

Jan. 1, 1952

E. G. GOODWIN

2,580,760

RAILWAY CAR

Filed May 17, 1946

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Fig. 3.

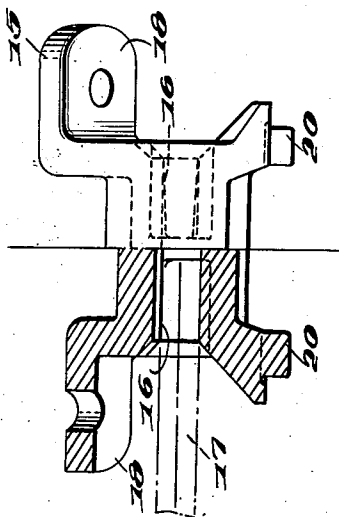


Fig. 4.

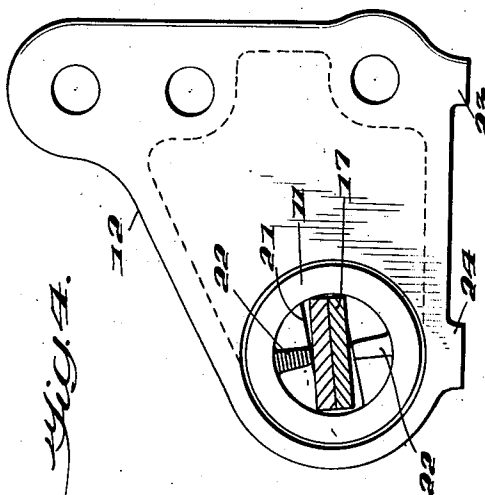
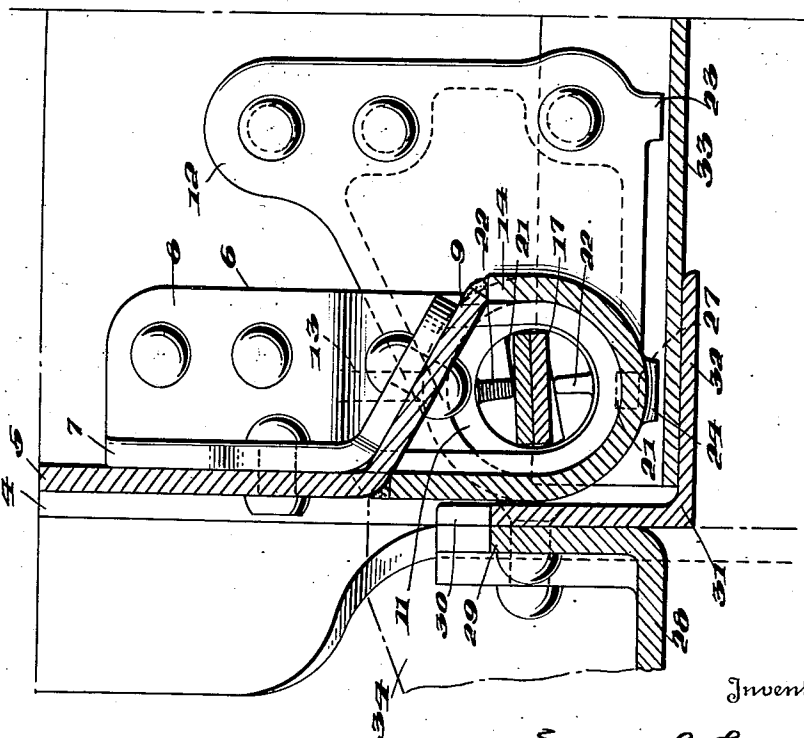


Fig. 2.



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Fig. 5.

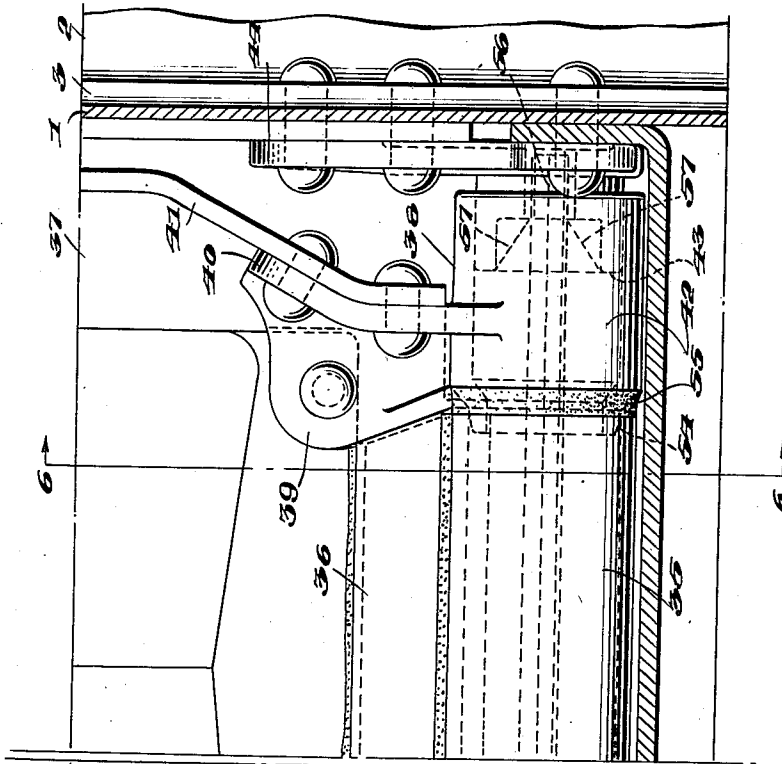
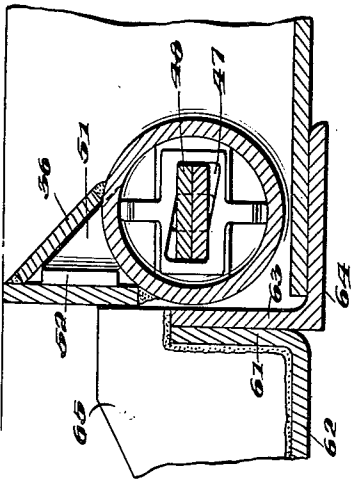


Fig. 8.



