W. L. SCOTT.

DIGGING MACHINE.

APPLICATION FILED NOV. 13, 1913.

1,236,112.

Patented Aug. 7, 1917.

2 SHEETS—SHEET 1.

Fig. 10.

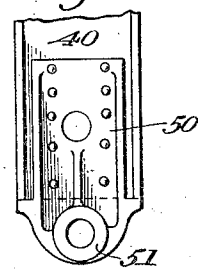


Fig. 11.

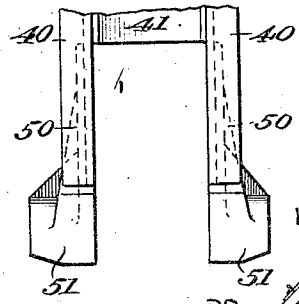
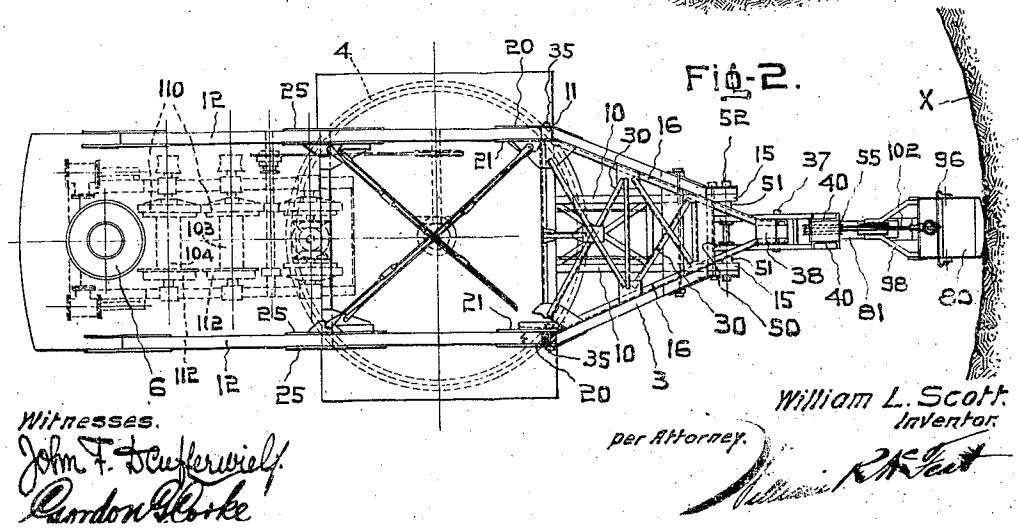


Fig. 1.

Fig. 2.



Witnesses.

John F. Deufenwieb.

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2 SHEETS—SHEET 2.

Fig. 3.

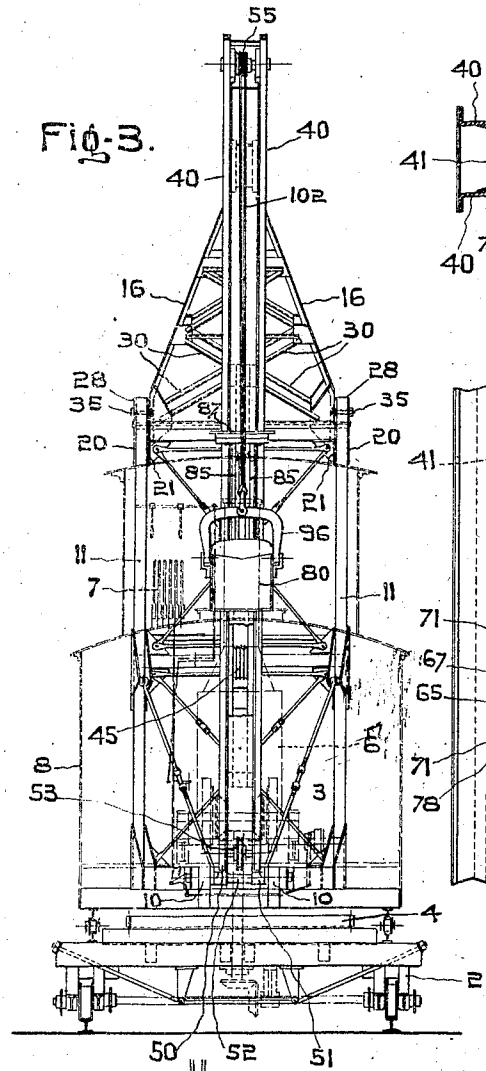


Fig. 4.

