May 25, 1926. 1,585,694

F. L. SCHOEW

APPARATUS FOR LOADING MATERIAL

Filed Jan. 6, 1925 4 Sheets-Sheet 1

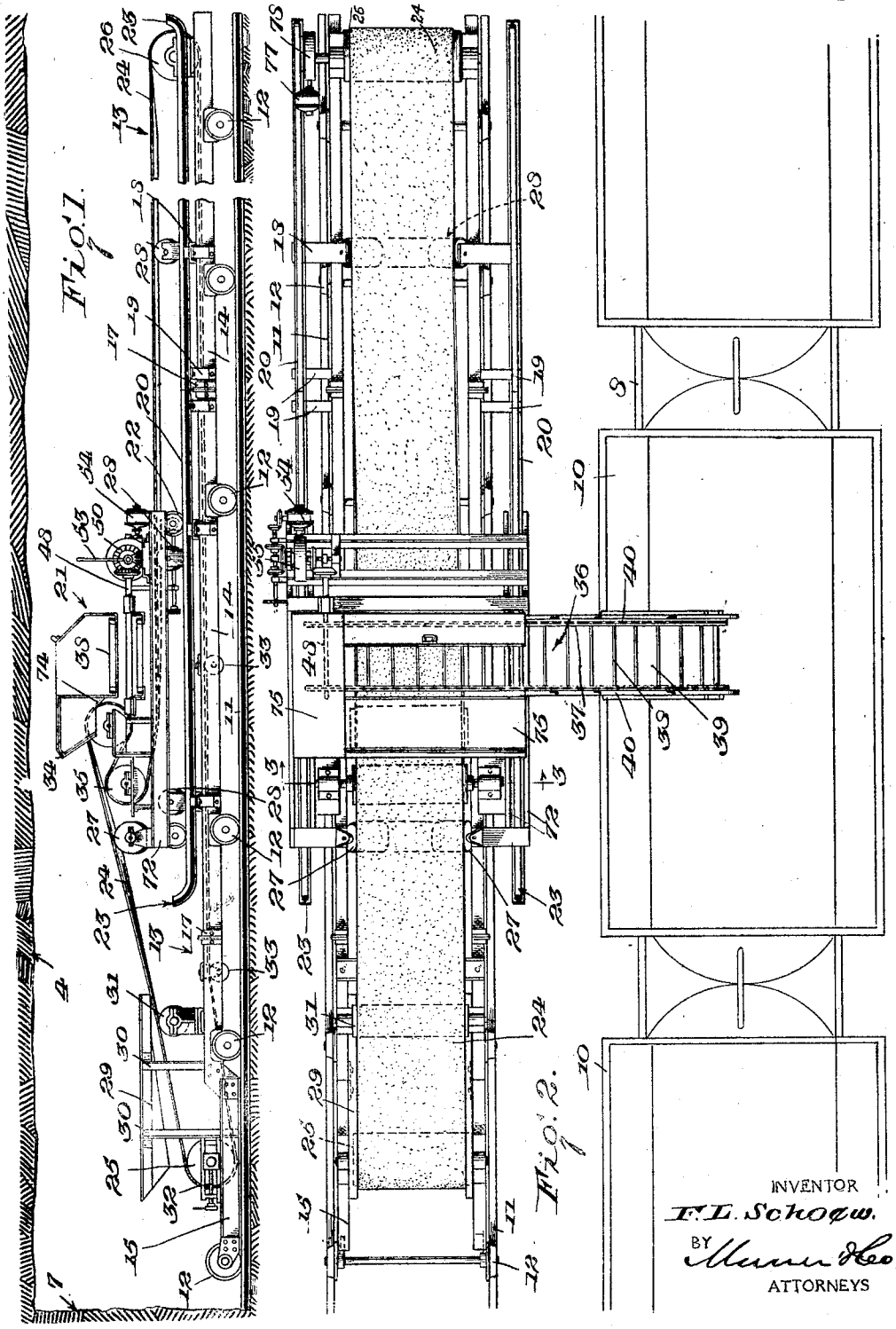


Fig. 1.

Fig. 2.

