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T. F. McCARTHY

2,139,129

APPARATUS FOR HANDLING MATERIAL IN MINES

Filed Aug. 18, 1937

2 Sheets-Sheet 1

Fig. 1

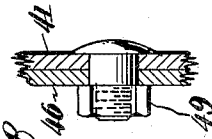
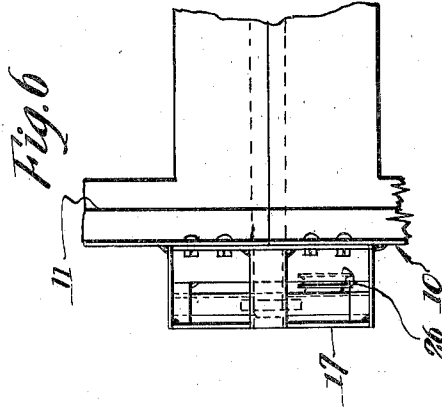
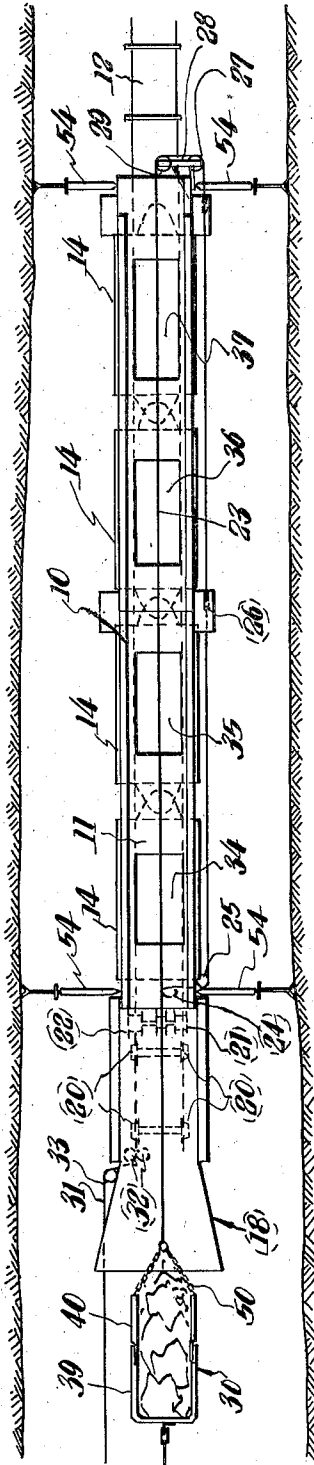
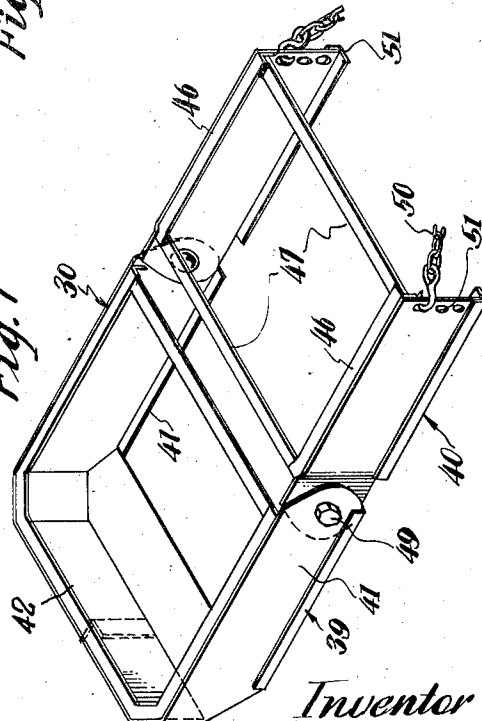


