(No Model.)

4 Sheets—Sheet 1.

J. CABLE.

EXCAVATOR.

No. 418,272. Patented Dec. 31, 1889.

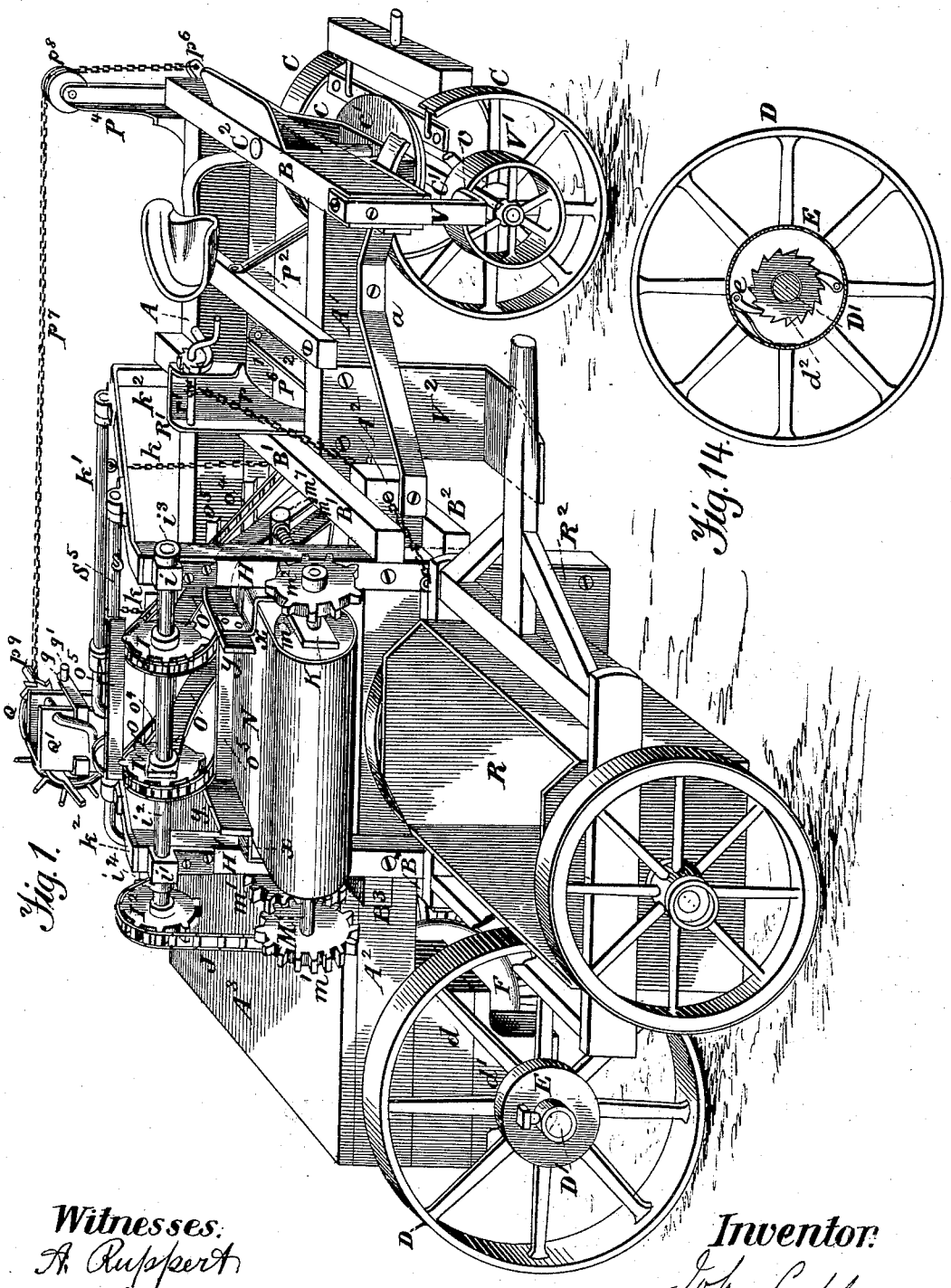

Fig. 1.

Fig. 14.

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(No Model.) 4 Sheets—Sheet 2.

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EXCAVATOR.

