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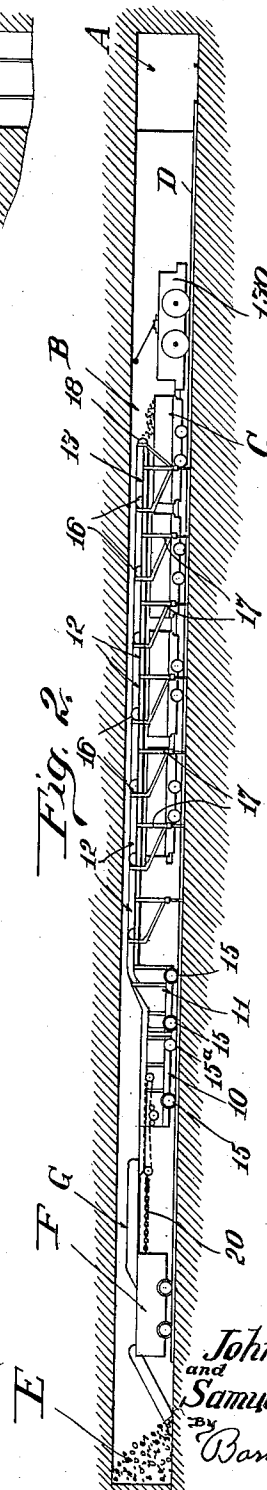
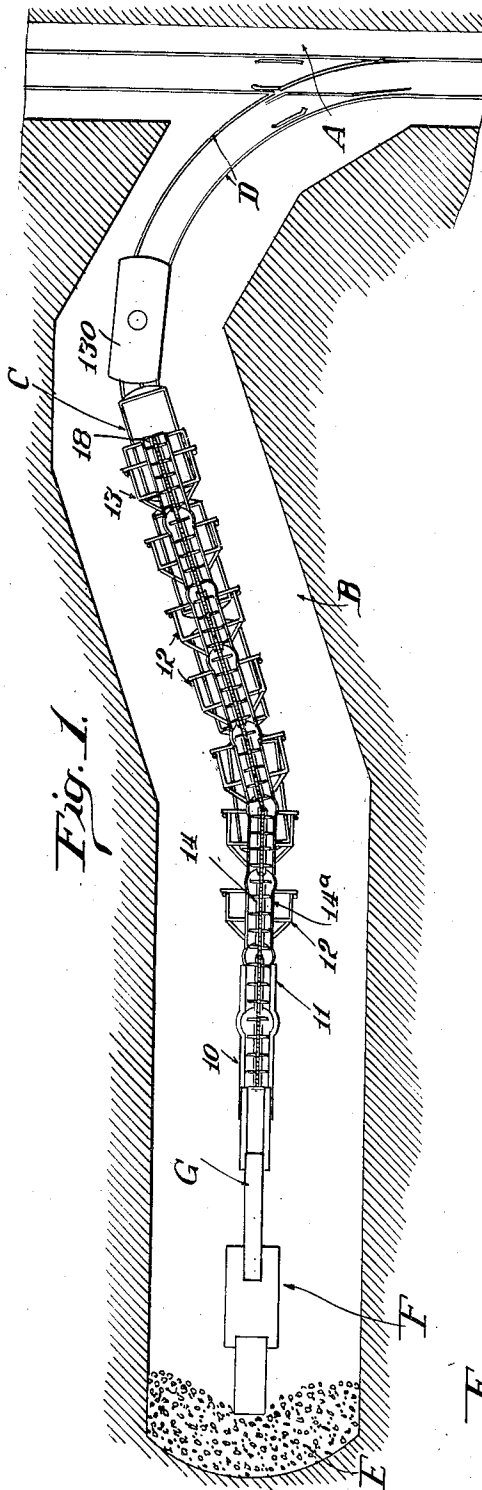
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CONVEYER APPARATUS FOR LOADING CARS

Filed Jan. 18, 1932

8 Sheets-Sheet 1



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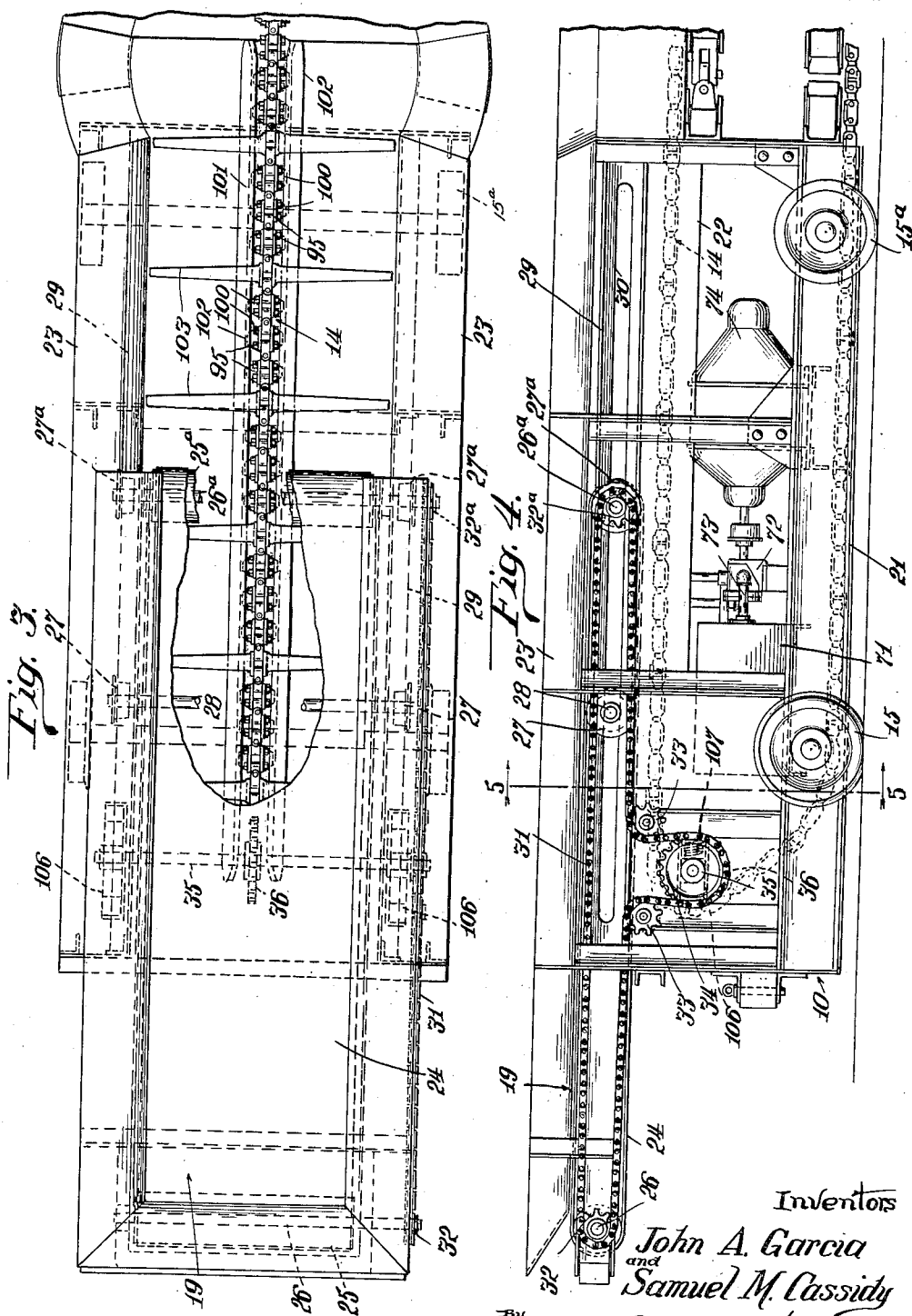
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Fig. 5.

