April 13, 1954 A. F. SANFORD II 2,675,135

LATCH TRIPPING MECHANISM

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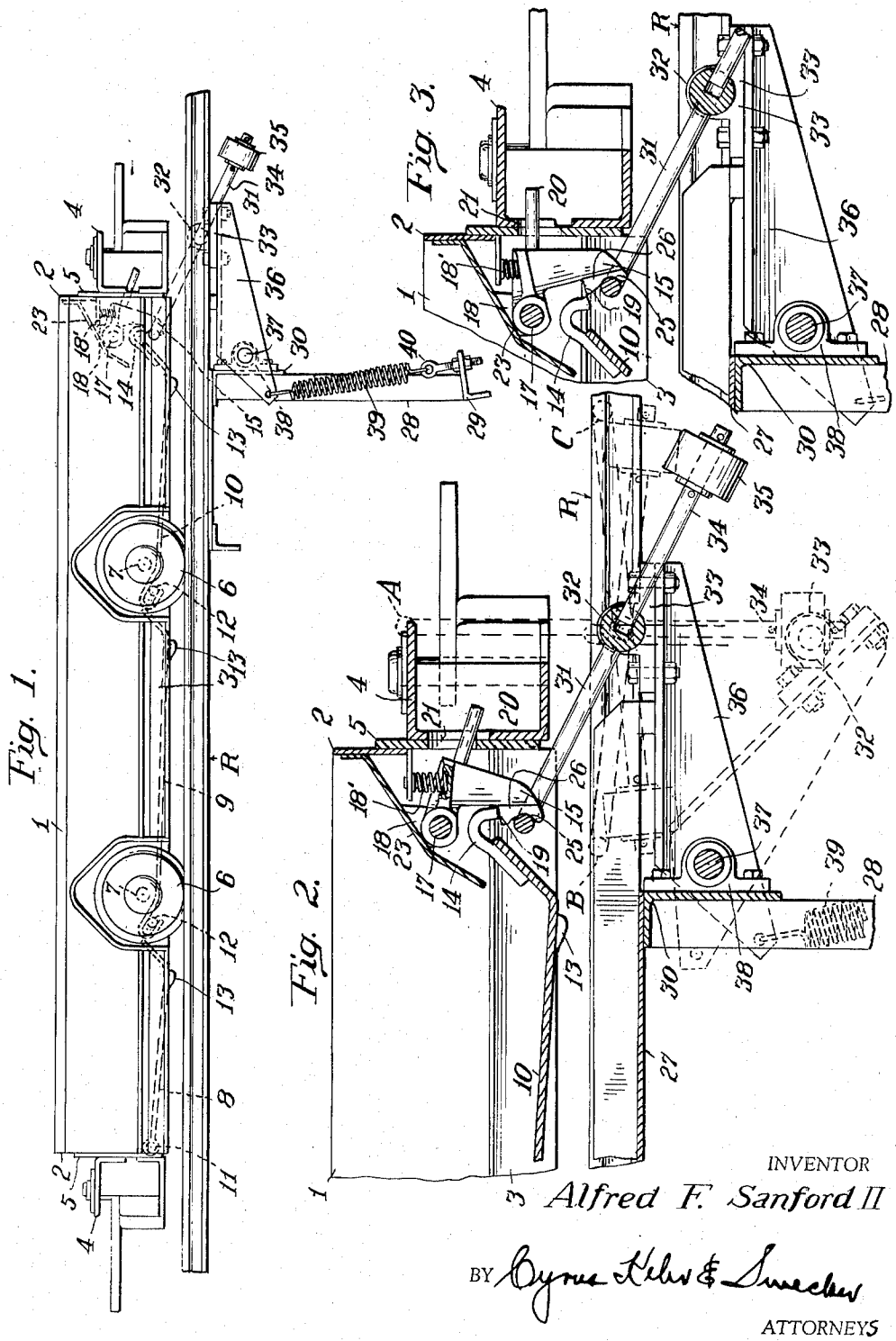


Fig. 1.

Fig. 2.

Fig. 3.

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Fig. 4.

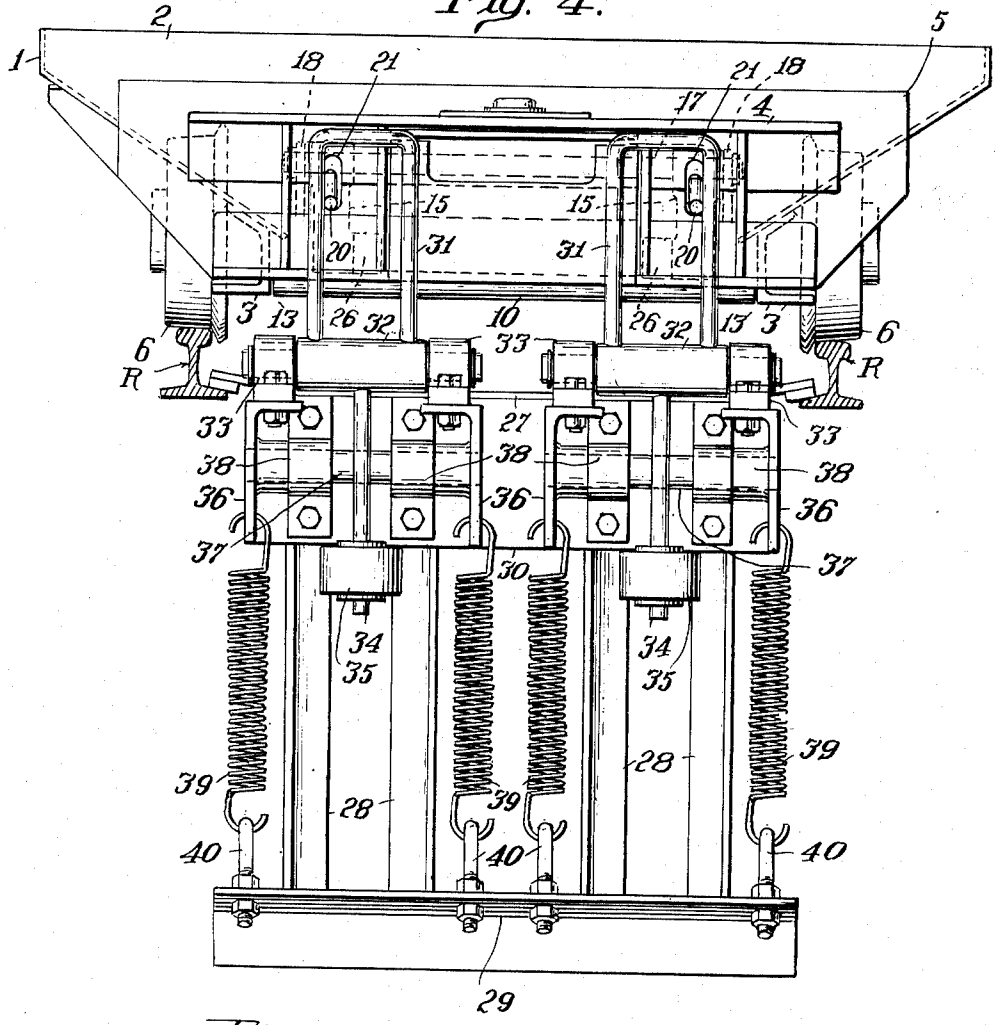
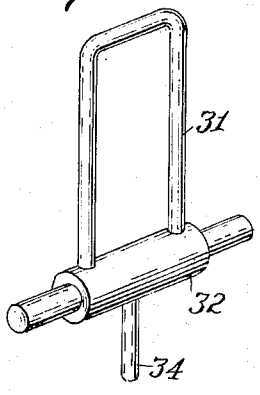