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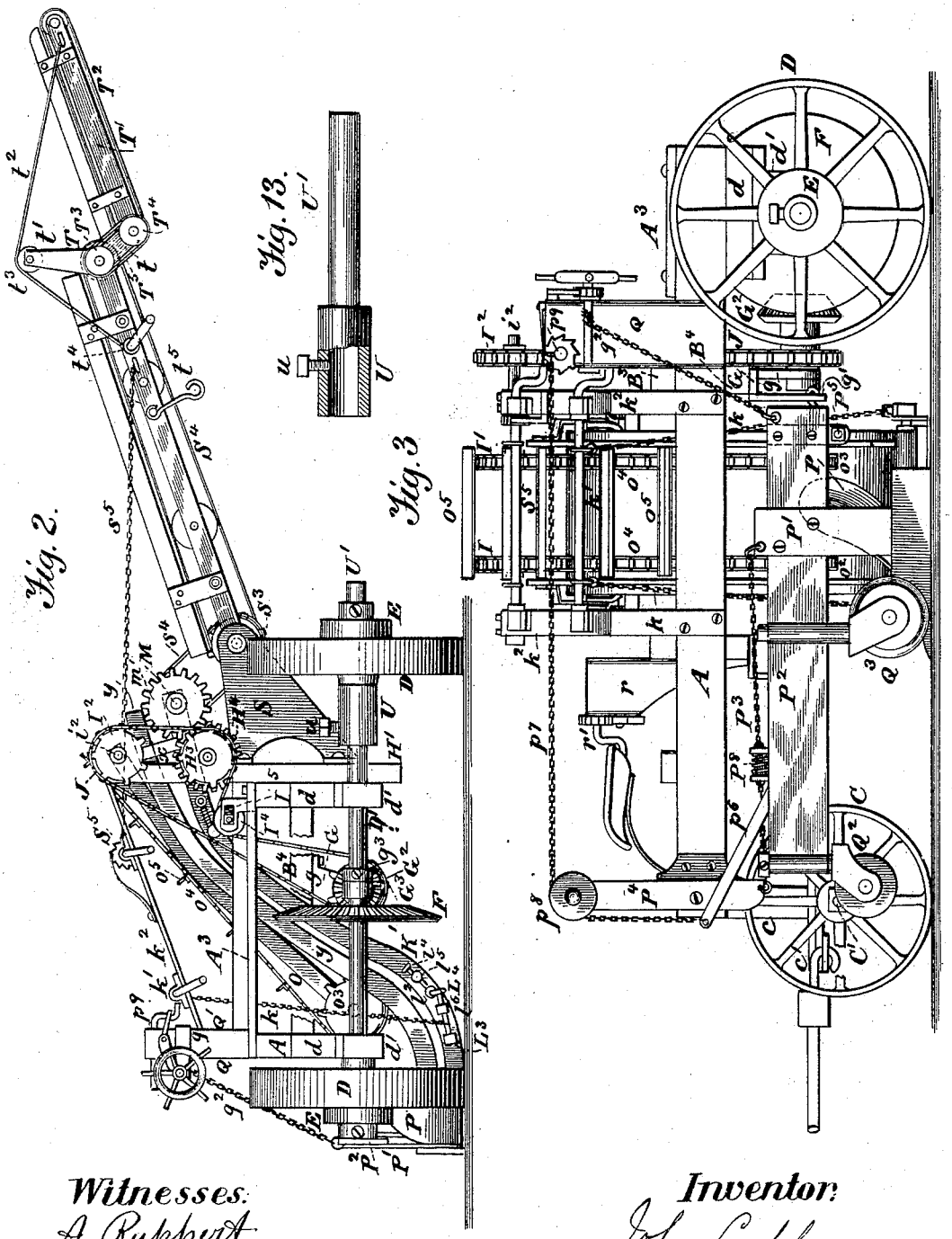

Fig. 2.

Fig. 13.

Fig. 3.

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(No Model.) 4 Sheets—Sheet 3.