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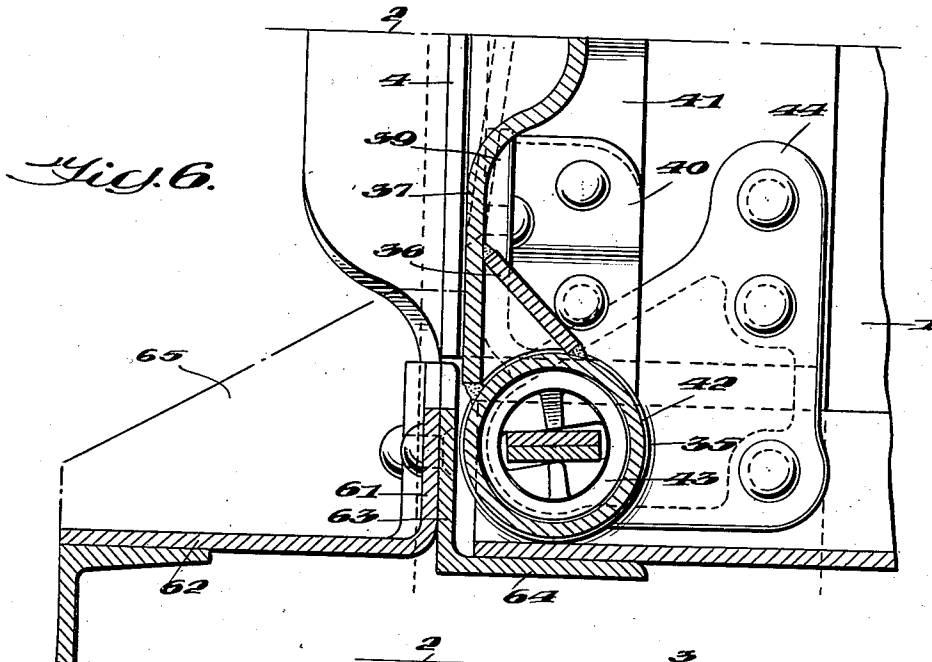
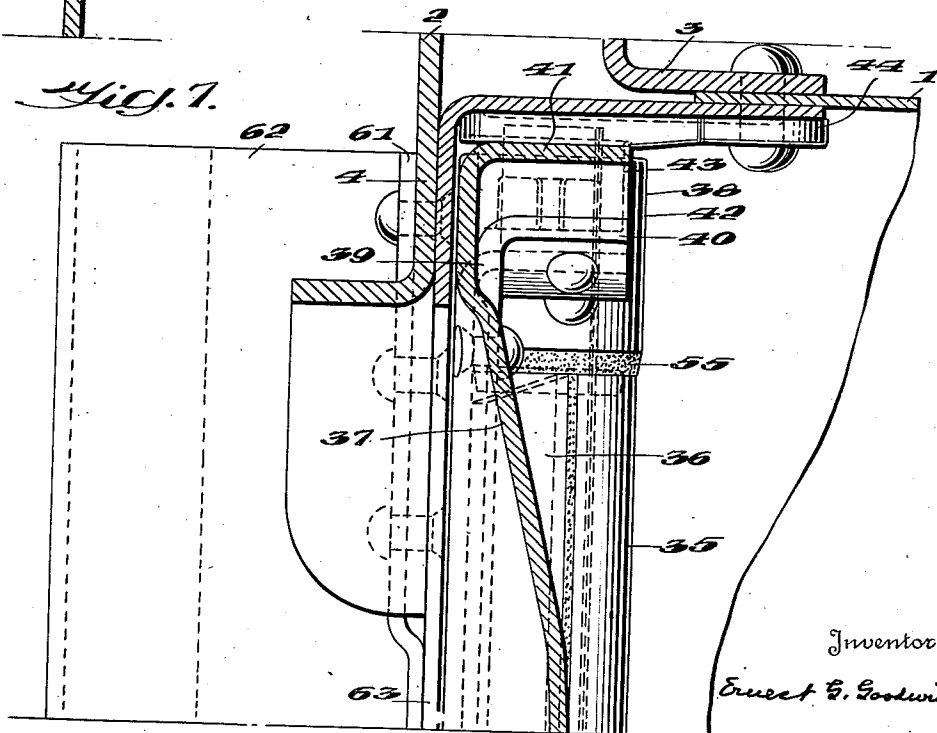
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Fig. 9.

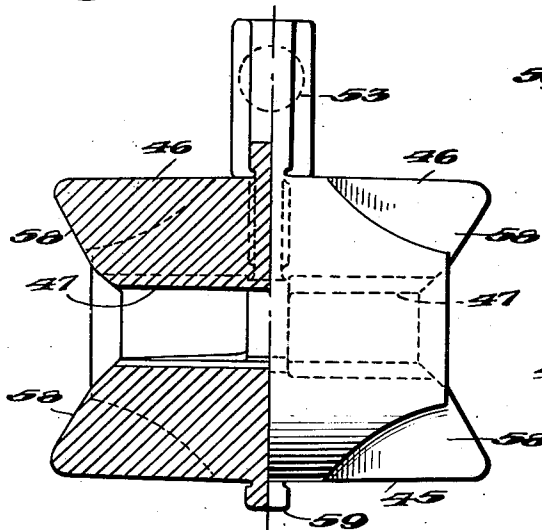


Fig. 10.

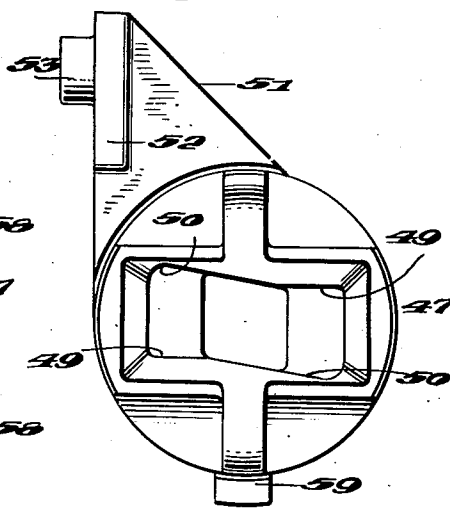


Fig. 11.

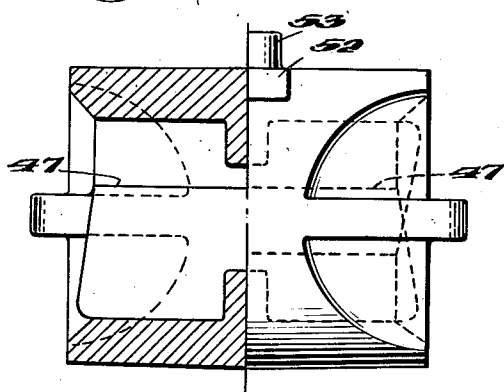


Fig. 12.

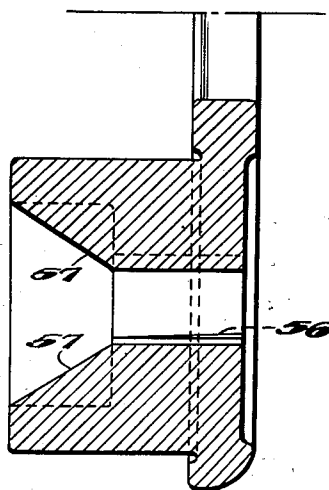
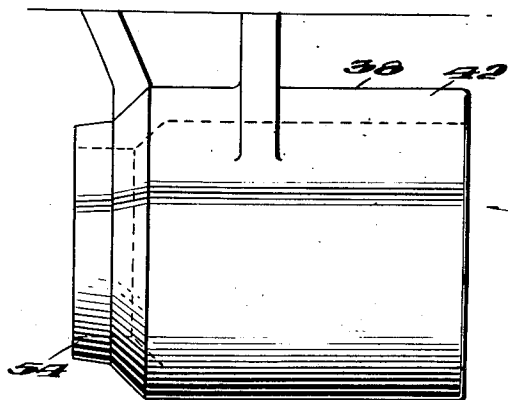


Fig. 13.

