Nov. 21, 1944. T. M. CATE ET AL 2,362,986

DROP-BOTTOM MINE CAR

Filed Oct. 15, 1941 4 Sheets-Sheet 1

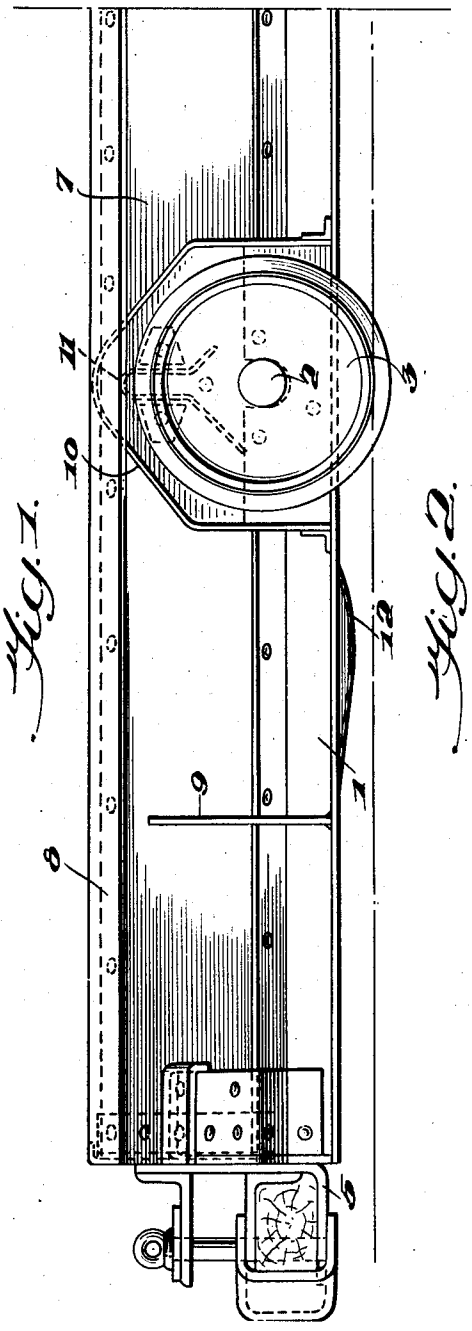


Fig. 1.

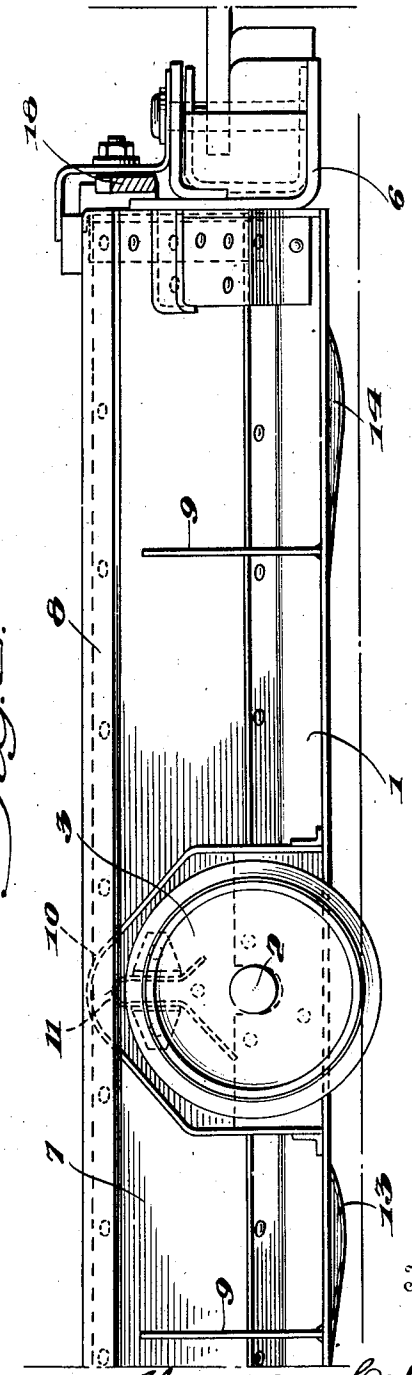


Fig. 2.

