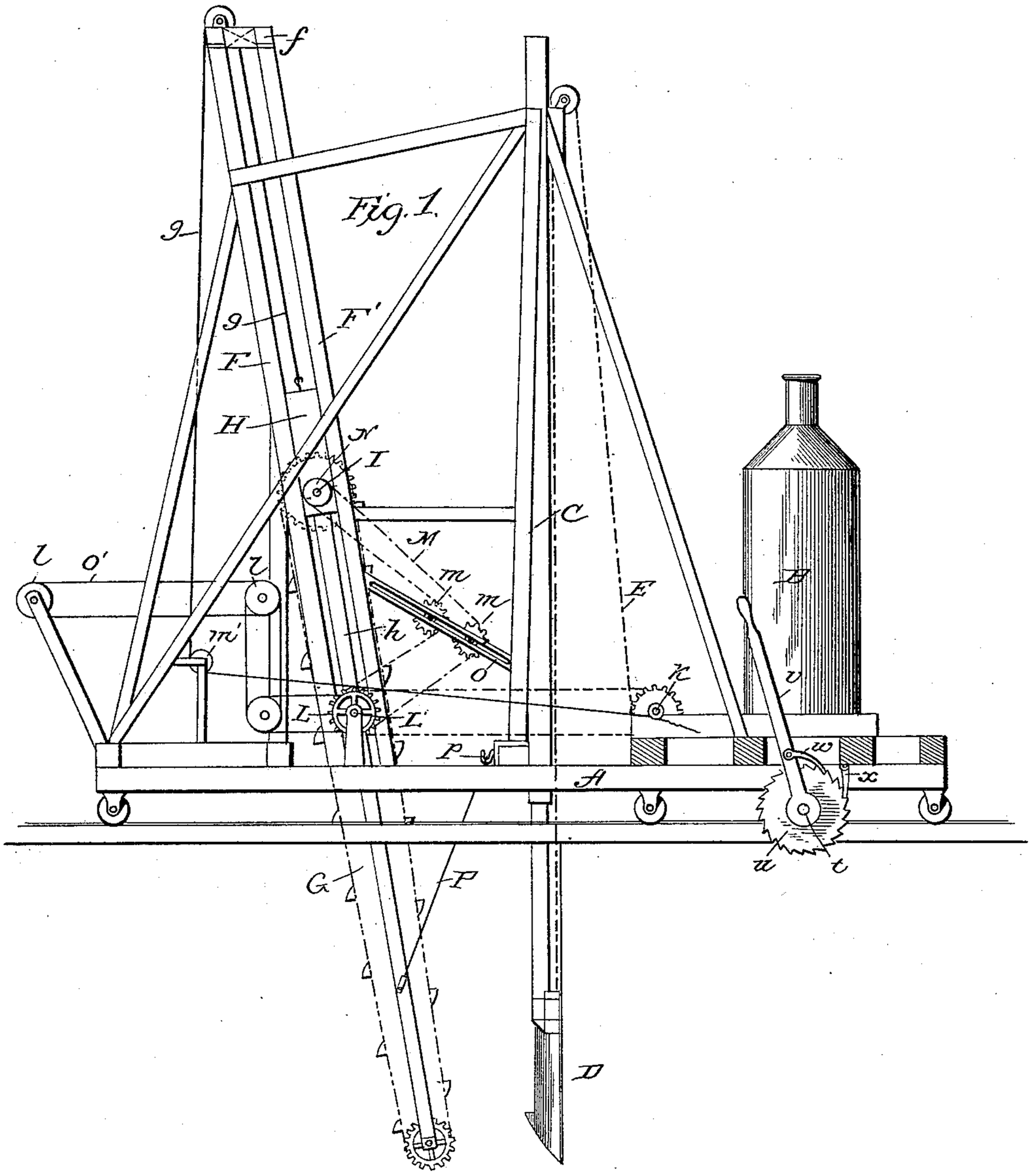
(No Model.) 3 Sheets—Sheet 1.

J. S. WHITCOMB.

EXCAVATING APPARATUS.

No. 452,492. Patented May 19, 1891.

Fig. 1.



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(No Model.) 3 Sheets—Sheet 2.