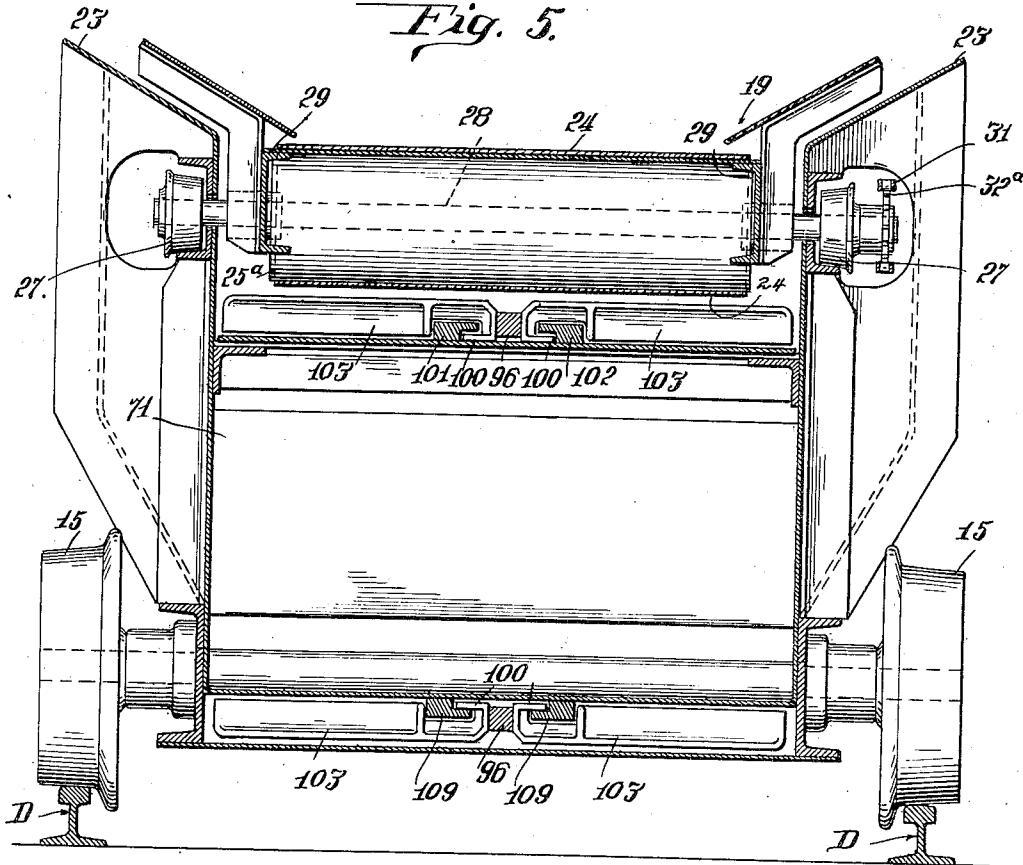
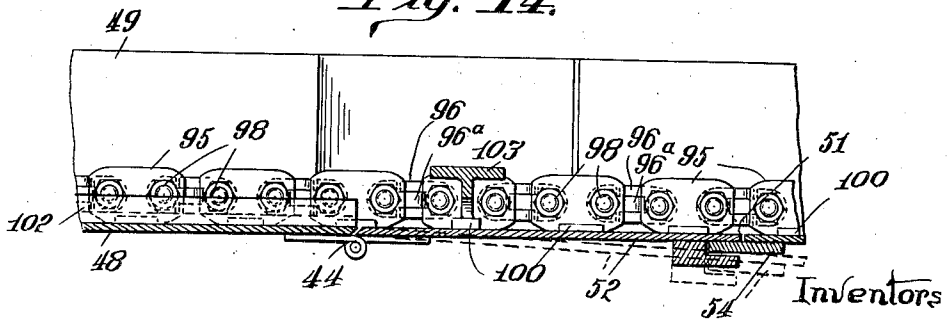


Fig. 14.