Fig. 7



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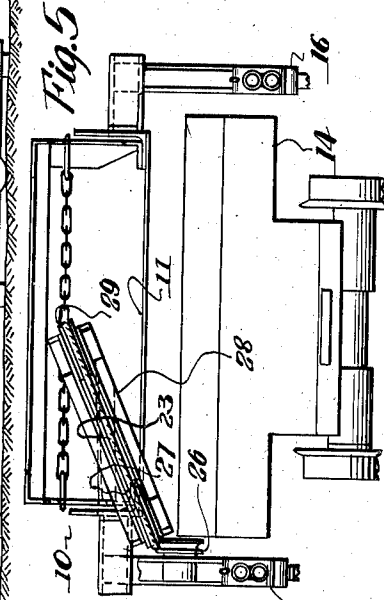
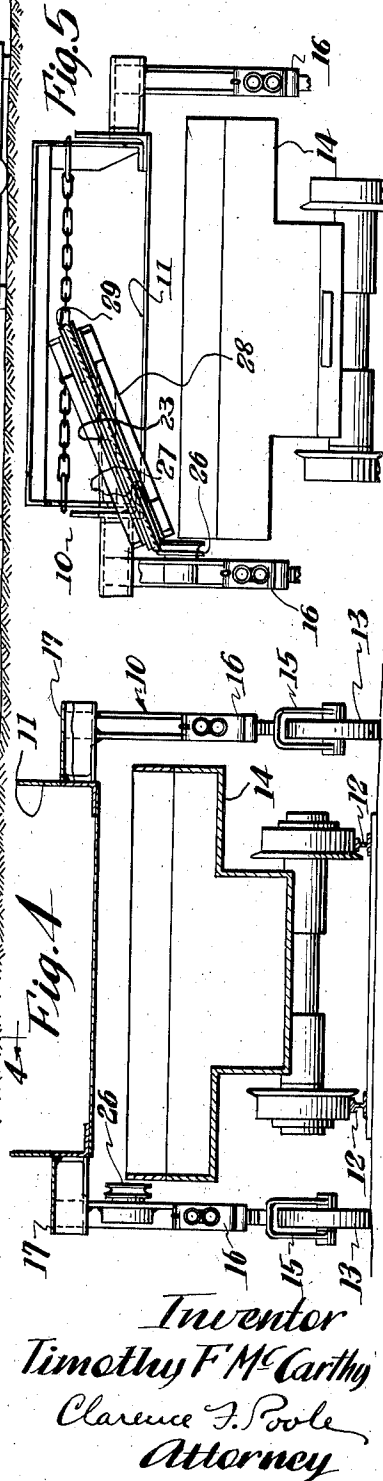
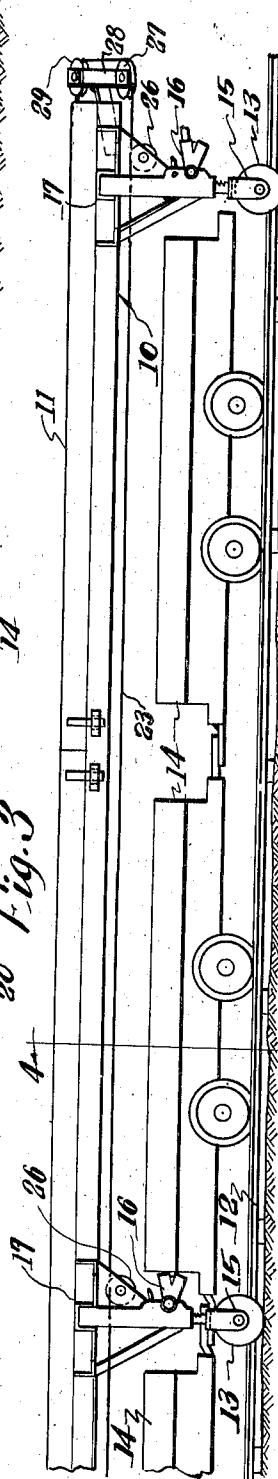
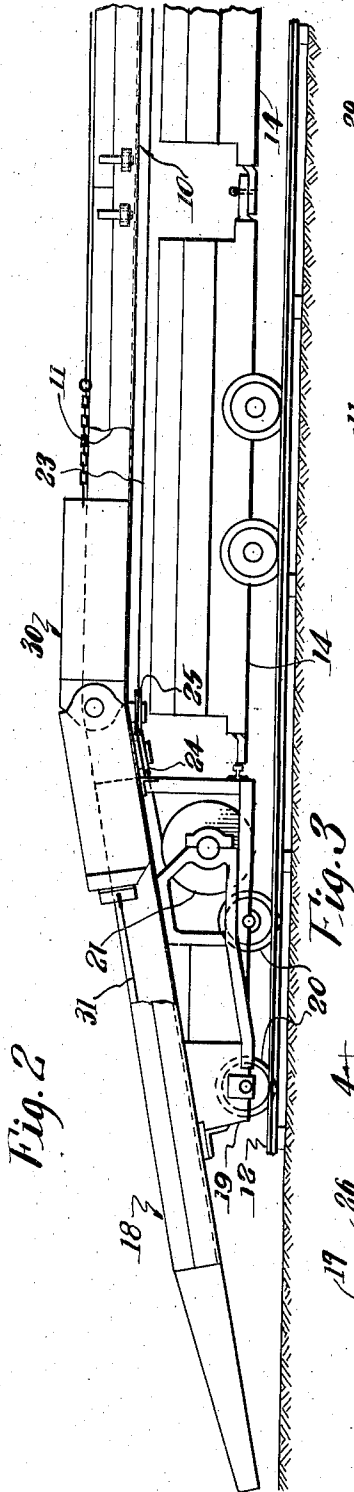
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2 Sheets-Sheet 2



