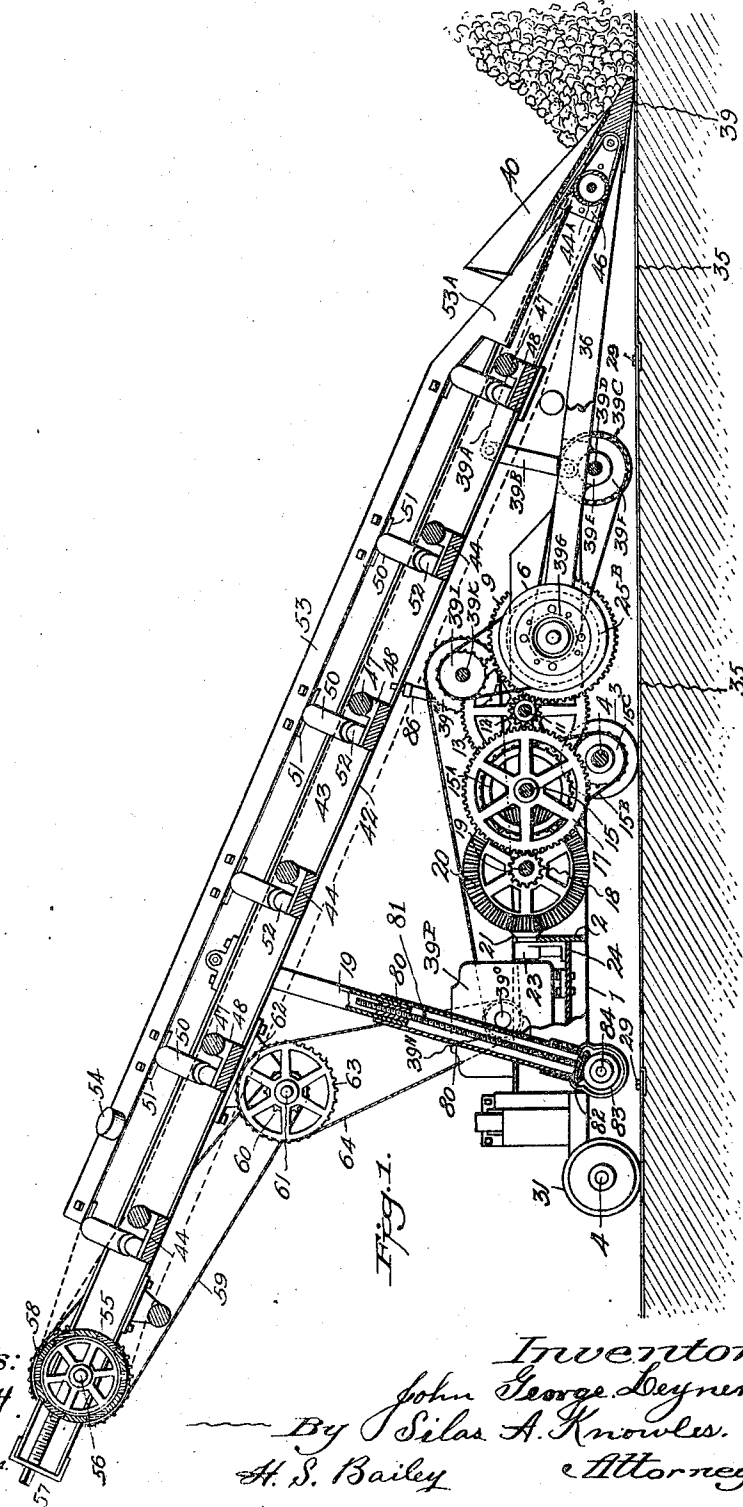


J. G. LEYNER & S. A. KNOWLES.
 OSCILLATING SHOVEL MUCK REMOVER FOR TUNNELS.
 APPLICATION FILED APR. 25, 1910.

1,000,337.

Patented Aug. 8, 1911.

2 SHEETS—SHEET 1.



Witnesses:
 L. Sargent & Co., att.
 Robert J. Hallman.

