M. T. HOSTER.

SHOVELING OR MUCKING MACHINE.

APPLICATION FILED APR. 5, 1912.

1,100,241.

Patented June 16, 1914.

3 SHEETS—SHEET 1.

Fig. 1.

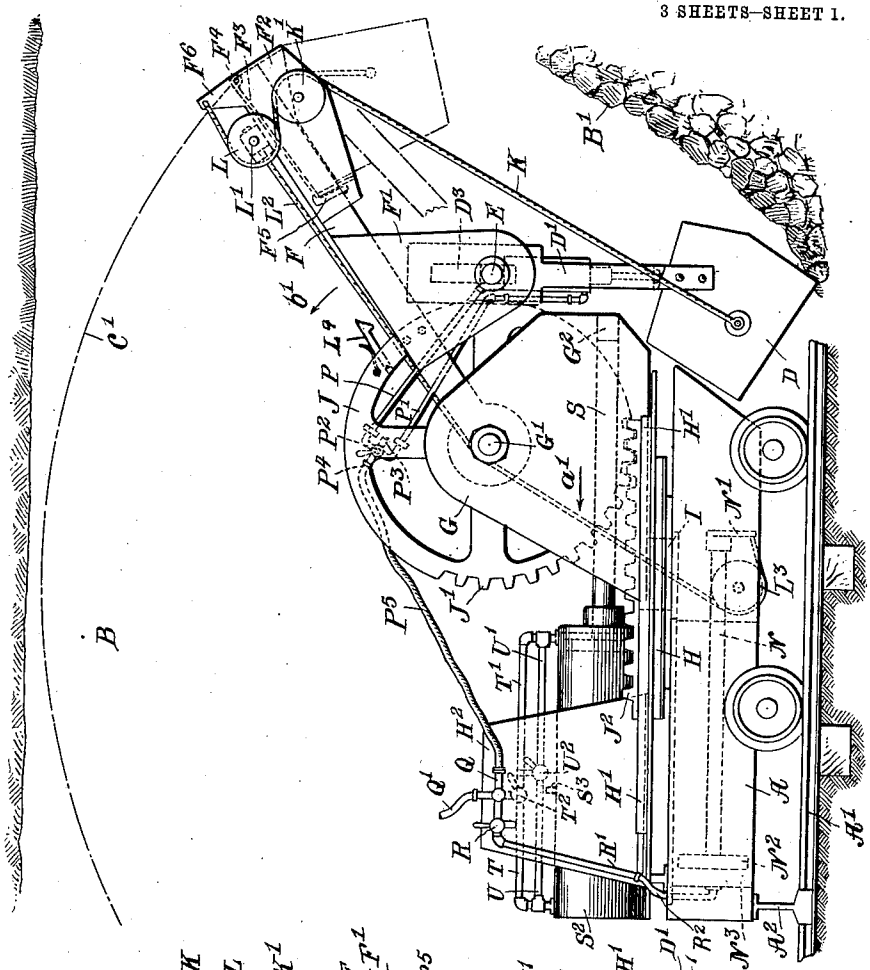
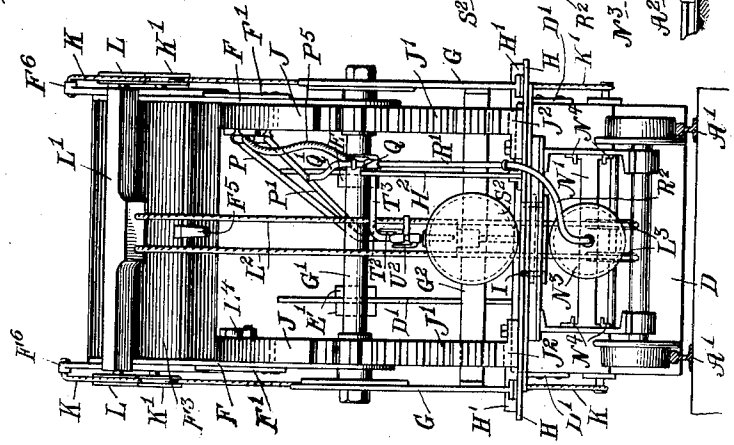


Fig. 2.



WITNESSES

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3 SHEETS—SHEET 2.