Fig 5.



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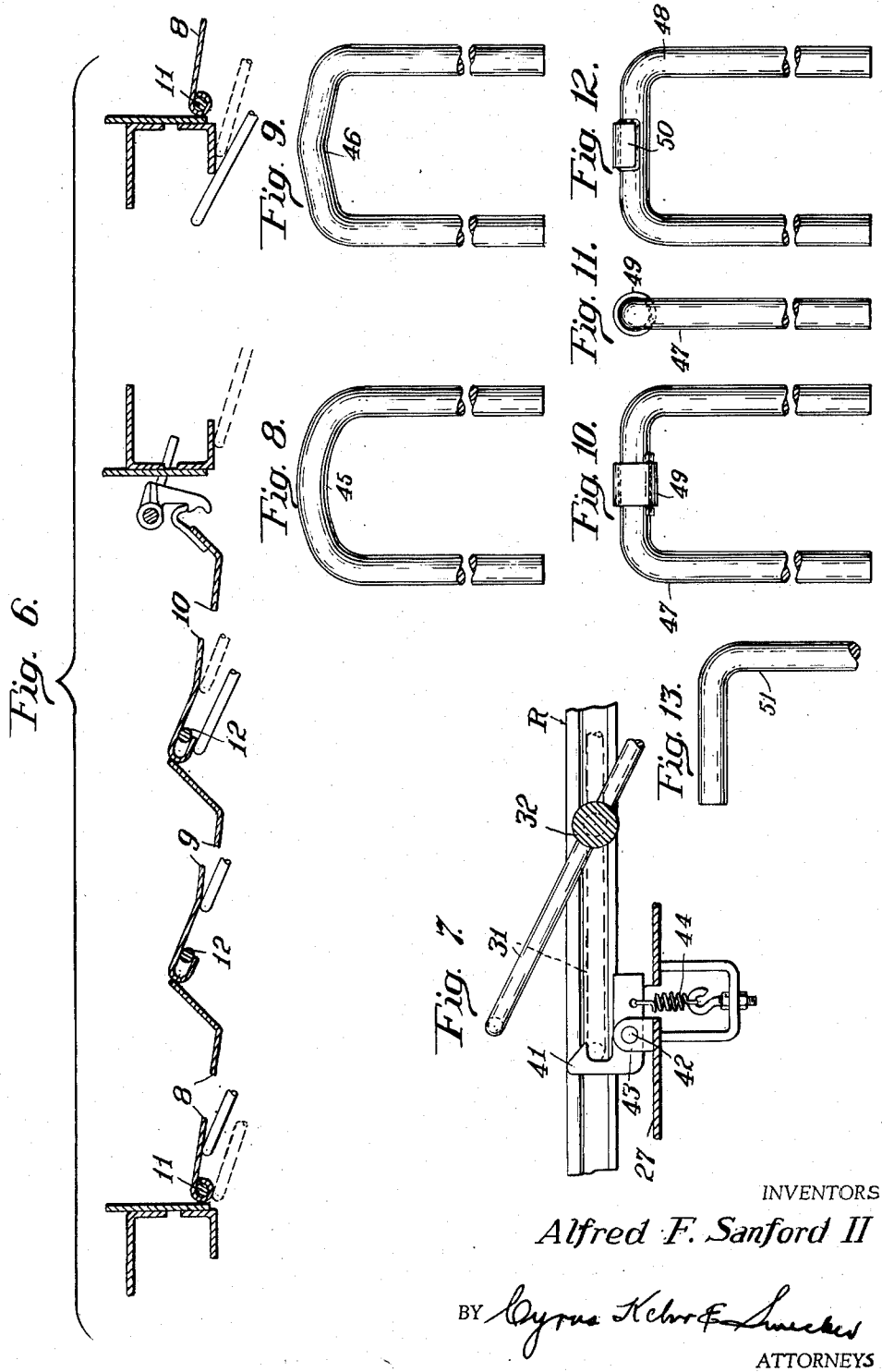
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LATCH TRIPPING MECHANISM

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Fig. 14.

