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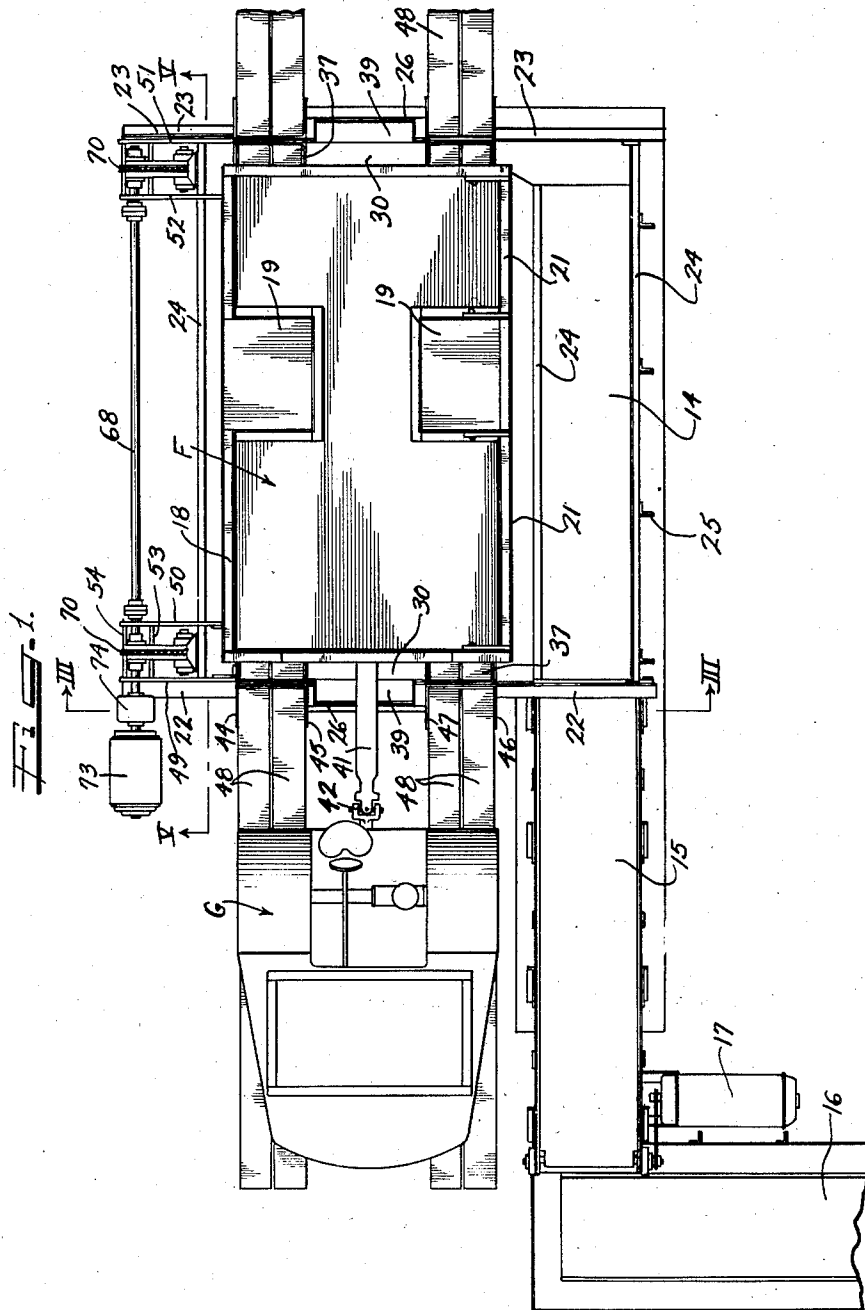
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2,384,904