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APPARATUS FOR HANDLING MATERIAL IN MINES

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12 Claims. (Cl. 214—110)

This invention relates to improvements in apparatus for handling material in mines and more particularly to an apparatus arranged to progressively load a series of cars by means of a draft operated scraper.

Heretofore, trains of cars have been loaded by extensible conveyers extending thereover, or by means of trackways arranged to run over the cars and having a car or conveyer adapted to move therealong and discharge into the mine cars. Such devices have been of a relatively bulky construction and frequently have to be dismantled when the working place is extended beyond a certain point and have been difficult to transport from working place to working place, and have also not been satisfactory due to their complicated nature and due to the fact that the individual cars must be trimmed by hand.

Among the objects of my invention are to provide an apparatus of a simple and efficient construction for progressively loading a series of cars by means of a draft operated scraper which is so arranged that the loaded material in the cars forms a part of the bottom over which the loaded scraper passes, which enables the scraper to trim the cars as it passes thereover and which may progressively remove the rock and coal in a working place such as a mine entry without removing or dismantling the apparatus until the entry has been advanced to the desired length.

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

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

Figure 1 is a plan view of a material handling apparatus constructed in accordance with my invention showing the apparatus in position in a mine entry;

Figure 2 is an enlarged side elevation of the forward portion of the apparatus shown in Figure 1;

Figure 3 is a side elevation of the rearward portion of the apparatus shown in Figure 1, drawn to the same scale as Figure 2;

Figure 4 is a transverse sectional view taken substantially along line 4—4 of Figure 3;

Figure 5 is a fragmentary rear end view of the apparatus with certain parts broken away;

Figure 6 is an enlarged detail view of the chute structure showing certain details of construction thereof;

Figure 7 is an enlarged isometric view showing

a type of scoop which may be used with the apparatus; and

Figure 8 is an enlarged partial fragmentary sectional view showing certain details of the hinged connection between the forward and rear parts of the scraper.

In the embodiment of my invention illustrated in the drawings, a frame 10 is provided, the upper portion of which forms a runway or loading chute 11 which is adapted to span a mine track 12. As herein shown, said loading chute is mounted on wheels 13, 13 which ride along the ground on opposite sides of said track so that a passageway is provided over the track to permit mine cars 14, 14 to be placed under said chute or runway.

The wheels 13, 13 are each mounted between the furcations of a forked bracket 15 in a usual manner. Each of said brackets depends from and is mounted on the end of a lifting jack 16. Said jacks are of a construction well known to those skilled in the art so will not herein be shown or described in detail, and are secured to and depend from lateral extensions 17, 17 of the frame 10 to raise the entire chute to prevent spillage when the cars are pulled out from under the chute and to properly adjust the height of the chute with respect to the height of the cars for trimming the cars to the desired extent.

The frame 10 may be of a sectional construction to facilitate transportation about the mine and to permit its extension to take care of additional cars if desired, so that the storage capacity under the frame may be equal to the number of cars that are required to load out a complete cut of coal or rock. Said chute includes an inclined approach section 18 which has an inclined runway or chute extending angularly upwardly from the ground to the chute 11. Said approach section includes a frame 19 mounted on track wheels 20, 20 for movement along the mine track 12. Said frame forms a support for a head rope drum 21 and a tail rope drum 22 mounted thereon beneath the inclined chute. Said head and tail rope drums are adapted to be selectively driven by power in a usual manner by means of a suitable motor on said frame (not shown).