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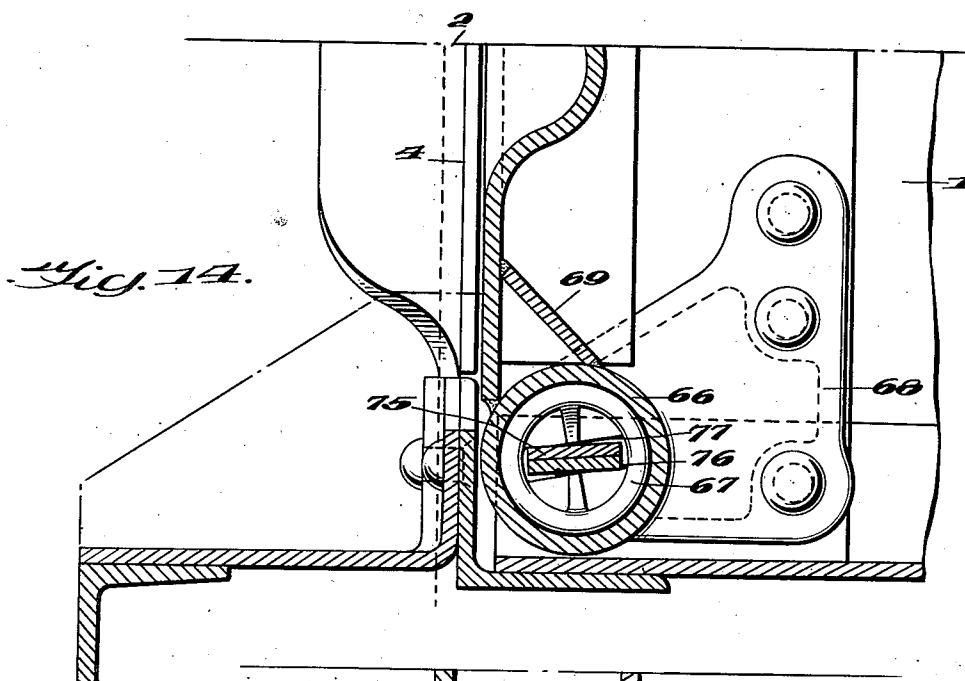
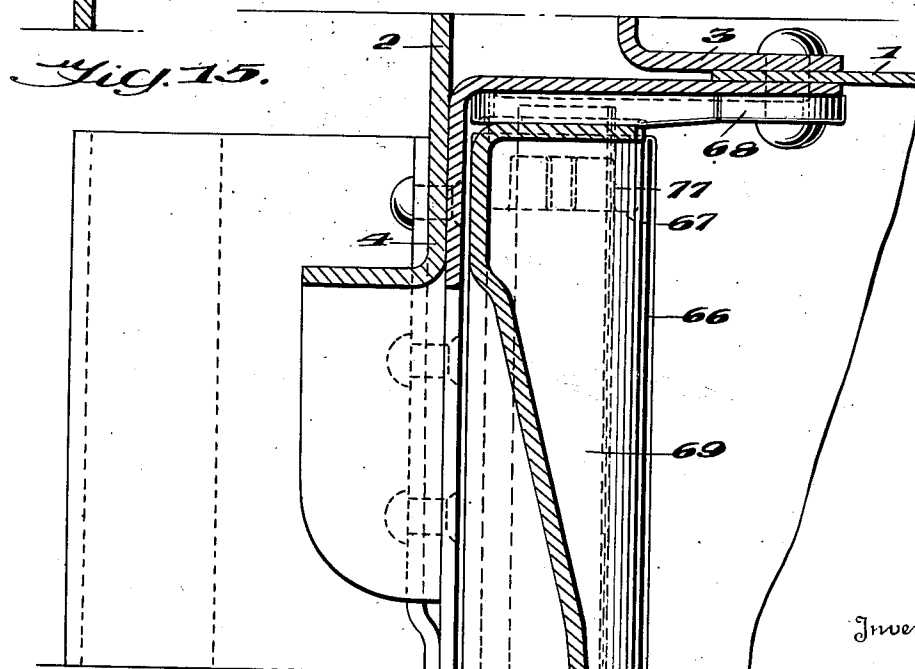
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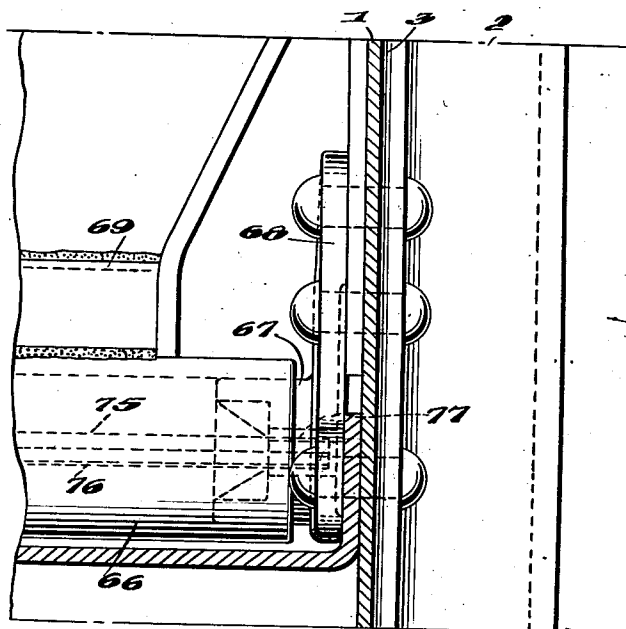


Fig. 16.

Fig. 17.

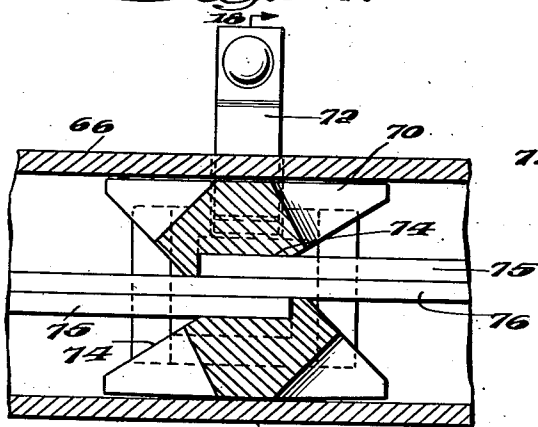


Fig. 19.

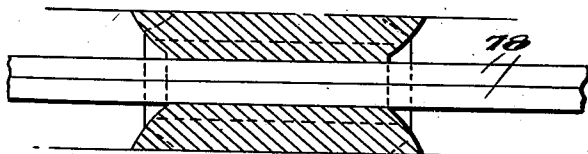
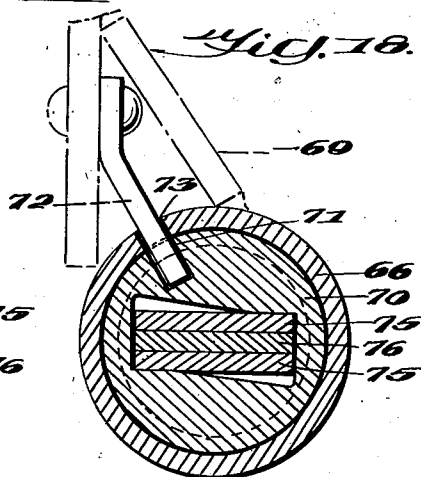


Fig. 18.



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Fig. 20.