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DROP-BOTTOM MINE CAR

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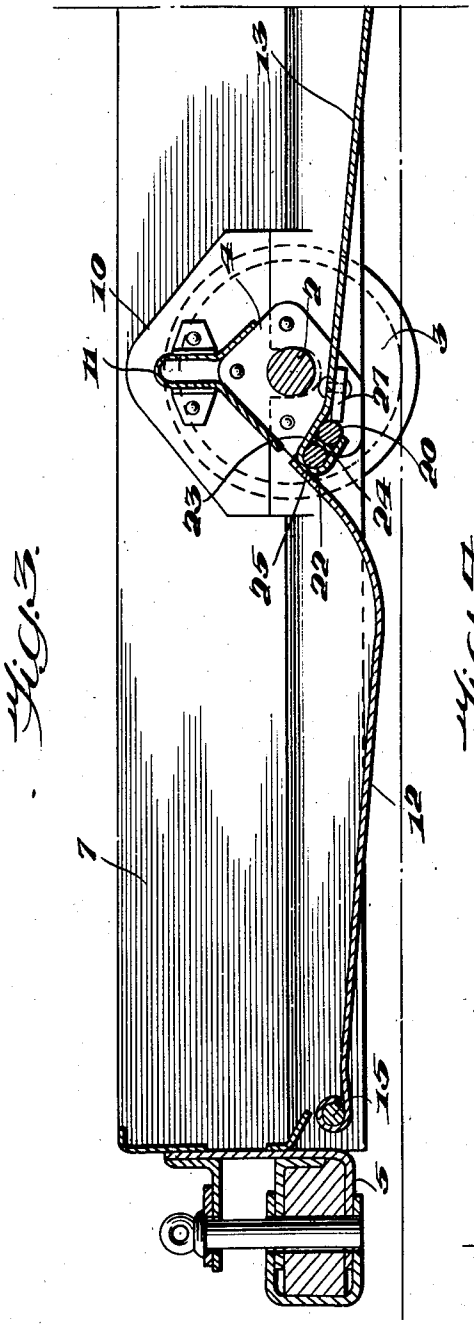


Fig. 3.

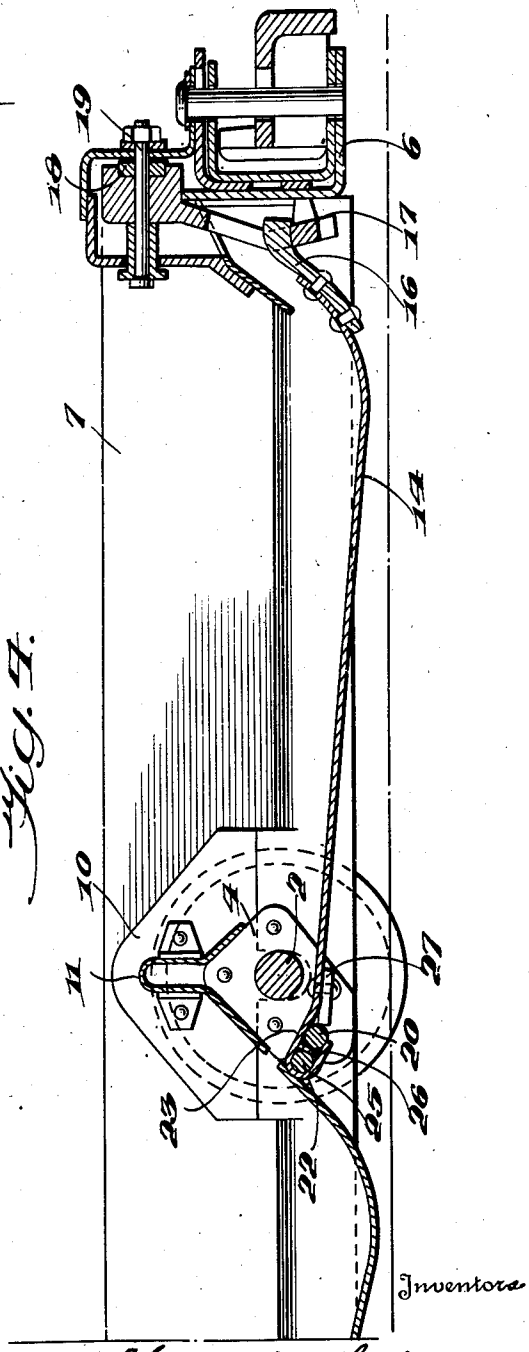


Fig. 4.

