May 9, 1939. R. R. DOOLEY ET AL 2,157,736

SHOVELING MACHINE

Filed Sept. 30, 1936 3 Sheets-Sheet 1

Fig. 3

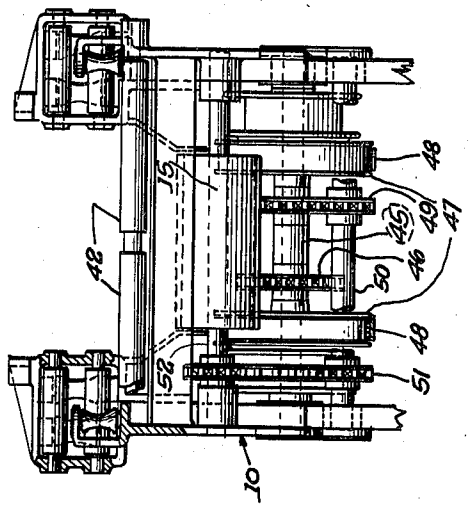


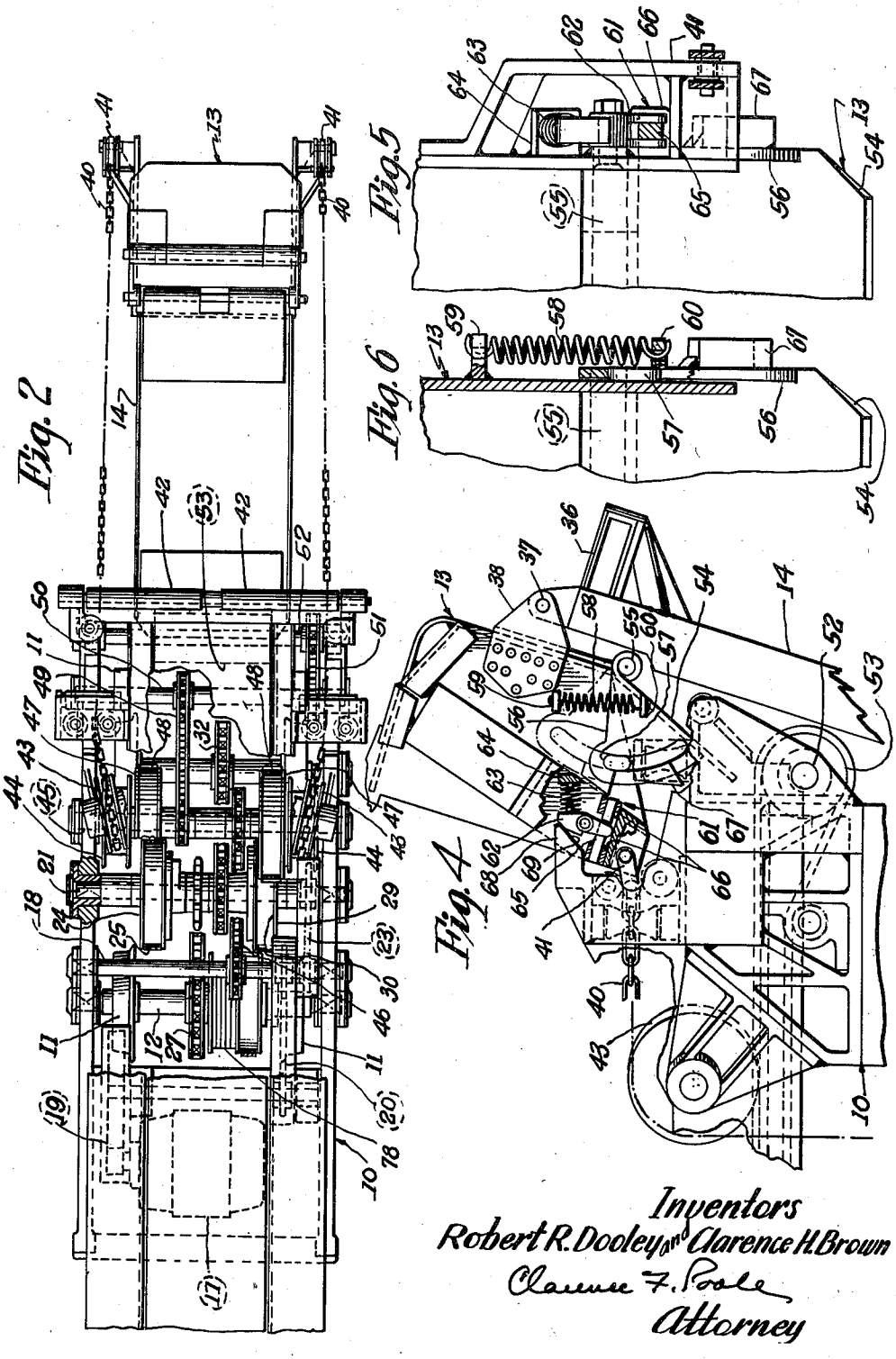
Fig. 1

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Filed Sept. 30, 1936 3 Sheets-Sheet 2