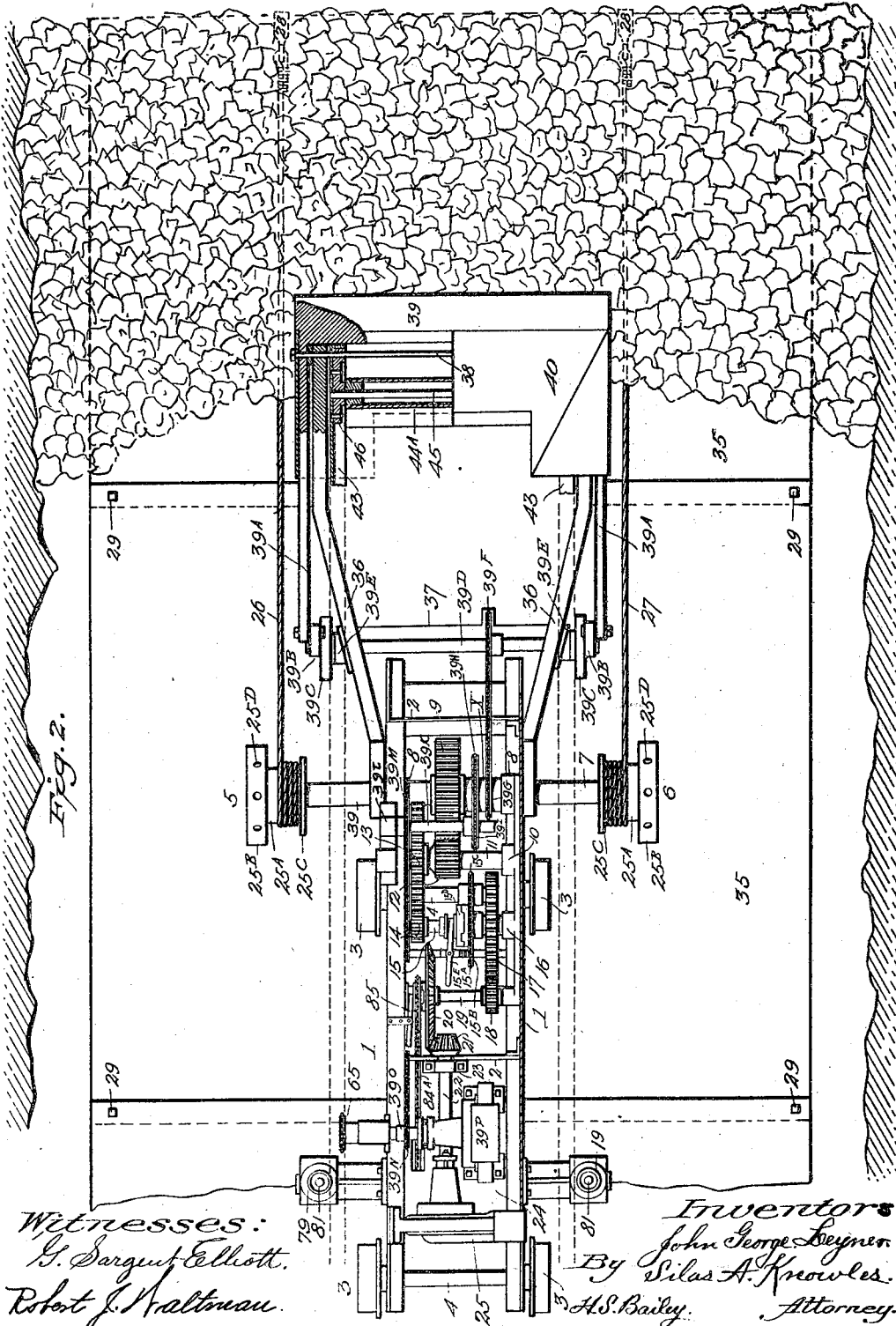
Inventors:
 John George Leyner.
 By Silas A. Knowles.
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Witnesses:
 G. Sargant Elliott.
 Robert J. Haltnan.

Inventors:
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UNITED STATES PATENT OFFICE.