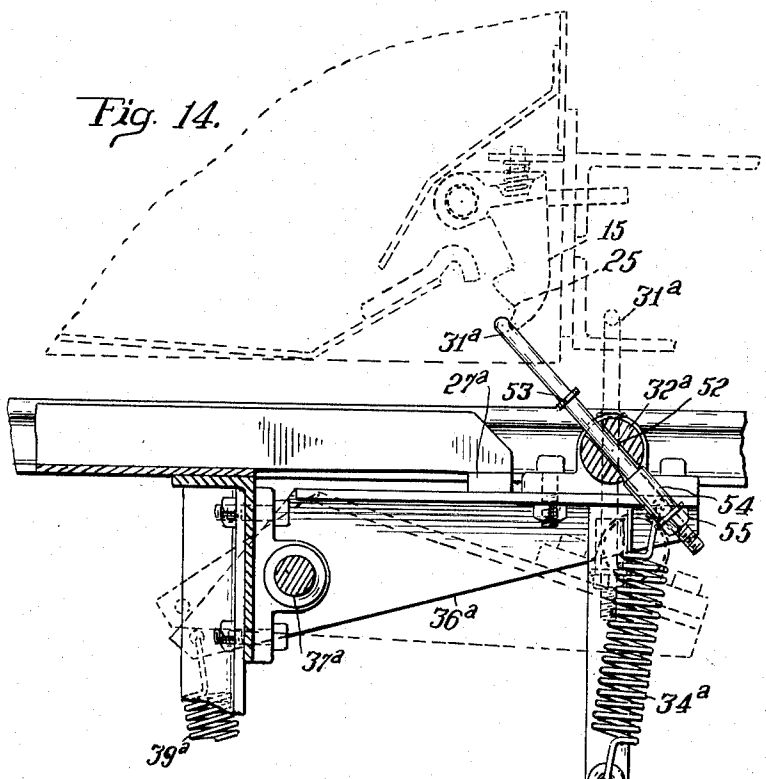
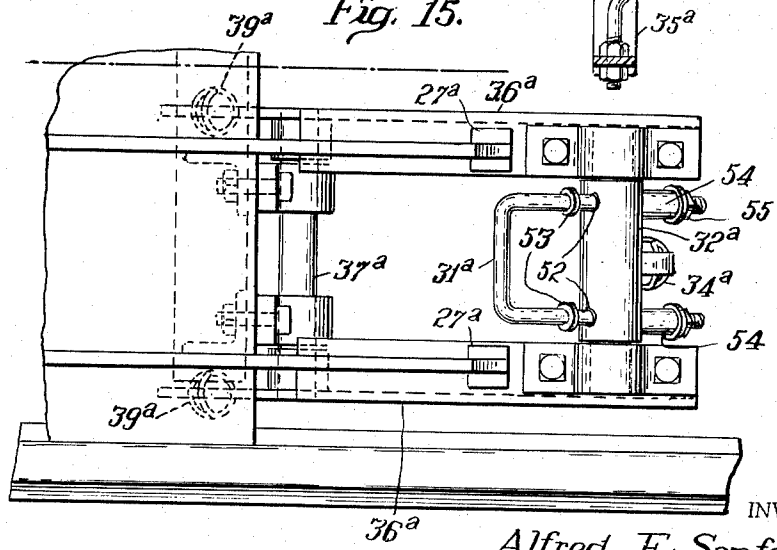


Fig. 15.



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LATCH TRIPPING MECHANISM

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Fig. 16.

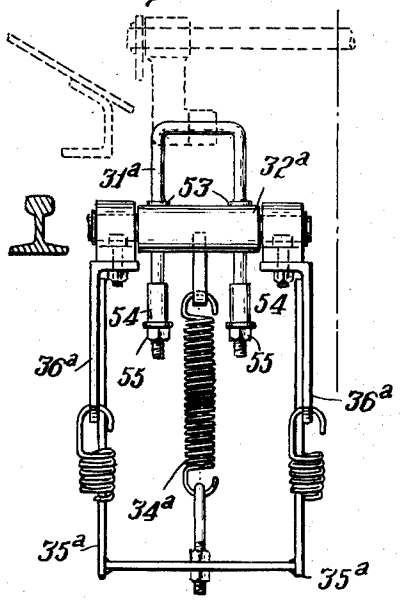


Fig. 17.

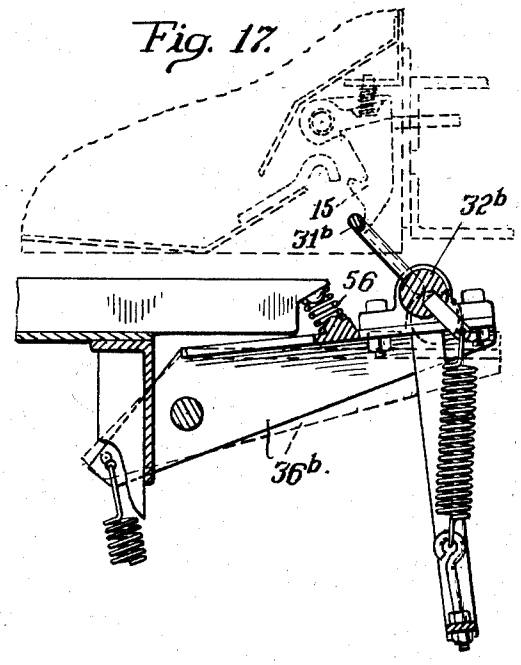


Fig. 18.