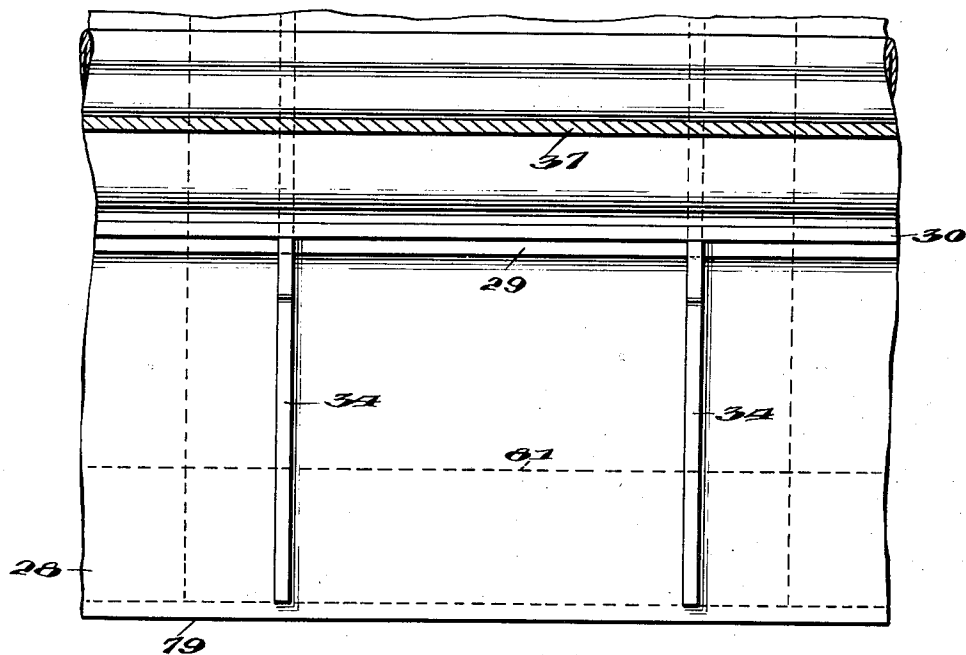
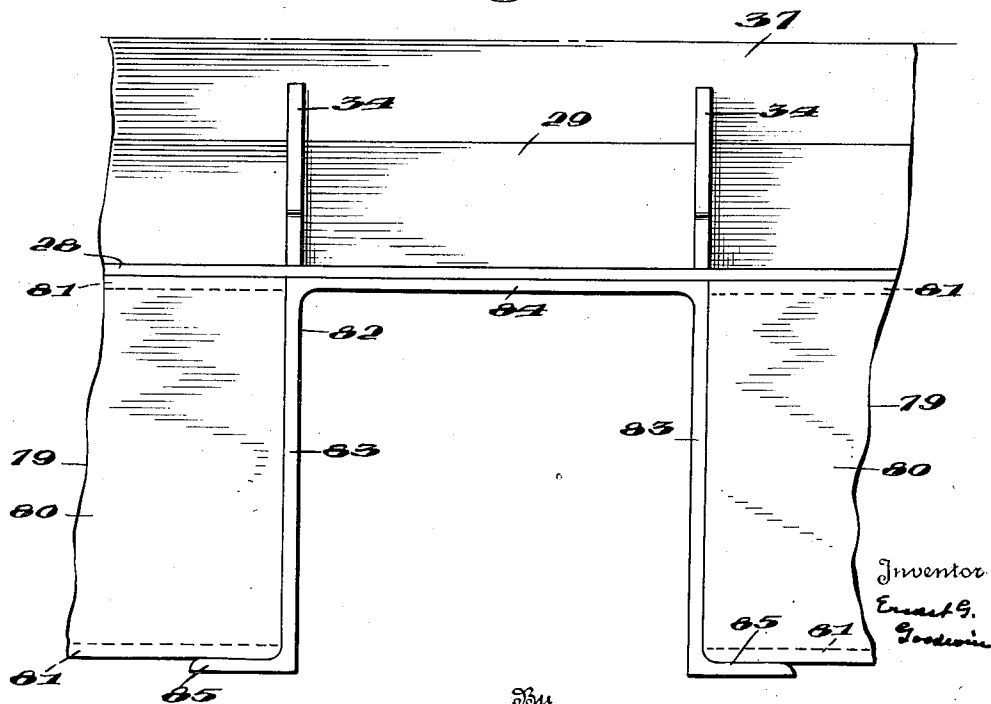


Fig. 21.



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UNITED STATES PATENT OFFICE

2,580,760

RAILWAY CAR

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Application May 17, 1946, Serial No. 670,410

23 Claims. (Cl. 105—406)

1

My invention relates to railway cars and more particularly to spring means for drop end doors of gondola cars and to a method of applying the spring means to the doors.

The primary object of the invention is to provide a drop end door of a gondola car with spring means which is energized upon opening of the door and tends to return the door to closed position.

Another object of the invention is to provide an improved method whereby the spring device formed of torsion bars is subjected to initial torsion during the assembling operation of the door with the car.

The primary feature of the invention consists in providing a drop end door of a railway gondola car with torsion bars extending longitudinally of the lower edge of the door, the outer ends of the bars being secured to the side walls of the car against rotation and the door being provided with means for twisting the bars as it moves toward open position so as to provide a force tending to return the door to closed position.

Another feature of the invention consists in providing the lower edge of a drop end door with a tubular housing in which a plurality of torsion bars are disposed, the outer ends of the torsion bars being secured to the side walls of the car against rotation and means being disposed in the tubular portion of the door for operatively engaging the bars and twisting them as the door moves toward open position to provide a force tending to return the door to closed position.

A further feature of the invention consists in providing a drop end door with a tubular portion along its lower edge having a bracket intermediate the sides of the door for engaging the inner ends of torsion bars which, at their outer ends, are secured to the side walls of the car and are, therefore, twisted when the door is moved toward open position to thereby provide a force tending to return the door to closed position.

A still further and more specific feature of the invention consists in providing a drop end door having a downwardly and inwardly inclined flange with a U-shaped member providing a housing for torsion bars extending longitudinally of the door, the outer ends of the torsion bars being held by the side walls of the car against rotation and the bars being adapted to be twisted as the door moves toward open position to provide a force tending to return it to closed position.

A still further feature of the invention consists in providing a drop end door with tubular means at its lower edge adapted to encircle inwardly

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projecting bosses of brackets secured to the car sides, the outer ends of the torsion springs being held against rotation by the brackets and the torsion springs being adapted to be twisted upon movement of the door toward open position to provide a force tending to return the door to closed position.

Other and more specific features of the invention, residing in advantageous forms, combinations and relations of parts, will hereinafter appear and be pointed out in the claims.

In the drawings,

Figure 1 is a vertical sectional view of a railway gondola car showing a drop end door of standard manufacture in elevation as viewed from the end of the car.

Figure 2 is a sectional view taken on a line corresponding to line 2—2 of Figure 1.

Figure 3 is a view partly in section and partly in elevation of the bracket secured within the tubular portion of the drop end door.

Figure 4 is a side view in elevation of one of the brackets secured to the car sides, the torsion bars engageable thereby being shown in section.

Figure 5 is a fragmentary vertical sectional view of a gondola car showing a drop end door embodying another form of my invention.

Figure 6 is a vertical sectional view taken on a line corresponding to line 6—6 of Figure 5.

Figure 7 is a horizontal fragmentary sectional view of a railway gondola car showing the corner of the car illustrated in Figure 5.

Figure 8 is a vertical sectional view taken on line 8—8 of Figure 5.

Figure 9 is a view partly in section and partly in elevation of the door bracket for the torsion bar of the form of the invention illustrated in Figure 5.

