SPLIT SIDE WALL RAILWAY CAR

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This invention relates to a railway car having a split side wall. More particularly, it relates to the provision, in a car of the unit frame type as shown in the copending application of Franklin P. Adler and James E. Candler, Jr., Serial No. 89,033 filed February 13, 1961, now abandoned, of an improved vertically sliding door arrangement which is sufficiently strong with respect to transverse load forces that the doors may function as a car wall without the necessity of providing separate load retainers.

It is an object of my invention to provide a freight car which is characterized by the absence of permanently affixed side walls and by the absence of all vertical and diagonal strength members at points between the car ends so that the entire side areas may be utilized for loading purposes.

According to this aspect of my invention, a door means is provided which extends for the full length of the car, and which opens vertically so that the entire side of the car is exposed to permit direct loading.

Another object of my invention is to provide an improved vertically sliding door arrangement, and also an arrangement in which the doors themselves can function as the side walls of a freight car.

According to this aspect of my invention the door means is split into two or more parts, of which the lower part is three feet high and therefore can be accommodated by the standard rail clearance. The standard A.A.R. clearance diagram permits extension of the door guides for a distance of a foot or more above the top of a nine foot door opening, as a result of which I have found that it is possible to provide a relatively stable mounting for the upper door part or parts. In other words, assuming that the door means is divided into two parts, a three foot lower part and a six foot upper part, one foot overlap of the door guides and the upper part can be utilized to provide a stable mounting for the six foot upper part when in elevated position, whereas such overlap would be insufficient in the case of a full door which is nine feet high.

It is a further object of my invention to provide in a car of the type described door actuating means which includes a separate mechanism for the door parts at each end plus a connecting shaft which runs the length of the car so that the lifting force can be applied to both ends of the door means by a single hand wheel.

A still further object is to provide an improved counterweighted arrangement for the doors so that only a comparatively low torque need be transmitted by the shaft.

Still another object is to provide an improved arrangement for maintaining the door means in closed position in such a manner that the door means is capable of taking up the transverse forces which may arise from load shifting.

According to this aspect of my invention I provide anchor means for the top and bottom edges of the door means together with locking mechanism which draws upon the anchor means at the same time that the door parts are locked to each other.

Other objects, features and advantages of the invention will be apparent as the description proceeds.

With reference now to the drawings in which like reference numerals designate like parts:

FIG. 1 is a side elevation of a railway car embodying my invention, a portion being shown in section;

FIG. 2 is a vertical enlarged section taken along line 2-2 of FIG. 1 showing the door actuating means;

FIG. 3 is an end view of the car of FIG. 1, and also showing the ladders and hand holds which are omitted for the purpose of clarity in the other figures;

FIG. 4 is a transverse sectional view taken along line 4-4 of FIG. 1 showing the relationship of the doors to each other and to the car structure;

FIGS. 5a and 5b are diagrams illustrating the operation of the door actuating means;

FIG. 6 is a detailed plan section taken along line 6-6 of FIG. 2;

FIG. 7 is a detailed plan section taken along lines 7-7 of FIG. 2;

FIG. 8 is a detailed plan section taken along line 8-8 of FIG. 3 showing the mounting for the hand wheel;

FIG. 9 is a vertical section showing the construction of the lower door;

FIG. 10 is a vertical section showing the construction of the upper door;

FIG. 11 is a view showing in side elevation the locking means which is mounted on the lower door;

FIG. 12 is a view similar to FIG. 11 but showing the locking means in a changed position;

FIG. 13 is a plan section taken along line 13-13 of FIG. 12;

FIGS. 14 and 15 are front and side elevations respectively of the lower bolt;

FIGS. 16 and 17 are views similar to FIG. 12 but showing still further changes of position of the locking means;

FIG. 18 is a plan section taken along line 18-18 of FIG. 17;

FIG. 19 is a plan section taken along line 19-19 of FIG. 17 showing the handle latching means;

FIG. 20 is a fragmentary front elevation of the locking mechanism showing the handle latching means; and

FIG. 21 is a diagram similar to FIG. 5, but showing a modification.

My invention will first be described with respect to the car structure and then with respect to the door actuating mechanism, the door guides, and the door lock.