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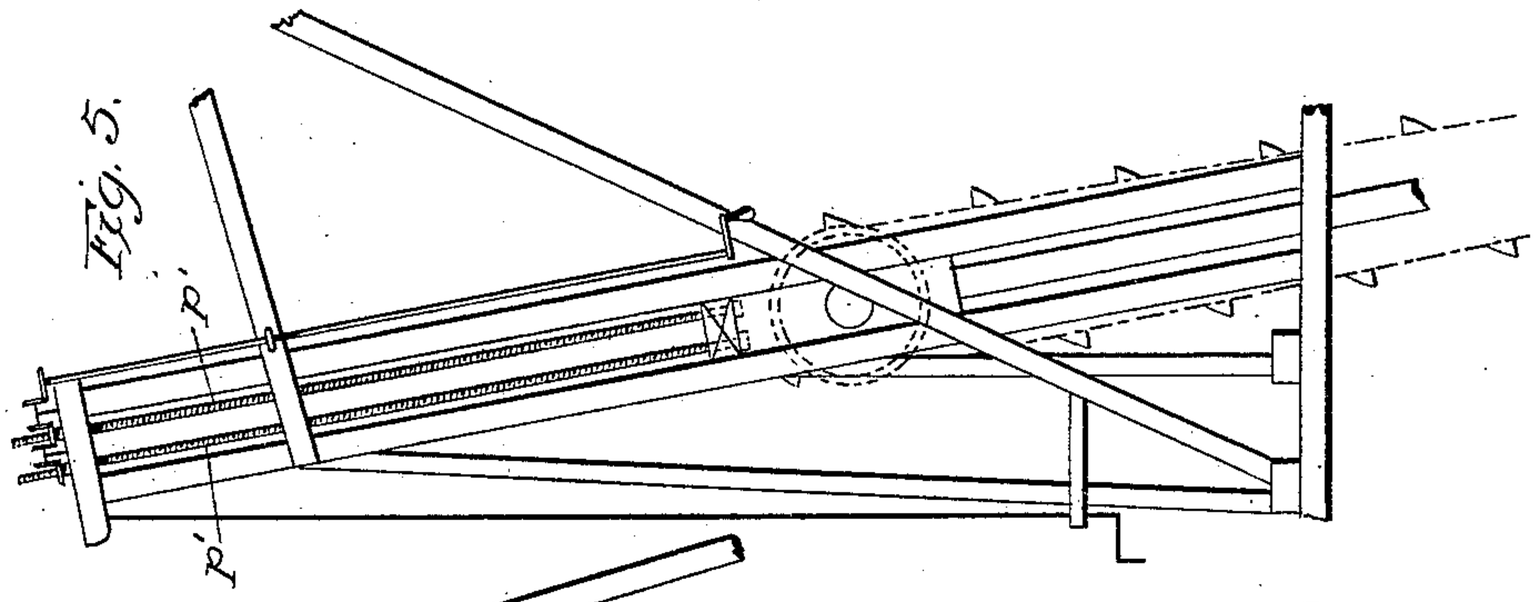