Figure 10 is a side view of the bracket as seen in Figure 9.

Figure 11 is a top view of the bracket, partly in section and partly in elevation.

Figure 12 is an enlarged vertical sectional view of one of the bosses of one of the car brackets.

Figure 13 is an enlarged elevational view of one of the door hinge brackets.

Figures 14 and 15 are views respectively corresponding to Figures 6 and 7 of a third form of the invention.

Figure 16 is a fragmentary vertical sectional view of a railway gondola car showing a drop end door thereof embodying the third form of the invention.

Figure 17 is a vertical sectional view of the tubular member at the lower edge of the drop end

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door showing still another form of the invention wherein one of the torsion bars extends continuously from one side of the car to the other.

Figure 18 is a sectional view taken on line 18—18 of Figure 17.

Figure 19 is still another modified form of the invention showing two torsion bars extending continuously from one side of the car to the other.

Figure 20 is a sectional view through the closed door showing the positions of the door abutment members transversely of the car.

Figure 21 is an end elevational view of the portion of the car shown in Figure 20 illustrating the location of the door abutting members with respect to the center sill of the car.

Referring more particularly to the drawings and to the form of the invention illustrated in Figures 1 to 4, inclusive, 1 indicates the side sheets of the side walls of a drop end railway gondola car to which, as is well known, corner posts 2 are respectively secured. In addition to the flange 3 which is secured to the side walls of the car, each corner post has a flange 4 which extends transversely of the car across the adjacent end thereof.

Pivotaly associated with the car adjacent its opposite ends are drop end doors 5, only one of which has been illustrated since the two doors are of identical construction. The flanges 4 of the corner posts are arranged to overlap the outer faces of the drop end door and provide an abutment therefor when the door is in upright closed position.

Adjacent its lower corners, the door may be advantageously provided with a pair of brackets 6 each having a portion 7 secured to the main body portion of the door and a flange 8 secured to an adjacent marginal flange 8a of the door which preferably inclines inwardly as shown in Figure 1. The door illustrated to which this present embodiment of the invention is applied has a downwardly and inwardly inclined lower flange 9 to which the brackets 6 are also preferably secured. The brackets are respectively formed with outwardly projecting portions 10 which encircle inwardly projecting bosses 11 of brackets 12 which are rigidly secured to the sides of the car whereby the door is pivotaly supported. The cylindrical portions 10 may advantageously be reinforced and connected to the main portions of the bracket 6 by triangularly shaped rigidifying ribs 13.

The lower portion of the door is provided with a tubular housing which preferably extends from one side of the door to the other and, in the present embodiment of the invention, may conveniently be formed by a U-shaped member 14 whose upper ends are welded to the door adjacent opposite edges of the inclined flange 9. The door is thus provided with a curved or semi-circular lower portion which is preferably concentric with the pivotal axis of the door. This enables the lower edge of the door to be disposed closely adjacent the floor of the car and dirt or other foreign matter which may pass under it will not obstruct or interfere with movement of the door on its rigid pivotal connections to the car as the rounded lower edge will merely slide on dirt which may have accumulated in the cavity between the bottom portion of the door and the end of the car.

Disposed within the tubular portion and secured to the lower flange 9 before the U-shaped member 14 is connected thereto is a bracket 15

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having oppositely opening recesses 16 for receiving the inner ends of torsion bars 17 which extend longitudinally of the lower edge of the door. To prevent any turning of the bracket 15 with respect to the door, it is formed with laterally projecting ears or the like 18 for receiving rivets 19 whereby it may be rigidly secured to the inclined flange 9. In addition, the bracket may be conveniently provided with downwardly extending lugs or the like 20 which are adapted to fit within suitable recesses in the bottom of the U-shaped member 14. Thus bracket 15 is prevented from turning by the rivets 19 as well as by the lugs or studs 20 engaging recessed portions of the U-shaped member 14 which, as stated before, is secured to the lower edge of the door after the bracket has been riveted in place.

A plurality of torsion bars 17 arranged in overlapping engagement are preferably disposed on opposite sides of the bracket 15 with their inner ends fitting within the recesses 16. The outer ends of the torsion bars are inserted into recesses 21 in the respective bosses 11 of the car brackets 12. The portions of the bosses 11 which extend beyond the recessed portions 16 of the car brackets for receiving the torsion bars may be advantageously provided with substantially triangularly shaped ribs or the like 22 for guiding the ends of the bars when being inserted in the recesses.

By thus holding the outer ends of the torsion bars against rotation with respect to the car body and by also holding the inner ends of the two sets of torsion bars against rotation with respect to the door, it will be appreciated that, when the door is moved inwardly toward its open position, the bars will be twisted and thereby provide a force tending to return the door to upright closed position. With the aid of the torsional forces provided by the bars 17, it will be readily apparent that the door may be raised from its horizontal open position to its vertical closed position by a single workman instead of by several as have heretofore been required. The torsion bars may, of course, be of such size as to completely counterbalance the weight of the door so that they will, of themselves, move the door to closed position but it is preferred that the bars be of such size that the torsional forces they exert will require manual raising of the door from open position. By using the torsion bars which do not, of themselves, exert sufficient force to move the door from open to closed position, the door will not bounce or jiggle to any substantial extent when in open position and the car is in transit.

Instead of having torsion bars on both sides of the bracket 15, it will, of course, be appreciated that a smaller spring force may be obtained by completely omitting the torsion bars on one side of the bracket. Moreover, when torsion bars extend from only one of the car sides to the bracket 15, the torsion to be imparted by the bars to the door may be varied or adjusted by shifting the bracket transversely of the car and securing it to the door in the desired position of adjustment.

While it is preferred that the torsion bars themselves be insufficient to cause the door to move from open to closed position, it is desired that they exert some torsional force even after the door has assumed fully closed position so as to hold the door in that position unattended while the usual retaining means (not shown) are operated to lock the door in closed position.

To accomplish this, the recesses 21 in the car brackets 12 are inclined relatively to the substantially horizontal recesses 16 in the bracket 15, it being seen that all of the recesses are enlarged at points opposite the walls thereof which are engaged by the bars so as to enable them to be easily inserted in the recesses and to also eliminate the necessity of machining the recesses for the entire width of the bars. Thus before the door is applied to the car, the torsion bars 17 are inserted within the recesses 16 and the car brackets 12 are mounted on the opposite sides of the door in engagement with the outer ends of the torsion bars. In view of the relative disposition of the recesses 16 in the bracket 15 secured to the door and the recesses 21 in the car brackets 12, the lower ends 23 of the car brackets which are offset from the door will depend below the bottom portion of the bracket 24 which is disposed immediately below the torsion bars. Thus when the door is lowered into the car for connection thereto, the depending portions 23 of the car brackets engage the floor or some other portion of the car before the door comes to rest upon the car floor. This initial engagement of the car brackets with the car body causes them to rotate into the positions shown in the drawings and thus imparts some torsion to the bars 17. After the car brackets have been rotated into the more or less upright positions shown in the drawings to impart initial torsion to the bars 17, they may be secured in the desired positions by first placing a drift pin through one of the apertures in the brackets and the corresponding apertures in the car sides. Thereafter, the brackets may be easily riveted in place.