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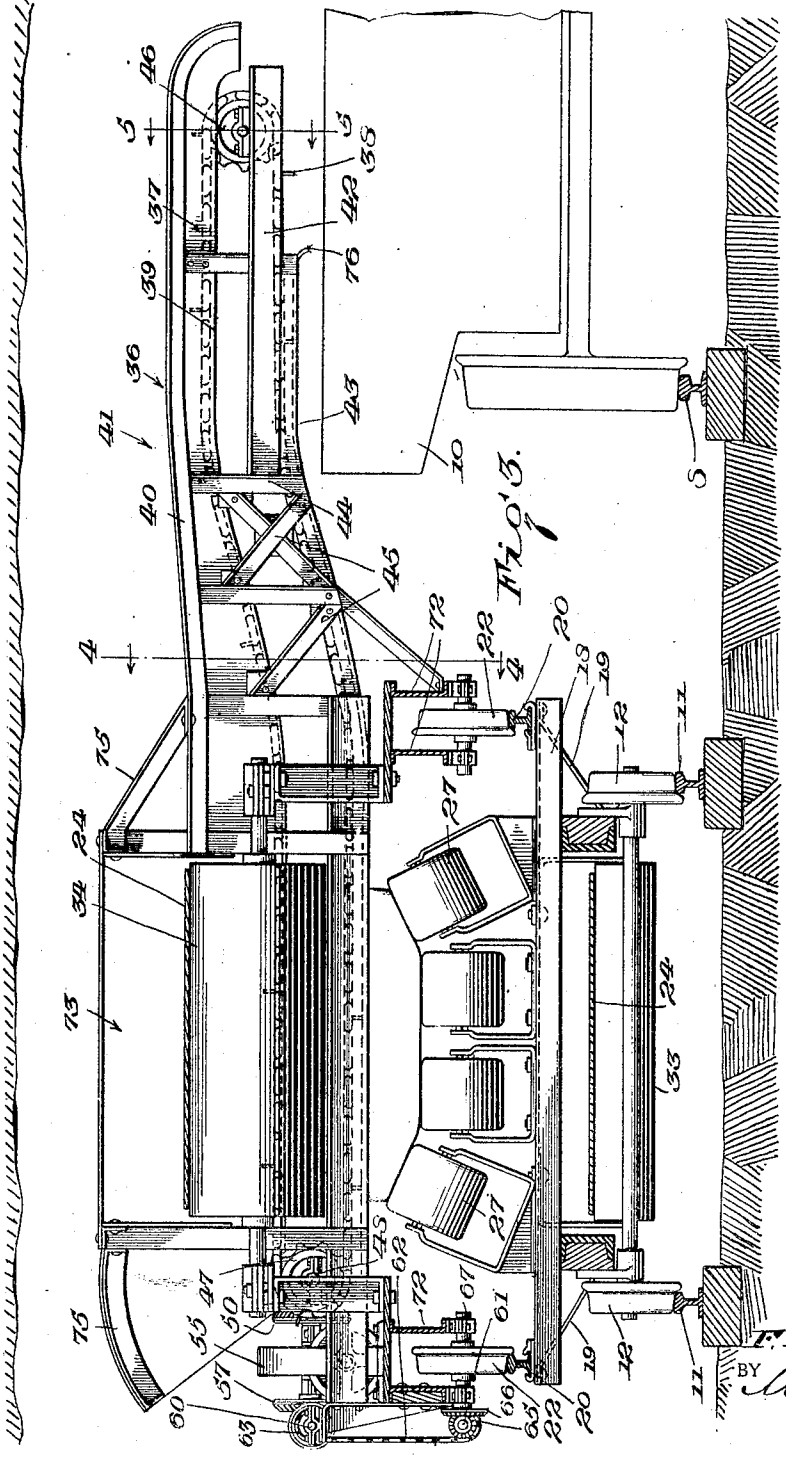


Fig. 5.

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Fig. 3.

