

994,942.

J. H. W. LIBBE.
EXCAVATING MACHINE.
APPLICATION FILED JULY 5, 1910.

Patented June 13, 1911.

4 SHEETS—SHEET 1.

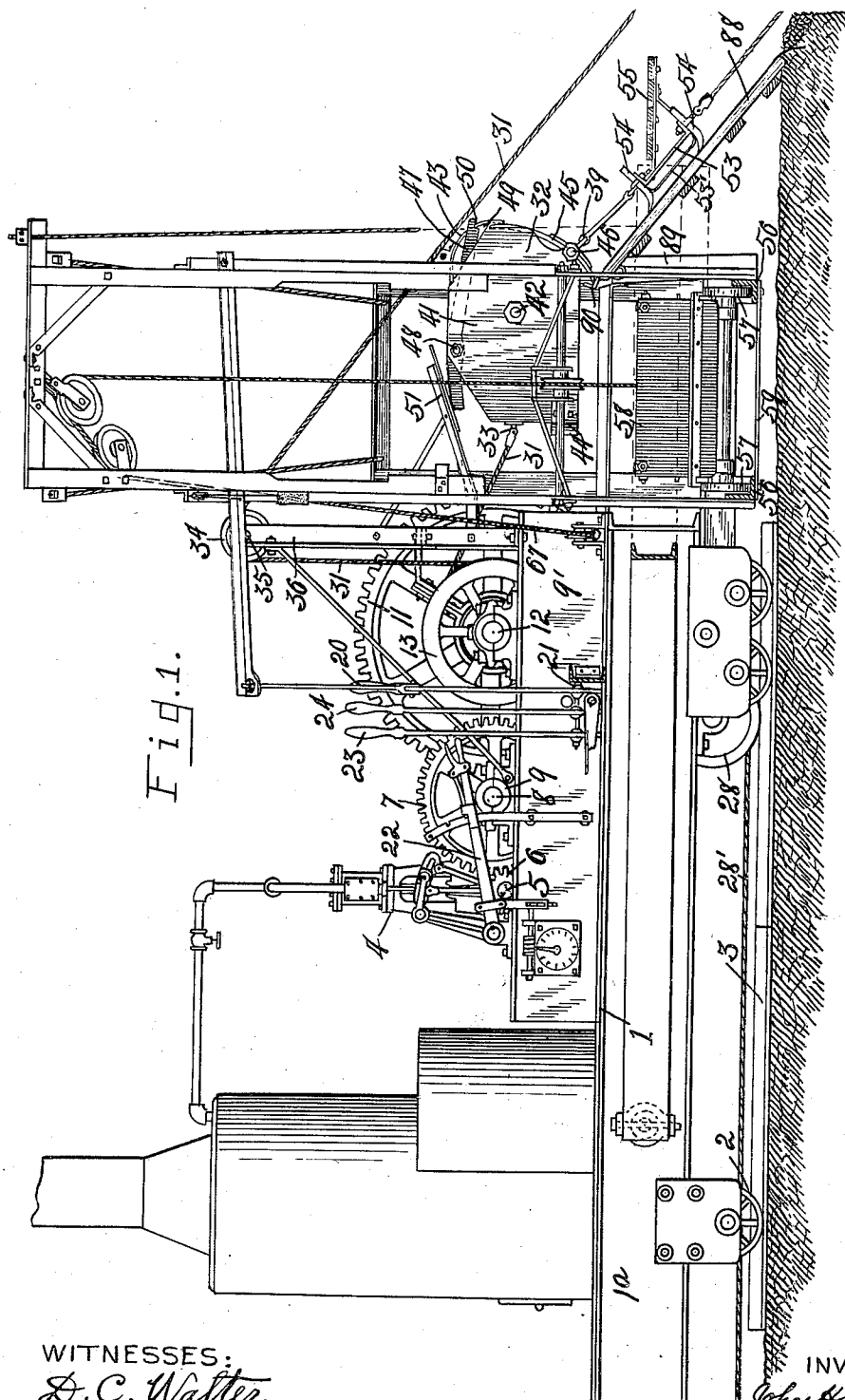


Fig. 1.

