Jan. 26, 1937. J. J. TATUM 2,068,895

HOPPER DOOR AND HOPPER DOOR LATCH

Filed Feb. 24, 1934 3 Sheets-Sheet 1

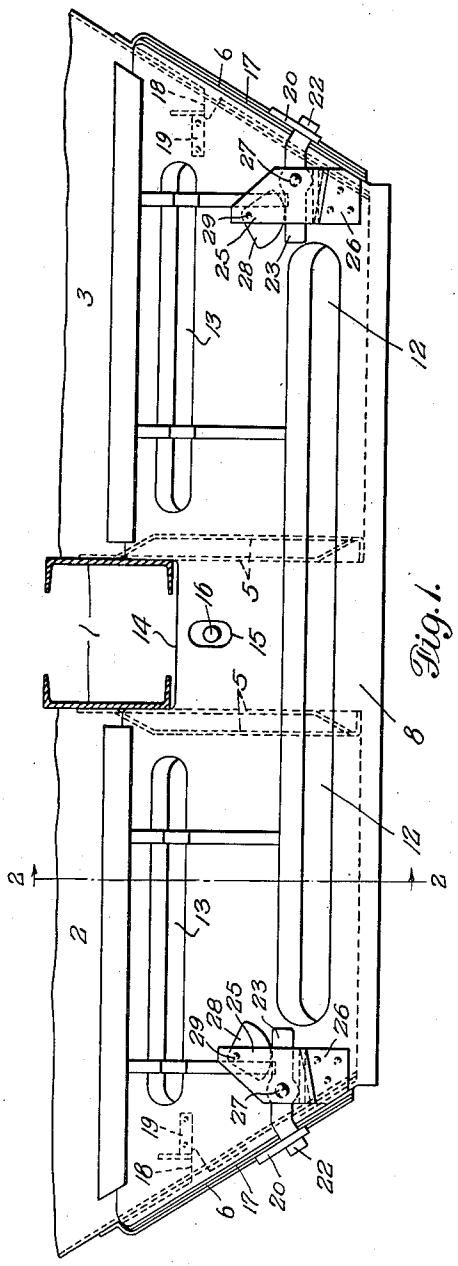


Fig. 1.

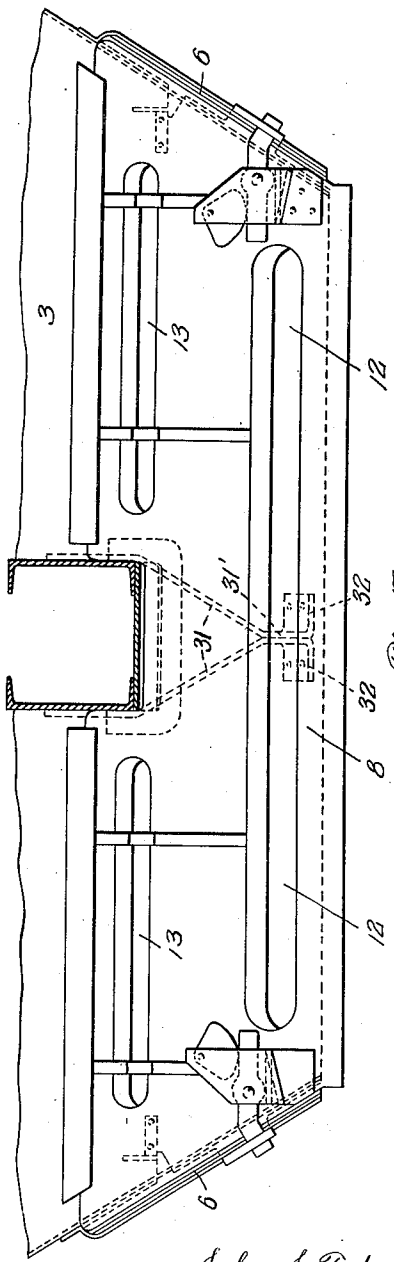


Fig. 7.