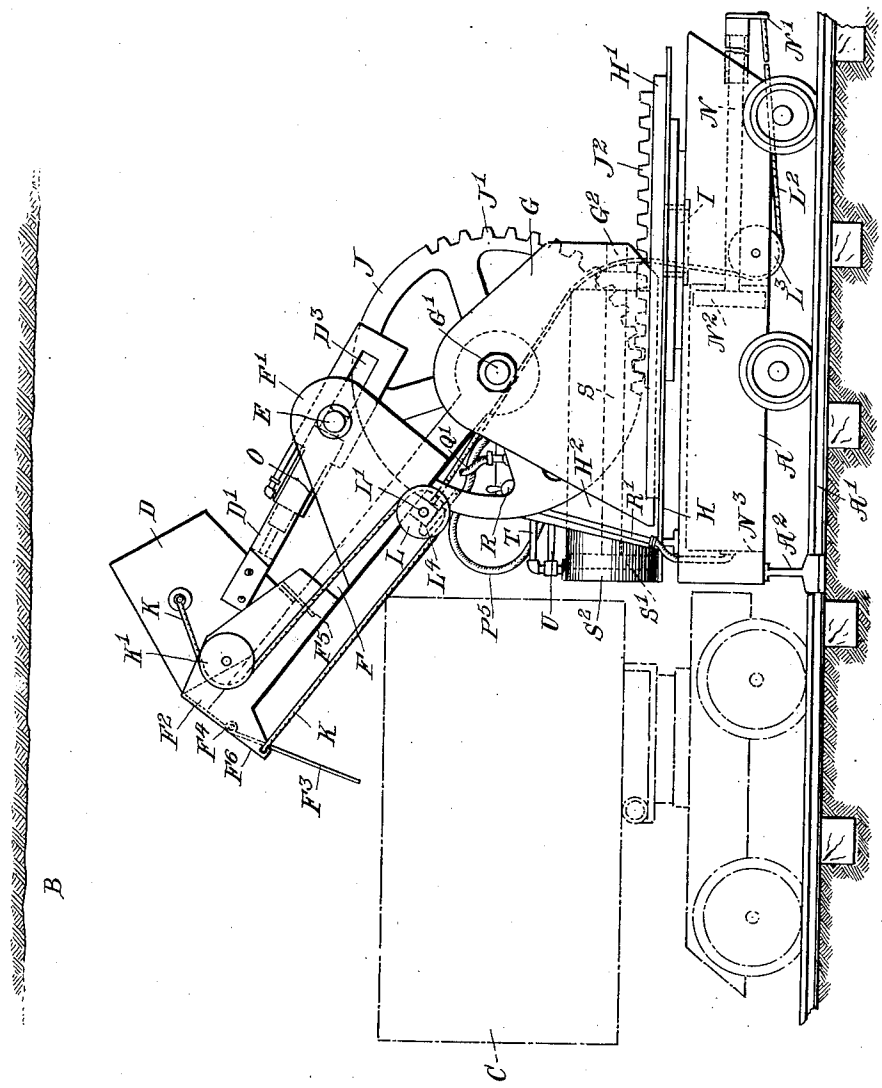


Fig. 3.

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3 SHEETS—SHEET 3.

Fig. 4.

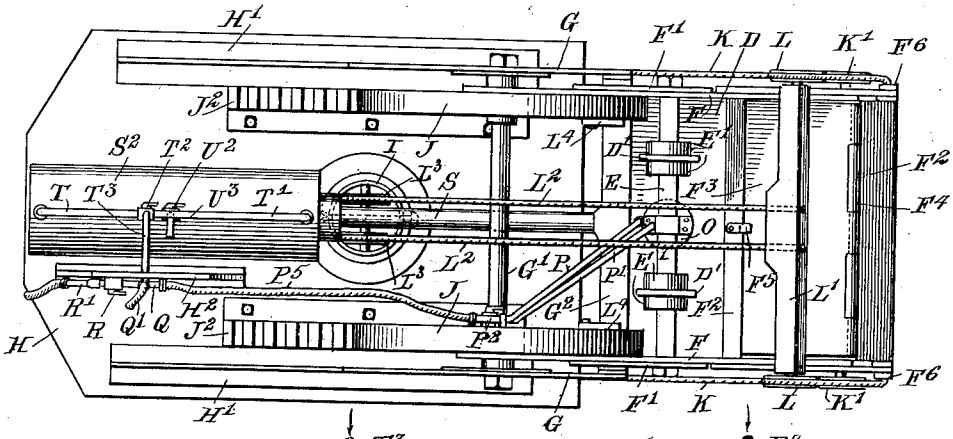


Fig. 5.

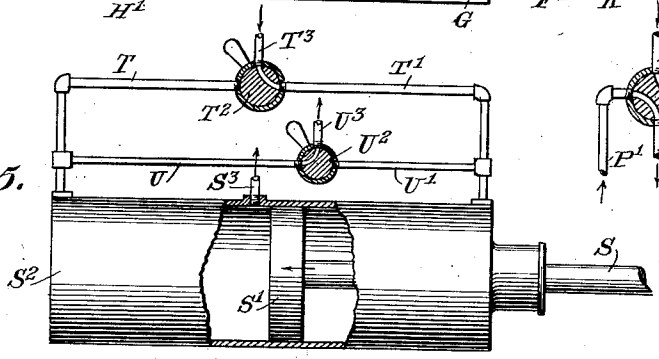


Fig. 9.