Car structure

With reference now to FIGS. 1, 2 and 4, the car comprises a body 20 which is supported on trucks which are represented by the wheels 21 shown in broken lines. The body 20 includes an underframe which, except for the side sills 22, is of the usual construction. In other words, the underframe comprises a center sill 23, the side sills 22, and intermediate sills 24, all of which are connected to each other by suitable cross bearers and floor beams, not shown. The center sill 23 rests on the trucks in the usual manner.

The strength members of the body include the underframe in its entirety, as well as certain end piers and horizontal members as will be pointed out below.

As shown in FIG. 1, the car body 20 also includes a floor 25, made up of planks resting on the sills 21, 22 and 23, end walls 26, and a roof 27, all of which may be of the usual construction. As previously indicated, the body does not includes the usual fixed sides; rather, vertically sliding doors are provided as, for instance, the upper and lower doors 28 and 29 shown in FIGS. 1 and 4.
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The side sills 22, as shown in FIG. 4, are fabricated channels, and comprise upper and lower angles 30 and 31 respectively which are connected by a web 32, these three elements providing a side sill in the form of a beam which extends the full length of the car. The car ends 26 are spaced inwardly of the ends of the side sills 22. Disposed longitudinally outwardly of the end walls are L-shaped end piers 33. The end piers 33 are located exteriorly of the side sills 22 and are suitably welded thereto to provide rigid upstanding members. The upper ends of the piers 33 are connected by horizontal compression members 36 which are in the form of box beams. Each compression member 36 is secured at each end to the piers 33 by welding at various points. Each set of elements 22, 33, and 36 provides a unit frame, and the two unit frames provide a type of car construction which eliminates the need for all vertical and diagonal strength members at points between the car ends 26, as pointed out in the aforesaid copending application.

In this unit frame type construction, when the car is loaded the members 36 are subjected primarily to compressive stress which results in a greatly diminished flexure of the side sills 22. Furthermore, in addition to greatly strengthening the car structure against flexure, the present arrangement maintains the end piers 33 in parallelism with each other so that they can be used as mounting means for the door guides.

The roof 27 is mounted on upwardly projecting flanges 38 of the box beam 36, as shown in FIG. 4. The roof includes end transoms 47 and inside transoms 48.

Vertically extending door guides 50 are mounted on each of the end piers 33, as shown in FIGS. 1, 6 and 7, which provide channels for receiving both the upper and lower doors 28 and 29. The lower door 29, as shown in FIG. 1, comprises a framework which includes side posts 51 and a top bar 52 which support a door sheet 53. Suitable reinforcing battens in the form of channels 54 may be provided as shown in FIGS. 1 and 9. The side posts 51 are provided with flanges 55 (FIG. 7) which cooperate with the edges 63 of the door guides 50 and serve as side stops for the door. A filler strip 62 may be provided in the channels formed by the door guides 50.

The upper door 28 is of similar construction, having side posts 58, but the top bar carries an inverted channel 59 which, as shown in FIGS. 4 and 10, engages a corrugation 60 formed on a flange 46 of the compression member 36. The cooperation of the channel 59 and corrugation 60 provides a weather seal, and a suitable gasket 64 is preferably employed. As shown in FIG. 6, the upper door 28 may be provided with rollers 56 which are mounted in brackets 57 on the side posts 58 and which engage the edge 63 of the door guide, thus serving as side stops.

The upper and lower doors 28 and 29 may be actuated by suitable mechanism to be described which includes a door actuating wheel 61. As shown in FIG. 4, the upper door 28 slides upwardly in the door guide 59 whereas the lower door 29 slides downwardly as to completely expose the opening in the side of the car. As shown in FIG. 3, the door guides 50 extend upwardly above the compression members 36, and downwardly as far the bottom of the side sills 22.

The door actuating mechanism

With reference now to FIG. 1 it will be observed that a shaft 70 is journaled in the transoms 48 and extends for the full length of the car between the car ends 26. Both ends of the shaft extend through the car ends, and one end extends outwardly and is suitably journaled in one of the end transoms 47. The shaft 70 is provided for each side of the car, as shown in FIG. 4. An extended end of the shaft is provided with a sprocket 71 by means of which the shaft may be driven by a chain 72 and a sprocket 73 which is mounted on the shaft 74 of the hand wheel 61, as shown in FIG. 2. The wheel 61 and its shaft 74 are mounted in a suitable bracket 75 as shown in FIG. 8, the bracket being secured to an end pier 33 immediately above the end sill 46. Thus, rotation of the hand wheel 61 drives one shaft 76, and a similar hand wheel at the other end of the car drives the other shaft, and the arrangement of both is identical so that the description of one applies to the other. A suitable housing, not shown, may be provided at one end of the car to enclose the chain 72 and its associated sprockets 71 and 73.