John J. Tatum,
INVENTOR

BY Edwin S. Clarkson
ATTORNEY

Jan. 26, 1937. J. J. TATUM 2,068,895

HOPPER DOOR AND HOPPER DOOR LATCH

Filed Feb. 24, 1934 3 Sheets-Sheet 2

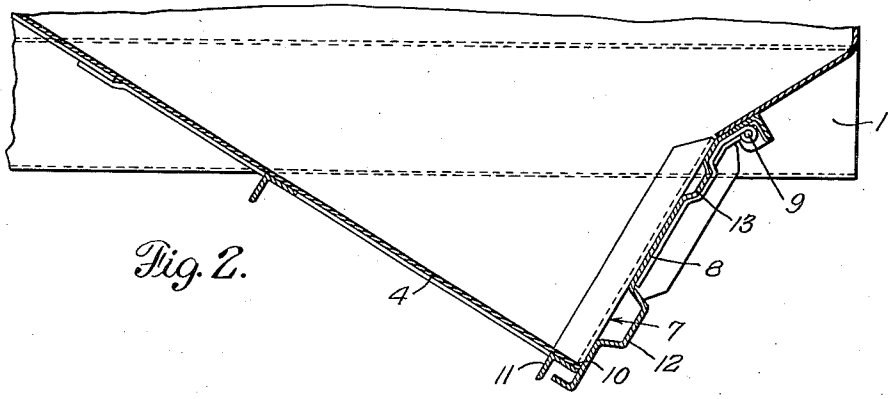


Fig. 2.

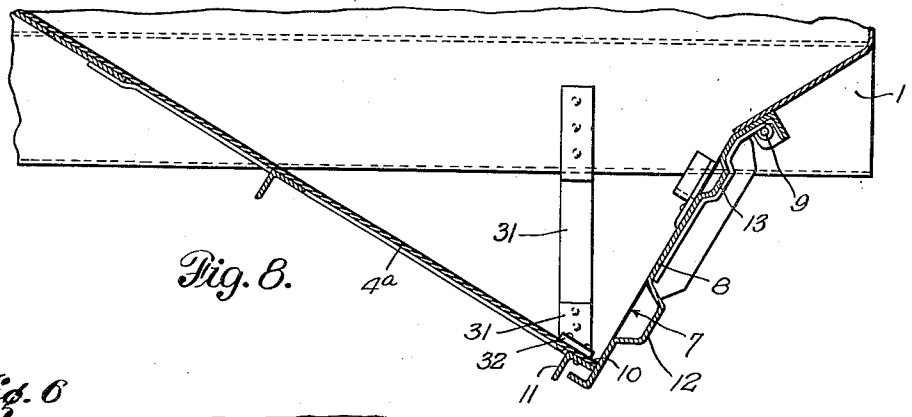


Fig. 8.

Fig. 6

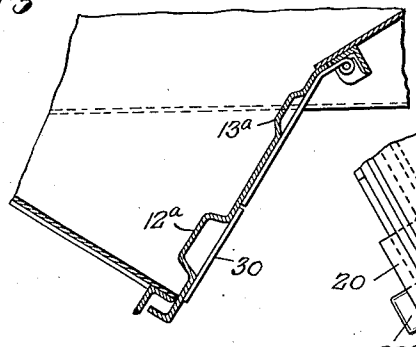
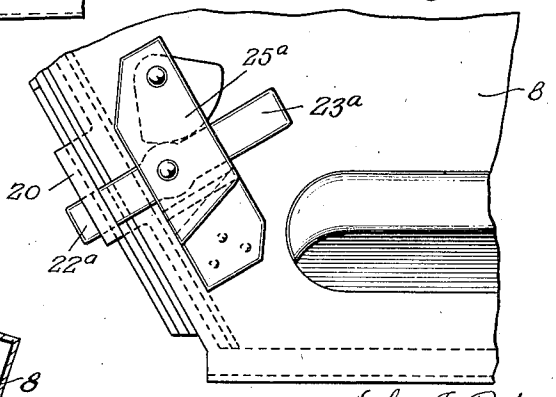


Fig. 9.



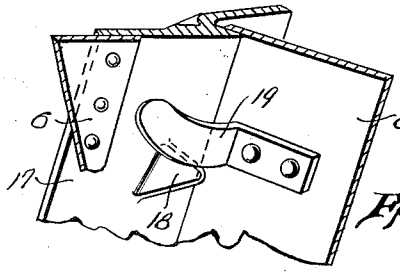


Fig. 12.