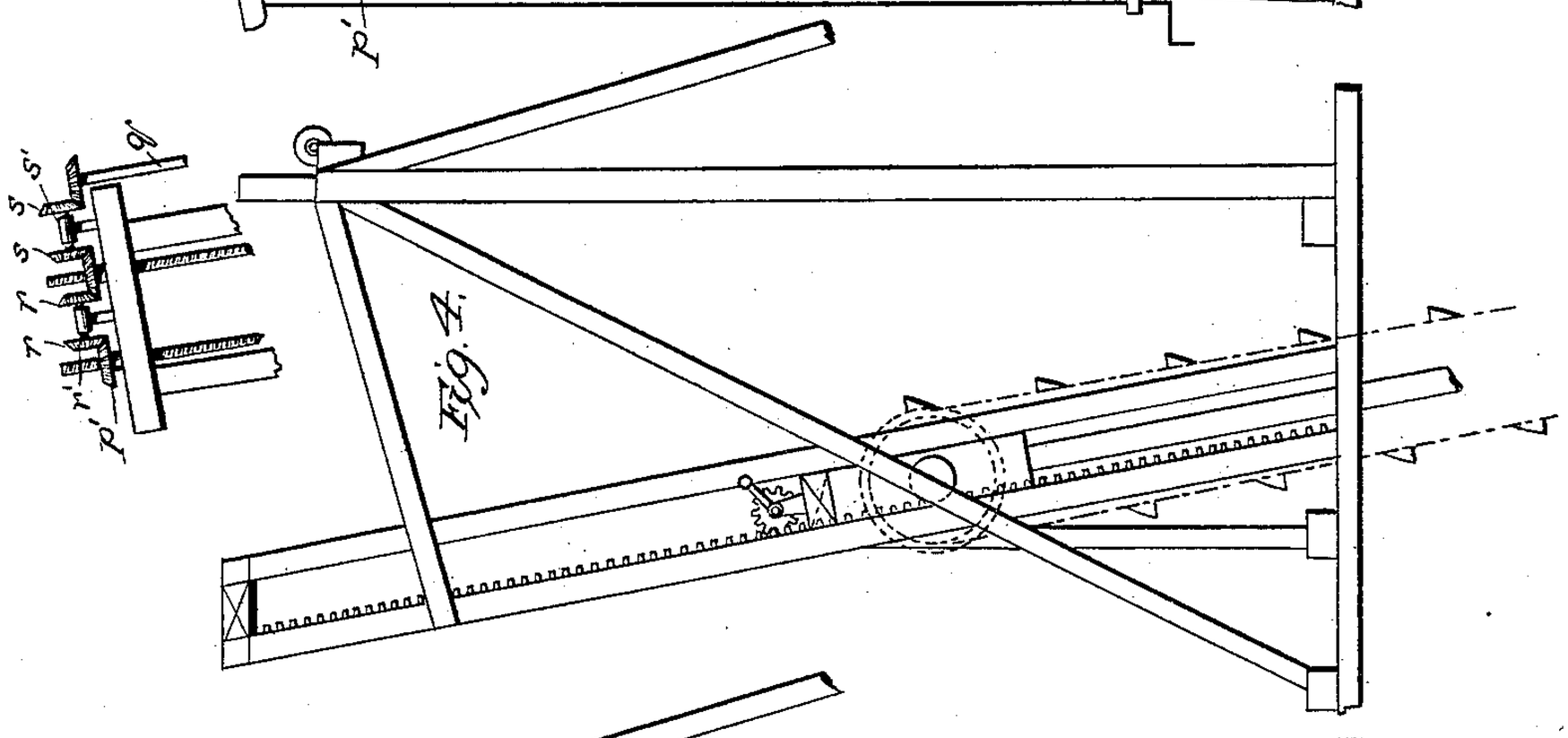

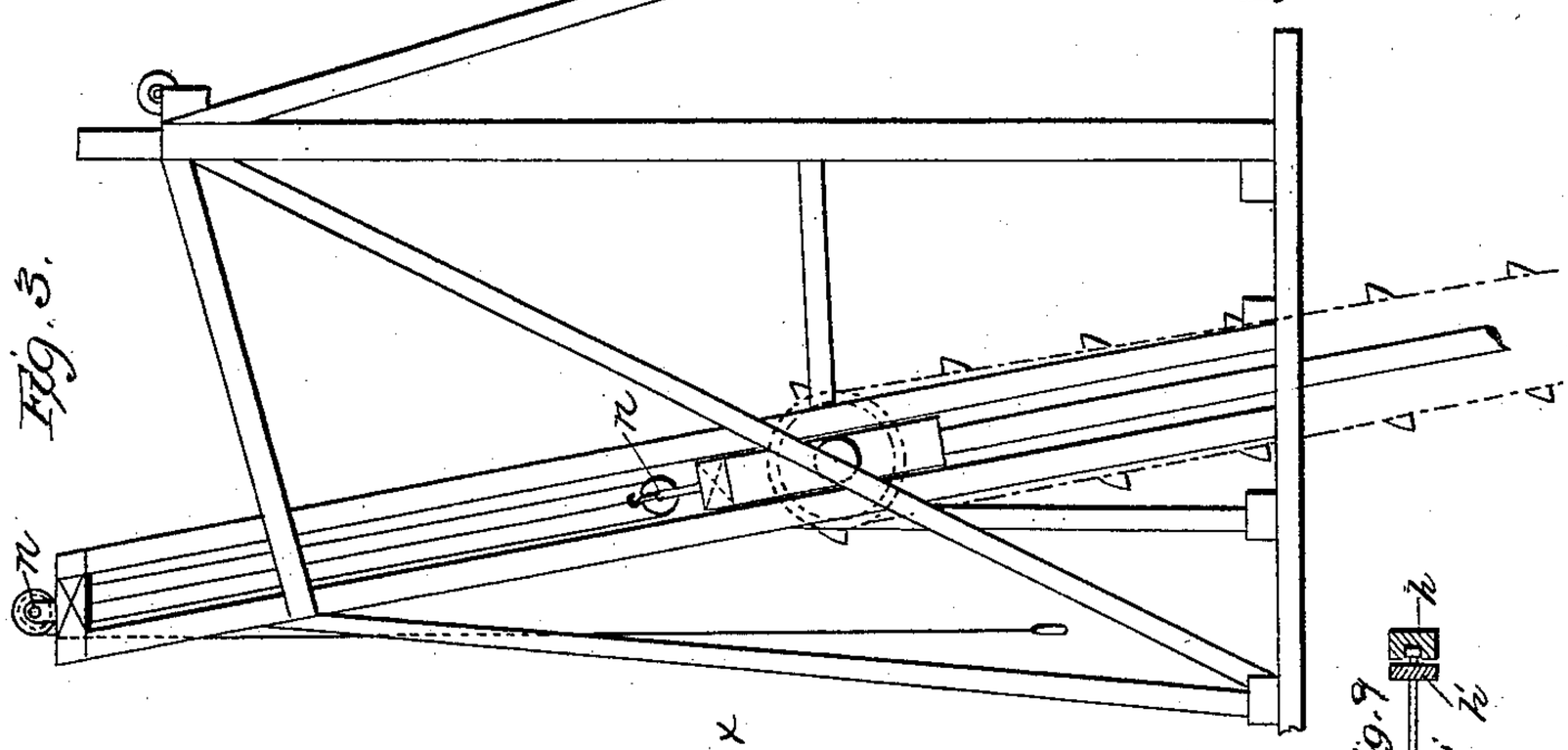

