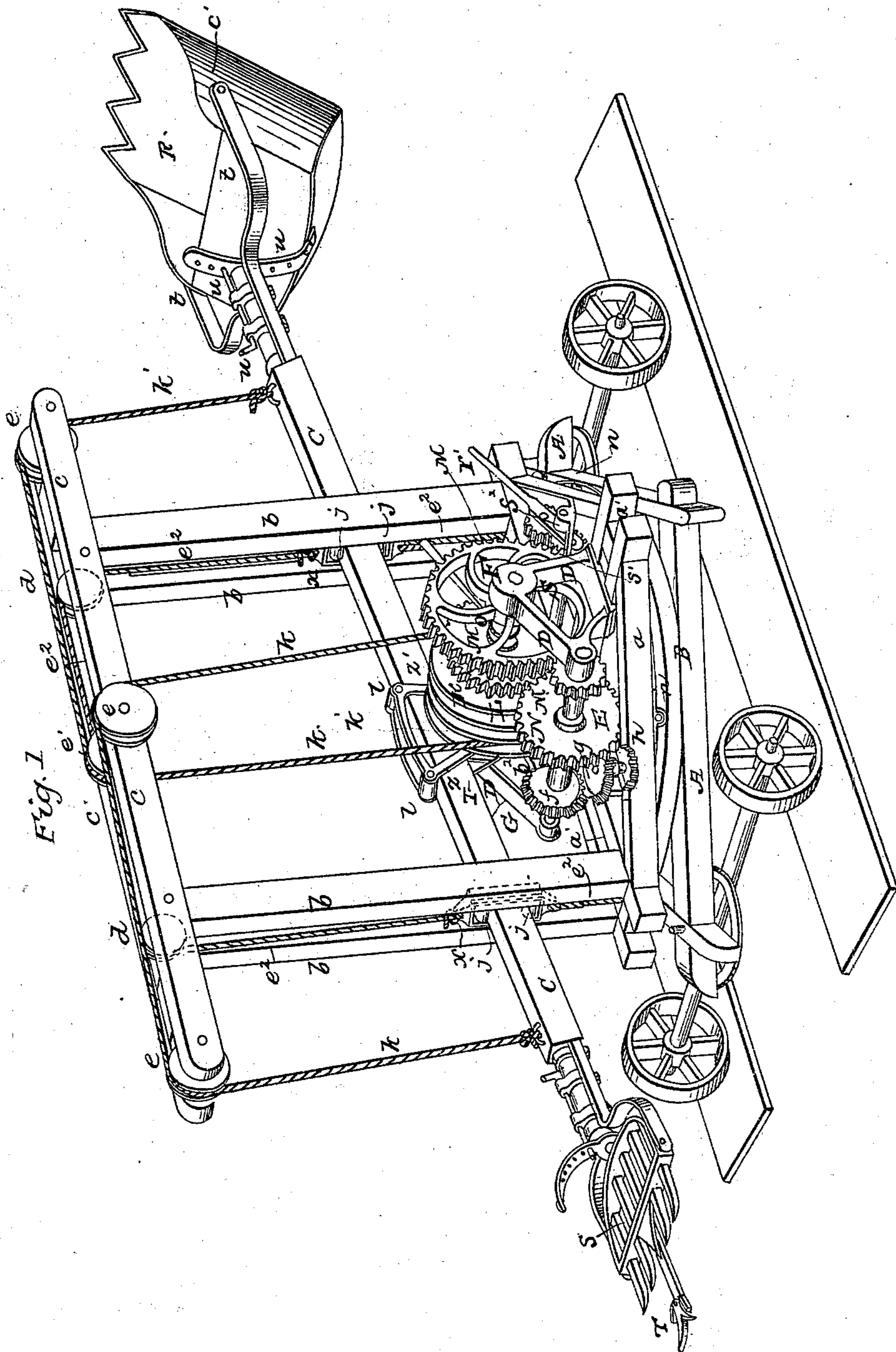


W. R. MAFFET.
Excavating Machine.

No. 21,206.