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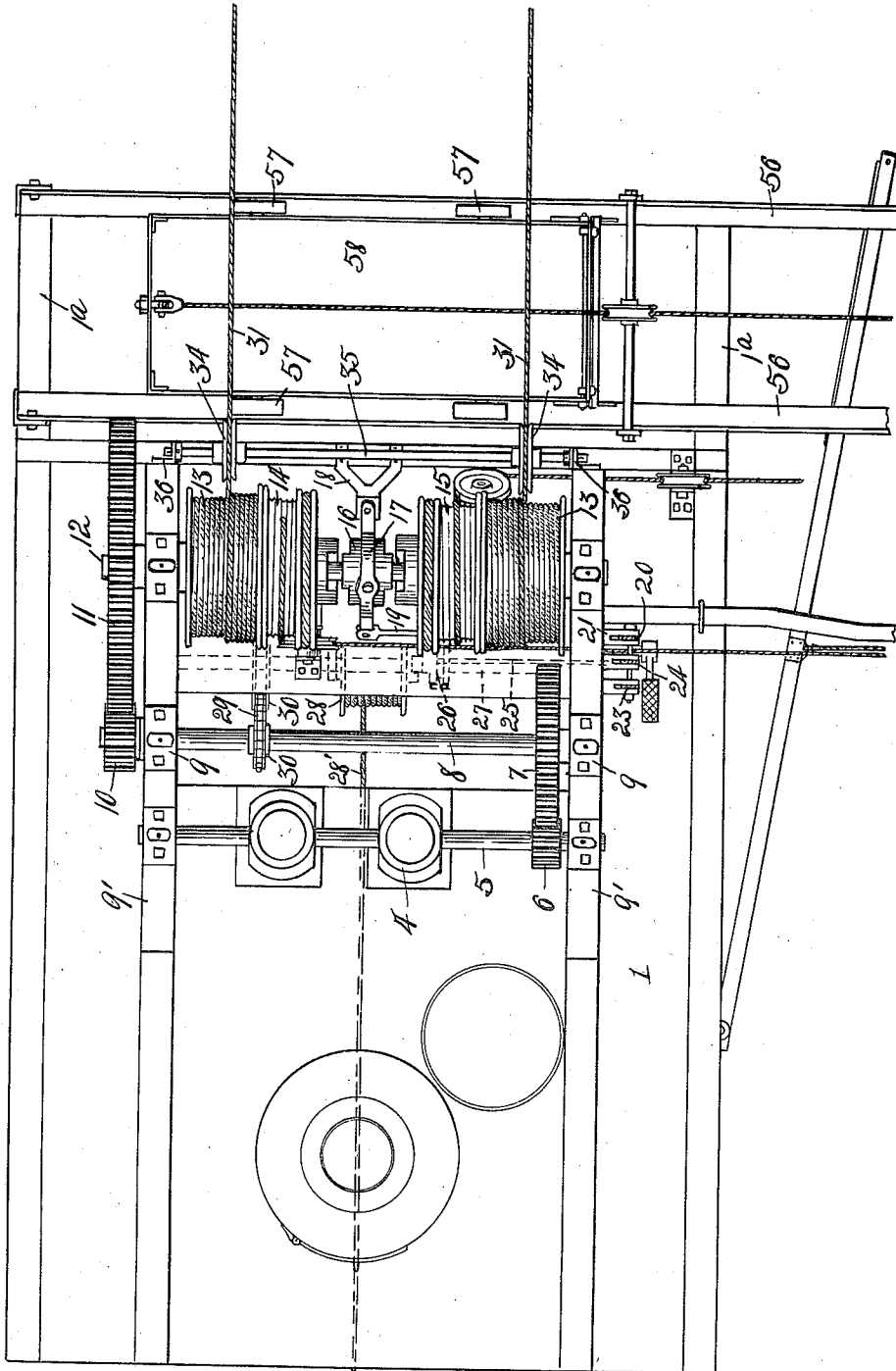
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4 SHEETS—SHEET 2.

Fig. 2.