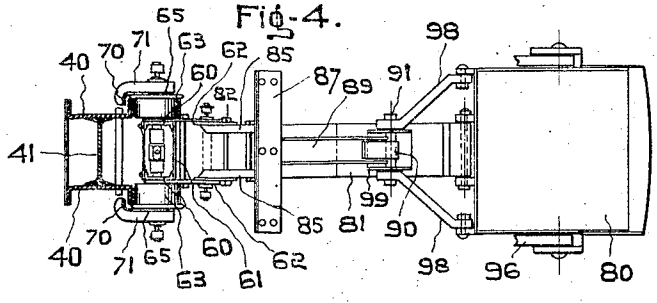


Fig. 5.

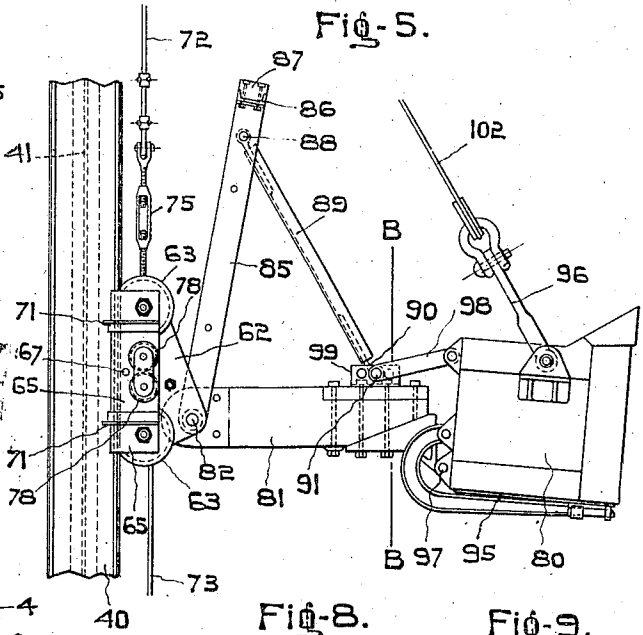


Fig. 8.

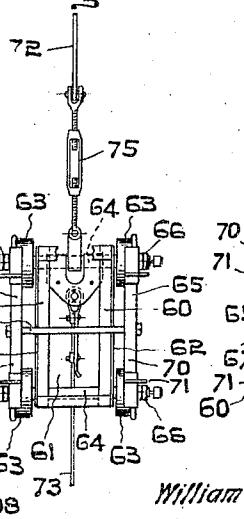


Fig. 9.

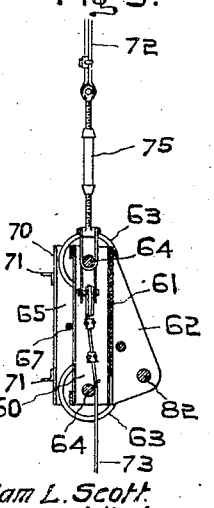


Fig. 6.

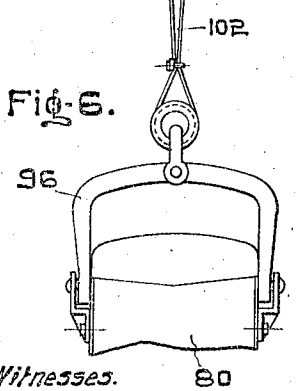
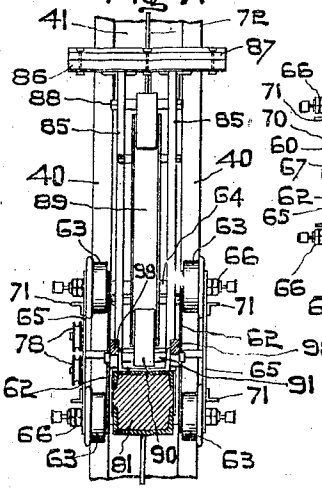


Fig. 7.



