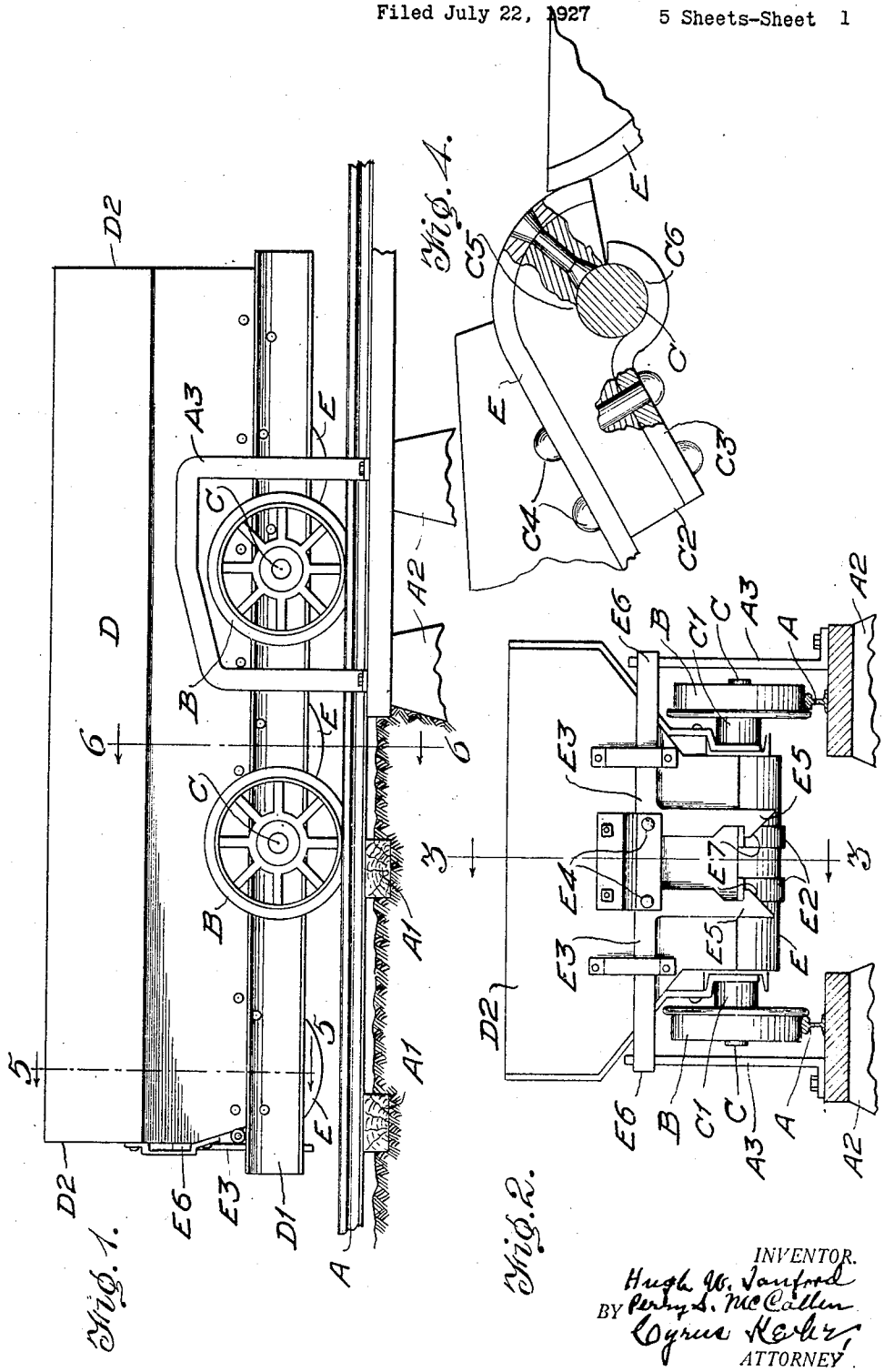
June 10, 1930. H. W. SANFORD ET AL 1,762,667

