Dec. 12, 1950 L. J. TILLMAN 2,533,536

DOOR MECHANISM FOR RAILWAY CARS

Filed May 9, 1947 3 Sheets-Sheet 1

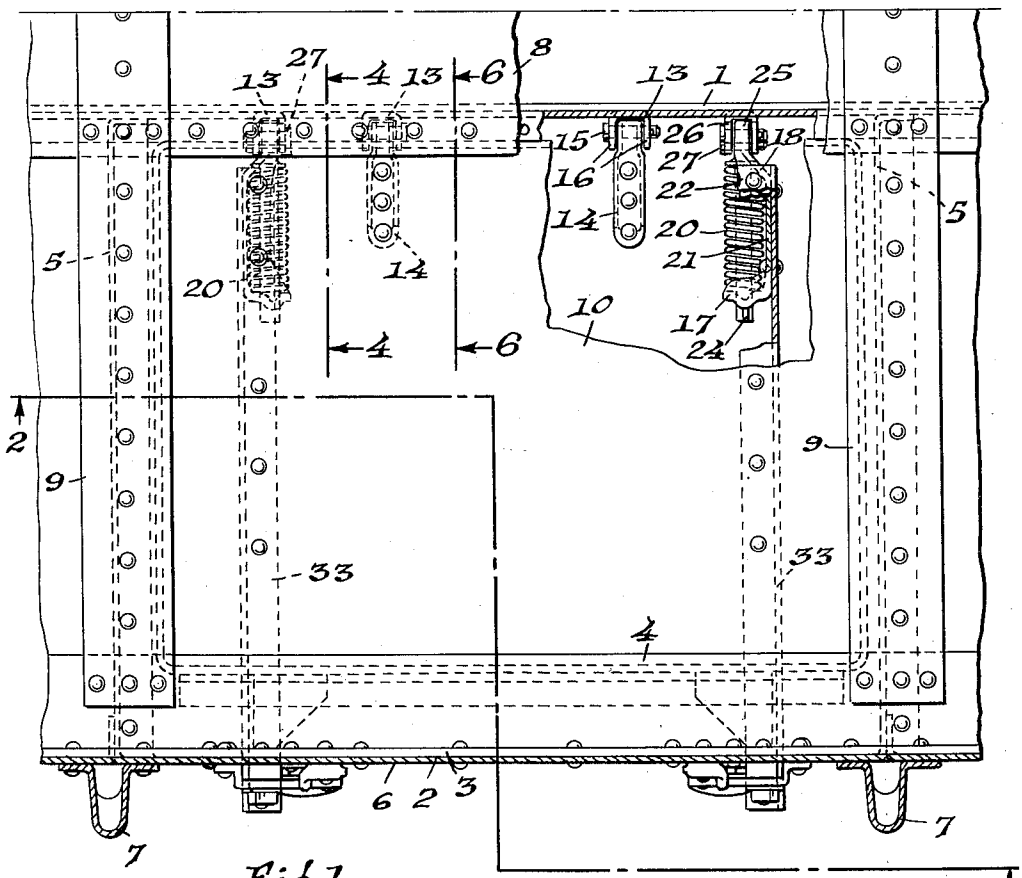


Fig. 1

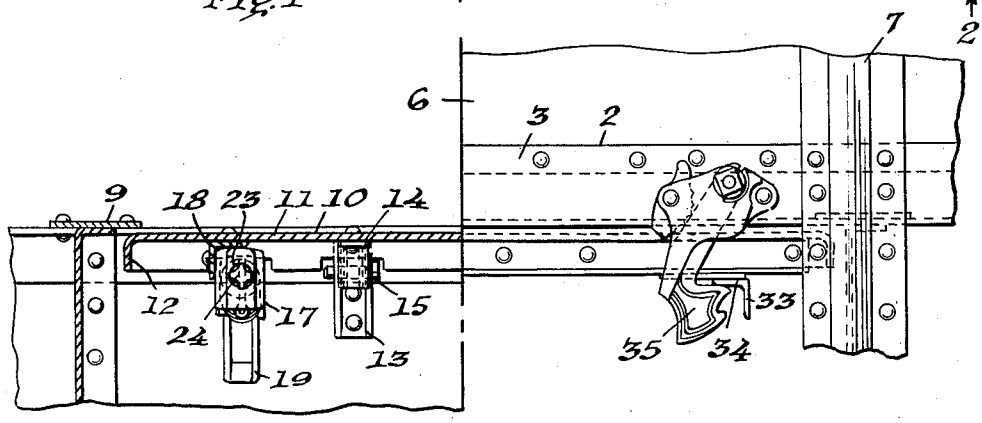