DUMPING APPARATUS

Filed Aug. 23, 1943

6 Sheets-Sheet 1



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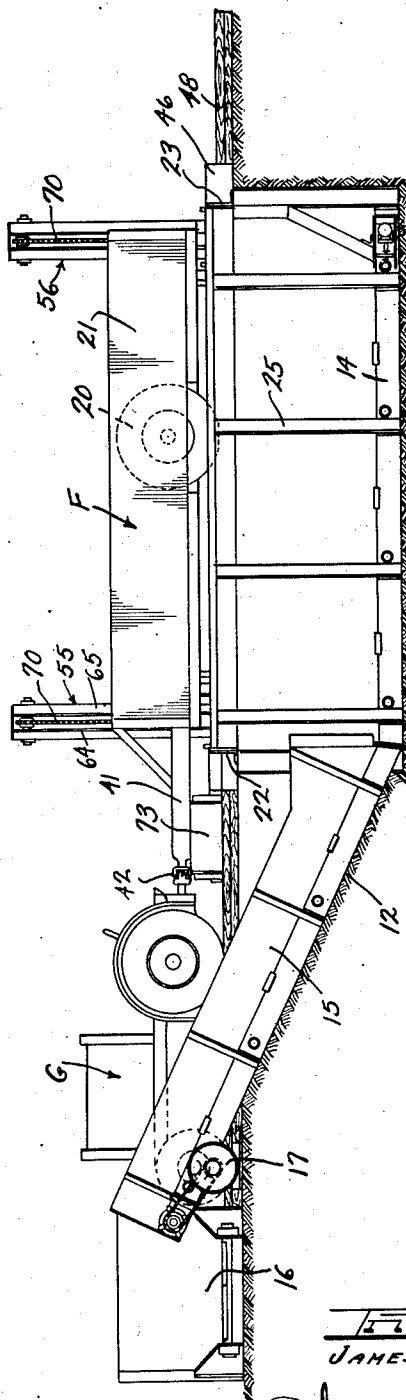
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Fig. 2.



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Fig. 2.

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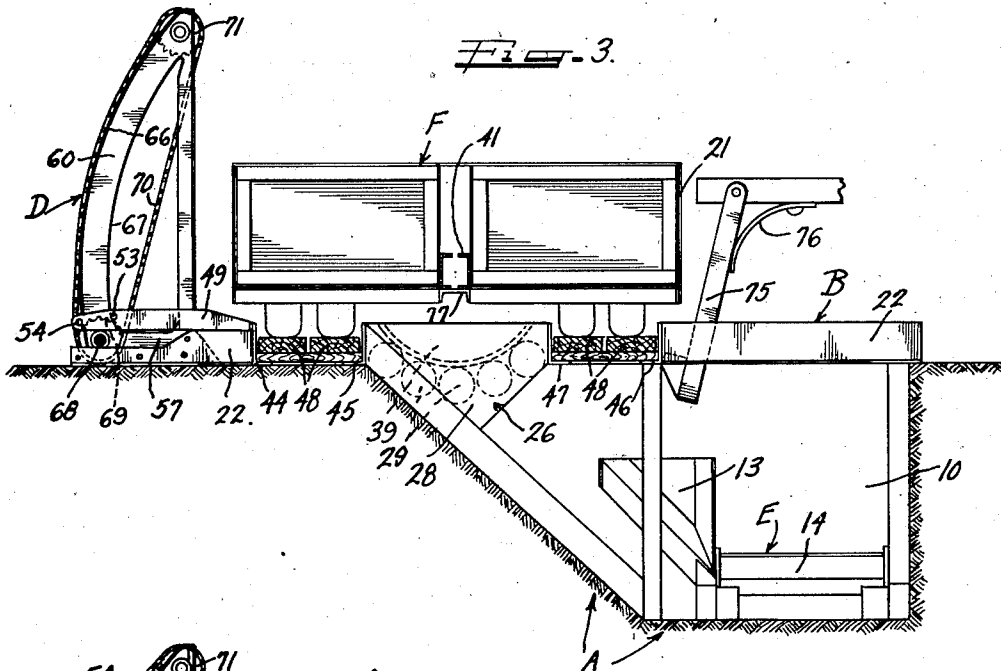
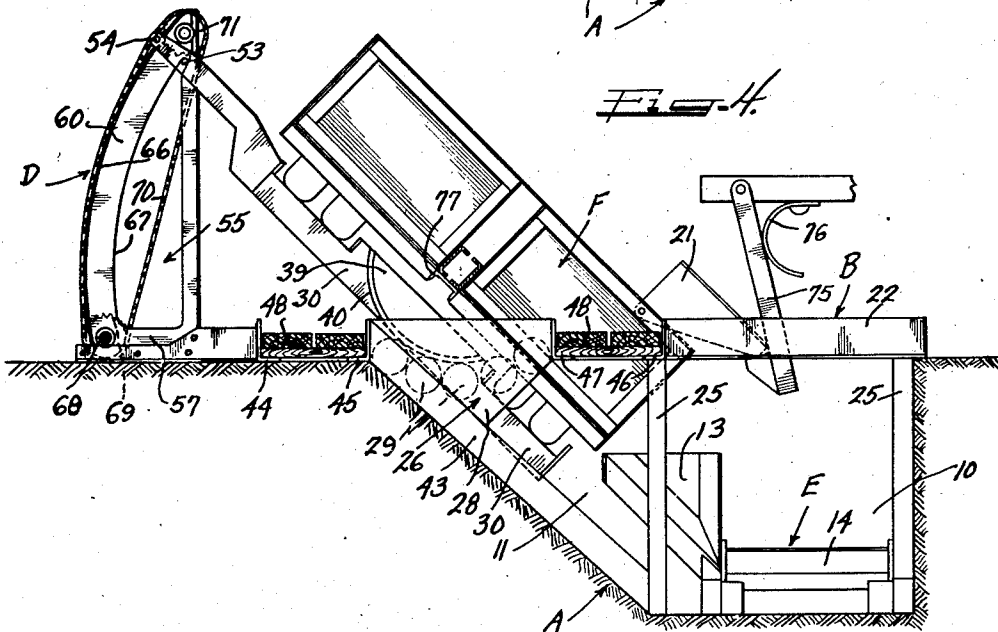
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2,384,904