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DROP-BOTTOM MINE CAR

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Fig. 5.

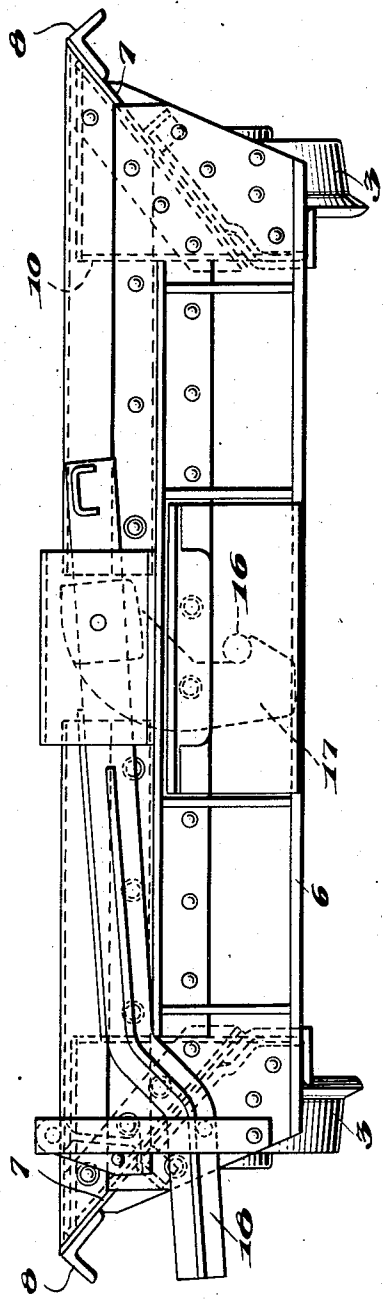
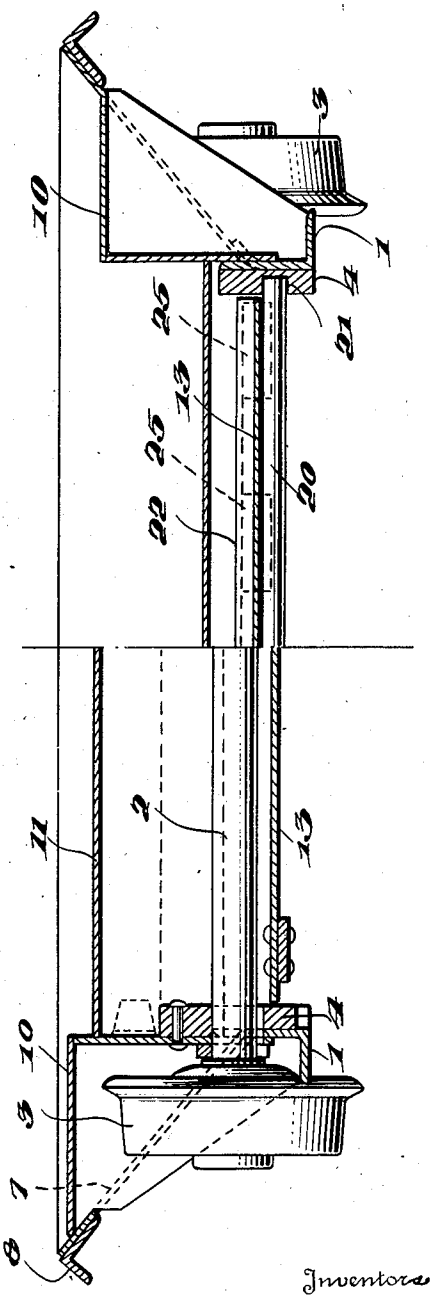


Fig. 6.



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DROP-BOTTOM MINE CAR

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Fig. 7.