A roll of chain 79 is located in a compartment under the seat 80, and longitudinally external of the end walls 26 is a drive sprocket 81. Mounted in the upper end of each door guide 50 by means of suitable brackets 85, are two small sprockets 78 which are aligned with the drive sprocket 77.

The arrangement is such that a single chain 79 is provided which engages both doors 28 and 29 so as to elevate one while the other is lowered, and vice versa, one door serving as a counterweight for the other.

In accordance with this arrangement which is shown in FIG. 2 and is also shown diagrammatically in FIGS. 5, 5a, and 5b, one end of the chain 79 is attached to the lower side edge of the upper door 28, and the other end of the chain is anchored at 81 to a suitable point on the end pier 33. The lower end of the door is attached to an idler sprocket 82 mounted on a bracket 83, and the arrangement is such that the chain is maintained taut by the weight of the lower door 27 which the chain 79 supports by means of the idler sprocket 82. The chain 79 extends through the box beam or compression member 36 and also through the end pier 33, and to this end, suitable tubes 86 are provided as shown in FIG. 2 to provide pathways for the chain.

The operation of the door actuating mechanism is diagrammatically illustrated in FIGS. 5, 5a, and 5b. The fact that the lower door 29 is supported from the chain 79 by the idler sprocket 82 provides a mechanical advantage of two to one in favor of the upper door. In other words, as the upper door is elevated through six feet, the lower door 29 will be lowered three feet. This arrangement also provides a counterbalancing action, and in this connection, the lower door is made twice as heavy as the upper door, which results in an inverted weight per unit area ratio of four to one in favor of the lower door. In order to maintain this ratio, the upper door is preferably constructed of a suitable light weight aluminum alloy, and the lower door of steel, and an effort is made to maintain an absolute weight ratio of two to one in favor of the lower door to provide counterbalance.

Since the actuating mechanism including the chain 79 and the various sprockets is duplicated at the opposite end of the door, each end of the door is counterbalanced. As a result, the torque which is transmitted through the relatively long shaft 70 is only that torque which is necessary to overcome the frictional operation, and furthermore, the doors will tend to remain in any given position, closed, open or partially open. By virtue of this arrangement, if a chain 79 at one end of the door should break, then that end of both doors will drop down and will become wedged in place with the result that the upper door will not drop and injure a stevedore. However, as an additional safety factor, spring biased latches 87 may be provided at each end of the door, as shown in FIG. 1 with respect to the left end, which engage the door in its fully opened position, and which must be released prior to closing the same by manipulation of the door actuating wheel 61.

The door guides

As shown in FIGS. 6 and 7, the door guides 50 provide an enclosed space 90 which is located beyond the side posts 58 or 59. The chain 79 is located within this enclosed space 90 where it is protected from mud and dirt.
though up from the roadbed; in other words, the door guide 50 in itself provides a housing for the vertical spans of the channel 38 engaging the housing, not shown, may be provided for that portion of the horizontal span which is adjacent to the drive sprocket 77.

Disposed within the enclosed space 90 is a vertically arranged bearing strip 91, shown in FIG. 6, which is connected to the upper door side post 58 in an integral relationship by means of a connecting flange 92. Thus, the upper door guide 50 at two inner points, one being the sliding engagement between the roller strip 62 and the side post 58 and the other being the sliding engagement between the end pier 33 and the edge of the bearing strip 91.

As shown in FIG. 7, the bearing strip 91 is extended downwardly beyond the lower edge of the upper door so that, when the doors are closed, the bearing strip 91 will overlap the bracket 83 and the side post 51 of the lower door 29. The extent of overlapping is preferably of the order of one and a half feet or more so as to provide a stable support for the upper door 29 when it is in its elevated position and shown in FIG. 4. It will be noted in FIG. 2 that the upper end of the door guide 50 extends upwardly beyond the door opening, as defined by the lower edge of the box beam 36, by a substantial distance which in practice is somewhat more than a foot. As a result, somewhat less than five feet of the upper door project beyond the ends of the door guide, and stability is provided by the cooperation of the bearing strip 91 with the door guide 50 throughout a distance of more than two and a half feet. As shown in FIG. 7, a portion 92a of the connecting flange 92 may also be extended downwardly to provide reinforcement for the bearing strip 91.