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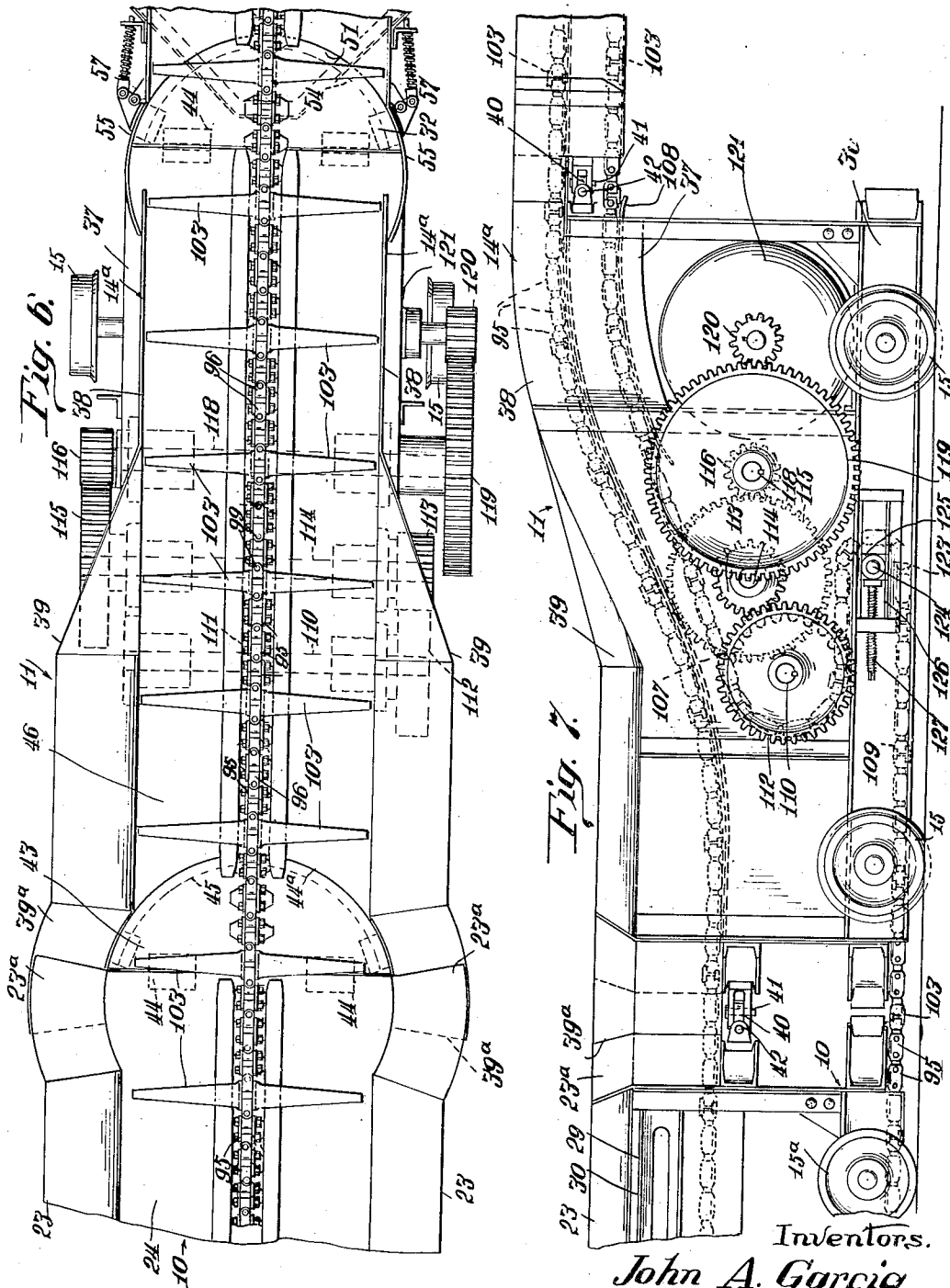
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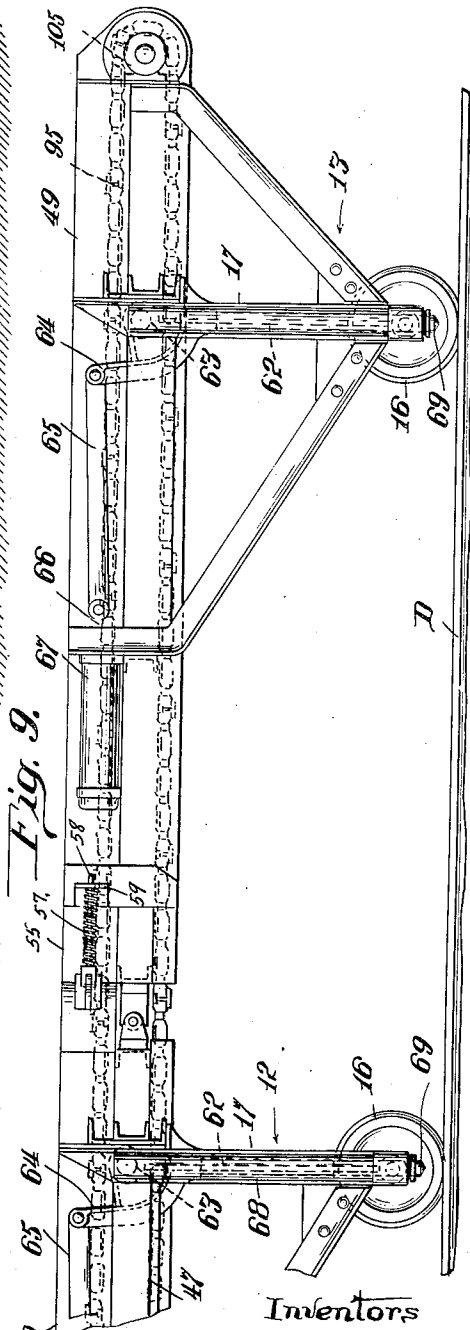
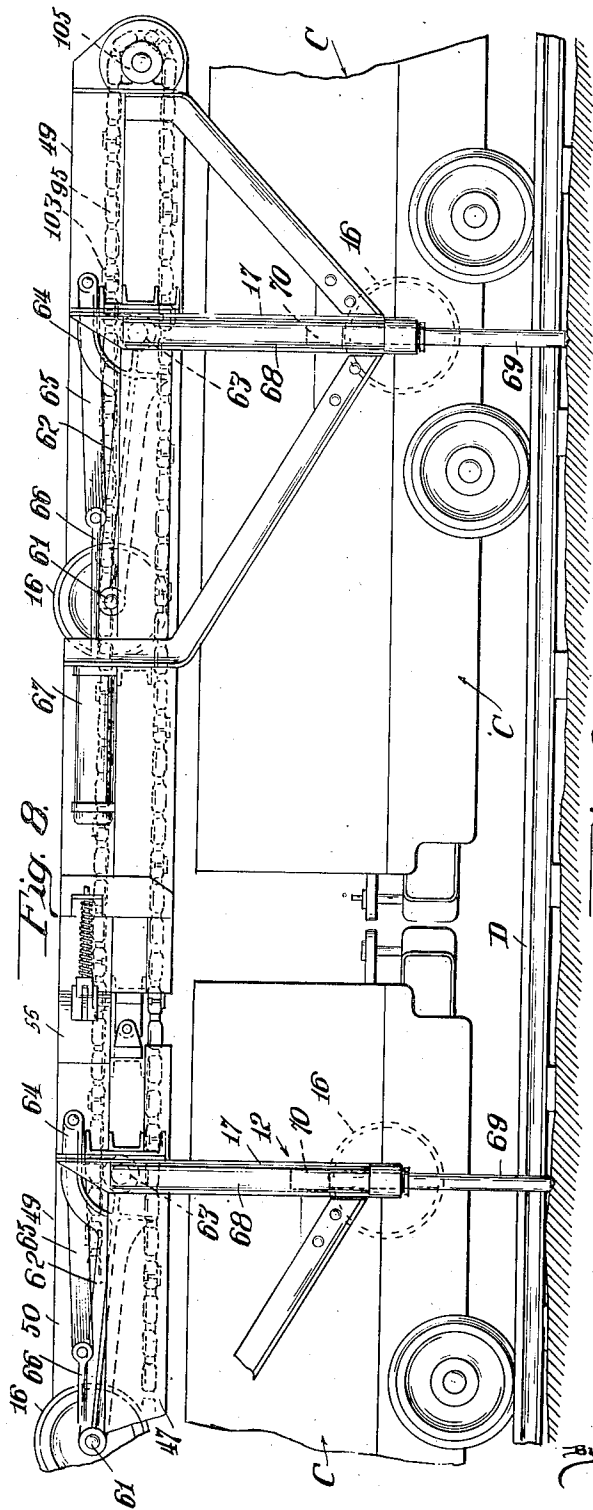
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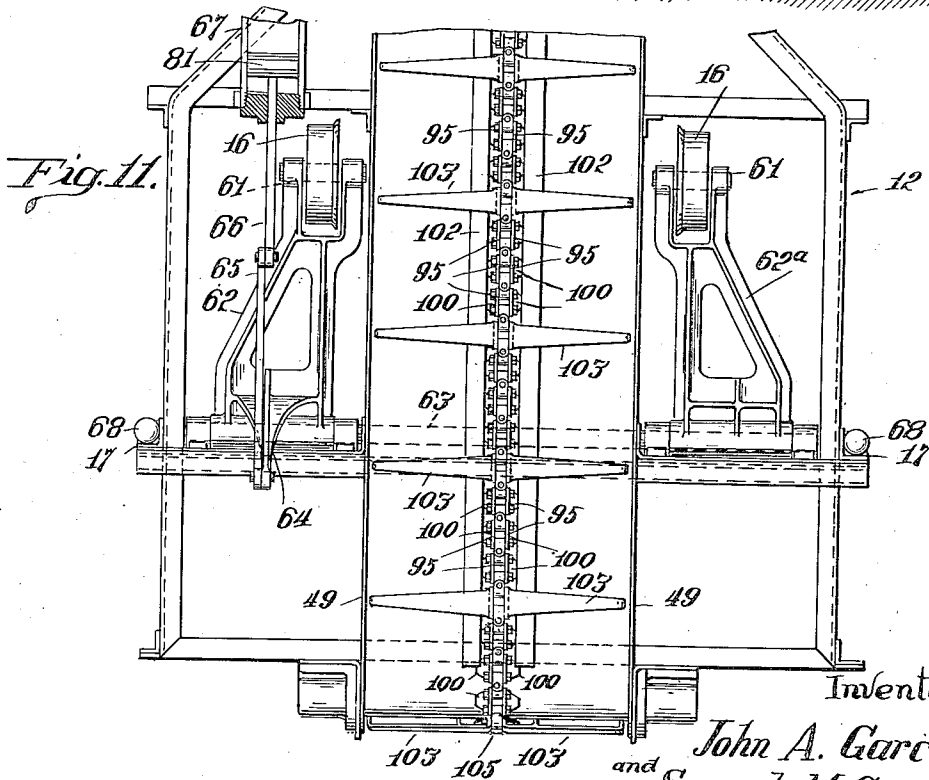
