Jan. 6, 1953 H. W. SANFORD 2,624,292

DOOR LATCH MECHANISM

Original Filed April 16, 1945

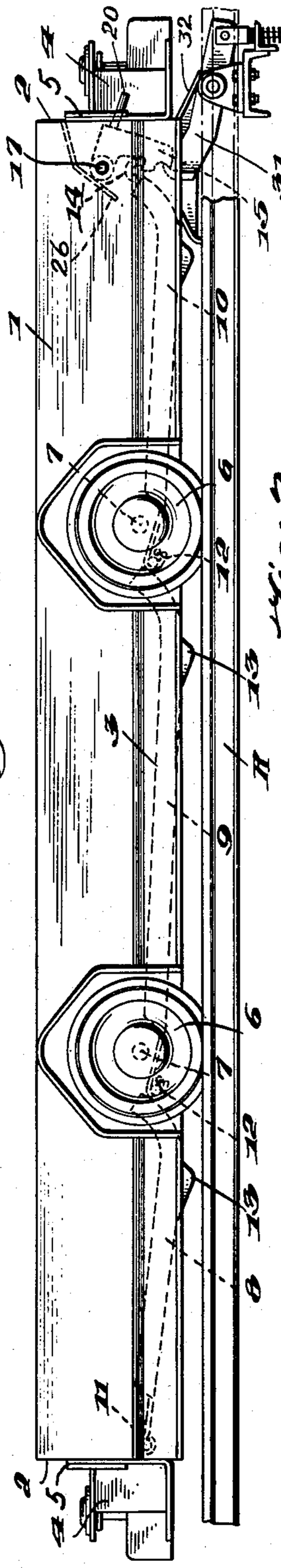

Fig. 1.

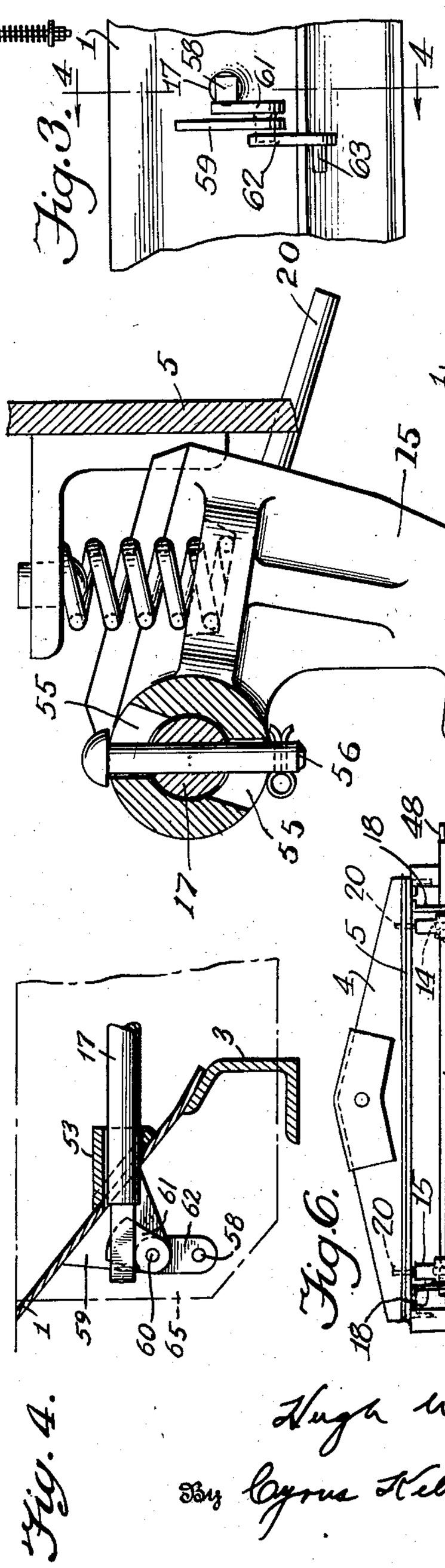

Fig. 2.

Fig. 3.

