Jan. 26, 1965 L. KLOSK 3,167,193

LOADING CAR WITH CONVEYOR

Filed May 14, 1962 2 Sheets-Sheet 1

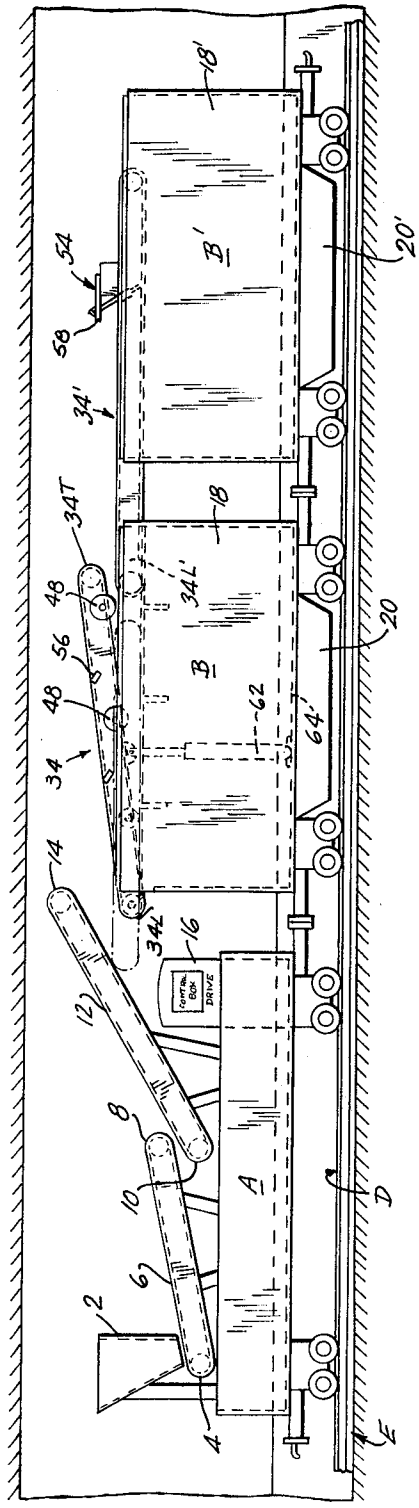


FIG. 1

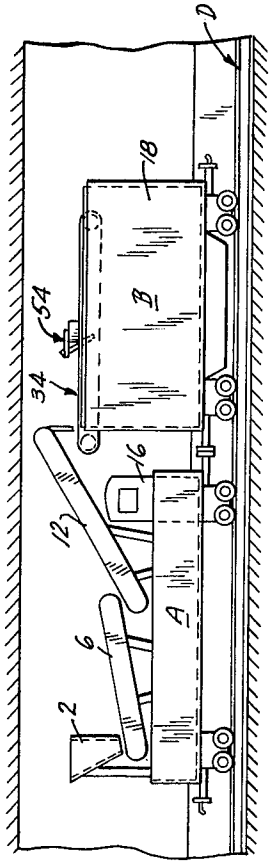


FIG. 5

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FIG. 2

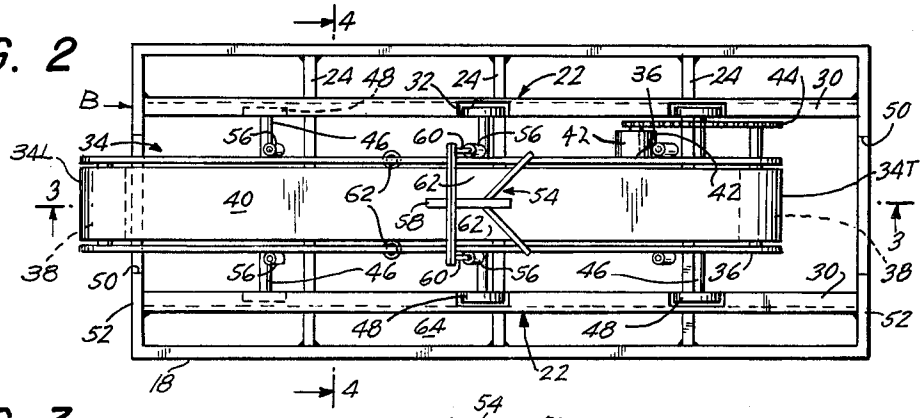
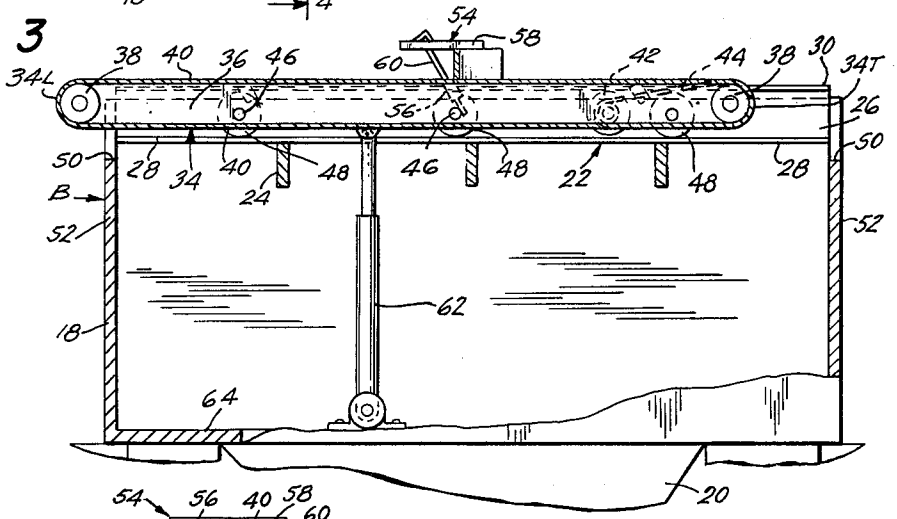


FIG. 3



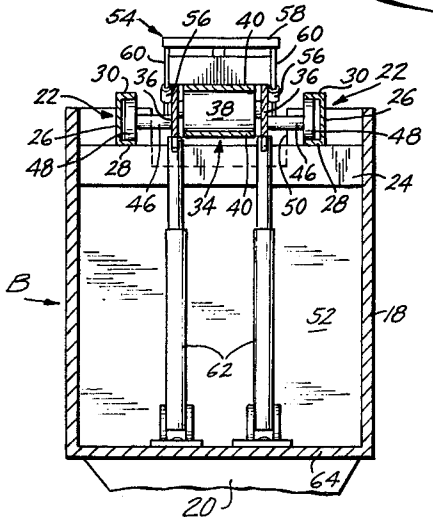


FIG. 4

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LOADING CAR WITH CONVEYOR

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The present invention relates to a combination loading car and conveyor the parts of which are so constructed and arranged as to facilitate not only the filling of that particular car with material conveyed thereto, but also the utilization of that car for feeding material thereover to another loading car associated therewith. The arrangement is particularly well adapted for use in connection with the removal of ballast from the roadbed of a railroad, but is not limited thereto.

Most railroad rights of way are provided with ballast, on or in which the track ties are laid, in order to stabilize the track and to provide for drainage thereof. The type of material used for ballast may vary widely—the most common type of material is trap rock or small crushed stones, although shale, coral, ashes, slag, dirt, sand and similar materials are also in use. Rehabilitation and maintenance of the roadbed often requires that the ballast be dug up and removed. Disposal of this material presents problems even when the roadbed being worked upon is in the open, with wide areas to either side thereof where the dug-up material may be deposited at least temporarily. Ballast disposal is a critical problem, however, when the roadbed being worked upon is in a restricted area, such as a narrow cut or a subway tunnel, because under those circumstances there is virtually no place where the dug-up material can be deposited even for a short time. In either case the dug-up ballast must be removed from the roadbed area where it is excavated, and since the track being worked upon is necessarily rendered unavailable for regular use, it would obviously be most efficient if that very track could be utilized for the removal of the used ballast material and the transportation thereof to a suitable disposal area. If the roadbed rehabilitation work can be thus carried on, only one track need be put out of commission at any one time. The use of the track being rehabilitated for ballast removal requires, if work is to proceed efficiently, that large amounts of ballast be removed at any given time, since while the ballast-containing train is moving from the rehabilitation area to the disposal area over a single track, ballast excavation work must come to a virtual standstill, awaiting the return on that track of an empty train of cars ready to be filled with newly excavated ballast.

