H. W. SANFORD.

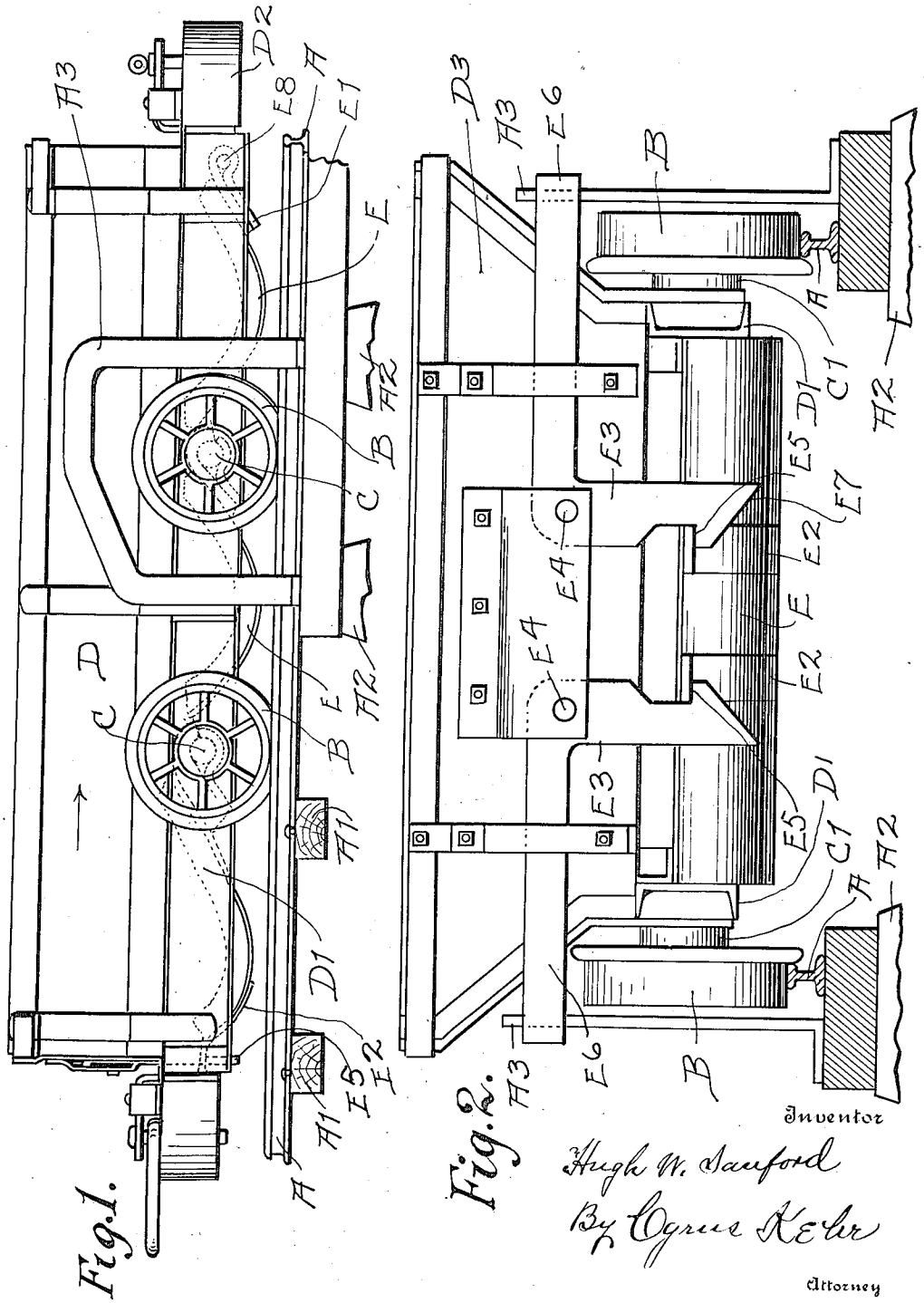
RAILWAY.

APPLICATION FILED NOV. 26, 1917.

1,268,390.

Patented June 4, 1918.