Witnesses.

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UNITED STATES PATENT OFFICE.

WILLIAM L. SCOTT, OF MONTREAL, QUEBEC, CANADA.

DIGGING-MACHINE.

1,236,112. Specification of Letters Patent. Patented Aug. 7, 1917.

Application filed November 13, 1913. Serial No. 800,776.

To all whom it may concern:

Be it known that I, WILLIAM L. SCOTT, a resident of the city of Montreal, in the Province of Quebec and Dominion of Canada, a subject of the King of Great Britain, have invented certain new and useful Improvements in Digging-Machines; and I do hereby declare that the following is a full, clear, and exact description of the same.

My invention has for its object to provide a machine capable of digging a path for itself and then cutting in a substantially vertical plane from the face of a bank.

To this end my invention may be said briefly to consist of a portable and preferably rotatable carrier frame, a bucket mounted on the frame, a motor for imparting motion to the bucket and means for so transmitting the power from the motor to the bucket that the latter is caused to first dig a path for a short distance in advance of its carrier frame and then cut in a substantially vertical plane from the face of a bank, the carrier frame being revolved to make successive cuts and for the purpose of enabling the contents of the bucket to be discharged at one side.

For full comprehension, however, of my invention reference must be had to the accompanying drawings forming a part of this specification in which similar reference characters indicate the same parts, and wherein:

Figure 1 is a side elevation of my improved digging machine in operation;

Fig. 2 is a plan view thereof;

Fig. 3 is a front elevation;

Fig. 4 is a horizontal sectional view taken on line A A Fig. 1 and drawn to a larger scale;

Fig. 5 is a side elevation of the bucket and its carrying and operating mechanism;

Fig. 6 a face view of the bucket-bail;

Fig. 7 a vertical sectional view taken on line B B Fig. 5;

Fig. 8 a rear view of the dipper carriage,

Fig. 9 a vertical sectional view of the dipper carriage taken on its center line;

Fig. 10 is a side elevation of the lower end of the track illustrating particularly the means for pivotally connecting the same to the truck-frame; and

Fig. 11 is a front elevation of the means in Fig. 10.

In the embodiment illustrated of my invention I employ a truck 2, a carrier-frame 3, and a turn-table 4 interposed between the truck and carrier-frame, each of these parts being in the main of a construction common to locomotive cranes and other like machines. The frame carries its rotating mechanism indicated at 5, an engine indicated at 6, operating mechanism 7, and a housing indicated at 8; the frame itself including besides other members a pair of center sills 10, a pair of posts 11, and a pair of diagonal back-stays 12.

According to my invention the forward portion of the carrying frame is of special design in order to carry and accommodate the travel of the bucket in the performance of its function in digging the path for its truck and cutting in a substantially vertical plane from the face of a bank *x*.

Provision is made for the performance of this function by extending the center sills forwardly as at 15 and pivotally connecting to the ends thereof a vertical track braced at its upper end from the frame by a rigid back-stay 16. This back-stay has for its purpose to rigidly retain the upper end of the vertical track against displacement in both forward and rearward directions. This back-stay is a structural steel member and in order that the construction thereof may be understood I will first briefly describe the main frame. This frame consists of a pair of side frames made up of the posts 11 and diagonal stay 12 before mentioned united by gusset-plates 20 and 21 bolted to opposite sides of these posts and diagonal stays. Other braces and gusset-plates 26 and 25 respectively complete these side frames of the main frame and these side frames are rigidly connected together by girths 27. The upwardly projecting ends 28 thus formed of the side frames carry this rigid stay 16 between them. This rigid stay is of substantially A-form suitably braced as at 30 to establish a rigid connection between the upper end of the track and the main frame. This rigid stay is adjustably connected to the main frame by pins 35 and a series of holes 36 in the legs of the back-stay, the forward end of which is pivotally connected as at 37 to legs 38 secured to the track.