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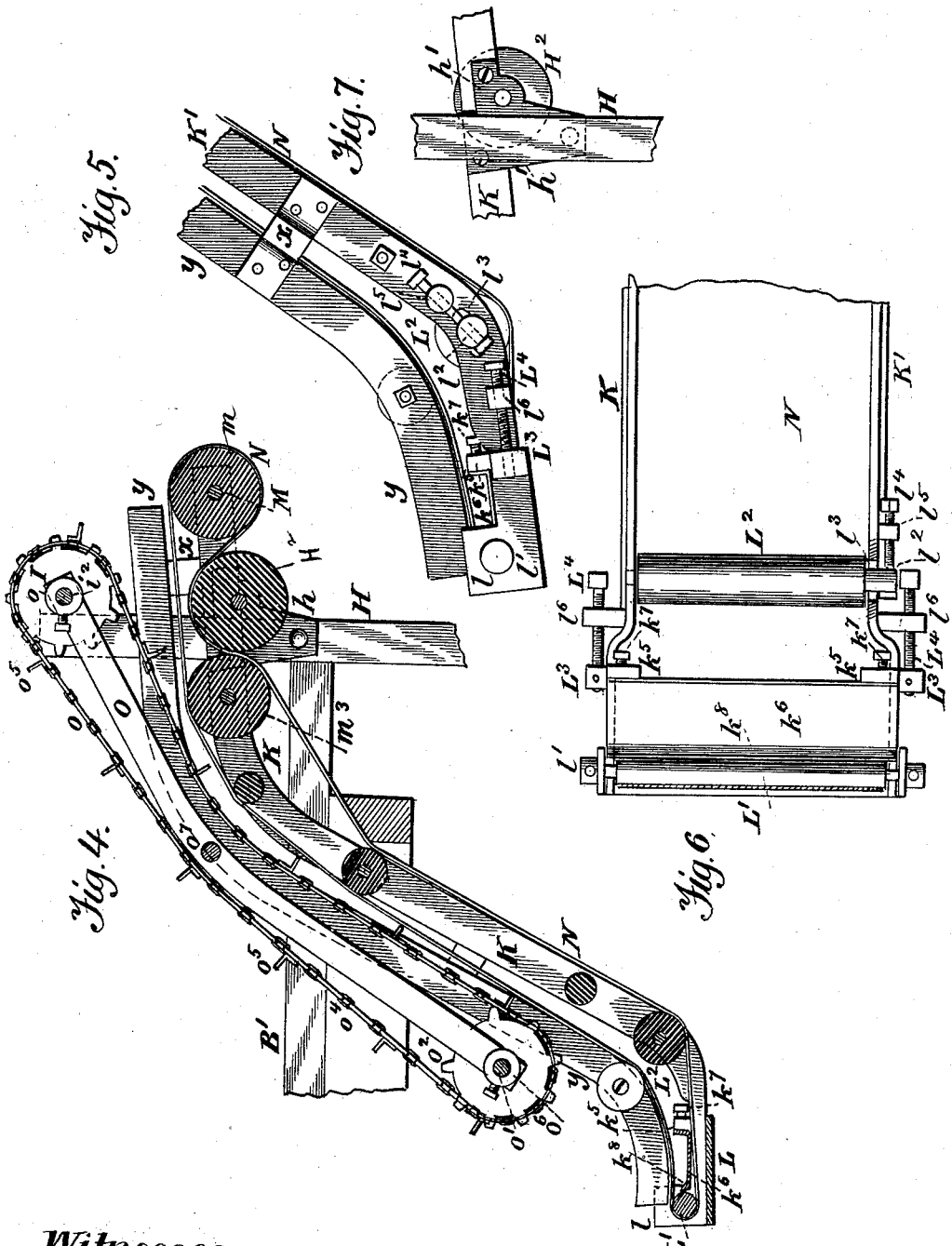
EXCAVATOR.

No. 418,272. Patented Dec. 31, 1889.



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(No Model.) 4 Sheets—Sheet 4.

J. CABLE.

EXCAVATOR.

No. 418,272. Patented Dec. 31, 1889.

Fig. 8.

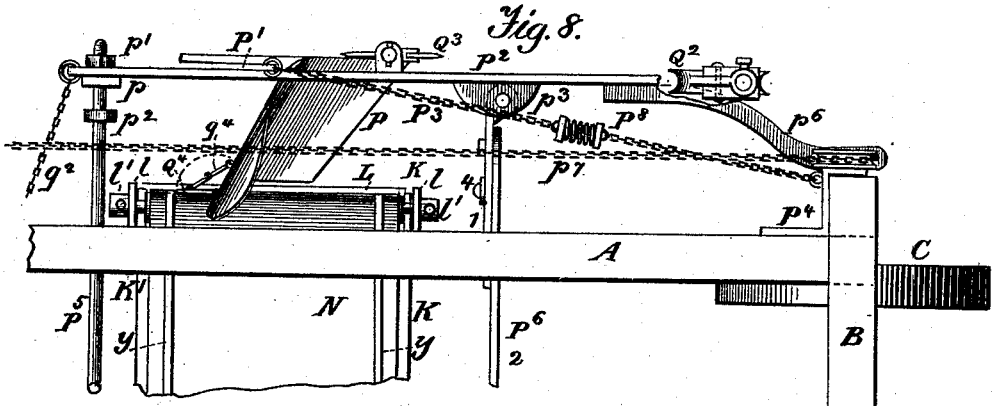


Fig. 9.