2 SHEETS—SHEET 1.



Inventor

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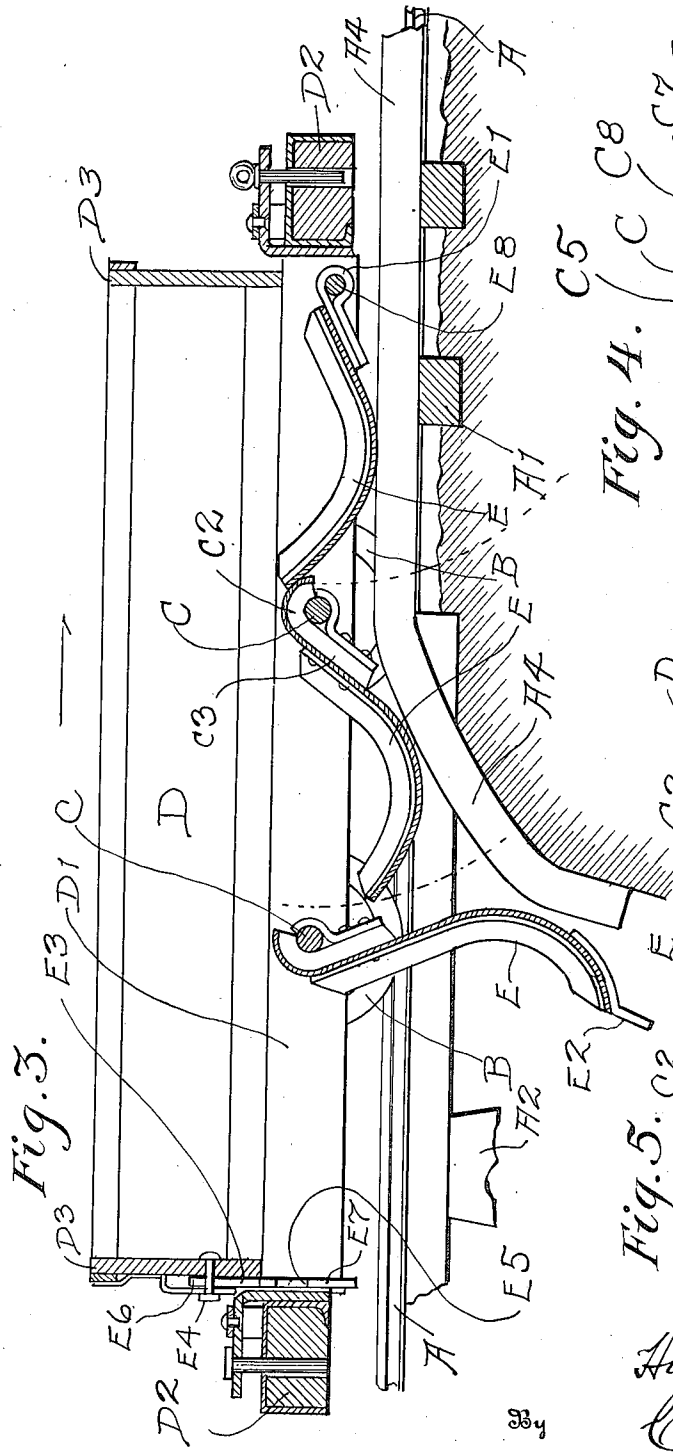


Fig. 3.

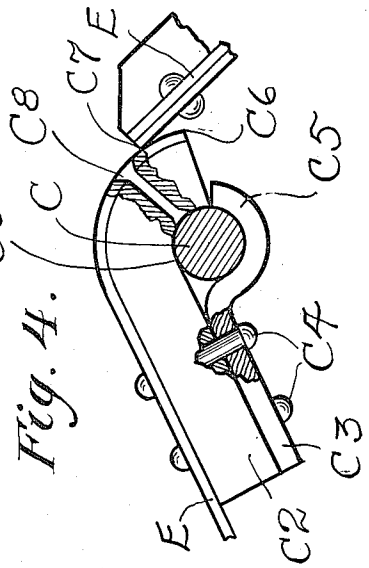


Fig. 4.

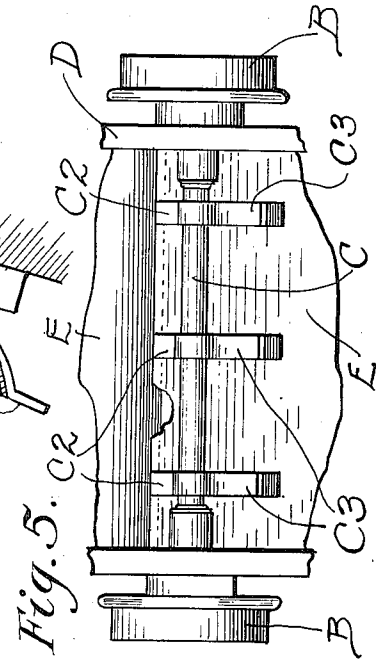


Fig. 5.

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UNITED STATES PATENT OFFICE.

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RAILWAY.

1,268,390. Specification of Letters Patent. Patented June 4, 1918.

Application filed November 26, 1917. Serial No. 204,078.

To all whom it may concern:

Be it known that I, HUGH W. SANFORD, a citizen of the United States, residing at Knoxville, in the county of Knox and State of Tennessee, have invented a new and useful Improvement in Railways, of which the following is a specification, reference being had to the accompanying drawing.