John J. Tatum,
INVENTOR

BY Edwin S. Clarkson
ATTORNEY

Jan. 26, 1937. J. J. TATUM 2,068,895

HOPPER DOOR AND HOPPER DOOR LATCH

Filed Feb. 24, 1934 3 Sheets-Sheet 3

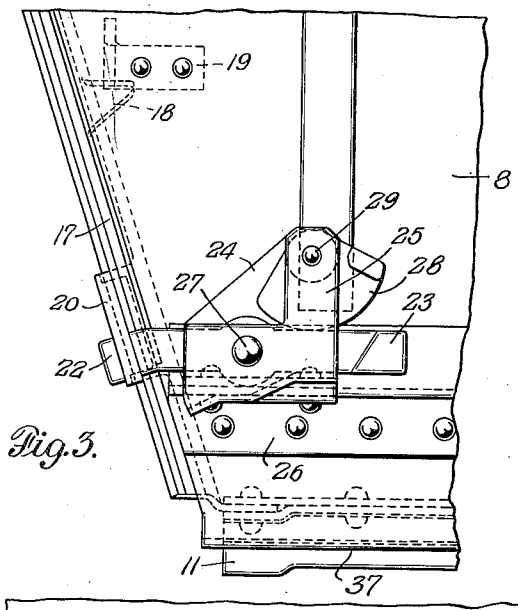


Fig. 3.

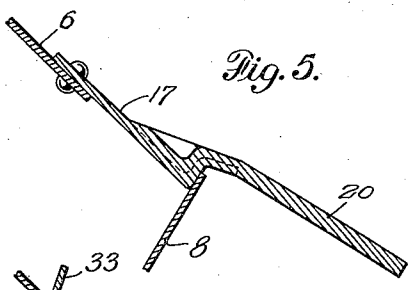


Fig. 5.

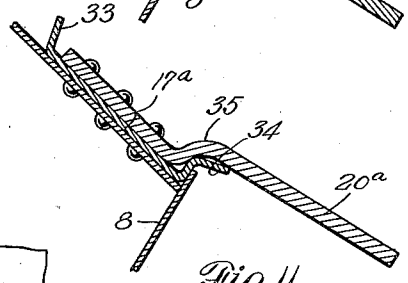


Fig. 11.

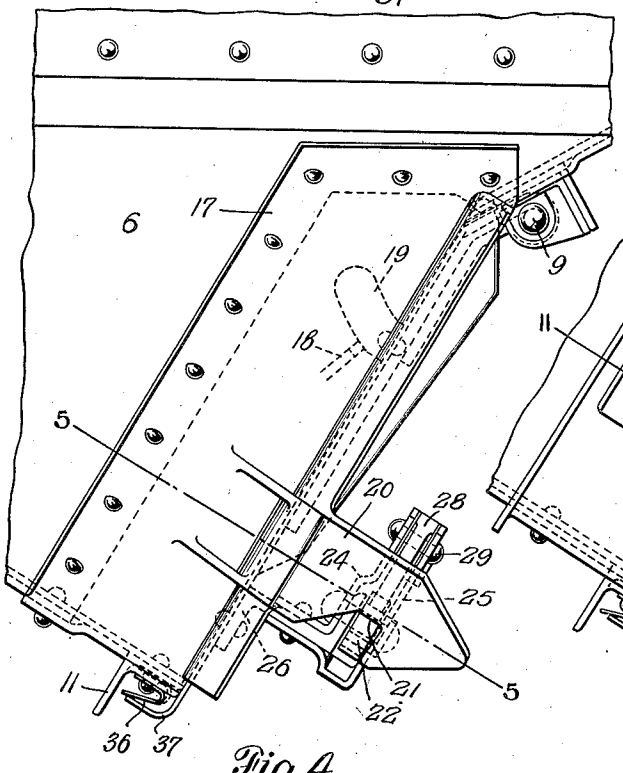
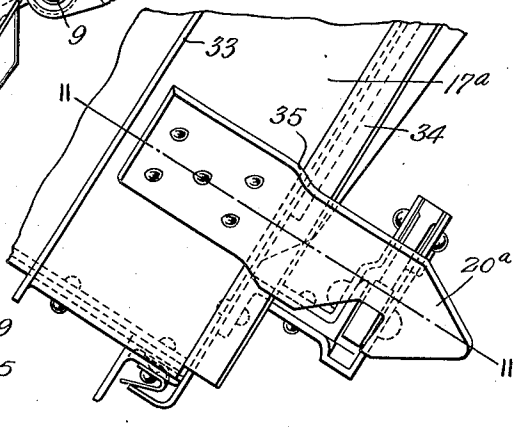


