

Aug. 29, 1961

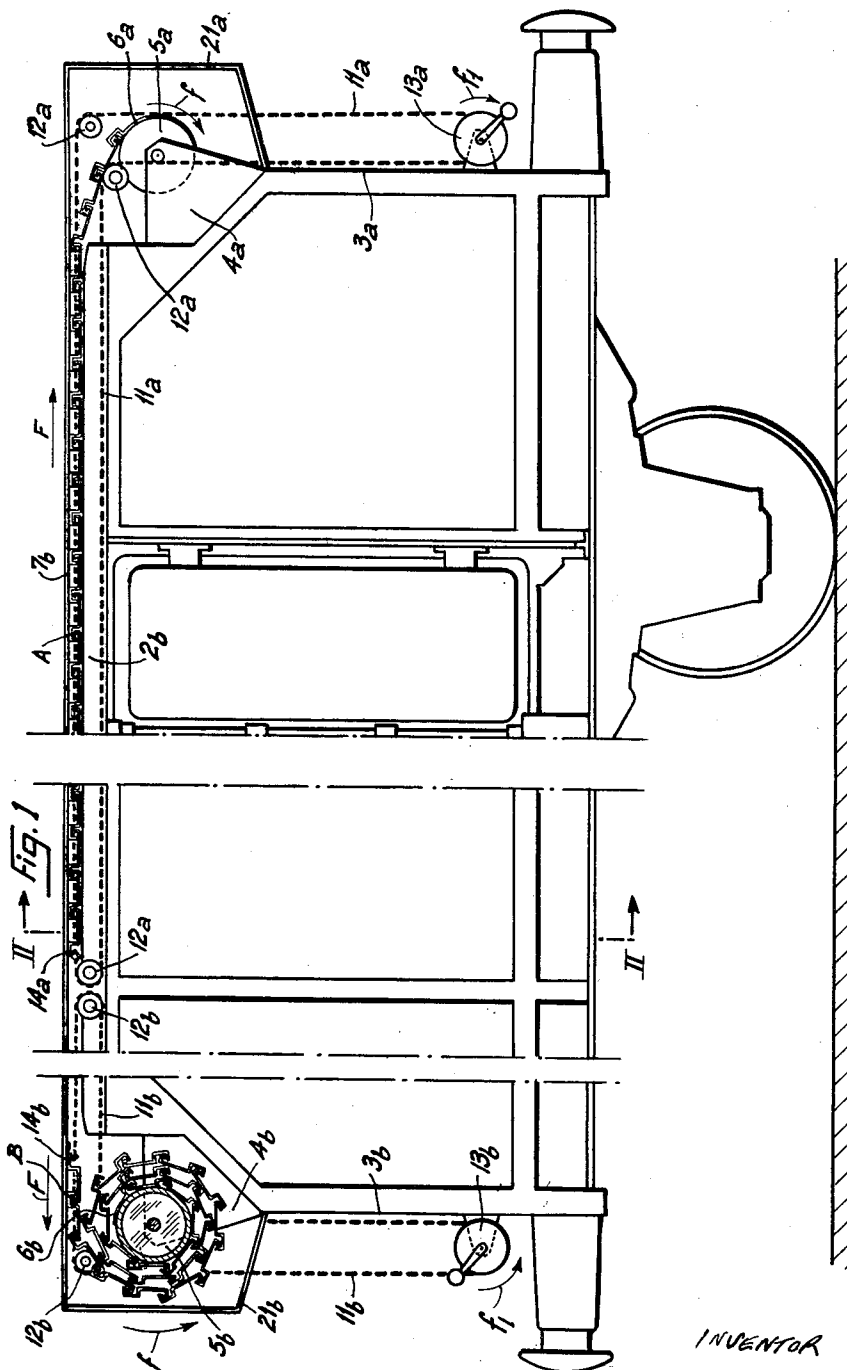
J. MALAPERT

2,997,967

OPENABLE ROOF FOR RAILWAY CAR

Filed May 27, 1959

5 Sheets-Sheet 1



INVENTOR