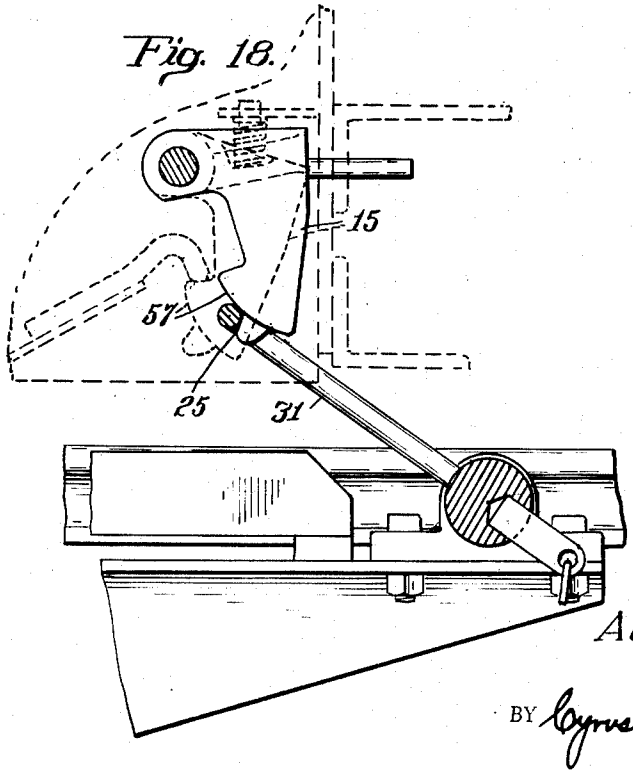
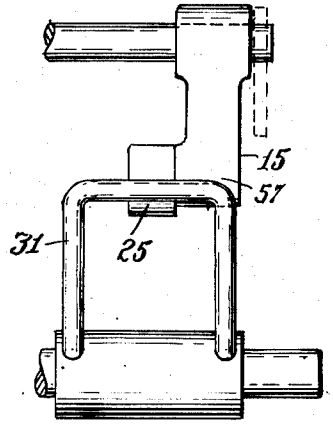


Fig. 19.



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UNITED STATES PATENT OFFICE

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LATCH TRIPPING MECHANISM

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Application May 12, 1950, Serial No. 161,589

11 Claims. (Cl. 214—58)

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

This invention is an improvement on the latch tripping mechanisms set forth in prior applications of Hugh W. Sanford, Serial No. 432,341, filed February 25, 1942, now Patent No. 2,399,708, granted May 7, 1946; Serial No. 571,170, filed January 3, 1945; and Serial No. 588,577, filed April 16, 1945, now Patent No. 2,645,368, granted July 14, 1953.

In the door latch mechanisms set forth in the above prior applications, the latch or latches that support the free edge of the door were adapted to be engaged from beneath the car by tripping mechanism mounted at the trackway, whereby a tripping member would be moved by engagement with the latch hook for movement of the hook with respect to the car or conveying device to a released position, thereby unlatching or releasing the door for dropping movement. The contact and tripping members utilized for such prior devices were disposed in side-by-side relation substantially in the same upright transverse plane, whereby the contact member connected with the tripping member would ride along the under surface of the car and control the movement of the tripping member in response to the contour of the under-surface of the car.

An object of this invention is to improve the construction of the tripping mechanism to provide for the use of a single contact member or surface which will act to deflect the contact member beneath the under-surface of the car or conveying device, being guided along said under-surface as the car or conveying device moves thereover, and also acting to engage and release the latch means to dump the lading at the desired point.

An additional object of the invention is to provide in a tripping device a construction such that effective operation of the latch means will be assured without danger that some part of the car may engage a contact member connected with a tripping member for the latch, which thereby would prevent the tripping member from engaging and operating the latch means.

Where separate contact and tripping members are located in side-by-side relation, one of which engages the under-surface of the car while the other trips the latch, occasionally some part of the car may engage the tripping member in its raised position, which would not extend across the car far enough to engage the contact member, or a part of the car may engage the contact member and prevent the tripping member from engaging the latch means. This may interfere with the operation of the conveying device or dislocate parts of the tripping mechanism.

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Such danger may be eliminated, however, by utilizing a single contact surface or member both to bear against the under-surface of the car and deflect the tripping member beneath the car or device as the latter passes thereover, and also to engage the latch means to release the latch from the door. This would have the advantage that any part of the conveyance which would engage the tripping mechanism would also engage the contact face or member and thereby cause a deflection of the latter, so as not to dislocate parts of the mechanism, except when the latch means reaches the tripping mechanism and is to be engaged thereby for release of the doors and discharge of the lading.

Another object of the invention is to simplify and improve the construction of tripping mechanism by utilizing a single contact face on a single tripping arm to serve both functions of deflecting the tripping arm under the conveyance, and also to engage and actuate the latch means. This simplifies the structure, reduces the cost thereof, and yet it insures of effective deflection except when the latch means is reached.

Still another object of the invention is to provide for more effective clearance of the tripping device in the event that the car or a locomotive or other portions of the conveying device may pass over the tripping mechanism in the opposite direction to that normally intended. It is desirable that the tripping member be maintained normally in a tripping position but that provision be made for passage of the conveyance in the opposite direction thereover and for clearance of the tripping device for the latter.

While the tripping arm may be pivotally mounted on its support to swing in opposite directions from its normal position, I have also provided an additional means of insuring the deflection of the tripping arm, especially when a locomotive, car or conveyance moves in the opposite direction over the tripping mechanism. This is made possible by mounting the tripping arm on a movable support whereby its support is bodily deflected from its normal position by an abnormal engagement with the tripping arm. This movable support may be provided by a pivotal mounting normally maintained in one position by yieldable means, while allowing downward swinging of the support when an abnormal

obstruction strikes the tripping arm, as, for instance, when any conveyance moves in the opposite direction over the tripping mechanism.

Certain embodiments of the invention are illustrated in the accompanying drawings, in which:

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

Fig. 2 is a longitudinal sectional view therethrough, showing the latch in engaged position;

Fig. 3 is a similar view showing the latch in released position;

Fig. 4 is an end elevation of the car in its relation to the tripping mechanism;

Fig. 5 is a perspective view of the tripping arm detached;

Fig. 6 is a diagrammatic sectional view showing the tripping member in different positions with respect to portions of interconnected cars;

Fig. 7 is a side elevation, partly in section, showing a lock for the tripping arm;

Figs. 8, 9 and 10 are elevations showing modified forms of tripping members;

Fig. 11 is an edge view of the form shown in Fig. 10;

Figs. 12 and 13 are elevations of further modified forms of tripping members;

Fig. 14 is a vertical section through tripping mechanism of modified construction and showing a part of the car in dotted lines;

Fig. 15 is a top plan view of the modified tripping mechanism;

Fig. 16 is an end elevation thereof;

Fig. 17 is a view similar to Fig. 14 but showing a further modification of the tripping mechanism;

Fig. 18 is a side elevation of the tripping member and latch, diagrammatically illustrating the action thereof; and

Fig. 19 is a front elevation thereof.