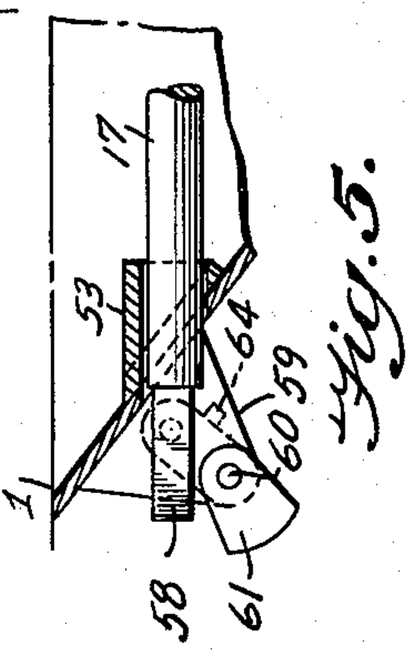

Fig. 5.

Fig. 4.

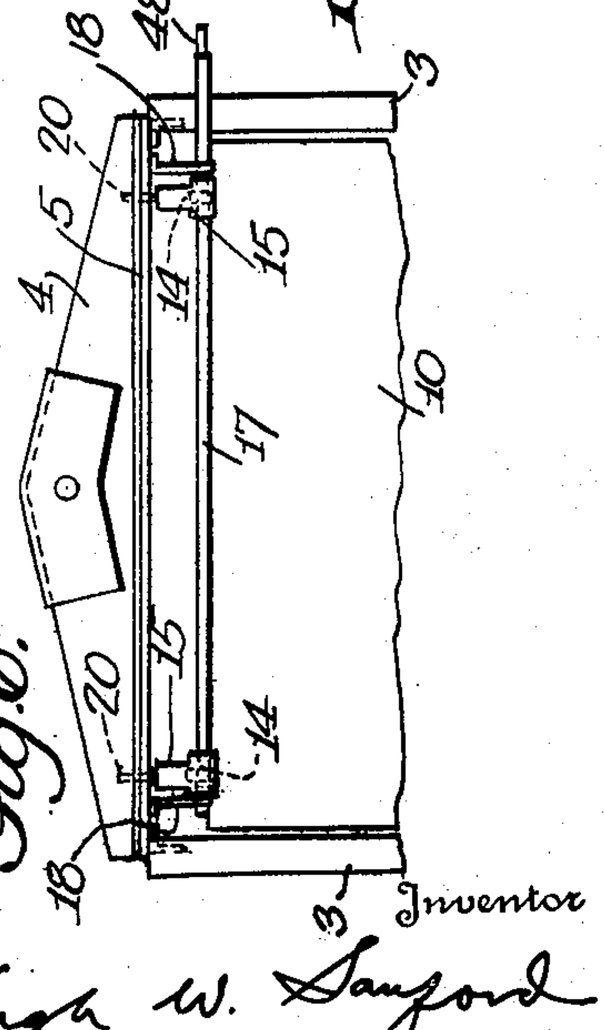

Fig. 6.

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DOOR LATCH MECHANISM

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12 Claims. (Cl. 105—308)

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This invention relates to improvements in door latch mechanisms, particularly for mine cars and other conveying devices having drop bottom doors for the discharge of lading therefrom.

This application is a division of my prior application for Door Latch Mechanisms, Ser. No. 588,577, filed April 16, 1945. It is also an improvement on the latch devices set forth in my prior application, Ser. No. 432,341, filed February 25, 1942, now Patent No. 2,399,708, granted May 7, 1946.

In the door latch mechanisms set forth in my prior patent, the latches that support the free edge of the door were mounted at transversely spaced points on opposite sides of the longitudinal center line of the car in positions to engage and support the free edge of the door. In that application and patent the latches were adapted to be engaged directly by the tripping device mounted in the trackway, to release the same from engaged position. The latches were either fixed to the cross shaft or free thereof.

An object of this invention is to improve the construction of the latch mechanism, in which one or both latches is mounted on the cross shaft for freedom of movement with respect thereto in one direction, except as such resistance may be offered to the movement by friction or a spring, but in which movement of the shaft will operate the latch to release it from the door. Therefore, the latch has lost motion with respect to the shaft, so as to be free to move only in one direction with respect thereto without moving the shaft or the other latch mounted thereon. However, when the rock shaft itself is rotated, both latch hooks must move from their door supporting positions into their door releasing positions.

