

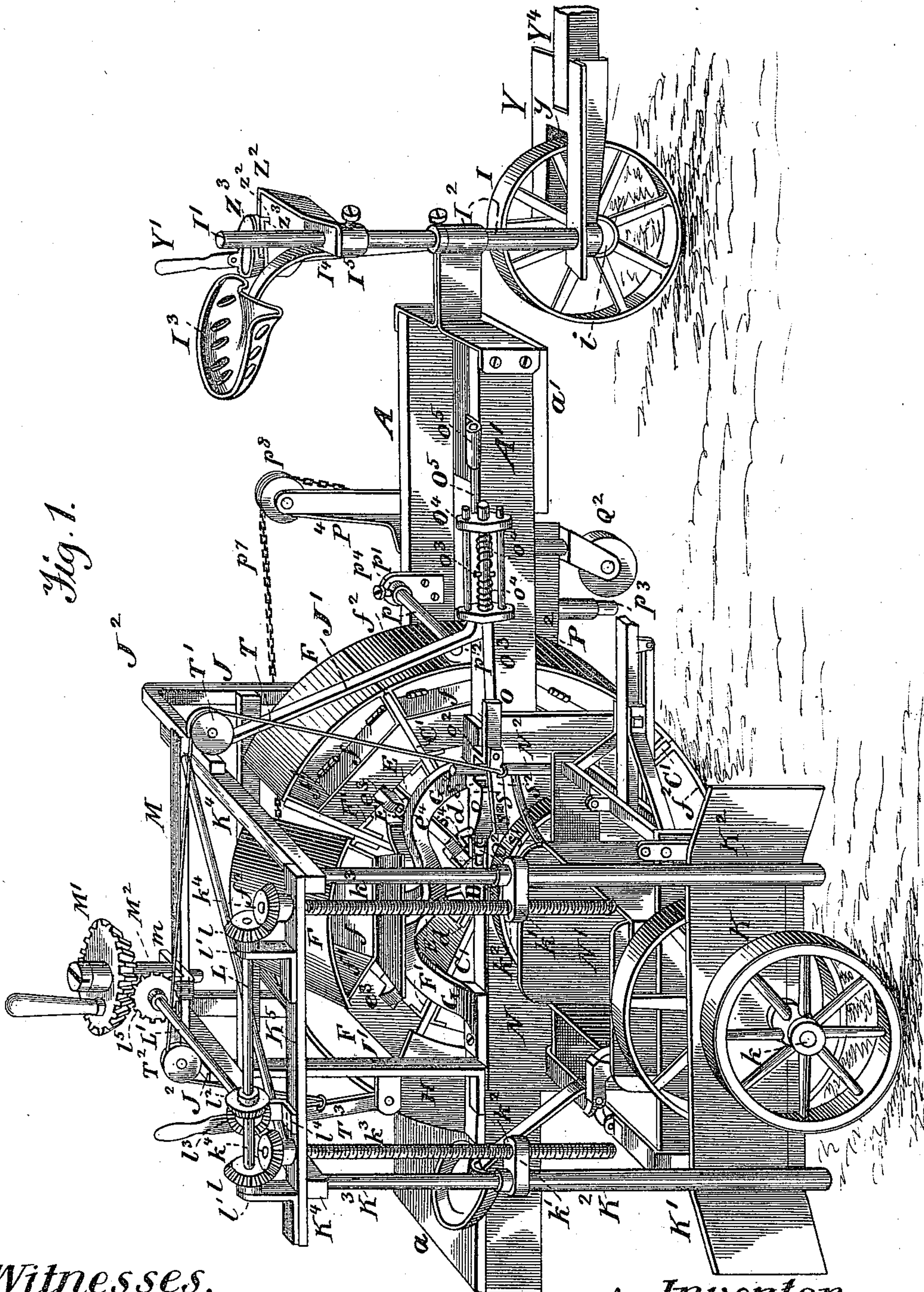
(No Model.)

4 Sheets—Sheet 1.

J. CABLE.
EXCAVATOR.

No. 440,912.

Patented Nov. 18, 1890.



Witnesses.
A. Ruppert.
E. Luce.