Patented Aug. 17, 1858.

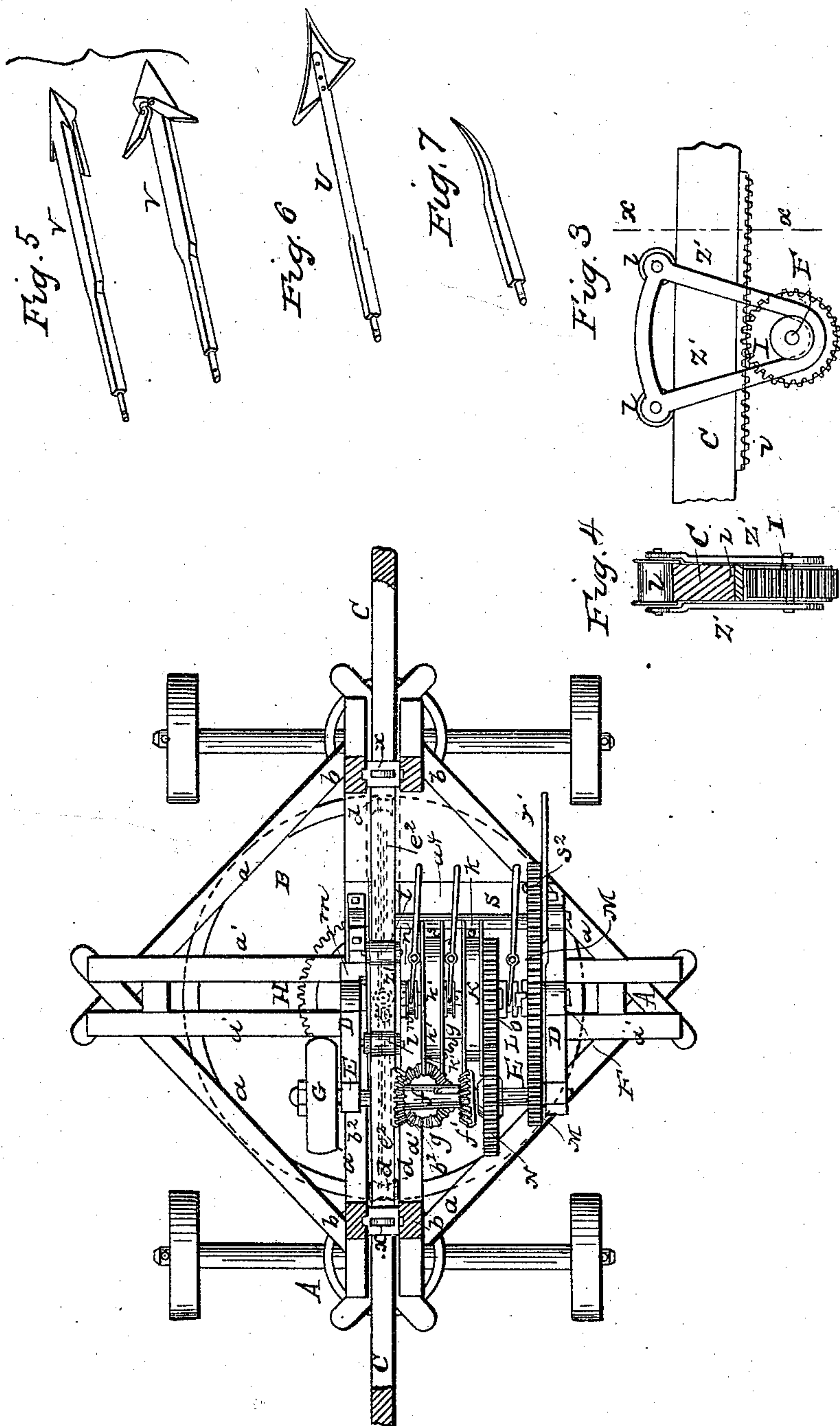


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2 Sheets—Sheet 2.