Fig. 2

INVENTOR.
Lambert J. Tillman,
BY
Ritter, Maeblin & Mills
his attorneys

Dec. 12, 1950 L. J. TILLMAN 2,533,536

DOOR MECHANISM FOR RAILWAY CARS

Filed May 9, 1947 3 Sheets-Sheet 2

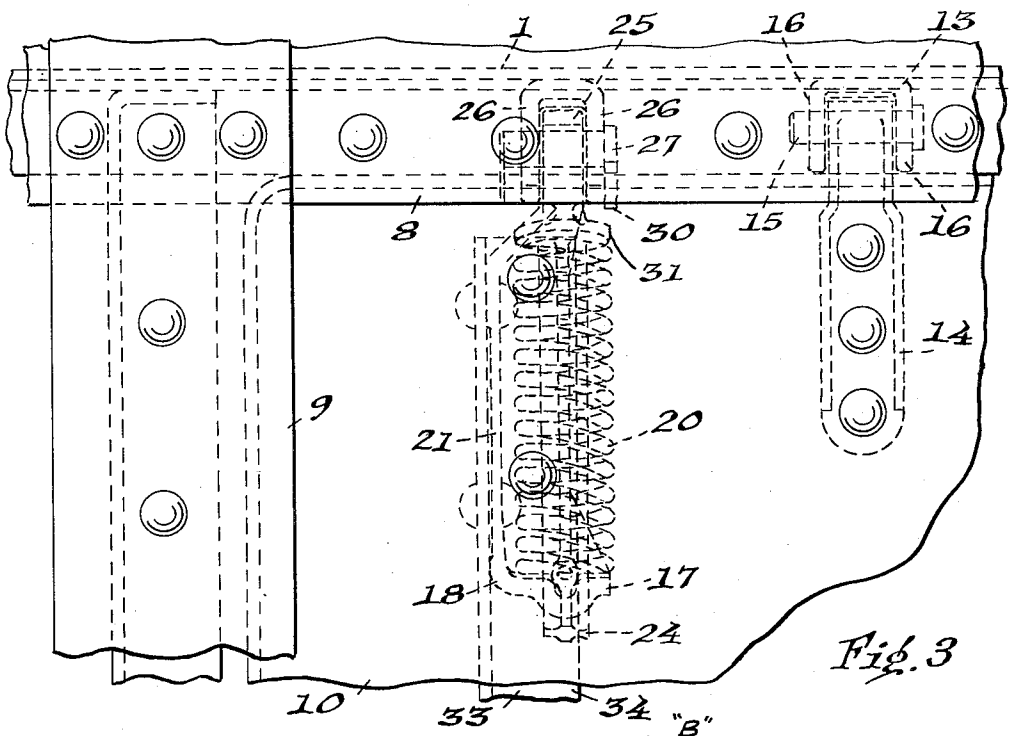


Fig. 3

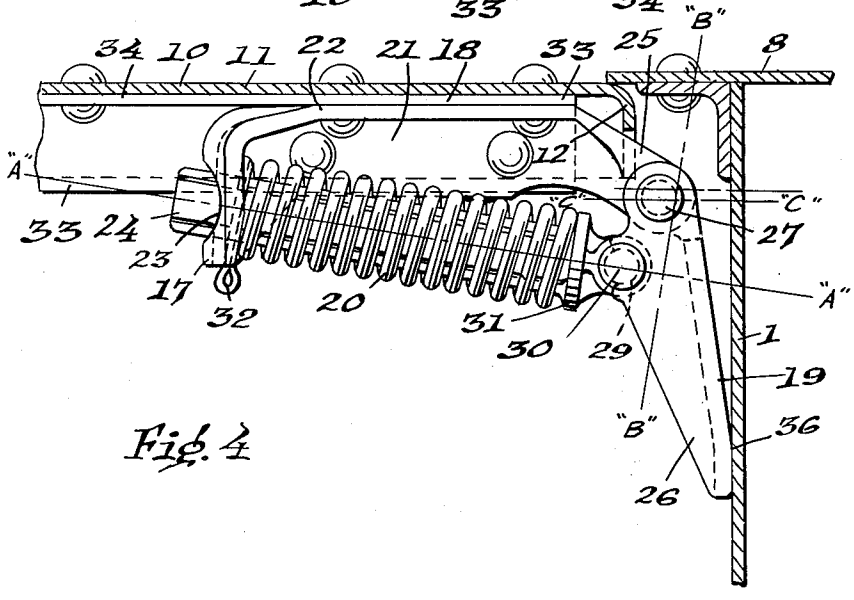


Fig. 4

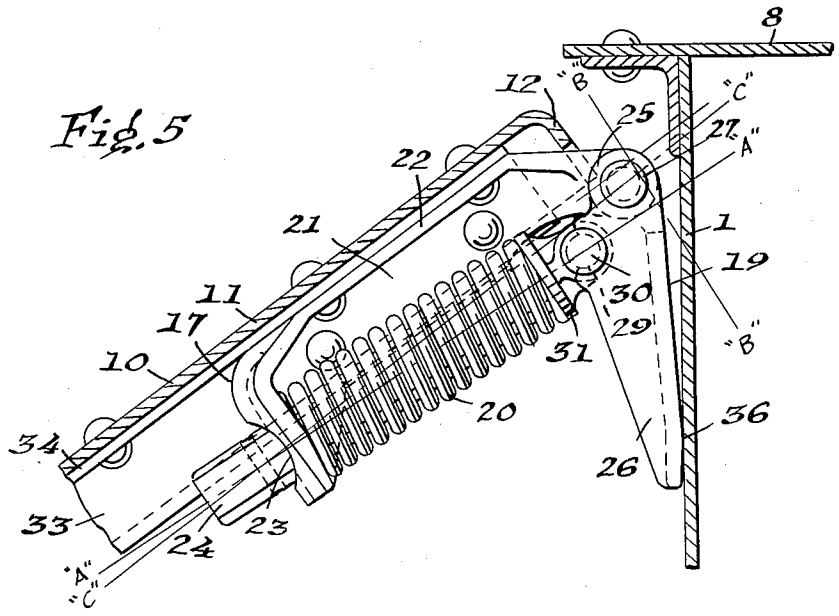
INVENTOR.
Lambert J. Tillman,
BY
Ritter, Meeklen & Muir
his attorneys