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SHOVELING MACHINE

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Fig. 8

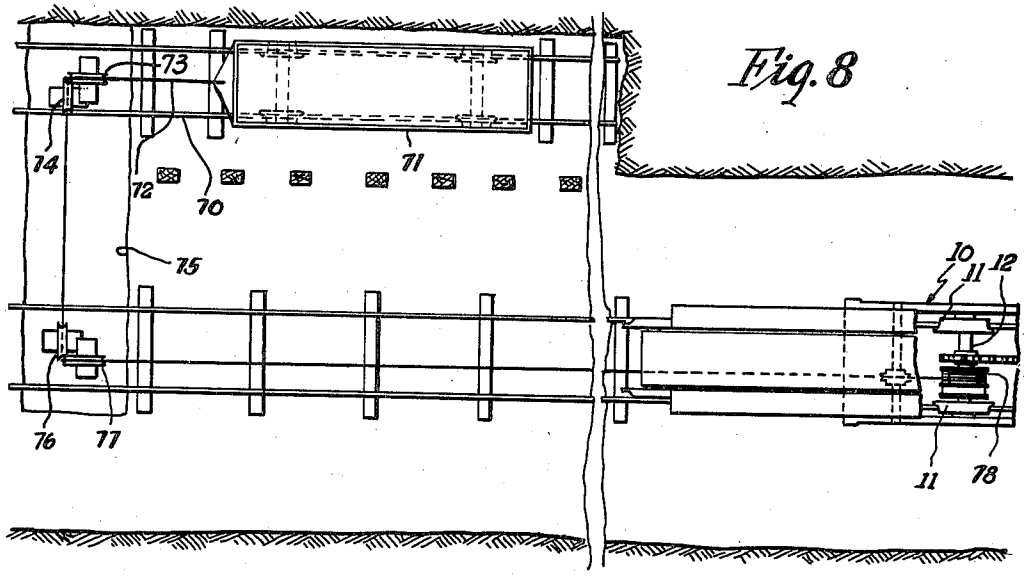


Fig. 9

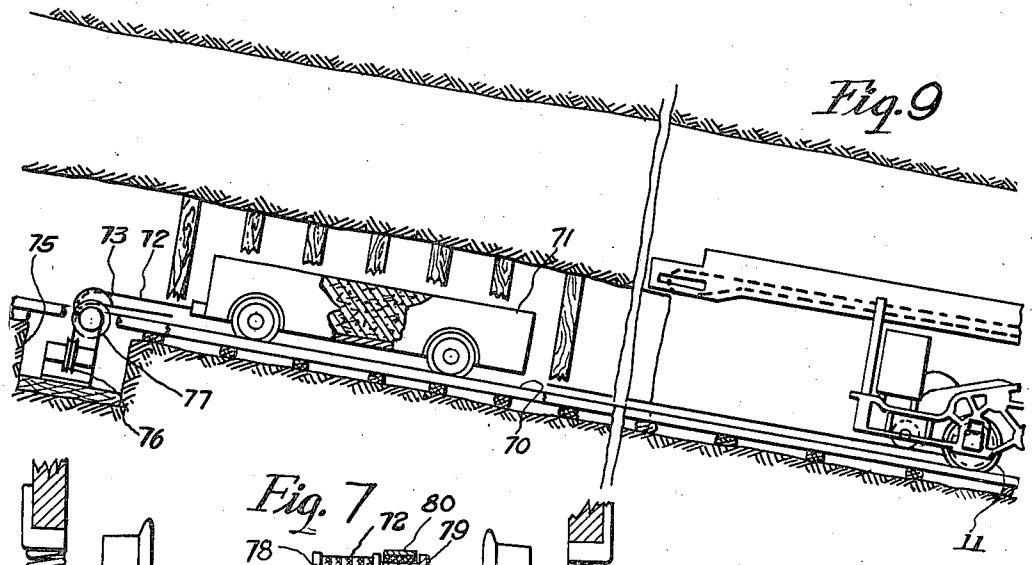
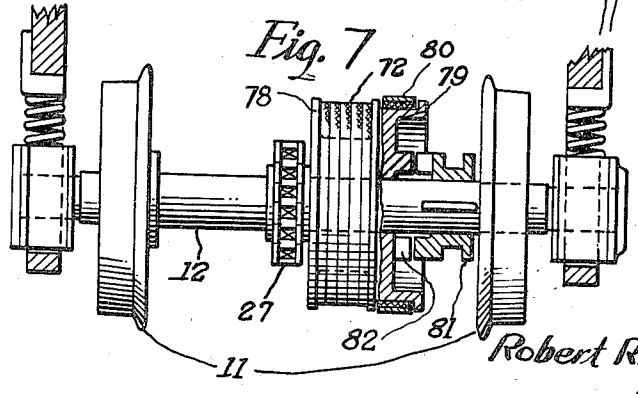


Fig. 7



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Patented May 9, 1939

2,157,736

UNITED STATES PATENT OFFICE

2,157,736

SHOVELING MACHINE

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Application September 30, 1936, Serial No. 103,242

14 Claims. (Cl. 214—90)

This invention relates to improvements in shoveling machines of the type adapted for use in shoveling muck in tunnels or mines and has among other objects to provide a new and improved machine of the class described constructed in a novel, compact and efficient manner so as to be particularly adapted for shoveling downwardly along sloping tunnels.

In carrying out our invention, we utilize generally the principles disclosed in Patent No. 1,514,008, which issued to J. P. Mosier, November 4, 1924, but elevate the front end of the conveyer so that it is substantially parallel with the track to minimize the pitch of the conveyer and make it possible for the conveyer to efficiently convey material to a point beyond the rear end of the machine for discharge into cars or the like. The bucket or scoop is also arranged to discharge material directly onto the conveyer in such a manner as to prevent injury to the conveyer, which occurs where the material drops or slides a relatively long distance to the belt, and a means is provided for counterbalancing the weight of the machine when working downwardly along a grade to prevent its getting out of control of the operator during the gathering operation.