It is a prime object of the present invention to provide equipment to permit the effective and efficient removal of ballast from the area where ballast excavation is taking place, and the transportation of the excavated ballast to a disposal area, by using only that track from which it is intended to remove ballast, and without having to use adjacent tracks in the removal operation. It is a further prime object of the present invention to devise such equipment which can be utilized in highly restricted areas such as subway tunnels, and on railroads such as subways where the tracks are often sharply curved.

To the accomplishment of the above, specially constructed material-receiving cars are employed, those cars having associated therewith a conveyor assembly onto which material such as ballast is adapted to be deposited, the conveyor assembly moving the material therealong. If the material is to be loaded onto a given car carrying a conveyor assembly, means can be associated with the conveyor assembly to cause the material to fall therefrom into the car in question. If this were all that were done, one-track operation would involve cessation of excavation each time the material-receiving car is filled, that car then

being removed to a disposal station. Further excavation work would have to await the arrival of an empty material-receiving car. To obviate this, the conveyor assembly is adjustably mounted on the car with which it is associated so as to be useable either to cause material deposited thereon to fall into the car associated therewith, or to be conveyed over or through the associated car to a second car, thus permitting the use of a train of material-receiving cars and therefore enabling the excavation operations to continue for a much longer period of time before having to be interrupted for removal of excavated ballast to the disposal station.

More specifically, the conveyor assembly in a given material-receiving car is so mounted on that car as to assume either a substantially horizontal position or a position in which it is inclined rearwardly and upwardly. The first or horizontal position is used when material is to be caused to flow into said given car. The second or rearwardly and upwardly inclined position is to be used when material is to be conveyed to a subsequent car, the leading end of the conveyor assembly of the subsequent car being projected to a position beneath the upwardly lifted trailing end of the conveyor assembly of the given car, so that material deposited on the conveyor assembly of the given car will be transferred thereby to the conveyor assembly of the second car.

In those instances where material is to be deposited on a given conveyor from a conveyor mounted on a preceding car of a train, the conveyor of one of those two cars must project beyond the end limits of that car toward the other car. However, while the train of cars is in motion, this type of spatial relationship is often inadmissible, particularly when the train is to be required to negotiate relatively sharp curves. Hence it is in all cases desirable, and in many cases necessary, that the conveyors be mounted on their respective cars so as to be movable in a longitudinal direction between a retracted travelling position and an extended operative position. In connection with the transfer of ballast from the conveyor assembly of the first material-receiving car to the conveyor assembly of a second material-receiving car, longitudinally adjustable movement of the conveyor assemblies is required—when the conveyor assembly on the first car is in its horizontal position the conveyor assembly on the second car must be longitudinally withdrawn therefrom, and when the conveyor assembly on the first car is in its upwardly and rearwardly inclined position the conveyor assembly on the second car must be moved forwardly so that its leading end is beneath the trailing end of the inclined conveyor assembly.

Through the structure here disclosed and claimed, a loading unit is produced which is capable of effective and efficient use as part of a train of material-receiving and transporting cars, and which is particularly well adapted for the reception and transportation of excavated ballast from a roadbed while using only the track being excavated to convey the ballast to a disposal station. The present invention is here specifically disclosed in connection with this latter type of use thereof, but it will be appreciated that it has other capabilities as well.