Dec. 12, 1950 L. J. TILLMAN 2,533,536

DOOR MECHANISM FOR RAILWAY CARS

Filed May 9, 1947 3 Sheets-Sheet 3

Fig. 5



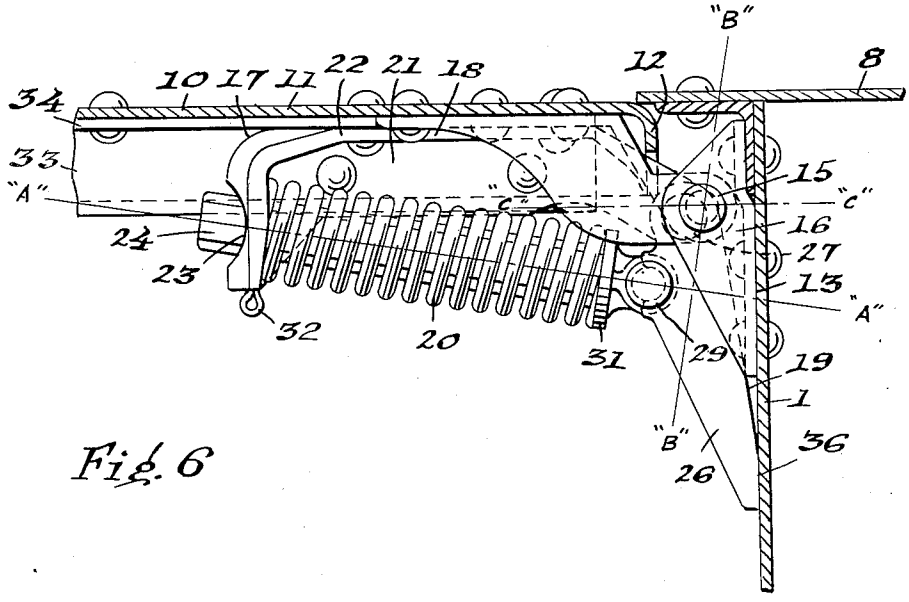


Fig. 6

INVENTOR.
Lambert J. Tillman,
BY
Ritter, Meehlin & Muir
his attorneys

Patented Dec. 12, 1950 2,533,536

UNITED STATES PATENT OFFICE

2,533,536

DOOR MECHANISM FOR RAILWAY CARS

Lambert J. Tillman, Toledo, Ohio

Application May 9, 1947, Serial No. 746,896

9 Claims. (Cl. 105—286)

1

This invention relates to railway cars and more particularly to improvements in railway gondola cars having drop bottom doors.

The principal object of the invention is to provide a spring actuated unit, separate from the hinge connection of the door to the car, which tends to resist opening movement of the door.

Due to the weight of drop bottom doors of gondola cars, difficulty has been often experienced in the past in moving the doors from open to closed position, it frequently requiring more than one man to effect closure of the door. To overcome this difficulty, a spring actuated unit is provided which tends to partly counterbalance the weight of the door so that complete closure may be easily effected by but a single man.

A primary feature of the invention consists in providing the hinged door of a railway car with an arm which is pivotally connected thereto and depends therefrom adjacent the hinged edge thereof and with a spring for causing the arm to rotate about its pivot into engagement with the fixed part of the car to afford resistance to opening movement of the door.

Another feature of the invention consists in providing the hinged door of a railway gondola car with a pivoted arm spaced laterally from the means by which the door is hinged to the car and in interposing a spring between the arm and the door to cause the arm to bear against a fixed part of the car and thereby afford resistance to opening movement of the door.

A still further feature of the invention consists in providing a hinged door of a railway car with a spring actuated unit separate from the means by which the door is hinged to the car, the unit involving an arm pivoted to the door adjacent the hinged edge thereof and depending therefrom and a spring cooperable with the arm for forcing it against a fixed part of the car to afford resistance to opening movement of the door

A still further feature of the invention consists in providing the door of a railway gondola car with a spring actuated unit separate from the means hingedly connecting the door to the car body, the unit involving a member secured to the door, an arm pivotally connected to the member and a spring cooperable with the arm for urging it against a fixed part of the car so as to provide a force tending to resist opening of the door.

A still further feature of the invention consists in providing a spring actuated unit for the hinged door of a railway car which exerts a force tending to resist opening movement of the door, the moment arm of the force of the spring about the hinge axis of the door being arranged so as to decrease upon an opening movement of the door.

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.

2

In the drawings,

Figure 1 is a fragmentary plan view of a railway gondola car showing one of the drop bottom doors with a portion thereof taken away to show the invention.

Figure 2 is a fragmentary side elevational view of the construction illustrated in Figure 1, the portion of the view at the left of the center thereof being in section on a line corresponding to line 2—2 of Figure 1.

Figure 3 is an enlarged plan view of one corner of a drop bottom door of a railway gondola car and the adjacent parts of the car.