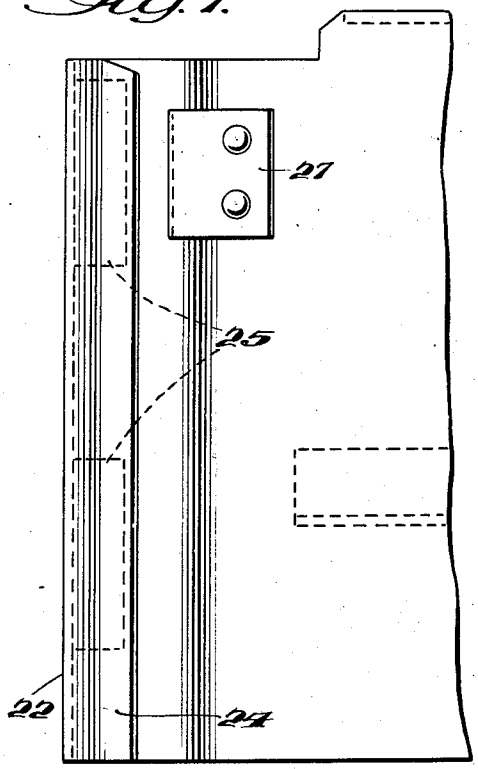


Fig. 8.

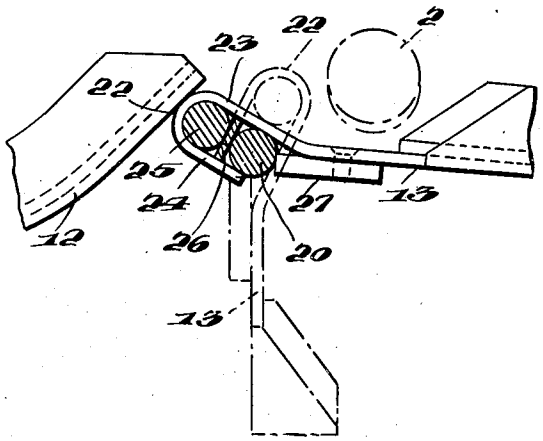


Fig. 9.

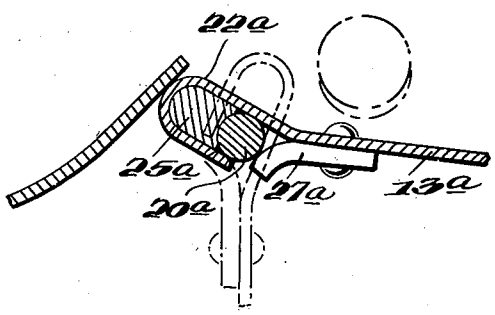


Fig. 10.

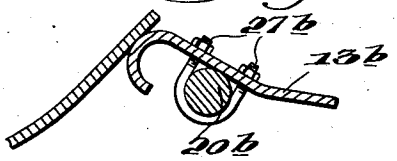


Fig. 11.

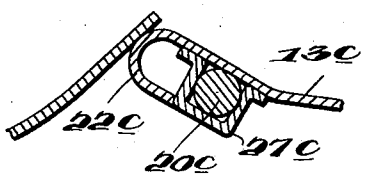
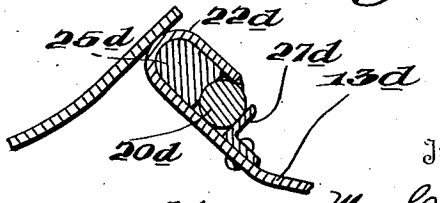


Fig. 12.



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UNITED STATES PATENT OFFICE

2,362,986

DROP-BOTTOM MINE CAR

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Application October 15, 1941, Serial No. 415,134

14 Claims. (Cl. 105—253)

This invention relates to an improvement in drop bottom mine cars of the type having bottom doors designed for automatic release to discharge the lading through the bottom of the car.

Mine cars of this character are provided usually with a plurality of doors hinged about transverse axes, with the free edge of one door resting on the hinge edge of the next following door, being supported usually on a hinge rod extending transversely between opposite side sills. Various means have been provided heretofore for supporting the free edges of the doors to permit automatic dropping thereof, as by a hinge rod that was bodily movable to release the free edge of the next forward door, but this is objectionable due to its complexity and expensiveness. It has been proposed also to connect a bracket or swinging member with the hinge rod, or to offset the hinge rod in the form of a crank, but these are objectionable because of the expensiveness of the construction and the difficulties of mounting the same in the car, as well as the amount of wear that is imposed on the hinge rod in relatively short space.

Where the hinge rod is fixed in place and the hinged edge of the next following door extends thereover in a curve concentric with the hinge rod, to a point where it will support the free edge of the next forward door, it has been necessary to interpose spacing structures, such as castings, to form hinge supports for the following door on the hinge rod, but these are objectionable because they reduce the capacity of the car, add to its cost of manufacture, and provide for support of the door only at spaced points on the hinge rod.