Other objects of our invention will appear from time to time as the accompanying specification proceeds.

Our invention may be more clearly understood with reference to the accompanying drawings wherein:

Figure 1 is a fragmentary view in side elevation of a shoveling machine constructed in accordance with our invention;

Figure 2 is a fragmentary top plan view of the machine shown in Figure 1 with the central portion of the conveyer broken away;

Figure 3 is an enlarged partial fragmentary front end view of the device shown in Figure 1 with certain parts shown in transverse section;

Figure 4 is an enlarged detail side view of the upper portion of the device shown in Figure 1 with the scoop shown in a discharge position and certain parts thereof broken away and shown in section;

Figure 5 is an enlarged fragmentary detail view of one side of the scoop showing several details of the means for locking the bottom thereof in a closed position;

Figure 6 is a fragmentary detail view of the scoop, drawn to the same scale as Figure 5, with certain parts shown in vertical section in order to illustrate certain details of the invention not shown in Figure 5;

Figure 7 is an enlarged fragmentary detail end view of the rearward portion of the machine, showing the rear truck wheels and axle and certain details of the winding drum which controls the counterbalancing mechanism;

Figure 8 is a horizontal sectional view taken through a tunnel or mine entry illustrating the means for counterbalancing the weight of the machine when operating downwardly along a grade; and

Figure 9 is a longitudinal sectional view taken through a tunnel or mine entry illustrating certain details of the counterbalancing mechanism not shown in Figure 8.