Fig. 4.

Fig. 10.



John J. Tatum,
INVENTOR

BY Edwin S. Clarkson
ATTORNEY

Patented Jan. 26, 1937 2,068,895

UNITED STATES PATENT OFFICE

2,068,895

HOPPER DOOR AND HOPPER DOOR LATCH

John J. Tatum, Baltimore, Md.

Application February 24, 1934, Serial No. 712,832

12 Claims. (Cl. 105—253)

This invention relates to improvements in hopper doors and hopper door latches or locking devices for railway cars.

One object of the invention is to provide novel and improved means for partly or wholly sustaining the weight of the closed door so as to relieve the door hinges therefrom and prevent sagging of the closed door, as well as to prevent lateral working or shifting of the door on its hinges and undue strain and wear on the hinges and door latches resulting therefrom; and further to provide a seal at the lower edge of the door which is kept closed by said sustaining means to prevent leakage of the lading between the door sill and lower edge of the closed door.

Another object of the invention is to provide a novel latch mechanism for the door whereby the door will be effectually held in closed position and against casual opening movement, but may be readily opened and closed manually whenever required.

Still another object of the invention is to generally improve and increase the construction and efficiency of operation of such doors and latches, as well as to secure other material and important advantages, all as hereinafter fully described.

In the accompanying drawings disclosing the invention:—

Fig. 1 is a sectional elevation through a portion of the underframe of a hopper car, showing two transversely alined hoppers and a door and latch structure embodying my invention as employed for closing the same.

Fig. 2 is a vertical longitudinal section through the door and one of the hoppers, taken, for example, on line 2—2 of Fig. 1.

Fig. 3 is a fragmentary front elevation of the hopper and door structure shown in Figs. 1 and 2 on an enlarged scale.

Fig. 4 is a side elevation of the same.

Fig. 5 is a section on line 5—5 of Fig. 4.

Fig. 6 is a sectional view through a modified form of door.

Fig. 7 is a view similar to Fig. 1, with parts broken away, showing a single hopper extending from side to side of a car instead of two transversely alined hoppers.

Fig. 8 is a vertical longitudinal section through one of the hoppers shown in Fig. 7.

Fig. 9 is a view similar to Fig. 3 showing a modified form of door latch.

Fig. 10 is a view similar to Fig. 4 showing another modification.

Fig. 11 is a section on line 11—11 of Fig. 10.

Fig. 12 is an interior view of the hopper showing the means for partly or wholly relieving the door hinges of the weight of the closed door.

In the practical embodiment of my invention as disclosed in the organization shown in Figs. 1 to 5, inclusive, 1 designates the center sills of the frame structure of a car of that type having hoppers arranged in transverse pairs, a pair of such hoppers, denoted 2 and 3 respectively, being shown for the purpose of indicating the application of my invention. Each of these hoppers includes a bottom sheet 4 and inner and outer side sheets 5 and 6, the inner sheets or walls 5 of the two hoppers being illustrated as spaced, in accordance with customary practice, a distance substantially equal to the distance between the center sills 1. Ordinarily the doorways or openings 7 of these hoppers are closed by independent doors of quite heavy type, and which because of their independent structure and the required mode of mounting thereof, add considerable weight to the car. I avoid this objection by providing a single door 8 extending across the doorways of both transversely alined hoppers 2 and 3 and operating to simultaneously open and close the doorways 7 thereof.