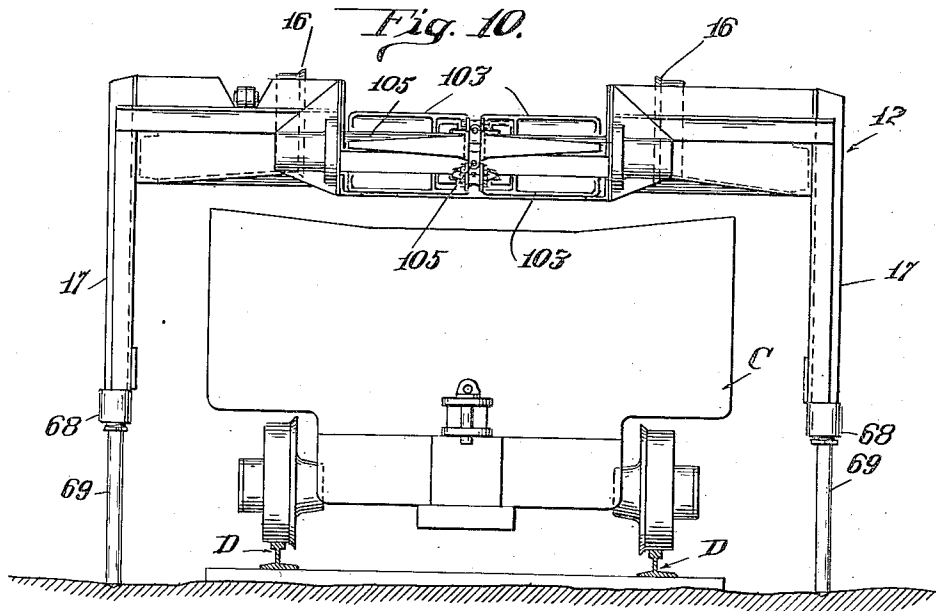
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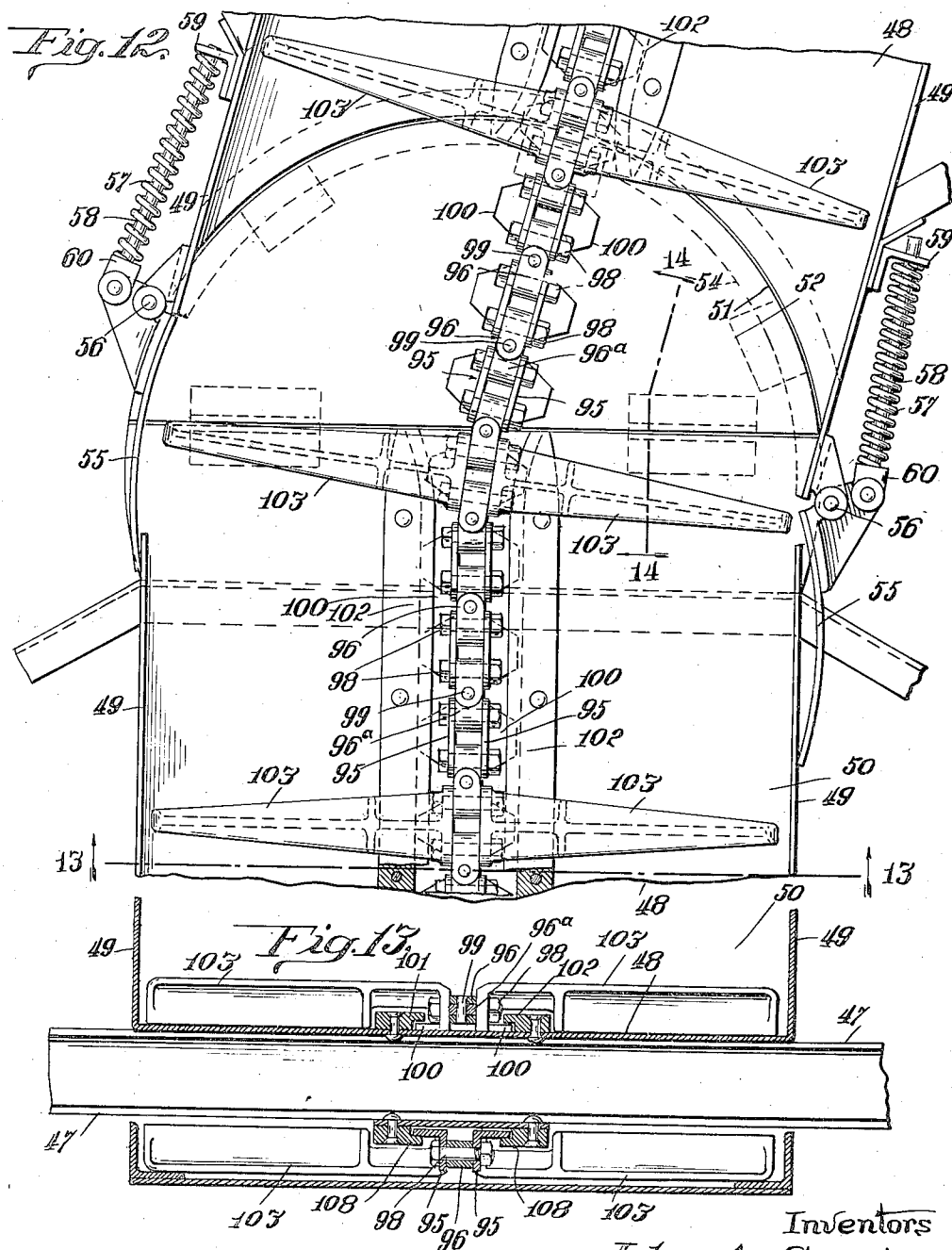
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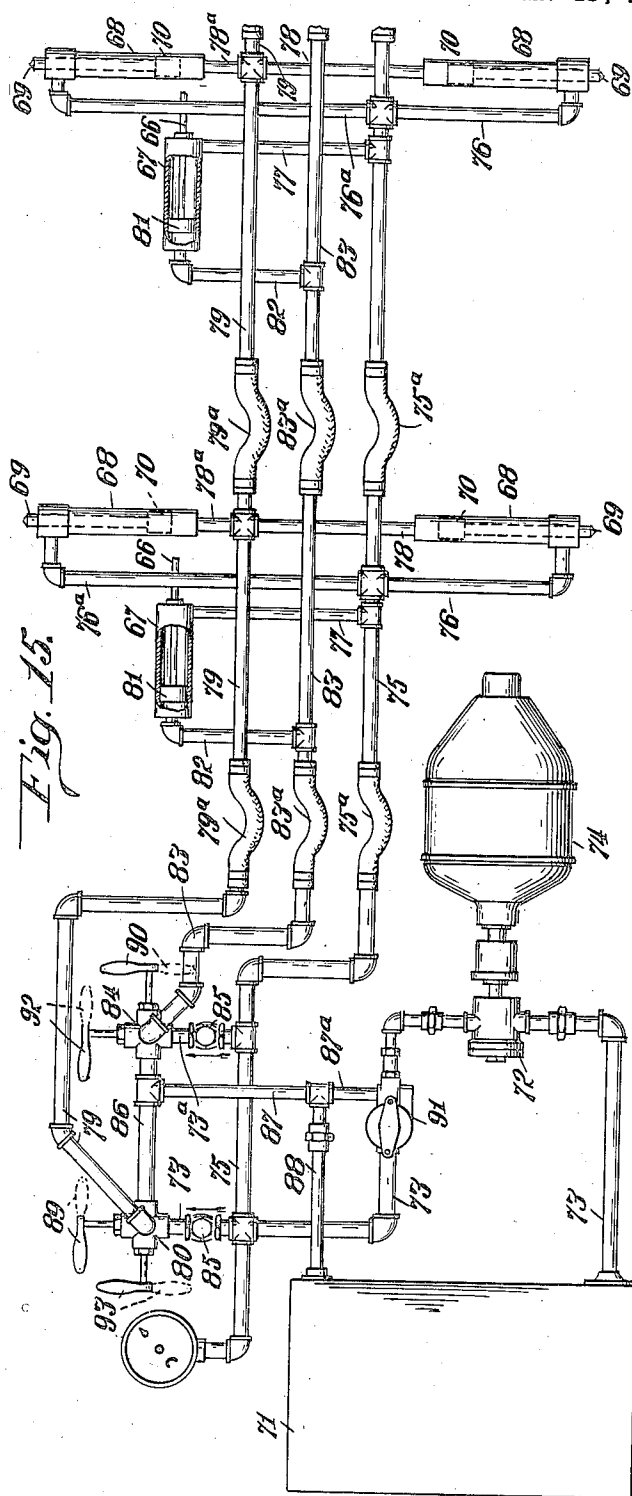
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CONVEYER APPARATUS FOR LOADING CARS