According to the dimensions given which in a preferred embodiment of my invention include a door and door guide overlap of about seventeen inches, the front clearance 93 between the side post and bearing strip 91 and the flange of the door guide 50 is a quarter inch which is sufficient to provide for free sliding movement, but which nevertheless considerably limits any lateral tilting of the upper door when in its open position.

The side clearance 94 shown in FIG. 6, between the bearing strip 91 and the door guide 50 is maintained by rollers 56.

Means are also provided for aligning the doors 28 and 29 with each other when in a closed position. As shown in FIG. 10, the lower edge of the door comprises a Z-shaped strip 95 on which is mounted at intervals a conical centering lug 96 which cooperates with a suitable opening formed in the top bar 52 of the lower door 29, and this arrangement maintains the clearances above mentioned and also facilitates alignment of the locking means as hereinbefore described.

Door lock

Means are provided to lock the doors 28 and 29 in their closed position, and to draw them up sufficiently tightly so that the door means are capable of taking up the transverse forces imparted to them by a shifting of the lading, in order that the door means also may function as the side wall of the car. The locking means are mounted on the exterior of the doors as shown in FIG. 1, and comprise a lock casing 100 mounted on the lower door 29 and a keep 101 mounted on the upper door 28. The lock casing 100 extends for the full depth of the lower door 29 and the keeper 101 is somewhat shorter and is located directly above it, and the construction is shown in FIGS. 11 to 20. As shown in FIGS. 13 and 18, the lock casing and keeper casing are both elongate generally cylindrical casings having aligned axial openings 102 which are slightly elliptical in cross section.

A bolt 103 shown in FIGS. 14 and 15 is slidable and rotatably mounted in the lock casing 100. The upper end of the bolt 103 is notched to provide a tapered head 184. The bolt is also provided with a transverse stem 105 which extends outwardly through a slot in the lock casing 100. As shown in FIG. 11, the slot comprises a vertical side portion 106, a horizontal portion 107 and a short vertical front portion 108. The stem 105 projects outwardly through the slot, and when the bolt 103 and stem are in the FIG. 11 angular position, the bolt 103 may be projected upwardly into the keeper casing 101 as shown in FIG. 12.

The inner surface of the keeper casing 101 is provided with a pair of horizontal ribs 109 which provide a restricted elongate opening for receiving the bolt 103 when it is oriented so that the stem 105 projects through the vertical slot portion 106. When the bolt is in its projected position as shown in FIGS. 12 and 13, the horizontal slot portion 107 permits it to be rotated through 90° into the engaged position shown in FIGS. 16 and 18, wherein the head 104 interlocks with the ribs 109.

Cam means are provided to draw the bolt downwardly from the FIG. 16 position into the FIG. 17 position so that the two doors 28 and 29 will be drawn tightly together. This means includes a reaction lug 110 mounted on and formed integrally with the locked casing 100. A bifurcated operating handle 111 is pivotally mounted on the stem 105 by a suitable pin 112. The upper end of the handle 111 is provided with cams 113 which engage the reaction lug 110 when the handle 111 is swung from the horizontal position of FIG. 16 downwardly into the vertical position of FIG. 17. Thus, the bolt 103 is forced downwardly into engagement with the ribs 109, and the doors are drawn together.

Means shown in FIGS. 17, 19 and 20 are provided to latch the operating handle 111 in its locked position. The handle-latching means includes a bracket 114 extending outwardly from the lock casing 100 as shown in FIG. 19, and carries at its outer end a short tubular member 115. A U-shaped strip 116 is loosely mounted in the tubular member for both longitudinal and rotational movement. The operating handle 111 is provided with a slot 117 shown in FIGS. 17 and 20 which is of a length sufficient to receive the bent end of the U-shaped strip 116 when in its upwardly turned position shown in dotted lines in FIG. 20. When the U-shaped strip is turned downwardly into the solid line position, the handle 111 is secured against outwardly swinging movement. Aligned holes 118 and 119 are provided in the handle 111 and the strip 116 respectively so that a sealing wire 120 can be passed therethrough to seal the handle latch.