Referring now to the drawings, the embodiment of our invention illustrated therein includes a truck or main frame 10 mounted on track wheels 11, 11 and axles 12, 12. Said main frame forms a support means for a scoop 13 which is disposed in advance thereof on the end of a beam 14. Said scoop is adapted to gather material by movement of the truck along the track when positioned with its dipping lip adjacent the ground and is arranged to be pivoted in an upward direction to discharge material directly onto a conveyer 15.

The moving parts of the machine are driven from a motor 17 mounted adjacent the rearward end of the main frame 10, which motor is herein shown as being an electric motor of an ordinary construction. Said motor drives a transversely disposed shaft 18 by means of a gear train generally indicated by reference character 19 and a chain and sprocket drive 20. A shaft 21 parallel to the shaft 18 is driven therefrom by means of a chain and sprocket drive 23. The shaft 21 forms a means for driving the truck in either a forward or reverse direction without reversal of the motor in a manner similar to that shown in the aforementioned Mosier Patent No. 1,514,008.

The drive to the truck includes generally a planetary geared reduction device 24 freely mounted on the shaft 21 and controlled by means of a friction band 25 which has driving connection with the rear truck axle 12 and track wheels 11, 11 by means of a chain and sprocket drive 27.

Likewise, a planetary 29 is mounted coaxial with the shaft 21. Said planetary is controlled by means of a suitable friction band 30 in a usual manner and has driving connection with the front truck axle 12 by means of chain and sprocket drive 32. The friction bands 25 and 30 are operated by means of a suitable system of levers in a usual manner so that one friction band engages

its respective planetary when the other is disengaged therefrom. Thus, the machine may be driven in a rearward direction through the planetary 24 and chain and sprocket drive 27 by engaging the friction band 25 with said planetary, or in a forward direction through the planetary 29 and chain and sprocket drive 32. The construction and operation of these planetaries is well known to those skilled in the art and is no part of our present invention so is not herein shown or described in detail.

The beam 14, which forms a support for the scoop 13, is mounted on a hinge member 33 for vertical pivotal movement with respect to the main frame 10 by means of a transverse hinge pin 34. Said hinge member is in turn pivotally mounted on the forward end of said main frame by means of a vertical pivotal pin 35 disposed closely adjacent the hinge pin 34. Thus, since the axes of pivotal movement of the beam 14 are closely adjacent each other, said beam may readily be manipulated to gather in various positions in the entry and be elevated so the scoop 13 may discharge material directly onto the conveyer 15 in alignment therewith.

An integral supporting member 31 extends forwardly from the front end of said main frame and serves as a rest or support for the beam 14 when in a lowered position and also forms a means for limiting downward movement of said beam. A foot 36 depends from the forward end of said beam and is adapted to be engaged by the rearward end of the scoop 13 to limit pivotal movement thereof in a rearward direction and form a means against which said scoop may abut during the digging or loading operation when being forced into the material it is desired to load by movement of the truck along the track.

The scoop 13 is mounted on the forward end of the beam 14 by means of a pivotal pin 37 which extends through ears 38, 38, projecting from opposite sides of said scoop in a direction which is towards the rear of the machine when said scoop is in a gathering position.