The object of this invention is to improve the construction of the car, particularly as to the manner of supporting drop bottom doors, to simplify its structure, and to render it economical to manufacture and use, while hinging the door by a support extending continuously throughout the width of the door.

This is accomplished by pivotally supporting each drop bottom door directly on the hinge rod which is mounted between the side sills, and providing an extension substantially in alignment with the upper surface of the door beyond the hinge rod, which will engage the free edge of the next forward door to support the same and to release said edge automatically upon the dropping of the next following door. This extension may be formed as a continuation of the metal plate of the door turned back upon itself substantially as a loop having a width approximately the same as the diameter of the hinge rod. This forms an effective support for the free edge of the forward door while allowing the doors to drop in the desired sequence without danger of interference with each other.

A preferred embodiment of the invention, together with modifications thereof, are illustrated in the accompanying drawings in which:

Fig. 1 is a side elevation of the front end portion of a mine car embodying this invention;

Fig. 2 is a similar view of the rear end portion thereof;

Fig. 3 is a longitudinal section through the front end portion of said car;

Fig. 4 is a similar view through the rear end portion thereof;

Fig. 5 is an elevation of the rear end of the car;

Fig. 6 is a cross section of the car taken partly through the axle and partly through the hinge rod;

Fig. 7 is a bottom plan view of a portion of one of the doors;

Fig. 8 is a side elevation partly in section, showing the adjacent edges of the doors and the hinge means;

Fig. 9 is a cross section showing a modified form of door supporting means; and

Figs. 10 to 12 are similar views of still other forms thereof.

The mine car shown in the drawings is of a contour and design such as will provide for maximum capacity in a drop bottom car for given over-all dimensions. In the car shown, side sills 1 extend lengthwise of the car and are mounted on axles 2, supported on wheels 3. Axle boxes 4 are rigidly secured, as by rivets or other fastenings, to the inside faces of the side sills 1, for supporting said side sills on the axles in the usual manner, as shown more in detail in Figs. 3, 4 and 6. The front ends of the side sills 1 are joined together by a bumper structure designated generally by the numeral 5 (Figs. 1 and 3), while the rear ends of said side sills are joined together by a bumper structure designated generally by the numeral 6 (Figs. 2, 4 and 5).

The side sills 1 are shown as having their upper edges below the upper edges of the axles 2, and support thereon flare side walls 7, extending laterally and upwardly from the upper edge portions of the side sills 1. The side walls 7 are arranged at an angle to the horizontal greater than the angle of response of loose coal or other similar lading so as to shed the same into the opening formed in the bottom of the car. The upper edges of the flare side walls 7 are braced by lon-

gitudinally extending angle bars 8 rigidly fixed thereto, and braces for the side walls are shown also at 9.

The side walls 7 are notched out at the wheels and receive therein wheel hoods 10 which are fixed to the side sills 1 and the axle boxes 4. Opposite wheel hoods 10 are braced also by a tie plate 11, extending therebetween and secured to the respective wheel hoods. The lower edges of the tie plate 11 flare outward to form a hood over the axle 2.

The bottom of the car is open between the side sills with drop bottom doors 12, 13 and 14 mounted therein successively from the front to the rear of the car and forming a bottom therefor. The forward door 12 is hinged on a rod 15 extending transversely between and supported by opposite side sills 1 adjacent the front bumper 5. The center door 13 and rear door 14 support the free edges of the next forward doors respectively, while the free edge of the rear door 14 has a trunnion 16 fixed thereto in position to be engaged and held by a hook 17 which is fixed to a lever bar 18 pivotally supported at 19 (Figs. 4, 5). The lever bar extends laterally to a point outside the lateral confines of the car in position to be engaged automatically to release the doors for dropping.

Each of the center and rear doors, 13, 14, is supported on a hinge rod 20 that extends transversely of the car between opposite side sills. The opposite ends of the hinge rod 20 are shown as extending into holes or recesses 21 formed in the axle boxes 4, as shown in Fig. 6, for supporting said rod, although it may be supported in any other desired manner.