The door 8 is formed of sheet metal of proper gage. It is mounted upon the hopper structures 2 and 3 by suitable hinges 9 and is adapted to close against the bottom edge or sill 10 of the doorway, which is formed in part by an angle metal stiffening beam 11 secured to the bottom sheet 4. This door is provided along its lower portion, that is between its horizontal center and lower edge, with a stiffening beam 12 pressed outwardly therefrom as an integral component thereof. The portions of the door on opposite sides of the vertical center thereof are also preferably provided with outwardly pressed stiffening beams 13 disposed between the horizontal center of the door and the upper hinged edge thereof. These pressed stiffening beams may be employed in conjunction with other stiffening elements, but of themselves give great strength and rigidity to the door, to adapt it to withstand the pressure of the lading and other surface pressures and strains, without adding great weight to the door, such as produced by the use of stiffening beams or elements of added material. At the center, the upper portion of the door may be cut away, as shown at 14, to accommodate the lower portions of the sills 1, and such portion of the door may also be provided with an opening 15 for passage of the brake rod 16.

It will, of course, be understood that the door 8

may be in a single continuous piece as shown, for example, in Figs. 1 and 7, or it may be constructed in separate pieces, that is to say, two separate doors attached to one stiffening or tie beam may be employed, in accordance with common practice.

The type of hopper disclosed in Figs. 1 to 5, inclusive, involves the use of inwardly and downwardly inclined or sloping outer side sheets or walls 6, and a corresponding angular inclination of the ends of the door which close thereagainst. Preferably the forward edges of the sheets 6 at the sides of the doorway terminate in rear of the plane of the side margins of the doorway, and the spaces thus left vacant by removal of portions of the sheet 6 are occupied or covered by plates or extension sheets 17 of cast steel which are riveted, welded or otherwise firmly secured to such sheets 6 and to the bottom sheet 4. On the inner face of each of these plates or sheets 17 is cast or otherwise suitably applied an abutment lug 18, and each of these abutment lugs is adapted to be engaged by a door supporting shoulder or stop 19. These parts 18 and 19 may be so formed and arranged that, in the operation of closing the door, the lug and stop members on coming into engagement will lift the door to a slight degree or a sufficient degree to relieve the hinges from all or a part of the strain of supporting the door. By this means the door will not only be supported from its hinges but will additionally be supported by the side sheets or walls of the hopper, thus overcoming any tendency of the door to sag or bind and thereby ensuring its easier movements between open and closed positions. As shown in the present instance, the shoulders 19 are arranged at such an angle with their lower edges so disposed that such edges provide cam surfaces for engagement with the lugs 18 to ensure a desired movement of the door during its closing action. The shoulders 19 also engage the lugs at points adjacent to the sheets 5 and 6 so as to abut the same and prevent any material degree of lateral shifting movements of the door in either direction on its hinges, thus preventing undue wear on the hinge parts due to such lateral shifting or working movements of the door which would otherwise be permitted.

Latch mechanism is provided at each side of the door for securing the door in closed position. This desirably comprises a latch plate 20 cast integrally with and projecting forwardly from the plate 17 and formed in its lower edge with a latch bar receiving notch or recess 21 to receive the latch end 22 of a latch bar or member 23. This latch bar or member 23 as shown in Figs. 1, 3 and 7 is preferably provided with a straight body portion having its latch end 22 bent downwardly at a suitable angle for engagement with the notch or recess in the inclined latch plate. The straight body portion of the latch bar is mounted in a housing carried by the door comprising a pair of plates 24 and 25, riveted at their lower portions to an angle stiffening or spreader plate 26 riveted or otherwise secured to the door. The latch bar is pivotally mounted between these plates on a pivot pin or rivet 27 and is limited in downward movement by a stop surface formed by one of the plates on the angle beam 26. A segment-shaped or other type of latch dog 28 is pivotally mounted between the upper ends of the housing plates on a pivot pin or rivet 29, the cam edge of which is adapted for engagement with the upper edge of the body of the latch to hold the latch end 22 thereof securely in latching engagement with the latch plate in the closed position of the door. If desired, the walls of the latch receiving notch or recess of the latch plate may be undercut or beveled to assist in maintaining the latch end 22 more securely in latching position.