Inventor:
John Cable,
by R. W. T. Howard,
att'y

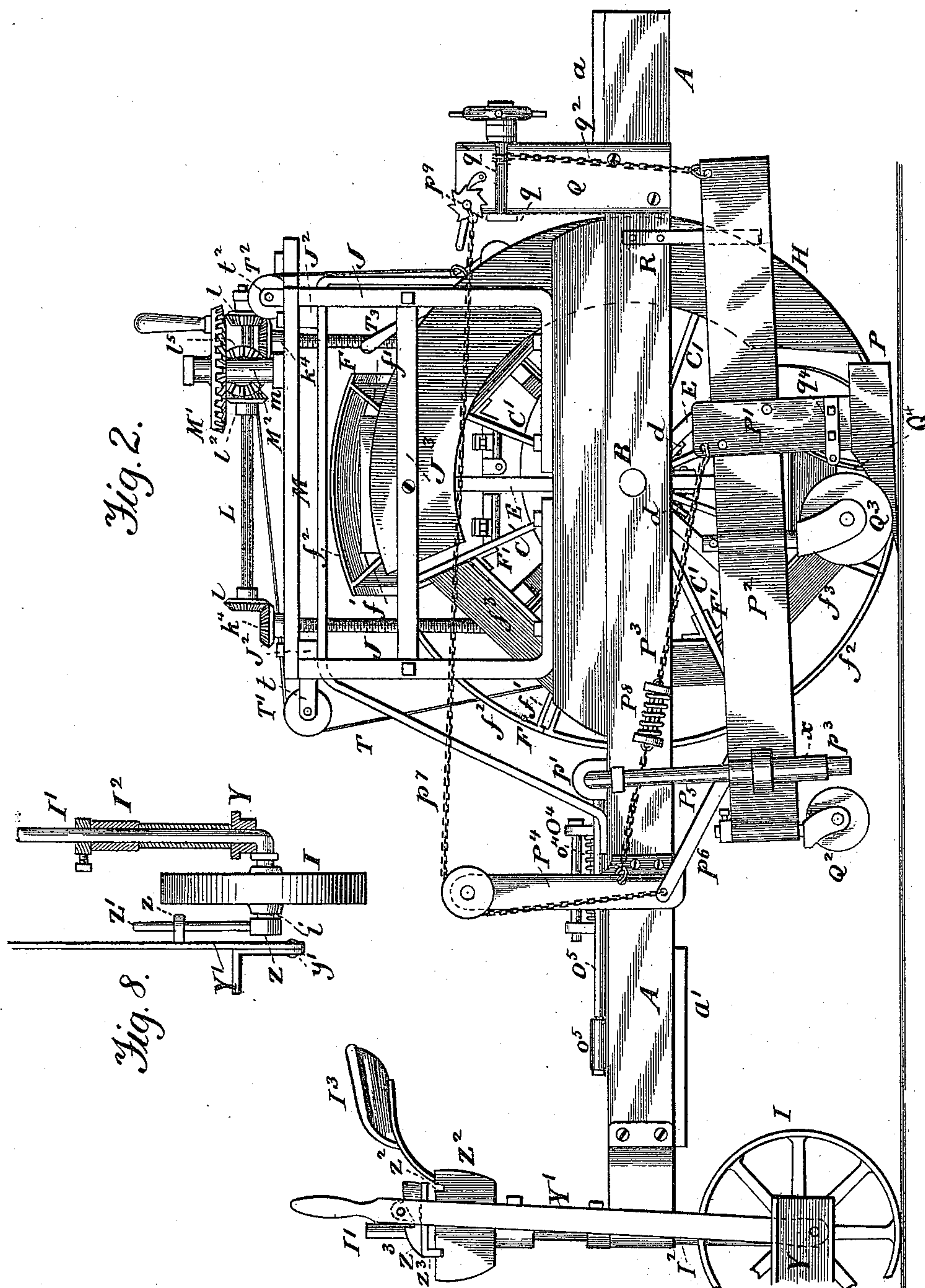
(No Model.)

4 Sheets—Sheet 2.

J. CABLE.
EXCAVATOR.

No. 440,912.

Patented Nov. 18, 1890.



Witnesses:
A. Ruppert
E. Luse.

Inventor:
John Cable
by R. W. J. Howard, atty

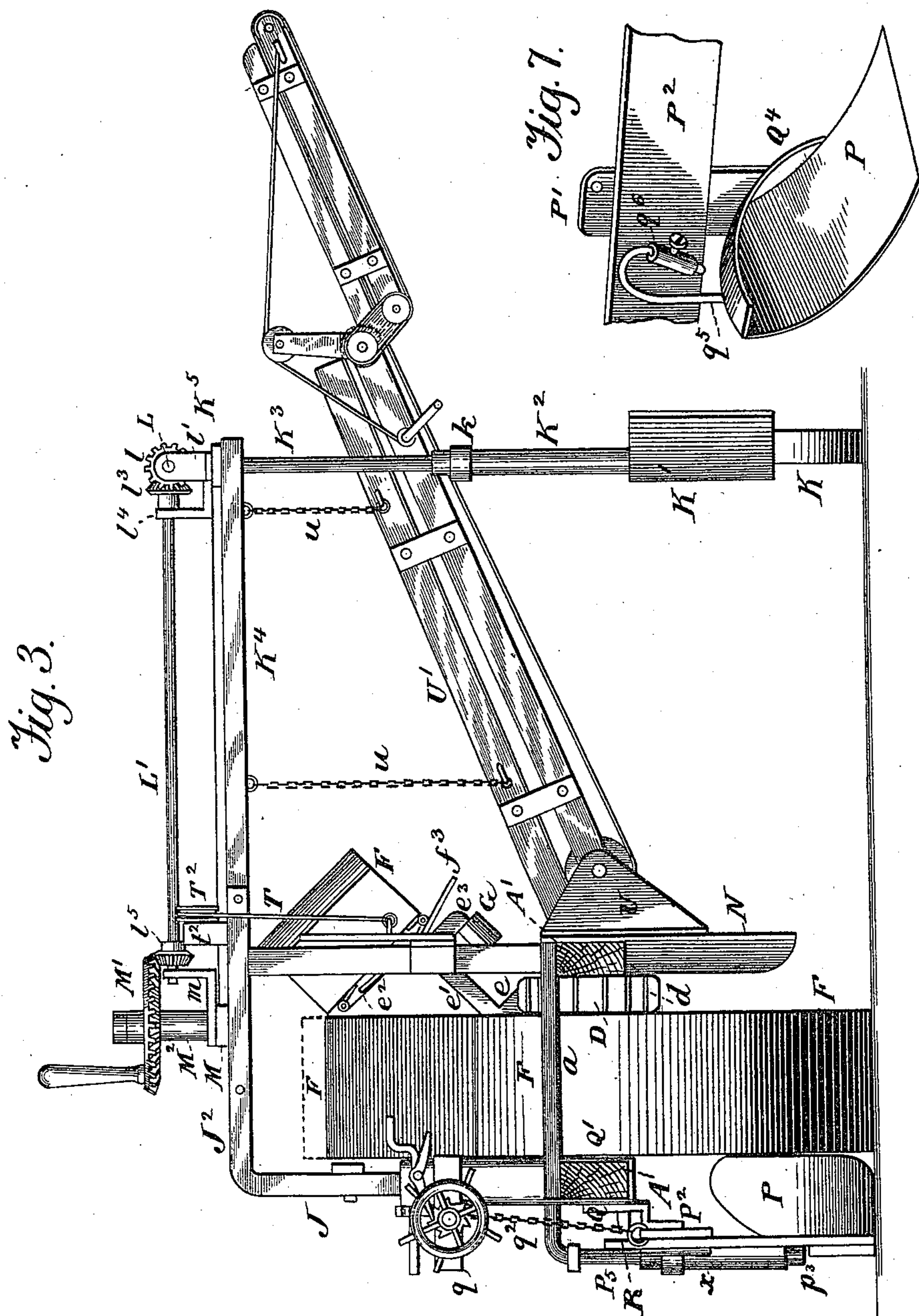
(No Model.)

