S. A. DeFORCE. 2 Sheets—Sheet 1.

DITCHING AND EXCAVATING MACHINES.

No. 195,263. Patented Sept. 18, 1877.

Fig. 1.

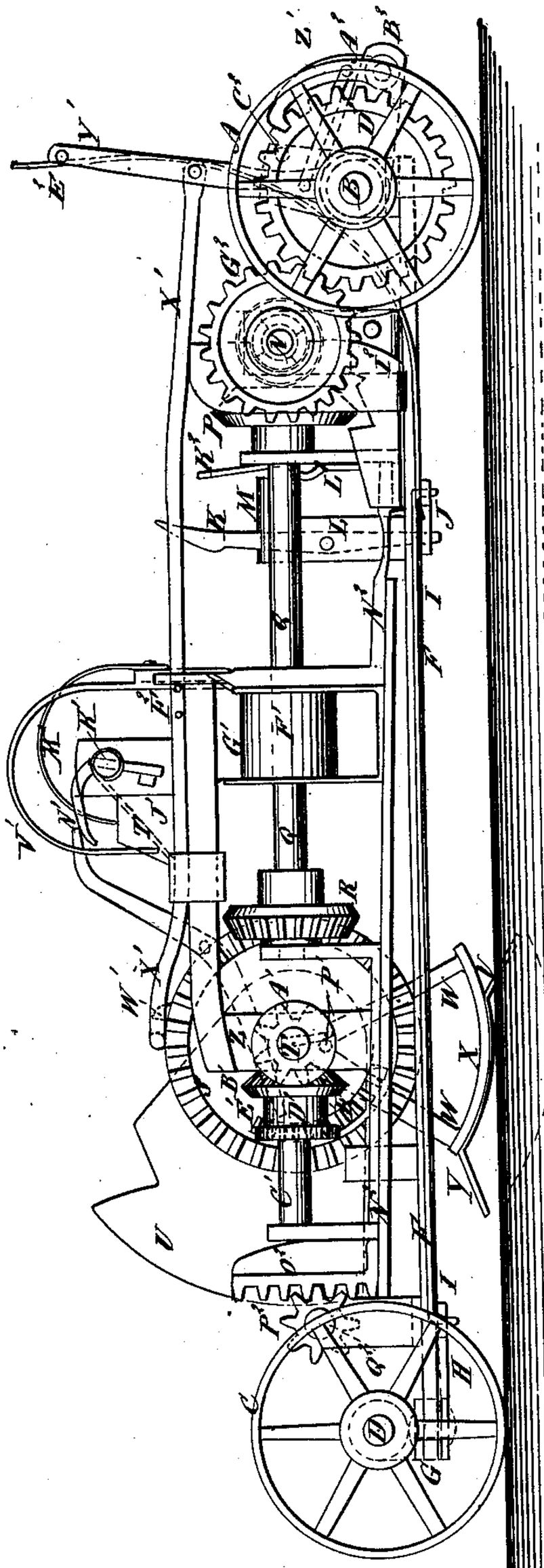
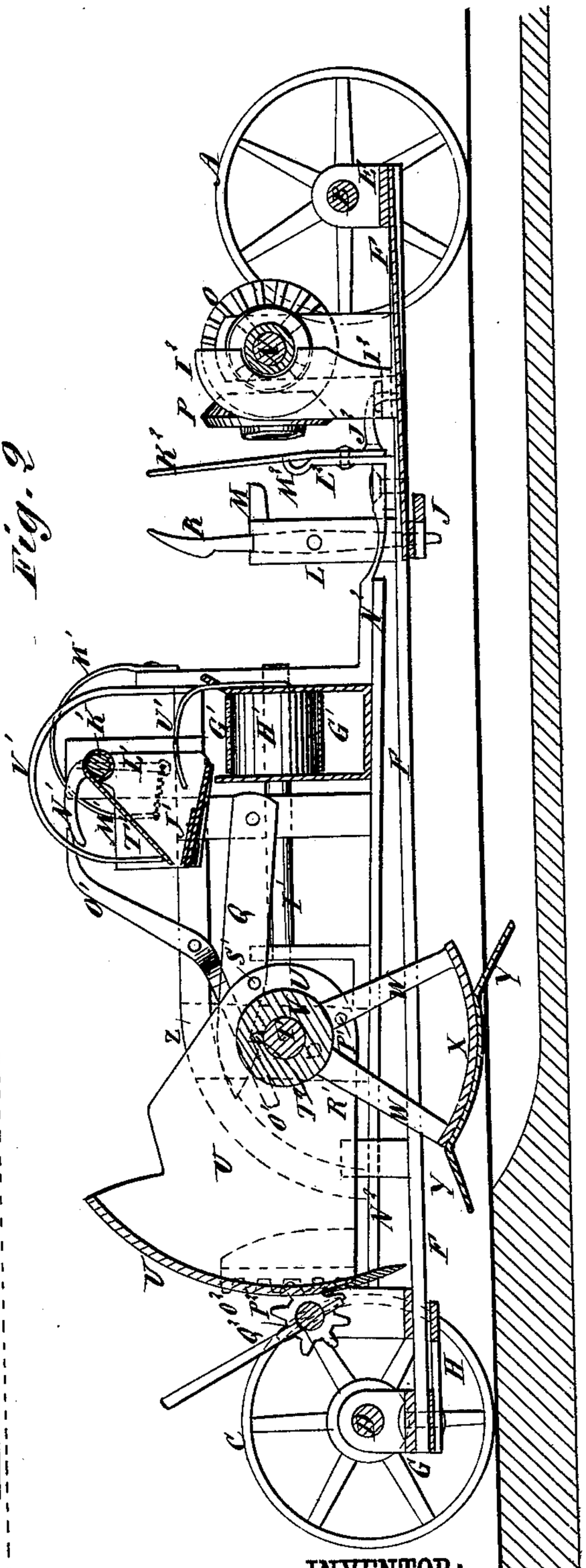