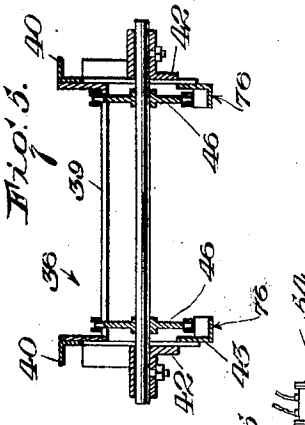
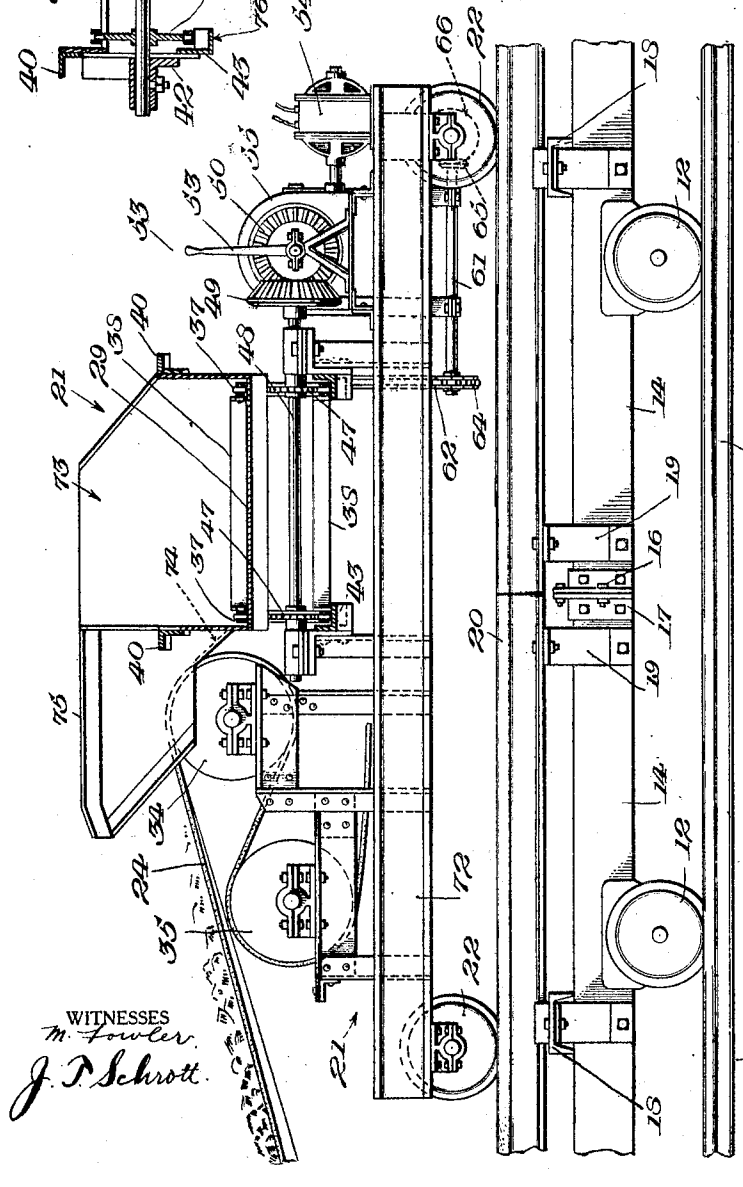


Fig. 4.



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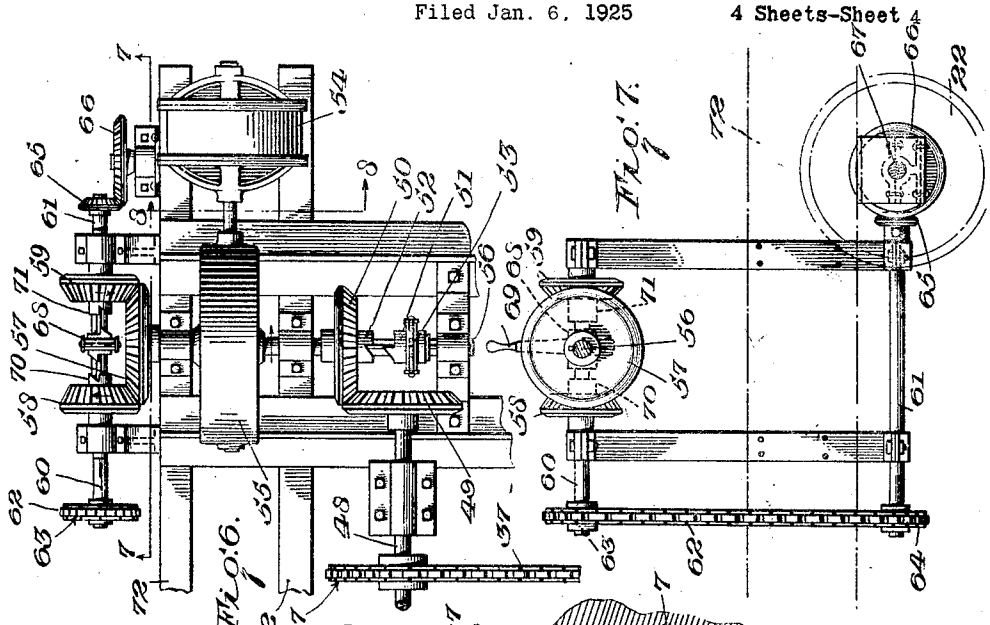


Fig. 6.