JOHN GEORGE LEYNER, OF DENVER, AND SILAS A. KNOWLES, OF GOLDEN, COLORADO,
ASSIGNORS OF THREE-FOURTHS TO THE J. GEORGE LEYNER ENGINEERING WORKS
COMPANY, OF DENVER, COLORADO, A CORPORATION OF COLORADO.

OSCILLATING-SHOVEL MUCK-REMOVER FOR TUNNELS.

1,000,337.

Specification of Letters Patent.

Patented Aug. 8, 1911.

Application filed April 25, 1910. Serial No. 557,468.

To all whom it may concern:

Be it known that we, JOHN GEORGE LEYNER and SILAS A. KNOWLES, citizens of the United States of America, the former residing at the city and county of Denver and State of Colorado, and the latter residing at Golden, county of Jefferson, State of Colorado, have invented a new and useful Oscillating-Shovel Muck-Remover for Tunnels, of which the following is a specification.

Our invention relates to a new and improved oscillating shovel mucker for removing blasted, broken-down, or crushed material such as ore, rock, gravel, and dirt, which is termed muck, from the breasts of tunnels; and the objects of my invention are: first, to provide a machine having an oscillating shovel point for removing and depositing in cars the rock, ore, dirt, or muck thrown down at the breast of tunnels when drilling and blasting, or brushing or chipping, or drilling the breasts of tunnels when driving tunnels in mining or railroad or other operations; second, to provide an endless belt automatic shoveling and car loading machine, in which the shovel moves with an oscillating movement and thus loosens up the muck and works under it; and third, to provide a muck removing machine that can be arranged in tunnels to be forced directly under the body of muck material at the breasts of tunnels, and that will load the muck automatically onto cars, or discharge it from the end of the conveyer, and as it is drawn under the body of the muck material. We attain these objects by the mechanism illustrated in the accompanying drawings, in which:

Figure 1, is a plan view of the supporting frame of our oscillating shovel muck removing machine, a fragment only of the inclined conveyer frame, which is pivotally connected to the forward end of the truck, being shown. And Fig. 2, is a vertical longitudinal section of our improved muck shoveling machine.

Similar letters of reference refer to similar parts throughout the several views.

Referring to the drawings, the frame of the mucker consists of the side beams 1 and the cross pieces 2; and these beams are preferably made of structural iron. The frame is preferably mounted on car wheels 3, which are rotatably mounted on axles 4, which are

secured to the under side of the front and rear ends of the frame. To the front end of the machine are secured two capstans 5 and 6, which are arranged horizontally one on each side of the machine, on the opposite ends of a shaft 7, which is journaled in suitable boxes 8, which are secured to the side beams 1. Upon the center of the shaft 7, is secured a gear 9. Parallel to the shaft 7, is mounted in suitable boxes 10 a shaft 11, and upon the central portion of this shaft 11, is secured a pinion 12, which meshes with the gear 9. At the side of the pinion 12, is secured a gear 13, which meshes with a pinion 14, on a shaft 15, which is revolubly journaled in boxes 16, that are secured to the frame of the machine in any suitable manner. To the shaft 15 is also secured a gear 17, which meshes with a pinion 18, that is secured to shaft 19. A bevel gear 20 is also secured to the shaft 19, which meshes with a bevel pinion 21, secured upon a shaft 22, that is revolubly mounted in boxes 23, that are secured to a platform 24, which is attached to the side beams of the frame. This shaft is connected in any suitable manner to any suitable engine or motor, but we preferably use, however, a compact rotary reversible Dake engine 25, and the shaft 22, is connected directly to the center disk of the engine. This engine is mounted upon and is secured in any suitable manner to the frame of the machine. The engine 25 thus drives the train of gears above enumerated and rotates the capstans 5 and 6.

