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E. A. LE BEAU

1,935,882

SLIDING DOOR STRUCTURE

Filed Nov. 27, 1931

2 Sheets-Sheet 1

Fig. 1.

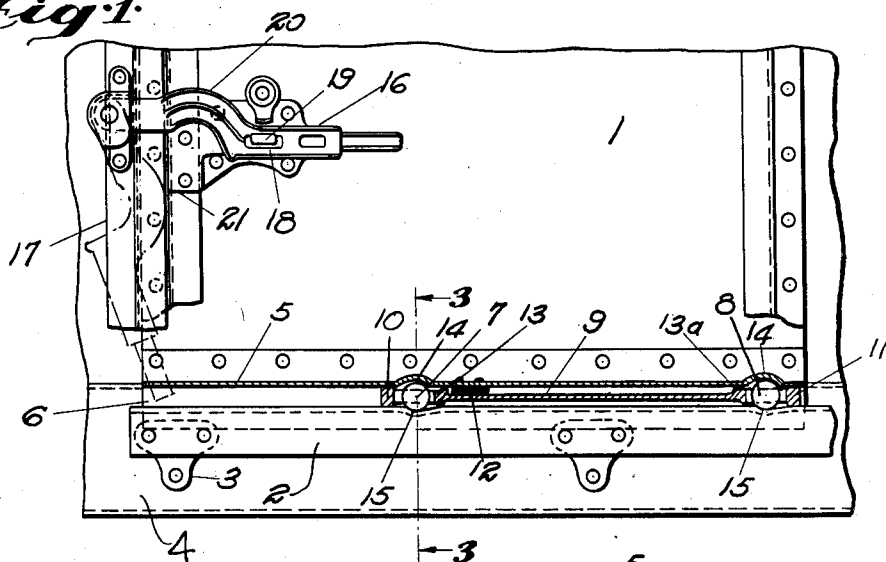


Fig. 2.

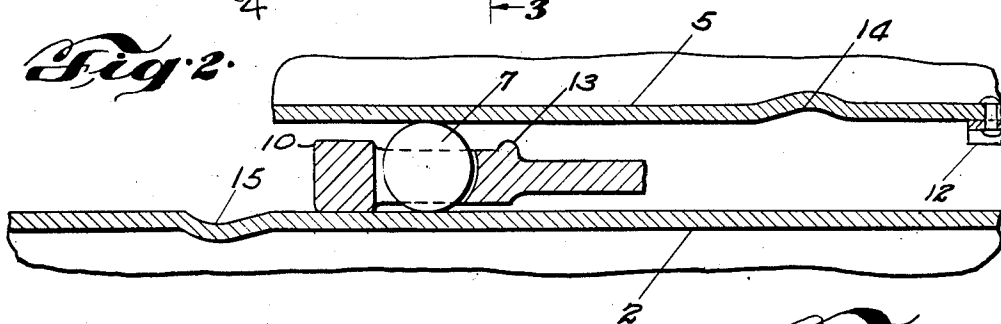


Fig. 4.

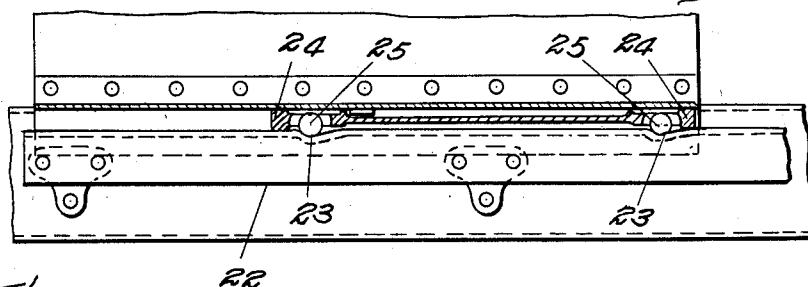
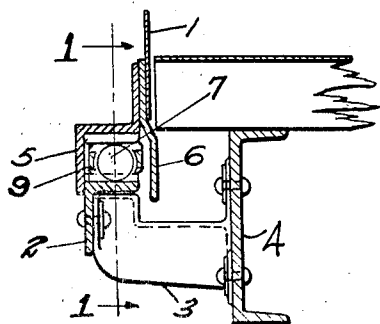


Fig. 3.