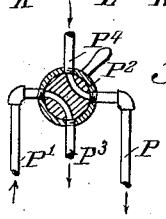
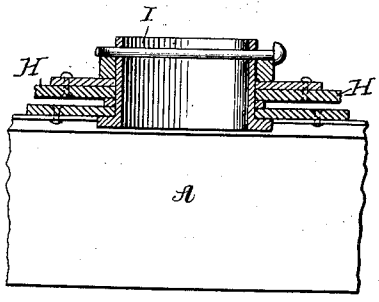


Fig. 6.

Fig. 7.



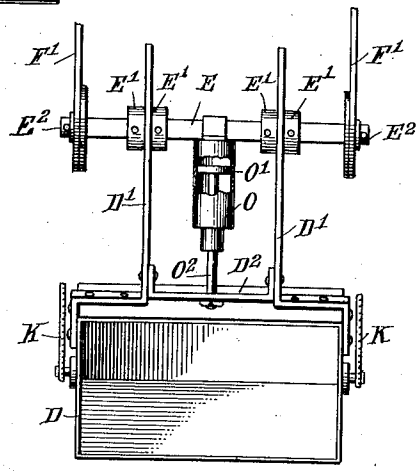
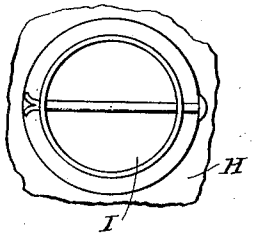


Fig. 8.



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MANFRED T. HOSTER, OF EAST RUTHERFORD, NEW JERSEY.

SHOVELING OR MUCKING MACHINE.

1,100,241. Specification of Letters Patent. Patented June 16, 1914.

Application filed April 5, 1912. Serial No. 688,707.

To all whom it may concern:

Be it known that I, MANFRED T. HOSTER, a citizen of the United States, and a resident of East Rutherford, in the county of Bergen and State of New Jersey, have invented a new and Improved Shoveling or Mucking Machine, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved shoveling or mucking machine, more especially designed for use in mines, tunnels, and the like for removing loose material, and arranged to enable a single operator to readily control the machine with a view to shovel up the loose material in front and on the sides of the machine and transfer it rearwardly into a car or other vehicle or receptacle at the rear of the machine. For the purpose mentioned use is made of a bucket adapted to be moved forward and upward to scoop up the material to be shoveled, and transferring means for moving the filled bucket rearwardly overhead of the machine into dumping position, at a point beyond the rear end of the machine to dump the material into a car or other receptacle.

A practical embodiment of the invention is represented in the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a side elevation of the shoveling or mucking machine with the bucket in position for entering the loose material; Fig. 2 is an elevation of the rear end of the shoveling machine; Fig. 3 is a side elevation of the shoveling machine with the bucket in dumping position; Fig. 4 is a plan view of the shoveling machine with the parts in position as in Fig. 1; Fig. 5 is an enlarged side elevation with parts in section of the fluid pressure means for controlling the movement of the transferring arm; Fig. 6 is a front elevation of the bucket in position as in Fig. 1, and connected parts, the cylinder of the pressure means for adjusting the bucket on the transferring arm being partly broken out; Fig. 7 is an enlarged sectional side elevation of the pivotal connection between the truck and turntable; Fig. 8 is a plan view of the same; and Fig. 9 is an enlarged sectional side elevation of the valve for controlling the fluid pressure of the means for adjusting the sweep of the bucket.

In driving drifts and tunnels the material in the face thereof is loosened by blasting or by the use of machines or hand tools and the loosened material is then shoveled into cars or wheelbarrows for carrying the material out of the drift or tunnel to a suitable place of discharge, the operation of shoveling the loose material into the cars or other transporting means being usually termed mucking.

In order to carry on the mucking operation in narrow drifts and tunnels of about six feet in height and width by the use of shoveling or mucking machines, many difficulties have to be overcome owing to the small amount of available space in which such machine can be effectively used as the machine has to be located and worked between the loose material ahead and the car located in the rear of the machine and to which car the loose material has to be transferred by the machine.