Fig. 7.

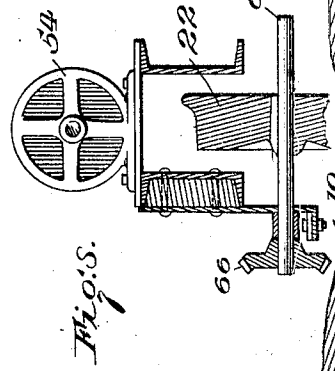


Fig. 8.

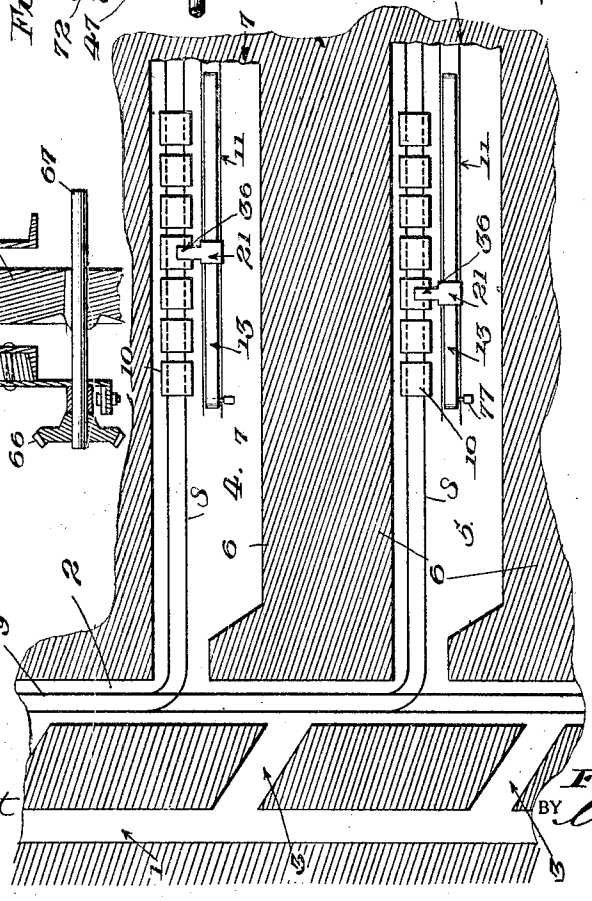


Fig. 9.

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UNITED STATES PATENT OFFICE.

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APPARATUS FOR LOADING MATERIAL.

Application filed January 6, 1925. Serial No. 840.

This invention relates to improvements in loaders, and it consists of the constructions, arrangements and method herein described and claimed.

An object of the invention is to provide loading apparatus by means of which coal or other material can be continuously discharged into each car of a waiting train, without moving said train or uncoupling cars the provision of the loading apparatus making it possible to serve an entire train as stated, thereby obviating the loss of time necessitated by the prevalent practice of switching and loading single cars.

Another object of the invention is to provide loading apparatus upon which the material is deposited, there being a conveyor which is capable of running lengthwise of the loading apparatus, continuously removing and discharging the material into each car of a waiting train, or trip of cars without uncoupling or moving cars.

Another object of the invention is to provide a loading apparatus which is made sectionally both in respect to the frame and the conveyor belt, thereby permitting not only any necessary lengthening or shortening of the apparatus but also the easy replacement of any section that might have become damaged.

Other objects and advantages appear in the following specification, reference being had to the accompanying drawings in which—

Figure 1 is a side elevation of the loading apparatus.

Figure 2 is a plan view thereof,

Figure 3 is a cross section on the line 3—3 of Figure 2.

Figure 4 is a cross section on the line 4—4 of Figure 3.

Figure 5 is a detail cross section on the line 5—5 of Figure 3.

Figure 6 is a detail plan view of the cross conveyor drive mechanism.