A further object of the invention is to provide for the locking of the latch hook against releasing movement whereby to make it impossible for the doors to drop when the car is in transit. This is desirable particularly when workmen are riding in the cars, as may be done occasionally in transporting workmen into and out of the mine.

I have provided a supporting member for the latch hook which is rotatable with the hook in moving to a released position, and has means for locking this supporting member against turning movement so as to hold the hook against releasing action, whereby the latch hook will be retained in its latched position.

The invention is shown applied to a mine car as the preferred application thereof, in the accompanying drawings in which:

Fig. 1 is a side elevation of the mine car and latch tripping mechanism;

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Fig. 2 is a side elevation, partly in section, showing the mounting of the latch hook on the rock-shaft;

Fig. 3 is a detailed side elevation of a portion of the car, showing the cross shaft lock mechanism;

Fig. 4 is a transverse section therethrough on the line 4—4 in Fig. 3, showing the device in its locked positions;

Fig. 5 is a similar view showing the lock means in released position; and

Fig. 6 is a partial top plan view of the car showing the mounting of the latches.

This invention is shown as applied to a mine car of the general type set forth in my prior patent, No. 2,001,471, granted May 14, 1935, adapted for conveying coal or other loose lading from a receiving point to a tipple or other point of discharge. The mine car is shown to be of the 4-wheel type, having three drop bottom doors interconnected for release in one-two-three order. This application of the invention is used, however, merely for the purpose of illustration, and it is evident that the subject matter of this invention may be applied to other types of cars, vehicles, and drop bottom conveyors in general, wherever it may be desirable to release bottom doors for dropping, in which the principles of this invention may be applicable.

The general structure of the car illustrated comprises a car body formed of side and end walls 1 and 2, rigidly secured together, the side walls 1 rising from a pair of oppositely disposed side sills 3, connected together at the ends of the car by means of combined end-sills and bumpers, designated generally at 4 and supported by bumper plates 5. The side and end-sills 3 and 4 comprise the frame structure of the car for supporting the lading body thereof, and between which is a bottom opening designed generally for discharge of the lading therethrough.

The car is supported upon wheels 6 and axles 7 connected with the side sills 3. The wheels 6 are adapted to travel on a track formed by a pair of laterally spaced rails indicated generally at R.

The car is shown of the character provided with three drop bottom doors adapted for discharge in one-two-three order from front to rear of the car. These doors are designated respectively by the numerals 8, 9 and 10. The forward door 8 is pivotally supported at its forward edge on a hinge rod 11, while each of the middle and rearward doors 9 and 10 is slidably and pivotally mounted on a hinge rod 12 extending between the frame structures at opposite

sides of the drop bottom opening. Any other suitable door construction or arrangement may be used as desired.

The extreme forward edge of each of said doors 9 and 10, when in closed or latched position, projects laterally from the hinge rod 12, and is adapted to support the free edge of the next forward door. Then upon release of the rearward door, it may drop sufficiently to drag and move bodily rearward, thereby releasing the free edge of the middle door which will likewise drop and release the free edge of the forward door. This occurs usually just before the car reaches the tipple or bin, and permits dropping of the forward door in the bin for discharge of the lading thereon, as soon as room enough is provided in the bin therebeneath. The other doors drop in succession during the continued forward movement of the car over the bin or tipple in one-two-three order from front to rear of the car.

After dumping in passing over the bin or tipple, the doors are adapted to be closed by the usual door-closing rails located in the track. The doors may have indentations 13 in the under faces thereof to ride on the door-closing rails, which indentations would extend transversely of the doors throughout substantial portions of the width thereof. The doors are thus moved successively about their hinge rods to their closed positions, and the middle and rearward doors are pushed forward into wedging relation with the next forward door, adapted to be latched in closed position.

The foregoing car structure, to which this invention is shown applied as hereinafter described, is set forth more in detail in my prior patents, No. 2,001,471, May 14, 1935, and No. 2,036,644, April 7, 1936, to which reference is made for a more complete illustration of the structure thereof.