It should be noted that the bottom of the U-shaped member 14 is provided with a plurality of drain holes 25 so that moisture collecting within the member may easily drain therefrom. Moreover, adjacent its opposite ends, the U-shaped member is also provided with openings 26 for receiving depending lugs 27 of the hinge brackets 6 whereby the weld connections between the door and the member 14 are relieved from undue strain upon movement of the door to and from closed position.

The end sill cover plate 28 at each end of the car has an upwardly projecting flange 29 which is overlappingly secured to an upright flange 30 of the end floor supporting angle 31, the other flange 32 of the angle underlying and thus supporting the floor 33 of the car. The upwardly extending portion 29 of the end sill, as well as the upwardly extending flange of the end angle, terminates in a horizontal plane near the horizontal plane passing through the pivotal axis of the door. When the door is closed these upstanding portions overlap the outer face of the door, and when the door is open they cooperate with the U-shaped member 14. By arranging the upper edges of flanges 29 and 30 in this manner, the formation of pockets between the flanges and the door, when the door is in open position, is eliminated so that dirt which might possibly prevent movement of the door to closed position is thereby prevented from collecting and lodging therein. This feature of construction whereby foreign matter cannot collect adjacent the hinge axis of the door when the door is open and thereby interfere with closure of the door is applicable to all types of drop end gondola car doors having curved lower portions, such as the member 14, for example, whether the doors are or are not provided with springs which tend to close them,

While the upright flange of the end floor angle and the corresponding part of the end sill cover plate have heretofore served as abutments to engage the lower portion of the pivoted door when in closed position, upright members 34 secured to the end sill cover plate and projecting over the tops of the upright portion thereof and of the end door flange may be conveniently employed for this purpose. Two of these upright members may be placed transversely of the car as seen in Figures 20 and 21 wherein each is shown as a plate member extending longitudinally of the car.

The end sill cover plate 28 overlies the end sill 79 which may be of any conventional shape, such as a channel or the like, having a web 80 and inwardly projecting flanges 81. Intermediate its length and at the center of the car, the end sill is interrupted by the center sill 82 which may be conveniently formed as an integral member having sides 83 connected by a top wall 84, the sides terminating in outwardly projecting flanges 85. The upright door abutting members 34 are preferably disposed in the planes of the sides 83 of the center sill.

In the form of the invention illustrated in Figures 5 to 13, inclusive, the tubular member extending longitudinally of the lower edge of the door may be formed by a pipe or the like 35 welded or otherwise secured to the door and it is disposed below the bottom edge of the door so that the lower half thereof provides a curved portion concentric with the pivotal axis of the door. A downwardly inclined shedding plate 36 may be employed with the pipe to prevent dirt from collecting in the angle where the pipe is secured to the door, one edge of the plate being secured to the upper portion of the pipe and its opposite edge being secured to the inner face of the door.

The lower corners of the drop end door 37 may be provided with hinge castings 38 similar to the hinge brackets 6 of the first described embodiment of the invention. These castings or brackets respectively have plate portions 39 secured to the main body portion of the door and flanges 40 secured to the lower portion of inwardly inclined marginal flanges 41 of the door. In addition, each bracket 38 is formed with a cylindrical portion 42 which is adapted to encircle an inwardly extending boss 43 of an adjacent bracket 44 secured to the neighboring side wall of the car. By having the brackets 38 encircle the bosses 43 of the car brackets 44, the door is pivotally connected to the car.

At about the center of the door is a bracket 45 which is rigid therewith. This bracket serves the same purpose as bracket 15 of the previously described form of the invention and is formed with a cylindrical body portion having oppositely arranged portions 46 disposed within the pipe 35 which is preferably formed in two sections, each extending in opposite directions from the casting 45.

Each of the portions 46 is formed with a recess 47 for receiving the inner ends of torsion bars 48, as clearly shown in Figures 9 and 10. The recesses in the casting 45 are of the same shape as those formed in the brackets 15, having diagonally opposite substantially horizontal surfaces 49 adapted to engage the torsion bars 48 and diagonally arranged inclined portions 50 which, as pointed out in the description of bracket 15, permit the torsion bars to be easily inserted therein and eliminate the necessity of

machining the top and bottom surfaces of the recesses for the entire width of the bars.

Rigid with the casting is an upwardly extending leg or the like 51 which is provided with a plate portion 52 for engaging the adjacent inner face of the door and, to properly position the casting on the door, the plate portion 52 may be formed with an inwardly projecting lug 53 adapted to extend within an opening in the door.

Because of the upwardly extending member 51, the pipe 35 is formed in sections, one end of each section encircling one of the cylindrical portions 46 of the casting and the other end thereof encircling a conical extension 54 of the adjacent door bracket 38. By tapering the exterior of the portion 54, the adjacent tubular section may be easily placed thereover and thereafter welded to the door bracket, as indicated at 55.

The bosses 43 of the car brackets 44 are recessed, as indicated at 56, similarly to the car brackets 12 of the first described embodiment of the invention to receive the outer ends of the torsion bars 48. The brackets are likewise formed with triangularly shaped guiding flanges 57 extending from the recessed portions 56 to the ends of the bosses. It is to be appreciated that these flanges 57 also afford means for rigidifying the bosses 43. The center casting 45 is also formed with flanges 58 for guiding the torsion bars into the recesses 47.

With the inner ends of the torsion bars held against rotation with respect to the door by the casting 45 and the outer ends of the bars held against rotation with respect to the car by the brackets 44, it will be perceived that, as the door is moved toward open position, the bars are twisted and thereby provide a force which tends to cause the door to return to upright closed position.

The casting 45 on the door is prevented from relative rotation with respect thereto not only by the upright member 51 but also by a downwardly extending lug or projection 59 which is embedded in weld 60 connecting the sections of the pipe together and to the casting.

As seen in Figures 6, 8 and also Figure 21, the upwardly extending portions 61 of the end sill cover plate 62, as well as the upwardly extending portion 63 of the end floor supporting angle 64, terminates approximately in a horizontal plane passing through the pivotal axis of the door so that, when the door is in open position, no pocket is formed between the door and these upwardly projecting portions in which foreign material may collect which would interfere with movement of the door to closed position. A plurality of upright members 65 are secured to the end sill cover plate and extend over and above the upper edges of the upstanding portions 61 and 63 of the end sill and end floor angle respectively to provide suitable abutments for the lower portion of the door when it is moved to closed position.

Instead of providing the lower corners of the door with brackets such as those indicated at 38 in the form of the invention illustrated in Figures 5 to 13, inclusive, the tube or pipe 66 along the lower edge of the door may be made of sufficiently heavy material so that, as shown in the form of the invention illustrated in Figures 14 to 19, inclusive, the brackets may be dispensed with and the pipe itself encircle inwardly projecting bosses 67 of brackets 68 secured to the car sides and thereby afford a pivotal support for

the door. In such a construction, the door will be pivotally connected to the car in the same manner as in previously described embodiments of the invention. A downwardly inclined shedding plate 69 identical with shedding plate 36 in the form of the invention illustrated in Figures 5 to 13, inclusive, may be employed in connection with the pipe 66.

The pipe 66 may advantageously extend continuously from one side of the car to the other by interiorly providing it with a casting 70. This casting is formed with a recess 71 for receiving a member 72, which may conveniently be plate-like, and is riveted to the door and extends through an opening 73 in the pipe into the recess 71. Thus the casting 70 is firmly locked against relative rotation with respect to the pipe 66. In using a casting of this form, it will, of course, be appreciated that it will have to be carefully assembled with the pipe 66 so that its recess 71 will register with the opening 73 so as to receive the plate-like member 72.