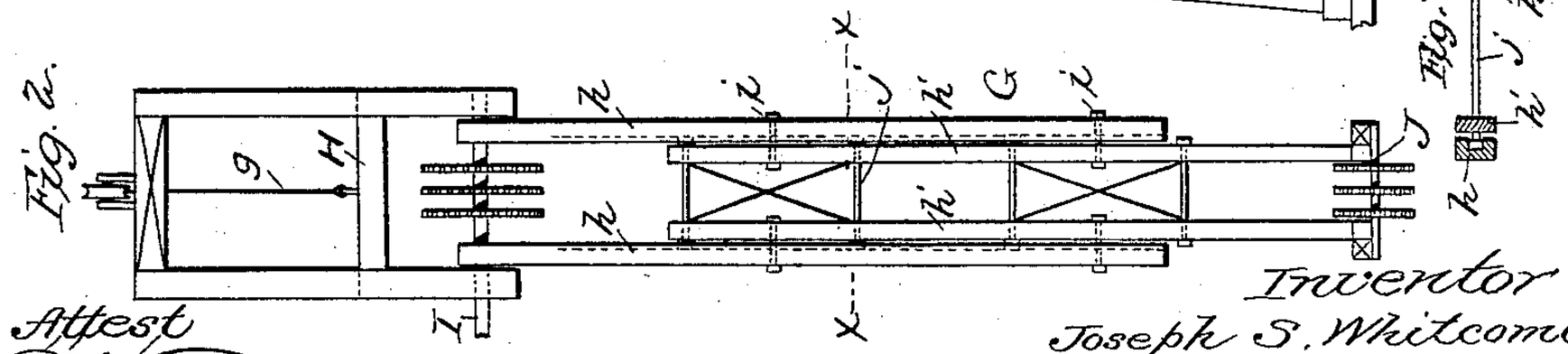

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Fig. 6.