A flexible cable 23 is trained from the head rope drum 21 through a pair of sheaves 24 and 25 on the upper portion of said frame to the outer side of the chute 11. From thence said cable extends rearwardly along the outer side of said frame and is trained through sheaves 26, 26 mounted in the lateral extensions 17, 17. From

said sheaves said cable is trained around a sheave 27 mounted in a bracket 28 at the rearward end of said chute structure, to and around a sheave 29 at the inner side of said bracket, and forwardly along the central portion of said chute to a scraper or scoop 30 to which it is connected. Said scraper is herein shown as being of an open end construction and will be more clearly described as this specification proceeds.

A flexible cable 31 is trained from the tail rope drum 22, forwardly through a pair of sheaves 32, 32 outwardly around a sheave 33 and forwardly to the working face. At this point said cable is trained around a suitable sheave (not shown) and rearwardly to the rear end of the scoop 30 for pulling said scoop towards the face to a loading position.

The loading chute 11 is of a trough-shaped formation of a sectional construction so that it may readily be extended to take care of additional cars or be disassembled and transported about the mine from one working place to the other, the details of which construction will not herein be described since they are no portion of my present invention. A plurality of successively arranged discharge openings 34, 35, 36, and 37 are herein shown as being provided in the bottom of said chute for the discharge of material there-through onto the cars 14 when positioned therebeneath. Although four openings are herein shown as being provided in the chute 11 it may readily be understood that the number of openings may be increased where smaller cars are used and that the length of the chute may also be increased and provided with additional openings to take care of additional cars. The opening 35 is herein shown as being of a larger area than the opening 34 and the size of said openings progressively increases towards the rearward end of said chute. The purpose of this arrangement will hereinafter more fully appear as this specification proceeds.

With reference now in particular to the details of the scraper or scoop 30, said scoop, as herein shown, includes a rear section 39 and a front section 40 pivoted thereto for pivotal movement with respect thereto in a vertical plane. Said rear section has an open bottom and is provided with side walls 41, 41 and a closed rear end wall 42.

The front section 40 of said scoop is made up of a pair of parallel spaced side walls 46, 46 secured together by transverse braces 47, 47. Said side walls are pivotally connected at their rear ends to the forward ends of the side walls 41, 41 by means of suitable nuts and bolts 49, 49, as is best shown in Figure 3. A draft chain 50 is detachably connected to the forward end of the side walls 46 at its ends by means of suitable hooks extending through apertures 51, 51 provided in said side walls, which draft chain is adapted to have the forward end of the head rope 23 secured thereto.

It should herein be noted that since the scoop 39 is hinged at its middle, it may be relatively long and still conform to the form of the inclined approach section 18. This prevents pounding of said scoop on the chute as it moves onto and off of the incline and prevents spilling of material as the scoop leaves said approach section and moves along the horizontal runway or chute 11. If desired, the forward section of said scoop may be separated from the rear section thereof to permit use of the rear section alone where the material being loaded is relatively heavy. For

example, when driving an entry where it is desired to load rock taken from the top or bottom, as well as coal, the front section of the scoop may be separated from the rear section, and the rock, being relatively heavy, may be loaded with the rear section while the coal, being relatively light compared to the rock, may be loaded by the entire scoop.

With reference now to the use and operation of the device of my invention, and the function of the progressive increase in size of the openings 34 to 37 towards the rear end of the chute 11, the apparatus may be positioned in a mine entry as shown in Figure 1 and held in place by a plurality of jacks 54, 54 in a usual manner. A series of mine cars 14 may then be run under the apparatus, each of said cars being positioned under an opening 34, 35, 36, and 37. The chute may then be adjusted as to height by means of the jacks 16, 16 so the cars will be trimmed to the desired level. The tail rope 31 may then be trained from the drum 22 to the coal face and in a reverse direction to the rear end of the scoop 30 in the hereinbefore described manner.