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UNITED STATES PATENT OFFICE.

WILLIAM R. MAFFET, OF WILKES-BARRE, PENNSYLVANIA.

EXCAVATING-MACHINE.

Specification of Letters Patent No. 21,206, dated August 17, 1858.

To all whom it may concern:

Be it known that I, W. R. MAFFET, of Wilkes-Barre, in the county of Luzerne and State of Pennsylvania, have invented certain new and useful Improvements in Excavating-Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, which form part of this specification, and in which—

Figure 1 represents a view in perspective of my improved excavating machine; Fig. 2, a horizontal section thereof, taken under the top tie pieces of the frame; Fig. 3, a longitudinal elevation of the central portion of the scoop beam with its balancing devices; Fig. 4 a transverse section of the same at the line $x x$ of Fig. 3; Fig. 5 views in perspective of the upper and lower side of a barbed pick for extracting roots, stumps, &c.; Fig. 6, a similar view of a spear, used for loosening the ground and preparing it for the scoop; and Fig. 7 a similar view of one of the picker teeth, the place of which is occupied by the horizontal cutting tool (T) in Fig. 1.

In excavating earth by machinery there are numerous difficulties to overcome, many of which, the various machines in use are altogether incapable of surmounting. The different descriptions of work to be done, various qualities of earth to be excavated, and the presence of stones, stumps, roots, and other analogous obstructions in the earth, together with many other common obstacles, are important objects of consideration in the construction of excavating machines:—they should be readily adjustable to any direction of cut, should operate with facility and expedition, remove loose earth, be provided with various implements to clear the ground and suit different descriptions of earth, and be so arranged that the cut may be continued and the several operations performed without any other movement of the machine than its progressive motion in the direction of the cut.

To effect these desiderata is the object of my invention.

In the drawing the excavator is represented as mounted on a truck (A) that carries it from place to place. On the top of the truck is a horizontal table (B) which is provided at its center with a vertical pivot or pin (m) shown by red lines in Fig. 2, on which the frame of the excavator is hung to

admit of its being turned around horizontally; anti-friction rollers (n) are attached to the lower sills of the excavator frame to run on a track on the outer circumference of the table (B) to facilitate the turning of the excavator horizontally. The frame is composed of lower cross sills (a, a^1), vertical posts (b), and top horizontal tie timbers (c); the posts and top tie timbers are made double, leaving a space between them to form guides for the vertical play of the scoop beam and to admit rope or chain pulleys (d, e, e^1) between them. Brackets (D), bolted on the platform of the frame, serve to form bearings for a driving shaft (E) and counter shaft (F).

The sills (a, a^1) forming the platform, may be covered by a floor on which a steam engine should be placed to supply the power required to work the machine. The power should be applied, through a belt, to the pulley (G) on the driving shaft (E), or the connecting rod of the engine may be attached, by a wrist pin, directly to the pulley (G). The scoop beam (C), either end of which carries a scoop or other excavating implement, is fitted, on its under side, with a rack (i), for moving the beam, either way, in the direction of its length, through the guides formed by the spaces between the double posts (b); this is accomplished by a pinion (I) which takes into the rack, the said pinion being mounted on the counter-shaft (F) and operated by gear from the main shaft as will be hereinafter described.