In practical mining as now generally carried on, use is made of power drills actuated by compressed air as the motive agent, and after the holes are drilled in the face of the drift or tunnel the drills are removed to a place of safety while the charging of the drilled holes with dynamite or other explosive and the subsequent blasting and mucking are carried out. For the several operations mentioned different sets of men are usually employed and considerable time consumed. In order to permit of effectively carrying out the mucking operation in the drift or tunnel in the shortest time possible, and at the same time utilizing the same hose or other means employed for conducting the compressed air or other fluid pressure to either the drills or to the shoveling or mucking machine and with but a single man for controlling the shoveling or mucking machine is the main object of the shoveling or mucking machine presently to be described in detail.

The shoveling or mucking machine as shown in the drawings is mounted on a suitably constructed truck A running on rails A′ laid in the bottom of the drift or tunnel B containing the loose material B′ to be shoveled up and transferred by the machine to a car C or other receptacle located in the rear of the shoveling or mucking machine and likewise running on the rails A′, as indicated in Fig. 3. After the truck A has been run to operative position it is prefer-

ably locked in place by a suitable clamping device A^2 connecting the truck A with the rails A', as indicated in Figs. 1 and 3.

The loose material B' in front of the shoveling or mucking machine is scooped up by a bucket D open at the front and provided at the sides with upwardly-extending arms D' rigidly connected with each other above the top of the bucket D by a cross arm D^2 (see Fig. 6), and the upper ends of the said arms D' are provided with slots D^3 through which extends a pivot E on which the said arms D' and consequently the bucket D are mounted to swing to scoop up the loose material B' thus filling the bucket D. The arms D' are free to slide on the pivot E to permit of lengthening the sweep of the bucket D as hereinafter more fully explained. The pivot E is provided on opposite sides of each arm D' with collars E' for guiding the arms D', and the pivot E is preferably polygonal in cross section and provided with rounded ends or trunnions E^2 journaled in brackets F' attached to a transferring arm F mounted to swing on a transverse shaft G' as a center and which shaft G' is held on a slidable support G mounted to slide forward and backward on longitudinal guideways H' arranged on top of a turntable H connected by a hollow pivot or king pin I with the top of the truck A.

The transferring arm F is preferably formed of two spaced side pieces rigidly connected with each other at their outer ends by two spaced transverse bars, forming with the outer portions of the side arms a box-like structure E^2 open at the bottom, and into which is adapted to pass the open end of the bucket D, as hereinafter more fully explained. The lower ends of the side pieces of the transferring arm F are attached to wheels J central on the shaft G' and provided on portions of their peripheries with gear teeth J' in mesh with racks J^2 extending longitudinally and secured to the top of the turntable H adjacent the guideways H' of the slidable support G. When the slidable support G is moved from its forward position shown in Fig. 1 rearwardly in the direction of the arrow *a'* then the transferring arm F moves bodily with it and at the same time a rearward swinging motion in the direction of the arrow *b'* is given to the transferring arm F owing to the teeth J' of the wheels J being in mesh with the fixed racks J^2 so that the outer end of the transferring arm F moves approximately in a flat curve *c'* indicated in Fig. 1, and when the slidable support G is moved forward from a rear position in the inverse direction of the arrow *a'* then a return swinging and bodily traveling motion is given to the transferring arm F. During the movement of the transferring arm F as above described the bucket D is held on the outer end of the transferring arm F (see Fig. 2 and dotted lines in Fig. 1), that is, the bucket D is moved overhead of the machine from the front end thereof to a rear or dumping position to dump the contents of the bucket D into the car C and is returned to front position. The top of the box-like structure F^2 is provided with a cover F^3 hinged at its upper end at F^4 to the box-like structure F^2 and adapted to be engaged at its lower free end by a spring catch F^5 for holding the cover in closed position during the time the transferring arm F moves rearwardly and carries the bucket D to dumping position as shown in Fig. 3. When this point is reached the operator releases the catch F^5 to allow the cover F^3 to swing into open position by its own weight and the pressure of the loose material in the bucket D. It will be noticed by reference to Fig. 3 that when the bucket D is in dumping position it is inclined with the open end downward so that the loose material in the bucket D presses against the cover F^3 and on opening of the same slides out of the bucket D and down into the car C. When the transferring arm F returns to forward position the cover F^3 swings shut of its own accord and is locked in the closed position by the spring catch F^5. By the use of the cover F^3 the open end of the bucket D is closed during the movement of the filled bucket D overhead of the machine from the front to the rear, and hence the loose material in the bucket is not liable to be spilled onto the machine.