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8 Sheets-Sheet 8



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UNITED STATES PATENT OFFICE

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CONVEYER APPARATUS FOR LOADING CARS

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Application January 18, 1932. Serial No. 587,252

14 Claims. (Cl. 198—139)

This invention relates to improvements in conveyer apparatus and particularly to a portable conveyer apparatus for loading cars in a mine, quarry, or in other situations where a permanently located loading apparatus would be inconvenient, expensive or otherwise undesirable. The principal object of the invention is to provide an improved portable conveyer which will facilitate the loading of a train of cars by making it practicable and convenient to load the entire train of cars without separating or separately switching the cars of the train.

Another object of the invention is to provide a portable conveyer adapted to be so arranged with relation to a railway track or other trackway that a train of cars may be moved beneath and longitudinally of the conveyer during the loading operation regardless of the curvature or the variation in grade of the trackway on which the cars are located.

A further and more specific object is to provide a conveyer apparatus of the above character the operation of which may be interrupted momentarily while the space between adjacent cars of the train is passing beneath the discharge end of the conveyer, without requiring similar interruption in the operation of the mechanism for feeding the material onto the receiving end of the conveyer, thereby making it practicable to operate continuously the shoveling and loading mechanism which delivers the material to the receiving end of the conveyer.

Another object is to provide a portable conveyer of the above character which may be conveniently moved from one location to another and quickly conditioned for operation. In this connection the invention includes a conveyer structure made up of a plurality of articulated units adapted to be movably supported on a railway track, preferably, though not necessarily, by means of track wheels carried by the several units of the conveyer and adapted to be supported in a fixed location above the trackway by means of extensible supporting members positioned at opposite sides of the trackway.

Another object of the invention is to provide a portable conveyer apparatus of the above general character which by reason of its improved construction effects a substantial reduction in the cost of loading a train of railway cars in locations of restricted area, for example, in coal mines and the like, by providing a loading conveyer which requires fewer men for its operation, permits greater concentration of the workings, facilitates better supervision of the loading, minimizes

congestion in the haulage ways, requires less trackway and a lesser number of attendant locomotives than are required in connection with the loading apparatus heretofore used for loading cars in mines and other similar situations.

A further object of the invention is to provide the specific improvements, arrangements and combinations of parts and devices hereinafter described and claimed for carrying out the above stated objects and such other objects as will appear from the following description of the embodiment of the invention shown in the accompanying drawings.

The invention is illustrated in the accompanying drawings where:

Fig. 1 is a plan view of our improved conveyer apparatus and illustrating generally its position relative to a loading machine and the train of cars to be loaded in a coal mine or other situations involving similar conditions.

Fig. 2 is a side view of the apparatus shown in Fig. 1 for loading mine cars.

Figs. 3 and 4 are plan and side views respectively of the unit of our improved conveyer apparatus at the receiving end of the apparatus.

Fig. 5 is a sectional view on line 5—5 of Fig. 4.

Figs. 6 and 7 are plan and side views respectively of the next adjacent unit of the conveyer apparatus, illustrating the means for operating the flexible conveyer belt forming a part of the invention.

Fig. 8 is a side view of the conveyer unit at the discharge end of the apparatus supported on extensible supporting members and showing a train of mine cars positioned beneath the conveyer apparatus for loading.

Fig. 9 is a side view of the conveyer units shown in Fig. 8, but illustrating the extensible supporting members in a contracted position and showing the said units movably supported on the railway track, whereby the conveyer apparatus may be moved from one location to another.

Fig. 10 is an end view of the apparatus shown in Fig. 8.

Fig. 11 is a plan view of the discharge end unit shown in Fig. 8.

Fig. 12 is a plan view of a portion of the conveyer trough and flexible belt of the conveyer apparatus at a location where adjacent units of the apparatus are articulated.

Fig. 13 is a sectional view through the conveyer trough and the upper and lower runs of the conveyer belt, this section being taken on line 13—13 of Fig. 12.

Fig. 14 is a sectional view through the bottom

of the conveyer trough taken on line 14—14 of Fig. 12, and looking in the direction indicated by the arrow; and

Fig. 15 is a diagrammatic illustration of the means for operating the devices for supporting adjacent units of the apparatus during the loading operation and for supporting said units on a railway track while they are being moved from one location to another.

The embodiment of the present invention, as shown herein, is particularly suitable for use as a mechanical loader for loading coal into a train of cars in a mine and will be described herein in connection with such use. It will be obvious, however, that the apparatus may be used to equal advantage in other similar situations and therefore is not limited to coal mining operations.

Referring to the drawings, A designates a principal entry of a coal mine, B a lateral drift in which the coal is mined and loaded into suitable mine cars. The mine cars are designated by the reference character C and run on suitable trackways D. The loose coal to be loaded into the mine cars is indicated at E in Figs. 1 and 2 of the drawings.

A mechanical loader F, heretofore used for loading the loose coal into mine cars, is employed in connection with the present conveyer apparatus to elevate the coal from the floor of the mine and deliver it onto the receiving end of the apparatus of the present invention. The coal supplied to the receiving end of the conveyer apparatus is carried away from the apparatus F and loaded into mine cars C at a substantial distance therefrom.

The conveyer apparatus which constitutes the subject matter of the present invention, is not concerned with the specific constructions of the apparatus F. Any suitable means may be employed for delivering the loose coal from the floor of the mine onto the receiving end of the conveyer apparatus. However, certain structural features of the present embodiment of the invention have been made to harmonize with the normal operation of a loading apparatus F of a type having a boom conveyer G which normally projects over a substantial portion of the conveyer unit at the receiving end of the conveyer apparatus. To this end the height of the conveyer unit at the receiving end of the conveyer apparatus is such as to permit the boom conveyer G of the apparatus F to operate in the space between the roof of the mine and the receiving end of the conveyer apparatus.

Before describing in detail the several units of the conveyer apparatus, the apparatus will be described briefly as a whole. It may be described generally as consisting of a plurality of articulated units 10, 11, 12 and 13 which provide a frame-work for supporting and guiding a flexible conveyer belt 14 which extends the full length of the apparatus. In the present embodiment the framing of each of said units supports a trough section which is flexibly connected with adjacent trough sections to provide a conveyer trough which extends the full length of the apparatus, the said trough being designated as a whole by the reference character 14a. The conveyer belt 14, is preferably of a link belt construction which is flexible both vertically and laterally so as to conform to the general contour of the sectional trough 14a. The units 10 and 11 are supported on track wheels which normally remain on the trackway at all times. The wheels designated 15

wheels 15a are relatively wide and of non-flange construction so as to permit the unit 10 to pass around relatively sharp curves in the trackway D. The several units designated by the reference characters 12 and 13 are each provided with two sets of supporting devices. One set of said supports includes means for movably supporting the units of the apparatus on the trackway whereby the apparatus as a whole may be moved over the trackway to different locations in the mine. In accordance with the generic scope of the present invention, the said movable supports may be carried by the conveyer apparatus, or they may be separate therefrom, such for example, as a train of mine cars adapted to support the articulated units 12 and 13 while they are being transported from one location to another. However, in the embodiment shown herein, the movable supporting means comprises flanged track-wheels 16 swingably mounted on each unit 12—13 and adapted to be moved clear of the trackway D when the apparatus is supported by the second set of supporting devices. The latter set of supporting devices consists of a plurality of extensible leg members 17 disposed on opposite sides of each of said units. The extensible legs 17, when they are extended, seat on the floor of the mine at opposite sides of the trackway and elevate the framework of the conveyer apparatus so as to permit a train of mine cars C to be moved beneath and longitudinally of the conveyer structure. It will be observed by inspection of Figs. 1 and 2 of the drawings that the entire train of cars C may be loaded with material as they are moved in either direction beneath the discharge end 18 of the conveyer structure. It will also be noted from said Figs. 1 and 2 of the drawings that the articulation of the several units is such that the apparatus as a whole will conform to the contour of the trackway in a manner to support the conveyer belt in a position above the center of the trackway. The swingable supporting means and the extensible leg supports of the several units of the apparatus are preferably controlled simultaneously from a central station located on the apparatus so as to facilitate a quick change from one set of supporting members to the other set.

While it is possible to very quickly shift the conveyer structure longitudinally of the trackway, it is desirable to maintain the structure in one location until an entire train of cars are loaded or until all of the loose coal has been loaded into the cars. In order to accomplish this result, the unit 10 is provided with an extensible feed conveyer 19 which is movably supported on the unit 10 so that it can be extended as shown in Figs. 1 and 2, when the loading apparatus F has moved forward a distance greater than the length of its boom conveyer G. The extensible feed conveyer 19 is attached, preferably by means of a chain 20, to the loading apparatus F. By means of said attachment, movement of the apparatus F beyond a predetermined distance from the receiving end of the unit 10, automatically withdraws the feed conveyer 19, thereby affording greater range of movement for the loading apparatus F. The extensible conveyer 19 is automatically moved rearwardly when the apparatus F moves rearwardly a distance sufficient to engage the forward end of said conveyer.

The conveyer apparatus may be moved by any suitable means from one location to another in a mine. A separate motor car may be employed for this purpose if desired.