MINE CAR

Filed July 22, 1927 5 Sheets-Sheet 1



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MINE CAR

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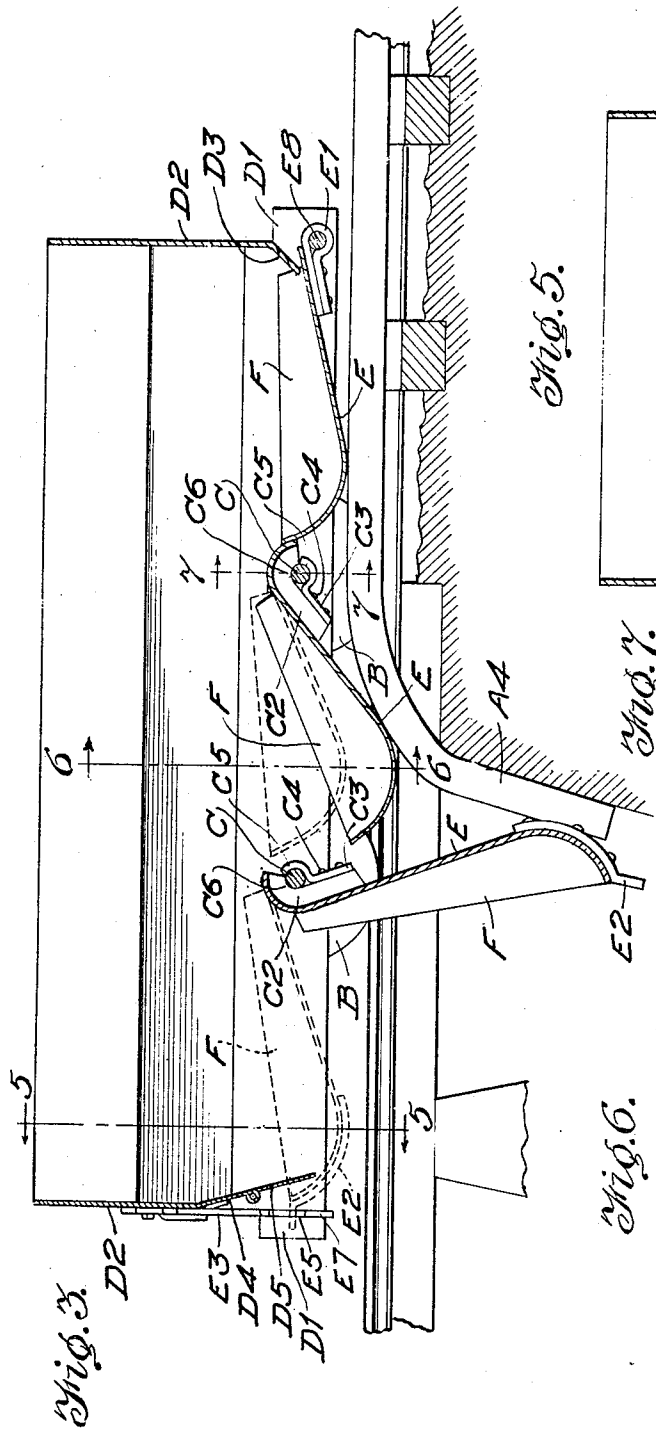


Fig. 3.

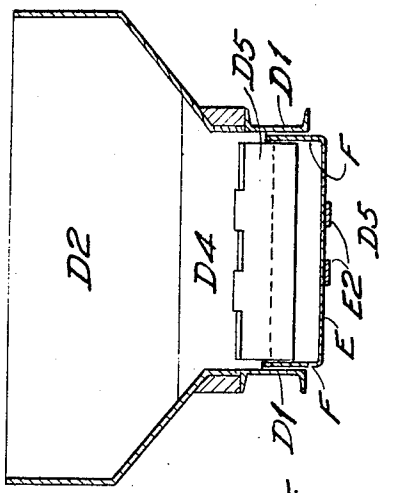


Fig. 5.

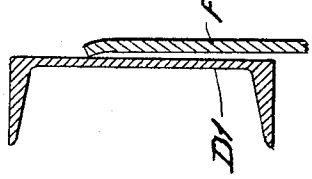


Fig. 7.

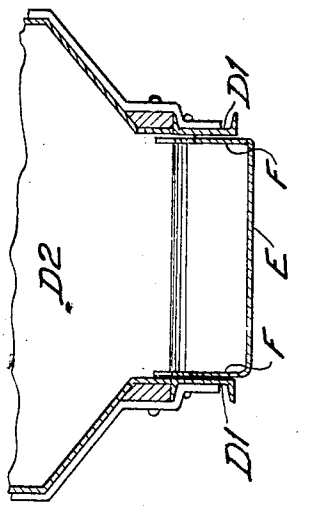


Fig. 6.

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MINE CAR

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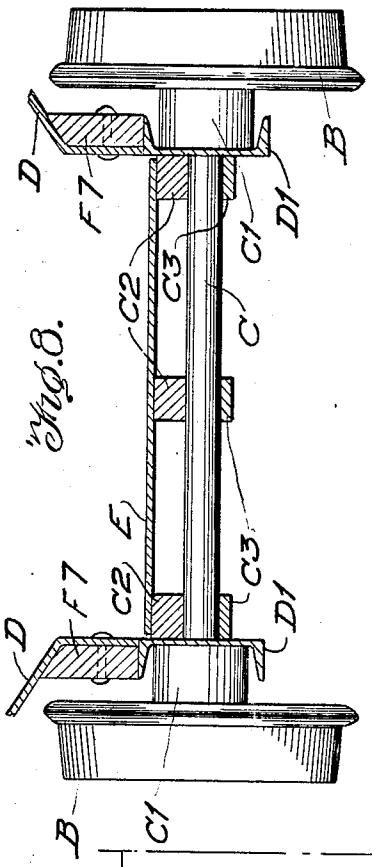


Fig. 8.