The head rope 23 may likewise be trained forwardly from the sheave 29 and connected at its free end to the draft chain 50. The scoop may then be moved to the face by the tail rope 31 and tail rope drum 22 and loaded with either coal or rock, as desired, by being moved back and forth in the loose material until loaded. It may also be loaded by hand, if desired. The operation of the head and tail rope drums may be controlled by suitable control means at the inclined approach section 18 or may be controlled from the face by means of a suitable system of remote controls (not shown) in a manner well known to those skilled in the art so that the loading crew may control the movement and loading of the cars direct from the face. When loaded, said scoop is then moved towards the loading chute 11, up the inclined approach section 18 and discharged through the opening 34. This operation is continued until the first car of the series has been fully loaded and the material therein, leveled by passage of the scoop thereover, is even with the bottom of the chute 11. After the first car has been loaded, the scoop having gone to the face and returned with a load is moved along said chute over the opening 34, which is closed by material in the first car 14, to the next opening 35 until the second car has been loaded. This operation may be continued until all of the cars have been loaded either with rock or coal, or until certain cars have been loaded with rock and others have been loaded with coal.

It should herein be noted that inasmuch as material loaded in the cars forms a bottom for the chute and inasmuch as the scoop passes over the first openings more often than the last opening, that the tendency is for material to pack in the first cars and for a greater amount of material to be loaded in the first cars than the last cars. This causes spilling of material from the first cars and uneven trimming of the cars. In order to overcome this difficulty the opening 34 has been made considerably smaller than the opening 35 as has been hereinbefore described and the size of said openings increases towards the rearward end of the chute. This enables the cars to be trimmed to substantially the same degree and thus insures that the cars will be equally loaded.

When all of the cars have been loaded, the entire loading chute 11 is raised to clear material on the cars by means of the lifting jacks 16, 16, to

permit said cars to be freely moved from beneath said chute. Said cars may then be pulled from beneath said chute by means of a mine locomotive or any other suitable haulage means.

5 It may thus be seen that a new and improved apparatus has been provided for progressively loading a series of cars which is particularly adapted for entry driving in coal mines, and that
10 this apparatus is so arranged that the cars may be loaded and trimmed by the material transporting and loading apparatus without the use of hand labor to perform this operation. It may also be seen that this loading operation is effected by means of a scraper in a simplified manner
15 which scraper is so arranged as to handle a large amount of material without spillage as it moves up the incline to the chute over the cars, and which may be adapted for use in loading rock as well as coal in a simplified and expeditious manner.

20 While I have herein shown and described one form in which my 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, I do not wish to be construed as limiting myself to the specific embodiment illustrated, excepting as it may be limited in the appended claims.

30 I claim as my invention:

1. In an apparatus for handling material in mines, in combination, a draft operated scraper, an extensible sectional movable frame adapted to span and extend along a mine track and provided with a passageway extending therealong, a series of mine cars adapted to move along said mine track and extend under said frame, said frame being provided with a runway on its upper side having an inclined approach extending to the ground to permit movement of said scraper upwardly therealong from the ground and along said runway, and spaced apart openings in said runway, each one of said openings being adapted to be disposed directly above one of said mine cars for the discharge of material directly into said cars from said passageway, said runway being so arranged that it may be extended over the cars to permit a complete cut to be loaded out upon extension of said frame and said openings being so arranged with respect to said cars that when the first of said cars is filled, the material therein will form a bottom for said passageway over which said scraper may move, for successively trimming the loaded cars and loading the next successive cars on said track.

2. In an apparatus for handling material in mines, in combination, a draft operated scraper, an extensible sectional movable frame adapted to span and extend along a mine track and provided with a passageway extending therealong, a series of mine cars adapted to move along said mine track beneath said frame, said frame being provided with a runway on its upper side having an inclined approach extending to the ground to permit movement of said scraper upwardly therealong from the ground and along said runway, and spaced apart openings in said runway, each one of said openings being adapted to have one of said mine cars disposed directly therebeneath for the discharge of material into said cars from said passageway, said runway being so arranged that it may be extended over the cars to permit a complete cut to be loaded out upon extension of said frame and said openings being so arranged with respect to said cars that when the

first of said cars is filled, the material therein will form a bottom for said passageway over which said scraper may move, for successively trimming the loaded cars and loading the next successive cars on said track, and means for raising said frame to permit the ready removal of said cars therefrom when in a loaded condition.