DUMPING APPARATUS

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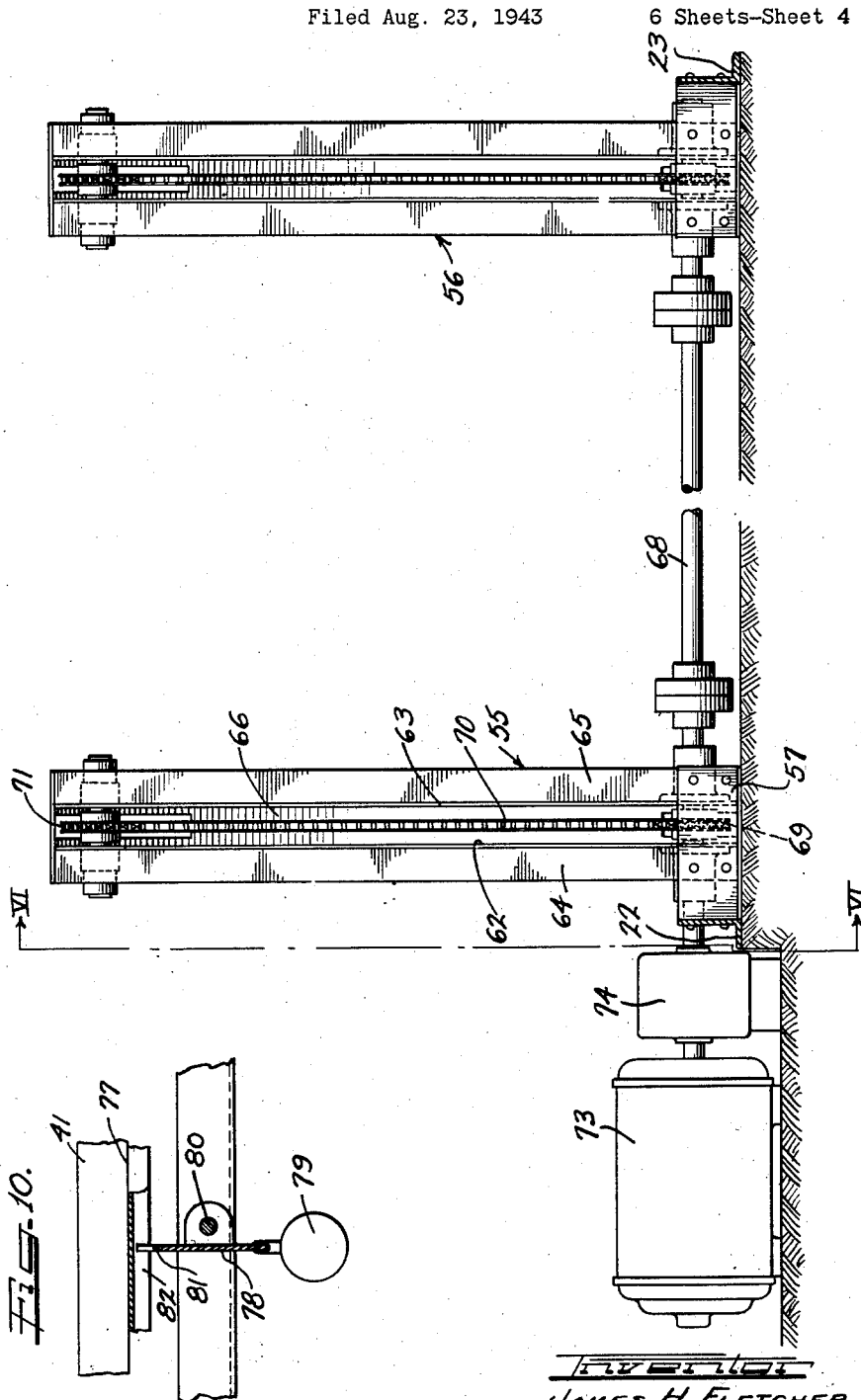
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DUMPING APPARATUS