The scoop 13 is elevated to a discharge position or swung from side to side by means of a pair of chains 40, 40. Said chains are secured to the upper ends of brackets 41, 41 extending along and spaced outwardly from opposite sides of said scoop. Said chains are each trained over a roller 42 at the upper end of said main frame and downwardly around guide sheaves 43, 43 to winding drums 44, 44 on a transversely extending shaft 45. Said shaft is driven from the shaft 18 by means of a chain and sprocket drive 46 and said winding drums are simultaneously or independently driven from the transverse shaft 45 by means of suitable planetaries 47, 47. Said planetaries are each controlled by means of a friction band 48 and are not herein shown in detail since they are similar in construction to those disclosed in the aforementioned Mosier Patent No. 1,514,008. Thus, when both friction bands 48 engage their respective planetaries, the beam 14 and scoop 13 will be pivoted in an upward direction to the discharge position shown by dotted lines in Figure 1. When it is desired to swing the scoop to one side or the other, power is applied to the winding drum adjacent the side it is desired to swing, by engaging the respective friction band 48 with the respective planetary 47.

The conveyer 15, as herein shown, is a belt conveyer of an ordinary construction and extends rearwardly along the main frame 10 between the sides thereof in substantially parallel relationship with respect to the ground and beyond the rearward end of said main frame for discharging material into a suitable mine car or like receptacle. As herein shown, said conveyer is spaced above the axles 11, 11 a distance sufficient to permit the scoop or bucket 13 to discharge material directly onto said conveyer with a minimum amount of drop. This construction besides eliminating the usual drop from the bucket to the conveyer and the resultant excessive wear on the conveyer belt also decreases the angle of the conveyer belt with respect to the ground and makes it possible for the machine to be efficiently used along downwardly sloping grades.

The belt conveyer 15 is driven from the shaft 45 by means of a chain and sprocket drive 49 which drives a parallel shaft 50, and a chain and sprocket drive 51 connected from said shaft to a parallel shaft 52. Said last named shaft is disposed at the forward end of said main frame and has a drive roller 53 thereon about which the belt of said conveyer is trained.

Referring now particularly to the novel construction of the scoop 13, said scoop has a side 54, which side is its upper side when in a gathering position and its lower side when in a discharge position. Said side is hinged to said scoop by means of a pivotal pin 55 in such a manner that it may open when said scoop is in a discharge position above the conveyer 15 and form a chute for discharging material directly onto said conveyer. As herein shown, said side is provided with slotted sectors 56, 56 extending inwardly along opposite sides of said scoop, the slots of which sectors are engaged by guide members 57, 57 extending laterally from opposite sides of said scoop to limit downward pivotal movement of said bottom. Said drop bottom is held in closed relation with respect to said scoop by means of compression springs 58, 58 connected between projections 59, 59 extending laterally from opposite sides of said scoop, and projections 60, 60 extending laterally from said sectors. The tension of said springs is such as to close said scoop when material has been discharged therefrom and permit the bottom thereof to open due to the weight of material therein when in the discharge position shown in Figure 4.

Suitable means of a novel construction are provided for locking the side or drop bottom 54 of the scoop 13 in a closed position which, as herein shown, includes a latch 61 on each side of said scoop. The construction of each of these latches being the same, one only will herein be described in detail. The latch 61 includes a spring pressed lever 62 pivoted intermediate its ends to a side of the scoop 13. One lever arm of said lever is engaged by a spring 63 interposed between said lever arm and a projection 64 from the side of said scoop. The other arm of said lever, which is the lower lever arm when the scoop is in the position shown in Figure 4, is bifurcated and the furcations thereof engage a locking member 65. Said locking member is slidably mounted in guides 66, 66 extending outwardly from said scoop and is adapted to engage a projection 67 extending outwardly from the periphery of the sector 56, for locking said bottom in a closed position (see Figures 1 and 4).

The locking member 65 is disengaged from the projection 67 by means of an engaging member 68 projecting forwardly from the upper end of the main frame 10 above the conveyer 15 and having an inclined engaging surface 69 which

is adapted to engage the upper lever arm of the spring pressed lever 62, as is shown in Figure 4.