Figure 7 is a detail sectional view on the line 7—7 of Figure 6.

Figure 8 is a detail sectional view on the line 8—8 of Figure 6.

Figure 9 is a diagram illustrating the application of the loading mechanism to the room and pillar system of mining.

The loading apparatus, as herein disclosed, is designed primarily for use in handling material in coal mines, but it should be understood that it is applicable equally as well to handling materials other than coal, inside or outside of mines. One of the purposes of the invention, as already stated, is to make possible the continuous loading of a number of cars in a train.

According to present methods it is the practice to run a coal car into the drift, entry and rooms of a mine leave the car there for loading and later return to draw away the loaded car. A great deal of time is lost by the operator in awaiting the switching of coal or other cars, both empty and full, in fact the operator spends more time in waiting that he does in working.

Attention is first directed to Figure 9 which diagrammatically illustrates the plan of mining according to the room and pillar system in coal mines. Parallel chambers 1 and 2 provide an air course and entry respectively. These are placed in communication by passages 3. A number of rooms 4, 5, etc. are cut back from the entry 2, and in practice these rooms run in large numbers when the coal vein covers an extensive area.

It is necessary to support the strata overhead and the rooms are therefore spaced apart by pillars 6. These pillars consist of natural coal, but this coal is later removed when the rooms have been cut back as far as practicable. It is from the ends or face of the rooms (or drifts, as they are commonly called) that the coal is loosened for removal.

This loosening of coal is done by drilling into the solid material at the outer face of drifts and inserting explosive charges which upon being set off, bring down tons of coal or other material which is carried away in coal cars. The handling and loading of single coal cars obviously consumes a great deal of time, and it is with the purpose of making practically all of the time of the operator or operators available that the particular combination and method have been designed.

Spur tracks 8 are laid in the rooms or drifts, 4, 5, etc. These connect with the main track 9. The coal cars 10 have wheels that run upon the spur tracks. A number of coal cars make up the train, and the conveyor is so designed as to load the cars of the train in succession. The operator may shovel coal upon the conveyor continuously.

A portable track 11 is laid in the drift parallel to the spur track 8. The wheels 12 of the longitudinal conveyor, generally designated 13, run upon this track. The conveyor frame is composed of sections 14 all of which are substantially alike with the exception of the loading section 15. The frame sections are bolted or otherwise temporarily secured at 16, abutting ends of the sections having angle or other irons 17 through which the bolts pass. The sections 14 are braced by transverse channels 18, it being upon these channels, and upon other suitable supports 19 adjoining the connecting angles 17, that the rails 20 for the carriage 21 are laid. The carriage has wheels 22 running upon the rails, and the ends of the rails are turned up (Fig. 1) at 23 to prevent the carriage from running off.

A belt 24 runs longitudinally of the conveyor 13. This belt runs over a take-up pulley 25 at the loading end of the conveyor, and over a drive pulley 26 at the opposite end. The loading end of the conveyor faces the face or end 7 of the drift. The belt 24 is held in the shape of a trough upon its approach to the discharge carriage 21 by troughing rollers 27. Other sets of troughing rollers 28 are disposed along the conveyor frame 13, it being necessary to hold the belt 24 in a trough-shape particularly when the carriage 21 is discharging from the outward extremity of the conveyor. The belt 24, like the conveyor frame 13, is made in sections so that the loading apparatus may be lengthened or shortened to meet various requirements. In practice the frame sections are made in 10 ft. sections, and the belt is made in 20 ft. lengths. Any appropriate belt coupling is used to join the belt sections. Coal or other material is loaded onto the belt 24 at the tail end of the conveyor in a hopper 29. This hopper is of open formation, and is merely for the purpose of assisting in piling the coal upon the belt. The hopper is supported at 30 upon the loading section 15. The belt is supported in the vicinity of the hopper by a flat carrier 31.

Adjustments of the pulley 25 are made by a standard take-up 32. The use of the take-up is necessary when belt sections are subtracted or added. It consists merely of suitable bearing blocks which are adjustable in appropriate guides by suitable swiveled screws. The return side of the belt 24 is supported by idlers 33 which are journaled upon the conveyor frame. Rollers 34 and 35 upon the framework of the carriage 21 direct the belt 24 back upon itself in such a manner as to first discharge the load and then pass back to the drive pulley 26.