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Fig. 5.



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Fig. 5.

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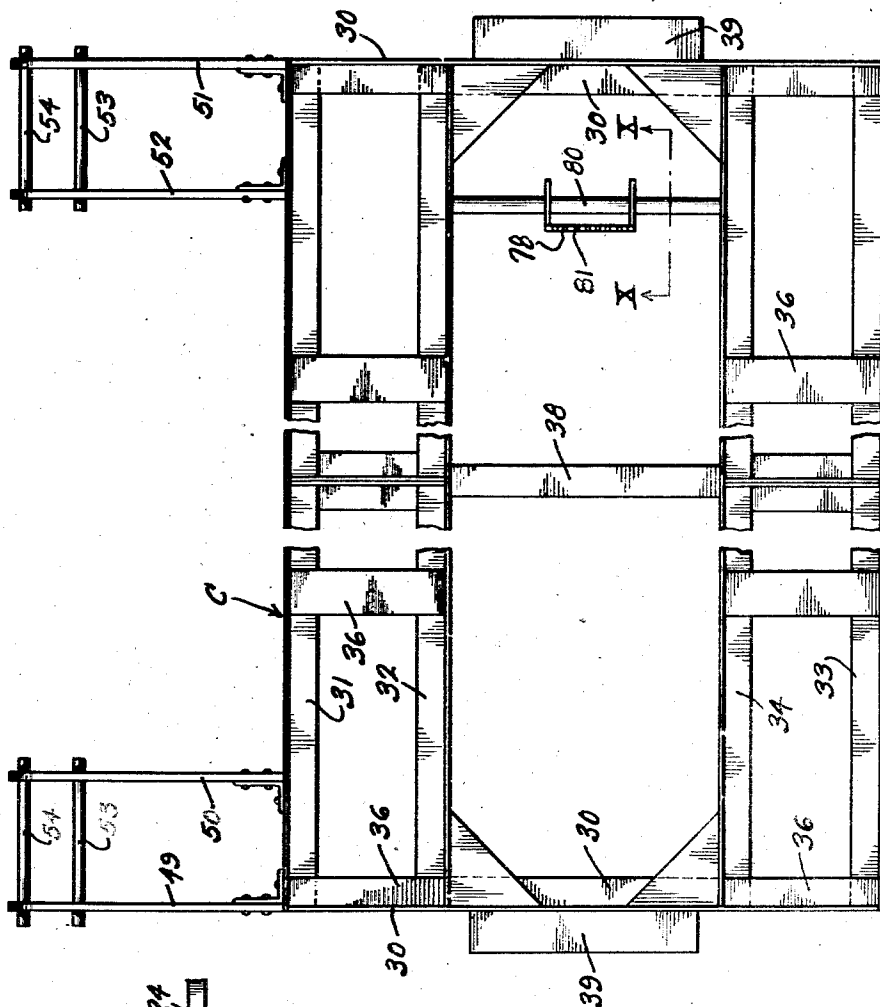
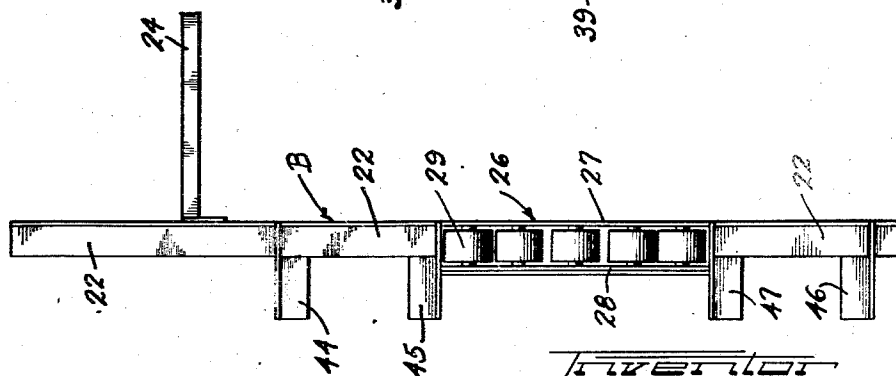
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2,384,904