It will be understood, of course, that the efficiency of this type of latch mechanism is increased by the provision of the door supporting elements 18 and 19 which, by preventing sagging of the door, also prevent the latch ends 22 of the latch bars 23 from slipping down in their keeper recesses 21, and allowing play of the latch bars causing wear on the latch bars and keepers and liability, through such play, of the release of the latch dogs and casual disengagement of the latch bars from the latch plates.

As shown in Fig. 9 the latch structure may be modified by forming the latch 23*a* as a continuous straight bar with a latch end 22*a* in alinement with its body portion, which adapts the latch housing 25*a*, which may be constructed in the same manner as that previously described, to be disposed in a plane parallel with the side edge of the door.

It is to be understood, however, that while the use of a latch plate with a latch receiving notch or recess in its lower edge, together with a suitably mounted coacting latch is preferred, an ordinary type of latch with the notch or recess in its upper edge may be employed under desired conditions.

Instead of forming the door with the outstruck reinforcing beams 12 and 13, the door may be formed with similarly shaped inwardly pressed beams 12*a* and 13*a* as shown in Fig. 6. Also as shown in Fig. 6, over the open sides of the beams, whether of outstruck or instruck type, I may dispose reinforcing plates 30, which may be bolted or riveted to the door, and which will form with the beam a box beam or girder giving still greater strength to the door structure.

In the embodiment of my invention shown in Figs. 7 and 8 the inner walls of the hoppers are dispensed with and braces or bracket members 31 are provided which extend downwardly from the center sills in converging relation or V formation and are riveted or otherwise united adjacent their lower ends, as at 31', and then bent to provide attaching feet 32 which are riveted or otherwise fastened to the hopper floor sheets. By this construction the width of each hopper is increased and the hopper given greater storage capacity, and at the same time provision is made for effectually supporting the hopper floor 4*a*, which may be of continuous type, to give it greater strength and rigidity. As previously stated, the door here may be a single continuous door or formed of united separate doors, as may be found most desirable in use.

Figs. 10 and 11 show a construction of hopper in which a cast or pressed metal stiffener or reinforcing plate 17*a* is welded or otherwise attached to the outside hopper sheet, and to this plate and the hopper sheet is riveted or otherwise attached a latch plate 20*a* which may be of the structure previously described. The plate 17*a* is preferably provided with front and rear stiffening flanges 33 and 34, which latter may form the abutment for the cooperating side edge of the door, and the latch plate may be provided, as shown, with an offset 35 to adapt it to bear against the flange 34 and to be properly extended in advance thereof. This construction provides a latch carrying stiffener or rein-

forcement for the outer sheet in which said sheet may be either continuous between its rear edge and front door bearing edge or arranged to terminate in rear of the plane of the side margin of the doorway, as in the construction disclosed in Figs. 1 to 5, inclusive.

In order to prevent leakage of certain kinds of solid fluent material through the joint between the hopper bottom and lower edge of the door, I provide a joint closing or sealing strip **36** made of any suitable durable resilient or flexible material. This strip is secured at one edge to the hopper bottom, preferably by the rivets or other fastenings securing one of the flanges of the angle stiffening beam **11** thereto and has its opposite or free edge extending downwardly and rearwardly toward the other flange of said beam and adapted to be housed between the beam and a downwardly and rearwardly turned flange **37** at the bottom of the door and to close the joint between the same when the door is closed, the strip **36** maintaining by its resiliency a bearing contact with the flange **37**, whereby the escape of any lading which may gravitate through any open spaces between the hopper bottom and door will be effectually prevented.

This action is assured under all conditions as, by the use of the supports **18** and **19**, sagging of the door is prevented and hence the flange **37** is constantly maintained at a proper level for engagement by the strip **36** in the closed position of the door and prevented from dropping down below such level.