In order to impart a scooping motion to the bucket D and to swing it into engagement with the box-like structure F^2 of the transferring arm F and to hold it therein during the movement of the transferring arm F as above described, the following arrangement is made: To the sides of the bucket D are secured the lower ends of upwardly-extending cables, ropes, chains or other flexible connections K passing around guide pulleys K' and traveling pulleys L, the upper terminals of the flexible connections being secured to lugs F^6 on the free ends of the side members of the transferring arm F. The pulleys K' are journaled on the side members of the transferring arm F and the pulleys L are journaled on the ends of a cross head L' mounted to slide up and down on the side members of the transferring arm F. Parallel cables, ropes, chains or other flexible connections L^2 are connected at their upper ends with the cross head L' and extend downwardly and pass over the shaft G' then through the hollow king pin I and around guide pulleys L^3 journaled on the truck A. The lower ends of the flexible connections L^2 are attached to a crosshead N' attached to the forward end of a piston rod N extending from a piston N^2

mounted to reciprocate in a fluid pressure cylinder N^3 mounted on the truck A. The crosshead N′ is mounted to slide in guideways N^4 (see Fig. 2) held on the truck A. When the parts are in the position shown in Fig. 1 and fluid pressure is admitted to the rear end of the cylinder N^3 then the piston N^2 is moved forward and with it the piston rod N so that a pull is exerted on the flexible connections L^2 whereby the crosshead L′ is caused to slide downward on the transferring arm F. The pulleys L move with the crosshead L′ and exert a pull on the flexible connections K whereby an upward and forward swinging motion is given to the bucket D and the latter now scoops up the loose material B′, it being understood that the bucket D swings from the pivot E as its fulcrum. The bucket D after being filled with loose material continues its upward swinging movement until it finally reaches the free end of the transferring arm F, as shown in dotted lines in Fig. 1. At the time the bucket D engages the free end of the transferring arm F the crosshead L′ moves into lowermost position (see Fig. 3) and engages a spring catch L^4 which locks the crosshead L′ in lowermost position and holds it in this position during the entire movement of the transferring arm F as above described. The spring catch L^4 is pivoted on the rim of the wheel J and is released by the operator whenever the bucket D is returned to the dotted position shown in Fig. 1.

In order to lengthen the sweep of the bucket D as the shoveling proceeds, use is made of a cylinder O (see Fig. 6) attached to the pivot E and containing a piston O′ having a piston rod O^2 rigidly connected with the cross bar D^2 of the bucket arms D′. Compressed air or other fluid pressure is admitted to the ends of the cylinder O or discharged therefrom by the use of pipes P and P′ connected with a four-way valve P^2 having an outlet P^3 to the atmosphere and an inlet P^4 connected with a hose P^5 attached to a pipe fixture Q attached to a bracket H^2 erected on the rear end of the turntable H. The pipe fixture Q is connected by a hose Q′ with a source of compressed air or other fluid pressure. The valve P^2 is normally closed and compressed air or other fluid pressure is in both ends of the cylinder O thus holding the piston O′ in the position it is in at the time. At the beginning of the mucking operation the piston O′ is at or near the upper end of the cylinder O and the bucket D has its shortest sweep, and after the bucket D has removed the loose material as far as it can be reached during the shortest sweep of the bucket D the operator turns the valve P^2 to connect the pipe P^5 with the pipe P and to connect the pipe P′ with the exhaust P^3 so that the fluid pressure is admitted to the upper end of the cylinder O to drive the piston O′ downward a desired distance to increase the sweep of the bucket D correspondingly, a portion of the fluid pressure in the lower end of the cylinder O passing out to the atmosphere by way of the pipes P′ and the exhaust P^3. When the piston O′ reaches the desired position the valve P^2 is closed to hold the piston O′ in the adjusted position. The sweep of the bucket D can be successively increased in the manner above described to the range of the travel of the piston O′ in the cylinder O before it is necessary to change the position of the truck A on the rails A′. When it is desired to return the piston O′ to uppermost position in the cylinder O for shortening the sweep of the bucket D the operator turns the valve P^2 to connect the pipe P^5 with the pipe P′ and to connect the pipe P with the exhaust P^3 so that fluid pressure passes into the lower end of the cylinder O and forces the piston O′ upward in the cylinder O, the fluid pressure in the upper end of the cylinder O passing to the atmosphere by way of the pipe P and exhaust P^3. When the piston O′ reaches the upper end of the cylinder O the operator closes the valve P^2. It is understood that when the piston O′ moves downward in the cylinder O the bucket D is moved downward thereby increasing the sweep of the bucket as the bracket arms D′ now slide downward on the pivot E which forms the fulcrum for the bracket arms D′ and bucket D to swing on.

The pipe fixture Q is provided with a three-way valve R connected by a pipe R′ and hose R^2 with the rear end of the cylinder N^3 to supply the latter with fluid pressure with a view to force the piston N^2 forward for imparting a swinging or scooping motion to the bucket as previously explained. The forward end of the cylinder N^3 is preferably open and when it is desired to return the empty bucket D from its position on the free end of the transferring arm F to the beginning of the scooping position then the operator manipulates the valve R to shut off the fluid pressure from the pipe R′ and to connect the latter with the atmosphere thus permitting the fluid pressure in the rear closed end of the cylinder N^3 to escape, thereby releasing the downward pull on the cables L^2 and permitting the bucket D to swing down to the starting position shown in Fig. 1 and causing the piston N^2 to return.