This invention is shown as applied to a mine car of the general type set forth in the 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 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 principle 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 (Figs. 1 and 2), 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 the 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 to 3, 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 as indicated in Fig. 4, symmetrically with respect to the longitudinal center of the car. The latches 15 are pivotally mounted on a cross shaft 17 supported by brackets 18 secured to the adjacent bumper plate 5 of the car. Each of the latches 15 is preferably spring-pressed by a spring 18', 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. As shown in Fig. 2, the seat 19 is located on the opposite side of the vertical plane passing through the pivot axis of the latch 15 from the door 10, so that the weight of the door and the lading thereon tends to maintain the latched

relation without any tendency for this weight to push the latch to one side.

Each of the latches 15 is provided, preferably, with a lateral pin 20 attached thereto and projecting through a slot 21 in the adjacent portion of the end-sill plate 5 (Figs. 2 and 3).

As shown in Figs. 2 and 3, 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 23 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 disarrangement 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.

To accommodate the tripping mechanism hereinafter described, each latch hook 15 has its forward face, beneath the seat 19, provided with a notch or re-entrant portion 25 in a laterally offset portion 26 of the latch, which notch has upper and lower engaging faces that slope forwardly relative to the length of the car. These faces are adapted to be engaged by the tripping arm, as hereinafter described and as shown in Figs. 2 and 3, to release the latch hook from supporting engagement with the door.

The tripping mechanism for the latches 15 is adapted to be mounted in the trackway between the opposite rails R at a point adjacent the bin or other place of dumping. Since the latches 15 are laterally displaced symmetrically on opposite sides of the longitudinal vertical plane through the center of the car, a tripping device may be provided for each of the respective latches. Separate tripping devices should be provided where the latches are pivotally mounted independently on the cross shaft 17, although one tripping device may be used if the latches are secured to said cross shaft.

In the form shown, the tripping mechanism is mounted preferably on a base 27, shown in the form of a supporting track plate securely mounted in suitable position in the rackway, preferably by being secured, as shown, upon the base flanges of the rails R. Secured rigidly to the track plate 27 and extending downwardly therefrom are upright supports 28 connected together by a cross member 29 at the lower ends thereof, and at their upper ends by a cross member 30. Angle bars or other suitable rigid members may be utilized for this purpose. These parts, preferably, are welded together or secured in rigid relation by rivets, bolts or other fastenings, so as to form a secure frame structure suspended beneath the track plate 27 and supported thereby in the trackway.

A tripping arm is provided for each latch hook 15 in the form illustrated, which tripping arm is designated generally at 31. In the latch mechanism shown as one embodiment of the invention, the tripping arm 31 engages the latch hook directly, or a forward projecting flange 26 thereon, which is offset laterally from the upright plane of the latch hook, as shown in Fig. 4, in which projection 26 the notch 25 is provided. However, separate latch releasing means may be provided for the latch hooks 15, if desired, and connected therewith through the shaft 17 or otherwise, in which event the tripping arm 31 may engage and actuate the separate latch releasing means, as illustrated in Sanford Patent No. 2,458,738, granted January 11, 1949.

The tripping arm 31 in the form illustrated in Figs. 1 to 5 is in the form of a loop formed by bending a rod or bar substantially into U-shape, with the closed end thereof at the upper end of the loop and tripping arm in position for engaging in the notch 25 to release the latch 15 as the car or other conveyance passes over the tripping mechanism. It is preferred that a round rod be used for this purpose, and normally the tripping arm 31 would be mounted in the trackway in position to engage the projecting portion 26 of the latch hook in the loop of the arm as the car passes thereover. In the form illustrated, in which separate latches are shown spaced on opposite sides of the upright longitudinal plane through the car, it is preferred that separate tripping arms 31 be provided for engaging the respective latches, as also shown in Fig. 4. The length of the closed side of the loop of each arm 31 should be sufficient, preferably, to insure of engaging the latch hook, regardless of some lateral deflection of the car with respect to the tripping mechanism, as in the event of wearing of the rails, wheels or axles, and thereby causing sluing of the car in the trackway.

The tripping arm 31 is shown as mounted on a stub shaft 32 to which the loop is securely fastened, as by being inserted at its ends into the body of the shaft. The shaft 32 is journaled at its opposite ends in bearing boxes 33. This provides for swinging movement of the arm 31 about the axis of the shaft 32 to the different positions illustrated in full lines and in dotted lines in Figs. 2, 3 and 6.

Also connected with the shaft 32 is a rod 34 on which a counter-weight 35 is fixed so as to act normally to maintain the tripping arm 31 in an upright position. The counter-weight 35 is a form of means for yieldably holding the tripping arm in its operative position. However, a spring may be used for this purpose, if desired, in place of the counter-weight.

It will be appreciated that the tripping arm 31 may swing to different sides of a vertical plane through the axis of the stub shaft 32 to accommodate for deflection of the arm by different portions of a vehicle passing thereover. However, if additional yielding action is desired, this may be provided by allowing for bodily deflection of the tripping arm and its mounting, as is possible in the construction illustrated.

In the construction shown, the bearing boxes 33 are mounted on a pair of arms 36 spaced apart sufficiently for freedom of passage of the rod 34 and counter-weight 35 therebetween in the swinging action of the arm 31. The arms 36 are pivotally supported at 37 on a shaft mounted in bearing boxes 38 secured to the cross support 30, as shown in Figs. 2 and 4. The pivotal mounting 37 is intermediate the length of the arms 36. The portions of the arms 36 opposite the mounting of the stub shaft 32 have coiled springs 39 connected therewith, as shown in Figs. 1 and 4, and extending downwardly therefrom to suitable anchoring means, such as eye-bolts 40 attached to the cross support 29. These springs 39 are of substantial tension and, used in pairs, act with sufficient rigidity on the

arms 36 normally to maintain the stub shaft 32 in its full-line position in Fig. 2 for the normal operation of the conveyance thereover, including the discharge of the lading therefrom. However, if an abnormal obstruction should strike the tripping arm, the mounting thereof will yield due to the resiliency of the springs 39, so that the entire tripping arm and mechanism may be deflected between the tracks, especially when a car or other conveying means is passed thereover in the direction opposite from the normal direction, to prevent destruction to the tripping mechanism.