The discharge carriage 21 has a cross conveyor generally designated 36 to which the coal is delivered by the belt 24. The cross conveyor discharges the coal or other material into the cars 10, and in order that the discharge of coal into the cars may be a continuous performance, means is provided for moving the carriage 21 upon the rails 20. The cross conveyor is composed of a pair of chains 37 which are connected by upstanding slats 38 for the purpose of moving the coal outward upon the trough 39. The trough is carried by the rails 40 of a cross conveyor frame 41 which projects from the side of the carriage 21 in such a manner as to discharge the coal into the cars 10. The frame 41 includes a support 42 and guide angles 43, both being suspended and braced by the angles 44 and 45. Sprockets 46, journaled upon the support 42, carry one end of the chains 37, while sprockets 47 upon the carriage 21 carry the opposite ends of the chains. The shaft 48 of the sprockets 47 (Fig. 6) carries a gear 49 which is driven by a gear 50 when the clutch collar 51 is moved into engagement with the clutch hub 52 upon operation of the lever 53. The cross conveyor 36 is thus capable of being started and stopped independently of the driving mechanism of the carriage 21.

This driving mechanism includes the electric motor 54 (Fig. 6). The motor drives a speed reducer 55 which in turn drives the countershaft 56 by which the gear 50 is carried. The counter-shaft also carries a gear 57 which meshes with pinions 58 and 59 on the carriage drive shaft 60. A shaft 61 immediately below the shaft 60 (Fig. 7) receives driving motion by a chain 62 applied to sprockets 63 and 64 on the respective shafts. The shaft 61 has a pinion 65 meshing with a gear 66 on the axle 67 of the nearest one of the wheels 22 of the carriage 21.

A clutch collar 68 (Fig. 6) movable upon the drive shaft 60 by means of a lever 69 is capable of causing either forward or backward motion of the carriage 21, or cause it to stand still at a given place. The collar 68 is splined upon the shaft, but is slidable so that the teeth at opposite sides may engage the adjacent toothed hubs 70 and 71 of the adjacent pinions. These pinions are loose upon the shaft 60, but are connectible therewith by means of the clutch collar. Upon appropriately shifting the clutch collar the shaft 60 is made to turn in one or the other direction, as shown by the arrows, resulting in a forward or rearward driving of the carriage 21. Upon intending to have the carriage 21 move toward the right (Figs. 1 and 2) the collar 68 must be shifted to engage the hub 70 (Fig. 6) and vice versa.

In further reference to the discharge carriage 21: A part of the structure has already been described in connection with Figure 3. The foundation of this carriage is composed of parallel pairs of channel irons 72. It is

beneath these that the wheels 22 are journaled, and it is on top of these channels that the cross conveyor frame 41 is mounted. This frame includes a hopper generally designated 73, and a strike plate 74 within the hopper (Fig. 1) guides the coal from the belt 24 into the trough 39 where it is taken up or raked out by the slats 38 of the cross conveyor 36. The hopper 73 includes an arrangement of covers or shields 75 which are for the purpose of preventing flying coal from dropping into important parts of the machinery, and also when properly arranged can contribute largely toward the keeping in of the dust.

It is observed that the extreme end of the guide angles 43 are curved downward at 76 (Fig. 3). This provision is for the purpose of readily catching the slats 38 on the return side of the chains 37. The angles 43 guide the slats as well as the chains, preventing striking of the slats against the side of the carriage 21. The cross conveyor takes a peculiar upward turn in the frame 41. This is necessary to compensate for the relatively low level of the carriage 21 and the higher level of the coal cars 10.

Driving power for the pulley 26 (Figs. 1 and 2) is provided by a motor 77. The shaft of the motor drives the pulley 26 through a speed reducer 78. The speed reducer 78 consists simply of a worm pinion on the motor shaft meshing with a worm gear on the pulley shaft. The drive of the belt 24 is continuous as long as the motor 77 is in operation.

The operation is readily understood. The room (4 for example) is started by drilling into the wall of the entry 2, shooting away the coal and carrying the loose coal to the point of disposal in the mine. As soon as the room has been cut in far enough preparations are made for the laying of the spur track 8 and the track 11 for the loading apparatus. The loading apparatus may begin with but a few sections 14 (Figs. 1 and 4) but as the length of the drift increases, so that a longer train of cars 10 can be accommodated, sections of both framework and belting are added to load the train to better advantage.