3. In an apparatus for handling material in mines, in combination, a draft operated scraper, an extensible sectional movable frame adapted to span and extend along a mine track and provided with a passageway extending therealong, a train of mine cars adapted to travel along said mine track beneath said frame, said frame being provided with a runway on its upper side having an inclined approach extending to the ground to permit movement of said scraper upwardly therealong from the ground and along said runway, and spaced apart openings in said runway, each one of said openings being adapted to be disposed directly above one of said mine cars for the discharge of material directly into said cars from said passageway, said runway being so arranged that it may be extended over the cars to permit a complete cut to be loaded out upon extension of said frame and said openings progressively increasing in size from the approach end of said frame and being so arranged with respect to said cars that when the first of said cars is filled, the material therein will form a bottom for said passageway over which said scraper may move, for successively trimming the loaded cars and loading the next successive cars on said track.

4. In an apparatus for handling material in mines, in combination, a draft operated scraper, an extensible sectional movable frame adapted to span and extend along a mine track and provided with a passageway extending therealong, a train of mine cars adapted to travel along said mine track beneath said frame, said frame being provided with a runway on its upper side having an inclined approach extending to the ground to permit movement of said scraper upwardly therealong from the ground and along said runway, and spaced apart openings in said runway, each one of said openings being adapted to be disposed directly above one of said mine cars for the discharge of material directly into said cars from said passageway, said runway being so arranged that it may be extended over the cars to permit a complete cut to be loaded out upon extension of said frame and said openings progressively increasing in size from the approach end of said frame and being so arranged with respect to said cars that when the first of said cars is filled, the material therein will form a bottom for said passageway over which said scraper may move, for successively trimming the loaded cars and loading the next successive cars on said track, and means for raising said frame when said train of cars is loaded to permit the ready removal of said cars therefrom.

5. In an apparatus for handling material in mines, in combination, a scraper having an open forward end and bottom, a movable frame adapted to span and extend along a mine track and provided with a passageway extending therealong, a train of mine cars adapted to travel along said mine track beneath said frame, said frame having an inclined approach extending from the ground to the upper side of said frame which is arranged to form a runway for said scraper, power driven draft means on said frame including a plurality of winding drums, one of said drums having a head rope wound thereon

adapted to extend along said frame from the rearward end thereof and have connection with said scraper for moving it onto and along said frame, and the other of said drums having a tail rope wound thereon adapted to extend forwardly from said frame to a working place and back towards said frame and have connection with the rearward end of said scraper for moving it towards the working place, and spaced apart openings in said runway for the discharge of material therethrough, each of said openings being adapted to have a car positioned directly therebeneath, so said scoop may progressively load said cars and the loaded material on said first car may form a bottom for said runway and permit said scoop to pass thereover.

6. In an apparatus for handling material in mines, in combination, a scraper having an open forward end and bottom, a movable frame adapted to span and extend along a mine track and provided with a passageway extending therealong, a series of mine cars adapted to travel along said mine track beneath said frame, said frame having an inclined approach extending from the ground to the upper side of said frame which is arranged to form a runway for said scraper, power driven draft means on said frame including a plurality of winding drums, one of said drums having a head rope wound thereon adapted to extend along said frame from the rearward end thereof and have connection with said scraper for moving it onto and along said frame, and the other of said drums having a tail rope wound thereon adapted to extend forwardly from said frame to a working place and back towards said frame and have connection with the rearward end of said scraper for moving it towards the working place, and spaced apart openings in said runway for the discharge of material therethrough, each of said openings being adapted to have a car positioned directly therebeneath, so said scoop may progressively load said cars and the loaded material on said first car may form a bottom for said runway and permit said scoop to pass thereover, and said openings progressively increasing in size from the forward end of said runway to prevent the repeated passage of material over said openings from packing material in the cars adjacent the forward end of said runway.

7. In an apparatus for handling material in mines, in combination, a scraper having an open forward end and bottom, a movable frame adapted to span and extend along a mine track and provided with a passageway extending therealong, a series of mine cars adapted to travel along said mine track beneath said frame, said frame having an inclined approach extending from the ground to the upper side of said frame which is arranged to form a runway for said scraper, power driven draft means on said frame including a plurality of winding drums, one of said drums having a head rope wound thereon adapted to extend along said frame from the rearward end thereof and have connection with said scraper for moving it onto and along said frame and the other of said drums having a tail rope wound thereon adapted to extend forwardly from said frame to a working place and back towards said frame and have connection with the rearward end of said scraper for moving it towards the working place, and spaced apart openings in said runway for the discharge of material therethrough, each of said openings being adapted to have a car positioned directly

therebeneath, so said scoop may progressively load said cars and the loaded material on said first car may form a bottom for said runway and permit said scoop to pass thereover, and means for raising said frame to permit the ready removal of said cars therefrom when loaded.