Fig. 2.



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2 Sheets—Sheet 2.

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DITCHING AND EXCAVATING MACHINES.

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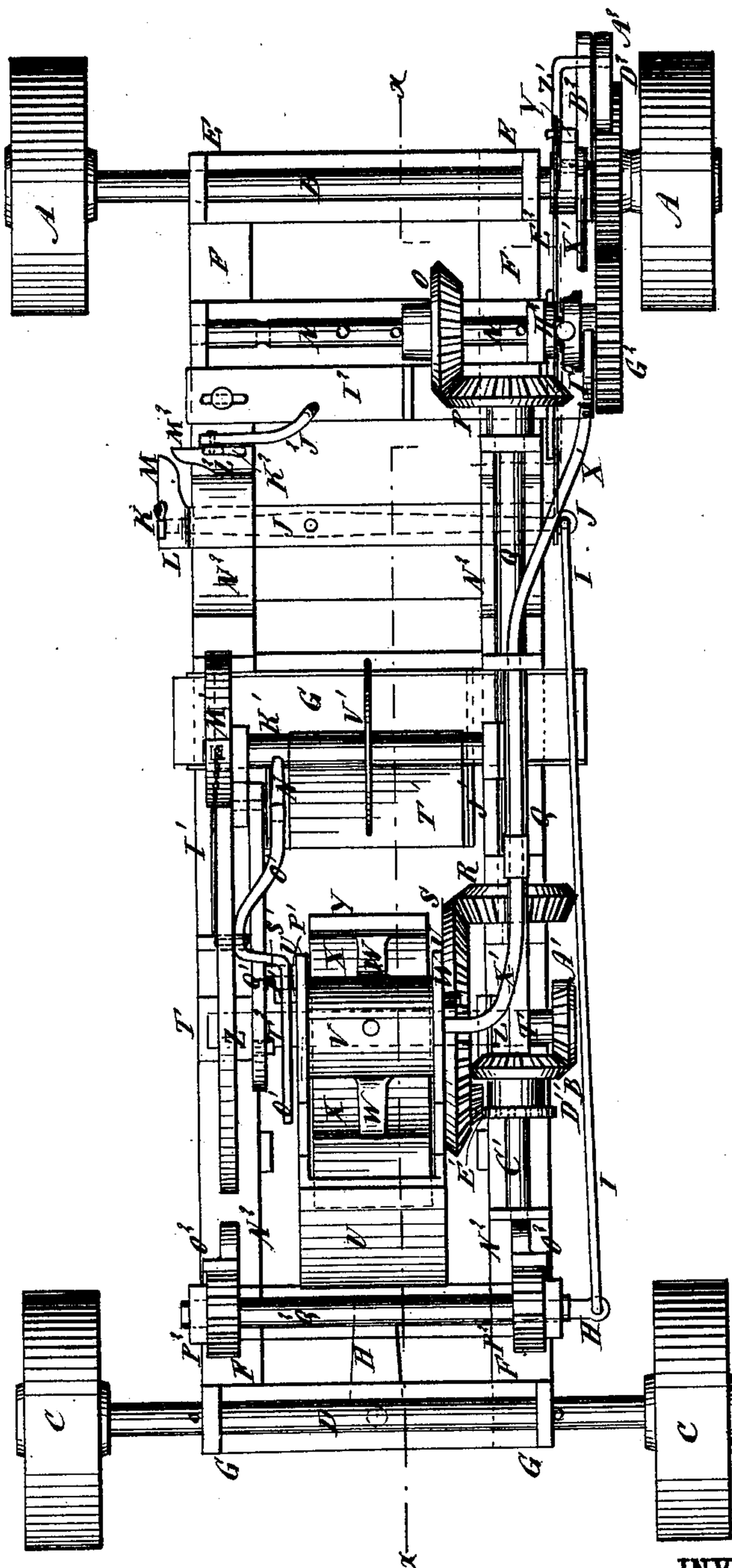
Fig. 3