With reference now in particular to Figures 8 and 9 and the means for compensating for the weight of the shoveling machine when operating downwardly along a grade, a relatively short track 70 is provided which is herein shown as being parallel to the track along which the machine operates. Said track may be disposed in a trench beneath the main track but, as herein shown, is disposed to one side thereof, preferably in a recessed portion of the tunnel. Said track is adapted to have a weighted car 71 movable therealong which serves as a counterweight for the machine. The weight of said car is such as to counteract the downward force of the machine, and said car is connected to said shoveling machine by means of a suitable flexible cable 72 so as to be moved in an upward direction when the loading machine moves in a downward direction for feeding the scoop 13 into the material it is desired to gather. The cable 72 is secured to said car at one of its ends and extends rearwardly from said car over a guide sheave 73 and downwardly around a sheave 74 disposed beneath the floor level at right angles to the sheave 73 in a trench 75. From thence said cable extends laterally across the entry or tunnel in the trench 75 to an aligned sheave 76. From the sheave 76 said cable extends upwardly and over a sheave 77 disposed at right angles with respect to the sheave 76 and forwardly therefrom to a winding drum 78 freely mounted on the rear truck axle 12.

The winding drum 78 is provided with a flange 79 which is adapted to be engaged by a friction band 80 for holding said winding drum from rotation in a usual manner. During the normal gathering operation of the machine, the winding drum 78 is held from rotation by means of the friction band 80 so that the weighted car 71 may move upwardly along the track 70 when the machine is moving downwardly therealong for feeding the scoop 13 into the material it is desired to load. As the working face advances, cable is payed off the winding drum 78 to make unnecessary the extension of the track 70. When the end of the cable 72 is reached, a new recessed cut is made in the side of the entry and another track is laid therein which is similar to the track 70.

When the machine is moving upwardly against the grade, it is desirable that means be provided for winding the cable 72 on the drum 78. As shown in Figure 7, said means comprises a suitable jaw clutch member 81 feathered on the rear axle 12 and adapted to engage suitable jaws 82, 82 extending from said winding drum for selectively driving said winding drum from said axle.

While we have herein shown and described one form in which our invention may be embodied, it will be understood that the construction thereof and the arrangement of the various parts may be altered without departing from the spirit and scope thereof. Furthermore, we do not wish to be construed as limiting ourselves to the specific embodiment illustrated, excepting as it may be limited in the appended claims.

We claim as our invention:

1. In a mucking machine, a track mounted main frame, a conveyer spaced above the bottom of said main frame and extending therealong, and means for gathering material and depositing it directly onto said conveyer comprising a beam mounted on said main frame for pivotal movement about a transverse horizontal axis and about a vertical axis, a scoop transversely pivoted on the end of said beam and adapted to be moved into the material it is desired to gather by movement of the machine along the rails, said scoop having a hinged side, which is its upper side when in a gathering position, which forms a drop bottom when in an elevated position for discharging material therethrough directly onto said conveyer, locking means for locking said bottom in closed relation with respect to said scoop including a spring pressed latch, a projection on said frame engaging said latch for releasing said locking means when said scoop is in a discharge position, and yieldable means for bringing said bottom to a normal position when said scoop is returning to a gathering position.

2. In a track mounted mucking machine adapted for operation along pitching seams, a main frame mounted on track wheels and axles, a conveyer extending longitudinally along said main frame, a beam mounted on the forward end of said main frame for pivotal movement about horizontal and vertical axes, a scoop transversely pivoted on the end of said beam and adapted to dig by movement of the machine along the track, a drive connection to said track wheels for moving the machine along the track, and a counterweight operatively connected with said machine for counterbalancing the weight of said machine when operating downwardly along a grade and the scoop is digging by movement of the machine along the track propelled by said track wheels.

3. In a track mounted mucking machine adapted for operation along pitching seams, a main frame mounted on track wheels and axles, a conveyer extending longitudinally along said main frame, a beam mounted on the forward end of said main frame for pivotal movement about horizontal and vertical axes, a scoop transversely pivoted on the end of said beam and adapted to dig by movement of the machine along the track, a drive connection to said track wheels for moving the machine along the track, and a counterweight movable along a track parallel to the track along which said machine moves for counterbalancing the weight of said machine when operating downwardly along a grade and the scoop is digging by movement of the machine along the track propelled by said track wheels.