From the foregoing description, taken in connection with the drawings, the construction and mode of use of my improved hopper, hopper door and latch will be readily understood and it will be seen that the invention provides a construction in which both doorways of a pair of transversely alined hoppers may be closed by means of a single door, by which the door construction is not only simplified but a decrease in weight of a car of seventy tons capacity amounting to about one thousand pounds obtained, thus allowing an increase in amount of revenue lading which may be carried and correspondingly decreasing the dead weight of the car and reducing its cost of hauling when empty. The construction also provides for an increase in the cubical capacity of the hoppers below the underframe or sills of the car, and an increase in the amount of lading carried in the car below the underframe or sills, thus providing for a lower center of gravity and increasing the safety of cars moving at high speeds by preventing them from rocking off the track. The hopper construction disclosed also increases the size of the doorway or aperture through which the lading is discharged from the car, thereby decreasing the time of car unloading, and, because of the reduction in the weight of the car as above set forth, there will be a proportionate reduction in cost of manufacture, both for labor and material, required for building the car. The use of a sealing strip or weatherstrip is also of material advantage in preventing escape of certain kinds of lading from the car through the joint between the door and seat of the hopper floor and side sheets, while the described construction of the latch and the door supporting means obviates liability of binding of the door and provides for the supporting of the door in such manner as to prevent it from sagging and to relieve its hinges and the latch from other strains.

While the features of construction disclosed for purposes of exemplification are preferred, it will, of course, be understood that changes in the form, construction, proportions and arrangement of the parts may be made within the scope of the appended claims without departing from the spirit or sacrificing any of the advantages of the invention.

What I claim is:—

1. A freight car having a doorway, a door hinged at its upper edge for swinging movements to open and close said doorway, keepers at the sides of the doorway, latching means on the door for coaction with said keepers, and cooperating engaging and supporting members on the side walls of the doorway and the door between the horizontal centers and top edges of the doorway and door brought into engagement upon the closing of the door to assist in supporting said door, said members having cam surfaces serving to lift the door in its closing movement so as to support the door and relieve the door hinges from supporting strain and prevent sagging of the door.

2. A railway car having a doorway, a door hinged at its upper edge for swinging movements to open and close the doorway, fastening means for holding the door in closed position, supporting members on the side walls of the doorway between the horizontal center and top of the doorway, and supporting members projecting inwardly from the door between its horizontal center and hinged edge adapted for engagement with the first-named supporting members on a closing movement of the door to assist in supporting the closed door and to relieve the door hinges from supporting strain.

3. A freight car having a doorway, a door hinged at its upper edge for swinging movements to open and close the doorway, fastening means for holding the door in closed position, supporting lugs on the side walls of the doorway above the horizontal center thereof, and supporting members on the door between its horizontal center and hinged edge having cam-shaped lower edges for riding engagement with said lugs to slightly lift the door in its closing movement so as to assist in supporting the closed door and to relieve the door hinges from supporting strain.

4. A hopper car having transversely alined hoppers having discharge outlets, a single hinged, vertically swinging door for closing both hopper outlets, said door being provided with a longitudinal girder disposed between its transverse center and lower edge and a pair of longitudinally alined girders arranged on opposite sides of its transverse center and between its longitudinal center and upper edge, said girders being pressed from the sheet metal of which the door is made, fastening means for securing the door in closed position, supporting lugs on the side walls of the hopper above the horizontal center of the hopper outlets, and supporting members projecting inwardly from the door between its horizontal center and hinged edge adapted for engagement with said lugs on the hopper walls in the closed position of the door to assist in supporting the door and to relieve the door hinges of door supporting strain.

5. A railway car having a doorway, a vertically swinging hinged door for closing said doorway, a latch plate on each side wall of the doorway having a recess in its lower edge, a hinged

latch bar on the door movable upwardly to engage the recess in the latch plate and downwardly for disengagement from the recess, and door supporting means separate from and independent of said latch elements comprising coacting engaging elements on the door and side walls of the doorway above the horizontal center of the doorway and door engageable when the door is in closed position to assist in supporting the door and to relieve its hinges of supporting strain.

6. A freight car having a doorway, a hinged door to close the doorway, a latch plate on each side wall of the doorway having a recess in its lower edge, a reinforcement on each side wall of the doorway, a latch plate on each reinforcement having a recess in its lower edge, a hinged latch bar at each side of the door movable upwardly to engage the recess in the latch plate on the adjacent side of the doorway and downwardly for disengagement from said recess, and coacting supporting elements on the door and side walls of the doorway above the horizontal center of the doorway and door engageable when the door is in closed position to assist in supporting the closed door and to relieve the door hinges from supporting strain.