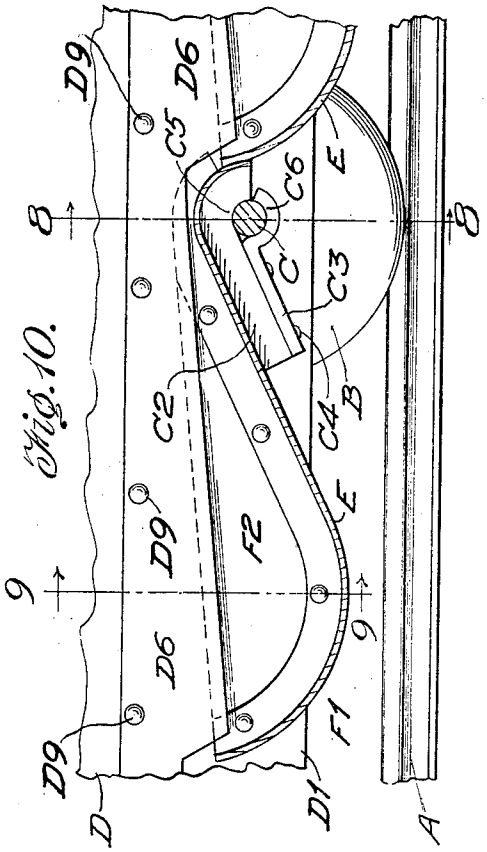


Fig. 10.

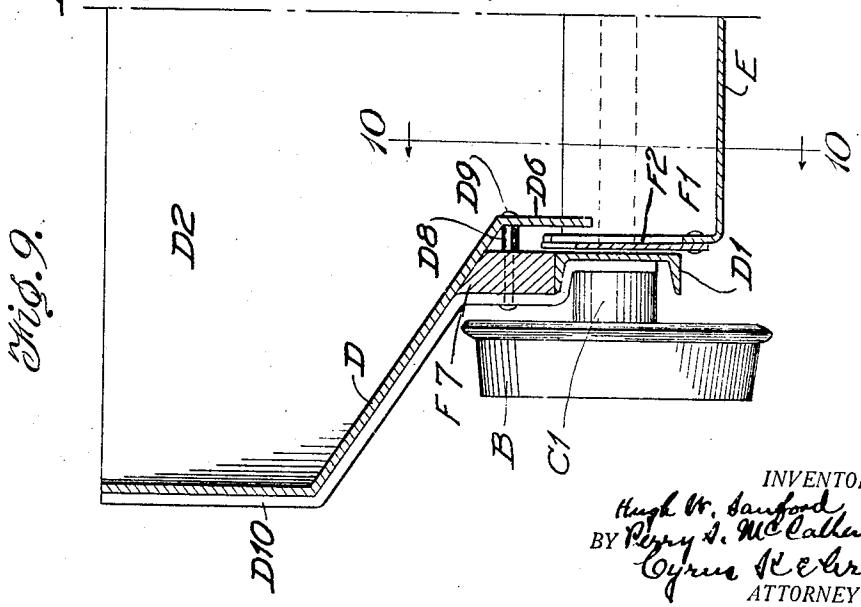


Fig. 9.

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MINE CAR

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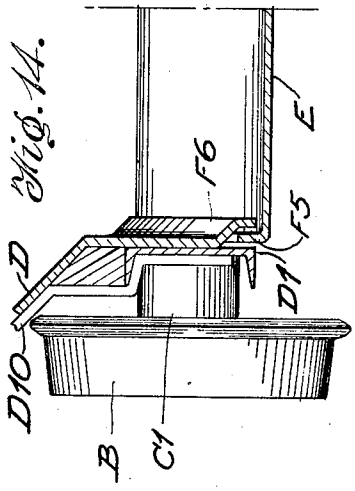


Fig. 14.

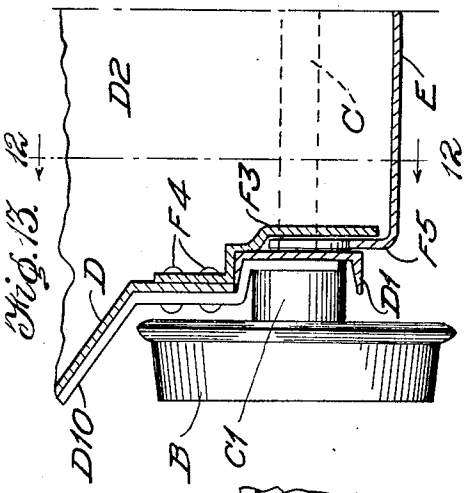


Fig. 13.