Jean Malapert

By Watson, Cole, Grindle & Watson
ATTORNEYS

Aug. 29, 1961

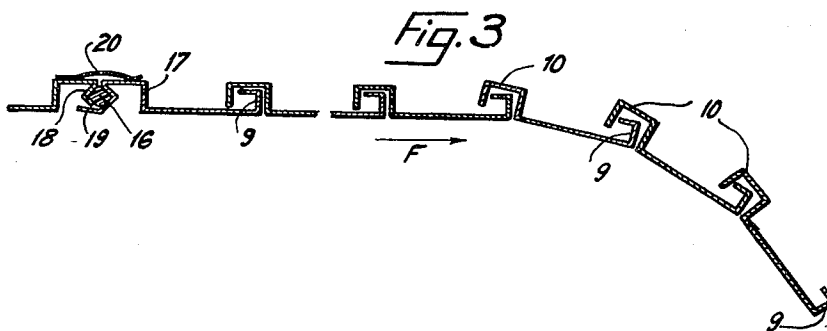
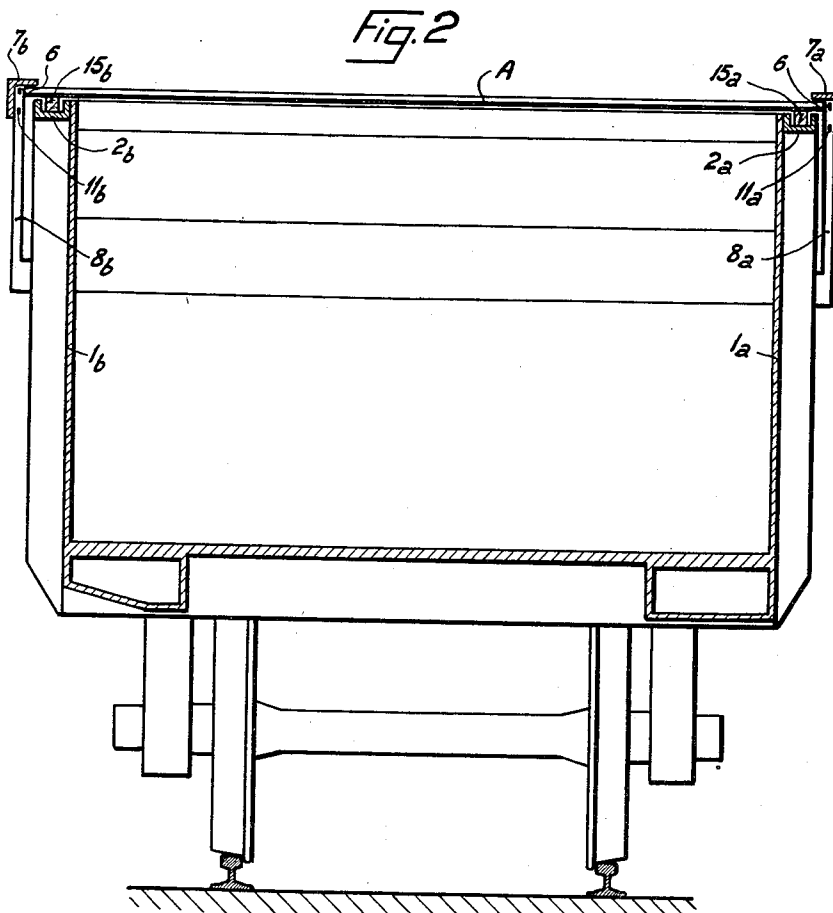
J. MALAPERT