The section 15 (Fig. 1) is a standard tail end. The remaining sections 14 are all alike, and can be added to and subtracted from the conveyor 13 by merely undoing the bolts and nuts 16 (Fig. 4) at the connecting angles 17. The last section (opposite the tail end) is a standard drive end.

Assume the loading apparatus to be in position as in Figures 1, 2 and 9. That end of the conveyor coming next to the breast 7 of the drift 4 is known as the forward or loading end. The operator stands near and shovels the loose coal into the hopper 29, whereupon the belt 24 takes up the coal and carries it into the hopper 73 of the discharge carriage 21. The belt 24 is constantly driven by the motor 77 and speed reducer 78 (Fig. 2) at the rear end of the loading mechanism.

Driving of the cross conveyor 36 of the carriage 21 is accomplished by throwing the clutch collar 51 (Figs. 2 and 6) into engagement with the hub 52, whereupon motion from the countershaft 56 is imparted to the shaft 48 of the cross conveyor. The cross conveyor does not work unless the clutch collar 51 is thrown in. The discharge carriage 21 remains stationary upon the rails 20 of the longitudinal conveyor 13 (Fig. 1) as long as the clutch collar 68 (Figs. 2 and 6) is held in the neutral position in respect to the pinions 58 and 59.

But upon moving the collar 68 into engagement with either pinion the carriage 21 is caused to run upon the rails 20 in the direction depending upon that pinion 58 or 59 which has been engaged. The belt 24 (Fig. 1) adapts itself to the discharge carriage 21 and the latter moves along. The rollers 34 and 35 are intended for that purpose. The arrangement provides for a continuous delivery of coal into the hopper 73, and when the conveyor 36 is in operation, coal is discharged in a continuous stream.

It will be the practice to throw the discharge carriage 21 in gear so that it travels continuously along the rails 22 beside the train of cars 10. The cross conveyor 36 will be thrown in gear as long as the discharge end is over a car, and when the space between cars is reached the cross conveyor is thrown out of gear in order to avoid wasting coal.

It is not essential that the travel of the carriage 21 be continuous along the rails. If desired, the operator may bring the carriage to a standstill until the cross conveyor 36 discharges coal into a car up to a certain height, whereupon the carriage 21 may be moved a little farther and brought to a stop until more coal is discharged in a pile. This procedure may be carried out until the entire car is filled. It is immaterial how the loading apparatus is used, it being important to bear in mind that a novel combination is that of the movable cross conveyor 36 with the longitudinal conveyor 13 for the purpose of loading an entire train of cars successively at one standing.

I claim:—

1. Loading apparatus comprising a sectional conveyor frame, means joining the sections permitting lengthening and shortening of the frame, a continuously movable belt carried by the frame also being composed of sections permitting addition and subtraction in consonance with the frame, a track carried by the frame also sectional to permit addition and subtraction, a carriage movable upon the track, and a movable cross

conveyor mounted upon the carriage and receiving material from the conveyor belt for discharge at one side of the loader.

2. Loading apparatus comprising a conveyor frame being composed of two sections of predetermined length, means at the ends of the sections permitting connection and providing for lengthening or shortening of the frame, a track carried by the frame being composed of sections corresponding in length with that of the frame sections, means carried by the frame sections supporting the track sections, a conveyor belt carried by the frame also being composed of sections of predetermined length permitting adjustment to agree with the adjustment of the frame, and take-up means permitting any necessary adjustment of the tension of the belt after the addition or subtraction of sections.

3. Loading apparatus comprising a carriage, lateral trough, a cross conveyor including a chain having slats for moving material along the trough to a point of discharge, and means including angle irons forming part of the lateral trough structure also guiding the chain and slats along the return side of the cross conveyor.

4. Loading apparatus comprising a carriage, a cross conveyor mounted upon the carriage including a lateral trough, means including a frame extending from the carriage supporting the trough, a chain running along the bottom of the trough and having slats for moving material along the trough to a point of discharge, means including angles with curved ends for receiving and guiding the chain and slats on the return side, and means for suspending said angles from the conveyor frame.

5. Loading apparatus comprising a sectional conveyor frame, means joining the sections permitting lengthening and shortening of the frame, a continuously movable belt carried by the frame also being composed of sections permitting addition and subtraction in consonance with the frame, and a track carried by the frame also sectional to permit addition and subtraction.

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