In order to impart a forward and backward sliding movement to the slidable support G use is made of the following device: The support G is provided at its forward end with a cross bar G^2 to which is secured the forward end of a piston rod S carrying a piston S′ mounted to reciprocate in a cylinder S^2 attached to the rear end of the turn-

table H. The cylinder S^2 is closed at both ends and the latter are connected with pipes T, T′ leading to a supply valve T^2 arranged to connect either pipe T or T′ with a pipe T^3 connected with the pipe fixture Q. The pipes T, T′ are connected with pipes U, U′ leading to an exhaust valve U^2 having a partly choked exhaust U^3 leading to the atmosphere. The cylinder S^2 is provided at a distance from the rear end with an exhaust opening S^3 leading to the atmosphere so that the piston S′ can return quickly and when it has passed the exhaust S^3 then the fluid pressure in the rear end of the cylinder S^2 is trapped to form a cushion to insure an easy movement of the traveling arm F and bucket D when nearing its rearward dumping position, it being understood that the entrapped fluid is gradually exhausted from the rear end of the cylinder S^2 by way of the valve U^2 to allow the transferring arm F and bucket to reach the dumping position without jerk or jar, the fluid pressure being turned off as the piston S passes the exhaust opening S^3. It is further understood that gravity causes the transferring arm to travel the latter half of its path for both the forward and backward travel of said transferring arm.

The operation is as follows: When the several parts of the machine are in the position shown in Fig. 1 the operator opens the valve R to admit the fluid pressure into the rear end of the cylinder N^3 whereby the piston N^2 in the said cylinder is forced forward and a forward and upward swinging motion is given to the bucket D as previously explained so that the bucket D scoops up loose material and finally moves with its open end into the box-like structure F^2 on the free end of the transferring arm F. During this operation the operator manipulates the valve P^2, as previously explained, to vary the reach of the bucket D and is thereby enabled to shovel up whatever material is within the maximum reach. It is understood that the bucket arms D′ are drawn into the minimum reach of the bucket before the open end of the bucket moves into the box-like structure F^2 on the transferring arm. The operator now closes the valve R and shifts the normally closed valves T^2 and U^2 into the position shown in Fig. 5 so that the fluid pressure passes into the forward end of the cylinder S^2 and forces the piston S′ rearward therein. The piston S′ during the rearward movement draws the support G rearwardly and with it the transferring arm F and the bucket D, and at the same time a rearward swinging motion is given to the transferring arm F and bucket D owing to the turning of the wheels J caused by the gear teeth J′ of the wheels J engaging the racks J^2 as before explained. When the filled bucket and transferring arm swinging overhead as one piece pass their center of gravity the piston S′ passes the exhaust opening S^3 of the cylinder S^2 and allows the fluid pressure to escape thus relieving the piston S′ of pressure. The valve T^2 is now turned to prevent further inflow of fluid pressure to the cylinder S^2 while the filled bucket and transferring arm due to gravity move on with slowly retarded motion to the final dumping position shown in Fig. 3, the retarded motion being caused by the resistance of the entrapped air in the remaining portion of the cylinder S^2, this entrapped air slowly escaping through the choked exhaust U^3. When the bucket D reaches the dumping position shown in Fig. 3 the operator releases the catch F^5 to allow the cover F^3 to swing open so that the loose material in the bucket D drops out of the latter into the car C. The operator now reverses the valves T^2 and U^2 so that the fluid pressure passes into the rear end of the cylinder S^2 and forces the piston S′ forward thus causing the support G to move forward and the wheels J to turn in an opposite direction to return the transferring arm F and the empty bucket D to forward position. When this has been done the valves T^2 and U^2 are closed and the catch L^4 is released to unlock the cross head L′, and then the valve R is returned to exhaust position to allow the air in the rear end of the cylinder N^3 to escape so that the bucket D by its own weight swings downward back to the starting position shown in Fig. 1. The turntable H is now turned to shift the bucket D to either side so that the latter can reach the loose material to the full width of the drift, and the above described operation is then repeated as often as necessary until the loose material within reach of the bucket D is transferred to the car C. When the material within reach of the bucket D has been transferred to the car the entire mucking machine can be advanced on the track toward the remaining loose material, refastened and the operation of the machine continued.