In the normal operation of the conveying mechanism, the tripping arm formed by the loop 31 will be held in its upright position, as indicated at A in Fig. 2, by the action of the counterweight 35 thereon. As the car reaches the tripping mechanism, the forward end portion of the car will engage the loop 31 and tilt the loop in a downward direction, substantially as illustrated at the right in Fig. 6. The contact surface formed at the closed side of the loop about the circumference thereof will cause the loop to be deflected under the car or conveyance and to follow the contour of the under-surface thereof in a wiping action, as illustrated in the different positions shown in Fig. 6. This prevents the car or conveying device from damaging the tripping mechanism in passing thereover.

As the car or conveying device reaches substantially the position just preceding that illustrated in Fig. 2, the loop or tripping arm 31, with its contact surface at the center of the loop, will follow up into the portion of the car shown in advance of the latch hook 15, in position to engage in the notch 25 of the hook as the car passes thereover. The continued forward movement of the car will cause the latch thus engaged by the same contact surface of the loop 31 to move back from the position shown in Fig. 2 to the position shown in Fig. 3. In the latter position, the latch has been withdrawn out of supporting engagement with the trunnion 14, allowing the rearward door 10 to drop onto the track.

Through the entire movement of the latch, the tripping arm 31 hooks in the latch sufficiently to prevent the latter from slipping off the loop until the latch has released the door, and thereby insure of an effective disengagement of the latch, releasing the door for dropping. As the latch means moves through its arc due to the action of the loop, the plane of its surface in contact with the surface of the loop changes to a point where the hook actually forces the loop to disengage itself from the hook. In other words, originally it was impossible to disengage the hook and the loop, but after the hook has moved an appropriate number of degrees to achieve unlatching, the situation changes whereby the hook actively tends to force the loop to disengage itself.

As soon as the car has moved forward sufficiently to disengage the latch from the door, the loop 31 will be deflected out of engagement with the latch. Thus, the contact surface on the tripping arm will be depressed so as to insure that, while it will contact the under-surface of the car and will continue to follow back beneath the car, substantially as illustrated in the several positions in full lines and in dotted lines in Fig. 6, no damage will result therefrom.

This action is facilitated by the location of the pivot point 32 for the arm 31 in a direction rearwardly of the contact face formed at the closed side of the loop, whereby the tripping arm 31 will swing in a direction away from the portion of the car engaged by the contact face, swinging downward in a direction toward the front of the car in its forward movement along the track, rather than rearwardly. This insures that the engagement of the contact face on the arm 32 with the forward edge and bottom portions of the end-sill structure, does not have a destructive effect on the tripping arm but pushes it down so that the arm will pass underneath the end-sill structure, as well as the remainder of the under-surface of the car, without becoming entangled therein.

A very low overhanging portion of the conveyance or vehicle may deflect the arm 31 down to or beneath the top of the rails R, as shown in Fig. 2, substantially to the position designated B therein, and yet the tripping arm will be returned to its normal position A, or other deflected position, after passage of this low portion thereover.

In the event that the car moves over the tripping mechanism in a reverse direction, or a locomotive or other conveyance passes thereover in its opposite direction, the tripping arm is free to swing about the stub shaft 32 substantially to the position shown at C, to clear the car or other conveyance. However, if the arm is not in a position to swing freely to the position C, destruction of the tripping mechanism would be avoided by the mounting of the stub shaft 32 on a pivoted support provided by the arms 36 and shaft 37. In this position, the arms 36 are free to swing downward under abnormal pressure against the tension of the springs 39 to drop the stub shaft 32 to the position shown in dotted lines in Fig. 2, which thereby will allow freedom of clearance for the vehicle.

If it be desired to hold the tripping arm 31 down for cars to pass over the tripping mechanism without tripping the latches, this may be provided by mounting a latch shown generally at 41 in Fig. 7, on the track plate 27 between the rails R. The latch hook 41 is in position to engage the contact center portion of the loop of the arm 31 to hold the latter in its dotted-line position in Fig. 7 until the latch hook is released. In the form illustrated, this latch hook 41 is supported on a pivot 42 carried by a bracket 43 mounted on the plate 27. It is normally urged toward its engaging position by a spring 44 connected with the latch hook. Other suitable forms of latching means may be used, as desired, that will be effective for this purpose.

It is also possible to modify the form of the loop, several forms of which are shown in Figs. 8 to 12, in place of using the rectangular form illustrated in Fig. 5. These modified forms are designated, respectively, at 45, 46, 47 and 48. In the form shown in Fig. 8, the loop 45 has an arcuate upper end which may be made somewhat V-shaped, as shown at 46 in Fig. 9. In both instances the contact surface is formed substantially at the center thereof, and this center portion will engage the undersurface of the car passing thereover and also provide the contact surface for engaging the latch hook.

In the form shown in Figs. 10 and 11, the loop 47 is provided with a sleeve 49 journaled thereon at the center portion of the loop for freedom of turning movement with respect thereto. This sleeve will form the contact surface for engaging the undersurface of the car and the notch

in the latch hook, and its freedom for turning movement will reduce friction thereagainst.

In place of the sleeve **49**, a wearing lug may be applied to the loop, as indicated at **50** in Fig. 12, forming the contact surface thereon. As illustrated, this lug **50** is shown as welded in place on the loop.

These or any other desired form of loop may be used to release the latch means as the conveyance passes over the tripping mechanism, by a hooking action directly between the tripping mechanism and the latch means. It is not essential, however, for the tripping member to be in the form of a loop, as any other form of hook-shaped device may be used, such as the L-shaped tripping member illustrated at **51** in Fig. 13. A hooking action would be accomplished thereby as well as by the loop, to disengage the latch during movement of the conveyance over the tripping mechanism.