To the accomplishment of the above, and to such other objects as may hereinafter appear, the present invention relates to the construction of a loading unit as defined in the appended claims and as described in this specification, taken together with the accompanying drawings, in which:

FIG. 1 is a side elevational view of a typical work train in which the loading unit of the present invention may be used;

FIG. 2 is a top plan view of one of the loading units of the present invention;

FIGS. 3 and 4 are cross sectional views thereof, taken

along the lines 3—3 and 4—4 respectively of FIG. 2, the railroad trucks and supporting structure being eliminated for purposes of simplicity; and

FIG. 5 is a view similar to FIG. 1 but showing a work train utilizing only a single loading unit.

FIG. 1 discloses a work train comprising a hopper car generally designated A and a pair of loading unit cars generally designated B and B' coupled thereto and adapted to travel over a track D laid on a roadbed E. The portion of the track D being excavated will be to the left of the train shown in FIG. 1, and the train will be moved along the track D to a position just short of the excavated area. The train will be thus moved by a suitable locomotive (not shown). The actual execavation can be accomplished in any desired manner, either manually or through the use of mechanical equipment such as bucket loaders, the latter being preferred for reasons of efficiency.

The hopper car A comprises a hopper 2 into the open upper end of which excavated material is deposited, that material falling onto the leading end 4 of an upwardly and rearwardly inclined conveyor assembly 6. That assembly may consist of an endless conveyor belt motor-driven in any appropriate manner so that its upper reach moves from left to right as viewed in FIG. 1, material deposited at the leading end 4 thereof thus being conveyed to the trailing end 8 thereof. That material then falls onto the leading end 10 of a second upwardly and rearwardly inclined conveyor assembly 12, which carries the material to the trailing end 14 thereof. The car A may be provided with a housing 16 containing the controls for the conveyors 6 and 12 as well as the power supplies therefor and for the rest of the work train. If desired, valve means may be provided at the discharge end of the hopper 2 in order to control the outflow of ballast therefrom. The trailing end 14 of the second conveyor 12 is elevated to a height above that of the succeeding material-receiving cars B and B'.

The material-receiving car B comprises an open-topped body 18 designed to receive and hold material deposited therein, that body being provided with some means for discharging the material stored therein when that is desired. This type of structure is conventional and takes many forms. As here specifically disclosed the discharging means comprises a bottom discharge chute 20, but this is merely for purposes of exemplification.

Two longitudinally extending mounting members 22 (see FIGS. 2–4) are located within the body 18 adjacent the top thereof and laterally spaced from one another, and may be supported by cross beams 24. As here specifically disclosed these mounting members 22 are channel-shaped, having U-shaped cross sections which face one another and which are formed by vertical wall 26, bottom flange 28 and top flange 30. The bottom flanges 28 are substantially continuous. The top flanges 30 are provided with cut-out areas 32 at specific locations therealong (see FIG. 2), the purpose of which will be described below.

The loading unit B is provided with a conveyor assembly generally designated 34 which may comprise side supporting struts 36 between which rollers 38 are mounted. (For purposes of simplicity, only two rollers 38 are specifically disclosed.) An endless conveyor belt 40 passes over the rollers 38, and any suitable means, such as the electric motor 42, is operatively connected to one of the rollers 38, as by the chain drive 44, in order to rotate that roller 38 and thus cause the belt 40 to move in a clockwise direction as viewed in FIG. 3. It will be understood that the specific construction of the conveyor assembly 34 as here disclosed is but typical, and may take many forms.