The operation of the door locking means is illustrated by a comparison of FIGS. 11, 12, 16 and 17. When the bolt 113 is in its inoperative position, the tail of the handle 111 is received in a retainer loop 121 located beneath the vertical slot portion 106 to prevent free swinging movement of the handle when the door is open. Considerable clearance is provided between the bolt 103 and the inner surface of the locked casing 100 for ease of operation. A lug 122 is formed on the stem 125 which is engaged by one of the cams 113 when extended to facilitate manipulation of the bolt 103.

As the doors are closed, the centering lug 96 aligns the lock and keeper casings 100 and 101 so that the bolt 103 may be projected upwardly into the keeper casing 101 and rotated into the 90° or engaged position of FIG. 16.

Then the operating handle 111 is drawn downwardly and latched and sealed in position. The downward movement of the operating handle 111 together so that the weather seal channel 59 is urged into engagement with the rib or corrugation 60, and so that an upwardly facing channel 125 at the bottom of the lower door 29 (FIGS. 11 and 9) will be urged upwardly into engagement with a rib 126 formed on a steel floor plank 25. Thus, the door is anchored against outward movement not only by the door guides 59 which are located at opposite ends, but also at all intermediate points by virtue of the anchor means which include channel elements 59 and 125 and rib elements 60 and 126.
The resilient gasket 64 provides a certain amount of "give" as the operating handle 111 and cam 113 draw the parts together, and a similar gasket may be provided between the channel 125 and the bead 126, if desired.

In the alternative, the bolt 103 may be split and a heavy spring loading introduced between the two halves or between the head 104 and the remainder of the bolt 103.

As shown in FIGS. 2 and 3, the door guides 50 taper outwardly toward the middle. This permits the doors to spring outwardly to a slight extent when the door lock is released, thus providing clearance between the doors and lading which may have shifted into a door abutting position.

**Operation**

The operation of my invention has been pointed out in connection with the description of the various parts and subassemblies. To summarize the same, the structure of the car is free from vertical and diagonal strength members at points between the end piers 35. In particular, each side sill 22 together with its end piers 33 and compression member 36 are rigidly secured to each other to provide a unit frame type of construction which is described in greater detail in the aforesaid copending application. The unit frame type of construction greatly decreases deflection of the side sills 22 under load with the result that the door guides 50 on each side will be maintained in parallelism with each other, thus permitting the use of a single vertically slidable door means for each side of the car.

By making each door means in two parts, I am enabled to provide a practical construction which exposes the entire side of the car for load purposes, and the arrangement of the door guides 50 and bearing strips 91 provides a stable support for the upper door 28 when in its elevated position. With the entire side of the car thus exposed, direct loading may be achieved, which is to say that the lading may be moved into the car by transverse movement only of the fork lift trucks or other devices used in car loading.

The door actuating arrangement shown herein provides a counterbalanced mechanism which can be easily operated by one man at the single door actuating whee 61, and a second wheel is provided for the door means on the other side, as shown in FIG. 1.

By virtue of the improved lock means shown, of which there are several, and preferably four for each door means, I am enabled to draw the doors and anchor means together very tightly so that to all intents and purposes, a rigid side wall is provided for the car. The door locks may be equally spaced from each other along the length of the door, the points corresponding to ¼, ¾, 5/8 and ¾ of the door length measured from one end of the door.

Instead of the two-part door means as shown in FIGS. 1, 2 and 5, a three-part door means may be provided as shown in FIG. 21 which includes a lower door 29', a middle door 28', and a top door 140. The operating arrangement for doors 28' and 29' is substantially the same as described in connection with FIGS. 5, 5a and 5b, and includes a chain 79' and a drive sprocket 77'. The top door 140 is connected to the lower door 29' by means of a chain 141 and a sprocket 142, the latter being mounted on shaft 78' and being one-half the diameter of the main drive sprocket 79', and rotating therewith. Thus, although the middle door 28' moves at twice the speed of the lower door 29', the top door 140 will move at the same speed as the lower door 29', and in the opposite direction, and is counterbalanced thereby. According to this arrangement, the lower door 29' weighs less than twice as much as the sum of the weights of both upper doors 28' and 140.

Where compartmentalized loading is desired, one or more movable partitions 65 may be provided as shown in FIGS. 1, 4, 9 and 10, the partitions being suspended from suitable trolleys 66 which ride on flanges 67 extending inwardly from the box beam 36. Suitable locking means may be provided for locking the partition in a given position, such as the projections 68 (FIG. 9) which extend into suitable openings 69 formed in the steel floor plank 25' and a corresponding arrangement, not shown, for the upper edge of the partition 65.