DUMPING APPARATUS

Filed Aug. 25, 1943

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UNITED STATES PATENT OFFICE

2,384,904

DUMPING APPARATUS

James H. Fletcher, Wilmette, Ill.

Application August 23, 1943, Serial No. 499,595

6 Claims. (Cl. 214—52)

This invention relates to dumping apparatus for use in mines for dumping mine material, such as coal, from haulage units onto conveyor structures at transfer points for transfer to cars on main line conveyors for transport out of the mines.

An important object of the invention is to provide dumping apparatus particularly adaptable in seam mining where head room is limited and whose installation will require only a comparatively small shallow pit to thus eliminate large feed pits at transfer points and cutting down the excavation volume and time consumption.

Another object is to provide dumping apparatus adapted to receive a loaded haulage unit and rotate it on a longitudinal axis for side dumping therefrom of the contents onto conveyor structure traveling alongside of the unit.

A further object is to provide dumping apparatus for receiving a loaded trailer coupled to a propulsion or tractor unit and to effect side dumping of the trailer without need of uncoupling thereof from the tractor unit.

Another object of the invention is to produce dumping apparatus which is of particular advantage where the side dumping haulage units are of the flat bottom rectangular type which afford maximum carrying capacity within permissible operating limits in a mine.

The various features of my invention are embodied in the structure disclosed on the drawings, in which drawings—

Figure 1 is a plan view of the dumping apparatus showing a load carrying trailer drawn onto the apparatus ready for the dumping operation;

Figure 2 is a side elevation of the dumping apparatus;

Figure 3 is a section on line III—III of Figure 1;

Figure 4 is a similar section showing the dumping operation;

Figure 5 is an enlarged section on line V—V of Figure 1;

Figure 6 is a section on line VI—VI of Figure 5;

Figure 7 is a section on line VII—VII of Figure 6;

Figure 8 is a plan view of the dumping cradle;

Figure 9 is a plan view of one end of the base frame; and

Figure 10 is a section on plane X—X of Figure 8.

The dumping apparatus embodies a pit A, a base frame B mounted over the pit, a cradle frame C on the base frame for receiving the

vehicles to be dumped, the cradle operating means D, and conveyor mechanism E.

The pit A comprises the rectangular part 10 and the triangular part 11, and the upwardly sloping part 12 at the end of the part 10. The pit part 11 receives the discharge side of the tilted vehicle F for dumping of its contents into a stationary hopper 13 for reception by the conveyor 14 in the pit part 10, this conveyor discharging into the upwardly inclined conveyor 15 for discharge into another conveyor 16 from which the coal is carried into cars or onto a main line belt for transport from the mine. The conveyors may be driven by an electric motor 17 in any well known manner.

