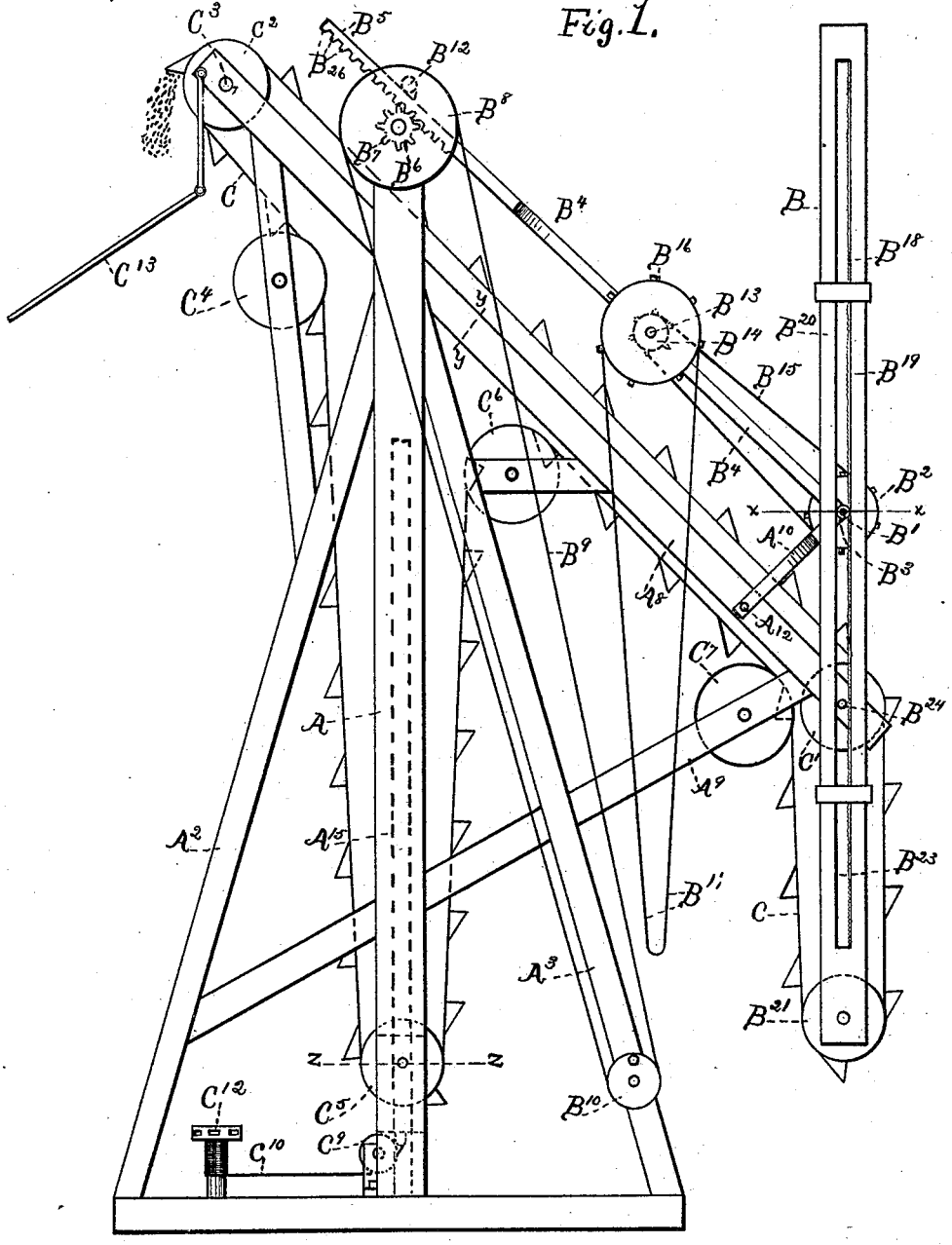
(No Model.) 3 Sheets—Sheet 1.

W. L. SMYTH.

EXCAVATING ELEVATOR.

No. 421,113. Patented Feb. 11, 1890.

Fig. 1.



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(No Model.) 3 Sheets—Sheet 2.