It is not always necessary to lower the bucket D to the bottom of the drift or tunnel for beginning the scooping operation as the latter may be started at any point of the height of the loose material. The transferring arm F may be held in any desired position within its range of movement while the scooping operation is carried out and simultaneous movement can be given to the bucket D and the transferring arm F by the operator manipulating the valves R, T^2 and U^2 correspondingly.

By causing the filled bucket D to travel overhead of the machine in an elongated or flat curve a comparatively short transferring arm F can be used and yet the material can be dumped from the bucket D into the

car a distance in the rear of the machine, and hence the machine can be readily used in drifts and tunnels of heights as low as six feet. It will further be seen that by the arrangement described the strain incident to the carrying of the load overhead of the machine is mostly in a downward direction and hence the truck A is not liable to be disturbed or upset during the transferring of the filled bucket from a point in the front of the machine to a point in the rear of the machine. By forming the transferring arm F of widely spaced side arms and a box-like structure F^2 at the free end thereof, the bucket D can be readily accommodated in the box-like structure between the side arms and hence a bucket of considerable width and any desired depth can be employed to scoop up a large amount of loose material at each operation thus insuring the removal of a large pile of loose material in a comparatively short time.

It will be noticed that the hose Q' which supplies the shoveling or mucking machine with fluid pressure can be used for supplying the drills with fluid pressure, it being understood that in practical mining the mucking operation and the drilling and blasting operations are carried on alternately as the loose material incident to the blasting must be partly removed before the drills can be set up and the drills are removed to a place of safety prior to the blasting. Only one operator is needed to successfully operate the machine.

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

1. A rock and earth shoveling machine comprising a bucket, means for imparting a forward and upward swinging motion to the said bucket for the latter to scoop up the material to be shoveled, and a transferring arm for swinging the filled bucket from a filled position beyond the front end of the machine rearwardly overhead of the machine into an upside down dumping position at a point beyond the rear end of the machine.

2. A rock and earth shoveling machine comprising a bucket, means for imparting a forward and upward swinging motion to the said bucket for the latter to scoop up the material to be shoveled and a transferring arm for simultaneously swinging and bodily moving the filled bucket from a filled position beyond the front end of the machine rearwardly and overhead of the machine into an upside down dumping position at a point beyond the rear end of the machine.

3. A shoveling machine, comprising a bucket, means for imparting movement to the said bucket for the latter to scoop up the material to be shoveled, covering means for covering the filled bucket, transferring means for moving the filled and covered bucket rearwardly overhead of the machine into dumping position, and releasing means for the said covering means to allow the material to drop out of the bucket when reaching the dumping position.

4. A rock and earth shoveling machine comprising a bucket, means for imparting a forward and upward scooping movement to the said bucket to fill the latter with the material to be shoveled, covering means for covering the filled bucket, a transferring arm for swinging and bodily carrying the filled and covered bucket from a filled position at a point beyond the front end of the machine rearwardly overhead of the machine in an approximately flat curve into an upside down dumping position at a point beyond the rear end of the machine, and releasing means for the said covering means to allow the material to drop out of the bucket when the latter reaches the dumping position.

5. A shoveling machine, comprising a bucket, means for imparting a forward and upward scooping movement to the said bucket to fill the latter with the material to be shoveled, covering means for covering the open end of the filled bucket, transferring means for simultaneously imparting a swinging motion and a bodily traveling motion to the filled bucket to transfer the bucket from the filled forward position overhead of the machine to upside down dumping position at a point beyond the rear of the machine, and releasing means for releasing the said covering means to allow the material to drop out of the open end of the bucket into a receptacle in the rear of the machine.

6. A shoveling machine, comprising a bucket, a transferring arm on which the said bucket is mounted to swing up and down, means for swinging the said bucket up and down and into engagement with the said transferring arm, a slidable support on which the said transferring arm is pivoted to swing overhead of the machine and to carry the bucket overhead from a forward filled position into a rear upside down dumping position, and an actuating means for imparting simultaneously an overhead swinging motion to the said transferring arm and a traveling motion to the said slidable support.

7. A shoveling machine comprising a truck, a bucket, a transferring arm on which the said bucket is mounted to swing up and down, a support slidable on the truck and on which the said transferring arm is mounted to swing, means on the said truck and connected with the said slidable support to move the latter forward and backward, a connection between the said truck and the

said transferring arm for imparting a swinging motion to the said transferring arm and actuating means on the said truck and connected with the said bucket for imparting a swinging motion to the same.

8. A shoveling machine provided with a bucket, a transferring arm mounted to swing and to travel bodily overhead of the machine from a forward to a rearward position, the said bucket being mounted to swing on the said transferring arm to scoop up the material to be shoveled, and a cover on the said transferring arm for covering the said filled bucket and keeping it covered during the swinging and traveling motion of the said transferring arm.