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Fig. 5.

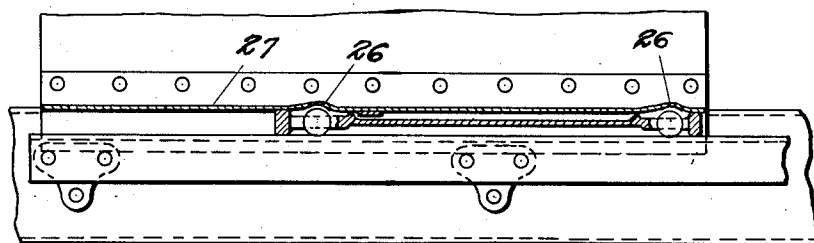


Fig. 6.

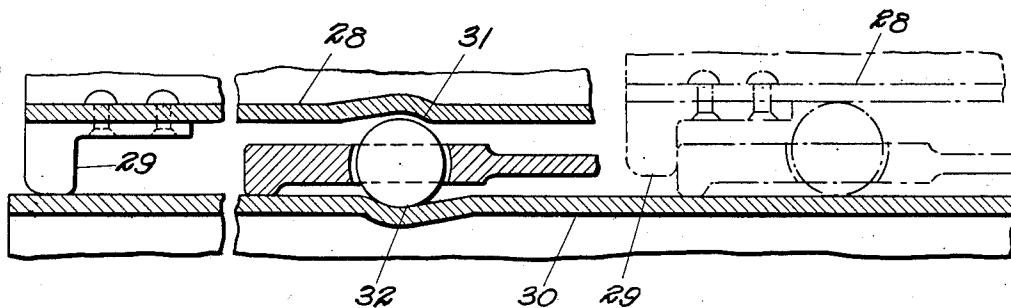


Fig. 7.

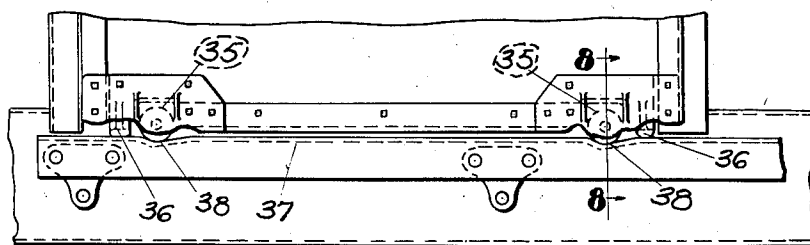
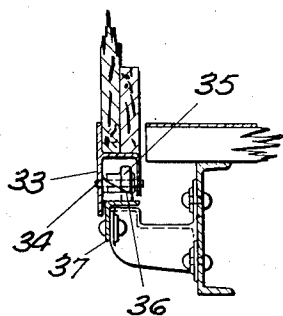


Fig. 8.

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UNITED STATES PATENT OFFICE

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SLIDING DOOR STRUCTURE

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Application November 27, 1931
Serial No. 577,615

8 Claims. (Cl. 189—46)

This invention relates to sliding doors and particularly to means for supporting and facilitating the movement of railway box car side doors.

Box car doors are frequently mounted upon 5 tracks or runners with anti-friction bearings provided in order to facilitate the opening and closing movements thereof. It is desirable, however, that the weight of the door be removed from the bearings and applied directly to the track 10 when the door is closed to relieve the bearings of strain and wear caused by vibration during movement of the car. Also this arrangement reduces the tendency of the door to slide back and forth if the car is traveling and the door is not 15 secured. Various devices for accomplishing this feature have been proposed but these have usually been more or less complicated and require multiplication of parts, resulting in increased expense and difficulty of maintenance. Some de- 20 vices necessitate manual manipulation of various mechanisms in addition to movement of the door itself.