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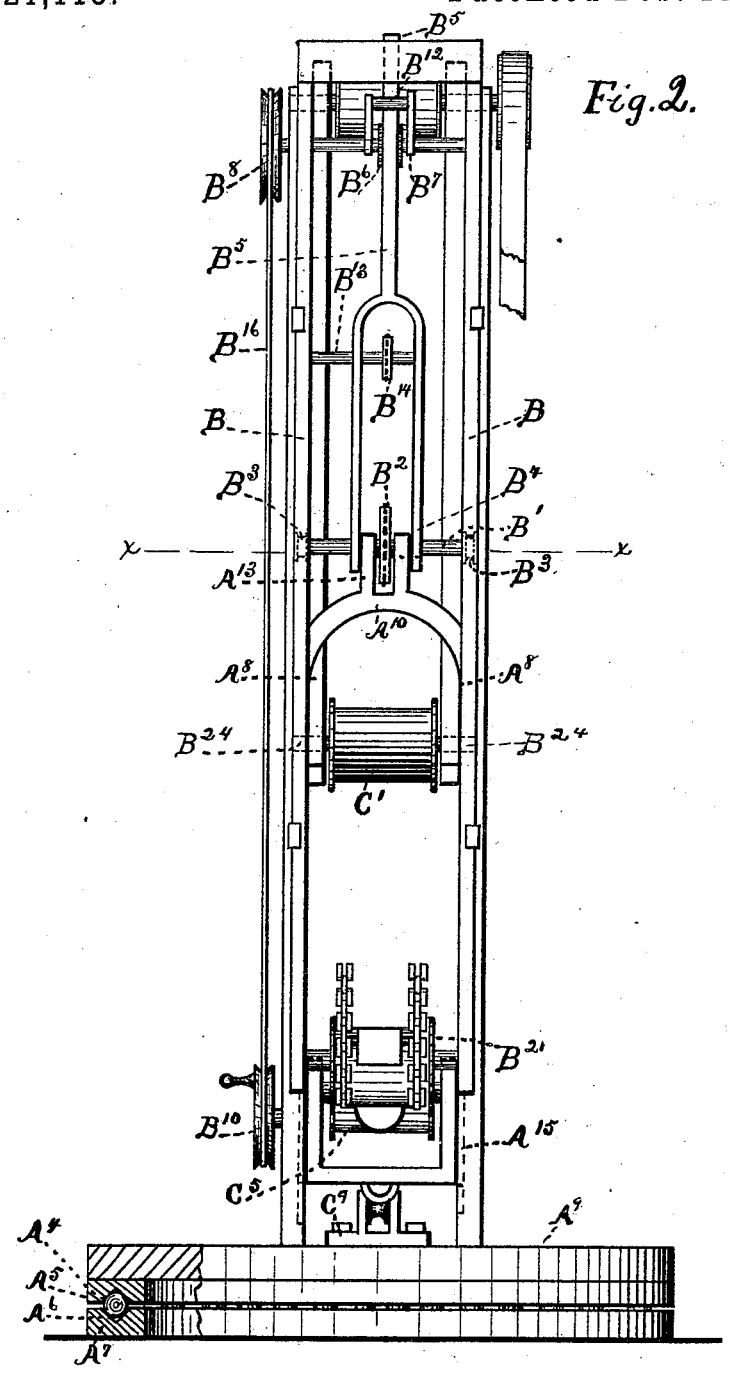
Fig. 2.



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(No Model.) 3 Sheets—Sheet 3.

W. L. SMYTH.

EXCAVATING ELEVATOR.

No. 421,113. Patented Feb. 11, 1890.

Fig. 3.

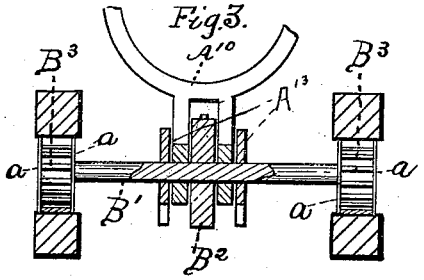


Fig. 4.