Each of the doors is formed preferably of a main steel plate or sheet as shown in Figs. 3, 4 and 7, and may be braced longitudinally by angle bars fixed to the upper surfaces thereof, if desired.

The hinge edge portion of each of the doors 13 and 14 rests directly on the hinge rod 20, substantially throughout the width of the door, but is turned back upon itself in the form of a loop 22 that projects beyond the hinge rod 20, as shown in Fig. 8, which loop has opposite sides 23 and 24 spaced apart a distance substantially equal the diameter of the hinge rod 20. The side 24 is of a length preferably sufficient to coact with the side 23 in embracing the hinge rod 20, being parallel therewith. The outer edge portion of the loop 22 has fixed therein filler bars 25, which are confined by spacing plates 26 that extend transversely between the sides 23 and 24, being welded in place, and bear upon the hinge rod 20, holding the sides properly spaced. At the opposite side of the hinge rod 20 is a keeper bar 27 riveted or otherwise fixed to the bottom face of the door in position to confine the hinge rod 20 substantially within the loop, as shown, for turning movement of the door relative thereto.

In place of the filler bars 25 with the interposed plate 26, the form of the invention illustrated in Fig. 9, has one or more solid blocks 25*a* within the loop 22*a*, filling the same and bearing against one side of the hinge rod 20*a*. A keeper bar 27*a* is secured to the door 13*a* to confine the hinge rod on the opposite side thereof from the loop.

Another form is shown in Fig. 10, in which the door 13*b* rests on the hinge rod 20*b* and is secured thereto by U-bolts 27*b* passing through the plate of the door and embracing the hinge rod. A forwardly extending loop 22*b* at the edge of the door 13*b* is turned back upon itself and forms a supporting loop for the next forward door.

Instead of using U-bolts as shown in Fig. 10, clamps may be used, as shown at 27*c* in Fig. 11, embracing the hinge rod 20*c*, and secured to the under face of the door 13*c* holding the latter in bearing relation upon the surface of the hinge rod. In this instance, the loop 22*c* is shown as extending back substantially to the clamp 27*c* and may press thereagainst to form a secure support for the free edge of the next forward door resting thereon.

Instead of mounting the door upon the hinge rod, as in the forms described above, the door may be supported beneath the hinge rod, as shown in Fig. 12, having a loop 22*d* turned back over the hinge rod 20*d*, with a filler 25*d* secured in the loop and bearing against one side of the hinge rod. On the opposite side of the hinge rod is a keeper bar 27*d* secured to the top surface of the door.

The doors are thus supported for successive dropping in 1, 2, 3 order from rear to front of the car upon release of the hook 17 from the trunnion 16 when the lever 18 is actuated in the usual manner. The dropping of the rear door 14 swinging about the hinge rod 20 causes the loop 22 to be moved out from under the free edge of the next forward door, substantially to the position shown in dotted lines in Fig. 8. This releases the next forward door which is allowed to drop in the same way to release the front door, thus discharging all of the lading from the car.

It will be noted that the hinge rod is mounted above the lower edges of the side sills and is thus protected from being knocked off in the event of derailment of the car. By supporting each door directly on the hinge rod, intervening brackets and castings are eliminated, thus not only simplifying the construction with less cost of manufacture, but also lowering the doors for increased capacity of the car, and providing a support extending continuously throughout the width of the door. The structure is not weakened thereby because the door can rotate about the straight hinge rod, and the wear is distributed throughout the length of the rod, instead of being confined at isolated points therealong or at the ends of the rod.

By forming the projection as a loop at one side of the hinge rod, a true rotating motion is obtained, and at the same time, a good margin of overlap is provided for the free edge of the next forward door. Furthermore, the point of release of the forward door relative to the extent of swinging movement of the rearward door, can be varied as desired, by varying the extent of projection of the loop toward or from the hinge rod. Thus, a quick or a slow release of the doors can be provided, as may be desired.

We claim:

1. In a drop bottom dumping vehicle, the combination of opposite side sills, a plurality of drop bottom doors between the sills, and means for hinging said doors about transverse axes, said hinging means including a hinge rod extending intermediate the side sills and fixed relative thereto, one of said doors having the major portion thereof formed of sheet material with a side of said sheet bearing against said hinge rod substantially throughout the width of said door for swinging movement relative thereto, means holding said door against bodily movement transversely of the hinge rod, said door having a latch-

ing loop extending substantially throughout the width of the door and turned back upon itself and attached to the hinge edge thereof and projecting laterally of said hinge rod on the opposite side of said rod from the door for supporting an edge of the adjacent door.