The present invention has for its main object the provision of means whereby the weight of the 25 door is automatically removed from the door bearings at the end of the closing movement.

Another object is to provide automatic means for breaking the momentum of the door in opening and closing in order to lessen the impact of the 30 door and door post.

These objects and others are obtained in the structure illustrated in the accompanying drawings, in which—

Figure 1 is a front view of a car door illustrating the invention, portions being shown in vertical section on the line 1—1 of Figure 3.

Figure 2 is a detail vertical section on the longitudinal center line of the door bearings and shows the door in partly opened position.

40 Figure 3 is a vertical transverse section taken on the line 3—3 of Figure 1.

Figure 4 is a fragmentary view corresponding to Figure 1 and showing a modification.

45 Figure 5 is a similar view showing another modification.

Figure 6 is a fragmentary vertical longitudinal section on the center line of a door bearing and illustrating still another modification.

50 Figure 7 is a side view illustrating another modification.

Figure 8 is a vertical transverse section taken on line 8—8 of Figure 7.

In Figure 1 a car door 1 is shown supported on a runner or track 2 secured to brackets 3 project- 55 ing from the car side sill 4. A Z-bar 5 and a

slightly offset backing bar 6 secured to the lower edge of the door form a three-sided housing for the door bearings 7 and 8.

During opening and closing, the door rides 60 upon a pair of ball bearings 7 and 8 maintained a substantial distance apart by an elongated cage 9 which embraces the balls. Cage 9 has enlargements 10 and 11 at the ends comprising friction elements serving a purpose to be de- 65 scribed hereafter. A stop 12 on the under surface of Z-bar 5 is disposed to engage lugs 13 and 13a projecting upwardly from cage 9 between the balls 7 and 8 to limit the longitudinal movement of the cage relative to the door.

Bar 5 and track 2 are provided with recesses 70 14 and 15 arranged to receive balls 7 and 8 when the door is in its closed position. The recesses 14 and 15 and stop 12 are positioned so that immediately before the door reaches its full closed position, stop 12 will engage lug 13 tending to 75 drag balls 7 and 8 until the balls seat in the recesses whereupon the door rests on the friction enlargements 10 and 11 instead of on the balls.

A handle 16 pivoted to the door post 17 has a hasp portion 18 for cooperating with staple 19 80 on the door in sealing the car, and an arcuate intermediate portion 20 for engaging a projection 21 on the door jamb to effect a leverage in starting the door opening movement. In open- 85 ing the door considerable force is exerted by means of lever 16 to slide the door over the enlargements 10 and 11 until the sides of the recesses 14 and 15 engage the balls 7 and 8 to raise the door from enlargements 10 and 11 and permit the ball bearings to function normally. 90

At the end of the opening movement of the door, stop 12 engages lug 13a on the bearing cage causing the balls to drag and to break the momentum of the door.

If desired, the ball seating depressions may 95 be eliminated from either one of the guideways. In Figure 4 recesses 23 in lower guideway 22 are of sufficient depth to cause the door to engage enlargements 24 when balls 25 are seated there- 100 in. In Figure 5 the recesses 26 are limited to the Z-bar 27 forming the upper door carried guideway. In Figure 6 the door carried guideway 28 is provided with a depending boss 29 which rests upon the lower track 30 when the 105 balls are seated in depressions 31 and 32. When the door is moved to the right, boss 29 is lifted from track 30, as indicated in broken lines, permitting the bearings to function normally. If 110 desired, in this form the ends of the upper guide-

way 28 could be bent downwardly to replace the separately formed boss elements 29.