In addition to having recessed portions 74 for receiving the inner ends of torsion bars 75 which extend in opposite directions to the sides of the car from adjacent the central portion of the door, the casting 70 is formed intermediate the recesses 74 with an opening permitting a torsion bar 76 to extend continuously from one side of the car to the other. As in other forms of the invention, the outer ends of the torsion bars are held against rotation by being disposed within recesses 77 in the bosses 67 of the car brackets. Thus the same torsional forces are set up in the bars, when the door is moved toward open position, as in the other embodiments of the invention.

It will, of course, be recognized that the casting positioned within the central portion of the tubular lower edge of the door may be provided, as seen in Figure 19, with an opening of sufficient size to permit a plurality of torsion bars 78 to extend continuously from one side of the car to the other instead of merely having oppositely opening recesses for receiving shorter torsion bars.

As all structural parts of the car illustrated in the above embodiments of the invention are identical, the same numerals have been used to designate the corresponding parts of car construction throughout the specification.

Various alterations may be made in details of the structural embodiments of the invention here disclosed without departing from the spirit and scope of the invention as defined in the appended claims.

What I claim is:

1. In a railway gondola car having side walls and a pivoted drop end door adapted to be disposed in upright position when closed and adapted to be disposed in overlapping relation with the car floor when opened, a bracket mounted in the lower portion of the door having oppositely opening recesses, a tubular housing extending on opposite sides of said bracket, brackets secured to the side walls of the car affording a pivotal mounting for the door, and torsion bars disposed within said housing and having their inner ends in said recesses, the outer ends of the said torsion rods being secured against rotation by said brackets secured to the car sides, said bracket on the door being cooperable with said torsion bars to twist them as the door moves toward open position to thereby provide a force tending to return the door to closed position,

2. In a railway gondola car having side walls and a pivoted drop end door adapted to be disposed in upright position when closed and adapted to be disposed in overlapping relation with the car floor when opened, a tubular housing extending along the lower portion of the door, brackets on the side walls of the car affording a pivotal support for the door, a bracket mounted within said tubular housing intermediate the sides of the door and having oppositely opening recesses, and torsion bars disposed within said housing and having their inner ends respectively disposed in said recesses and having their outer ends connected to the said brackets on the side walls of the car to prevent rotation of the outer ends thereof, said bracket on the door being co-operable with said torsion bars and being adapted to subject them to torsion when the door is moved toward open position to thereby provide a force tending to return the door to closed position.

3. In a railway gondola car having side walls and a pivoted drop end door adapted to be disposed in upright position when closed and adapted to be disposed in overlapping relation with the car floor when opened, brackets on the side walls of the car affording a pivotal support for the door, a bracket secured to the lower portion of the door intermediate the side edges thereof and having oppositely opening recesses, and torsion bars respectively disposed in said openings and extending toward the sides of the car, said brackets on the car sides respectively holding the outer ends of said bars against rotation whereby when the door is moved toward closed position the bars are twisted and thereby provide a force tending to return the door to closed position.

4. In a railway gondola car having side walls and a pivoted drop end door adapted to be disposed in upright position when closed and adapted to be disposed in overlapping relation with the car floor when opened, said door having a downwardly extending flange adjacent its lower end, means secured to said door and disposed below said flange forming a tubular housing, torsion bars disposed within said housing and connected to the side walls of the car against rotation, and means on the door intermediate the sides thereof having oppositely opening recesses in which the inner ends of said torsion bars are mounted for twisting said bars as the door moves toward open position to thereby provide a force tending to return the door to closed position.

5. In a railway gondola car having side walls and a pivoted drop end door adapted to be disposed in upright position when closed and adapted to be disposed in overlapping relation with the car floor when opened, said door being provided adjacent its lower edge with an inwardly and downwardly inclined flange, a substantially U-shaped member disposed below the flange and connected to the door adjacent opposite edges of the flange, torsion bars extending longitudinally of said U-shaped member and having their outer ends connected to the side walls of the car against rotation, and means on the door intermediate the sides thereof for twisting said bars as the door moves toward open position to thereby provide a force tending to return the door to closed position.

6. In a railway gondola car having side walls and a pivoted drop end door adapted to be disposed in upright position when closed and adapted to be disposed in overlapping relation with the

car floor when opened, said door having an inwardly and downwardly inclined flange adjacent its lower edge, a bracket secured to said flange intermediate the sides of the door, and torsion bars extending substantially parallel with said flange and having their outer ends secured to the car sides against rotation, said bracket on the door engaging said bars for twisting them as the door moves toward open position to thereby provide a force tending to return the door to closed position.

7. In a railway gondola car having side walls and a pivoted drop end door adapted to be disposed in upright position when closed and adapted to be disposed in overlapping relation with the car floor when opened, said door having a downwardly inclined flange adjacent its lower edge, a bracket secured to said flange and disposed on the under side thereof, a member secured to the door enclosing said bracket and providing the lower edge of the door with a longitudinally extending housing, and torsion bars disposed within said housing and having their outer ends secured to the side walls of the car against rotation, said bracket being engageable with said bars to twist them as the door is moved toward open position to thereby provide a force tending to return the door to closed position.

8. In a railway gondola car having side walls and a pivoted drop end door adapted to be disposed in upright position when closed and adapted to be disposed in overlapping relation with the car floor when opened, brackets respectively secured to the lower corners of the door, and brackets secured to the side walls respectively cooperating with said door brackets for pivotally supporting the door, and torsion bars extending substantially parallel with the lower edge of the door and having their outer ends held against rotation by said brackets on the car, and means on the door intermediate the sides thereof operable upon movement of the door to open position to twist said bars so that a force is provided tending to cause the door to return to closed position.

9. In a railway gondola car having side walls and a pivoted drop end door adapted to be disposed in upright position when closed and adapted to be disposed in overlapping relation with the car floor when opened, brackets on the side walls of the car having inwardly extending bosses affording a pivotal support for the door, and torsion bars extending substantially parallel with the lower edge of the door, each of said brackets being respectively formed with recesses for receiving the outer ends of the torsion bars to hold them against rotation, and means on the door having oppositely opening recesses engageable with the inner ends of said bars for twisting them as the door moves toward open position to thereby provide a force tending to cause the door to return to closed position.

10. In a railway gondola car having side walls and a pivoted drop end door adapted to be disposed in upright position when closed and adapted to be disposed in overlapping relation with the car floor when opened, brackets on the side walls of the car having inwardly projecting bosses, means adjacent the lower portion of the door adapted to encircle said bosses to pivotally connect the door to the car, torsion bars substantially parallel with the lower edge of the door and extending through said means on the door to enable their outer ends to be engaged by said brackets to hold them against rotation, and

means on the door having oppositely opening recesses engageable with the inner ends of said bars for twisting them as the door moves toward open position to thereby provide a force tending to return the door to closed position.

11. In a railway gondola car having side walls and a pivoted drop end door adapted to be disposed in upright position when closed and adapted to be disposed in overlapping relation with the car floor when opened, brackets on the side walls of the car having inwardly extending bosses; brackets connected to the lower corners of the door respectively having cylindrical portions encircling the bosses on the car bracket for pivotally connecting the door to the car, torsion bars extending through said cylindrical portions and having their outer ends connected to said bosses to secure them against relative rotation with respect thereto, and means on the door intermediate the sides thereof for twisting said bars as the door moves toward open position to thereby provide a force tending to return the door to closed position.