My improvement relates particularly to railways in which provision is made for dumping loose material through the bottom of a car at a chosen point on the track of the railway.

The object of the improvement is to provide a railway having cars of economical and durable construction and which are adapted to the automatic opening of the bottom for dumping and to the subsequent automatic closing of the bottom preparatory to receiving a new load, the track or way coöperating with the cars to open and close bottom doors in the latter to the end that a train of such cars may be made to pass a dumping station and automatically dump at such station, the bottom of each car afterward automatically closing, while the train is in motion and without the assistance of an attendant, the man in charge of the locomotive being the only person necessary to operate the train, if the train be operated by a locomotive, and no person at all being needed in connection with the train, if the train is moved by gravity or cable or other means capable of operation without the presence of a person on the train.

My improvement is applicable to cars like that described in the application of Charles A. Griffith, Serial Number 119,908, filed September 13, 1916, for a patent for an improvement in railways.

This improvement relates to the doors which form the bottom of such a car as is described by said application.

In the accompanying drawings,

Figure 1 is a side elevation of a car and a portion of a track illustrating my improvement;

Fig. 2 is a transverse upright section immediately at the rear of the car, the bumper being omitted;

Fig. 3 is an upright, longitudinal section showing the car in engagement with a means for raising the bottom doors;

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

Fig. 5 is a bottom view of the forward portion of one of the doors.

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 beams forming portions of the car. The ends of these beams are joined to and stayed by the bumpers, D^2, and the end walls, D^3, of the body. The beams are metal channels. Boxes, C^1, seated in the channels of the beams 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 rails, A, and the place at which the discharge is effected, is called the dumping station. Beneath the rails, A, the material discharged from the car may be received by 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. Since the rearmost of these three doors controls the series, it 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 large 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 preponderating weight tends to tilt the bell crank so as to move said hook toward said plane. Each of said hooks has a bevel 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, A^3, 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 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 unless both arms, E^6, are 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 a block, C^2, and 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 axle; while the strap, C^3, has a reversely concave portion, C^5, which conforms to the lower side of the axle. The forward part of the door and the hinge block, C^2, are curved to be approximately concentric to the axle, C. When the forward portion of the door is thus formed, the door can turn on the axle, C, without lifting the next forward door with 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.

When the forward part of the door is not thus curved, the part which is forward of the upright plane of the axial line of the axle must rise when the part of the door rearward of said plane turns downward. Said forward part can not so rise without lifting all that rests upon it. That would be the rear edge of the next forward door with its load of material plus the material resting upon the rear door forward of said axial line. Furthermore, the material in the portion of the car between the front edge of the rear door and the rear end wall, D^3, of the car body at times tends to pack or mass and resist the movement of the forward edge of said door toward said end wall, D^3.

When the forward edge of said door is curved as above described, there are substantially no lifting and no packing or massing of material when the part of the door rearward of the axle is turned downward, there being merely such frictional resistance as results from the next forward door and the load material bearing upon the curved surface of the turning door.

When thus constructed, the weight of the part of the first door which is rearward of the axle, C, plus the weight of the material resting on said rearward part of said door is ample to overcome the resistance offered by the next forward door and the material bearing downward upon the part of the first door forward of said plane to turning the first door. In practice, it has been found that this frictional resistance is substantially uniform and always so small as to readily be overcome by the weight of the door, and the load thereon, at the rear of said plane.

Although, as above described, duplex latch mechanism is provided for holding the rear part of the first door in its elevated position, provision should be made for accidental conditions which release said door. If that occurs when the car is not at an unloading station, it is desirable to avoid the releasing of the other doors. For that reason, the next forward door should normally bear upon the forward door along the line, C^7, which is upward and rearward of the forward edge, C^6, of the door far enough to allow the main part of the first door to fall to and rest upon the ties of the track before the edge, C^6, moves above and out of engagement with the rear edge of the next forward door.

At the same time, it is desirable that, when the car is at an unloading station, disengagement between the edges of the two doors be effected early enough during the turning of the rear door to allow the rear edge of the next forward door to descend across said portion of the path of the first door before the first door enters the path of

the second door. This is to avoid slamming of the first door against the second door and thereby interfering with the movement of the doors and avoiding injury to the doors.

This inter-relation of the two doors can best be established by making the hinge block, C^2, of considerable thickness so as to bring the upper surface of the door to a suitable distance from the axle, C, whereby the distance between the edge, C^6, and the normal contact line, C^7, is increased. Such distance is also needed to allow the forward door to descend.

At each of the hinges a rivet, C^8, extends through the door plate and the hinge block, C^2, for securing said block to said plate.