9. A shoveling machine provided with a bucket having an open end, a transferring arm mounted to oscillate in a vertical plane and to travel bodily forward or backward overhead of the machine, the said bucket being mounted to swing on the said transferring arm to scoop up the material to be shoveled, a cover on the said transferring arm for covering the open end of the said bucket, and locking means for locking the cover in closed position.

10. In a shoveling machine, the combination of a transferring arm having side arms and a box-like structure held on the side arms, a bucket having an open end adapted to pass into the said box-like structure, and means for imparting a scooping motion to the said bucket to scoop up loose material and to pass the open end into the said box-like structure.

11. In a shoveling machine, the combination of a transferring arm having spaced side pieces, a bucket mounted to swing on the said transferring arm and adapted to engage the said pieces, means for imparting a swinging motion to the said bucket for the latter to scoop up loose material and to engage the filled bucket between the said side pieces and means located at a point below the axis of the said transferring arms for imparting a simultaneous swinging and bodily movement to the said transferring arm, overhead of the machine.

12. In a shoveling machine, the combination of a transferring arm having side arms and a box-like structure held on the side arms, a bucket having an open end adapted to engage the said box-like structure, means for imparting a scooping motion to the said bucket to scoop up loose material and to engage the open end with the said box-like structure, and a cover on the top of the said box-like structure to cover the open end of the said bucket.

13. In a shoveling machine, the combination of a transferring arm having side arms and a box-like structure held thereon, a bucket having an open end adapted to engage the said box-like structure, means for imparting a scooping motion to the said bucket to scoop up loose material and to engage the open end with the said box-like structure, a cover on the top of the said box-like structure to cover the open end of the said bucket, and a locking means for locking the cover in closed position.

14. In a shoveling machine, the combination of a transferring arm having spaced side pieces, a bucket mounted to swing on the said transferring arm and adapted to engage the said pieces, means for imparting a swinging motion to the said bucket for the latter to scoop up loose material and to pass the filled bucket into engagement with the said side pieces, and means for imparting a simultaneous swinging and bodily traveling motion to the said transferring arm overhead of the machine.

15. In a shoveling machine, the combination of a truck, a turntable provided with longitudinal guide ways and racks, a hollow pivot connecting the turntable with the said truck, a support mounted to slide on the said guideways, actuating means mounted on the said turntable to move the said support backward and forward on the said guideways, a transferring arm mounted to swing on the said support, wheels mounted to turn on the said support in unison with the said transferring arm, the said wheels having teeth in mesh with the said racks, a bucket having arms mounted to swing on the said transferring arm and provided with a piston, a cross head mounted to slide on the said transferring arm, a flexible connection between the said actuating means and the said cross head and passing through the said hollow pivot, a flexible connection between the said cross head and the said bucket, and guiding means for the said flexible connections.

16. In a shoveling machine, the combination of a transferring arm carrying a bucket and mounted to swing overhead of the machine and to travel bodily in a longitudinal direction, fluid pressure means, connecting means connecting the said fluid pressure means with the said transferring arm, the said fluid pressure means imparting a swinging and traveling motion to the said transferring arm during about one-half of its stroke and until the transferring arm reaches an approximately vertical position and cushioning means for cushioning the transferring arm during the completion of its forward or backward strokes.

17. In a shoveling machine, the combination of a transferring arm carrying a bucket and mounted to swing overhead of the machine, and fluid pressure means for imparting an initial motion to the said transferring arm during about one-half of its stroke, until the transferring arm reaches an approximately vertical position and for

allowing the transferring arm to complete its stroke by its own gravity, the said fluid pressure means providing a cushion for the said transferring arm during the time it completes its stroke.

18. In a shoveling machine, the combination of a transferring arm carrying a bucket and mounted to swing overhead of the machine and to travel bodily in a longitudinal direction, fluid pressure means, and connecting means connecting the said fluid pressure means with the said transferring arm, the said fluid pressure means imparting an initial swinging and traveling motion to the said transferring arm during about one-half of its stroke and until the transferring arm reaches an approximately vertical position, and the said fluid pressure means forming a cushion cushioning the transferring arm during the completion of its stroke.

19. In a shoveling machine, the combination of a transferring arm carrying a bucket and mounted to swing overhead of the machine and to travel bodily in a longitudinal direction, and fluid pressure means having a cylinder and a piston reciprocating therein, the said cylinder being provided near its center with an outlet for the fluid pressure, a connection between the said piston and the said transferring arm, and manually-controlled means for controlling the flow of fluid pressure to and from the ends of the said cylinder.

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

MANFRED T. HOSTER.

Witnesses:

THEO. G. HOSTER,

PHILIP D. ROLLHAUS.