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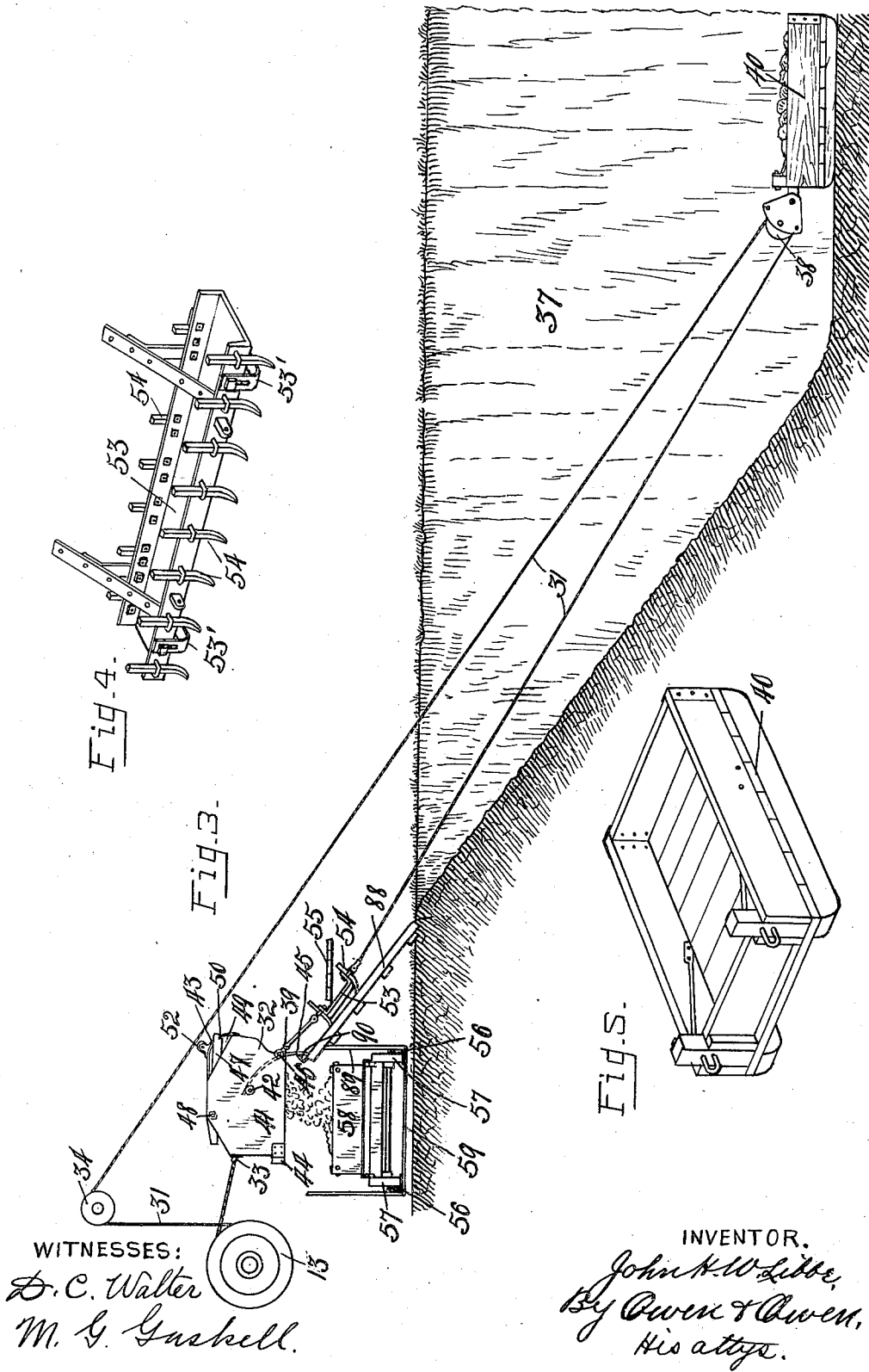
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Fig. 6.

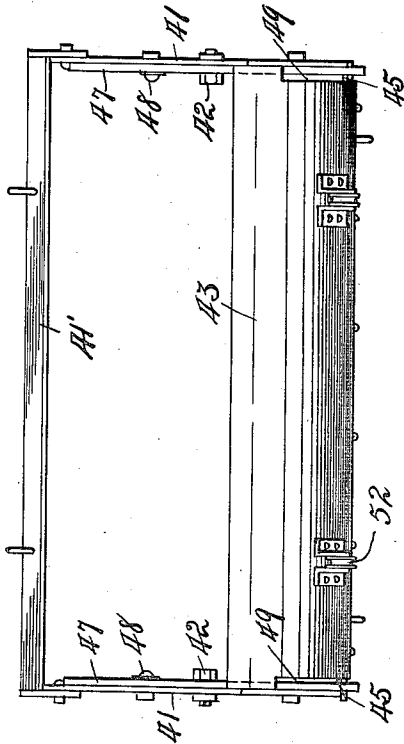


Fig. 8.