A further modification of the tripping mechanism is illustrated in Figs. 14 to 16, in which the tripping arms **36***a* are pivotally supported at **37***a* and normally urged upward yieldably as by a spring **39***a*, as described above, the upward movement being restricted by a limit stop **27***a*, as described above.

Journaled on the pair of arms **36***a* in bridging relation therebetween is a support shaft **32***a* similar to the shaft **32** described above. This shaft **32***a* normally is turned yieldably in one direction by a coiled spring connected therewith, as indicated at **34***a*, and extending from the point of connection with the shaft to a supporting frame **35***a* secured to the arms **36***a*, as shown in Fig. 16.

In this form the loop is designated at **31***a* and has the opposite sides thereof freely slidable through openings **52** that extend through the shaft **32***a* transversely of the axis thereof at points spaced lengthwise of the axis, as shown in Fig. 16. The openings **52** should be sufficiently larger than the diameter of the side arms of the loop **31***a* so these arms will slide freely therethrough. Limit stops **53** are provided on the arms of the loop and fixed thereto to limit the sliding movement in one direction. Sleeves **54** are mounted on the arms of the loop at the opposite side of the shaft **32***a* from the stops **53**, either threaded directly on the arms or secured thereto by nuts **55**, as shown.

Normally the loop **31***a* stands upright in the dotted line position shown in Fig. 14 when no car or other conveyance is passing over the tripping mechanism, but the limit stops **53** hold the loop **31***a* in such position as to engage the undersurface of the car or other conveyance as the latter passes over the tripping mechanism. Such engagement will cause swinging movement of the tripping member **31***a* to deflect the latter by the rocking action of the shaft **32***a* to follow under the contour of the car as the car or other conveyance passes over the tripping mechanism until this tripping member rises up into a position for engagement with the notch **25** in the hook **15**. With the latch hook in engaged position, as shown in Fig. 2, the upper end of the loop or tripping member **31***a* will be directed into the notch so that continued forward movement of the conveyance will first pull the loop to its upper extended position, as illustrated in full lines in Fig. 14, with the sleeves **54** abutting against the shaft **32***a*. Then the loop or tripping member will cause the latch **15** to be pulled to its open position, as shown in Fig. 14, releasing the door for dropping.

The loop engaging the latch means by a hook action insures of positive opening of the latch as the car or other conveyance passes over the tripping mechanism.

When the latch **15** has released the door for dropping and has been moved substantially to the position shown in Fig. 14, the loop in extended position will be deflected along the lower side of the notch **25** to pass under the latch and release the latter, following freely under the rear bumper and end structure.

The purpose for extending the loop is to allow the use of a short loop which will not become wedged or caught on any part of the underneath side of the car. A loop of this length positively fixed would be insufficient to provide positive repetitive unlatching. At high speeds or on high latches, etc. the loop would slide off the hook before the door is fully disengaged and the doors of the car will remain latched. The extensible loop, however, combines the advantages of a short loop and also the effective unlatching that would be found in a long loop. A long loop has a very flat angle during the unlatching time whereas the short loop has a relative upright angle. Naturally, the flatter the angle the more difficult it is to disengage the hook and the loop, and the further the hook has to rotate in order to effect disengagement.

Instead of providing for sliding movement of the loop through the shaft **32***a*, an extending action of the loop may be accomplished, as shown in Fig. 17. In this form, the pivoted arms **36***b* that carry the shaft **32***b* are free to rise to a higher position than the normal position of the arms, which latter is illustrated in dotted lines in Fig. 17, while the raised position is shown in full lines therein, this being the position with the loop **31***b* engaging the latch hook **15**. The loop **31***b* is fixed to the shaft **32***b* rather than slidable therethrough, as shown in Fig. 14, but may be of the short form as distinguished from the long form illustrated in Figs. 1 to 5. Except when the arms **36***b* are raised positively by engagement of the loop **31***b* with the latch **15**, these arms are in their lowered normal dotted line positions in Fig. 17 by the action of coiled springs **56** thereon.

The latch hooks **15** are shown more in detail in Figs. 18 and 19. As described above, each latch hook **15** has a lateral projection **26** formed thereon, within which projection the notch **25** is formed at the forward face of the hook. This is the engaging face that is contacted by the loop **31** to release the latch means from supporting engagement with the door.

I have shown, as a modification, beside the lug or projection **26** on each latch hook **15**, a cam surface **57**, illustrated in Fig. 18, which forms a disengaging surface for the loop or tripping member **31**. This cam surface **57** assists in disengaging the loop from the latch hook when the latter is in the unlatched position, as shown in full lines in Fig. 18. It has a tendency to push the loop down out of the engaging surface or notch **25** as the conveyance moves over the tripping mechanism, thereby facilitating the release of the loop from the latch after the latter has been moved out of engagement with the door.

This cam surface **57** is shown and described as an element that may be used to assist in releasing the loop from the latch. However, it may be omitted entirely, if desired, and it will still disengage in a perfectly satisfactory manner.

Several forms of latch release means have been described, all of which, however, operate by a hook engagement between the tripping arm and

a portion of the latch means of the car or conveyance as the latter moves over the tripping mechanism. This hook engagement assures positive release of the latch means while providing for the location of the latch in a protected position above the lowermost portions of the frame structure of the car in the same upright longitudinal plane. Furthermore, the tripping member is so constructed as to utilize a single member for this purpose, as distinguished from separate contact and tripping members that must be located in side-by-side relation. The latter makes it possible for some part of the car to engage the contact member, which would thereby prevent the tripping member from engaging the latch means, whereas the provision of a single member both to engage and release the latch means and also to contact with the under-surface of the car as the latter moves over the tripping mechanism, will assure positive operation of the latch means, when desired; and at the same time this will prevent positive engagement of the tripping member with other parts of the car, whereby it will be guided along the under-surface of the car without causing destruction of the tripping mechanism as the car passes thereover.

The invention has been described with reference to one tripping arm and latch hook, although it will be appreciated that the separate latch hooks, where used, will be operated simultaneously by the action of the tripping arms thereon, which tripping arms both will function in the manner described.