2,997,967

OPENABLE ROOF FOR RAILWAY CAR

Filed May 27, 1959

5 Sheets-Sheet 2



INVENTOR

Jean Malapert

By Watson, Cole, Grindle & Watson
ATTORNEYS

Aug. 29, 1961

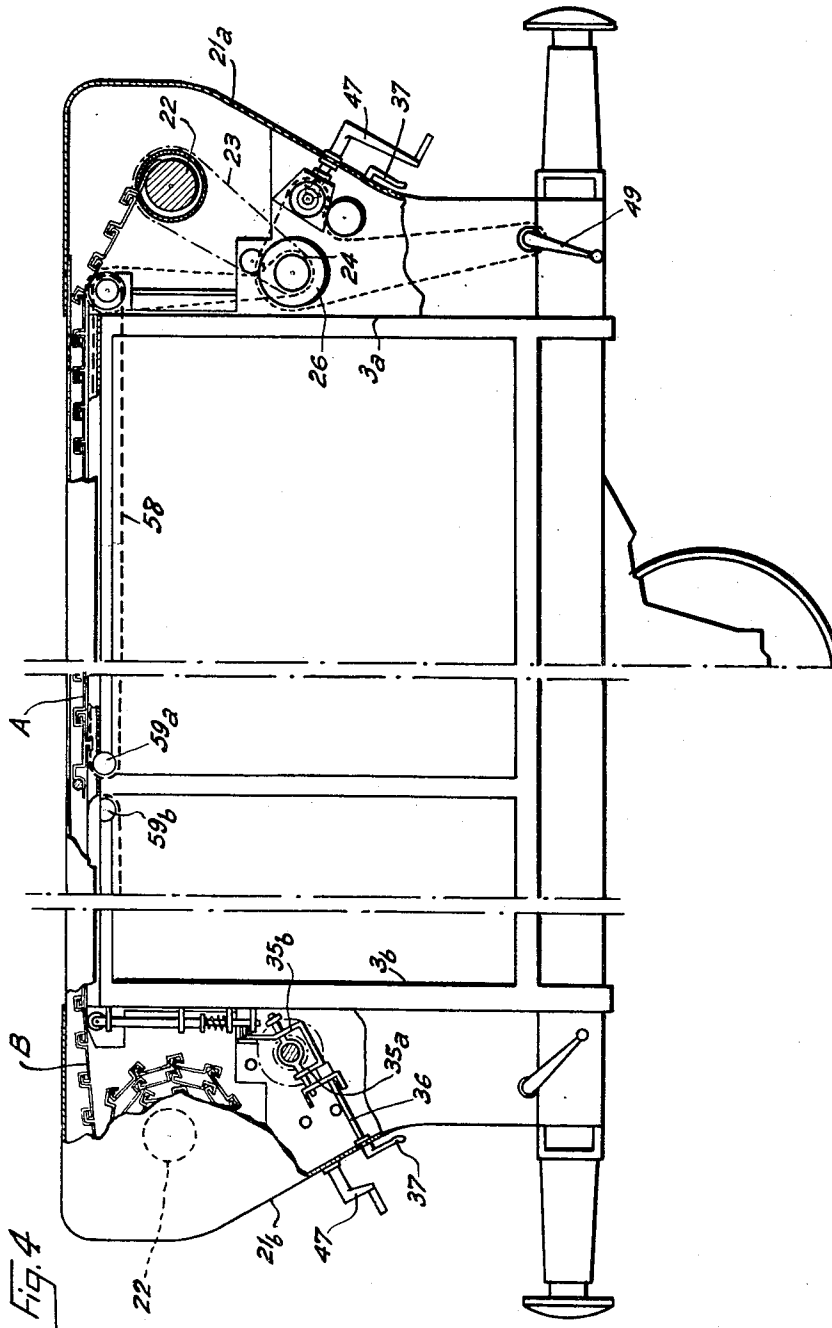
J. MALAPERT

2,997,967

OPENABLE ROOF FOR RAILWAY CAR

Filed May 27, 1959

5 Sheets-Sheet 3

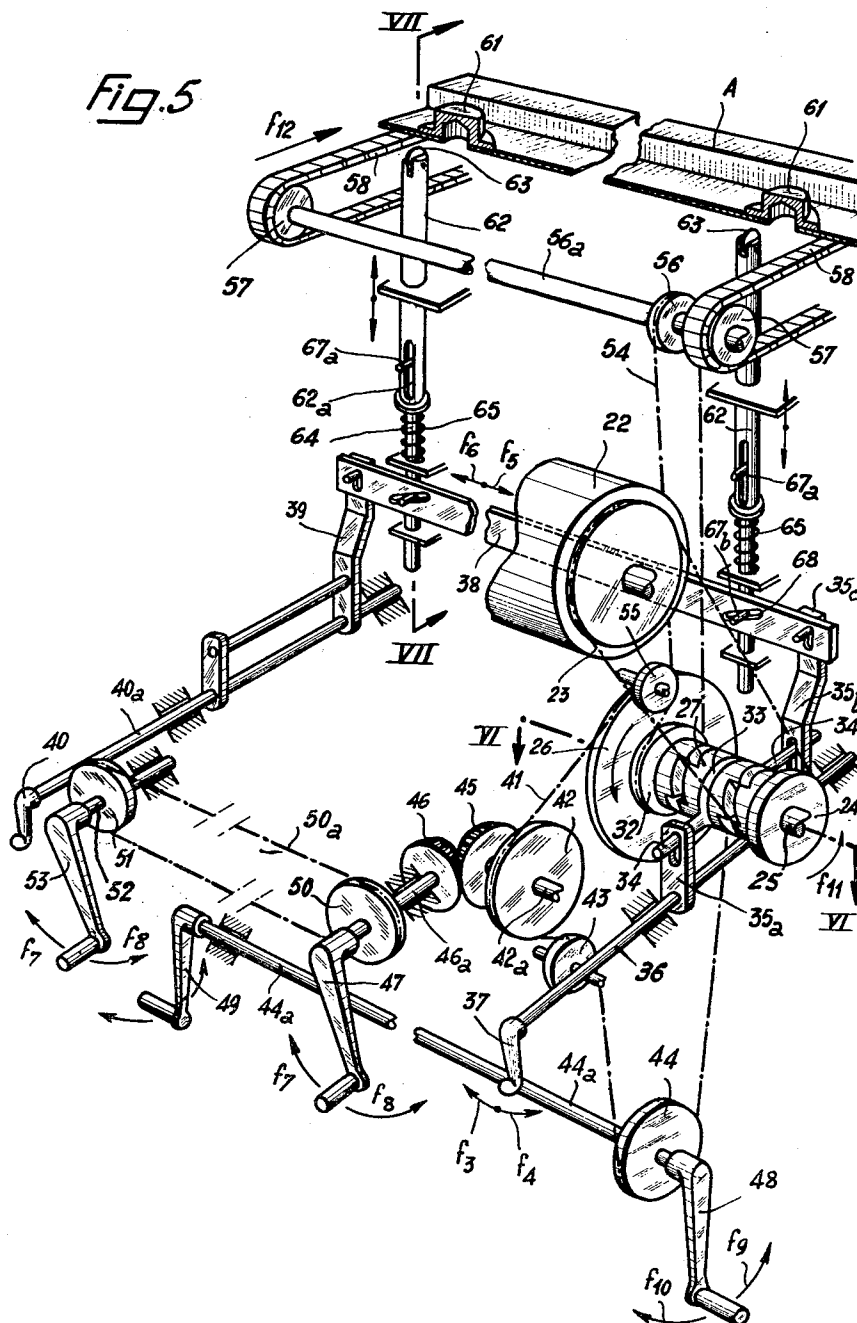


INVENTOR
Jean Malapert
By Watson, Cole, Grindle & Watson

Filed May 27, 1959

OPENABLE ROOF FOR RAILWAY CAR

5 Sheets-Sheet 4



INVENTOR
Jean Malapart
By Watson, Cole, Grindle & Watson

Aug. 29, 1961

J. MALAPERT
OPENABLE ROOF FOR RAILWAY CAR

2,997,967

Filed May 27, 1959

5 Sheets-Sheet 5

Fig. 6

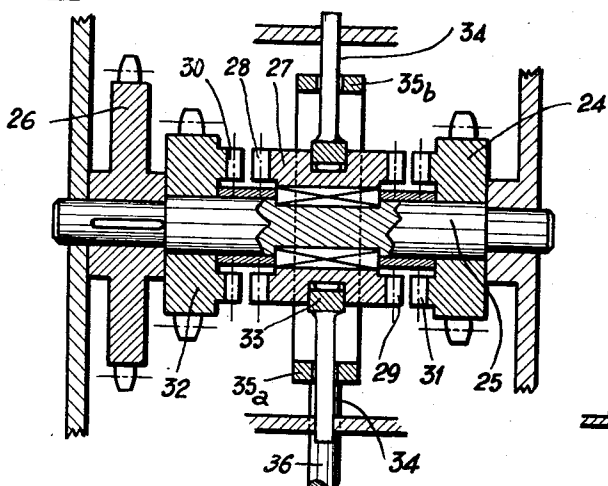


Fig. 7

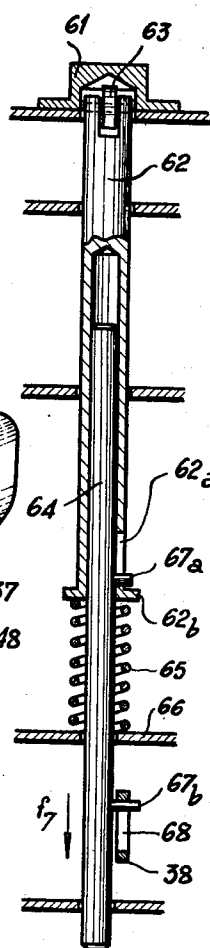
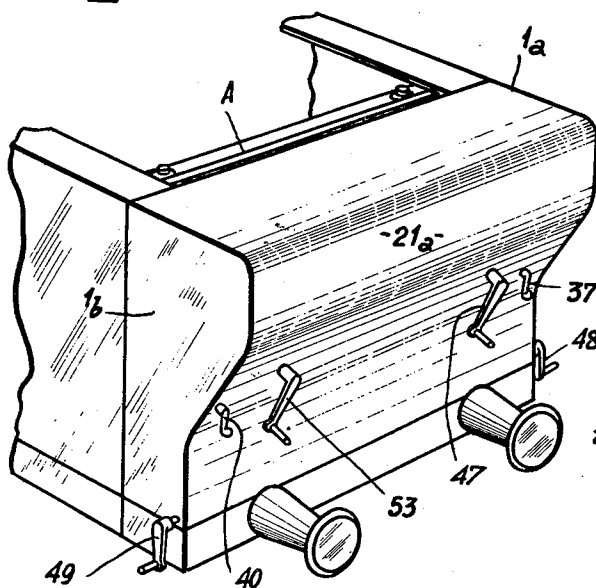


Fig. 8



INVENTOR

Jean Malapert
By *Watson, Cole, Grindle & Watson*

1

2,997,967

OPENABLE ROOF FOR RAILWAY CAR

Jean Malapert, Besancon, Doubs, France, assignor to Etablissements Ad. Mischler (S.A.R.L.), Doubs, France, a company of France

Filed May 27, 1959, Ser. No. 816,167

Claims priority, application France May 30, 1958

7 Claims. (Cl. 105-377)

The present invention relates to railway cars or wagons provided with an openable roof device and more especially to open railway cars, i.e. cars of the kind in which the floor is bordered by two longitudinal walls connecting between them the end walls, the assembly constituting an open-topped body.

A primary object of the invention is to provide an openable roof device for a car which is water-tight and rain-proof and give a good protection for the goods housed in the car when the latter is stored in the open in bad weather.