Although only a preferred embodiment of my invention has been shown and described herein, it will be understood that various modifications and changes may be made in the construction shown without departing from the spirit of my invention as pointed out in the appended claims.

1. A railway car comprising side sills, end piers and compression members connected to each other to provide a unit frame type of construction, vertical door guides mounted at either end of the car in a fixed position relative to said end piers, door means extending the full length of one side of the car and being slidable mounted in said door guides for vertical movement, said door means comprising an upper door and a lower door, anchor means located at the top edge of said upper door and the lower edge of said lower door for anchoring the horizontal edges of said door means with respect to said frame when the said door means is in closed position, and means for drawing said doors into engagement with each other in order to render said anchor means effective, whereby said door means, when closed, may serve as a side wall which is secured to the car structure at the top, bottom and side edges.

2. A railway car as claimed in claim 1 which comprises a pair of vertically extending parallel door guides mounted on said car structure, each door guide comprising a channel for receiving the side edge of said upper and lower doors, said door guide extending upwardly beyond the door opening so as to overlap the lower portion of said upper door when in its elevated position.

3. A railway car as claimed in claim 1 which comprises a pair of vertically extending parallel door guides mounted on said car structure, each door guide comprising a channel for receiving the side edge of said upper and lower doors, said door guide extending upwardly so as to overlap the lower portion of said upper door when in its elevated position, and a bearing strip carried by said upper door and cooperating with the channel of said door guide and extending downwardly below the lower edge of said upper door whereby said extended portion of said bearing strip imparts stability to said upper door when in elevated position.

4. A railway car as claimed in claim 1 which includes a pair of vertically extending parallel door guides mounted on said car structure, each door guide comprising a channel for receiving the side edge of said upper and lower doors, and said channels being tapered outwardly toward the middle so as to permit said doors to spring outwardly when said locking mechanism is released in order to provide clearance between said doors and any lading which may have abutted the same when the doors were in closed and locked position.

5. A railway car as claimed in claim 1 in which said anchor means each comprises a channel portion mounted on a door and an interlocking rib portion mounted on said car, a lock casing mounted on one of said doors, a bolt slidable mounted therein and having a stem extending through said lock casing to permit manipulation of said bolt, keeper means mounted on each other along the length of said doors and located for releasable engagement by said bolt, and cam means for drawing said bolt into tight engagement with said keeper means, said cam means comprising a handle member pivotally mounted on said stem and including a cam at one end for engagement with a portion of said lock casing, whereby rotation of said handle member will operate said cam means to draw said doors together so that said interlocking ribs and channels will be drawn into engagement with each other.
6. A railway car as claimed in claim 5 in which said cam means includes a handle member pivotally mounted on said retainer mounted on said lock casing and aligned with said vertically extending slot for engaging the end of said handle member when said bolt is in its retracted position.

7. A railway car as claimed in claim 5 in which said cam means comprises a handle member pivotally mounted on said stem and including a cam at one end for engagement with a portion of said lock casing, said handle member being movable between a cam engaged and a cam disengaged position, and a latching member engaging said handle member when in cam engaged position, said latching member and said handle having aligned openings therein whereby a sealing strip may be passed through said members to maintain said handle member in cam engaged and latched position.

8. A railway car as claimed in claim 1 including chain and sprocket means connecting said upper and lower doors to each other in a counterbalanced relationship, and located at both ends of said doors, and a drive shaft rotatably mounted in said car and extending for substantially the full length thereof and being connected at its ends to said chain and sprocket means.

9. A railway car as claimed in claim 8 which includes latching means for maintaining said upper door in open position.

10. A railway car comprising side sills, end piers and compression members connected to each other to provide a unit frame type of construction, vertical door guides mounted at either end of the car in a fixed position relative to said end piers, door means extending the full length of one side of the car and being slidably mounted in said door guides for vertical movement, said door means comprising an upper door and a lower door, means connecting said doors to each other in a counterbalancing arrangement, and actuating means for opening and closing said doors, anchor means located at the top edge of said upper door and the lower edge of said lower door for anchoring the horizontal edges of said door means with respect to said frame when said door means is in closed position, and locking mechanism mounted on the abutting horizontal edges of said doors to draw the same into engagement with each other and to render said anchor means effective whereby said door means, when closed, may serve as a side wall which is secured to the car structure at the top, bottom and side edges.