As shown in Figs. 1 and 2, provision is made for latching the free edge of the rearward door 10 in closed position, thereby holding the several doors closed, to retain the lading in the car until the latching means is released for dumping. For this purpose, I have provided on the free edge of the rearward door 10, one or more supporting trunnions 14, one for each latch of said door. I prefer to use a pair of latches, each designated generally by the numeral 15 and spaced apart transversely of the car, symmetrically with respect to the longitudinal center of the car. The latches 15 are pivotally mounted on a cross shaft or rockshaft 17 supported by brackets 18 secured to the adjacent bumper plate 5 of the car. Each of the latches 15 is preferably so constructed, or spring-pressed, as to be disposed normally in its door supporting position, or to return thereto automatically when disengaged for release of the lading.

Each of the latches 15 is provided with a seat 19 at the forward face thereof in position to receive the end of the adjacent trunnion 14 attached to the free edge of the rearward door 10. Each of the latches 15 is provided, preferably, with a lateral pin 20 attached thereto and projecting through a slot in the adjacent portion of the end-sill plate 5.

The latches 15 are interposed between the free edge of the rearward door 10 and the adjacent end-sill structure 4, underneath a deflector plate 26 secured to the adjacent end wall 2. The latches 15 are so constructed and arranged that they are disposed wholly above the lower edges

of the end-sills 4 of the car, and also, preferably, above the lower face of the rearward door, in protected positions. This prevents disengagement of the latches or damage thereto in the event of wreckage of the car or from contact with obstructions in the trackway, as might occur in a mine, thus assuring adequate protection of the latches to maintain these in proper operative positions.

Each latch 15 is so mounted in protected position between the door 10 and the bumper 4 that a tripping space is provided between said door and the latch 15 in latched position for entry of a tripping arm therebetween.

While any suitable form of tripping mechanism may be used, as desired, for releasing the latches 15, the form shown in Fig. 1 includes tripping mechanism generally of the form set forth in my prior application, Ser. No. 588,577, wherein a tripping arm 31 is adapted to engage and release each of the latch hooks 15, normally being urged into engagement therewith by a spring 42 connected therewith. The tripping arm is of the hook type as shown in said application, and therefore the latch hook 15 is provided with a notch 25 in the forward face thereof in position for engagement by the hook of the tripping arm. A contact member 32 is connected with the tripping arm 31 in position to follow along the under surface of the car in bearing engagement with the bottoms of the doors, to raise and lower the tripping arm as the car moves thereover, substantially as described more in detail in my application above mentioned.

It may be desirable under some circumstances to release the latches manually, or by external means, to open the bottom doors and dump the lading, as when the car is standing still on the trackway. This may be done by extending the latch supporting shaft through one of the side flare plates of the car body to a point externally thereof, as shown for instance in Fig. 4. The shaft 17 that supports the latches is preferably round between the side wall flare plates 1, but at least one end of this shaft 17 is preferably extended through the flare plate 1 to a point externally of the confines of the car body. At this point, the shaft extends through a bearing box 57 secured to the inner face of the flare plate 1 at a point where it is protected beneath the deflector plate, as will be evident from Fig. 4. The bearing box 57 has its outer end so constructed as to conform to the inner face of the flare plate 1, as shown in Fig. 3, and may be welded or riveted to the flare plate and form a journal for the end of the cross shaft but at a point where it is out of contact with the lading.

The projecting end of the shaft 17 is shown as square in cross section, as indicated at 58, although the shape thereof may be of any desired form. This squared end is adapted to receive an ordinary hand crank or other element which may be applied thereto for rotating the shaft 17 in counter-clockwise direction to cause release of the latches 15 when this may be desired, at a point externally of the car body. Thus the door may be unlatched manually without movement over the tripping mechanism, as is desired frequently.

The latches 15 are loose on the shaft 17 for individual respective actuation as described above. I have provided some lost motion between each latch 15 and the shaft 17, as shown in Fig. 2. The hub of the hook is journaled on the shaft but is provided with slots 55 therein receiving a locking

pin 56 which extends through the slots and through the cross shaft 17 to secure each of the latch hooks to the shaft. Then, in order to release both hooks by rotation of a single shaft, the rotation of the shaft must continue to take place to an extent sufficient to take up this lost motion provided by the slots 55 and continue to an extent where both hooks will be released and unlatched successively or simultaneously.