2. In a drop bottom dumping vehicle, the combination of opposite side sills, a plurality of drop bottom doors between the sills, and means for hinging said doors about transverse axes, said hinging means including a hinge rod extending intermediate the side sills and fixed relative thereto, one of said doors having the major portion formed of a door plate with a portion thereof bearing directly on said hinge rod substantially throughout the width of said door for swinging movement relative thereto, means holding said door against bodily movement transversely of the hinge rod, said door having a substantially U-shaped projection fixed to said edge portion thereof continuously throughout substantially the entire width of the door and on the opposite side of said rod from the major portion of said door and extending laterally from said hinge rod approximately tangentially thereof for latching an edge of the adjacent door.

3. In a drop bottom dumping vehicle, the combination of opposite side sills, a plurality of drop bottom doors between the sills, and means for hinging said doors about transverse axes, said hinging means including a hinge rod extending intermediate the side sills, one of said doors being formed of sheet material having the underside of said sheet bearing directly on said hinge rod substantially throughout the width of said door for swinging movement relative thereto, means holding said door against bodily movement transversely of the hinge rod, said door having a loop along the edge thereof extending laterally from said hinge rod on the opposite side of the hinge rod from the major portion of the door to a position appreciably further from the peripheral surface of the hinge rod than the lading-supporting surface of the door and with the sides of said loop arranged approximately tangentially of said rod for supporting an edge of the adjacent door.

4. In a drop bottom mine car, the combination of a lading body having side sills, a plurality of drop bottom doors between the side sills, and means for hinging said doors about transverse axes, said hinging means including a hinge rod extending between the side sills and having opposite ends thereof secured in fixed position relative to said side sills, one of the doors having the major portion thereof formed of sheet material with an edge portion of said sheet bearing directly on said hinge rod approximately throughout the width of the door for swinging movement only of the door relative to the hinge rod, and a loop attached to said edge portion of the door and extending laterally from the hinge rod substantially throughout the width of the door and on the opposite side of the hinge rod from the major portion of the door in position to support an edge of the adjacent door.

5. In a drop bottom mine car, the combination of a lading body having side sills, a plurality of drop bottom doors between the side sills, and means for hinging said doors about transverse axes, said hinging means including a hinge rod extending between the side sills and having opposite ends thereof secured in fixed position relative to said side sills, one of the doors being formed of sheet material and having an edge portion thereof mounted on the hinge rod for swinging movement relative thereto, said door having a portion of the sheet material at the edge portion thereof extending laterally from the hinge rod on the opposite side of the hinge rod from the major portion of the door and looped back upon itself in position to support an edge of the adjacent door, said loop having the back-turned side thereof extending substantially to the hinge rod and arranged approximately tangentially of said rod, and means for holding the door against sliding movement transversely of the hinge rod, said holding means including filler means within the loop between the opposite sides thereof and bearing against one side of the hinge rod.

6. In a drop bottom mine car, the combination of a lading body having side sills, a plurality of drop bottom doors between the side sills, and means for hinging said doors about transverse axes, said hinging means including a hinge rod extending between the side sills and having opposite ends thereof secured in fixed position relative to said side sills, one of the doors being formed of sheet material and having an edge portion thereof mounted on the hinge rod for swinging movement relative thereto, said door having a portion of the sheet material at the edge portion thereof extending laterally from the hinge rod on the opposite side of the hinge rod from the major portion of the door and looped back upon itself in position to support an edge of the adjacent door, said loop having opposite sides embracing said rod, and means for holding the door against sliding movement transversely of the hinge rod and filler means within said loop between the end thereof and said rod in position to bear against one side of the rod.

7. In a drop bottom vehicle, the combination of a lading body having side portions, a plurality of drop bottom doors between the side portions, and means for hinging said doors about transverse axes, said hinging means including journal means extending inwardly from the side portions and supporting one of the doors thereon for swinging movement, said door being formed of sheet material and having an edge portion thereof hinged on the journal means, said door having a portion of the sheet material extending laterally from the journal means on the opposite side of said journal means from the major portion of said door and looped back upon itself in position to support an edge of the adjacent door, said loop having the opposite sides thereof approximately tangentially of said journal means, and means for holding the door against sliding movement transversely of the hinge rod, said holding means including filler means within the loop between the opposite sides thereof and bearing against one side of the hinge rod.