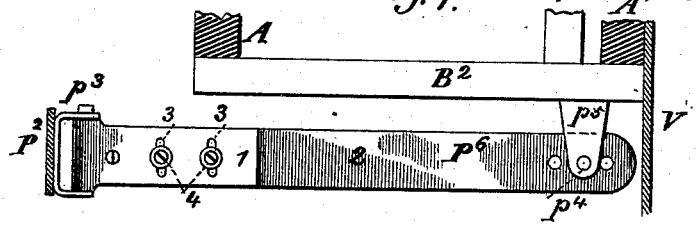


Fig. 12.

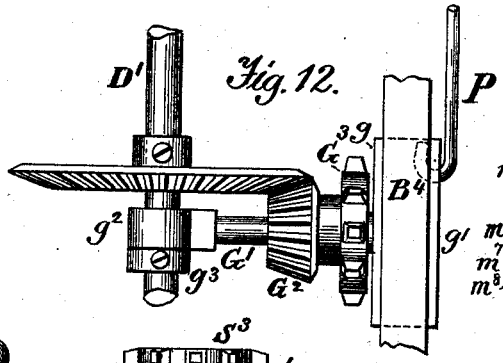


Fig. 11.

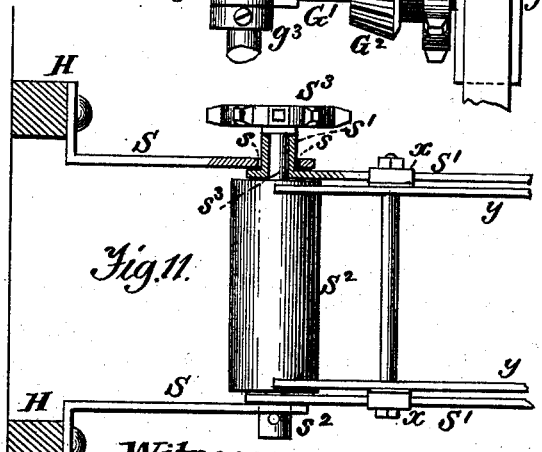
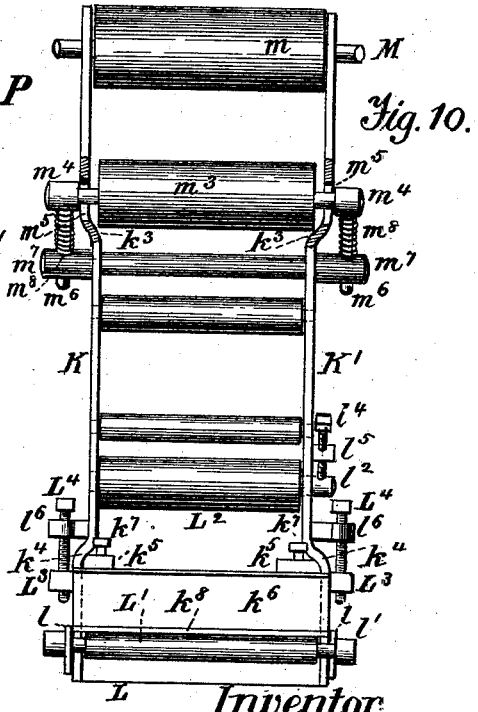


Fig. 10.



Witnesses:
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E. Kruse.

Inventor:
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UNITED STATES PATENT OFFICE.

JOHN CABLE, OF CABLE, MINNESOTA.

EXCAVATOR.

SPECIFICATION forming part of Letters Patent No. 418,272, dated December 31, 1889.

Application filed February 15, 1889. Serial No. 299,926. (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.

One object of my invention is to provide an excavator which shall make the cut on a line outside the line of the frame of the machine on the side on which the plow is located, in order that a perpendicular or sloping bank may be formed, if necessary, when making a deep cut for the purpose of forming a roadway or other analogous purpose.