It is often desirable to lock the latch mechanism against accidental release, especially when workmen are riding in the car, for which purpose I have provided a locking device as shown in Figs. 3, 4 and 5. This is used in connection with the squared end 58 of the cross shaft 17 at a point externally of the side flare plate 1, and the locking device is preferably supported by the flare plate.

In the form shown, the locking device is carried by a bracket 59 welded or otherwise rigidly fixed to the outer face of the flare plate and having a stub shaft 60 journaled therein. One end of the stub shaft 60 has fixed thereto a locking member 61 disposed on one side of the bracket 59 in position to be turned up between the bracket 59 and the adjacent face of the squared end 58 of the shaft 17 to hold the shaft against turning movement. The opposite end of the stub shaft 60 has fixed thereto a crank member 62 carrying a handle 63 thereon for manual shifting of the locking member 61. This crank 62 should be considerably heavier than the locking member 61, so that normally it will tend to rotate downward to the position shown in Fig. 4, holding the locking member in its locking position. The parts are thus disposed when the car is in transit and it is not desired to actuate the latches for release of the doors.

When the car gets to the dumping bin, or it is desired to release the locking means, it is necessary merely to rotate the crank 62 to the position shown in Fig. 5, where it will be supported by a stop 64, thus holding the locking member 61 out of engagement with the squared end 58 of the cross shaft 17. This will leave the shaft free for turning movement by the tripping mechanism, allowing the dumping of the lading automatically in the manner described above. It will be evident that the locking mechanism may be used when desired and yet it may be retained in operative position when not required, allowing dumping of the car automatically.

The locking mechanism and squared end of the shaft may be protected by an extended portion 65 on the bumper structure, shown in Fig. 4, against injury thereto.

The latch hooks 15 are supported on the rockshaft 17 for freedom of movement in one direction with respect thereto, as described above. The pin 56 not only prevents movement of each latch hook in one direction with respect to the shaft, but also prevents movement of the latch lengthwise of the shaft. The forward movement of the latch hook with respect to the shaft 17 is substantially as shown in Fig. 2, but the rearward movement is free except for the resisting action of the coil spring bearing on the latch until the back face of the latch hook strikes the end-sill plate 5. Thus the latch hook is relatively free of the rockshaft 17 so as to be capable of moving backward independently thereof to provide means by which, if one latch hook is struck by an object on the track and is forced backward into its door releasing position, the other latch hook will not be moved backward in the same manner but will continue to support the edge of the door under such circumstances. It is also arranged, however, so that when the rockshaft 17 is rotated, both hooks are moved back from their door supporting positions into their door releasing positions. Thus the door will not be released if one of the latches should be moved accidentally to its released position, and yet both latches will be moved to door releasing positions when the rockshaft itself is moved.

While the invention has been illustrated and described in one embodiment, it is recognized that variations and changes may be made therein without departing from the invention, except as specified in the claims.

I claim:

1. In a dumping conveyance having a lading body with a drop bottom door and a plurality of latch hooks for supporting an edge of the door, a cross shaft mounted on the conveyance and supporting the hooks thereon, means mounting the hooks on the cross shaft for freedom of movement of the hooks with respect thereto in one direction and for positive movement of the hooks upon rotation of the cross shaft in one direction, and resilient means acting on the hooks normally tending to turn said hooks in one direction thereon.

2. In a dumping conveyance having a lading body with a drop bottom door and a plurality of latch hooks for supporting an edge of the door, a cross shaft mounted on the conveyance and supporting the hooks thereon, means for providing lost motion between the hooks and said shaft, and resilient means acting on the hooks normally tending to turn said hooks in one direction thereon.

3. In a dumping conveyance having a lading body with a drop bottom door and a plurality of latch hooks for supporting an edge of said door, a cross shaft mounted on the conveyance and supporting the hooks thereon, means connected with the cross shaft for rotating said shaft, means for securing the hooks on the shaft for movement of the hooks to released positions upon rotation of the shaft in one direction, means connecting the hooks with the shaft for freedom of movement of the hooks relative thereto in one direction without movement of the shaft, and resilient means acting on the hooks normally tending to turn said hooks in one direction thereon.