8. In a drop bottom mine car, the combination of a lading body having side sills, wheels and axles for supporting the side sills, axle boxes bearing on the axles and attached to the side sills, a plurality of drop bottom doors between the side sills, and means for hinging said doors about transverse axes, said hinging means including the hinge rod extending substantially in a straight line between the side sills and having opposite ends supported by the axle boxes, one of the doors having the major portion thereof formed of sheet material with the under surface of said sheet bearing directly on said hinge rod for swinging movement relative thereto, and a loop fixed to said door and extending laterally from said hinge rod on the opposite side of the hinge rod from the major portion of the door in position for supporting an edge of the adjacent door, and filler means within said loop between

the opposite sides thereof for holding the door against sliding movement relative to the hinge rod in swinging to open and closed positions.

9. In a dumping conveyor, the combination of side sill means, a plurality of drop bottom door structures each including a door plate, and supporting means for said door structures including a transverse journal fixed relative to the side sill means and having the plate of one door structure seated directly thereon and hinged thereto for swinging movement about a transverse axis while said door structure is held against bodily displacement relative to said transverse axis, and a loop connected with said hinged door structure substantially throughout the width thereof and extending substantially lengthwise thereof laterally of said journal on the opposite side of said journal from the major portion of the door and in position to engage under the free edge of the adjacent door structure for supporting said free edge.

10. In a dumping conveyor, the combination of said sill means, a plurality of drop bottom door structures each including a door plate, and supporting means for said door structures including a transverse journal fixed relative to the side sill means and having the plate of one door structure extending substantially tangent to said journal in position to bear directly thereon, means connected with the bearing portion of said plate and embracing the journal for hinging the door structure thereto and holding said door structure against sliding movement laterally of the journal, and a tubular section fixed to said door structure and extending laterally from the journal on the opposite side thereof from said door in position to support the free edge of the adjacent door structure at a point above the lower edge of said journal.

11. In a drop bottom dumping vehicle, the combination of opposite side portions, a plurality of drop bottom doors between the side portions, means for hinging said doors about transverse axes, said hinging means including a hinge rod extending transversely of the vehicle for supporting one of the doors for swinging movement at an edge thereof, said last-mentioned door being formed of sheet material with a portion of said sheet having bearing relation against the hinge rod substantially throughout the width of said door, said door having a latching loop extending throughout a substantial portion of the width of the door and turned back upon itself and attached to the hinge edge of the door and projecting laterally of the hinge rod on the opposite side of said rod from the door for supporting an edge of the adjacent door, and means holding said door against bodily movement transversely of the hinge rod.

12. In a dumping conveyor, the combination of side sill means, a plurality of drop bottom door structures each comprising a main door sheet, and supporting means for said door structures including a transverse journal carried by the side sill means, the main door sheet of one door having a portion bearing on said journal substantially throughout the width of the door, means embracing the journal and holding the door structure against bodily movement laterally of the journal, and a tubular section fixed to said door structure and extending laterally from the journal on the opposite side thereof from the main door plate in position to support the free edge of the adjacent door structure.

13. As an article of manufacture, a door for a drop bottom car comprising a main door plate back-turned to form a substantially U-shaped loop along an edge thereof, said U-shaped loop having one side thereof forming a continuation of the main door plate lengthwise thereof and forming a pivotal bearing between the sides of the loop spaced from the closed edge thereof to receive a hinge rod therein with the plate in position to bear on the hinge rod, and means to confine opposite sides of the hinge rod at said pivotal bearing, said confining means including filler means within the loop between the closed edge thereof and the bearing for preventing endwise displacement of the main door plate relative to the hinge rod.

14. As an article of manufacture, a door for a drop bottom vehicle comprising a main door sheet having a hinge portion in position to bear on a supporting journal substantially throughout the width of the door, means connected with said hinge portion of the door for embracing opposite sides of the journal to hold the door against bodily movement transversely of the journal, and a tubular section fixed to said hinge portion of the door substantially throughout the width of the door and extending laterally therefrom on the opposite side thereof from the main door sheet in position to support the free edge of an adjacent door.

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