Another object of my invention is to convey the dirt loosened by the plow either to a conveyer mounted on wheels, which can be attached to one side of the excavator and moved with it, or else, by means of additional carrying-belts, to discharge it on one side of the cut to form an embankment.

My invention consists in the construction, arrangement, and combination of the several parts, as will be hereinafter fully set forth in the specification and claims.

In the drawings, Figure 1 is a perspective view of the machine, showing a conveyer connected to it. Fig. 2 is a rear view, partly broken away, showing the additional carrying-belts attached. Fig. 3 is an elevation taken on the side to which the plow is attached. Fig. 4 is a section showing the carrying-belt and wheels. Figs. 5, 6, and 7 are details on an enlarged scale. Fig. 8 is a plan of the plow and its attachments. Figs. 9, 10, 11, 12, 13, and 14 are detached details.

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

The main frame of the machine consists of the longitudinal beams A, A′, and A^2 and the cross-beams B, B′, B^2, B^3, and B^4, the latter being firmly secured to the former by bolts or otherwise. The beam A′ extends rearwardly only as far as the cross-beams B^3 B^4, a clear space being thus left between the beams A and A^2 for parts of the operating mechanism, to be hereinafter described. A platform A^3 is secured to the upper sides of the beams A and A^2. The beam A^2 is shorter than the beam A, extending forward only a short distance beyond the beams B′ B^2. Its forward end is connected by means of a bent iron brace *a* to the beams A′ and B. This last-described construction is similar to that set forth in my patent, No. 390,201, dated October 2, 1888, and is for the purpose, fully described in said patent, of enabling the machine to be turned in a cut very little wider than the length of the machine.

The front part of the excavator is supported on the wheels C C, a suitable bolster *c* and a fifth-wheel *c′* being interposed between the under side of the beam B and the axle C′, the several parts being connected by means of a bolt C^2, which passes through them and forms a pivot, on which the axle C′ revolves in a horizontal plane. The wheels C C are of a size enabling them to pass freely under the frame of the machine.

The rear end of the machine is supported on the wheels D D. Suitable bolsters *d* are secured to the under sides of the beams A and A^2, and to these bolsters are attached the boxes *d′*, in which the axle D′ revolves. Each of the wheels D is loosely mounted on the axle, outside the frame of the machine. The outer ends of the hubs of the wheels D are provided with ratchet-teeth d^2.

E E are caps which fit over the outer ends of the hubs, and inside of each of these caps spring-pawls *e* are pivoted, which engage with the teeth on the hub of the wheel, and thus cause the cap to rotate with the wheels when the machine is moving forward. The caps E, being keyed to the axle D′, will also cause it to revolve with them. The wheels D being, however, loosely mounted on the axle, if the machine is moved backward the pawl *e* will slip over the ratchet-teeth and the caps E and axle D′ will not revolve.

F is a bevel gear-wheel keyed to the axle D′.

To the under side of the beam B^4 is bolted a casting G, having two downwardly-projecting sides *g g′*, the side *g* serving as a bearing for one end of a shaft G′, the other end of which has a bearing in a casting g^2, loosely mounted on the axle D′, the said casting being held in position by means of the collar g^3, secured on the axle D′ by means of a set-screw. On the shaft G′ a bevel-gear G^2 is keyed and meshes with the bevel-gear F on the axle D′. The gear G^2 carries a sprocket-wheel G^3, which may be cast integral with or keyed to it.

To the beam A^2 are bolted the uprights H H′, extending above and below the beam A^2, on the inner sides of which the plates *h h′*

are pivotally attached. These plates project upward from the pivotal point and form bearings for the shaft h^2 of the roller H^2. The shaft h^2 extends beyond the upright H′, and carries a sprocket-wheel H^3 and a gear-wheel H^4. To the upper ends of the uprights H H′ are bolted the boxes $i\,i'$, in which the shaft i^2 revolves, the latter being held longitudinally in position by means of the collars i^3 i^4. On the shaft i^2 are keyed the sprocket-wheels I, I′, and I^2. A sprocket-chain J passes over the wheels I^2, H^3, and G^3, a tension-wheel I^4, mounted in self-adjusting spring-bearings I^5, bolted to the beam A^2, being interposed between the sprocket-wheels H^3 and G^3. The object of these self-adjusting spring-bearings will be explained hereinafter. It will be seen that motion is thus transmitted from the axle D′ to the shafts h^2 and i^2, and thereby to the roller H^2 and the sprocket-wheels I I′.