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UNITED STATES PATENT OFFICE.

SAMUEL A. DE FORCE, OF CROCKETT, TEXAS.

IMPROVEMENT IN DITCHING AND EXCAVATING MACHINES.

Specification forming part of Letters Patent No. **195,263,** dated September 18, 1877; application filed July 9, 1877.

To all whom it may concern:

Be it known that I, SAMUEL A. DE FORCE, of Crockett, in the county of Houston and State of Texas, have invented a new and useful Improvement in Ditching and Excavating Machine, of which the following is a specification:

Figure 1, Sheet 1, is a side view of my improved machine. Fig. 2, Sheet 1, is a vertical longitudinal section of the same, taken through the broken line *x x*, Fig. 3. Fig. 3, Sheet 2, is a top view of my improved machine.

Similar letters of reference indicate corresponding parts.

The object of this invention is to furnish an improved machine for making ditches and other excavations, which shall be so constructed as to separate the slice from the soil, raise it, and deposit it at the side of the cut, which will feed itself forward automatically, shall be simple in construction, and easily guided and controlled.

The invention consists in the combination of the rotating cutter and the reciprocating holder with the shaft upon which they are hung and with the frame-work of the machine; in the combination of the segmental gear-wheels and the bevel-gear wheels with the shaft and the bevel-gear wheel that carries the holder and the cutter; in the combination of the spout with the cutter, the holder, and the endless carrier; in the combination of the spring and the arm with the shaft, to which the spout is attached, for moving said spout forward to receive the dirt; in the combination of the arm, the lever, and the stop-pin with the cutter and the shaft, to which the spout is attached, to move the said spout back to allow the cutter and holder to pass; in the combination of the stops, the latch, and the stop-pins, with the shaft, the frame, and the cutter, for controlling the movements of the holder from the movement of the cutter; in the combination of the tooth, the sliding rod, the spring-lever, and the gear-wheel, with the bevel-gear wheel and the axle of the carriage; in the combination of the gear-wheel, the clutch, the sliding bar, and the lever, with the driving-shaft and the frame.

A are the rear wheels, which are attached to the journals of the axle B, and C are the fore wheels, which are attached to the journals of the axle D. The rear axle B revolves in bearings in the ends of a bar, E, rigidly attached to the rear end of the frame F. The forward axle D revolves in bearings in the ends of a bar, G, which is pivoted at its center to the forward end of the frame F. To the center of the bar G is rigidly attached the short arm of a right-angled lever, H, the end of the long arm of which projects at the side of the frame F, and to it is pivoted the forward end of connecting-bar I. The rear end of the connecting-bar I is pivoted to the projecting end of a lever, J, which is pivoted to the frame F, and its other end projects at the other side of the said frame F, and to it is pivoted the lower end of a lever, K. The lever K projects along, and is pivoted to a standard, L, attached to the frame F, and to the upper end of which is attached, or upon it is formed, a catch-plate, M, in which is formed a notch to receive and hold the lever K when the front and rear wheels are in line with each other. By this construction the machine can be guided by operating the lever K.