Detail description of the conveyer apparatus

The unit 10 of the apparatus consists of a lower frame 21 mounted on the track wheels 15—15a, and an upper frame 22, the latter of which supports a hopper structure which extends the full length of the unit. The side walls 23—23 of the hopper are inclined outwardly and upwardly so as to direct the material discharged therein toward the center of the hopper and to also provide sufficient capacity to retain the material discharged from the boom conveyer G when the operation of the belt 14 is interrupted. For example, when the conveyer belt 14 is halted momentarily to prevent the discharge of material into the space between adjacent cars when the cars are moved beneath the discharge end 18 of the conveyer. The increased capacity of the hopper at the receiving end of the conveyer apparatus makes it practicable to operate the loading apparatus F continuously during the loading of the entire train of mine cars. The height of the unit 10 is preferably such that the boom conveyer G of the loading apparatus F may move freely between the hopper and the roof of the mine. This arrangement permits the loading apparatus F to shift its position in accordance with the location of the loose material E without requiring a corresponding change in the position of the conveyer apparatus.

The extensible conveyer comprises a flexible belt 24 which is operatively supported on rollers 25—25a. The said rollers are mounted at opposite ends on shafts 26—26a. The said frame is movably supported in the hopper of the unit 10 by means of wheels 27—27a, mounted on shafts 28 and 26a respectively. The said wheels 27—27a operate between the horizontal flanges of channel members 29—29 secured to opposite sides of the hopper structure of the unit 10, the channel members 29 being slotted as indicated at 30 to permit the shafts 28 and 26a to project through the side walls 23—23 of the unit 10. The belt 24 of the extensible feed conveyer 19 is driven by means of a chain 31 meshed with sprockets 32—32a on the shafts 26—26a respectively. The said chain extends over idler sprockets 33—33 and meshes with a sprocket 34 on a shaft 35. The shaft 35 is rotated by the movement of the flight conveyer 14, the latter of which meshes with a sprocket 36 fixed on the said shaft 35.

The unit 11 comprises a lower frame 36 mounted on track wheels 15, and an upper frame 37 which increases in elevation toward the rear end of the unit. A section of the conveyer trough 14a is supported on the upper frame member. This section of the conveyer trough is designated 38 and is movably connected with the rear end of the hopper structure of the unit 10. The side walls at the forward end of the trough section 38 are preferably inclined upwardly and outwardly as indicated at 39 and overlap the correspondingly inclined sides 23—23 of the hopper portion of the unit 10. The overlapping side portions designated 23a—39a of the adjacent units 10 and 11 are curved outwardly as indicated in Figs. 3 and 6. The curvature of the overlapped sides is substantially concentric with the vertical axis of articulation between the said units. This arrangement permits the units 10 and 11 to assume various angular positions with respect to each other, for example when rounding a curve in the trackway, without separating the adjacent ends of the said side walls. The articulation of units 10 and 11

include a link member 40 having a vertical pivotal axis 41 and a horizontal pivotal axis 42 so that the coupled units have capacity for angular movement both laterally and vertically of each other, thereby permitting the apparatus to conform to variations in the grade of the track-way as well as lateral curvatures thereof. In order to provide a vertically flexible connection between the bottom portions of the hopper 23 and the adjacent trough section 38, a semi-circular bottom plate 43 is hinged at 44—44 to the bottom of the hopper 23. The curved margin 44a of the hinged plate seats on a flange 45 secured to the bottom face of the trough section 38, so as to support the curved edge of the hinged plate substantially flush with a correspondingly curved edge of the bottom plate 46 of the trough section 38.

The rear end of the unit 11 is flexibly connected to the first of a series of units designated 12, by means of a coupling link having a vertical and a horizontal axis such as described in connection with the coupling link 40. The several units 12 and 13 are also connected together by means of the same form of coupling. The said coupling is therefore designated in its several locations by the same reference character used to describe its construction and operation between the units 10 and 11.

The several units designated by the reference character 12 are preferably identical in construction. It will be sufficient, therefore, to describe one of said units. It will be understood, in this connection, that any desired number of said units may be employed to give the conveyer apparatus the required length. Each of the units 12 comprises a body frame 47 on which is supported the bottom 48 and side walls 49—49 of a trough section 50, which trough section, or sections, as the case may be, together with the hopper 23 and trough section 38, form a single conveyer trough 14a extending the full length of the apparatus. The forward edge of the bottom plate 48 is cut away on a radius corresponding to that of the curved edge portion 51 of a semi-circular plate 52 forming a part of the preceding trough section. The curved margin of the hinged plate 52 rests on a supporting flange 54 and is thereby supported flush with the bottom plate 48 of the next adjacent trough section 50. In so far as the connection between the floor plates of adjacent trough sections is concerned, the flexible floor plate construction and the manner in which it is supported flush with the floor plate of the succeeding trough section is substantially the same as that shown for the jointed connection between hopper 23 and trough section 38. The spaces between the ends of the side walls 49—49 of adjacent trough sections 50 are closed by means of yieldable side members 55 (shown best in Fig. 12 of the drawings). Preferably the yieldable side members 55 consist of plates hinged at 56 to the side walls of one trough section so as to overlap the side walls of an adjacent trough section. The said yieldable side members are held resiliently against the side walls of the adjacent trough section by means of springs 57. Said springs surround rods 58 connected to outward projections on the side members 55. The rods hold the springs in position between fixed abutments at 59 on one trough section and abutments 60 on the rods. The said rods are slidably supported in the abutments 59 so that compression of the springs will hold the side plates 55 firmly against the side walls of the adjacent trough section.

Each of the said units 12 and 13 are provided with means for supporting the said units movably on the trackway D. The means referred to consist preferably of the track wheels 16 journaled on stub shafts 61 at the lower end of bracket supports 62—62a arranged at opposite sides of the unit. The upper end of each of said brackets is fixed to a transverse shaft 63 extending across the upper frame of the unit. The bracket 62 is formed also with an upstanding lever arm 64 which is connected by means of a connecting rod 65 with the end of a piston rod 66. The said rod 66 is connected with a piston which reciprocates within a closed cylinder 67. The said piston may be operated by any suitable pressure medium. In the present apparatus the pressure medium for operating the piston and consequently raising or lowering the movable support for each unit consists of oil under pressure which is directed into one end of each cylinder 67 to swing the supporting brackets 62, 62a upwardly and which is directed into the opposite ends of the cylinders 67 when the supported bracket and wheels 16 are moved into position to support the units on the railway track. A more detailed description of the hydraulic operating mechanism will be described in connection with a similar mechanism for operating the extensible leg members 17. The extensible leg members each consist of a cylinder 68 secured rigidly in a vertical position to the frame structure of the units 12 or 13, as the case may be. The opposite ends of the said cylinder 68 are closed except for the opening in the head of the lower end through which the extensible portion or rod 69 extends. The said rod 69 is secured to a piston head 70 slidably fitted within the cylinder 68. The extensible portion 69 of each leg is raised by introducing fluid pressure into the lower end of the cylinder 68. It is forced downwardly against the floor of the mine so as to elevate the conveyer frame by introducing fluid pressure into the upper end of the said cylinder 68. There are preferably extensible leg members 17 on opposite sides of each of the units 12—13. Any suitable stop means may be provided to limit the movement of the piston 70 within their respective cylinders. The rod 69, however, has capacity for movements of different lengths intermediate its maximum travel and thereby compensates for any variation in the floor level of the mine, the said conveyer structure being supported by virtue of a uniform pressure in each of the cylinders 68 regardless of the extent to which the piston 70 is moved in any one of the said cylinders. In other words, the framing and load-carrying structure of the conveyer as a whole is supported on means which automatically adjusts itself to various lengths to meet the conditions encountered in service.