This track consists of a pair of channel-irons 40 rigidly connected together by an I-beam 41 extending substantially from end to end of the channel. A pair of stiffening webs 42 secured to the rear sides of the chan-

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nel and united and braced by cross-channels 43 afford means for carrying sheaves 45. The lower end of the member thus consructed has a pair of castings 50 bolted to the channels and presenting bearings 51 in alinement and receiving a fulcrum pin 52 journaled in the projecting ends 15 of the center sills thus affording a pivotal connection between the track and the main frame. A series of sheaves are mounted within this track one 53 near the bottom thereof and three 55 near the top. These sheaves 45, 53 and 55 carry the ropes by which the dipper and its carriage are operated. The forward faces of the channels 40 reinforced by wearing strips constitute rails upon which the dipper carriage runs.

This dipper carriage comprises an oblong truck-frame consisting of a pair of channels 60 joined together by a plate 61 a pair of forwardly extending plates 62 being riveted to the outside webs of the channels. The truck wheels 63 are mounted outside of the plates 62 and are rotatably carried on axles 64 the ends of which project through the channels 60. The ends of these axles are reduced and threaded and carry a pair of side plates 65 which are rigidly connected thereto by nuts 66, the plates being rigidly connected together by a tie-bar 67. The rear edges of these plates are bent inwardly behind the flanges of the channels as at 70 to retain the truck movably upon the track, angles 71 stiffening these plates. The ends 72 and 73 of an operating rope 74 are connected to this truck, the end 72 being connected to a turn buckle 75 directly to the upper axle 64 and the end 73 being taken outside of the lower axle and connected by a forked strap clevis 200 straddling the connected end 72 of the rope, this arrangement of the rope end 73 serving, when this end is in tension, to crowd the lower end of the truck on to the track. A pair of sheaves 78 mounted on the outside of one of the side plates serve to guide the rope for dumping the dipper as will be presently shown.

The dipper 80 is carried at the outer end of an arm 81 pivoted between the plates 62 on a fulcrum pin 82 upon which a strut is also carried. This strut consists of a pair of channel iron legs 85 pivoted at their lower ends on the pin 82 and having a cross channel 86 rigidly secured at their outer ends and shod with a piece of timber 87 serving as a bearing for the rope as will be presently shown; a tie-bar 88 having the upper end of a rigid brace 89 secured thereto at the lower end thereof having an eye 90 through which projects a pin 91 serving also as a portion of the means for connecting the dipper to the dipper arm.

The dipper is of well-known construction having a bottom dumping door 95 and bail 96. The connection of the dipper to the dipper arm is indicated at 97 and 98, the latter having a pair of I-beams pivoted at their opposite ends to the bucket and pin 91. This pin is preferably adjustable in a pair of angle brackets 99 secured on the top of the bucket arm.

The bucket is dumped as usual by a dumping rope 100 extending from the guiding sheaves 78 to a point within easy reach of the operator.

The bucket is suspended on a twin rope 102 extending from the bail 96 up to and over two of the sheaves 55 thence down the rear side of the track and under two of the sheaves 45 and thence to the forward drum 103 of the winch mounted on the carrier-frame, a second drum 104 of this winch having a dipper carriage rope 74 wound around. Following this dipper carriage rope from the upper end of the carriage it extends from end 72 over the third sheave 55 under the third sheave 45 to the top of the drum 104 and after being wound several times around this drum it extends over the fourth sheave 45 down the rear side of the track under sheave 53 and up the front of the track and terminates in the end 73. The drums of the winch are independently operated by driving frictions 110 and controlled by friction brakes of any preferred type not illustrated and acting upon cylindrical face 112; the driving mechanism being operated by the engine through the medium of a crank-shaft 115 operating a spur gear 116 intermeshing with spur gears which in turn operate the drums by means of friction clutches, the connection between the engine and the crank-shaft being of any desired form not shown.