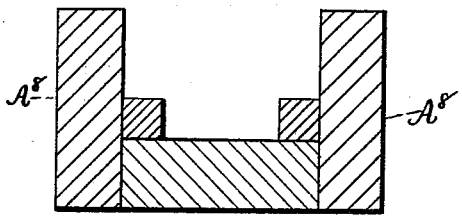
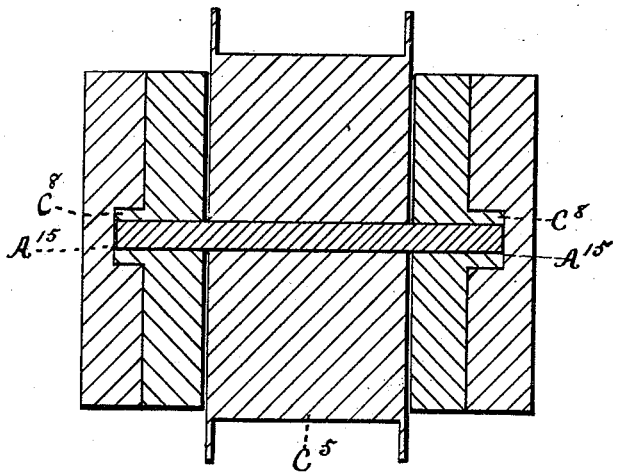


Fig. 5.



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UNITED STATES PATENT OFFICE.

WILLIAM L. SMYTH, OF VAN WIE'S, ASSIGNOR TO MARY F. SMITH, OF BETHLEHEM, NEW YORK.

EXCAVATING-ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 421,113, dated February 11, 1890.

Application filed October 5, 1888. Serial No. 287,281. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM L. SMYTH, a resident of Hazlewood, Van Wie's, in the county of Albany and State of New York, have invented certain new and useful Improvements in Excavating-Elevators; and I do hereby declare that the following is a full, clear, and exact description of the invention that 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 the letters of reference marked thereon, which form a part of this specification.

Similar letters refer to similar parts in the several figures therein.

My invention relates to improvements in excavating-elevators; and it consists of the novel construction and combination of parts hereinafter described, and pointed out in the claims.

Figure 1 of the drawings is a view in side elevation of my improved elevator. Fig. 2 is a view in front elevation of the same parts with a portion of the bucket-chain broken away, and showing the device mounted upon a turn-table. Fig. 3 is a sectional view taken on the broken line $x\ x$ in Figs. 1 and 2. Fig. 4 is a sectional view of the arm A^8, taken on the broken line $y\ y$ in Fig. 1. Fig. 5 is a sectional view of the mainmast and slide-block, taken on the broken line $z\ z$, Fig. 1. The last three figures are made upon an enlarged scale. In Fig. 2 the scale is somewhat exaggerated for convenience in illustration, the lateral dimensions being nearly doubled.

Though my improved elevator is adapted to lift grain, coal, and other articles from a lower to a higher plane, it is especially applicable for dredging or excavating soil, and also elevating it to a distributing-point on a higher plane.

The device may be erected from a dock or boat when the excavation is to be made beneath a body of water.

The supporting-mast A is erected from the turn-table A′ and provided with braces A^2 and A^3. The turn-table may be mounted upon a series of balls A^4, adapted to roll in the annular grooves A^5 and A^6 in the table and supporting-base A^7, respectively. The mast is provided with and supports a laterally-projecting arm A^8 stayed by brace A^9. The arm supports at its lower end an elevator-leg B, and at its upper end the shaft which drives and partly supports the endless bucket-chain C. The leg is connected with the arm by the fork A^{10}, the lower bifurcate ends A^{12} of the fork being pivoted to the arm, one end on one side and the other on the other side of the arm. The fork is also provided with upper smaller bifurcate ends A^{13}, which support a shaft B′, upon which shaft are fixed the sprocket-wheel B^2 at the middle part and the pinions B^3, one at each end. This shaft also serves to pivot the upper ends of the fork to the bifurcate arms B^4 of another fork having a stem B^5. This stem is provided with a toothed rack B^{26}, adapted to engage with and be supported by the pinion B^6, fixed upon shaft B^7. This shaft is also provided with a fixed pulley B^8, and has its bearings in the upper end of the mast.

The pulley B^8 is connected by a belt or cord B^9 with the crank-wheel B^{10}, fixed upon a shaft which has its bearings in the lower end of brace A^3. The rack is held in engagement with the pinion by the roller B^{12}. The fork-arms B^4 serve to support a shaft B^{13}, upon which is fixed the small sprocket-wheel B^{14}, connected by chain B^{15} with the wheel B^2. Fixed upon the same shaft B^{13} is a larger pulley or sprocket wheel B^{16}, provided with an operating endless belt or chain B^{17}.

The pinions B^3 are adapted to travel along a plate-gear B^{18}, secured to two of the bars B^{19}, forming the leg B. The other two bars B^{20} serve to hold the pinions in engagement with their plate-gears.