The conveyor assembly 34 is supported by the mounting members 22 in the following way: shafts 46 extends out laterally from the supporting struts 36 and carry rollers 48 at their ends, those rollers being received within the

channel portions of the mounting members 22 and resting and rolling on the lower flanges 28 thereof. In this way the entire conveyor assembly 34 is movable longitudinally relative to the car body 18 between forward and rear positions, the term "forward" position relating to the left hand position thereof as viewed in the drawings, in which the leading end 34L of the conveyor 34 projects forwardly from the body 18 so as to be brought beneath the trailing end 14 of the conveyor 12 on the hopper car A. A portion 50 of the end walls 52 of the body 18 may be cut away to permit the free passage of the leading end 34L of the conveyor assembly 34 to this forwardly extended position, in which it is illustrated in solid lines in FIGS. 1–4. If the conveyor assembly 34 were to remain in this forward position while the train of which it is a part is in motion, the negotiation of sharp curves by that train might be inhibited, either because of interference between the leading end 34L of the conveyor assembly 34 and apparatus on the hopper car A or interference with trains on other tracks, sides of tunnels or the like. Accordingly, when the train is in motion the conveyor assembly 34 is moved to its retracted position shown in FIG. 5.

When material is to be deposited into the body 18 of the car B the conveyor assembly 34 is moved to its forward position, as shown in FIG. 1, so that material falling from the trailing end 14 of the conveyor 12 of the hopper car A falls onto the belt 40 of the conveyor assembly 34 and is conveyed rearwardly thereby. Means, such as the plow generally designated 54, is mounted on the conveyor assembly 34 so as to force material off from the belt 40, that material then dropping into the body 18. The supporting struts 36 are provided, along their length, with pairs of inclined sleeves 56, and the plow 54 is provided with a supporting bracket 58 including arms 60 adapted to be removably received within the sleeves 56. Thus the plow 54 may be adjustably positioned along the length of the conveyor assembly 34, in this way permitting substantially even distribution of material along the length of the body 18.

When the excavated material is to be caused to fill the body 18' of the next succeeding loading unit B', it is necessary that the material be deposited upon the conveyor assembly 34' of the car B'. In order to permit this to be accomplished lifting means in the form of a pair of jacks 62 are mounted within the body 18 of the loading unit B, those jacks being active, when appropriately extended, between the bottom wall 64 of that body and the supporting struts 36 at points rearwardly spaced from the forward roller-carrying shafts 46 thereon. The effect of the jacks 62 is when extended, to cause the conveyor assembly 34 to assume a rearwardly and upwardly inclined position, as shown in FIG. 1, so that the trailing end 34T of that assembly is raised, thereby to permit the leading end 34L' of the loading unit B' to pass through the opening 50 in the rear end wall 52 of the car B and be positioned thereunder in order to catch the material falling therefrom and convey that material to and into the body 18' of the loading unit B'. In order to permit this upwardly and rearwardly inclined orientation of the conveyor assembly 34 to be attained, the previously mentioned openings 32 in the upper flanges of the mounting members 22 are so located as to register with all of the sets of rollers 48 carried by the conveyor assembly 34 except the forwardmost set of rollers 48, and thus to register when the conveyor assembly 34 is in a forwardly projected position, with its leading end 34L beneath the trailing end 14 of the conveyor assembly 12 on the hopper car A. In this position of the conveyor assembly 34, the forwardmost rollers 48 will be covered by the upper flanges 30 of the mounting members 22. Thus when the jacks 62 are actuated or extended the vertical position of the forwardmost set of rollers 48 will remain constant, but the other sets of rollers 48 will be moved upwardly through the openings 32.

Thus it will be seen that the loading car B can be used

either to receive material within its own body 18 or convey that material to a succeeding loading unit B'.

While the conveyor assembly 34 on the car B need be projected forwardly only for a given distance in order to bring its leading end 34L beneath the trailing end 14 of the conveyor 12 on the hopper car A, it will be noted that additional forward projection of the conveyor assembly 34 is permitted. The reason for this can appreciated by considering the relationship of the conveyor assembly 34' of the car B' to the conveyor 34 of the car B. If the car B' were to be first loading unit of the train its conveyor assembly 34 would have to move forwardly only for the distance shown for the conveyor assembly 34 of the car B. However, when, as is illustrated, it is the second car of the train, its conveyor assembly 34' must be moved forward a greater distance for its leading edge 34L' to be properly positioned. Since the location of a given car in a given train may vary, the construction of each car is preferably such as to enable it to be used effectively no matter where it may be coupled in a given train of cars.