4 Sheets—Sheet 3.

J. CABLE.
EXCAVATOR.

No. 440,912.

Patented Nov. 18, 1890.



Witnesses:
A. Ruppert
E. Cruise

Inventor:
John Cable
by J. H. W. J. Howard
att'y

(No Model.)

4 Sheets—Sheet 4.

J. CABLE.
EXCAVATOR.

No. 440,912.

Patented Nov. 18, 1890.

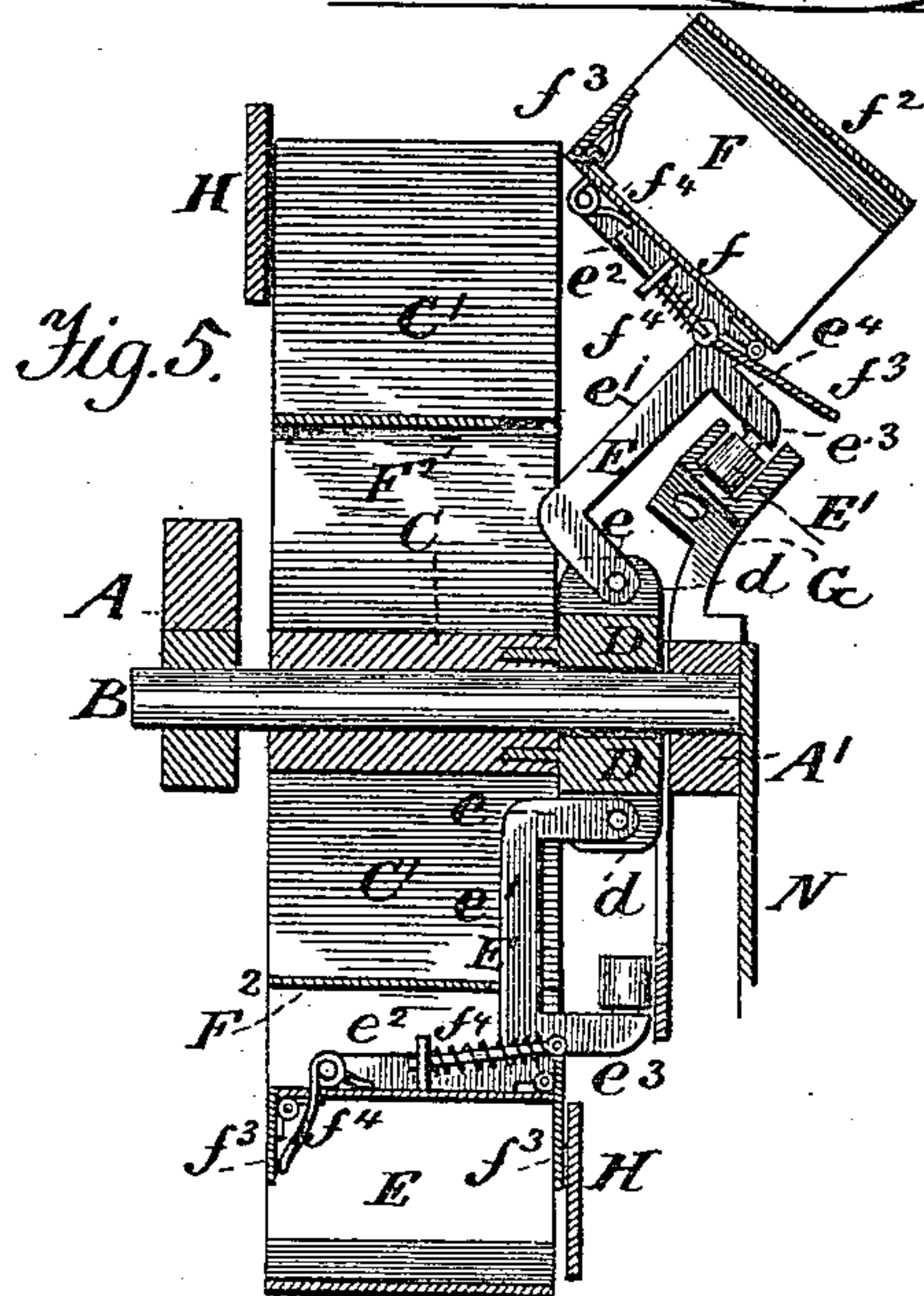
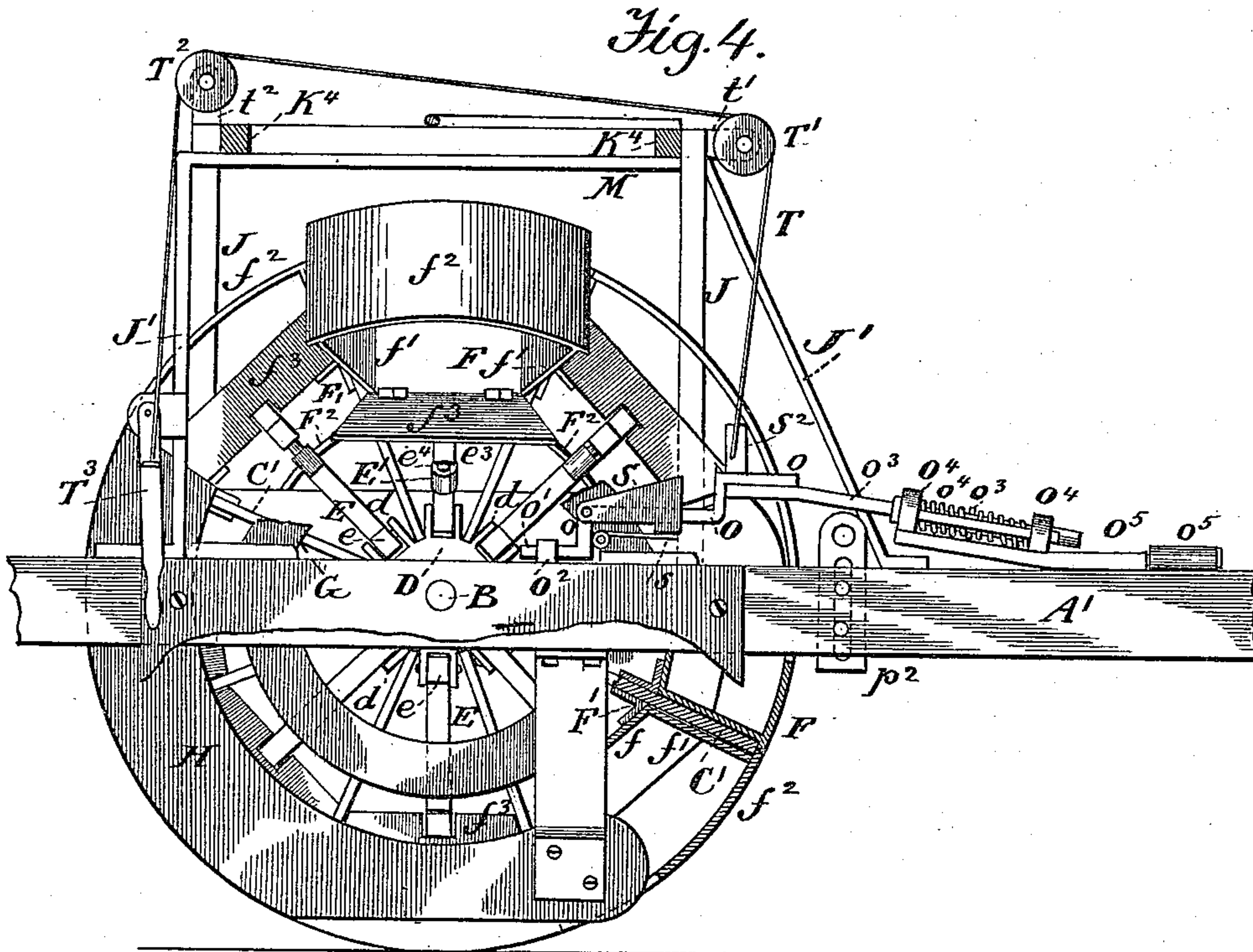
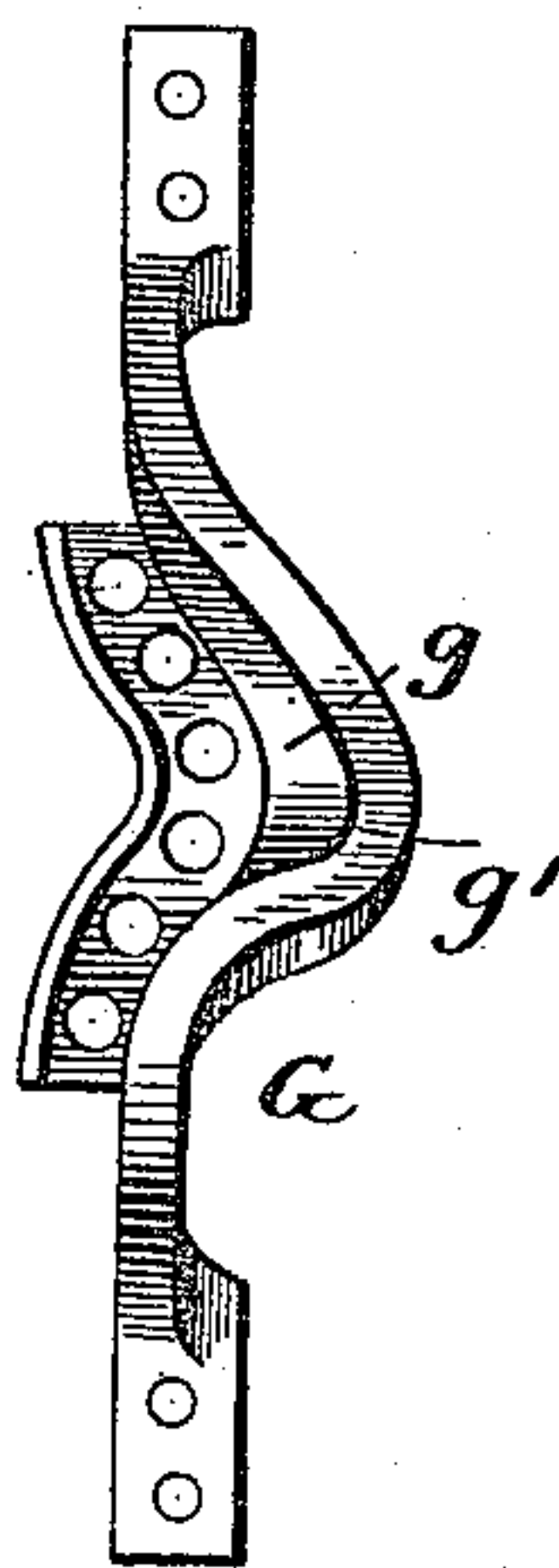


Fig. 6.