A further object of the invention is to provide a rain-proof openable roof device for a car which can be rolled up from one of the ends of the car.

Another object of the invention is to provide a rain-proof openable roof device for a car having a structure permitting an easy flow of the rain water outside of the car.

Another object of the invention is to provide an openable roof device for a car having a mechanical strength high enough for permitting several attendants to travel upon, and which is rain-proof and made of jointed elements transversely disposed and adapted to be rolled up on a winding drum located at one longitudinal end of the car.

Another object of the invention is to provide an openable roof device for a car made of jointed elements which is brought to its closed position by a pull exerted on the leading element, the other elements being drawn in turn by the successive elements lying ahead.

Another object of the invention is to provide an openable roof device for a car made of jointed elements capable of being rolled up about a winding drum, which is brought to its closed position by a pull exerted on the leading element, and is drawn back to its opened position by a pull exerted on the trailing element.

Still another object of the invention is to provide an openable roof device for a car which is rain-proof and which may be brought to its opened and closed positions through positive controls.

Another object of the invention is to provide an openable roof device which is automatically and positively locked in its closed position.

Yet another object of this invention is to provide an openable roof device for a car having the characteristics herein above specified, further ensuring inviolability of the contents of the car by having means for placing leads or seals.

Other objects and advantages of this invention will be apparent from the following description taken in conjunction with the accompanying drawings in which:

FIGURE 1 is a partly sectioned elevation of a first form of waggon comprising an openable roof in accordance with the invention,

FIGURE 2 is a section taken along the line II—II of FIGURE 1,

FIGURE 3 is a longitudinal section view, on an enlarged scale, showing details of the screens of the waggon of FIGURE 1.

FIGURE 4 is a partly sectioned elevation of a second form of waggon comprising an openable roof in accordance with the invention,

FIGURE 5 is a schematic perspective view of the

2

various control and locking means for one screen of the waggon of FIGURE 4.

FIGURES 6 and 7 are sections, on an enlarged scale, taken along the lines VI—VI and VII—VII, respectively, of FIGURE 5, and

FIGURE 8 is a schematic perspective view of an end of the waggon of FIGURE 4.

In the embodiment shown in FIGURES 1 to 3, the openable roof is formed in two parts A and B each constituting a movable screen.

Along the longitudinal walls 1a and 1b of the waggon are fixed channels 2a, 2b the flanges of which are directed upwardly.