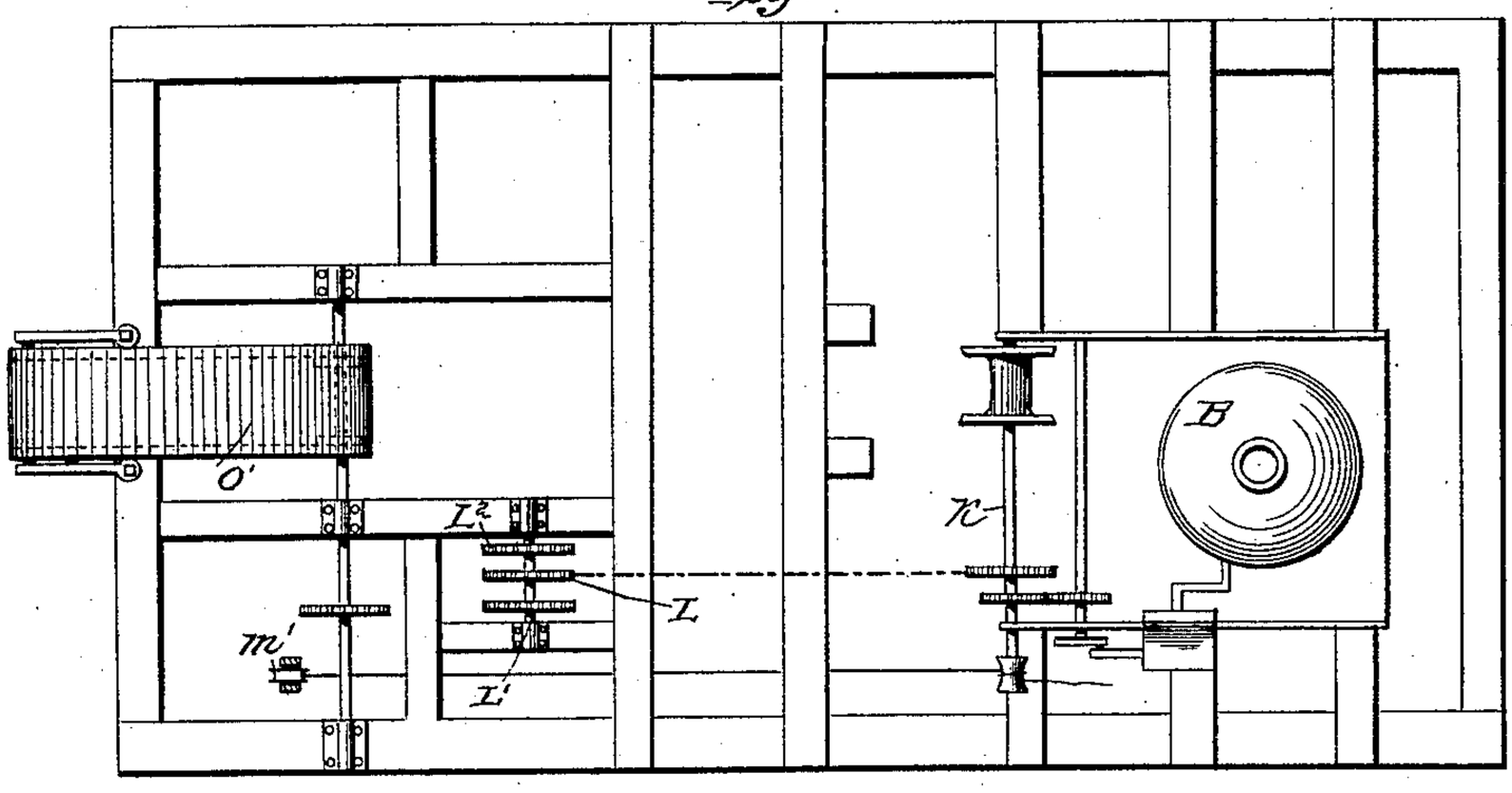


Fig. 8.

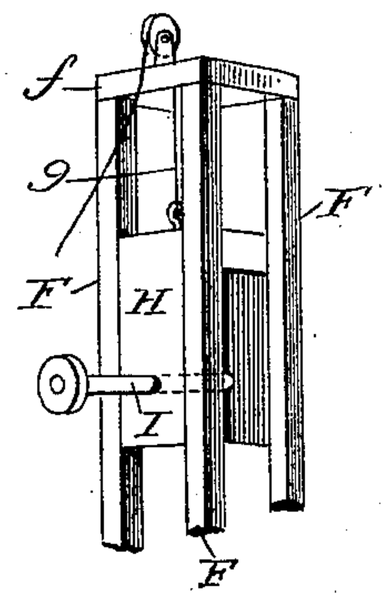
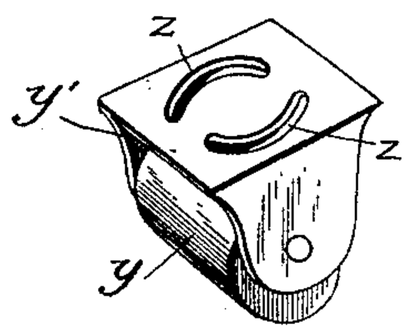


Fig. 7.



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UNITED STATES PATENT OFFICE.