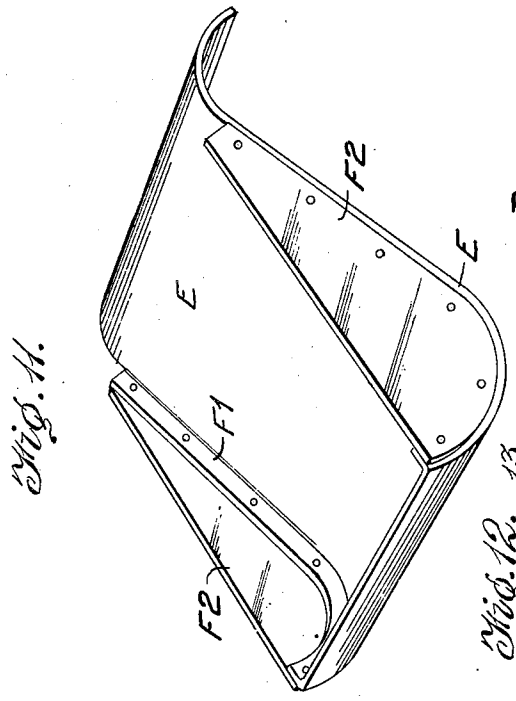


Fig. 11.

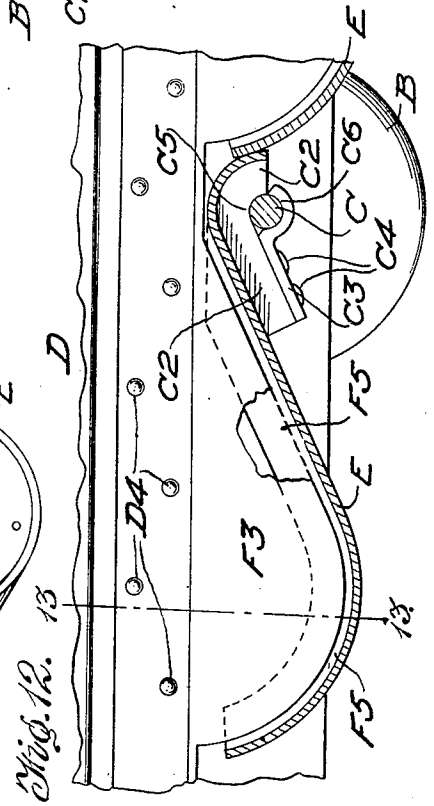


Fig. 12.

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MINE CAR

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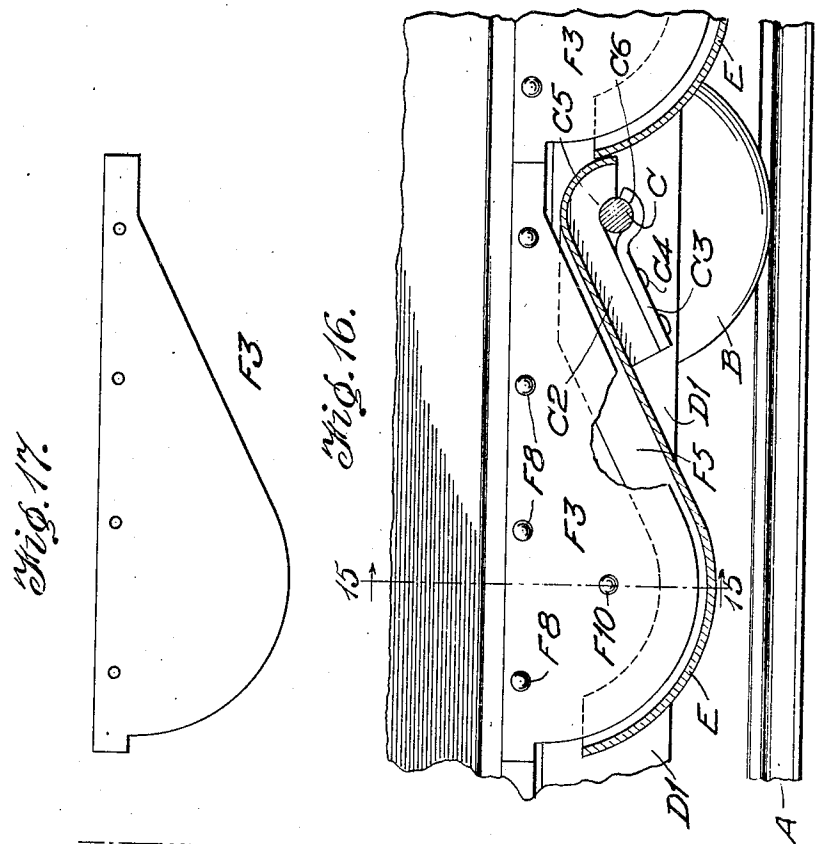


Fig. 17.

Fig. 16.