Upon the shaft 15 is loosely mounted a sprocket wheel 15^A, which is connected by a chain 15^B with a sprocket wheel 15^C, rigidly mounted on the forward supporting axle 4 of the wheel frame. The sprocket 15^A has a clutch which is normally engaged by a clutch 15^D on the shaft 15, so that the power from the shaft 15 will be transmitted to the sprocket 15^C, by means of the chain 15^B to move the machine either forward or backward; but when it is desired to raise or lower the inclined conveyer frame, the clutch 15^D is thrown out of engagement with the sprocket wheel 15^A, as will hereinafter be fully shown. The clutch is operated by means of a lever 15^E.

The capstans each comprise a drum 25^A, and two flanged portions 25^B and 25^C. One flange 25^B of each drum, is made wide

enough to contain a circumferential row of holes 25^D, that are adapted to receive one end of a lever, by which they may be turned by hand when necessary.

5 To the drums 25^A, we secure two ropes 26 and 27, the free ends of which are secured to hooks 28, which engage the forward edge of a foundation plate 35, which comprises two heavy plates of iron that are detachably
10 bolted together at their meeting ends by bolts 29. These plates form a smooth surface for the lip of the shovel to slide on, as it is forced forward under the ore or rock or other material knocked down at the
15 breast of the tunnel. As our machine is adapted to be used at the breasts of tunnels for removing and depositing in cars the rock, ore, dirt, or muck that is thrown down in blasting, we have illustrated it in
20 plan and elevation in operative position at the breast of a tunnel.

To the forward ends of the side beams 1, is secured a supporting frame, which consists of side beams 36, which are connected
25 by a bottom plate 37 and a bolt 38. This bolt extends through the front ends of the beams 36, and upon it is pivotally mounted the improved muck shovel, which consists of a wedge shaped forging 39, which forms
30 a shoveling lip, and rearwardly extending lever arms 39^A. This lip and the arms 39^A of the muck shovel and the beams 36, are covered by a heavy sheet steel plate 40, for a portion of their lengths, and the sides of
35 this plate are sloped upward and inward from a point adjacent to the edge of the lip of the muck shovel, so as to form a trough that will guide the rock, ore, dirt, or muck into the center of the shovel, as it
40 is forced over the surface of the plate under the material, as will be explained more fully hereinafter. The rear ends of the arms 39^A are pivotally connected to pitman arms 39^B, which are pivotally connect-
45 ed at their opposite ends to disks 39^C, which are rigidly secured upon a shaft 39^D, mounted in bearings 39^E, which are secured upon the beams 36. Upon this shaft is secured a sprocket wheel 39^F, which is connected by
50 a chain with a sprocket wheel 39^G, on a sleeve X loosely mounted on the drum shaft 7. The sleeve X is also provided with a sprocket wheel 39^H, which is connected by a chain with a sprocket wheel 39^I, on a
55 shaft 39^K, mounted in bearings 39^L on the side beams 1. The shaft 39^K also carries a sprocket wheel 39^M, which is connected by a chain with a sprocket wheel 39^N, on the shaft 39^O, of an engine 39^P, similar to the
60 engine 25. Thus, as the shaft 39^D with the disks 39^C are turned by the engine, through the medium of the chains and sprocket wheels above mentioned, the pitman arms 39^B impart an oscillating motion to the
65 muck shovel, which not only enables it to

work under the muck, but the muck is thereby loosened or agitated so that it falls upon the plate or shield 40, whence it is delivered upon an endless conveyer, which we will now proceed to describe.