Figure 4 is an enlarged vertical sectional view taken on line 4—4 of Figure 1.

Figure 5 is a view similar to Figure 4 of a slightly modified form of the invention showing the door in open position.

Figure 6 is a view similar to Figure 4 of the same modified form of the invention shown in Figure 5 taken on a line corresponding to line 6—6 of Figure 1.

As the construction of the car on one side of the longitudinal axis thereof is identical with the construction of the car on the other side, only one-half of the car structure is illustrated and, as each door and the cooperating parts thereof are the same, only one door and the adjoining portions of the car are shown.

In the drawings, 1 indicates one of the upright structural members of the center sill of the car and 2 one of the side sills which may conveniently be of angle shape having an upright or vertical flange 3 and a horizontal flange 4, the inner edge of which may define one edge of each of the lading discharge openings in the car floor. The center and side sills may be conveniently connected by a plurality of laterally spaced cross bearers or diaphragms 5. Sheet metal plates 6 may be advantageously employed to form the sides of the car, the lower portions of the sheets being riveted to the upstanding flange 3 of the adjacent side sill. The side walls may, if desired, be reinforced by conventional side stakes 7.

The floor of the car is principally formed by a longitudinally extending plate 8 which overlies the center sill and by a plurality of transversely extending plates 9 which extend over the top of plate 8 and at their opposite ends are suitably riveted to the horizontal flange 4 of the adjacent side sill. Together with the inner edge of the horizontal flange of the side sill, the adjacent edges of plates 8 and 9 define the lading discharge openings in the floor of the car.

Each lading discharge opening is closed by a door 10 which, in the present embodiment of the invention, comprises a sheet metal plate 11 having continuous depending marginal flanges 12. Each door may be hingedly connected to the center sill by any suitable means, such as hinge butts 13 riveted to the upright member 1 of the

center sill and hinge brackets 14 secured to the under side of the door, the hinge brackets being pivotally connected to the hinge butts by pivot pins 15. In the construction which has been chosen to illustrate the invention, the hinge butts 13 are formed of sheet metal and each is bent to provide outwardly extending jaws 16 to receive between them the outer end of the adjacent hinge bracket which, as seen in Figure 6, extends downwardly and outwardly from the door.

To resist opening of the door and thereby provide a force tending to return it to closed position, a pair of spring actuated units 17 is preferably associated with each door. These units are entirely independent of the means by which the door is hingedly connected to the car and may, therefore, be easily applied to the doors of existing cars without making any change in the hinge connections.

Each unit preferably comprises a member 18, a pivoted arm 19 and a spring 20. The member 18 is generally of angular shape having a vertical flange 21 and an additional flange 22 which, when the door is in closed position, is disposed in a horizontal plane. At its forward end, the flange 22 of member 18 is bent downwardly to provide an abutment for the forward end of spring 20. The down-turned forward end of member 18 is preferably apertured, as indicated at 23, to slidably receive one end of a spring supporting rod 24. At the inner or rear end of the member 18 the vertical flange 21 is inwardly offset and projects rearwardly from the door to provide a hinge lug 25 of a width which is of substantially greater width than the flange itself. In addition to extending beyond the hinged edge of the door, the lug 25 also extends somewhat downwardly.

The arm 19 which may be conveniently of U-shape having laterally spaced walls 26 is pivotally connected at its upper end to the hinge lug 25 at the outer end of member 18 by a pin or the like 27, the lug being received between the spaced walls 26 of the arm.

One end of the rod 24 on which the spring 20 is mounted is slidably supported within the aperture 23 and the other end is rotatably seated in recesses 29 formed in the outer edges of the arm 19 at a point below the connecting pin 27. While the end of the rod cooperable with the arm 19 may be integrally provided with oppositely extending bosses for cooperation with the recesses 29, it is preferred that this end of the member be formed with an aperture to receive a pin 30 so that the rod may be readily disconnected from the arm.