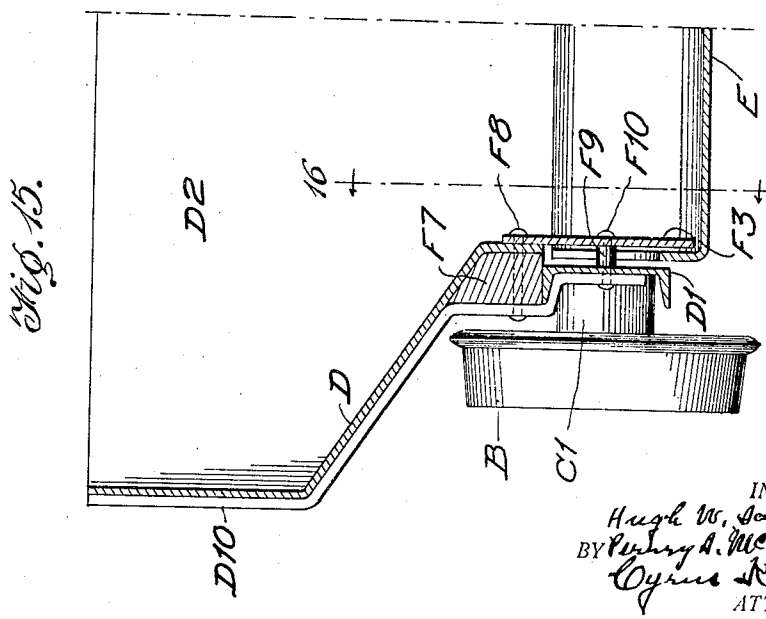


Fig. 15.

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Patented June 10, 1930 1,762,667

UNITED STATES PATENT OFFICE

HUGH W. SANFORD AND PERRY S. McCALLEN, OF KNOXVILLE, TENNESSEE, ASSIGNORS TO SANFORD INVESTMENT COMPANY, OF WILMINGTON, DELAWARE, A CORPORATION OF DELAWARE

MINE CAR

Application filed July 22, 1927. Serial No. 207,763.

This invention relates to mine cars of the general type shown and described by Letters Patent of the United States, No. 1,268,390, granted to Hugh W. Sanford, June 4, 1918, the car of that patent having transversely hinged bottom doors which are held in the approximately horizontal closed position while the car contains a load, and which doors are released and allowed to turn downward on their hinge supports when the load is to be discharged.

The object of this invention is to improve the doors and associated members in such manner as to substantially prevent leakage of material downward from the interior of the car between the doors and the side sills or side walls of the car, and also adapt the doors to be made amply strong with light weight metal.

Our application, Serial Number 449,245, filed May 2, 1930, for Letters Patent for "mine cars", is a division of this application.

In the accompanying drawings,

Fig. 1 is a side elevation of a car and a portion of a track illustrating our improvement, the end sills of the car having been omitted;

Fig. 2 is a rear elevation of the structure shown by Fig. 1;

Fig. 3 is an upright, longitudinal section on the line 3—3, of Fig. 2, showing the car in engagement with the means for raising the bottom doors;

Fig. 4 is an enlarged detail view showing the meeting edges of two doors;

Fig. 5 is an upright section on the line, 5—5, of Figs. 1 and 3, looking toward the left;

Fig. 6 is an upright transverse section on the line, 6—6, of Figs. 1 and 3, looking toward the right, the door being in the closed position;

Fig. 7 is a detail showing a cross section of a side sill and the adjacent door flange or wall;

Fig. 8 is an upright transverse section on the line, 8—8, of Fig. 10;

Fig. 9 is a section similar to Fig. 6, the construction being in another form;

Fig. 10 is an upright longitudinal section on the line, 10—10, of Fig. 9, looking toward the left;

Fig. 11 is a perspective of a door in which the side walls are not integral with the body of the door;

Fig. 12 is an upright longitudinal section on the line, 12—12, of Fig. 13, looking toward the left;

Fig. 13 is a transverse upright section on the line, 13—13, of Fig. 12, looking toward the right;

Fig. 14 is a view similar to Fig. 13, the apron being extended further downward;

Fig. 15 is an upright section on the line, 15—15, of Fig. 16, looking toward the left;

Fig. 16 is an upright longitudinal section on the line, 16—16, of Fig. 15, looking toward the right;

Fig. 17 is a side elevation of the apron shown in Figs. 15 and 16.

Referring to said drawings, A, A are track rails resting on ties, A^1, and piers, A^2. B, B are ordinary car wheels applied to the ends of axles, C, C. D is the body of the car. D^1, D^1 are side sills of channel-shape cross section forming parts of the car. The ends of these sills are joined by end sills or bumpers, not shown. Boxes, C^1, seated in the channels of the side sills receive the axles, C.

The end of the car at the right, as viewed in the drawings, is the forward end of the car, and it is to be understood that the car moves forward for dumping and for closing the doors after the load has been discharged from the car. The discharge is downward between the side sills and between the track rails, A. The place at which the discharge is effected is called the tipple or dumping station. Beneath the rails, A, the material discharged from the car may be received in a chute or another car or any other suitable device, not shown.