In bearings attached to the rear part of the frame F revolves a shaft, N, to which power is applied from an engine carried upon the said frame F.

To the shaft N is attached a bevel-gear wheel, O, the teeth of which mesh into the teeth of a bevel-gear wheel, P, attached to the rear end of the shaft Q. The shaft Q revolves in bearings attached to the frame F, and to its forward end is attached a bevel-gear wheel, R, the teeth of which mesh into the teeth of a large bevel-gear wheel, S.

The bevel-gear wheel S revolves loosely upon the shaft T, and to it is attached one arm of the cutter U, the other arm of which rides upon the said shaft T. The cutter U is curved longitudinally into the arc of a circle having its center in the axis of the shaft T, and has wide arms or plates attached to its side edges. The point of the center is detachable, so that it may be renewed when worn.

Upon the shaft T, between the arms of the cutter U, is attached sleeve V, upon which are formed, or to which are attached, radial arms W.

To the outer ends of the arms W is secured a plate, X, which is curved upon the arc of a circle having its center in the axis of the shaft T.

The plate X is made of such a width as to pass readily between the arms of the cutter U, and the arms W are made of such a length as to leave a sufficient space between the cutter U and the plate X, to receive the slice of soil cut by the said cutter U.

To the lower or convex side of the plate X is attached a longer plate, Y, the ends of which are inclined downward, so as to nearly meet the cutter U as it passes beneath the plate X.

The shaft T revolves in bearings in standards Z, attached to the frame F, and to one of its ends is attached a small bevel-gear wheel, A^1, the teeth of which mesh into the teeth of a small bevel-gear wheel, B^1, attached to the short shaft C, which revolves in bearings attached to the frame F and standard Z.

To the shaft C^1, or to the bevel-gear wheel B^1, is attached a small segmental gear-wheel, D^1, the teeth of which mesh into the teeth of the segmental gear-wheel E′, formed upon or attached to the side of the large bevel-gear wheel S.

To the shaft Q is attached a roller, F^1, around which passes an endless belt, G^1. The belt G^1 also passes around a roller, H^1, attached to a short shaft, I^1, secured to standards at the other side of the frame F.

The endless belt or apron G^1 is designed to receive the dirt raised by the machine and carry it to the side of the cut.

J^1 is a spout to receive the dirt and guide it to the carrier-belt G^1. The spout J^1 is attached to a shaft, K^1, which rocks in bearings in standards attached to the frame F.

To one end of the shaft K^1 is attached an arm, L^1, the free end of which is connected with a spring, M^1, attached to the frame-work of the machine, to hold the spout J^1 forward.

To the shaft K^1 is also attached a curved arm, N^1, upon which rests the end of the lever O^1. The lever O^1 is pivoted to the frame-work of the machine, and its forward end projects so as to be struck by a pin, P^1, attached to the arm of the cutter U, to force the spout J^1 back to allow the said cutter U to pass.

Q^1 is a latch, which is pivoted to the frame-work of the machine, with its forward or free end resting upon the shaft T. The latch Q^1 has a notch formed in its lower edge to receive a stop, T^2, attached to the shaft T, and limit the movement of the holder or plates X Y in one direction, their movement in the other direction being limited by a stop, R′, attached to the frame-work of the machine. The latch Q^1 is raised at the proper time by the pin P^1, which strikes against a pin, S′, attached to the said latch Q^1.

T^1 is an apron hung from the shaft K^1, to act as a scraper to scrape off any soil that may adhere to the convex surface of the cutter U, and the movements of which are limited by the springs U′ V′ attached to the frame-work of the machine.

With this construction, when the parts of the machine are in the position shown in Fig. 2, as the cutter U moves forward it cuts a slice of dirt and packs it into the cavity of the plates X Y. As the point of the cutter U leaves the ground the pin P^1 strikes the pin S′ and raises the latch Q^1, and the cutter U and the plates X Y move on together. As the point of the cutter U approaches the spout J^1 the pin P^1 strikes the lever O^1 and operates it to move the said spout J^1 back.

As the lower ends of the plates X Y reach the spout J^1 they are stopped by the stop T^2 striking the stop R′, and the cutter U moves on while the spout J^1 passes in between the lower end of the plate Y and the dirt. At the same time the segmental gear-wheel E′ comes into gear with the segmental gear-wheel D^1, and operates the gear-wheels B^1 A^1 to move the plates X Y back to their former position, where they are stopped by the stop T catching upon the latch Q^1.