The invention has been described also with reference to latch hooks having notches in the engaging portions thereof, but the tripping arm may be used with other forms of latch hooks. For instance, they may engage surfaces with sufficient friction to release the latch hooks from the door, without requiring a distinct notch in the engaging face, although the notch shown insures of more positive release.

While the invention has been illustrated and described in certain embodiments, it is also appreciated that other variations and changes may be made therein without departing from the invention, as set forth in the claims.

I claim:

1. In conveying mechanism, the combination with a trackway, a dumping conveyance movable along the trackway and including a lading body with a drop bottom door, and latch means for holding the door closed and movable to release the door for opening, of tripping mechanism mounted at the trackway and including a tripping arm having a loop portion thereon in position for embracing engagement with the latch means during movement of the conveyance over the tripping mechanism to release the door for opening, a pivot mounting supporting said loop on the arm, and means yieldably urging the loop portion upwardly relative to the trackway.

2. In conveying mechanism, the combination with a trackway, a dumping conveyance movable along the trackway and including a lading body with a drop bottom door, and latch means for holding the door closed and movable to release the door for opening, of tripping mechanism mounted at the trackway and including a tripping arm having a loop-shaped member in position to engage the latch means during movement of the conveyance over the tripping mechanism to release the door for opening, a shaft having the loop-shaped member fixed thereto, means connected with the shaft yieldably urging the loop-shaped member in an upward direction, a journal supporting the shaft for swinging movement of the loop member, a support for the journal, and means yieldably mounting the support for bodily movement of the tripping arm relative to the trackway.

3. In conveying mechanism, the combination with a trackway, a dumping conveyance movable along the trackway and including a lading body with a drop bottom door, and latch means for holding the door closed and movable to release the door for opening, of tripping mechanism mounted at the trackway and including a tripping arm having means in position to engage the latch means during movement of the conveyance over the tripping mechanism to release the door for opening, means mounting the tripping arm for swinging movement relative to the trackway, an arm supporting said mounting means thereon, and means mounting the supporting arm for swinging movement relative to the trackway for bodily movement of the tripping arm relative thereto.

4. In conveying mechanism, the combination with a trackway, a dumping conveyance movable along the trackway and including a lading body with a drop bottom door, and latch means for holding the door closed and movable to release the door for opening, of tripping mechanism mounted at the trackway and including a tripping arm having means in position to engage the latch means during movement of the conveyance over the tripping mechanism to release the door for opening, means mounting the tripping arm for swinging movement relative to the trackway, said tripping arm mounting means including a stub shaft, a pair of arms supporting said stub shaft thereon in bridging relation between the outer ends of said pair of arms, and means mounting the pair of arms for swinging movement relative to the trackway for bodily movement of the tripping arm relative thereto.

5. In conveying mechanism, the combination with a trackway, a dumping conveyance movable along the trackway and including a lading body with a drop bottom door, and latch means for holding the door closed and movable to release the door for opening, of tripping mechanism mounted at the trackway and including a tripping arm having means in position to engage the latch means during movement of the conveyance over the tripping mechanism to release the door for opening, means mounting the tripping arm for swinging movement relative to the trackway, additional means mounting the tripping arm for bodily movement thereof relative to the trackway downward with respect thereto, and means yieldably urging the last mentioned mounting means in an upward direction for supporting the tripping arm normally in latch engaging position.

6. Latch tripping mechanism adapted to be mounted in a trackway for releasing latch means of a drop bottom door on a conveyance, said tripping mechanism comprising a tripping arm including a substantially U-shaped loop with a connecting portion between opposite sides in position to engage the latch means, a shaft fixed to the opposite sides of the loop, means mounting the shaft for swinging movement of the arm, means yieldably urging the arm in an upward direction, a pair of arms supporting the journal means thereon and spaced apart transversely for swinging movement of the arm therebetween, a pivotal support for said pair of arms, and means yieldably urging the pair of arms in an upward

direction while allowing bodily movement of the tripping arm downward upon yielding of the last mentioned means.

7. Latch tripping mechanism adapted to be mounted in a trackway for releasing latch means of a drop bottom door on a conveyance, said tripping mechanism comprising a tripping arm having means supported thereon in position for engaging the latch means by a hooking action, a cross shaft, a journal for said shaft, the tripping arm extending slidably through the shaft for extending movement lengthwise relative thereto, and means connected with the tripping arm for limiting the sliding movement thereof in opposite directions.

8. Latch tripping mechanism adapted to be mounted in a trackway for releasing latch means of a drop bottom door on a conveyance, said tripping mechanism comprising a tripping arm including a hook member in position to engage the latch means and having a side portion, and a supporting shaft journaled for turning movement, said shaft having the side portion of the hook member extending slidably through the shaft for bodily movement relative thereto.

9. Latch tripping mechanism adapted to be mounted in a trackway for releasing latch means of a drop bottom door on a conveyance, said tripping mechanism comprising a tripping arm including a substantially U-shaped loop with a portion connecting opposite sides in position to engage the latch means, and a supporting shaft journaled for turning movement, said shaft having the opposite sides of the loop extending slidably through the shaft for bodily movement relative thereto.

10. Latch tripping mechanism adapted to be mounted in a trackway for releasing latch means of a drop bottom door on a conveyance, said tripping mechanism comprising a tripping arm including a substantially U-shaped loop with a portion connecting opposite sides in position to engage the latch means, a supporting shaft journaled for turning movement, said shaft having the opposite sides of the loop extending slidably through the shaft for bodily movement relative thereto, and means normally tending to move said loop to a raised position.

11. In conveying mechanism including a trackway, and a dumping conveyance movable along the trackway and including a lading body with a drop bottom door, the combination of latch means for holding the door closed and movable to release the door for opening, said latch means including an actuating member having a reentrant portion in position for engagement from beneath the conveyance, and a tripping arm including a side member having a laterally extending hook portion in position to be engaged by the reentrant portion of the actuating member, said side member of the tripping arm extending in overlapping relation with a side of the actuating member when the hook portion is engaged with the reentrant portion thereof.

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