70 On the bolt 38 we pivotally mount one end of an endless belt frame 42, which consists of side pieces 43 and cross pieces 44. This endless belt frame extends rearward from the bolt 38, over and beyond the wheeled
75 frame of the machine, and its rear end is supported and arranged to be raised and lowered over the wheeled frame to stand at any desired angle to convey the rock, ore, dirt, or muck to its upper end, and discharge it directly into cars or if desired
80 into a suitable supplementary conveyer that will convey and discharge it into cars. In the belt conveyer frame adjacent to its pivotal bolt 38, and under the shovel plate, we rotatably mount a roller 44^A, on a shaft 45,
85 the ends of which are rotatably supported in a steel or iron casting or a forging 46, which is secured to the side pieces 43 of the frame of the belt conveyer, and through the ends of which the pivotal bolt 38 passes, and
90 along the center of the length of the belt conveyer frame at suitable distances apart to support a belt, we mount a plurality of rollers 47, in boxes 48, which are attached to
95 the cross pieces 44 of the frame, and on each side of each of these central rollers, we rotatably mount an inclined roller 50, which rollers are positioned at an upward angle
100 from adjacent to the opposite ends of each of the center rollers to the side beams of the belt conveyer frame, where their outer ends are journaled in suitable boxes 51, which are secured to the side beams of the frame.
105 The inner ends of these inclined rollers are also journaled in boxes 52, which are secured to the cross pieces 44. Upon the tops of the boxes 51, are secured strips 53, which support the side edges of the belt, between the rollers 50. These strips are connected
110 at their forward ends by an integral plate 53^A, which is adapted to lie beneath the conveyer belt and supports it against sagging as the heavy material falls upon it, that portion of the belt having to sustain the great-
115 est strain. Guide rollers 54, are secured near the ends of these strips, which guide the belt over a drum 55, which is mounted on a shaft 56, that is journaled in suitable
120 boxes that are slidably mounted on the side rails at the outer end of the belt conveyer frame, and a suitable belt tightener 57, may be employed for maintaining the required tension upon the belt. On the rollers
125 55 50, 47, and 44^A, we place a suitable belt, which in running over the inclined rollers forms a trough-shaped conveyer, that holds the rock, ore, dirt, or muck in its center without spilling it over its sides. The drum shaft 56 is provided at one end 130

with a sprocket wheel 58, which connects by a chain 59 with a sprocket wheel 60, on a shaft 61, mounted in bearings 62, secured upon the under side of the conveyer frame adjacent to its rear end. The shaft 61 also carries a sprocket wheel 63, which is connected by a chain 64, with a sprocket wheel 65, on the shaft 39^o of the engine 39^P. The conveyer belt of the shovel is thus driven to elevate the material shoveled into it, by the engine 39^P, which also operates the shaft 39^D by which the muck shovel is given its oscillating motion through the pitman arms 39^B.

The inclined conveyer frame 42 is raised and lowered by means of tubes 19, which are telescopically mounted in tubes 80, which are pivotally mounted to the side beams 1 of the car, the movable tubes having threaded rods 81 provided with bevel gears 82 at their lower ends, which mesh with bevel pinions 83 on the opposite ends of a shaft 84, which is driven by a chain 84^A from the shaft 19, a clutch 85 being employed to throw the shaft 84 out of connection with the shaft 19, when the machine is in operation, and for connecting the shafts when it is desired to raise or lower the conveyer. We have not, however, more fully described the mechanism for raising and lowering the conveyer, as we may employ any other suitable mechanism for accomplishing the same result, and a detailed description of this and other features of our invention is given in our pending application filed April 19, 1910, Serial No. 556,327.

Supporting arms 86 are pivotally secured to the car, the opposite ends of which are arranged to extend under the opposite side rails of the inclined conveyer when it is raised to its highest position, when its weight rests on these supporting arms.

The operation of the improved mucker is as follows: We preferably use compressed air, as the motive actuating fluid, and the engines on the mucker are operatively connected to a suitable supply of it. The breast of rock is drilled with a sufficient number of holes to blast its entire surface, and they are charged ready to be fired, but before a charge is fired, the floor plates 35 are laid down and the hooks at the ends of the ropes are hooked to the edge of the forward plate, while the mucker is run back a safe distance. The breast is then fired, and the ore and rock fall onto the floor plates on the ropes. The mucker is then run up on the plates by starting the engine 25, which at the same time winds up the rope, and forces the ram or shovel under the ore or rock. The inclined conveyer is then elevated to the desired angle by throwing in the clutch 85 that connects the shaft 19, with the shaft 84, by means of chain 84^A. The shovel of the