As the cutter U approaches the position shown in Fig. 2 the machine is moved forward for a distance equal to the thickness of the slice to be cut by the tooth W′ formed upon the edge of the large gear-wheel S, striking against the bent forward end of the rod X′. The rod X′ slides in bearings attached to the frame of the machine, and its rear end is pivoted to the lever Y′, the lower end of which is pivoted to the rear axle B. To the lower part of the lever Y′ is pivoted the end of a short rod, Z′, the other end of which is pivoted to the pawl A^2. The pawl A^2 is pivoted to the lower arm of a right-angled lever, B^2, to the upper arm of which a stop, C^2, is attached for the lever Y′ to strike against. The pawl A^2 engages with the teeth of a gear-wheel, D^2, attached to the axle B.

By this construction, as the lever Y′ is drawn forward, the rod Z′ draws the pawl A^2 downward and forward, causing it to engage with and turn the gear-wheel D^2, feeding the machine forward. As the lever Y′ moves back it strikes the stop C^2 and pushes the pawl A^2 back from the gear-wheel D^2.

The lever Y′ is moved back, after being drawn forward, by a spring, E′, attached to the frame F.

The throw of the pawl A^2, and consequently the distance the machine is fed forward each time, is limited by a pin, F^2, inserted in a hole in the rod X′, and which strikes against the bearing in which the said rod slides.

Several holes are formed in the rod X′ to receive the pin F^2, to enable the rapidity of feed to be regulated as required.

G^2 is a gear-wheel, the teeth of which mesh into the teeth of the gear-wheel D^2, and which runs loosely upon the end of the driving-shaft N, and which may be thrown into gear with a clutch, H^2, attached to the said driving-shaft N, so that the machine may be moved from place to place by the action of the engine.

I² is a bar, which slides upon guides attached to the frame F, and the end part of which is bent up at right angles and is notched or forked to enter a groove in the inner end of the hub of the wheel G², so that the said wheel G² may be thrown into and out of gear with its clutch H² by sliding the said bar I².

To the bar I² is pivoted the end of the rod J², the other end of which is pivoted to the lower end of the lever K². The lever K² is pivoted to a standard, L², attached to the frame F, and its upper part moves along a notched catch-plate, M², formed upon or attached to said standard L².

The frame N², to which the digging mechanism is attached, is hinged at its rear end to the frame F, and to its forward end are attached two upwardly-projecting rack-bars, O², the teeth of which mesh into the teeth of two small gear-wheels, P², attached to the ends of a shaft, Q².

The shaft Q² revolves in bearings attached to the forward part of the frame F, and may be turned by levers inserted in holes formed in it, or by other suitable means, and should be provided with ratchet-wheels and pawls to hold it in position when adjusted.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The combination of the rotating cutter U and the reciprocating holder X Y with the shaft T, upon which they are hung, and with the frame-work of the machine, substantially as herein shown and described.

2. The combination of the segmental gear-wheels E′ D¹ and the bevel-gear wheels B¹ A¹ with the shaft T, and the bevel-gear wheel S, that carry the holder X Y, and the cutter U, substantially as herein shown and described.

3. The combination of the spout J¹ with the cutter U, the holder X Y, and the endless carrier F¹ H¹ G¹, substantially as herein shown and described.

4. The combination of the spring M¹ and arm L¹ with the shaft K¹, to which the spout J¹ is attached for moving said spout forward to receive the dirt, substantially as herein shown and described.

5. The combination of the arm N¹, the lever O¹, and the stop-pin P¹, with the cutter U and the shaft K¹, to which the spout J¹ is attached to move the said spout J¹ back to allow the cutter U and holder X Y to pass, substantially as herein shown and described.

6. The combination of the stops T² R′, the latch Q¹, and the stop-pins S′ P¹, with the shaft T, the frame N², and the cutter U, for controlling the movements of the holder X Y from the movement of the said cutter U, substantially as herein shown and described.

7. The combination of the tooth W′, the sliding rod X′, the spring-lever Y′ E², the pawl A², and the gear-wheel D², with the bevel-gear wheel S and the axle B of the carriage, substantially as herein shown and described.

SAMUEL A. DE FORCE.

Witnesses:
JAMES COLLINS,
J. H. STUART.