The inner end of spring 20 seats upon a collar 31 which may be conveniently formed integral with the rod 28 and the forward end of the spring is adapted to bear against the portion of member 18 surrounding the aperture 23. To enable the spring to be easily shipped with the desired degree of compression, the forward end of rod 28 is preferably formed so as to receive a cotter pin 32 which is shown in Figures 4 and 6. It is understood, however, that, after the parts have been correctly assembled, the cotter pin is withdrawn to thereby permit the adjacent end of the spring to engage the member 18.

The vertical flange 21 of the member 18 is preferably riveted to a corresponding flange of a door stiffening angle 33 and the upper flange 22 of the member may be riveted to the top flange 34 of the stiffening angle as well as to the door itself. The stiffening angle may advantageously extend from adjacent the hinged edge of the door to a point beyond the opposite edge so as to project slightly beyond the adjacent side of the car for engagement by a door supporting hook 35.

The spring 20 forces the arm 19 into engagement with a fixed part of the car, such as the center sill, and thereby provides a force tending to resist opening movement of the door or, stated otherwise, the spring affords a force tending to move the door to closed position. When in closed position, the spring is incapable of exerting enough force to prevent the door from opening and, to prevent it from exerting sufficient force to close the door after it has been compressed during movement of the door from closed to open position, the points of reaction of the springs on the arms 19 are so related with respect to the hinge axis of the door that the moment arm of the force of the spring about the hinge axis decreases as the door moves from closed to open position. Thus the force which the springs exert on the door tending to close it when the door is in open position does not exceed the force of gravity acting on the door which must be overcome to move it from open to closed position. However, the springs exert sufficient force on the door to easily permit it to be closed by a single operator.

The axes of the pins 27 respectively connecting members 18 to the arms 19 of each spring actuated unit may lie in the same horizontal plane with the hinge axes of the door, as indicated in Figure 3, wherein line C—C represents such horizontal plane. In the slightly modified form of the invention shown in Figures 5 and 6 of the drawings, the pivotal axes of the arms 19 are, however, disposed slightly below the horizontal plane which passes through the hinge axis of the door, as indicated by line C—C. In both constructions, however, the moment arm of the force of the springs about the hinge axis of the door decreases as the door approaches open position. The line of force of the spring acting upon the pivoted arm 19 is indicated in the drawings by the line A—A and the line passing through the hinge axis of the door perpendicular to the line A—A is represented by the line B—B. The moment arm of the force which the spring exerts on the door tending to move it to closed position or retain it in that position is, therefore, represented by the distance on line B—B between the pivotal axis of the door and the point where it intersects the line A—A. By comparing Figure 5 and Figure 6 of the drawings, it will be seen that the distance on the line B—B between line C—C and line A—A representing the force exerted by the spring is materially less when the door is in open position, as shown in Figure 5, than it is when the door is in closed position, as shown in Figure 6.

Since the force exerted by the spring tending to close the door is the product of the moment arm of the spring force about the hinge axis of the door and the force of the spring itself due to compression, the spring is of such capacity and is compressed when the door is in open position to such extent that the product of the spring force and its moment arm is less than the force of gravity acting on the door when it is in open position. Thus even though the spring is compressed during opening movement of the door, it is still incapable of exerting sufficient force to move the door to closed position.

When the door is fully closed, as shown in Fig-

ures 4 and 6, the extreme lower end of each pivot arm 19 preferably engages the adjacent part of the center sill but, as the door is opened, the lower portion of the pivoted arm may conveniently rock around a portion of the rear wall of arm 19 which is bent as indicated at 36.

From the foregoing, it will be perceived that simple and rugged means has been provided which may be easily applied to doors of existing railway gondola cars without making any changes in the hinge mountings thereof. Various modifications in details in the embodiments of the invention here illustrated may, of course, be made without departing from the spirit and scope of the invention as defined in the appended claims.