11. In a railway car of the unit frame type characterized by the absence of vertical structural members located between the car ends, the combination of a pair of vertically extending door guides located on one side of the car at the ends thereof, and upper and lower doors slidably mounted in said door guides for vertical movement in opposite directions, said doors, when closed, serving as the side wall of said car, door actuating means located at each end of said door, each door actuating means including a drive sprocket located at an upper corner of the car, and an idler sprocket mounted on said lower door, said chain being formed around said drive sprocket and said idler sprocket and having one end secured to the lower part of said upper door and having the other end secured to said car structure at a point above said idler sprocket when said doors are in closed position, whereby movement of one of said doors will cause movement of the other door in the opposite direction with a mechanical advantage of two to one in favor of the upper door, said lower door being substantially twice as heavy as said upper door in order to provide a counterbalanced arrangement for each door actuating mechanism, and common means for driving both of said door actuating means in a manner such that each end of said upper doors will be moved through equal distances at the same time.

12. The combination as claimed in claim 11 in which said lower door is substantially one half the height of said upper door.

13. The combination as claimed in claim 11 in which said common driving means includes a drive shaft extending for the full length of said car.

14. A split side wall construction for a railway car having a floor structure, car ends, and a roof structure which defines a side opening, and which also has vertically extending structural members located beyond said door ends and a pair of vertically extending parallel guide means mounted on two of said vertically extending structural members, comprising, in combination, upper and lower wall parts in the form of upper and lower doors slidably mounted in said door guides for vertical movement in opposite directions, and extending for the full length of said side opening, a shaft journaling in said roof structure and extending for the full length of said car and projecting beyond said car ends, and door actuating means located at each end of said car, each door actuating means comprising a drive sprocket driven by said shaft and located at each end of said shaft in a position substantially aligned with one of said door guides, an idler sprocket mounted on the side edge of said lower door, a chain for said drive sprocket having one end connected to the lower portion of the side edge of said upper door, and having its other end anchored to said vertically extending structural member at a point above said idler sprocket when said doors are in closed position, intermediate portions of said chain being trained around said drive sprocket and said idler sprocket whereby rotation of said shaft will cause said doors to move in opposite directions with a mechanical advantage of two to one in favor of said upper door, said lower door being approximately twice as heavy as said upper door so that said doors tend to counterbalance each other, and means located at one end of said car for rotating said shaft, whereby the counterbalanced arrangement reduces the torque which is transmitted by said shaft from one door actuating means to the other.

15. A split side wall construction for a railway car having a floor structure, car ends, and a roof structure which defines a side opening, and which also has vertically extending structural members located beyond said door ends and a pair of vertically extending parallel channel type door guides mounted on two of said vertically extending structural members, comprising, in combination, upper and lower wall parts in the form of upper and lower doors slidably mounted in said door guides for vertical movement in opposite directions, and extending for the full length of said side opening, a shaft journaling in said roof structure and extending for the full length of said car and projecting beyond said car ends, and door actuating means located at each end of said car and connected by said shaft, each door actuating means comprising a drive sprocket driven by said shaft and located at each end of said shaft in a position substantially aligned with one of said door guides, an idler sprocket carried on said lower door and projecting beyond the side edge thereof, and being received within said door guide, a chain for said drive sprocket having one end connected to the lower portion of the side edge of said upper door, and having its other end anchored to said vertically extending structural member at a point above said idler sprocket when said doors are in closed position, intermediate portions of said chain being trained around said drive sprocket and said idler sprocket whereby rotation of said shaft will cause said doors to move in opposite directions with a mechanical advantage of two to one in favor of said upper door, a pair of guide sprockets located in the upper portion of said door guide at a point opposite said drive sprocket so that the vertically extending portion of said chain may be confined within said channel type door guide, said lower door being approximately twice as heavy as said upper door part so that said doors tend to counterbalance each other, whereby the counterbalanced arrangement reduces the torque.
which is transmitted by said shaft to said door actuating means.

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2,860,386 11/58 Doeg et al. 20—19 X
2,930,332 3/60 Cook et al. 105—378
2,966,706 1/61 Christensen 20—19 X
2,970,855 2/61 Fisher 292—59
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