The leg is made up of the four bars or strips B^{19} and B^{20}, and is provided at its lower end with a loose pulley B^{21}, adapted to support and guide the bucket-chain. This chain passes up over guide-pulley C′, supported upon the lower ends of arm A^8, up along the arm over the driving-pulley C^2, mounted upon the driving-shaft C^3, where the buckets are inverted, passing down over guide-pulley C^4, down around the vertically-adjustable guide-pulley C^5, movably secured to the mainmast,

up along the mast to the guide-pulley C^6, over the same, down the arm A^8, over guide C^7 to the place of beginning at the guide-pulley in the leg.

The driving-shaft C^3 may be driven in any well-known manner. I have shown a pulley fixed thereon with a driving-belt broken away.

The sides of the frame or block which supports the pulley C^5 is provided on its sides with the guides C^8, adapted to slide in corresponding vertical grooves A^{15} in the mainmast. A friction block or pulley C^9 is secured to the table and a rope or chain C^{10} passed under the same, one end of the rope being secured to the slide-block and the other end leading to a capstan C^{12} or equivalent device for communicating a downward slide movement to the slide-block which supports pulley C^5.

The operation of the machine is as follows: Power is applied to rotate the driving-shaft C^3, thereby imparting motion to the chain and buckets, which may be constructed and arranged in any well-known manner, the chain C^{10} slackened to permit of an upward movement of the slide-block, and rotary movement communicated to the pinions B′ by means of rope B^{17} and connecting-chain and sprocket-wheels in a direction to force the leg B downward, by reason of the action of the pinions upon the racks with which they engage. The leg is thus forced downward until the buckets secured to the chain come in contact with the soil to be excavated or other substance to be elevated. The excavated material is carried by the buckets up over the pulley C^2, where it falls as the buckets are inverted into a chute C^{13}, as indicated in Fig. 1. The chute may be of any well-known form and lead to such place as may be desired to deposit the material as excavated. It is manifest that the position of the leg may be varied vertically, as desired, by means of the pinions B′ and operating mechanism. The lower end of the leg can also be easily moved toward or from the mast by means of the rack B^{26} and pinion B^6, operated by the crank-wheel B^{10}. The shaft B^{24} of the pulley C′ projects sufficiently at each end to form a pivot-guide or fulcrum for the leg, the channel B^{23} forming a slideway for the pivot when vertical movements are communicated to the leg. If the rack is forced outward from the mast by the pinion B^6, the lower end of the leg will be forced inward, oscillating upon the pivot formed by the shaft B^{24}. Lateral movement in either direction may be communicated to the leg by imparting a rotary movement to the supporting-table. Such rotary movement may be communicated by hand or in any well-known manner. When the leg is given an upward movement by means of the pinions B′, the slack in the bucket-chain is taken up by drawing the slide-block C^5 down toward the table by means of the chain C^{10}, as before explained. As shown in the drawings, the slide-block is at its lowest limit of slide movement. Its upward limit is the level of the guide-pulley C^6. It is apparent that the leg can be given a vertical movement equal to the slide movement of the slide-block. The pinions B′ are held in engagement with their plate-gear on the leg by the flanges *a*, which fill the channel B^{23} and prevent the pinions from slipping their cogs or sliding longitudinally off their racks.

What I claim as new, and desire to secure by Letters Patent, is—

1. In an excavating-elevator having an endless bucket-chain and chain-guiding pulleys, the combination, with a rotary mast provided with a laterally-projecting leg-supporting arm and a vertical slideway for a slide-block, of an elevator-leg secured to such arm and adjustable vertically, and a chain-guiding pulley having a block vertically adjustable along the slideway in the mast, provided with means for communicating slide movements to such slide-block, substantially as described.

2. In an excavating-elevator having an endless bucket-chain, the combination, with a mast provided with a laterally-projecting arm, of a pinion rotary in bearings supported by such arm and means for imparting a rotary movement to such pinion, an elevator-leg provided with a longitudinal pivot-receiving channel, a pinion-engaging rack fixed upon the leg, a chain-guiding pulley located at the lower end of the leg, a pivot-guide fixed upon the mast-arm and having a slideway in the channel in the leg, and means for oscillating the leg upon such pivot-guide, substantially as described.

In testimony whereof I have hereunto set my hand this 20th day of September, 1888.

WILLIAM L. SMYTH.

Witnesses:
GEO. A. MOSHER,
CHAS. L. ALDEN.