Witnesses:
A. Ruppert.
E. Luse.

Inventor:
John Cable,
by W. W. J. Howard
att'y.

UNITED STATES PATENT OFFICE.

JOHN CABLE, OF CABLE, MINNESOTA.

EXCAVATOR.

SPECIFICATION forming part of Letters Patent No. 440,912, dated November 18, 1890.

Application filed March 18, 1890. Serial No. 344,357. (No model.)

To all whom it may concern:

Be it known that I, JOHN CABLE, of Cable, in the county of Sherburne and State of Minnesota, have invented certain new and useful Improvements in Excavators, of which the following is a specification, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

The object of my invention is to provide an excavator with an elevating-wheel having a series of tilting sections forming receptacles, which receptacles in turn receive the dirt from the plow, and as the wheel revolves elevate and discharge it by a tilting action into a wheeled conveyer or onto a carrying-belt, as may be desired. The elevating-wheel serves also to support in a large measure the weight of the machine.

My invention will be fully set forth in the following specification and claims.

In the drawings, Figure 1 is a perspective view of my improved excavator, showing a wheeled conveyer attached thereto to receive the dirt from the tilting receptacles. Fig. 2 is an elevation taken on the side of the machine to which the plow is attached. Fig. 3 is a rear view showing a carrying-belt attached to the machine to receive the dirt from the tilting receptacles. Fig. 4 is a side view, partly broken away and partly in section, showing particularly the elevating-wheel and the coupling device. Fig. 5 is a transverse section through a portion of the elevating-wheel, showing one of the receptacles tilted. Figs. 6, 7, and 8 are detached details.

Similar letters of reference indicate similar parts in the respective figures.

The main frame of the machine consists of two longitudinal beams A A', suitably braced together at their front and rear ends by planking, which at the rear end serves as a platform *a*, and at the front end as the bottom of a receptacle *a'* for tools, &c.

B is an axle revolving in suitable boxes in the beams A A'.

C is a hub keyed to the axle B, so as to revolve with it. From the hub C radiate a series of spokes C'. In practice I propose to make these spokes about two feet in width

and of a length sufficient to make a wheel about eight feet in diameter; but I do not limit myself to these dimensions.

D is a collar fitting loosely over the axle B between the hub C and the beam A' and pinned to the hub, so as to revolve with it. From the collar D project a series of plates or ears *d*, so arranged that a pair of such ears *d* shall be opposite the space between each pair of spokes where they join the hub.

E E are bars bent at a right angle in opposite directions at each end. The bent end *e* of each bar enters between a pair of ears *d* and is pivoted thereto. The part *e'* extends at a right angle from the part *e* and the bent end *e²* extends at a right angle from the part *e'* in a direction opposite to that of the end *e*. Each of these bent ends *e²* is secured to the bottom *f* of a receptacle F. The sides *f'* of these receptacles converge toward the bottom so as to allow them to fit snugly in between each pair of the spokes. The tops *f²* project slightly beyond the sides so as to rest on the ends of the spokes, and these tops constitute the rim of the wheel. It will be seen that each receptacle F is independently hinged to the ears *d* on the collar D.

F' F' are angle-irons extending across and bolted to the spokes to support the bottoms of the receptacles, and F² is a brace connecting all the spokes, said brace being concentric with the hub and rim of the wheel. This brace may be cast in position, suitable openings being made in the spokes to allow the metal to run through, or it may be made in sections and bolted to the spokes.

The ends of the receptacles F are partially closed by means of the gates *f³* hinged to the bottom, the gates on the plow side of the machine being hinged to open inwardly and those on the opposite side to open outwardly, each gate being held normally in a close position by means of springs *f⁴*, whose tension is not, however, sufficient to resist the weight of the dirt either in loading or discharging the receptacles. From the part *e'* of each of the bars E a short bar *e³* projects over the collar D and carries a downwardly-projecting rod *e⁴*, on which a roller E' revolves.

Rigidly bolted to the beam A' is a casting

G, in which is formed a cam-groove g , so arranged that as the elevating-wheel revolves the roller E' of each tilting receptacle will enter the groove g , which by its irregular form will cause the receptacles F to gradually tilt until the rollers have traveled nearly half-way of the groove, when the receptacles will by their own weight fall forward, causing the rollers E' to strike with some force in the dip or turn g' of the groove. This will give the receptacle a sharp jar and cause it to discharge its contents with some force, the gate f^3 being forced open by the weight of the dirt. As the wheel continues to revolve the groove g will throw the receptacle back again into its position between the spokes of the wheel, the springs f^4 automatically closing the gates. H H are guards or fenders secured to the frame of the machine on either side of the wheel and in close proximity thereto to prevent the dirt falling out of the receptacles as the wheel revolves.

The front end of the machine is supported on the wheel I , whose axle is the bent end i of a shaft I' . The upper vertical portion of the shaft I' passes through a sleeve I^2 , rigidly attached to the front end of the machine-frame. This sleeve I^2 rests on a casting Y , which in turn rests on the axle i and is pivoted at one rear corner on the vertical shaft I' . The casting is slotted at y to receive the wheel, and its other rear corner is attached by a pivotal connection y' to a lever Y' , extending upward to the seat for the driver. The wheel I is held on the axle i by a collar Z , rigidly secured on the end of the axle, and from this collar a short rod Z' extends upward and passes loosely through a lug z on the lever Y' .

