of the slot *P'* and tips the dipper into a vertical position for readily dumping its contents.

It is obvious that the piston may be actuated by compressed air or water without departing from my invention.

The dipper is provided with a hinged bottom, which may be opened and closed by the devices in ordinary use for that purpose.

The shoe or collar *Q*, to which the lower end of the crane *A* are secured, partially embraces and bears upon the lower end of the mast, and is slotted longitudinally forward of the center of the mast, as shown in Fig. 1, so as to permit the shoe to slide back of the mast when the crane is tilted, as hereinafter described. The remaining portion of that section of the mast

which is not embraced by the said shoe or collar *Q* is embraced by an independent semi-cylindrical collar, *R*, which is held against the mast by means of a screw, *S*, which has its bearing in the collar *Q*.

By loosening the screw the crane may be tilted to a considerable extent, since its angle of inclination will only be limited by the check given to the collar *R* by the wall of the shoe at that side through which the screw enters. This tilting of the crane is exceedingly desirable when the excavating-machine is mounted upon a scow or car and being passed under a bridge.

Upon the crane is a platform, *T*, for an attendant to stand upon, so that he can control the valve *V*, which regulates the admission of steam into the steam-cylinder.

The steam may be admitted from the boiler of the engine by any suitable flexible steam-pipe.

From the foregoing description of the construction and operation of the several parts of my improved machine the nature of its general operation in digging or excavating will be readily understood.

Having thus described my invention, what I claim is—

1. The combination, in an excavating-machine, of the hinged dipper with a sliding stock or handle, a bell-crank lever, connecting-rod, and a slotted guide-plate adapted to cause the vibration of the bell-crank lever as the dipper-handle is reciprocated, whereby the dipper will be tilted, substantially as herein specified.

2. The combination, in an excavating-machine, of the hinged dipper and sliding dipper-handle with a bell-crank lever on the dipper-handle, a connecting-rod between the bell-crank and the dipper, an actuating piston-rod, and a casing formed upon the steam-cylinder and provided with a slotted guide-plate for vibrating the bell-crank lever, whereby the dipper-handle will be reciprocated by the stroke of the piston and the bell-crank lever vibrated to tilt the dipper, substantially as herein set forth.

3. The combination, in an excavating-machine, of the dipper and sliding dipper-handle with a bell-crank lever and a casing upon a steam-cylinder, the said casing being adapted to guide and support the dipper-handle, and being also provided with a central longitudinal plate or partition having a guide-slot running in a horizontal plane a portion of its length and then terminating in an inclined slot, substantially as and for the purpose specified.

4. The combination, in an excavating-machine, of the mast with a shoe surrounding its base and having a partial bearing thereon, an independent semi-cylindrical collar applied against the mast as a continuation of the bearing of the shoe, a screw-bolt to tighten up the parts, and a crane rigidly secured to the shoe and hinged to the mast, whereby, by loosen-

ing the screw, the crane may be tilted, substantially as set forth.

5 5. The combination, in an excavating-machine, of a crane hinged to the mast and rigidly secured to an independent shoe with device for tightening the bearing of the shoe against the mast, substantially as specified.

10 6. The combination, in an excavating-machine, of the mast and crane with a shoe, Q, formed with a half-cylindrical bearing and an

enlarged space to admit of a longitudinal movement of the shoe, as and for the purposes herein specified.

In testimony whereof I have hereunto set my hand in the presence of two subscribing 15 witnesses.

THOMAS DILL.

Witnesses:

CHAS. R. WELLS,
WM. H. WELLS.