As a result of the use of the construction here disclosed, excavated ballast or other material is caused to flow steadily and rapidly and in great quantities from the hopper 2 into the loading units B and B' automatically and without the use of manual labor. Different numbers of loading cars may be used in a given train, and in particular more than one loading car may be used in a given train, thus greatly improving efficiency of operation. The loading units with their conveyor assemblies take up substantially no more space than conventional cars, and all operations are performed without requiring any appreciable degree of head room, thus rendering the equipment particularly well adapted for use in excavations in restricted areas such as railroad tunnels or tubes. The equipment particularly facilitates the carrying out of excavation operations using the very track being repaired for the removal of excavated ballast to a disposal area.

While the devices here disclosed have been shown as parts of railroad cars, it will be understood that the equipment is also adaptable for use in conjunction with other types of transportation, such as coupled truck trailers and the like, and it will be further understood that many variations may be made in the specific details of the structure here disclosed, all without departing from the spirit of the invention as defined in the following claims.

I claim:

1. A loading unit comprising a car having a material-receiving body with an open top, a pair of spaced longitudinally extending mounting members on said body, a conveyor assembly between said mounting members and having forward and rear supporting elements extending laterally therefrom and received in and longitudinally movable along said mounting members, said conveyor assembly being adjustably positionable longitudinally of said car between a first position and a second position longitudinally spaced from said first position, said mounting members being upwardly open at points registering with said rear supporting elements and upwardly closed at points registering with said forward supporting elements when said conveyor assembly is in its first position, and conveyor assembly lifting means mounted on said body, engageable with a rear portion of said conveyor assembly, and active to lift said conveyor assembly at said rear supporting elements thereof when said conveyor assembly is in its first position, said forward supporting elements of said conveyor assembly being constrained by said mounting members to substantially retain their vertical position, said conveyor assembly thereby being raised to an upwardly and rearwardly inclined position.

2. A loading unit comprising a car having a material-receiving body with an open top, a pair of spaced longitudinally extending channel members on said body with their channel portions facing one another, a conveyor assembly between said channel members and having forward and rear supporting elements extending laterally therefrom and longitudinally therefrom and received in and longitudinally movable along said channel members, said conveyor assembly being adjustably positionable longitudinally of said car between a first position and a second position longitudinally spaced from said first position, said channel members being upwardly open at points registering with said rear supporting elements and upwardly closed at points registering with said forward supporting elements when said conveyor assembly is in its first position, and conveyor assembly lifting means mounted on said body, engageable with a rear portion of said conveyor assembly and active to lift said conveyor assembly at said rear supporting elements thereof when said conveyor assembly is in its first position, said forward supporting elements of said conveyor assembly being constrained by said channel members to substantially retain their vertical position, said conveyor assembly thereby being raised to an upwardly and rearwardly inclined position.

3. A loading unit comprising a car having a front wall, side walls, a rear wall and an open top, said walls defining therebetween a material-receiving space, a conveyor assembly movably mounted on said car and located substantially at an upper part of said car substantially between said side walls, said assembly having leading and trailing portions and being adapted to convey material from said leading to said trailing portion, said assembly extending, from leading to trailing portion of said assembly, substantially longitudinally of said car, means for mounting said conveyor assembly on said car in a normal orientation in a vertical plane for adjustable positioning longitudinally of said car between a first position toward said front wall, in which first position the leading portion of said assembly extends out forwardly beyond said front wall of said car by a predetermined amount, and a second position rearwardly spaced from said first position, and means for selectively lifting the trailing portion of said assembly relative to the leading portion thereof, thereby to cause said conveyor assembly to assume an orientation upwardly and rearwardly inclined relative to said normal orientation.

4. The loading unit of claim 3, in which the trailing portion of said assembly is located forwardly of said rear wall of said car when said conveyor assembly is in both its first and second positions.

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