What I claim is:

1. A door mechanism for a railway car having a hinged door movable downwardly to open position, and spring means resisting opening movement of said door, said means including an arm pivoted to the door and depending therefrom adjacent its hinged edge, and a spring interposed between an abutment and said arm to cause the arm to engage a fixed part of the car and thereby afford resistance to opening movement of the door, said spring exerting its greatest force on the door when the door is closed and being compressed most when the door is open.

2. A door mechanism for a railway gondola car having a door hingedly connected to the car adjacent the center sill thereof and movable downwardly to open position, an arm pivoted to the door and depending therefrom adjacent said center sill, and spring means interposed between an abutment and said arm to force the arm against the center sill and thereby afford resistance to opening movement of the door, said spring exerting its greatest force on the door when the door is closed and being compressed most when the door is open.

3. A door mechanism for a railway gondola car having means hingedly connecting the door to the car, said door being movable downwardly to open position, and a spring actuated unit separate from said hinging means, said unit including an arm pivotally connected to the door adjacent the hinged edge thereof, and a spring between an abutment on the door and said arm for urging said arm into engagement with a fixed part of the car, said spring exerting its greatest force on the door when the door is closed and being compressed most when the door is open.

4. A door mechanism for a railway car having a hinged door movable downwardly to open position, an arm pivotally connected to the door adjacent its hinged edge, and a spring carried by the door and cooperable with an abutment on the door and with said arm at a point below its pivotal connection to the door, said spring being arranged so that the moment of the force of the spring about the hinge axis of the door is less when the door is in open position than when the door is in closed position.

5. A door mechanism for a railway gondola car having means hingedly connecting a door to the car, said door being movable downwardly to open position, and a spring actuated unit spaced from said door hinging means, said unit including a member fixed to the door, an arm pivotally connected to said member adjacent the hinged edge of the door, and a spring supported at one end by said member and cooperable at its other end with said arm for moving said arm into engagement with a fixed part of the car, said spring exerting its greatest force on the door when the door is closed and being compressed most when the door is open.

6. A door mechanism for a railway gondola car having a door hingedly connected to the car adjacent the center sill thereof, said door being movable downwardly to open position, and a spring actuated unit spaced from the hinge connection of the door to the car, said unit including an arm pivoted to the door and having a portion depending therefrom adjacent its hinged edge, and spring means normally cooperating with said depending portion for urging the lower end of said arm into contact with said center sill so as to provide a force tending to resist opening movement of the door.

7. A door mechanism for a railway gondola car having a door hingedly connected thereto adjacent the center sill thereof, and a spring actuated unit separate from the hinge connection of the door to the car body, said unit including a member secured to the door, an arm pivotally mounted on said member adjacent the hinged edge of the door and depending therefrom, and spring means cooperable with an abutment on the door and with said arm below its pivotal connection to said member to force said arm into engagement with said center sill, the moment of force of the spring about the hinge axis of the door decreasing as the door moves toward open position.

8. A door mechanism for a railway gondola car having a door hingedly connected thereo adjacent the center sill thereof, a member secured to the under side of the door independently of the hinge connection of the door to the car body, said member having a portion extending below the door, an arm pivotally connected to said portion, said arm having a recess on one side thereof below its hinge connection to said member, pivot means disposed within said recess, and a spring bearing against said pivot means and an abutment on the door urging the arm into engagement with said center sill, said spring providing a force tending to resist opening movement of the door.

9. A door mechanism for the hinged door of a railway gondola car, said mechanism being separate from the hinge connection of the door to the car and including an arm pivotally connected to the door, a rod having one end adapted to be slidably carried by the door and having its other end engageable with said arm, a spring encircling said rod for causing the latter to bear against a fixed part of the car, and removable means adjacent one end of the rod for maintaining the spring in association with the rod before the unit is applied to the door.

LAMBERT J. TILLMAN.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,066,146	Priebe	July 1, 1913
1,171,020	Buckius	Feb. 8, 1916
1,335,297	Richards	Mar. 30, 1920
1,631,306	Constantine	July 7, 1927

FOREIGN PATENTS

Number	Country	Date
15,355	Austria	Feb. 25, 1904