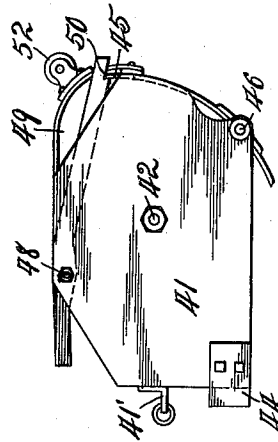
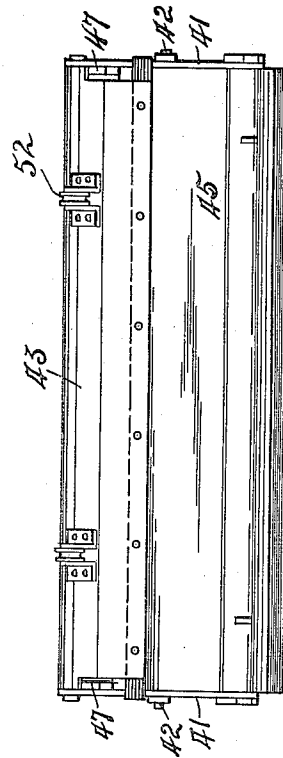


Fig. 7.



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UNITED STATES PATENT OFFICE.

JOHN H. W. LIBBE, OF TOLEDO, OHIO.

EXCAVATING-MACHINE.

994,942.

Specification of Letters Patent. Patented June 13, 1911.

Application filed July 5, 1910. Serial No. 570,241.

To all whom it may concern:

Be it known that I, JOHN H. W. LIBBE, a citizen of the United States, and a resident of Toledo, in the county of Lucas and State of Ohio, have invented a certain new and useful Excavating-Machine; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as 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 and figures of reference marked thereon, which form a part of this specification.

My invention relates to excavating machines, and particularly to machines of the type adapted for the digging of sewer trenches, but may be used for other open ditch work or for any work for which it may be adapted or appropriate.

The object of my invention is the provision of a machine of this character, which is capable of digging trenches for sewers, open ditches or other purposes in a rapid, economical and efficient manner, and which has the operative parts thereof disposed in advance of the end of the trench instead of over the trench as is customarily the case.

A further object of my invention is the provision in a machine of this class of a simple and improved form of shovel and of means for operating in conjunction with such shovel to cause it to effectually discharge its contents when at a predetermined point in its movement.

The invention is fully described in the following specification, and while in its broader aspect it is capable of embodiment in numerous forms, a preferred embodiment thereof is illustrated in the accompanying drawings, in which,—

Figure 1 is a side elevation of a machine embodying my invention with portions broken away and with the shovel or scoop in dumping position. Fig. 2 is a plan of the machine with portions broken away and parts diagrammatically shown. Fig. 3 is a side elevation of the excavating portion of the machine in association with a ditch, the shovel being in dumping position. Fig. 4 is a perspective view of the drag or soil

loosening device with the platform removed therefrom. Fig. 5 is a view in perspective of the movable anchor member of the excavating mechanism and Figs. 6, 7 and 8 are enlarged plan back and end views of the excavating shovel.

Referring to the drawings, 1 designates the platform or supporting frame of the machine by which the operative parts are carried and which is mounted on a set of wheels 2 to adapt it to be longitudinally moved as the digging progresses, such wheels being shown as running on temporary tracks 3.

4 designates the operating motor, which is mounted on the platform 1, and, in the present instance, shown as comprising a steam engine. The crank-shaft 5 of this engine carries a gear 6 which meshes with a gear 7 on a shaft 8, which is journaled transversely of the platform 1 in suitable bearings 9 rising therefrom. A small gear 10 on one end of the shaft 8 meshes with a larger gear 11 on the drum-shaft 12, which shaft 12 has a pair of cable-drums 13, 13 fixed thereto, one adjacent each end, and the two drums 14 and 15 loosely mounted thereon intermediate the drums 13, 13 and in spaced relation. A shiftable clutch-member is mounted on the shaft 12 intermediate the drums 14 and 15 and is movable by the movement of a shift-lever 17 to engage a clutch surface on the adjacent hub end of either of such drums. The shift-lever 17 is fulcrumed at one end to a fixed frame part 18 and has its other end connected by a rod 19 to a control lever 20, which is fulcrumed adjacent one side of the platform 1 to a bracket 21 projecting from the outer side of one of a pair of beams or frame parts 9', which form supports for the bearings of the several shafts.