When the conveyer structure is being moved from one location to another in a mine, the extensible portion 69 of the leg members 17 are retracted as indicated in Fig. 9. In this position the swingable supporting members 62—62a are lowered to a vertical position so that the track wheels 16 run on the trackway D. When the apparatus is transported to the desired location the extensible portions 69 of the supports 17 are moved downwardly so as to lift the entire structure upwardly towards the roof of the mine and thereby relieve the track wheels 16 of the weight of the conveyer structure whereupon the said track wheels 16, together with the supporting brackets 62—62a are swung upwardly from the

position shown in dotted lines in Fig. 8 to the position shown in full lines in that figure. The above operation of the movable and the extensible supporting means is obtained by hydraulic pressure mechanism as follows:

A supply reservoir for the oil employed in the hydraulic system is indicated at 71. Piping 73 connects the lower portion of said reservoir with a pressure pump 72 adapted to be operated by any suitable means, for example, a motor 74. The said piping 73 leads out of the pump 72 and communicates with a constant pressure line 75. The line 75 extends the full length of the several conveyer units 12 and 13 and communicates by means of branch pipes 76—76a with the lower ends of the cylinders 68 of the extensible supporting members 17. The constant pressure line 75 is also connected by means of branch pipes 77 to the ends of the cylinders 67 from which the piston rods 66 project. The upper ends of the several cylinders 68 are connected by means of branch pipes 78, 78a to an intermittent pressure line 79 which in turn communicates with a control valve 80, the latter of which is interposed in the pressure lines 79 and 73. The head ends 81 of the cylinders 67 (for operating the swingable support) are connected by means of branch pipes 82 with an intermittent pressure line 83, the latter of which communicates with a control valve 84. The valve 84 communicates with the constant pressure line 75 by means of a branch pipe 73a. Check valves 85 are interposed in the line 73 and in the branch pipe 73a between the constant pressure line 75 and the valves 80—84 so as to permit the oil to flow through the check valves only in the direction indicated by the arrows. The valves 80—84 are also connected with each other by means of a pipe 86 which, together with the branches 87 and 88 provide a return or exhaust line to the upper portion of the oil reservoir 71. The trunk lines 75, 83 and 79 are connected between the several units of the conveyer structure by means of the flexible connections designated in the drawings 77a, 83a, and 79a, respectively, so as to permit the several units of the conveyer to assume angular positions with relation to each other.

The operation of the hydraulic system is as follows: Assuming that the parts of both sets of supporting devices 16 and 17 of the several units are in the position indicated in Fig. 9 of the drawings and that it is desired to set up the conveying apparatus for operation at a predetermined location. The pressure in the constant pressure line 75 maintains the extensible portions 69 of the supporting member 17 in the retracted position until the valve handle 89 is turned to the dotted line position causing fluid pressure from the pump 72 to flow through the valve 80 into the intermittent pressure line 79 and on through the branches 78—78a to the larger area of the piston 70 in the cylinders 68. By virtue of the difference in area of the opposite faces of the pistons 70, the pressure on the larger area of the pistons will displace the fluid on the opposite side thereof (the smaller area of piston), thereby causing it to flow back into the constant pressure line 75. The fluid pressure in the constant pressure line, that is to say, that portion of the fluid displaced from the cylinders 68, is then recirculated through valve 80 into the intermittent pressure line 79. This re-circulation of fluid results from the fluid taking the path of least resistance. When the pressure capacity in line 79 has been attained, the fluid therein

is held in check by means of a check valve 85, the discharge of fluid from the pump 72 being then by-passed through by-pass valve 91 and pipes 37a and 88 into the supply reservoir 71.

After the extensible leg supporting members 69 have been expelled from the cylinders 68 a suitable distance to elevate the conveyer troughs 14a to the desired position, the valve levers 89 are returned to the full line position thereby cutting off the feed of oil into the intermittent pressure line 79 and consequently maintaining the conveyer structure at that elevation. The movable supporting members 25 are then swung upwardly from the dotted line position shown in Fig. 8 to the full line position shown in that figure. This operation is accomplished by turning the valve lever 92 of the valve 84 from the full line position to the dotted line position shown in Fig. 14, whereupon the fluid pressure is caused to flow from the pump 72 through the valve 84 and into the intermittent pressure line 83, thence through the branch pipes 82 to the large area of the pistons 81. This pressure causes the pistons in the several cylinders 67 to force their piston rods outwardly and by means of the connection 65 with the crank arms 64 of the brackets 62 rotate the shafts 63 in a direction to swing the track wheel supporting brackets 62, 62a upwardly to the full line position shown in Fig. 8.

By virtue of the differences in areas of the piston heads 81 in cylinders 67, the pressure on the larger area of the several pistons will displace the fluid on the opposite side thereof, causing the fluid to flow through branches 77 back into the constant pressure line 75, from which line it is re-circulated through valve 84 into the intermittent pressure line 83, this result being obtained by reason of the fluid flowing in the direction of least resistance. When the pressure capacity has been attained, the fluid in the intermittent pressure line 83 is held in check by means of a check valve 85 and the discharge of fluid from pump 72 is again by-passed through the by-pass valve 91 and pipes 37a—88 into the supply reservoir 71. When it is desired to lower the swingable supporting member, the valve lever 90, of valve 84, is turned from the full line position to the dotted line position. In this position of the valve the pressure from the constant pressure line 75 acts on the small area of pistons 81 in cylinders 67, causing them to displace the fluid on the opposite sides of said pistons, thereby forcing the displaced fluids through branches 82 into the intermittent pressure line 83 and on through valve 84 and exhausted through branches 86, 87 and 88 into the supply reservoir 71. Both levers 90—92 of the valve 84 are now returned to the full line position. When it is desired to retract the extensible portion 69 of the cylinders 68, the lever 93 of valve 80 is turned from the full line position to the dotted line position. The pressure from the constant pressure line 75 then acts on the small area of pistons 70 in the cylinders 68, causing the said pistons to displace the fluids on the larger areas thereof, thereby forcing such fluid through branches 78—78a into the intermittent pressure lines 79 and on through valve 80, from which it is then exhausted through branches 86, 87 and 88 into the supply reservoir 71. When the extensible portions 69 of the supports 17 are sufficiently retracted to permit the wheel 16 to rest on the rails of the trackway D, the valve levers 89—93 are both returned to the full line position as shown in Fig. 8.

The conveyer belt designated generally by the reference character 14 consists preferably of a sprocket chain made up of link side bars 95—95 and connecting link members 96—96a for flexibly connecting the said side bars of one link with corresponding side bars of an adjacent link of the chain. The connecting link members 96—96a are pivoted on horizontal axes 98 between the side bars 95—95 and are pivotally connected with each other about a vertical axis 99. This form of articulation of the line provides a chain which is flexible both laterally and vertically, thereby permitting the chain to assume a contour corresponding to any angular arrangement assumed by the several units or sections of the conveyer structure. The side bar members 95—95 are each provided with laterally extending flanges 100 which project beneath guide bars 101, 102 secured to the bottom plate of each trough section. The said guide bars 101—102 serve to hold the chain in the center of the trough structure and also prevent it from being displaced upwardly relative to the floor of the trough. At predetermined locations throughout the length of the chain certain side bar members of a link are formed integrally with laterally projecting arms or flights 103—103. Preferably the arms 103 extend from the chain to the side walls of the conveyer trough and form flights which engage the material being handled and move it through the trough to the discharge end of the conveyer. The conveyer chain extends over the sprocket 36 at the receiving end of the apparatus and over a sprocket 105 at the discharge end of the apparatus. The sprocket 36 is on shaft 35 which is preferably yieldably supported in guideways 106 by means of compression springs 107 so as to permit the upper run of the conveyer belt to vary its effective length to compensate for any variation required when the several units of the apparatus are moved at different angular positions with respect to each other. The lower run of the conveyer belt is supported beneath the floor plate of the several trough sections by means of supporting and guiding bars 108—108 (shown best in Fig. 13) secured to the under side of the frame structure of the units 12 and 13, 10 and 11, respectively. The guide bars on the unit 10 being disposed between and supported by the lower frame 21. The latter guide bars are indicated in Fig. 5 by the reference character 109.

The conveyer chain is driven by means of a sprocket 110 (Fig. 7) mounted on a shaft 111 which is journaled in suitable bearings supported by the frame structure of the unit 11. The shaft 111 is provided with a large gear 112 which meshes with a pinion 113, the latter of which is mounted on a transverse shaft 114. The shaft 114 is provided at one end with a large gear 115 which meshes with a pinion 116 on shaft 118. A large gear 119 on the shaft 118 meshes with a pinion 120 fixed on the shaft of a motor 121. Surplus slack in the conveyer chain is taken care of by means of an idler sprocket 123 on a shaft 124 which is mounted in bearings 125 slidably supported in guideways 126 at opposite sides of the lower frame 33 of the unit 19. The bearings 125 are held in suitable adjusted positions by means of a screw 127. The said screw 127 may be adjusted to take up any surplus looseness in the chain resulting from stretch of the link members or wear of the pivotal connections.