I^3 is the seat and I^4 the foot-rest for the driver, both secured to and supported by the collar I^5 , which is vertically adjustable on the shaft I' .

Secured to the side of the foot-rest next to the lever Y' is a plate Z^2 , the top edge of which has notches z^2 , with which the projection z^3 on the foot-plate Z^3 is adapted to engage. The foot-plate Z^3 is pivoted to the lever Y' , and the lever can be operated by either the hand or foot of the driver. The object of this lever is to steer the wheel I in order that a uniform cut may be made by the plow irrespective of any irregular movement of the team, and also to assist in turning the machine.

The casting Y is slotted at its front end to receive the pole Y^4 , and the whole draft will be on this casting Y , as the draft-eveners will also be attached to it. When the horses are pulling, the casting Y will form a rigid base, as it were, and the lever Y' being pivoted on the casting, and the axle i , being also pivotally connected with the casting, it is apparent that the axle i through its connection with the lever can be turned in the casting by operating the lever, and thereby kept in the desired direction, irrespective of the direction

given to the casting by any irregular movement of the team.

J J are standards extending up from the beam A , and J' J' standards extending up from the beam A' . These standards are suitably braced together by the horizontal bars J^2 , J^2 , J^3 , and J^4 , so as to form an open framework extending around and over that part of the elevating-wheel above the beams A and A' .

K is a wheel mounted on a short axle k , secured to the side of a plate K' . Extending upward from this plate are two sleeves K^2 K^2 , in which slide the rods K^3 K^3 . The upper ends of these rods are detachably connected by bars K^4 K^4 to the bars J^2 J^2 , and a bar K^5 connects the bars K^4 K^4 where they join the rods K^3 . Near its upper end each sleeve K^2 is provided with a lug k' , having a threaded opening k^2 , through which a threaded rod k^3 works. The upper end of each threaded rod k^3 passes loosely through the bar K^5 and carries a bevel-gear k^4 , engaging with a bevel-gear l , mounted on a rod L . This rod L is supported in bearings l' on the bar K^5 , and at any suitable point carries another bevel-gear l^2 , engaging with a similar gear l^3 on the rod L' . One end of the rod L' is supported in a bearing l^4 on the bar K^5 , and the other in a bearing m , on a bar M , resting on the bars J^2 J^2 and the bars K^4 K^4 , but secured to the latter only. This end of the rod L' also carries a bevel-gear l^5 , which engages with the teeth of the disk M' , the latter being revoluble on a suitable support M^2 , extending upwardly from the bar M . By revolving the disk M' the plate K' and wheel K can be raised or lowered on the rods K^3 K^3 to adapt the machine to uneven ground. The ends of the plate K' are bent outwardly, as shown, and serve as a guide for the wheeled conveyer when being drawn into position to receive the dirt from the elevator-wheel. This side extension serves to balance the elevating-wheel, and by means of its vertical adjustment enables the machine to operate on ground having an incline in either direction from the elevating-wheel. Furthermore, as it is attached to the main frame of the machine only by the removable connections between the bars J^2 and K^4 , it can be readily detached from the machine to economize space when it may be necessary to transport the excavators on cars or otherwise.

N is a shield or plate attached to the side of the beam A' .

N' is the wheeled conveyer, having a vertical post N^2 at one of its front corners to engage with a coupling device on the machine. This coupling device consists of a bar O , one end o being bent at about a right angle and the other end o' being bent twice to form a shoulder o^2 . The end o is connected to a short rod O' , which extends at a right angle to it and rests in a bearing O^2 on the beam A' in such a manner as to be free to revolve and also to have longitudinal movement therein. The end o' is connected to a rod O^3 , passing

through the heads of a cage O^4 . A pin o^3 passes through the rod O^3 , and spiral springs o^4 surround the rod between the pin and the heads of the cage. The cage is secured to a rod O^5 , the end of which is supported and revolves in a bearing o^5 on the beam A' . The whole coupling device is supported in the bearings O^2 and o^5 , and can be turned therein. The bar O and its rods O' and O^3 (see Figs. 1 and 4) have also a limited longitudinal movement in either direction against the force of the springs o^4 , and this movement prevents in a great measure any shock to the machine or conveyer which might otherwise be caused by obstructions.

S is a latch pivoted vertically to the bar O at the corner formed by bending the end o . This latch S will therefore swing in a horizontal plane, and is held in its extreme outward position by the spring s . The latch has an inclined face s' , the incline being outward from the pivotal point, and the larger end of the latch is squared. A recess s^2 is formed between the shoulder o^2 and the square end of the latch S for the reception of the post N^2 on the conveyer. Another latch S^2 is pivoted to the bar O at a point just forward of the shoulder o^2 , so as to swing vertically. The free end of this latch is bent outwardly, as shown, in order to guide the post N^2 into the recess s^2 . A lug s^4 on the bar O prevents the latch from swinging below said bar. A rope or chain T leads from the latch S^2 over pulleys T' T^2 , mounted on bearings t' t^2 on the bars J^2 J^2 , and is connected to a lever T^3 , mounted on the rear standard J' . By pulling on the lever T^3 and rope or chain T the latch S^2 will be first turned to a vertical position, and by a still further pull on the rope the entire coupling device will be turned in its bearings and moved entirely clear of the post N^2 , as shown in Fig. 4.

When it is desirable to discharge the dirt onto a belt to convey it to one side of the machine to form an embankment, or for other similar purposes, I secure brackets U to the plate or shield N to support the lower end of the carrier-belt frame U' , in a manner similar to that described in my patent, No. 418,272, dated December 31, 1889, the upper end being supported by chains u from either of the bars K^4 K^4 or K^5 , as may be most convenient. The carrying-belt on the frame U' will be driven by suitable gearing and chains from the axle B , which projects beyond the beam A . I have not shown this gearing, as it forms no part of my present invention, and would only complicate the drawings.