The coal haulage unit shown comprises the trailer F and the tractor or motor vehicle G. The trailer body 18 is rectangular, with a horizontal bottom and vertical sides and with rectangular protecting guards 19 for the wheels 20. The trailer is side dumping, the side wall on the dumping side being in the form of a door 21 which may have hinged connection with the ends of the trailer body and also the wheel guard 19 at the dumping side, as clearly shown on Figures 1 and 4.

The base frame B comprises front and rear end beams 22 and 23 which extend, respectively, on the ground adjacent to the front and rear ends of the pit, the end beams being connected by a number of longitudinally extending spacer bars 24. In the pit excavation 10, uprights 25 extend from the base of the conveyor 14 to the base frame to assist in supporting the frame over the excavation.

Each of the base frame end beams 22 and 23 includes a bearing frame 26 comprising inner and outer plates 27 and 28 between and in which are journaled a number of bearing rollers 29 arranged in an arcuate row, and these arcuate roller bearings support the cradle frame C.

The cradle frame is best shown on Figure 8. It comprises the end beams 30 connected by pairs of longitudinally extending bars 31, 32 and 33, 34, the bars being shown as angle bars. Cross bars 35 on these angle bars support boards 37 to provide trackage for the wheels of the haulage trailer. A cross bar 38 may extend between the two pairs of angle bars to hold them properly spaced and to provide rigidity.

The end bars 30 of the cradle frame have secured to their outer sides segment shaped bearing extensions 39 whose top surfaces are parallel with the end bars. These extensions project into the bearing frames 26 on the base structure B

with their arcuate lower surfaces 40 engaging the rollers 29 in the frames.

Referring to Figure 1, the trailer F has the tongue beam 41 extending along its bottom and forwardly therefrom for connection by a universal coupling 42 with the tractor G. The centers of the bearing arcs between the bearing segments 39 on the cradle frame and the rollers 29 on the base frame are located in the longitudinal axis of the coupling connection between the tractor and the trailer, as clearly shown on Figures 2, 3 and 4. With these bearing segments, the bearing frames 26 for the rollers 29 may be located sufficiently below the bearing arc center line for sufficient clearance between the bottom of the trailer and the base structure B when the trailer is drawn onto the cradle frame. Furthermore, the arcuate bearing surfaces of the segment bearing members are comparatively long for distribution of the trailer load over a plurality of the bearing rollers 29. The bearing friction is thus reduced and less power will be required to rock the cradle frame for dumping of the trailer contents. The bearing frames 26 are strengthened for load supporting by the brace bars 43 extending therefrom for connection with the inner risers 25 extending between the base frame 22 and the frame of the conveyor structure in the pit 10, as best shown on Figures 3 and 4.

Each of the side beams 22 and 23 of the base frame 22 has pairs of angle bars 44, 45 and 46, 47 secured to and extending outwardly therefrom in alignment with the pairs of bars 31, 32 and 33, 34 of the cradle frame C, these angle bar ends serving to align the ends of boards 48 with the boards 37 on the cradle frame to provide trackage for the tractor and trailer when the loaded trailer is to be hauled onto the cradle frame.

The cradle frame C at the ends thereof has the pairs of arms 49, 50 and 51, 52 extending laterally therefrom, each pair of these arms being apertured at their ends for the insertion of inner and outer guide bars 53 and 54, these bars cooperating with hoisting mechanism for rotation or rocking of the cradle frame for dumping of the contents from a trailer thereon. The hoisting mechanism is shown on Figures 3 to 7. It comprises standards 55 and 56 supported on the ground and secured to the ends of the end beams 22 and 23 of the base frame B. Each standard comprises the base structure 57 with parallel spaced-apart walls 58 and 59 secured thereto and rising therefrom. These walls are cut out to leave the opposed outer arcuate portions 60 and 61 and the inner portions 62 and 63, these inner portions being secured to and reinforced by angle bars 64, 65 extending upwardly from the base 57. The outer arcuate edges of the walls 58 and 59 are spanned by a plate 66 secured thereto as by welding. The center of curvature of the arcuate portions of the standards coincides with the center line of curvature of the arcuate bearing surfaces 40 on the bearing segment 39 on the cradle frame.