mucker is then forcibly drawn under the fallen ore or rock by the engine, which through the medium of the train of gears causes the shaft to rotate the capstans, which winds the rope slowly and draws the shovel of the mucker under the ore or rock, while at the same time the shovel is given an oscillating motion by means of the pitman arms 39^B which connect with the lever 39^A of the said shovel, the pitman arms being operated by the disks 39^C on shaft 39^D, which shaft is connected by sprocket wheels and chains with the shafts 39^o of the engine 39^P, the oscillating motion of the shovel causing the muck to be loosened so that it falls upon the plate 40, which guides it onto the inclined conveyer, which is driven by the engine 39^P. The inclined conveyer discharges the ore and rock upon a supplemental conveyer or directly into a car. The mucker can be thus drawn forward under the ore or rock by the ropes until the shovel reaches the breast of the tunnel and all or the greater portion of the ore or rock will be automatically shoveled up and loaded into cars, while the small amount remaining at the sides of the tunnel can be shoveled onto the endless inclined belt by a man on each side of the mucker. When desired, a lever can be inserted in either one of the capstans and they can be turned independently to even up the ropes 26 and 27, so that they will be of equal length, thus causing the pull to come in direct line with the machine. The capstans can also be turned to wind the rope, when the engine is shut down by turning the train of gears and the engine.

Our invention will very greatly lessen the time and expense required to remove the ore or rock from the breast of a tunnel after blasting, as the machine is easily and quickly manipulated, and is capable of removing a great amount of ore or rock in a short time, while to accomplish the same results manually would require several men, working a much longer time.

While we have illustrated and described the preferred construction and arrangement of our mucker, we do not wish to be limited to the construction shown and described, as many changes might be made without departing from the spirit of the invention, which contemplates any arrangement of a carriage and oscillating shovel that can be drawn under or forced into a body of blasted ore or rock in a tunnel, and that is provided with an endless conveyer belt that is arranged to elevate and discharge it into cars. Having described our invention, what we claim as new and desire to secure by Letters Patent, is:

1. In a muck removing apparatus for tunnels, the combination of floor plates comprising sheets of any suitable metal adapted

to be laid on the floor of a tunnel, one edge of each plate being provided with a depressed step shouldered portion adapted to receive the opposite edge portion of the adjacent plate and arranged to form an overlapping smooth level surface at the meeting edges of said floor plates, and bolts extending through said overlapping edges of said plates and arranged to boltingly clamp said plates' edges together, with a muck shoveling machine adapted to rest on said floor plates and provided with cable winding mechanism and with cables, the outer ends of said cables being provided with hooks arranged and adapted to hook over the edge of the floor plate, being adjacent to the breast of said tunnel.

2. In an oscillating mucker shovel for removing rock and other muck from the breast of tunnels, said tunnel being provided with floor plates, the combination of a car arranged to rest on said floor plates and provided with motor operated power transmitting shafts and gearing, and provided with a pair of forwardly extending arms, a shovel provided with a shoveling lip adapted to stand in shoveling relation to the floor portion of said tunnel and pivotally supported by said arms adjacent to its shoveling lip and between its shoveling lip and its opposite end, upwardly extending and rearwardly converging side portions on said shovel, means connected to said power driven shaft and gearing including a crank operated lever for imparting a vertically inclined oscillating movement to said shovel and its lip, a muck conveyer operatively mounted on said car and arranged to receive muck from said shovel and to convey it to and discharge it from the opposite end portion of said car from its shovel, and means including cable winding drums connected to said power driven shafts and cables connected at one end to said drums and arranged to extend to and be secured at or adjacent to the breast end portions of said floor plates, said cable winding drums and said cables being arranged and adapted to draw said oscillating shovel along the floor portion of a tunnel into and under muck thereon.

3. In an oscillating mucker shovel for removing a rock and other muck from the breast of tunnels, said tunnel being provided with floor plates, the combination of a car arranged to rest on said floor plates and provided with motor operated power transmitting shafts and gearing, and provided with a pair of forwardly extending arms, a shovel provided with a shoveling lip adapted to stand in shoveling relation to the floor portion of said tunnel and pivotally supported by said arms adjacent to its shoveling lip and between its shoveling lip and its opposite end, upwardly and rearwardly con-

verging side portions on said shovel, means connected to said power driven shaft and gearing including a crank operated lever for imparting a vertically inclined oscillating movement to said shovel and its lip, a muck conveyer operatively mounted on said car and arranged to receive muck from said shovel and to convey it to and discharge it from the opposite end portion of said car from its shovel, and means including cable winding drums connected to said power driven shafts and cables connected at one end to said drums and arranged to extend to and be secured at or adjacent to the breast end portions of said floor plates, said cable winding drums and said cables being arranged and adapted to draw said oscillating shovel along the floor portion of a tunnel into and under muck thereon.