The main belt-carrying frame consists of the side rails K K′, secured near their upper ends to the plates h h', and thereby pivotally connected to the uprights H H′. The upper ends of the rails project beyond the uprights H H′. The rails are bent, as shown, (being **S**-shaped in longitudinal outline,) and extend transversely across the frame of the machine, their lower ends reaching to a point somewhat beyond the vertical line of the frame. The lower ends of the rails are vertically adjustable by means of the chains k k, leading upward from them to a shaft k', mounted in suitable bearings on the rails k^2 k^2, the said rails being secured to the beam A and the tops of the uprights H H′. As the pivotal point of the plates h h' are below the rails K K′, when the lower ends of said rails are raised, the belt-carrying frame will have an outward movement at the top and the lower ends can be lifted in a true vertical line. The spring-bearing I^5 of the tension-wheel I^4 will allow the chain J to adjust itself to this movement. The rails K K′ are bent outwardly near their upper and lower ends, as shown at k^3 k^3 and k^4 k^4. At the upper end of the rails K K′ is journaled a shaft M, carrying a roller m. The shaft extends at each end beyond the rails and carries at one end a gear wheel m', which meshes with the gear-wheel H^4 on the shaft h^2, thereby imparting motion to the roller m. On the other end of the shaft M a sprocket-wheel m^2 is keyed, for a purpose hereinafter stated. Another roller m^3 is journaled in movable boxes m^4, working in slots m^5 in the rails K K′. Short rods m^6 are attached to the movable boxes m^4 and pass through studs m^7 on each rail, and a coiled spring m^8 surrounds each rod between the studs and boxes. By this arrangement the roller m^3 is pushed toward the roller H^2, for a purpose hereinafter explained. To the lower ends of the rails K K′ a plate L is secured extending across and beneath them from their ends back to the bends k^4 k^4. The ends of the plate L are turned up on the outside of the rails, and provided with upward extensions l l, to which boxes l' l' are secured in any suitable manner, the boxes receiving the ends of the shaft of the roller L′. The plate L is provided on each side with a lug L^3, in which the set-screws L^4 L^4 are pivoted. These screws work in lugs l^6 l^6, secured to the sides of the rails K K′. By this means the plate L and roller L′ are adjustable with reference to the rails K K′, and thus the tension of the belt may be regulated. Just to the rear of the bends k^4 k^4 another roller L^2 is located. One end of this roller has a fixed bearing in the rail K, and the other end has a bearing in the box l^2, which is adjustable in the slot l^3 by means of a set-screw l^4, working in the lug l^5, the latter being secured to the side of the rail K′. The object of making this roller adjustable at one end only is to steer the belt, as in practice it is found that a wide belt has a tendency to run either to the right or left. As many rollers as may be necessary to support the belt will be interposed between the rollers L^2 and m^3 and have their bearings in the rails K K′.

N is the belt which passes around the end rollers L′ and m. It passes over the roller H^2 and then under the roller m^3, and as the roller m^3 is pushed toward the roller H^2 the belt will be gripped between the two rollers and thus receive a positive motion. By this arrangement I am not dependent on the tension of the belt for its motion; hence it is not necessary to keep it too taut and the belt will therefore last much longer. The belt N is of a width equal to the length of the end rollers L′ and m and projects slightly over the outer edges of the rails K and K′ between the bends k^3 and k^4. This prevents the falling of dirt between the side rails K K′ and the clogging of the rollers. To each side of the rails K K′ are secured the metal supports x x, which extend upward above the belt and are bent over inwardly, the bent-over portions supporting the side fenders y y, which prevent, in a large measure, the dirt from falling off the sides of the belt.