When the dumping apparatus is assembled, the arms 49, 50 and 51, 52 of the cradle frame receive between them the standards 55 and 56, respectively, and the guide bars 53 and 54 are then inserted in the arms for engagement, respectively, with the inner edges 67 and the plates 66 of the arcuate portions 60 and 61 of the standards.

A shaft 68 extends through and is journaled in the standards at the lower ends of the arcuate portions 60 and 61 thereof. In each standard the shaft has a sprocket wheel 69 keyed thereto for engagement by an endless chain belt 70 which, at

its upper end, engages a sprocket wheel 71 journaled between the arcuate portions 60 and 61 at the upper end thereof. By screws 72 or other means (Figure 6) the chains are connected with the outer bars 54 in the respective arms on the cradle frame. As shown on Figures 1 and 5, the shaft 68 is driven by an electric motor 73 through reduction gearing within a housing 74. The reduction gearing is not shown, but is of some suitable self-locking type so that upon stoppage of the motor the shaft will be locked against rotation.

Figures 1, 2 and 3 show the cradle frame C in its normal or horizontal position, the tractor having just drawn a loaded trailer onto the cradle frame. The operator now starts the motor 73 for clockwise travel of the chains 70 and rotation of the cradle frame. As the cradle frame rotates, the lower edge of the dumping door 21 will engage with the end of a hook member 75 normally held out by a spring 76. As the rotation of the cradle with the trailer thereon continues, the dumping door will be held by the hook member for opening thereof and dumping of the trailer contents into the hopper 13 for reception by the conveyor structure 14. After the dumping operation the operator reverses the motor for return travel of the chains and restoring of the cradle frame with the trailer thereon to its normal position. As the normal position is being reached, the dumping door will be released from the hook member and the door can be swung back to its closed latched position. The dumped coal is received from the conveyor 14 by the conveyor 15 which discharges the coal into the cross conveyor 16 for deposit into cars for haulage out of the mine.

As the axis of rotation of the cradle frame coincides with the longitudinal axis of the coupling 42 between the trailer and the tractor, the tractor need not be uncoupled while the cradle frame undergoes its dumping operation.

When the cradle is rotated for dumping of a loaded trailer thereon, sidewise movement of the front end of the trailer on the cradle will be prevented by the coupling connection 42. Means are provided for holding the rear end of the trailer against side slippage of the cradle frame. As shown on Figures 3 and 4, a length of channel bar 77 is secured to the underside of the tongue beam 41 along the rear end thereof, the tongue beam extending the full length of the trailer. Referring to Figures 8 and 10, a dog 78, with a weight 79 at its lower end, is mounted on a bar 80 on the cradle frame for swinging movement, the dog at its upper end terminating in teeth 81 which will be held by the weight 79 in the path of the flanges 82 of the channel bar 77. As the trailer is drawn onto the cradle frame, either both or at least one of the channel flanges will engage between teeth on the dog, and as the dog is held against lateral movement on the cradle frame, the rear end of the trailer will be held against side slippage on the cradle frame when this frame is rotated for a dumping operation.

I have thus produced dumping apparatus and arrangement which is particularly adaptable and efficient in seam mining, where headroom is limited. With the side dumping arrangement disclosed, comparatively little pit volume is required, thus very materially cutting down the volume time and cost of excavation. With the arcuate roller bearings at or below the level of the base frame, and the bearing segments on the cradle frame below the level of the cradle

frame, low-slung haulage units may travel over the cradle frame with low clearance space between the haulage unit and the cradle frame so that, with the side dumping of the trailer, the required headroom will be reduced to a minimum.

Although I have shown a practical and efficient embodiment of the various features of my invention, I do not desire to be limited to the exact construction, arrangement and operation shown and described, as changes and modifications may be made without departing from the scope of the invention.

I claim as my invention:

1. Dumping apparatus comprising a base frame mounted to extend over a dumping pit, a bearing frame on each end of said base frame having bearing rollers therein arranged in the arc of a circle, a cradle frame extending between and within the ends of said base frame, a bearing extension on each end of said cradle frame having a lower bearing surface extending in a circular arc for bearing engagement with the rollers in the respective bearing frame, arms extending laterally from the side of said cradle frame, operating mechanism comprising endless chain means connected with said arms, and a motor for driving said chain means, said operating means normally holding said cradle frame in horizontal position for reception of a side dumping haulage unit and effective when operated to rotate said cradle frame for dumping of the haulage unit contents, said operating means including an arcuate guide structure having surfaces engaged by said arms whose center coincides with the center of the arcuate bearing surfaces on said cradle frame.