22 designates the control lever of the engine, which may be moved to reverse the direction of running of the engine; 23 the throttle-lever of the engine, and 24 the lever which controls the forward movement of the machine. The lever 24 is connected by a rod 25 to a movable clutch part 26 on a shaft 27, journaled in the lower portion of the frame, 1, and such clutch part is

adapted to be moved into engagement with a drum 28 on such shaft to cause the shaft and drum to rotate together, the shaft being driven by a chain 29 connecting sprocket-wheels 30, 30 on said shaft and the shaft 8. A cable 28' winds upon such drum and has one end connected to a stake or other suitable anchor means (not shown) in advance of the machine, whereby a turning of the drum to wind the cable thereon draws the machine toward the anchor means.

Each of the drums 13 has a cable 31 wound a plurality of times therearound to prevent a relative slipping of the cable thereon when the drum is rotated. Each of these cables attaches at one end to the associated end of an excavating shovel or scoop 32 at the forward side thereof, as indicated at 33, Figs. 1 and 3, and has its other end passed over a sheave 34 carried at the associated end of a shaft 35, which is journaled above the plane of the drums in the uprights 36, 36 rising from the rear ends of the beams 9', 9'. The cables 31, 31 after passing over their respective sheaves 34 continue down into the ditch or excavation 37, pass around an anchor-sheave 38 and thence extend forwardly and attach to the associated end of the shovel 32 at the rear thereof, as indicated at 39, Figs. 1 and 3, thus combining with the shovel to form an endless draft-cable.

In order that the anchor means to which the anchor-sheaves 38 attach may be movable to adapt it to move forward with the machine, and at the same time be sufficiently stable as to cooperate with the drum 13 to hold the cables taut and to stand firm during the retracting movement of the shovel into the trench after dumping its load, I provide for such purpose a boat 40, which travels on the bottom of the trench and is loaded with dirt, stones or other suitable weighty substance to a sufficient extent to anchor it against the stresses which the cables 31 exert thereon during a retracting movement of the shovel.

The shovel, scoop or scraper 32, while it may be of any suitable construction, is shown in the present instance, as comprising the two opposing ends 41, 41, which are connected by a hood 43 at the upper rear portion of the shovel and have their lower forward edges each provided with a cutting-nose 44. The front edges of the ends 41 are shown as being connected and relatively braced by a bar 41' to which the draft cables 31 are attached. The back or digging blade 45 of the shovel is pivoted adjacent the lower rear edges of the ends 41, as at 46, and has its lower portion curved forwardly from such pivot and provided with teeth to adapt it to form the main cutting nose of the shovel. The upper edge of the back 45 is

adapted to rest against the lower rear edge of the hood 43 whereby to limit its rearward swinging movements, and when in such position is locked against forward movement by the latch-bars 47. One of these latch-bars is pivoted to each end 41 adjacent its upper edge, as at 48, and has its rear end working through a registering opening or cut-away portion 49 of the hood 43 and notched, as at 50, to adapt it to shoulder against the upper edge of the back 45 when in normal digging position and thus lock the back against pivotal movements within the shovel. When the shovel has been drawn up to dump-position, as hereinafter more fully described, the noses or forward ends of the bars 47 coact with the under sides of registering trip-members 51, which project rearwardly on an incline from the associated uprights 36, as best shown in Fig. 1. Rollers 52 are mounted on the top of the hood 43 adjacent each end thereof for the rearwardly extending portions of the draft-cables 31 to work over. A bolt 42 is carried by each end 41 of the shovel and serves to limit the inward movements of the upper end of the back 45.

Attached to the cables 31, 31 adjacent the rear of the shovel is a dirt loosening or mulching member, which is shown as comprising a cross-piece 53 of channel-bar having mulching teeth 54 projecting downwardly from the front and rear sides thereof. This member follows the shovel 32 in its forward digging movements and cuts into and loosens the earth over which it passes to facilitate the digging action of the shovel on its next forward movement. A platform 55 is shown as being provided on the mulching member on which a person may stand or other weighty object be placed to weight down such member. Adjustable shoes 53' are carried by the cross-piece 53 and gage the depth of extension of the teeth 54 into the soil.

Disposed immediately to the rear of the platform 1 of the machine are the two transversely disposed tracks 56, 56 of channel-iron in the present instance, on which the wheels 57 of a dumping-car 58 travel, such tracks being suitably braced apart by bars 59 and attached to rearwardly extended portions of the side beams 1^a of the platform. As the mechanism controlling the movements of the dumping car 58 form no part of my present invention but is claimed in a copending divisional application Serial No. 589,176, such mechanism will not be described herein. The drums 14 and 15 and associated clutch form parts of this mechanism.