4. In a track mounted mucking machine adapted for operation along pitching seams, a main frame mounted on track wheels and axles, a conveyer extending longitudinally along said main frame, a beam mounted on the forward end of said main frame for pivotal movement about horizontal and vertical axes, a scoop transversely pivoted on the end of said beam and adapted to dig by movement of the machine along the track, a drive connection to said track wheels for moving the machine along the track, and means for counterbalancing the weight of said machine when operating downwardly along a grade and the scoop is digging by movement of the machine along the track, propelled by said track wheels, comprising a counterweight movable along a track substantially parallel to the track along which said machine moves, and a connection from said counterweight to said machine whereby said counterweight moves in a direction opposite to the direction of movement of the machine during the loading operation thereof.

5. In a track mounted mucking machine adapted for operation along pitching seams, a main frame, a conveyer extending longitudinally along said main frame, a beam mounted on the forward end of said main frame for pivotal movement about horizontal and vertical axes, a scoop transversely pivoted on the end of said beam and adapted to dig by movement of the machine along the track, and means for counterbalancing the weight of said machine when operating downwardly along a grade comprising a counterweight movable along a track substantially parallel to the track along which said machine moves, and a connection from said counterweight to said machine whereby said counterweight moves in a direction opposite to the direction of movement of the machine during the loading operation including a winding drum on said main frame and a flexible member connecting said winding drum with said counterweight.

6. In a track mounted mucking machine adapted for operation along pitching seams, a main frame, a conveyer extending longitudinally along said main frame, a beam mounted on the forward end of said main frame for pivotal movement about horizontal and vertical axes, a scoop transversely pivoted on the end of said beam and adapted to dig by movement of the machine along the track, and means for counterbalancing the weight of said machine when operating downwardly along a grade comprising a counterweight movable along a track substantially parallel to the track along which said machine moves, a winding drum on said main frame, a flexible member connecting said counterweight with said winding drum, and means for holding said winding drum from rotation during feeding movement of the machine.

7. In a track mounted mucking machine adapted for operation along pitching seams, a main frame, a conveyer extending longitudinally along said main frame, a beam mounted on the forward end of said main frame for pivotal movement about horizontal and vertical axes, a scoop transversely pivoted on the end of said beam and adapted to dig by movement of the machine along the track, and means for counterbalancing the weight of said machine when operating downwardly along a grade comprising a counterweight movable along a track substantially parallel to the track along which said machine moves, a winding drum on said main frame, a flexible member connecting said counterweight with said winding drum, means for holding said winding drum from rotation during feeding movement of the machine, and other means for selectively driving said drum in a winding direction when the machine is moving rearwardly along the track.

8. In a track mounted mucking machine adapted for operating along pitching seams, a main frame mounted on track wheels and axles, a conveyer extending longitudinally along the upper side of said main frame in substantially parallel relation with respect to the ground, a beam mounted on the forward end of said main frame for pivotal movement about horizontal and vertical axes, a scoop transversely pivoted on the end of said beam and adapted to dig by movement of the machine along the track, said scoop being adapted to discharge material directly onto said conveyer when in an elevated position and being elevated by pivotal movement of said beam, a drive connection to said track wheels for moving the machine along the track, and means for holding said machine when working along a grade and counterbalancing the effect of the grade, to permit said track wheels to move said machine upwardly or downwardly along a grade, comprising a counterweight operatively connected with said machine.

9. In a track mounted mucking machine adapted for operation along pitching seams, a main frame mounted on track wheels and axles, a conveyer extending longitudinally along the upper side of said main frame in substantially parallel relation with respect to the ground, a beam mounted on the forward end of said main frame for pivotal movement about horizontal and vertical axes, a scoop transversely pivoted on the end of said beam and adapted to dig by movement of the machine along the track, said scoop being adapted to discharge material directly onto said conveyer when in an elevated position and being elevated by pivotal movement of said beam, a drive connection to said track wheels for moving the machine along the track, and means for holding said machine when working along a grade and counterbalancing the effect of the grade, to permit said track wheels to move said machine upwardly or downwardly along a grade, comprising a counterweight movable along a track substantially parallel to the track along which said machine moves.