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EXCAVATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 452,492, dated May 19, 1891.

Application filed May 29, 1890. Serial No. 353,600. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH S. WHITCOMB, a citizen of the United States, and a resident of the city and county of San Francisco, State of California, have invented certain new and useful Improvements in Excavating Apparatus; and I do hereby declare that the following is a full, clear, and exact description of the same.

My invention relates to excavating apparatus or machinery for digging trenches for sewers, water-mains, &c., and more especially to certain improvements upon the constructions shown in Letters Patent heretofore granted to me—viz., No. 378,125, dated February 21, 1888, and No. 387,476, dated August 7, 1888. The general features of construction are the same in both these patents and in the present application—that is, the trench is formed by a gravity-cutter which cuts successive slices of earth, which are elevated and dumped by a bucket or series of buckets as the work progresses.

The present invention relates, principally, to the manner of supporting the excavator-frame adjustably and certain other features hereinafter pointed out in the claims.

The invention is illustrated in drawings accompanying this specification, in which—

Figure 1 is a side elevation of the entire machine in position for work. Fig. 2 is a plan view of the elevator-frame with the buckets removed. Figs. 3, 4, and 5 show modified forms of adjusting devices for the elevator. Fig. 6 is a plan view of the machine, the cutter and elevator being removed. Fig. 7 is a detail view of one of the supplementary carrying-wheels. Fig. 8 is a detail perspective view of the sliding box and guides by which the elevator is supported. Fig. 9 is a cross-section of the elevator-frame.

Referring to Figs. 1 and 2, A represents the frame of the machine mounted upon carrying-wheels designed to run upon a suitable track, as shown.

B is the hoisting-engine upon a platform at one end of the base-frame and of ordinary construction.

C is one of the uprights which form the guides for the gravity-cutter D, and E is the hoisting-rope for the cutter. The guides, cutter, and hoisting devices do not differ materially in construction or operation from those described in my patents previously referred to.

The elevator for removing the excavated earth and discharging it resembles in general construction the one shown in my patent, No. 387,476—that is to say, it is a frame carrying a series of endless-chain buckets suspended from the frame of the machine, so as to extend down into the ditch or trench in proximity to the cutter and in position to receive the earth, elevate it, and discharge it above. The special features of the elevator shown in the present application, however, constitute improvements upon that described in said patent.

F F F′ F′ are beams constituting a stationary frame for supporting and guiding the elevator G. These beams are mortised and bolted to the frame of the machine and are provided with a cap *f*, upon which is mounted a pulley for the suspension rope or cable *g*. The end of this rope is secured to a box H, having a vertical movement between the uprights F F and F′ F′, and also having bearings for the transverse shaft I, from which is suspended the swinging elevator G.

Fig. 2 is a front view of the elevator with the buckets removed. It is composed of two legs *h h*, suspended from the shaft I and having removably bolted between them the extension-legs *h′ h′*. The upper sprocket-pulleys for the chains supporting the buckets are fixed, as shown, upon the shaft I, while the lower pulleys are carried by a shaft J, journaled at the bottom of the extension-legs *h′ h′*. The chain and buckets may be of any ordinary or preferred construction. The extension-legs *h′ h′* are adjustable within the legs *h h* by removing the bolts *i* and sliding the legs *h′ h′* up or down, as the case may be. This adjustment also permits the proper tension to be given to the chains which carry the buckets. The sliding legs *h′ h′* are guided by the ends of the connecting-bolts *j j*, which

secure them together and which enter vertical grooves in the inner faces of legs *h h*, Fig. 2.

The buckets are driven continuously from the engine, as shown in Fig. 1.

K represents the driving-shaft on the engine-platform from a sprocket-wheel on which extends a driving chain, rope, or belt to a second sprocket-wheel L, mounted upon a shaft L′, placed at some convenient point on the main frame. From another sprocket-wheel L^2 on the shaft L′ extends another endless chain, rope, or belt M to the driving-pulley N on the shaft I. In order, however, to permit the elevator to be adjusted without interfering with the driving, I provide an automatic device for regulating the tension of the chain M when the elevator is shortened up. This consists of a pair of pulleys *m m*, journaled in sliding boxes, which are adapted to traverse by gravity an inclined guide O and over which passes the chain M. When the elevator-frame is raised, the pulleys will slide up the incline, and conversely when the elevator is lowered the pulleys will be caused to travel down the incline as far as the amount of extension of the elevator will allow them to go, thus regulating the tension at all times.