7. In a freight car having a doorway and provided with side walls terminating at their forward edges in rear of the doorway, a hinged door for closing the doorway, cast metal plates secured to said walls and closing the spaces between the same and forming the sides of the doorway, a latch plate cast integrally with each cast metal plate and having a recess in its lower edge, a hinged latch bar on the door movable upwardly to engage the recess in the latch plate and downwardly for disengagement from the recess, and coacting supporting elements on the door and side walls of the doorway above the horizontal center of the doorway and door engageable when the door is in closed position to assist in supporting the door and to relieve the door hinges of supporting strain.

8. A car door having a hopper provided with a doorway, a door for closing said doorway, said door being hinged at its upper edge to swing in a vertical plane and provided at its lower edge with a flange arranged to project beneath the hopper bottom in the closed position of the door, a flexible sealing strip on the hopper bottom engaged by the flange in the closed position of the door to prevent leakage of lading from the hopper, and coacting engaging elements on the door and side walls of the hopper to support the closed door and prevent it from sagging and to maintain said flange in engagement with said strip in the closed position of the door.

9. A car door having a hopper provided with a doorway, a door for closing said doorway, said door being hinged at its upper edge to swing in a vertical plane and provided at its lower edge with a flange arranged to project beneath the hopper bottom in the closed position of the door, a flexible sealing strip on the hopper bottom engaged by the flange in the closed position of the door to prevent leakage of lading from the hopper, and coacting supporting elements on the door and side walls of the hopper above the horizontal center of the doorway and door having coacting surfaces for a lifting action in the closing movement of the door to slightly elevate the door so as to support the closed door and relieve its hinges from supporting strain and to draw said flange into tight sealing engagement with said strip in the closed position of the door.

10. A freight car having a doorway, a pivotally mounted door for closing said doorway, a keeper at each side of the doorway and projecting forwardly beyond the front thereof, each keeper being provided in its underside with a keeper recess, latches pivotally mounted on the door for engagement with the respective keepers, each latch having a latch arm on one side of its pivot for engagement with the keeper and a retaining arm on the opposite side of its pivot, the said latch arms of the latches being vertically movable in the keeper recesses in the event of sagging of the door to relieve the latches from the strain of the weight of the door and prevent the latches from binding in the keepers, and means engageable with the retaining arms of the latches to hold the same in latching position.

11. A freight car having a doorway formed in part by side walls inclined downwardly and inwardly in convergent relationship to each other, a pivotally mounted door for closing said doorway and having correspondingly inclined side edges, a keeper on each side wall of the door projecting outwardly beyond the doorway and provided in its underside with a locking recess, separate and independent pivotally mounted latches at each side of the door adjacent to the inclined edges thereof, each latch having a longitudinally straight retaining arm located at one side of its pivot and a latch arm on the opposite side of its pivot projecting outwardly beyond the adjacent inclined edge of the door and terminating in an oblique outwardly and downwardly bent end to engage the keeper recess in the underside of the adjacent keeper, whereby each latch is movable initially in its keeper in the event of sagging of the door to relieve the latches from the strain of the weight of the door and prevent it from binding in its keepers, and means engageable with the straight body portions of the latches to hold the same in latching position.

12. A railway car having a doorway provided with inwardly and downwardly inclined side walls, a hinged door to close the doorway, a latch plate on each side wall of the doorway having an end portion projecting in advance of the doorway and formed with a recess opening through its lower edge, a hinged latch bar at each side of the door for engagement with the adjacent latch plate, each latch bar being intermediately pivoted to the door to provide a straight retaining arm and a locking arm, the latter terminating in an oblique outwardly and downwardly bent free end portion extending beyond the adjacent side edge of the door and movable upwardly to engage the recess in the latch plate and downwardly for disengagement from the recess, whereby the latch plates are adjustable downwardly in the latch recesses to compensate for any sagging of the door to prevent binding of the latches in the keepers, and means on the door engageable with the straight retaining arm of each latch to hold the latch in closed position.

JOHN J. TATUM.