On the end walls 3a, 3b of the waggon are fixed brackets 4a, 4b for supporting drums 5a, 5b. On these drums are fixed the ends 6a, 6b of the screens A and B, respectively, which screens rest, by their lower faces, on the flanges of the channels 2a, 2b (FIGURE 2). Preferably the supporting drums 5a, 5b are provided in a usual manner with return devices tending to make the drums rotate in the direction of the arrows f for automatically winding the screens on their supporting drums when no action is exerted on said screens.

The side edges 6 of these screens are engaged under the horizontal flanges of angles 7a, 7b disposed parallel to the channels 2a, 2b and fixed to supports 8a, 8b secured to the walls 1a, 1b.

Each of the parts A and B of the openable roof is formed from shaped elements, as shown in FIGURE 3. These elements which extend across the entire width of the waggon, as shown in FIGURE 2, are provided at one of their ends with a portion 9 which is folded twice at right angles and at their other end with an inverted trough like portion 10. The portion 9 of an element is engaged in the trough 10 of the adjacent element so that the movement of an element in the direction F (FIGURE 3) or in the opposite direction causes a movement in the same direction of the juxtaposed elements. This junction between the elements works in a hinge-like manner, allowing an element to take up a slanting position in relation to the adjacent elements. In particular it allows the winding up of the elements on their drum as shown in FIGURE 1, in which the screen B is shown wound up on its drum 5b.

Individual operation of the screens A and B is ensured by a control means for each of them, each control means comprising an endless chain 11a, 11b, respectively, passing over pulleys 12a, 12b and over a control wheel 13a, 13b capable of being actuated by a handle. The ends 14a, 14b of the screens are secured to the upper flights of the chains 11a, 11b. Actuation of the wheels 13a, 13b in the direction of the arrows f₁ causes movement of the screens A and B in the direction of the arrows F, which allows the return devices of the drums 5a, 5b to come into action and wind up the corresponding screen on its drum, thus ensuring the opening of the waggon. Actuation of the wheels 13a, 13b in a direction opposite to the arrows f₁ causes unwinding of the screens A and B to bring them into the position of closing the waggon. Rainwater received on the screens is evacuated by running out directly along the side edges 6 of the screens A and B. The arrangement of the channels 2a, 2b and angles 7a, 7b forms a baffle and prevents the water from dripping the interior of the waggon.

It is advantageous to provide between the flanges of each channel section 2a, 2b a filling formed of a strip of spongy or absorbing material 15a, 15b, the said filling extending throughout the length of the channel sections and thus eliminating all possibility for the water to pass into the interior of the waggon. Water received in the channel sections 2a, 2b is evacuated from both ends of these channel sections.

In order to obtain a suitable water-tightness between the two parts of the roof, there may be provided a supple joint 16 (see FIGURE 3) carried by the end element 17 of one of the screens which comes into contact with the suitably shaped end element 18 of the other screen. A gutter 19 may be provided under the joint to ensure the outflow of water at the side edges of the roof. In addition a joint cover 20 may be fixed to one of the screens.

Any kind of normal closing device (not shown) such as a bolt or lugs for padlocks, may, of course, be provided if desired, to oppose the opening of the roof.

By reason of the folded section or ribbed form of the elements forming the parts A and B of the openable roof, which elements are preferably made of sheet iron, said elements are particularly rigid and allow easily one or a plurality of attendants to travel on the roof when necessary, i.e., for operating bolts, lugs or padlocks, or for disposing seals or other devices generally used against thefts or the like.

The drums 5a and 5b are mounted in casings 21a, 21b arranged on the exterior of the end walls 3a and 3b.

The openable roof thus formed has the important advantage, amongst others, of allowing a normal functioning of the roof despite longitudinal deformations of the waggon resulting from shocks to which the latter is subjected, which deformations may be very considerable.

In a modified form of the above described car, a pull is positively exerted on one or the other ends of the screen during the opening and closing movements thereof, said ends being respectively secured to an endless flexible control member and to the winding drum which may be selectively coupled to an operating mechanism or disengaged therefrom. In such a case the coil-springs provided in the winding drums for rotating the drums in the direction opening the screens are no longer essential parts of the structure and can be dispensed with.