Three doors, E, are placed in series to form the bottom of the car. The rearmost of these doors controls the series. Therefore that door may be regarded as the first of the series and for that reason be described first. Said door has at its forward edge

three pairs of hinge members, C^2 and C^3, as hereinafter described. At its rear edge, two bars or arms, E^2, are attached to the lower face of the door and project a little way rearward of said rear edge. On the rear end of the car body and in an upright plane transverse to the length of the car body are a pair of bell cranks, E^3, pivoted at E^4, to the car body. Each of said bell cranks has a hook, E^5, adapted to extend beneath the adjacent bar or arm, E^2, each bell crank being so arranged as to bring its pivot, E^4, above its hook, whereby the arm bearing the hook may swing toward and from the upright, middle, longitudinal plane of the car while the arm, E^6, of the bell crank extends horizontally outward and by its preponderance of weight tends to tilt the bell crank so as to move said hook toward said plane. Each of said hooks has a beveled face, E^7, adapted to be engaged by the adjacent bar or arm, E^2, when the latter is carried upward by the upward movement of the rear portion of the door into the closed position. When said bars, E^2, thus rest on the hooks, E^5, said door is held firmly in its upper or closed position, and this condition continues until said hooks are moved outward far enough to allow the bars, E^2, to descend. Said hooks are made to move outward by raising the horizontal arms, E^6, of the bell cranks. To cause said arms to rise automatically when the car reaches the dumping station, a cam member, E^8, is placed at each side of the track in position to engage the lower edge of the adjacent latch arm, E^6, and cause said arm to ride upward on said cam member during the further forward movement of the car, the arm, E^6, being extended outward far enough to bring said cam member into the path of said arm. It is to be observed that said door will not become released until both arms, E^6, have been raised. Hence said door will not ordinarily become released through the accidental raising of one of said arms by means other than one of said cam members. Thus the latch mechanism is duplex, and both parts must, ordinarily, operate simultaneously before the door becomes released.

Said door has at its front edge three pairs of hinges each comprising an upper hinge member in the form of a block, C^2, and a lower hinge member in the form of a strap C^3. Rivets, C^4, extend through said strap and said block and the door, E, and bind said members to each other. The under part of the block, C^2, has a concave portion, C^5, to receive the upper part of the rear axle, C, while the strap, C^3, has a reversely concave portion, C^6, which conforms to the lower side of the axle. The forward part of the door and the adjacent part of the hinge block, C^2, are curved to be approximately concentric to the axle, C. When the forward portion of the door, E, is thus formed, the door can turn on the axle, C, without lifting the next forward door and the load of coal or other material resting thereon and without lifting the coal or other material resting on the forward portion of the door which is being turned, the forward portion of the turning door merely turning like a horizontal cylinder on which rests a mass of loose material.

The forward portion of the second or middle door is curved and provided with hinges engaging the forward axle, as described concerning the first door.

At the forward end of the car there is a shaft, E^8, which is horizontal and transverse to the length of the car and has its ends resting in the side sills, D^1. On the forward edge of the third door are three ears or hinge members, E^1, through which said shaft extends. The rear edge of that door rests upon the forward part of the second door when the latter is in the upper or closed position.

As soon as the first or latch-controlled door has been released, as above described, the portion rearward of its hinge turns downward in response to the preponderating action of gravity upon said portion, while the curved portion of said door which is forward of said hinge slides upward and rearward along the material and the part of the second door resting thereon until the first door is free from the rear edge of the second door. Thereupon the second door in similar manner turns downward upon its hinge and frees its forward edge from the rear edge of the third door. Thereupon the third door similarly turns downward upon its hinge.

Although the drawings show three such doors, it will be understood that the number of doors in the series may be varied.

When all the doors have been released and allowed to turn for the downward discharge of the load, the continued forward movement of the car brings the lower face of the forward door into engagement with a stationary cam member, A^4, located upon the track between the rails, A, and rising to a sufficient height to raise the rear portion of said door upward a little way above its normal position. Said cam member is extended horizontally far enough to maintain its engagement with the forward door until the other two doors have successively in the same manner engaged the inclined portion of said cam and have been forced upward thereby. When the rear or latch-controlled door is being thus forced upward, the bars, E^2, engage the bevel faces, E^7, of the hooks, E^5, and force said hooks laterally until said arms are above said hooks, whereupon the latter move inward into position beneath said bars. After this

has been done, the three doors pass successively out of engagement with the cam member, A^4. As soon as the forward door is out of such engagement, it falls slightly until its rear edge rests upon the forward part of the next door; and as soon as the next door passes out of engagement with said cam member, the rear portion of said door falls until its rear edge rests upon the forward part of the rear or latch-controlled door. As already described, this rear door is now being held by the latch mechanism.

A train of such cars may be moved forward over the rails, A, and beyond the dumping station, the doors being automatically opened and afterward automatically closed while the train is in motion. The portions of the rails at the dumping station or tipple are supported on piers or columns, A^2, instead of cross-ties, in order that the doors may turn downward between the rails.

As above stated, the object of our invention is to improve the doors and associated members in such manner as to substantially prevent leakage of material downward from the interior of the car between the doors and the side sills or side walls of the car. The drawings show means for this purpose in several forms.