Operation.

The operation of my improved digging machine is as follows:—

The machine preferably rests on rails laid in the direction of the bank to be cut. The operator lowers the dipper carriage to the bottom of the track and just before the carriage reaches this position he permits the dipper to swing beneath the projecting ends 15 of the center sills thus causing it as the carriage reaches its lowermost position to bite into the ground beneath these projecting sills. He then holds the carriage in this position by applying the brake to its operating drum and raises the bucket and its arm until they assume horizontal position. In order to cause the pull on the rope to be effective in performing this operation the strut 87 following the dipper to its lowermost position will have deflected the rope to the forward position indicated by dotted lines in Fig. 1. It may be explained here that when the dipper is permitted to swing beneath the projecting sill ends it is made to assume a position with the edge of its lip slightly behind the vertical li[illegible] with the

pivot of its arm in the dipper carriage, the effect being that the cut made directly in advance of the machine carriage is substantially horizontal. Immediately the dipper and its arm assumes this horizontal position the operator releases the brake on the carriage-operating drum and applies power and causes the carriage to move to a point upwardly along the track at practically the same rate of speed as the bucket. He then disconnects both the dipper and the carriage from the power and applies the friction brakes to both drums after which he applies the power to the rotating mechanism 5 and rotates the carrier-frame to swing the dipper to dumping position. Simultaneous with the swinging of the frame the operator lowers down the dipper and its carriage at the same speed by means of the friction brakes on the drums. The dipper is then in a position to be dumped and after dumping the operator returns the frame to position ready to make the next cut.

In the application of the invention illustrated the dipper is caused to cut from the face of the bank a layer of such thickness that when the bucket has reached the top of the bank it is completely filled with a mixture of the different strata or ingredients of which the bank is composed. The cut made is continuous from the track level forwardly and outwardly in an arc concentric with the pivot of the dipper arm and then upwardly in a line parallel with the track and as this track is adjustable within a limited extent the vertical angle of the face presented by the cut may be correspondingly adjusted, the back-stay 16 constantly resisting the backward thrust of the dipper during operation and consequently by a succession of single cuts as described made at different points in the bank within reach of the dipper through the rotation of the frame on its carriage a continuous cutting of any desired length and height within the limits of the vertical track having a substantially level floor for carrying the tracks upon which the machine moves can be made into the bank.

What I claim is as follows:—

1. In a digging machine, a truck, a carrier frame rotatably mounted thereon consisting of a platform, a pair of vertical posts located in the opposite sides of said platform, a pair of rigid diagonal back-stays having their opposite ends secured respectively to the platform and to the upper ends of the posts, a lateral extension on said platform consisting of a pair of center sills, a substantially vertical track the lower end of which is mounted on the free ends of said sills and a diagonal back-stay having one end secured to said carrier frame and constituting an extension of said first-mentioned back-stays and having its opposite end secured to the upper end of the track and adapted to constitute a rigid connection between the latter and the carrier frame.

2. In a digging machine, a carriage having a pair of projecting plates, an arm one end of which is pivoted between said plates, a dipper mounted upon the free end of said arm, a strut mounted upon the pivoted end of said arm and straddling the same, said strut consisting of a pair of channel-iron legs having a transverse channel-iron mounted upon the free ends thereof, a tie-bar having its opposite ends secured respectively to the free ends of the strut and said arm and adapted to brace the strut, a power-driven member and a rope operatively connecting the dipper to the power-driven member and adapted to bear upon the strut.

In testimony whereof I have signed my name to this specification in the presence of two witnesses.

WILLIAM L. SCOTT.

Witnesses:

WILLIAM J. C. HEWETSON,
GORDON G. COOKE.