P is the plow, provided with a vertical shank P' . This shank is securely bolted to the beam P^2 and extends slightly above it. From the upper end of the shank P' a draft-chain P^3 leads to a standard P^4 , firmly bolted to the beam A . The chain P^3 is provided in its length with a spring-compensating device P^8 , its object being to relieve the shock on the

machine should the plow meet with an obstruction.

P^5 is a bar bent at a right angle, its horizontal arm p being journaled in bearings p' p^2 on the beams A and A' , and its vertical arm p^3 , passing through a sleeve x , pivoted to the plow-beam P^2 near its forward end. The arm p^3 and the plow-beam P^2 are therefore free to swing longitudinally of the plow-beam in either direction. The sleeve-connection also permits the plow-beam to have free vertical movement, which is sometimes necessary in order to clear obstructions. The bar P^5 may be adjusted laterally of the machine, but when in proper position is held so by means of the collars p^4 on the arm p . The rear end of the plow-beam P^2 is prevented from coming in too closely to the elevating-wheel by the angle-iron R , bolted to the beam A . The bearing p^2 is vertically adjustable, in order that the plow-beam and plow may be canted in either direction out of a vertical line, this being found necessary in operating in different soils. The beam and plow are so arranged as to allow the mold-board of the plow to just clear the side of the elevating-wheel and at the same time turn the dirt over into the receptacles F . To facilitate this operation I pivot the front end of a deflector Q^4 to a short bar q^4 , bolted to the plow-shank just above the landside of the plow. This deflector gradually increases in width from its front to its rear end, and is so bent as to follow the upper edge of the mold-board and form substantially a right angle with it, there being a small space between them. The rear end of the deflector is vertically adjustable by means of a bent rod q^5 , attached to its upper end and passing through a collar q^6 , in which it is held by a set-screw. (See Figs. 2 and 7.) This deflector stops the upward movement of the dirt and turns it over toward the elevating-wheel into the receptacles. The space between the deflector and the edge of the mold-board gradually increases toward the rear end in order that it may not become clogged. The object of making the rear end of the deflector adjustable is to adapt it to soils of different degree of tenacity. Near the forward end of the beam P^2 is secured a bent iron bar p^6 , from the outer end of which a chain p^7 leads over a pulley p^8 , mounted on the top of the standard P^4 , and thence rearwardly to a shaft p^9 , having bearings in two plates Q Q' , bolted to the beam A , one on each side thereof. The shaft p^9 is provided with a crank and a ratchet-and-pawl mechanism, in the ordinary manner. A strap q is firmly secured to the plates Q Q' , and in the ends thereof is mounted a shaft q' , on which a chain q^2 , leading from the rear end of the beam P^2 , is adapted to be wound. The shaft q' is provided with a hand-wheel and a ratchet-and-pawl mechanism of ordinary construction. A caster-wheel Q^2 is pivoted to the forward end of the beam P^2 to equalize the depth of the furrow. A rolling cutter Q^3 is also pivoted on the beam P^2 about

on a line with the point of the plow. The periphery of the caster-wheel Q^2 is made convex, for the purpose of enabling it to ride up the edge of a furrow with greater facility than it would do if it were flat or concave.

The operation is briefly as follows: When a wheeled conveyer is to be used, it is drawn in between the plates K' and N , and the post N^2 on the conveyer will be guided into the recess s^2 of the coupling device by means of the oppositely-inclined faces of the latches S and S^2 . The machine is then started, and the conveyer will move uniformly with it. The plow will turn the dirt into the receptacles F , and as the elevating-wheel revolves the dirt will be elevated and the receptacles in turn be tilted by means of the rollers E' , entering the cam-groove g , and their contents be discharged into the conveyer. As soon as the conveyer has been loaded, the lever T^3 must be operated by the attendant and the coupling device detached from the post N^2 , leaving the conveyer free to be drawn away from the machine. On reversing the lever the coupling device will by gravity fall into position ready for the next conveyer, and the work of loading will continue. The operation of the plow and elevating-wheel will be the same should a carrier-belt be used instead of a wheeled conveyer.

Having described my invention, I claim—

1. In an excavator, a supporting and elevating wheel having a series of laterally-tilting receptacles, substantially as specified.
2. In an excavator, the combination, with the main frame and a plow, of a supporting and elevating wheel having a series of laterally-tilting receptacles, substantially as specified.
3. In an excavator, a supporting and elevating wheel having a series of tilting receptacles, the top sides of which form the rim of the wheel, substantially as specified.
4. In an excavator, the combination, with the spokes of a supporting and elevating wheel, of a series of tilting receptacles hinged between the spokes, the top sides of the receptacles forming the rim of the wheel, substantially as specified.
5. In an excavator, an elevating-wheel provided with a series of tilting receptacles, said receptacles having end doors, substantially as specified.
6. In an excavator, an elevating-wheel provided with a series of tilting receptacles, said receptacles having spring-actuated end doors, substantially as specified.
7. In an excavator, a supporting and elevating wheel having a series of hinged laterally-tilting receptacles, combined with a tilting device, substantially as specified.
8. In an excavator, the combination, with the main frame and a supporting and elevating wheel having a series of hinged laterally-tilting receptacles, of a casting secured to the frame and having a cam-groove and a roller attached to each receptacle and adapted to

enter the cam-groove, substantially as specified.

9. In an excavator, the combination, with the main frame, of an axle journaled therein, a hub mounted on said axle, spokes radiating from said hub, and a series of hinged receptacles between the spokes, the top sides of the receptacles forming the rim of the wheel, substantially as specified.