8. In an apparatus for handling material in mines, in combination, a scraper having an open forward end and bottom, a movable frame adapted to span and extend along a mine track and provided with a passageway extending therealong, a plurality of progressively arranged mine cars adapted to travel along said mine track beneath said frame, said frame having an inclined approach extending from the ground to the upper side thereof which is arranged to form a runway for said scraper, power driven draft means on said frame including a plurality of winding drums, one of said drums having a head rope wound thereon adapted to extend along said frame and the other of said drums having a tail rope wound thereon adapted to extend forwardly from said frame to a working place and back towards said frame and have connection with the rearward end of said scraper for moving it towards the working place, and spaced apart openings in said runway for the discharge of material therethrough, each of said openings being adapted to have a car positioned directly therebeneath, so said scoop may progressively load said cars and the loaded material on said first car may form a bottom for said runway and permit said scoop to pass thereover, said openings progressively increasing in size from the forward end of said runway to prevent the repeated passage of material over said cars from packing material in the cars adjacent the forward end of said runway, and means for raising said frame to permit the ready removal of said cars therefrom when loaded.

9. In a scraper loader apparatus, a movable frame adapted to span and extend along a mine track, and provided with a passageway extending therealong, a train of mine cars adapted to move along said mine track and extend under said frame, said frame being provided with a runway on its upper side having an inclined approach and having spaced apart openings disposed therealong permitting material moved along said runway to be discharged from said runway directly into said cars, draft means on said frame, and a scraper adapted to be moved onto said frame by said draft means, said scraper having an open forward end and bottom and being hinged intermediate its ends to prevent spillage of material therefrom as it moves upwardly along the inclined portion of said runway and onto said chute, and the size of said openings increasing towards the rearward end of said runway to enable said scraper to trim said cars as loaded and permit the loaded material to form a bottom for said runway.

10. In a scraper loader apparatus, a movable frame adapted to span and extend along a mine track, and provided with a passageway extending therealong, a train of mine cars adapted to move along said mine track and extend under said frame, said frame being provided with a runway on its upper side having an inclined approach and having spaced apart openings disposed therealong permitting material moved along said runway to be discharged from said runway directly into said cars, draft means on said frame, and a scraper adapted to be moved onto said frame by said draft means, said scraper

having an open forward end and bottom and being hinged intermediate its ends to prevent spillage of material therefrom as it moves upwardly along the inclined portion of said runway and onto said chute, the size of said openings increasing towards the rearward end of said runway to enable said scraper to trim said cars as loaded and permit the loaded material to form a bottom for said runway, and said frame being vertically adjustable to permit ready removal of said cars therefrom when loaded and prevent interference of said loaded cars with said frame.

11. In an apparatus for loading a train of cars in mines, a frame adapted to span and extend along a mine track and provided with a passageway extending therealong to receive a train of mine cars, said frame being provided with a runway on its upper side having an inclined approach, and a scraper adapted to move upwardly along said approach and along said runway, and means permitting said scraper to progressively load and trim said cars comprising a series of openings disposed along said runway under which said cars are adapted to be positioned, said openings progressively increasing in size towards the rearward end of said frame, and means for ver-

tically adjusting said frame to the desired height for loading and trimming said cars to the desired extent, and to permit ready removal of said cars therefrom when loaded to prevent interference of said loaded cars with said frame.

12. In an apparatus for loading a train of cars in mines, an extensible frame adapted to span and extend along a mine track, said frame being provided with a passageway therealong to receive a train of cars on the mine track, a runway extending along the upper side of said frame having an inclined approach, and a scraper adapted to move along said runway, and means permitting said scraper to progressively load and trim said cars comprising a series of openings disposed along said frame under which said cars are adapted to be positioned, said openings being so arranged that when the first of said cars is filled the material therein will form a bottom for said passageway over which said scraper may move for loading the next car, and a plurality of jacks supporting said frame and affording vertical adjustment of said runway for loading and trimming said cars to the desired extent and to permit ready removal of said cars when loaded.

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