12. In a railway gondola car having side walls and a pivoted drop end door adapted to be disposed in upright position when closed and adapted to be disposed in overlapping relation with the car floor when opened, said door having a lower circular portion, torsion means extending longitudinally of the lower edge of the door for resisting movement of the door to open position, and members secured to the car on the outer side of said door having upstanding portions extending substantially parallel with the longitudinal axis of the car adapted to engage the outer face of the door when it is disposed in closed position.

13. In a railway gondola car having side walls and a pivoted drop end door adapted to be disposed in upright position when closed and adapted to be disposed in overlapping relation with the car floor when opened, said door having a circular lower portion, torsion means extending longitudinally of the lower edge of the door for resisting movement thereof to open position, an end sill of the car having an upwardly projecting portion adapted to overlap the outer face of the door when in closed position, said portion terminating substantially at the same elevation as the pivotal axis of the door, and members secured to said end sill having upright portions substantially parallel with the longitudinal axis of the car and extending above the top of the end sill for cooperating with the outer face of the door.

14. In a railway gondola car having side walls and a pivoted drop end door adapted to be disposed in upright position when closed and adapted to be disposed in overlapping relation with the car floor when opened, a pipe secured to the lower portion of the door, torsion bars within the pipe and connected to the door against rotation relatively thereto, and brackets on the car sides respectively engageable with the outer ends of said pipe for pivotally supporting the door, said bracket respectively having portions for holding the outer ends of said bars against rotation so that when the door is moved toward open position the bars are twisted and a force is thereby provided tending to cause the door to return to closed position.

15. In a railway gondola car having side walls and a pivoted drop end door adapted to be disposed in upright position when closed and adapted to be disposed in overlapping relation with the car floor when opened, a pipe secured to the lower portion of the door, a downwardly inclined

shedding plate arranged above the pipe with one edge secured to the door and the opposite edge secured to the pipe, torsion bars extending longitudinally of the pipe and connected to the door against rotation relatively thereto, and brackets on the car affording a pivotal support for the door and for engaging the outer ends of said bars to hold them from rotation with respect thereto so that when the door is moved toward open position the bars are twisted and a force is thereby provided tending to return the door to closed position.

16. In a railway gondola car having side walls and a pivoted drop end door adapted to be disposed in upright position when closed and adapted to be disposed in overlapping relation with the car floor when opened, said door having a tubular portion extending longitudinally along its lower edge, a bracket respectively disposed within said tubular portion intermediate the sides of the door, and torsion bars extending through said tubular portion and having their outer ends anchored to the car sides against rotation, said bracket being cooperable with said bars for twisting them as the door moves toward open position and being provided with a portion extending upwardly above said tubular portion for cooperating with the inner face of the door to prevent it from being rotated with respect to the door during opening movement of the latter.

17. In a railway gondola car having side walls and a pivoted drop end door adapted to be disposed in upright position when closed and adapted to be disposed in overlapping relation with the car floor when opened, said door having a tubular lower portion, torsion bars disposed within said tubular portion, brackets secured to the side walls of the car affording a pivotal support for the door and for engaging the outer ends of the torsion bars to hold them against rotation, and a bracket secured to the door intermediate its sides for engaging said torsion bars to twist them as the door is moved toward open position, said bracket having an upwardly extending portion engaging the inner face of the door to prevent it from being turned by twisting of said bars.

18. In a railway gondola car having side walls and a pivoted drop end door adapted to be disposed in upright position when closed and adapted to be disposed in overlapping relation with the car floor when opened, brackets secured to the door adjacent the lower corners thereof, brackets secured to the car sides for cooperating with said door brackets to provide a pivotal support therefor, a tube assembly secured to the lower portion of the door and having end portions fitting over portions of said door brackets, and torsion bars disposed within said tube assembly and having their outer ends anchored in the brackets on the car body, said torsion bars being engageable intermediate the sides of the door upon movement of the door toward open position to twist the bars and thereby provide a force tending to return the door to closed position.

19. In a railway gondola car having side walls and a pivoted drop end door adapted to be disposed in upright position when closed and adapted to be disposed in overlapping relation with the car floor when opened, a pipe secured to the lower portion of the door, torsion bars extending longitudinally within the pipe, and brackets secured to the side walls of the car having bosses extending into said pipe affording a pivotal support for the door, said bosses respectively having recesses for holding the outer ends of the torsion

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bars against rotation, and means on the door intermediate the sides thereof and engageable with said torsion bars for twisting them during opening movement of the door to thereby provide a force tending to cause the door to return to closed position.

20. In a railway gondola car having side walls and a pivoted drop end door adapted to be disposed in upright position when closed and adapted to be disposed in overlapping relation with the car floor when opened, brackets on the side walls of the car for pivotally mounting the door on the car, a tubular portion along the lower edge of the door, torsion bars extending longitudinally of said tubular portion, and a bracket secured to the door intermediate the side edge thereof for cooperating with the torsion bars, said brackets on the side walls of the car being engageable with the outer ends of the torsion bars to hold them against rotation, at least one of said bars extending from one side of the car to the other.

21. In a railway gondola car having side walls and a pivoted drop end door adapted to be disposed in upright position when closed and adapted to be disposed in overlapping relation with the car floor when opened, said door being provided with a tubular portion extending along its lower edge, torsion bars disposed within said tubular member, the outer ends of said torsion bars being secured to the side walls of the car against rotation, a bracket within said tubular portion for cooperating with said torsion bars, and a member secured to the door extending through said tubular portion and cooperable with said bracket for holding it against rotation with respect to said tubular portion so that when the door is moved toward closed position the bars are twisted and a force is thereby provided tending to return the door to closed position.

22. The method of applying to a railway gondola car a pivoted drop end door having a torsion spring device involving torsion bars extending longitudinally of the lower edge of the door and operatively connected to the door and brackets mounted on the outer ends of the bars which are to be secured to the side walls of the car for holding the outer ends of the torsion bars against rotation, which consists in assembling the torsion bars upon the door in operative relation thereto, mounting said brackets upon the side edges of the doors in engagement with the outer ends of said torsion bars with a portion of each

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bracket projecting below and offset from the door, lowering the door towards its assembled closed position so as to impart torsion to said bars by causing the brackets to execute a predetermined rotation by engaging fixed portions of the car body, and thereafter securing the brackets in fixed position to the side walls of the car.

23. The method of applying to a railway gondola car a pivoted drop end door having a torsion spring device involving torsion bars extending longitudinally of the lower edge of the door and operatively connected to the door and brackets mounted on the outer ends of the bars which are to be secured to the side walls of the car for holding the outer ends of the torsion bars against rotation, which consists in assembling the torsion bars upon the door in operative relation thereto, mounting said brackets upon the outer ends of the bars in assembled relation thereto with a portion of each bracket projecting below and offset from the door, positioning said door and the brackets carried thereby above the floor of the car, lowering the door towards its assembled closed position to cause said brackets to engage fixed portions of the car body and thereby execute a predetermined rotation during completion of the downward movement of the door to impart initial torsion to said bars, and thereafter securing the brackets in fixed position with respect to the side walls of the car.

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