2. Dumping apparatus comprising a base frame for resting on the ground over a dumping pit, a bearing frame on each end of said base frame having bearing rollers therein arranged in an arcuate row, a cradle frame between the ends of said base frame and having segmental bearing extensions at its ends for engagement with the rollers in the respective bearing frames whereby said cradle frame may be rotated, an arm extending from said cradle frame, and hoisting means connected with said arm for rotation of said cradle frame for discharge of material from a side-dumping vehicle on the cradle frame, said hoisting means including a standard having inner and outer arcuate guide surfaces thereon for said arm, the center of curvature of said arcuate surface being a line extending through the centers of curvature of the bearing arcs of said rollers and segmental bearing extensions whereby said bearing arcs will be maintained concentric during rotation of said cradle frame.

3. Dumping apparatus for mine use comprising a base frame for resting on the mine floor over a dumping pit, a cradle frame within the plane of said base frame having trunnion connections therewith at its ends, a standard at one side of said base frame having inner and outer arcuate guide surfaces centered at the axis of said trunnion connections, an arm extending laterally from said cradle frame and having engagement at its outer end with the arcuate side surfaces of said standard for guiding said cradle frame when rotated on said trunnion connections, and hoisting means connected with said arm for rotating said cradle frame for side dumping of a haulage unit thereon.

4. Dumping apparatus for mine use comprising a base frame for resting on the mine floor over a dumping pit, a cradle frame within the plane of said base frame having trunnion connections therewith at its ends, a standard at one side of said frame having inner and outer arcuate guide surfaces centered at the axis of said trunnion connections, an arm extending laterally from said cradle frame and having engagement at its outer end with the arcuate side surfaces of said standard for guiding said cradle frame when rotated on said trunnion connections, sprockets at the upper and lower ends of said standard, an endless chain engaging said sprockets, the outer leg of said chain engaging against the outer arcuate side surface of said standard and being secured to the end of said arm, and a reversible motor connected with the shaft of the lower sprocket for driving said chain for rotation of said cradle frame for side dumping of a haulage unit thereon and for returning the cradle frame to horizontal position after dumping of the unit.

5. Dumping apparatus for mine use comprising a base frame for resting on the ground over a dumping pit, a cradle frame normally within the plane of said base frame and having trunnion connection therewith at its ends, a standard on said base frame at each end thereof, each standard having inner and outer arcuate side surfaces centered in the axis line of the trunnion connections, arms extending laterally from the ends of said cradle frame, each arm having engagement at its outer end with the arcuate side surfaces of the corresponding standard whereby said cradle frame will be guided when rotated on said trunnion connections, upper and lower sprocket wheels on each standard, a drive chain surrounding each standard and meshed by the sprocket wheels thereof, each of said arms having connection with the corresponding drive chain, a drive shaft for the lower sprocket wheels, and a driving motor for operating said drive shaft for rotation of said cradle frame for side dumping of haulage units received thereon.

6. Dumping apparatus adapted particularly to be used in mines having limited head room for dumping of a side dumping trailer connected with a tractor by a universal coupling, comprising a rectangular base frame resting flat on the ground over a dumping pit and having end beams, a flat rectangular cradle frame within the plane of said base frame and having end beams adjacent to the end beams of said base frame, trunnion segments secured to the outer sides of the end beams of said cradle frame to be entirely outside of said end beams to overhang the end beams of said base frame, recesses in the base frame end beams and arcuate rows of rollers journaled in said recesses, said trunnion segments extending into said recesses for engagement of their arcuate surfaces with said roller rows, the center line of curvature of said segment arcuate surfaces and said arcuate rows of rollers being in the longitudinal axis of the coupling between a trailer on said cradle frame and the tractor therefor whereby said cradle frame with the trailer thereon may be rotated on said base frame for dumping of the trailer without uncoupling of the trailer from the tractor, and means for controlling the rotation of said cradle frame.

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