In Figs. 3, 4, 5, 6 and 7, the side edges of the doors—the edges which are next to the side sills—have ample upright walls, F, integral with the body of the door, the door being made of plate metal stamped or forged into shape from a single piece. These upright flanges have their upper edges so near the adjacent face of the side sills as to substantially prevent the downward passing of material between said flanges and the side sills. These walls are of a height much exceeding the height of such a marginal rib as is shown in said Patent, No. 1,268,390, for the purpose of stiffening the door. These high walls and the downward curved door together form a trough-shape receptacle for the coal or other material. Making these walls high facilitates shaping them to make their upper edges bear yieldingly against the adjacent faces of the side sills, whereby said edges are made to wipe or scrape along the faces of the side sills during the upward turning of said doors, and then remaining in pressing contact with the side sills. (Fig. 7.) In the forward or right hand part of Fig. 3, the end wall, D^2, of the body has a lower part, D^3, extending rearward and downward to bring it close to the surface of the body of the forward door. At the rear of the car body, the rear wall, D^2, has a similar lower part, D^4, extending downward and forward; but this part, D^4, is higher than the part, D^3, at the forward end of the car. To the lower edge of the part, D^4, is hinged an apron, D^5, the lower edge of which normally extends into and rests against the adjacent bottom of the first or rear door, this apron extending downward and forward. (See Figs. 3 and 5.) This apron forms a part of the end wall of the car body and performs its part in retaining the material resting on this rear door. When this door is released for downward turning, the material above the door can turn this apron rearward on its hinge to increase the opening through which the material is then discharging.

In Figs. 9, 10 and 11, the walls of the door are not integral with the body of the door. The door has at each side edge an up-turned flange, F^1, and to each such flange is riveted a wall, F^2. On the upper flange of the side sill, D^1, rests a wooden sill, F^7. The adjacent part of the side wall, D, of the car body extends obliquely upward and outward and rests on the wooden sill, F^7. A strap, D^{10}, extends over the outer face of the sills, D^1 and F^7, and the outer face of the side wall, D. The oblique part of the wall, D, extends downward beyond the wooden rail, F^7, and beyond the upright plane of the wall, F^2, and thence downward in the upright position to form an apron, D^6, overlapping but spaced from the wall, F^2. A spacing sleeve, D^8, is placed between the wooden rail, F^7, and the apron, D^6. A bolt D^9, extends through the apron, D^6, the sleeve, D^8, the wooden rail, F^7, and the strap, D^{10}, to bind said members firmly to each other. Thus the apron is held in its position and serves to prevent material in the car from reaching the upper edge of the wall, F^2. The lower edge of the apron, D^6, is preferably cut to approximately parallel the upper edges of the door walls, as shown in Fig. 10.

In Figs. 12 and 13, the apron, D^6, is omitted and the door wall, F^3, is substituted. The side wall, D, extends downward only to the outer part of the upper flange of the side sill, D^1. The door wall, F^3, is offset to rest on the upper flange of the side sill and bears against the inner face of the side wall, D. Rivets, F^4, extend through the wall, F^3, the side wall, D, and the strap, D^{10}. The lower edge of the door wall, F^3, is shaped to conform to the curvature of the doors, E, and almost touches the doors. Each side edge of each door has an upward-directed flange, F^5, which over-laps the door wall, F^3.

In Fig. 14, the side wall, D, is extended downward to form a door wall, F^6, overlapping the flange, F^5, of the door. This section is taken near the axle, C.

In Figs. 15 and 16, the structure differs from the structure of Figs. 12 and 13, in the manner of supporting the door walls, F^3. A wood sill, F^7, rests on the upper flange of

the side sill and extends inward a short distance beyond the inner upright face of the side sill. The side wall, D, extends over the upper face and the inner face of the wood sill, F^7. The upper edge of the wall F^3, over-laps the lower edge of the wall, D. Bolts or rivets, F^8, extend through the wall, F^3, the wall, D, the sill, F^7, and the adjacent strap, D^{10}. Thus the wall, F^3, is placed far enough away from the inner face of the side sill, D^1, to give the door flange, F^5, free space between said sill and the wall, F^3. A spacing sleeve, F^9, is placed between the wall, F^3, and the side sill. A rivet or bolt, F^{10}, extends through the wall, F^3, and said sleeve and the side sill and the adjacent strap, D^{10}, to bind said members firmly to each other. A separate wall, F^3, may be provided for each door, as shown in Figs. 16 and 17; but, if so preferred, the several walls may be formed of a single piece.

In all the forms illustrated by the drawings, the structure forms a sealing at the parts of the door which are adjacent the side sills, said sealing being for the purpose of preventing the escape of lading material from the car along said parts of the door. In these cars as previously constructed, the over-lapping ends of the doors made their own seal. In our improvement special provision is made to prevent leakage at the forward end of the forward door and at the rear end of the rear door. At the rear, the apron, D^5, is hinged to allow its lower edge to make close contact with the door and to allow the apron to swing during downward movement of the lading material. This is specially important if the material is in large lumps or blocks, or if the material is not in large lumps, but tends to mass together. In all cases, the downward movement is facilitated by the larger discharge opening, and the larger opening tends to prevent stalling of the discharge.