Summary of operation

The conveyer structure being made up of a plurality of articulated units having trough sections which flexibly connect the trough section of an adjacent unit, may be set up for operation above a mine trackway so that the cars to be loaded may be positioned beneath the conveyer structure. When the conveyer structure is moved to a location for operation, the extensible supporting means 17 are first operated so as to lift the conveyer units 12 and 13 relative to the trackway and bring their respective trough sections into substantial alignment with the upper end of the trough section of the unit 11. When the frame structure of the units 12 and 13 have been elevated to a suitable height, pressure is introduced into cylinders 67 to force the piston therein toward the forward end of the cylinder. This movement of the said piston, by reason of its connection through the links 65 to the crank arm 64 of one of the wheel supporting brackets 62, rocks the shaft 63 so as to swing the wheels 16 and the brackets 62, 62a of each unit upwardly to a position substantially horizontal with respect to the framing of the unit. When the movable supporting members have been swung to their upward position as above described, a train of cars can be moved, by means of the locomotive 130 beneath the conveyer structure. The material to be handled is delivered onto the hopper end of the apparatus by means of the mechanical loader device F and is conveyed by means of the conveyer belt 14 to the discharge end 18 of the apparatus at which point it is delivered into the cars C of the train. When the loading device moves a predetermined distance from the unit 10, the chain connection 20 between the apparatus F and the extensible feed conveyer 19 moves the conveyer 19 outwardly, as shown in Fig. 2. In such case the coal is received by the extensible conveyer. The loading operation may be carried on while the train of cars is being moved beneath the conveyer structure or while the cars are being withdrawn therefrom. When any of the spaces between the cars pass beneath the discharge end 18 of the conveyer, a suitable control for the motor 121 is operated to interrupt the forward movement of the conveyer chain until another car C comes into position beneath the said discharge end of the conveyer. During this period of interruption in the operation of the conveyer, the loading mechanism F may continue its loading operation since the hopper construction of the trough section on the unit 10 is of sufficient capacity to take care of the amount of material discharged therein during the normal interruptions in the operation of the conveyer belt.

We claim:

1. A portable conveyer apparatus for loading cars comprising an endless belt and means for supporting the same above and longitudinally of a railway track comprising a plurality of belt supporting units adapted to be connected one with another provided with retractable supporting means for movably supporting said units on said railway track and provided also with legs disposed on opposite sides of the railway track whereby a train of cars may be positioned beneath and longitudinally of said belt.

2. A portable conveyer apparatus for loading cars comprising an endless belt and means for supporting the same above and longitudinally of a railway track comprising a plurality of belt

supporting units adapted to be connected one with another provided with retractable supporting means for movably supporting said units on said railway track and provided also with extensible legs disposed on opposite sides of the railway track and adapted to elevate the belt with relation to said track whereby a train of cars may be positioned beneath and longitudinally of said belt.

3. A portable conveyer apparatus for loading cars comprising an endless belt composed of a plurality of articulated units provided with extensible legs disposed on opposite sides of the railway track and adapted to elevate the belt with relation to said track, retractable supporting means for movably supporting said units on the railway track and adapted upon the elevation of the belt to move to a position whereby a train of cars may be positioned beneath and longitudinally of said belt.

4. A portable conveyer for loading cars comprising, in combination, a frame structure composed of a plurality of articulated units, means supported by said units for conveying material lengthwise of the structure, means for movably supporting said units on a railway track whereby they may be moved to different locations, means disposed at opposite sides of the track for supporting the said frame structure above and lengthwise of the track; said means for movably supporting said units being adapted to be moved to a position to permit a train of cars to be positioned beneath and lengthwise of said frame structure.

5. A portable conveyer for loading cars comprising a conveyer trough composed of a plurality of articulated sections, a flexible belt member movable through said conveyer trough, means for movably supporting said sections on a railway track, and means for supporting said trough sections in a stationary position above and longitudinally of the track comprising extensible leg members disposed at opposite sides of the track; said means for movably supporting said trough sections being adapted to be moved to a position to permit a train of cars to be moved beneath and longitudinally of said articulated units.

6. A portable conveyer for loading cars comprising a conveyer trough composed of a plurality of articulated sections, a flexible belt member movable through said conveyer trough, means for supporting said units in a stationary position above a railway track, and means for movably supporting said units on said track comprising members movably attached to the said units and adapted, when the conveyer trough is supported in a stationary position above said track, to be moved to a position to permit a train of cars to be positioned beneath and longitudinally of said conveyer trough.

7. A portable conveyer for loading cars comprising a conveyer trough composed of a plurality of articulated sections, a flexible belt member movable through said conveyer trough, means for supporting said units in a stationary position above a railway track, and means for movably supporting said units on said track comprising members swingably mounted on the said units and adapted, when the conveyer trough is supported in a stationary position above said track, to be moved to a position to permit a train of cars to be positioned beneath and longitudinally of said conveyer trough.

8. A portable conveyer for loading cars comprising a conveyer trough composed of a plurality of articulated sections, a flexible belt mem-

ber movable through said conveyer trough, means for supporting said units in a stationary position above a railway track, and means for movably supporting said units on said track comprising track-wheels and supporting arms therefor swingably mounted on said trough units and adapted, when the said trough units are supported in said stationary position, to swing upwardly into a position longitudinally of the track, whereby a train of cars may be positioned beneath and longitudinally of said conveyer trough.

9. A portable conveyer for loading cars comprising a conveyer trough composed of a plurality of articulated sections, a flexible belt member movable through said conveyer trough, track wheels for movably supporting said units on a railway track, extensible leg supports disposed at opposite sides of the track and adapted when extended to elevate the trough sections and support them in a stationary position above said track, and means for moving said track wheels to a position to permit a train of cars to be positioned beneath said conveyer trough.

10. A portable conveyer for loading cars comprising a conveyer trough composed of a plurality of articulated sections, a flexible belt member movable through said conveyer trough, track wheels for movably supporting said units on a railway track, extensible leg supports disposed at opposite sides of the track and adapted when extended to elevate the trough sections and support them in a stationary position above said track, means for operating said extensible leg supports, and means for moving said track wheels to a position to permit a train of cars to be positioned beneath said conveyer trough.

11. A portable conveyer for loading cars comprising a conveyer trough composed of a plurality of articulated sections, a flexible belt member movable through said conveyer trough, track wheels for movably supporting said trough section on a railway track, extensible leg supports disposed at opposite sides of the track and adapted when extended to elevate said trough sections and support them in a stationary position above said track, hydraulic pressure means for operating said extensible leg supports to maintain the said conveyer trough in its elevated position, and means for moving and supporting said track wheels clear of the space beneath the conveyer trough section, whereby a train of cars may be moved beneath said conveyer trough.

12. A portable conveyer for loading cars comprising a conveyer trough composed of a plurality of articulated sections, a link belt extending through said trough comprising link members articulated on vertical and horizontal axes and flight arms projecting laterally from the link belt for engaging the material in the trough, guiding means for maintaining the conveyer belt in a centralized position in said trough, and retractable means carried by said articulated sections for movably supporting said trough sections on a railway track, and means for supporting said sections in a stationary position above and longitudinally of said trackway.

13. A portable conveyer for loading cars comprising a conveyer trough composed of a plurality of articulated trough sections, a flexible belt member movable through said conveyer trough comprising a link belt made up of link members articulated on vertical and horizontal axes, and flight arms secured to said links and extending laterally of the belt, guide members secured to the trough bottom and overlapping portions of the link belt to hold it from movement away from the trough bottom, means for movably supporting said trough sections on a railway track, means for elevating and supporting said trough sections and said movable supporting means above said track to provide unobstructed passageways beneath the said trough sections, whereby a train of cars to be loaded may be positioned beneath and longitudinally of the conveyer structure.

14. Apparatus for loading mine cars comprising in combination a conveyer structure adapted to be supported in a fixed position above a railway track, a forwarding conveyer belt operating longitudinally of said structure, means movable with relation to the said conveyer structure for collecting material from the floor of the mine and delivering said material onto the receiving end of said conveyer structure, a belt conveyer movably supported at the receiving end of said conveyer structure for feeding material onto the forwarding conveyer and adapted to be extended to receive material from said movable collecting means, and means operatively connecting said extensible feed conveyer with means for operating said forwarding conveyer belt.

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