An inclined platform or guide 88 extends from the earth's surface to the top of a

frame-work 89, which rises from the rear track 56 to the rear of the truck-frame and by which the upper end of the platform 88 is supported. This platform guides the shovel to dumping position and has an upwardly turned flange 90 at its upper end, which coacts with the nose of the shovel back 45 at approximately the time of tripping engagement of the latch-bars 47 with the members 51, as previously described, whereby the upper portion of such back is thrown forward within the shovel to assist in discharging the shovel load into the car 58.

The operation of my machine is as follows:—When the shovel 32 upon a retracting movement thereof has reached the bottom of the trench being dug, the operator moves the reverse-lever 22 to reverse the action of the engine, thus causing the shaft 12 and drums 13, 13 thereon to rotate in a direction to move the draft-cables 31, 31 to draw the shovel up the inclined wall of the trench and to receive a load and to convey it up the platform 88 to dumping position over the car 58. When the shovel has reached a predetermined point over the car 58 the forward ends of the latch-bars 47 of the shovel coact with and are moved by the trip-members 51 to release the tail-pieces of such bars from locking engagement with the upper edge of the shovel-back or blade 45. As the shovel continues its forward movement the nose of the back 45 coacts with the stationary flange 90, thus causing the back to swing on its pivot 46 until its upper portion strikes the bolts 42, as shown in Fig. 4, and effecting a complete dumping of the shovel contents. As soon as the shovel has dumped its load the operator reverses the lever 22 to return the shovel to the trench bottom. The dragging of the nose of the shovel-back 45 on the platform 88 or trench bottom when returning to digging position will automatically throw the back to normal locked position. It is evident that the trailing of the mulching member behind the shovel in its digging movement will loosen the surface of the soil to render the next digging movement of the shovel easier than would otherwise be the case. To move the machine ahead it is only necessary to throw the lever 24 to effect an engagement of the clutch 26 with the drum 28 on the shaft 27, thus winding the machine-pulling cable 28' on such drum and advancing the machine. As the machine moves forward the anchor member 40 for the shovel cables 31, 31 moves forward therewith in the bottom of the trench.

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

1. In a machine of the class described, the

combination of an endless cable; a digging element attached to such cable, opposing rotatable members around which the cable passes, one of said members being operative to impart digging and retracting movements to said element longitudinally of the trench being dug, and weighted slidable means to which the other of said members is attached for frictionally anchoring the same within the trench, said means being movable longitudinally of the trench upon an advancing movement of the machine, the cable serving as draft means for said anchor means during such movement of the machine.

2. In a machine of the class described, the combination of a shovel having its back pivotally movable relative to the remaining portion thereof and forming a digging blade, latch-members normally locking the back against pivotal movements, means for moving the shovel, and means with which said members coact at a predetermined point in a movement of the shovel to effect their release from the back.

3. In a machine of the class described, the combination of a shovel having ends and a rear digging portion pivotally movable relative to such ends; locking means for acting on such portion to hold it in digging position, mechanism for moving the shovel, and means with which the locking means coacts at a predetermined point in a movement of the shovel to effect a release of such locking means from the digging portion.

4. In a machine of the class described, the combination of a shovel having ends and a rear digging blade pivotally movable relative to the ends, a latch-bar normally locking such blade in operative position, means for moving the shovel, means for coacting with the latch-bar to release it from locking engagement with the blade at a predetermined point in a movement of the shovel, and means for acting on the blade when released to move it relative to the sides to discharge a load.

5. In a machine of the class described, a shovel having ends and a rear side pivoted to the ends adjacent to its lower edge, said rear side forming a digging blade, and at least one latch member carried by the shovel and normally locking the upper portion of the rear side against inward dumping movements.

6. In a machine of the class described, the combination of a shovel having its back pivotally movable relative to the remaining portion thereof and forming a digging blade, at least one latch member normally locking the back against pivotal movements, means for moving the shovel, a way over which the shovel is moved and having means

for coacting with the digging edge of the shovel back to impart inward pivotal movements to the upper portion of the back, and means with which said latch member coacts
5 at approximately the time of engagement of the back with the way means to effect a release of such member from the back.

In testimony whereof, I have hereunto signed my name to this specification in the presence of two subscribing witnesses.
JOHN H. W. LIBBE.

Witnesses:

C. W. OWEN,
M. G. GASKELL.