In Figures 7 and 8, rollers 35 replace the balls shown in the previous figures. U-shaped brackets 33, on the lower edge of the door, journal shafts 34 which mount rollers 35. Brackets 33 also include friction elements 36 disposed to engage track 37 when rollers 35 enter recesses 38.

Obviously, many details of the selected embodiments might be varied within the spirit of the invention. The details of the door construction other than the bearings and associated elements are not essential. Moreover, the ball bearings in Figures 1 and 6 might be replaced by other forms of anti-friction rollers and the bearings could be advantageously applied to doors hung from top rails instead of supported at the bottom as shown. These and other modifications might be made without departing from the spirit of the invention, and the exclusive use of all such modifications as come within the scope of the appended claims is contemplated.

What is claimed is:

1. In combination, a wall structure having a door opening, a stationary track member in fixed relation to said wall structure, a sliding door member, a friction element and an anti-friction element between said members for respectively supporting said door member, said anti-friction element supporting said door member in certain positions of said door member, and means automatically transferring the support of said door member to said friction element to resist movement of said door member when the latter is moved to a certain other position.

2. In combination, a wall structure having a door opening, a track member in fixed relation to said wall structure, a sliding door member, a recess in at least one of said members, a rolling element arranged to support said door member on said track member and to facilitate relative movement of said members, said recess being positioned to seat said element when said door member is in its closed position, and a non-rolling element between said members and of less height than the diameter of said rolling element and adapted to support and frictionally engage said door member when in said position.

3. In combination, a wall structure having a door opening, a track member in fixed relation to said wall structure, a sliding door member, a recess in at least one of said members, rolling elements spaced along said track member to support said door member on said track member and to facilitate relative movement of said members, a cage maintaining said elements in spaced relation, said recess being positioned to receive one of said elements when said door member is in its closed position, and a non-rolling element between said members and adapted to support and frictionally engage at least a part of said door member when in said position.

4. In combination, a wall structure having a door opening, a track member in fixed relation to said wall structure, a sliding door member, a recess in at least one of said members, rolling elements spaced along said track member to

support said door member on said track member and to facilitate relative movement of said members, a cage between said members and maintaining said elements in spaced relation and having an enlargement, said recess being positioned to seat one of said elements when said door is in its closed position to decrease the effective height of said element, and said enlargement being adapted to support said door member when in said position.

5. In combination, a wall structure having a door opening, a track member in fixed relation to said wall structure, a sliding door member, spaced recesses in at least one of said members, spaced rolling elements for supporting said door member on said track member and movable along both of said members, a cage maintaining said elements in spaced relation, enlarged portions at the ends of said cage, said recesses being positioned to seat said elements when said door member is in its closed position, and said enlargements being arranged to support said door member and resist movement thereof when in said position.

6. In combination, a wall structure having a door opening, a track, a door member in fixed relation to said wall structure, anti-friction elements supporting said member on said track, a cage movable along said track and relative to said door and maintaining said elements in spaced relation, and cooperating stop elements on said cage and member adapted to limit relative movement of said cage and door member to cause said cage to resist travel of said elements and the movement of said door when the latter is in a predetermined position.

7. In combination, a wall structure having a door opening, a track in fixed relation to said wall structure, a sliding door, opposing members extending along said door and track, an anti-friction element between said members for supporting said door on said track, a recess in at least one of said members arranged to receive said anti-friction element when the door is in closed position, a friction element arranged to support said door when said anti-friction element is seated in said recess, means for positively moving said anti-friction element with said door, and cooperating leverage members on said wall structure and door for manually forcing said door away from a side of said opening and thereby move said anti-friction element out of said recess into door supporting position.

8. In combination, a wall structure having a door opening, a track member in fixed relation to said wall structure, a sliding door member, a recess in at least one of said members, a rolling element supporting said door member on said track member and facilitating relative movement of said members and movable into said recess in one position of said door member along said track member, and a non-rolling element between said members arranged to support said door member instead of said rolling element when said rolling element is seated in said recess, and means for guiding said rolling element into said recess.

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