To relieve the teeth of the pinion (I) and rack (i) of the weight of the scoop beam and facilitate its longitudinal movement, the beam is made with rails, on either side of the rack (i), which rest on and travel over smooth flanges on the pinion (I); the beam is also further balanced and steadied by rollers (l, l) arranged to run on the upper face thereof and held there by radius bars (Z^1) which are hung loosely on the shaft of the pinion (I). In addition to these arrangements for balancing the scoop beam and making it run smooth, it is further steadied and guided by rollers (j) placed above and below it and united by straps (x) which slide in vertical grooves in the interior faces of the upright posts (b) at either end of the frame: the rollers (j) allow the beam to run smoothly lengthwise, while it is prevented from lateral vibration, by the vertical posts (b) that act as guides for it as it

plays up and down between them. Cords or chains (e^2), which pass over upper pulleys (d) and corresponding lower pulleys, unite the straps (x) of either pair of rollers (j) and cause the descending pair to balance the ascending pair as the beam (C) is vibrated vertically, and, as the beam presses on the rollers (j) likewise cause the descending portion of the beam to assist the ascending in the operations of excavating and dumping.

The scoop beam is moved to any vertical angle required by means of the cords or chains (e^2) which in their connection of the straps (x) are wound around a drum (r) as shown by red lines in Fig. 2, fast to the inner end of a shaft s that is made capable of motion in either direction by means of a pinion (s^1), fast to its outer end and another pinion (s^2), which latter gears into the pinion s^1 and by a hand lever (r^1), that carries it, is made to rotate the shaft (s) in the one direction; or, if the shaft s is required to move in the opposite direction to produce a contrary dip to the scoop beam, the pinion s^1 is made the driving pinion of the shaft s ; either of these motions being produced accordingly as either pinion s^1 or s^2 is thrown into gear with a spur wheel (M) on the counter shaft. The hand lever (r^1), it will be observed, not only carries the pinions (s^1 and s^2) but also one end of the shaft s , so that by setting the lever backward or forward upon its fulcrum (s^3) either pinion s^1 or s^2 is put into gear with the wheel M; and the drum r , thus made to rotate in either direction, gives the requisite dip to the beam by the winding and unwinding of the cords e^2 around the drum (r). These arrangements serve generally for giving the beam its required dip, but when the scoop beam is run out any considerable length, in lifting the load for dumping, the vertical movement of the scoop beam is effected by cords or chains (k and k^1) which are made fast to the ends of the beam, the one chain passing over pulleys (e) and made fast to a drum (K) that is loose on the shaft F, while the other chain passes over similar pulleys (e^1) and is secured to another loose drum (K^1) on the same shaft. Accordingly as motion is communicated to either drum (K or K^1) is either chain (k or k^1) made to wind and lift the end of the beam to which it is connected; either drum is thrown into gear with the shaft (F) by a sliding clutch (a^3) operated by the hand lever (a^4); this arrangement of the lifting chains and drums allows of one chain winding more rapidly on its drum than the other unwinds, and vice versa, without causing either chain to hang slack or loose and thereby preventing retardation when the motion of the beam is reversed, which provision is necessary when the scoop beam is run out longitudinally until its center of oscillation is nearer to one end than

the other, and consequently, as the beam is made to play vertically, the lifting chain at the one end travels faster than that at the other end.

To swing or turn the scoop beam horizontally to adapt it to the required cut or to dump its load, as may be, the frame is turned in either direction as required by bevel wheels (f or f^1) that are fixed to a sliding sleeve on the main shaft (E) and are moved lengthwise thereon by a clutch lever (b^2) which throws either wheel (f or f^1), according to the direction required, into gear with a horizontal wheel (g) whose bearings are in the lower sills of the frame and that carries on its shaft a pinion (h) which meshes with a circular rack (H) fast to the table (B) and concentric therewith; so that, according to the direction of the motion given to the wheel g , will the frame, with the scoop beam and other working parts, be swung around, either way, on the vertical center pivot (m) on which the frame is hung; the pinion (h) that meshes into the stationary rack (H) traveling around the latter: or, when it is not required to swing the scoop beam horizontally and the main shaft (E) is kept running, the clutch lever (b^2) is operated so as to throw both wheels (f and f^1) out of gear with the horizontal wheel g . The longitudinal run of the scoop beam is also arrested, without stopping the countershaft (F), by means of a clutch (n^2) that, by a hand lever, throws the pinion I into or out of gear with the shaft (F) which shaft has a fast or slow motion communicated to it, to adapt the excavator to light or heavy work, by means of wheels L and M that are thrown into or out of gear with their shaft by a clutch (o), the wheels L and M respectively meshing into a wheel (N) and pinion M' fast on the driving shaft.