It will be seen that there are two independent adjustments of the elevator-frame, one by telescoping the legs *h h* within the guides F F′ and the other by shortening the extension-legs *h′ h′* by sliding them upward. This materially increases the ease with which the machine can be moved and renders it more completely portable, as will be readily understood when it is considered that the bottom of the elevator may have been working in a ditch or trench fifteen or twenty feet below the general surface of the ground, from which it is difficult to remove it.

P, Fig. 1, is a chain for adjusting the swinging elevator to or from the cutter. By attaching the chain near the bottom of the elevator it practically supports the latter and relieves a portion of the strain on the main suspension devices. The adjustment of the chain is easily accomplished by means of a simple hook *p* on the main frame, with which the chain links engage.

O′ in Fig. 1 represents the endless apron upon which the earth is discharged from the descending buckets. It is driven continuously from the shaft L′ by belts upon pulleys *l l*.

For raising the elevator bodily in the guides F F, I have devised several different attachments, which are separately illustrated. In Fig. 1 the suspension-rope *g* is carried down and under a guide-pulley *m′*, from which it is led to the engine-platform. To raise the elevator the rope is given one or two turns around a "gypsy" on the driving drum or shaft K, the workmen regulating the speed by letting the rope slip when necessary.

In Fig. 3 I have shown a hoisting-tackle consisting of pulley blocks *n*, from the lower of which the elevator is suspended.

In Fig. 4 the guides for the elevator-frame are provided with a rack, with which engages a pinion on the elevator-frame, by turning which the elevator-frame is caused to ascend or descend.

In Fig. 5 is represented another modification. Secured to the top of the elevator are a pair of screw-shafts, which project upward through the cap-piece and through internally-threaded pinions *p′ p′*. These pinions are geared together and to an external shaft *q* by pinions *r r* on a short shaft *r′* and pinions *s s* on a similar shaft *s′*, the shaft *q* having also a pinion at the top, which engages with one of the pinions *s*. Thus by turning the shaft *q* both screw-rods carrying the elevator will be caused to move upward. In Fig. 1 is also shown a device for moving the excavator on its track as the work progresses. A transverse axle *t* carries a pair of fixed supplementary carrying-wheels and a fixed ratchet-wheel *u*. A lever *v*, loose on the axle and provided with a driving-pawl *w*, operates the ratchet-wheel. A holding-pawl *x* on the frame prevents the ratchet-wheel from returning after each stroke of the lever.

In operating excavators in very wide ditches it is frequently necessary to move the machine sidewise so as to work transversely across the ditch. To provide for this I supply the machine with removable carrying-wheels *y* of larger diameter than the main supporting-wheels, and which are adapted to be set at right angles to the latter and move on a separate section of track. One of such wheels is shown in Fig. 7 as journaled in a chair *y′*, which is provided with two curved slots *z*.

When it is desired to move the machine transversely, the frame may be lifted by a jack and a pair of these supplementary wheels attached on each side at proper points to support it. The supplementary track is suitably laid across the main track and the chairs adjusted by their slots and bolts to the proper angle at which the machine is to be moved.

What I claim is—

1. In an excavating apparatus, a fixed guide-frame, an elevator-frame carrying buckets and composed of sliding or telescopic sections, and a pivotal longitudinally-adjustable support for the elevator-frame, whereby it may be adjusted as a whole longitudinally and its lower end laterally and it may be lengthened or shortened, substantially as set forth.

2. In an excavating apparatus, the combination, with a fixed guide-frame, of a sliding box, a shaft or pintle passing through said box, a swinging elevator-frame carrying hoisting-buckets and suspended from said pintle, and suspension devices for the sliding box, substantially as set forth.

3. In an excavating apparatus, a suspended

elevator-frame consisting of legs *h h*, having vertical grooves, in combination with sliding extension-legs *h' h'*, said legs *h' h'* being connected by bolts which enter the grooves in legs *h h*, substantially as set forth.

4. In an excavating apparatus, removable and supplementary carrying-wheels of greater diameter than the main carrying-wheels, substantially as and for the purposes set forth.

5. In combination with an excavating apparatus, removable and supplementary carrying-wheels journaled in chairs, said chairs being provided with curved slots and removable bolts passing through said slots, substantially as and for the purposes set forth.

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Witnesses:
L. W. SEELY,
H. J. LANG.