O O are bars loosely mounted at their upper ends on the shaft i^2 on the inner sides of the sprocket-wheels I I′, being held in position by the collars o o, the latter being provided with set-screws. These bars O O extend downward above the belt N, and in their lower ends a shaft o' is journaled. This shaft projects outwardly beyond the bars O O, and to its ends are keyed the sprocket-wheels o^2 o^3. Chains o^4 o^4 lead over the sprocket-wheels I I′ and o^2 o^3, carrying scrapers o^5, which work in between the side fenders y y. The bars O O are of such a length that the scrapers first come in contact with the belt at the point where its perpendicular ascent begins to be abrupt. The weight of the bars O O, the sprocket-wheels o^2 o^3, and the chains and scrapers will keep the scrapers in contact with the belt, and, when the machine is operated, as the belt N and the scrapers o^5 receive uniform motion through the medium

of the sprocket-wheels I^2 and H^3, which are of the same dimensions, the belt and scrapers will travel at a uniform speed, and all the scrapers will in turn come in contact with the belt and assist in carrying the dirt up the incline without scraping over the belt, which would have a tendency to wear it out. The bars O O are held in a fixed position laterally at their lower ends by means of the collars o^6 o^6 on the shaft o', and are also suitably braced by the rod o^7, extending across from one to the other about midway of their length.

To the rails K K′, near their lower ends, lugs k^5 k^5 are secured in any suitable manner, and to these lugs an open-ended trough k^6 is secured by means of set-screws k^7. This trough extends across the belt and within it immediately in the rear of the roller L′, its ends resting on the rails K K′. The side of the trough next the roller L′ is bent over toward the roller and comes in contact with it, thus forming a scraper k^8, for the purpose of scraping off any dirt that may accumulate on the roller. The dirt will fall into the trough, from whence it may be removed at pleasure.

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 the lower end of a standard P^4, firmly bolted to the beams A and B. 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. The beam P^2 is laterally connected to the frame of the machine by means of the rod P^5 and bar P^6. The rod P^5 is loosely connected at one end to the side g' of the casting G, in such a manner that it can swing either vertically or laterally, and its other end passes loosely through a lug p on the beam P^2. This end is screw-threaded to receive a nut p', and the beam P^2 has a limited amount of lateral play between said nut and a fixed collar p^2 on the rod. The bar P^6 is pivoted at one end in a bracket p^3, bolted to the beam P^2, so as to allow the said bar to swing laterally, and its other end is pivoted by means of a pin p^4 to a bracket p^5, bolted to the under side of the beam B^2, so as to allow the bar P^6 to swing vertically. This end of the bar is provided with several holes, as shown, so that the beam P^2 may be adjusted laterally with reference to the frame of the machine. The bar P^6 consists of two parts 1 and 2, the part 1 being provided with slots 3, through which the set-screws 4 pass into the part 2. The object of having the bar P^6 in two parts and connecting them together, as shown, is to cant the plow-beam and plow 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 lower end of the belt and its frame, and at the same time turn the dirt over onto the belt. 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, 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. To the extension of the mold-board of the plow is hinged an extension Q^4, the outer end of which is connected by means of a folding brace q^4 to the mold-board. When the machine is in operation, this extension forms a continuation of the mold-board, and assists in throwing the dirt onto the belt, and also prevents it from falling off. When the machine is not in operation, the extension can be swung around in the rear of the mold-board, as shown in Fig. 8. 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 shown. 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.

When it is desired to load the dirt into a wheeled conveyer, the conveyer is brought alongside the excavator and immediately under the top end of the belt-carrying frame.

R represents a conveyer, which may be of any approved construction. It is held to the machine by means of the chain r, adapted to be wound on the shaft r', mounted in suitable supports R′, bolted to the cross-beams B′ B^2, as shown. The shaft r' is provided with a crank-handle and ratchet-and-pawl mechanism in the ordinary manner. The plate R^2, bolted to the lower portions of the uprights H H′, will serve as a guard and prevent the conveyer from running into the frame or otherwise injuring the machine. When, however, it is desired to carry the dirt off to one side of the cut, the brackets S S are bolted to the uprights H H′, their outer ends being provided with openings s s, into which the boxes s' s^2 fit loosely. These boxes are firmly secured to the lower ends of the rails S′ S′, and serve as a bearing for the shaft s^3, carrying the roller S^2. One end of the shaft s^3 projects beyond the box s' and carries a sprocket-wheel S^3. A chain s^4 passes over the sprocket-wheels S^3 and m^2, and thereby transmits motion to the roller S^2. As many rollers as may be necessary to support the belt S^4 are journaled in the rails S′ S′. The

upper ends of the rails S′ S′ are supported by means of chains or ropes s^5 s^5, which lead from them to a shaft S^5, mounted in suitable bearings on the rails k^2 k^2, and on which they are adapted to be wound, the shaft S^5 being provided with a crank-arm and ratchet-and-pawl mechanism of ordinary construction.