To arrest the motion of the scoop beam when arrived at its position for dumping, a friction brake may be applied to the lifting drum of the shaft (s) which may be effected in the simplest or most convenient manner.

The scoop (R) at the one end of the beam is shaped somewhat like a large scoop shovel except that its front edge is serrated to give it easier entrance into the sand or earth: it is attached to the beam by a strap (t) which is fitted loosely on the rounded end of the beam so that it may be turned around thereon and thus turn the scoop (R) to any position required, when a pin should be passed through the stock of the strap and beam, or the scoop should be otherwise secured from turning when set. The scoop (R) is not immovably attached to the strap (t) but is hung on swivel pins (c^1) that project from either side of the strap at its outer ends, so that the scoop may be turned to

For other descriptions of work, a spear (U) may be used in the place of the undermining cutter, the said spear being operated by the motions of the scoop beam, to loosen the ground and prepare it for the picker or scoop; or a barbed pick (V) may be employed which will be found especially useful in extracting roots or stumps, the said pick being projected into behind the root or stump by a forward run of the scoop beam. In entering, the barbs of this pick will be closed, as they are hinged to the bar or stock on the under side, but in the backward run of the scoop beam, they will be thrown open so as to engage with the roots or stumps, and, by the continued back action of the beam, extract the same.

It is obvious that the versatility of operation and application of this machine is so great that a full description, in detail, could not be compressed within the limits of a specification, but sufficient has been said to enable a skilful engineer to apply it in any case. For the same reason the numerous modifications in construction and arrangement, of which the several parts of the machine are susceptible, are not described.

The principal peculiarity of my improved excavating machine, distinguishing it from all others heretofore used, is the working beam so arranged as to carry an excavating implement upon each end, whereby I attain the advantage of using two different tools with scarcely more labor than has hitherto been expended upon the employment of one. If the nature of the material requires it, the same kind of implement can be used on the two ends of the beam with advantage. For instance, the cars for receiving the matter excavated may be run upon the same track with the excavating machine, and standing behind it, may be loaded from one scoop while the other is turned to dig; this could be done when the earth was loose enough to be removed by the scoop alone; in hard material two picks might be used in the same way.

Another peculiarity of my excavating ma-

chine is the mode of attachment of the implements whereby they can assume different positions (moving around the axis of the beam) instead of the uniformly horizontal position hitherto given them.

A third peculiarity of my machine in connection with that last named, is the capability of using the implements, when attached to the working beam, in a reversed direction, so that the same implement may be used either with a pushing or pulling action, either to lift a shovel or to rake or scrape.

Having thus described my improved excavating machine, what I claim as new therein, and desire to secure by Letters Patent, is—

1. The arrangement of excavating implements on either end of the beam, in such manner, that the weight of one scoop or implement is made to counterbalance and assist the other; the said beam being capable of moving longitudinally forward or backward, and of swinging to the right or left, or up or down, each motion being had separately or in combination; whereby the loading of one digging implement and the dumping of the other form part of the same operation, as herein described.

2. Constructing and arranging the toothed picker and scoop in such manner that they may be turned with respect to the beam, substantially as herein set forth.

3. In combination with the arrangement for turning the scoop and picker on the beam, I claim attaching them so that they may separately be turned on their own axes, whereby the toothed picker may be made to perform the duty of both a digger and a rake and the scoop that of a shovel and hoe or scraper, substantially as specified.

In testimony whereof I have hereunto subscribed my name.

W. R. MAFFET.

Witnesses:

E. W. REYNOLDS,
JOHN B. FELL.