It is also to be especially observed that in most of the forms illustrated and described, the doors can be made of light weight metal and yet be amply strong. This economizes metal and limits weight of the structure. Not only do the ample sides of the doors permit attaining strength with light metal; but the fixed plates or aprons which overlap the sides of the doors, as shown in some of the forms, limit the strains exerted upon the sides of the doors by the load of material in the car.

We claim as our invention:

1. In a railway car of the kind described, the combination of axles, wheels supporting the axles, side sills supported by the axles, bottom doors supported on hinge lines which are transverse to the side sills, latch mechanism at the rear end of the rear door, and sealing means at the meeting of the doors and the side sills.

2. In a railway car of the kind described, the combination of axles, wheels supporting the axles, side sills supported by the axles, bottom doors supported on hinge lines which are transverse to he side sills, the meeting edges of the doors making supporting engagement with each other, latch mechanism at the rear end of the rear door, and sealing means at the meeting of the doors and the side sills.

3. In a railway car of the kind described, the combination of axles, wheels supporting the axles, side sills supported by the axles, bottom doors supported on hinge lines which are transverse to the side sills, latch mechanism at the rear end of the rear door, and the bottom doors having side walls of sufficient height to over-lap a large part of the inner face of the side sills and make the doors receptacles.

4. In a railway car of he kind described, the combination of axles, wheels supporting the axles, side sills supported by the axles, bottom doors supported on hinge lines which are transverse to the side sills, the meeting edges of the doors making supporting engagement with each other, latch mechanism at the rear end of the rear door, and the bottom doors having side walls of sufficient height to over-lap a large part of the inner face of the side sills and make the doors receptacles.

5. In a railway car of the kind described, the combination of axles, wheels supporting the axles, side sills supported by the axles, bottom doors supported on hinge lines which are transverse to the side sills, latch mechanism at the rear end of the rear door, and the doors having side walls of sufficient height to over-lap and have their upper edge bear yieldingly against the inner face of the side sills.

6. In a railway car of the kind described, the combination of axles, wheels supporting the axles, side sills supported by the axles, bottom doors supported on hinge lines which are transverse to the side sills, the meeting edges of the doors making supporting engagement with each other, latch mechanism at the rear end of the rear door, and the doors having side walls of sufficient height to over-lap and have their upper edge bear yieldingly against the inner face of the side sills.

7. In a railway car of the kind described, the combination of axles, wheels supporting the axles, side sills supported by the axles, bottom doors supported on hinge lines which are transverse to the side sills, latch mechanism at the rear end of the rear door, and end walls extending downward to the bottom doors.

8. In a railway car of the kind described, the combination of axles, wheels supporting the axles, side sills supported by the axles, bottom doors hinged on lines which are transverse to the side sills, latch mechanism at the rear end of the rear door, sealing means at the meeting of the doors and the side sills, and end walls extending downward to the bottom doors.

9. In a railway car of the kind described, the combination of axles, wheels supporting the axles, side sills supported by the axles, bottom doors supported on hinge lines which are transverse to the side sills, latch mechanism at the rear end of the rear door, and an end wall having a hinged downward extension reaching to the adjacent bottom door.

10. In a railway car of the kind described, the combination of axles, wheels supporting the axles, side sills supported by the axles, a bottom door supported on a hinge line which is transverse to the side sills, releasable means for holding the rear end of said door and sealing means at the meeting of the door and the inner faces of the side sills.

11. In a railway car of the kind described, the combination of axles, wheels supporting the axles, side sills supported by the axles, a bottom door supported on a hinge line which is transverse to the side sills and having side walls of sufficient height to overlap a large part of the inner face of the side sills and to make the door a receptacle, and releasable means for supporting the rear end of said door.

12. In a railway car of the kind described, the combination of a body having side walls, bottom doors supported on hinge lines which are transverse to the side walls, sealing means at the meeting of the doors and the inner faces of the side walls, and means for retaining the doors in the closed position.

13. In a railway car of the kind described, the combination of a body having side walls, approximately horizontal bottom doors supported on hinge lines which are transverse to the side walls, sealing means at the meeting of the doors and the inner faces of the side walls, and means for retaining the doors in the closed position.

14. In a railway car of the kind described, the combination of a body having side walls, approximately horizontal bottom doors supported on hinge lines which are transverse to the side walls, the bottom doors having side walls of sufficient height to overlap a large part of the inner face of said side walls to make the doors receptacles and give strength to the doors for supporting their loads, and means for retaining the doors in the closed position.

In testimony whereof I have signed my name at Nantucket, Massachusetts, this 25th day of June, in the year one thousand nine hundred and twenty-seven.

HUGH W. SANFORD.

In testimony whereof I have signed our names at Knoxville, Tennessee, this 2nd day of July, 1927.

PERRY S. McCALLEN.