The forward portion of the second or middle door is curved and provided with hinges as described concerning the first door, and the second door and the rear edge of the third door are brought into relation with each other as described concerning the first door and the second door, the rear edge of said second door extending far enough rearward to lie upon the forward part of the first door, as already described, when said doors are in the raised or normal position.

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 beams, D^1. On the forward edge of said door are three ears or hinge member, E^1, through which said shaft extends. The rear edge of said 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 along the material and the second door resting thereon until the first door is freed from the rear edge of the second or middle door. Thereupon said second door in similar manner turns upon its hinge and frees its forward edge from the rear edge of the third door. Thereupon, the third door similarly turns upon its hinge; but it does not release another door.

Thus I have a series of doors forming bottom sections, each being hinged at its forward portion on an axis which is horizontal and transverse to the body of the car, the rearmost door being held in its upper or closed position by latch mechanism and each of the other doors being held in position by the next rearward door so long as the latter retains its horizontal or closed position. Obviously the number of doors in the series may be varied.

Attention is now asked to the fact that the doors are hinged at the level of the car axles, and that said level is fixed by the radius of the wheels, B. This tends to bring the load close to the level of the rails. Furthermore, it must be noted that each door is extended downward between its front and rear edges, whereby the load supported by said doors is brought still closer to the level of the rails.

When all the doors have been released and allowed to turn for the downward discharge of the load, the continued 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 force 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 has been 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, the latter door is now being held by the latch mechanism. Thus all the doors have been raised and secured automatically and the car is again ready for a new load.

It will now be seen that a train of such cars may be moved forward over the rails, A, to and beyond the dumping station, the doors being automatically opened and afterward automatically closed while the train is in motion. This gives high capacity to the dumping station. Any number of trains comprising convenient numbers of such cars may pass the dumping station in quick succession. In connection with this rapid and automatic operation, the form of the rear part of the first and second doors, whereby resistance to turning is reduced to a minimum, is important.

In the form shown by the drawings, the wheels, B, are relatively small and the doors move downward between the rails. Hence the portions of the rails at the dumping

station are supported on piers or columns, A^2, instead of cross-ties.

The arrangement of tracks for the movement of cars or trains before arriving at or after leaving the dumping station does not form a part of this invention. Hence I have illustrated only the portion of the track at which the car doors are released and afterward closed.

I claim as my invention,

1. The combination of a car body, axles supporting said body for maintaining horizontal position and movement of said body, wheels carrying said axles, a first bottom door hinged near its forward edge on a line which is horizontal and transverse to the length of the car body, the rear upper face of said door being curved substantially concentric to its hinge line, releasable means for supporting the opposite edge of said door when the latter is in the closed position, and a second bottom door forward of said first door and hinged at its forward part on a line parallel to the hinge line of the first bottom door and having its rear edge normally resting upon said curved upper face of said first door, substantially as described.

2. The combination of a car body, axles supporting said body for maintaining a horizontal position and movement of said body, wheels carrying said axles, a metal plate first bottom door having its rear portion curved to be substantially concentric to the hinge line of the door, a shaft which is horizontal and transverse to the length of the car, pairs of superposed hinge members surrounding said shaft, the upper of said hinge members being of sufficient thickness to materially space the upper face of the door from the hinge line, releasable means for supporting the opposite edge of said door when the latter is in the closed position, a second shaft which is horizontal and transverse to the length of the car body and a second bottom door forward of said first door and hinged at its forward part on said shaft and said bottom door having its rear edge normally resting upon said curved upper face of said first door, substantially as described.

3. The combination of a car body, axles supporting said body for maintaining horizontal position and movement of said body, wheels carrying said axles, a first bottom door hinged near its forward edge on a line which is horizontal and transverse to the length of said body, the rear upper face of said door being curved substantially concentric to its hinge line, releasable means for supporting the opposite edge of said door when the latter is in the closed position, a second bottom door forward of said first door and also hinged near its forward edge on a line parallel to the hinge line of the first bottom door and having its forward part curved substantially concentric to the hinge line and having its rear edge normally resting upon said curved upper face of said first door, and a third bottom door hinged at its forward part on a line parallel to the hinge lines of the other doors and having its rear edge normally resting on said curved part of the second door, substantially as described.

4. The combination of a car body, axles carrying said body, wheels carrying said axles, two bottom doors one hinged to one and the other to the other of said axles and each extending to both sides of its axles, a third bottom door hinged on a line which is parallel to said axles, latch mechanism at one end of the car body, two of said doors having an edge resting upon the edge of an adjacent door and the third door having an edge supported by said latch mechanism when the doors are in the closed position, the doors which are hinged to said axles having their forward parts curved to make them approximately concentric to the axles to which they are hinged, substantially as described.

In testimony whereof I have signed my name this 23rd day of November, in the year one thousand nine hundred and seventeen.

HUGH W. SANFORD.