4. In a dumping conveyance having a lading body with a drop bottom door and a plurality of latch hooks for supporting an edge of said door, a cross shaft mounted on the conveyance and supporting the hooks thereon, means connected with the cross shaft for rotating said shaft, means for securing the hooks on the shaft for movement of the hooks to released positions upon rotation of the shaft in one direction, and a pin and slot connection between each of the hooks and shaft for freedom of movement of the hooks with respect to the shaft in one direction.

5. In a dumping conveyance having a lading body with a drop bottom door and a plurality of latch hooks for supporting an edge of the door, a cross shaft mounted on the conveyance and supporting the hooks thereon, each of said latch hooks having a hub portion mounted on the cross shaft and having a slot therein, and a pin fixed to the cross shaft in the slot for providing a lost motion connection between each said latch hook and the shaft.

6. In a dumping conveyance including a lading

body having a drop bottom door and a latch for supporting the door and movable to release the door for dumping, a cross shaft supporting the latch and having an end portion projecting through a side wall of the lading body, a bearing box fixed to said side wall and journaling said end portion of the shaft therein, said shaft having a handle-receiving portion thereon externally of said side wall in position for engagement to release the latch manually.

7. In a dumping conveyance including a lading body having a drop bottom door and a latch for supporting the door and movable to release the door for dumping, a cross shaft supporting the latch and having an end portion projecting through a side wall of the lading body, a bearing box fixed to said side wall and journaling said end portion of the shaft therein, said shaft having a flattened portion externally of said side wall, and lock means mounted on the conveyance in position to engage said flattened portion and to hold the shaft against rotation.

8. In a dumping conveyance including a lading body having a drop bottom door and a latch for supporting the door and movable to release the door for dumping, a cross shaft supporting the latch and having an end portion projecting through a side wall of the lading body, a bearing box fixed to said side wall and journaling said end portion of the shaft therein, said shaft having a flattened portion externally of said side wall, and lock means mounted on the conveyance in position to engage said flattened portion and to hold the shaft against rotation, said lock means including a locking member pivotally mounted on the conveyance for swinging movement into and out of engagement with the flattened portion of the shaft, and a crank member connected with the locking member for swinging said locking member.

9. In a dumping conveyance including a lading body having a drop bottom door and a latch for supporting the door and movable to release the door for dumping, a cross shaft supporting the latch and having an end portion projecting externally of a side wall of the lading body, said shaft having a flattened portion externally of said side wall, and lock means mounted on the conveyance in position to engage said flattened portion and to hold the shaft against rotation.

10. In a dumping conveyance including a lading body having a drop bottom door and a latch for supporting the door and movable to release the door for dumping, a cross shaft supporting the latch and having an end portion projecting externally of a side wall of the lading body, said shaft having a flattened portion externally of said side wall, and lock means mounted on the conveyance in position to engage said flattened portion and to hold the shaft against rotation, said lock means including a locking member pivotally mounted on the conveyance for swinging movement into and out of engagement with the flattened portion of the shaft, and a crank member connected with the locking member for swinging said locking member.

11. In a dumping conveyance having a lading body with a drop bottom door and a plurality of latch hooks for supporting an edge of said door, a cross shaft mounted on the conveyance and supporting the hooks thereon, means connected with the cross shaft for rotating said shaft, means for securing the hooks on the shaft for movement of the hooks to released positions upon rotation of the shaft in one direction, a pin and slot connection between the hooks and shaft for freedom of movement of the hooks with respect to the shaft in one direction, and a spring bearing against each hook tending to hold the hook in one extreme position with the pin at one end of the slot.

12. In a dumping conveyance having a lading body with a drop bottom door and a plurality of latch hooks for supporting an edge of the door, a cross shaft mounted on the conveyance and supporting the hooks thereon, each of said latch hooks having a hub portion mounted on the cross shaft and having a slot therein, a pin fixed to the cross shaft in the slot for providing a lost motion connection between each said latch hook and the shaft, and a spring bearing against each hook tending to hold the hook in one extreme position with the pin at one end of the slot.

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The following references are of record in the file of this patent:

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