10. In an excavator, the combination, with the hub and spokes of a supporting and elevating wheel, of a brace concentric with the hub connecting said spokes and a series of hinged receptacles between the spokes, the top sides of said receptacles forming the rim of the wheel, substantially as specified.

11. In an excavator, the combination, with the hub and spokes of a supporting and elevating wheel, of angle-irons bolted to said spokes and a series of hinged receptacles between the spokes, the bottoms of said receptacles resting on the angle-irons and their top sides forming the rim of the wheel, substantially as specified.

12. In an excavator, a supporting and elevating wheel having a series of hinged laterally-tilting receptacles, combined with a plow adapted to load the receptacles at the lowest point of their travel and a device to tilt the receptacles to discharge their contents at the highest point of their travel, substantially as specified.

13. In an excavator, the combination, with the main frame and an axle journaled therein, of a hub mounted on said axle, a collar loosely surrounding the axle and pinned to the hub, a series of spokes radiating from the hub, a series of lugs or ears projecting from the collar, arms hinged at one end to the lugs on the collar, and a series of receptacles fitting between the spokes and attached to the hinged arms, substantially as specified.

14. In an excavator, the combination, with the main frame, an axle journaled therein, a hub mounted on said axle, and a series of radiating spokes, of a collar fitting loosely over said axle and pinned to the hub, a series of lugs or ears projecting from the collar, arms hinged to said lugs, a series of receptacles fitting between the spokes and supported by said arms, a casting secured to the frame and having a cam-groove, and a roller carried by each arm adapted to enter the cam-groove to tilt the receptacles, substantially as specified.

15. In an excavator, the combination, with the main frame, of a supporting and elevating wheel having a series of hinged laterally-tilting receptacles adapted to receive dirt from a plow, and fenders or shields secured to the frame of the machine to prevent the escape of the dirt from the receptacle while being elevated, substantially as specified.

16. In an excavator, the combination, with the main frame and a supporting and elevating wheel mounted therein, of standards extending upwardly from the main frame, a side plate supported on a wheel, vertical sleeves

attached to said plate, rods sliding in said sleeves, and a series of horizontal bars connecting the upper ends of said rods together and to the said standards above the elevating-wheel, substantially as specified.

17. In an excavator, the combination, with the main frame and a supporting and elevating wheel mounted therein, of standards extending upwardly from the main frame, a side plate supported on a wheel, vertical sleeves attached to said plate, rods sliding in said sleeves, a bar connecting the upper ends of the rods, a lug attached to each sleeve and provided with a threaded opening, threaded rods passing through the connecting-bar and the said lugs, means, substantially as described, to revolve said threaded rods to vertically adjust the sleeves on the rods, and horizontal bars connecting the rods to the standards above the elevating-wheel, as and for the purpose specified.

18. In an excavator, the combination, with the main frame and a wheeled conveyer having a vertical post at its front corner adjacent to the frame, of a coupling device pivoted on the main frame and adapted to automatically engage the vertical post on the wheeled conveyer, substantially as specified.

19. In an excavator, the combination, with the main frame and a coupling device pivoted on said frame and having a spring-controlled longitudinal movement, of a wheeled conveyer having a vertical post adapted to automatically engage the coupling device, and a rope leading from the coupling device over pulleys to a lever on the main frame, whereby the coupling device may be turned on its pivots and disengaged from the vertical post, substantially as specified.

20. In an excavator, the combination, with the main frame, an elevating-wheel having a series of receptacles, and a plow connected to the main frame and located in close proximity to the elevating-wheel, of a deflector attached to the plow-shank and bent to follow the outline of the upper edge of the mold-board, said deflector forming with the mold-board substantially a right angle and assisting to turn the dirt into the receptacles, as specified.

21. In an excavator, the combination, with the main frame, an elevating-wheel having a series of receptacles, and a plow connected to the main frame and located in close proximity to the elevating-wheel, of a deflector, formed substantially as described, hinged at its front

end to the plow-shank and vertically adjustable at its rear end relative to the mold-board of the plow, a space being left between the deflector and the mold-board, said space being widest at the rear end of the deflector, as and for the purpose specified.

22. In an excavator, the combination, with the main frame, of a plow-beam carrying a plow, chains connecting the front and rear of the plow-beam to winding-shafts on the frame to vertically adjust said plow-beam and plow, a sleeve pivoted to the front end of the plow-beam, a bent rod, the horizontal arm of which rests in bearings transversely of the main frame and whose vertical arm passes through the pivoted sleeve on the plow-beam, said horizontal arm being held against lateral movement, substantially as described, whereby the plow-beam has free vertical and longitudinal movement but no lateral movement at its front end, for the purpose specified.

23. In an excavator, the combination, with the main frame, of a plow-beam and its plow, a sleeve pivoted to the front end of the plow-beam, a bent rod, the vertical arm of which passes through the pivoted sleeve, bearings secured to the main frame and in which the horizontal arm of said rod rests and can revolve, the bearing for the end of the horizontal arm being vertically adjustable, whereby the plow-beam and plow may be canted out of a vertical line, substantially as and for the purpose specified.

24. In an excavator, the combination, with the main frame and a supporting and elevating wheel, of a sleeve attached to the front end of the main frame, a vertical shaft passing through said sleeve and having its lower end bent to form an axle, a guide-wheel mounted on said axle, a draft-sustaining casting pivoted at one of its rear corners on the vertical shaft, a lever pivoted to the other rear corner of the said casting and extending upward to the seat for the driver, and a rod rigidly connected to the end of the axle and passing through a lug on the lever, substantially as and for the purpose specified.

In testimony whereof I hereunto set my hand and affix my seal this 21st day of February, 1890.

JOHN CABLE. [L. S.]

Witnesses:

E. CRUSE,
B. MILLER.