4. In an oscillating mucker shovel for removing rock and other muck from the breast of tunnels, said tunnel being provided with floor plates, the combination of a car arranged to rest on said floor plates and provided with motor operated power transmitting shafts and gearing, and provided with a pair of forwardly extending arms, a shovel provided with a shoveling lip adapted to stand in shoveling relation to the floor portion of said tunnel and pivotally supported by said arms adjacent to its shoveling lip and between its shoveling lip and its opposite end, upwardly and rearwardly converging side portions on said shovel, means connected to said power driven shaft and gearing including a crank operated lever for imparting a vertically inclined oscillating movement to said shovel and its lip, a muck conveyer operatively mounted on said car and arranged to receive muck from said shovel and to convey it to and discharge it from the opposite end portion of said car from its shovel, and means including cable winding drums connected to said power driven shafts and cables connected at one end to said drums and arranged to extend to and be secured at or adjacent to the breast end portions of said floor plates.

5. In a muck shoveling machine for tunnels, the combination of a car, provided with beams projecting forwardly from its opposite sides, a shaft between said beams, a shoveling lip tiltingly supported on said shaft, rearwardly extending arms on said shaft, a pair of disks mounted on said car and provided with wrist pins, levers secured at one of their ends to the wrist pins of said disks and pivotally secured at their opposite ends to the arms of said shoveling lip, a conveyer frame pivotally journaled to the shaft of said beams at one end, and arranged to extend over and to the rear end of said car from its shoveling lip, means including gearing and telescoping tubes mounted on said

car for raising the discharging end of said conveyer to any desired position above said car and for lowering the same to said car.

6. In a muck shoveling machine for tunnels, the combination of a car, a shovel tilt-
ingly supported by said car and provided
with a lip portion arranged in shoveling relation to the floor portion of a tunnel, said
shovel being provided with upwardly extending and rearwardly converging side portions, a conveyer frame pivotally supported at one end on said car under said shovel, said conveyer frame being provided with belt drums at its opposite ends, an endless conveyer belt mounted on said drums and operatively supported by said conveyer frame, means connecting said conveyer frame and said car for raising and lowering the discharging end of said conveyer, and
20 means including power driving mechanism on said car for imparting an oscillating movement to said shovel.

7. In a muck shoveling machine for tunnels, a car, motors mounted on said car,
25 power transmitting mechanism on said car connected to said motors, a shovel provided with a shoveling lip pivotally and reciprocally secured to one end of said car, said shovel being provided with upwardly projecting sides arranged to slope toward its

center on their upper shoveling surfaces, arms extending rearwardly from said lip portion to and beyond the opposite end portion of said shovel from its end lip portion, a lever pivoted at one end to the arm, crank disks 35 pivoted to the opposite end of each lever, and means connected to said crank disks and said power operated mechanism for imparting an oscillating movement to said shovel and its shoveling lip, an endless belt conveyer on 40 said car arranged and adapted to convey muck from said shovel to and to discharge it from the opposite end of said car from said shovel, and means including winding drums and cables for attaching said car to a point 45 in a tunnel ahead of said car and its shovel adjacent to the muck to be shoveled, and means for connecting said cable winding drums to said power rotating machinery and to said motors whereby said car and its 50 shovel may be drawn forward in operative muck shoveling relation to the floor portion of said tunnel.

In testimony whereof we affix our signatures in presence of two witnesses.

JOHN GEORGE LEYNER.
SILAS A. KNOWLES.

Witnesses:

G. SARGENT ELLIOTT,
ROBERT J. WALTMAN.