To the upper ends of the rails S′ S′ are bolted the bent iron bars T T, one arm t projecting below the rails S′ S′, and the other arm t' above. In the arms t another belt-carrying frame T′ is pivoted, its outer end being supported by chains or ropes t^2, leading therefrom over pulleys t^3, mounted on the arms t', to a shaft t^4, journaled in the rails S′ S′. The frame T′ carries the belt T^2, which receives motion through the medium of the sprocket-wheels T^3 and T^4 and the sprocket-chain T^5. When not required for use, the frame T′ and its belt can be folded under the rails S′ S′, and held in that position by means of the hooks t^5. When these supplemental belts are used, I also use an extension for the axle D′, as shown in Fig. 2. It consists of a sleeve or collar U, adapted to fit on the axle D′, and to be secured thereto by means of a set-screw u. A rod U′, of the same diameter as the axle D′, is rigidly attached to the collar, and on this rod U′, the draft-wheel is placed in the same manner as on the axle. The object of using this extension is to keep the center of gravity within the base of the machine.

As an additional means for preventing the machine from upsetting, and also to relieve the strain on the frame, caused by the preponderance of weight on the side carrying the supplemental belts, I secure a bar V to the end of the cross-beam B remote from the plow side, the lower end of said bar being bent inwardly, as shown at v. This bent-in portion is adapted to come in contact with a friction-wheel V′, mounted on the end of the axle C′, and thus throw the weight on the front wheel adjacent to the friction-wheel, and so relieve the strain on the frame.

V^2 is a step or platform for the operator to stand on when connecting or disconnecting the conveyer to or from the machine.

Having described my invention, I claim—

1. In an excavator, the combination, with the main frame and the carrying-belt running transversely thereof, of a horizontal plow-beam, a plow attached thereto immediately in front of the belt, a rod and bar connecting the plow-beam to the frame, so as to allow the beam to swing laterally or vertically, a draft-chain connecting the plow-shank to the main frame, chains leading from the front and rear ends of the plow-beam, and shafts mounted on said frame, on which the chains are wound, substantially as specified.

2. In an excavator, the combination, with the main frame, of a horizontal plow-beam, a plow attached thereto, a draft-chain connecting the plow-shank to the main frame, and a spring compensating device within the length of the chain, substantially as specified.

3. The combination, with the main frame and the uprights secured thereto, of plates pivoted on the uprights, a roller having bearings in said plates, a belt-carrying frame connected at its upper end to said plates, a roller mounted in said belt-frame and held by springs against the roller mounted in the plates, and a belt supported by the belt-frame and passing between the two rollers, so as to be gripped thereby, substantially as specified.

4. The combination, with the excavator and the supplemental carrying-belt and its frame, of an extension fitted on one end of the rear axle, said extension consisting of a collar fitting on the axle and secured thereto by a set-screw, and a rod of the same diameter as the axle rigidly attached to said collar and carrying one of the rear wheels, substantially as and for the purpose specified.

5. In an excavator, the combination, with the main frame and the supplemental carrying-belt and its frame, of an extension fitted on one end of the rear axle of the excavator and carrying one of the rear wheels, a friction-wheel mounted on one end of the front axle, and a bent bar attached to the front of the main frame and adapted to engage with the friction-wheel, substantially as specified.

6. In an excavator, the combination, with the side rails of the belt-carrying frame and the belt supported thereby, of an adjustable plate fitting over the ends of said rails, and a roller journaled in the adjustable plate, whereby the tension of the belt is regulated, substantially as specified.

7. In an excavator, the combination, with the side rails of the belt-carrying frame and the belt supported thereby, of a roller having a fixed bearing in one of the side rails and an adjustable bearing in the other side rail, whereby the travel of the belt can be maintained in a true line over the frame, substantially as specified.

8. The combination, with the main frame, the plow-beam, and the plow secured thereto, of a bar connecting the plow-beam to the main frame laterally and adjustably, said bar consisting of two parts connected together by means of set-screws, one part having slots in which the set-screws work, whereby the plow-beam and plow can be canted out of the vertical line, substantially as specified.

9. In an excavator, the combination, with the plow-beam and the plow secured thereto, of an extension hinged at one end to the mold-board of the plow, and a folding brace connecting the other end of the extension to the mold-board, substantially as specified.

In testimony whereof I have hereunto set my hand and seal.

JOHN CABLE. [L. S.]

Witnesses:
E. CRUSE,
C. B. THOMPSON.