10. In a track mounted mucking machine adapted for operating along pitching seams, a main frame, a conveyer extending longitudinally along the upper side of said main frame in substantially parallel relation with respect to the ground, a beam mounted on the forward end of said main frame for pivotal movement about horizontal and vertical axes, a scoop transversely pivoted on the end of said beam and adapted to dig by movement of the machine along the track, said scoop being adapted to discharge material directly onto said conveyer when in an elevated position and being elevated by pivotal movement of said beam, and means for holding said machine when working along a grade and counterbalancing the effect of the grade comprising a counterweight movable along a track substantially parallel to the track along which said machine moves, a winding drum on said main frame and a flexible connection between said winding drum and counterweight.

11. In a track mounted mucking machine adapted for operation along pitching seams, a main frame, a conveyer extending longitudinally along the upper side of said main frame in substantially parallel relation with respect to the ground, a beam mounted on the forward end of said main frame for pivotal movement about horizontal and vertical axes, a scoop transversely pivoted on the end of said beam and adapted to dig by movement of the machine along the track, said scoop being adapted to discharge material directly onto said conveyer when in an elevated position and being elevated by pivotal movement of said beam, and means for holding said machine when working along a grade and counterbalancing the effect of the grade comprising a counterweight movable along a track substantially parallel to the track along which said loading machine moves, a winding drum on said main frame, a flexible connection between said winding drum and counterweight, means for holding said drum from rotation during feeding movement of said machine and means for driving said drum in a winding direction when the machine is moving rearwardly along the track.

12. In a mucking apparatus of the class described, a track mounted main frame, a beam mounted on the forward end of said main frame for pivotal movement about vertical and horizontal axes, a scoop pivoted on the end of said beam, said beam resting on a forwardly projecting portion of said main frame when in a lowered position and being provided with a depending foot adapted to engage the rear end of said scoop and form an abutment therefor to permit said scoop to be moved forwardly along the track rails, means for swinging said beam about said vertical axis and also elevating said beam about said horizontal axis to an upright position for permitting material to be discharged from said scoop, a conveyer mounted on said main frame and disposed directly beneath said scoop when in an elevated position and extending along said frame from the forward end thereof and beyond the rear end thereof in substantially parallel relation with respect to the track rails on which the machine is mounted, said scoop having a hinged side which is its upper side when in a gathering position, which forms a drop bottom and chute along which material may slide into said conveyer when in a discharge position, locking means for locking said drop bottom in a closed position including a spring pressed latch, and yieldable means for moving said bottom to a normal locked position upon release of the load from said scoop.

13. In a track mounted mucking machine adapted for operation along pitching seams, a main frame mounted on track wheels and axles, a conveyer extending along said main frame, a beam pivotally mounted on the forward end of said main frame, a scoop transversely pivoted on the end of said beam and adapted to dig by movement of the machine along the track, said beam being mounted on said frame for movement about a vertical axis, for positioning said scoop to one side or the other of the track, and about a horizontal transverse axis to elevate said scoop to discharge directly onto said conveyer, means for driving said track wheels along the track, and other means for holding said machine when working along a grade to counteract the effect of the grade and permit said track wheels to move the machine upwardly or downwardly along a grade with substantially the same tractive effort as along the level.

14. In a track mounted mucking machine adapted for operation along pitching seams, a main frame, a conveyer extending along said main frame, a beam pivotally mounted on the forward end of said main frame, a scoop transversely pivoted on the end of said beam and adapted to dig by movement of the machine along the track, said beam being mounted on said frame for movement about a vertical axis, for positioning said scoop to one side or the other of the track, and about a horizontal transverse axis to elevate said scoop to discharge directly onto said conveyer, means for driving said track wheels along the track, and other means for holding said machine when working along a grade to counteract the effect of the grade and permit said track wheels to move the machine upwardly or downwardly along a grade with substantially the same tractive effort as along the level comprising a counterweight operatively connected with said machine and movable in a direction opposite to the direction of movement of the machine.

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