Referring now to FIGURES 4-8, the winding drum 22 of each of the screens A and B is connected by a chain 23 to a wheel 24 mounted loosely on a shaft 25. On this shaft 25, which constitutes the control shaft previously referred to, is keyed a wheel 26 which can be driven manually as will be described hereinafter.

On the shaft 25 there is also keyed against rotation a sliding sleeve 27 comprising on its end faces dogs 28 and 29 opposite dogs 30 and 31 provided on a wheel 32 mounted loosely on shaft 25 and the wheel 24, respectively.

The sliding sleeve 27 may be moved axially along the shaft 25 by means of a collar 33. The latter is provided with two rods 34 engaged in elongated slots formed in two levers 35a, 35b keyed to a common shaft 36. The end of shaft 36 passes out to the exterior of the casing 21a (or 21b) and is provided with a hand lever 37 (see in particular the left part of FIGURE 4). By actuating the hand lever 37 in the direction of the arrow f_3 coupling of the sleeve 27 with the wheel 24 is effected, while actuation of the hand lever 37 in the direction of the arrow f_4 brings the sleeve 27 into mesh with the wheel 32.

The end 35c of the lever 35b is pivotally connected to one end of a bar 38, the other end of the latter being pivotally connected to a lever 39. The latter is keyed to a shaft 40a terminating in a hand lever 40. The bar 38 may be moved longitudinally in the direction of the arrow f_5 or, conversely, in the direction of the arrow f_6 , either by actuating the hand lever 37 disposed in the region of the longitudinal wall 1a of the waggon (FIGURE 8) or by actuating the hand lever 40 disposed in the region of the other longitudinal wall 1b of the waggon.

Actuation of the bar 38 in the direction of the arrow f_5 has for its effect to couple the wheel 24 with the shaft 25, while actuation in the direction of the arrow f_6 causes coupling of the shaft 25 with the wheel 32.

A chain 41 is mounted on the wheel 26 and passes over a wheel 42, a tension roller 43 and a driving wheel 44.

The wheel 42 is secured to a shaft 42a on which there is keyed a bevel pinion 45. The latter meshes with another pinion 46 keyed to a shaft 46a which terminates in a crank handle 47.

The driving wheel 44 has its shaft 44a secured to a crank handle 48 passing out through the wall 1a of the waggon while the crank handle 47 passes out through the end wall of the waggon in the region of the hand lever 37. The shaft 44a extends throughout the width of the waggon and terminates in a crank handle 49 disposed on the exterior of the wall 1b of the waggon (FIGURE 8). In addition, on the shaft 46a is keyed a wheel 50 on which is mounted a chain 50a passing over another wheel 51 keyed on a shaft 52 which terminates in a crank handle 53. The wheel 26, and with it the shaft 25, may be driven either by utilising one of the crank handles 47 and 48 disposed towards one of the sides of the waggon or one of the crank handles 49 and 53 disposed towards the other side of the waggon.

A chain 54, which is subjected to the action of a tension roller 55, is mounted on the wheel 32 and a pinion 56. The latter is keyed on a shaft 56a having secured at its two extremities wheels 57 each carrying an endless chain 58 passing over a counter pulley 59a (or 59b) (see FIGURE 4). On each of the chains 58 is secured the corresponding front element of the screen A or B in the same way as for the chains 11a and 11b in FIGURE 1.

Each of the screens A and B comprises two cups 61, as shown in FIGURES 5 and 7, these cups providing bolt-holes to receive the end of sliding rods 62 constituting bolts for immobilising the screen in the closed position.

Each of the bolts comprising a rod 62 is constructed as shown in FIGURE 7. The rod 62 is provided at its upper end with a roller 63. The lower part of the rod is hollow and receives the end of a rod 64 comprising a pin 67a engaged in an elongated hole 62a in the rod 62. The latter terminates in a flange 62b against which bears one end of a spring 65. The other end of the spring 65 bears against a plate 66 in which the rod 64 slides. The rod 64 comprises a second pin 67b engaged in an elongated hole 68 disposed at an angle to the horizontal in the coupling bar 38.

The operation of the mechanism described above takes place as follows for each of the screens A and B:

Let it be assumed that the screen is in the closed position (i.e. the position of the screen A in FIGURE 4). If it is desired to bring the screen to the open position, one of the hand levers 37 and 40 is first actuated to its end position in the direction of the arrow f_3 (FIGURE 5). The result of this is to move the coupling bar 38 in the direction of the arrow f_5 . Thus the sliding sleeve 27 is brought into mesh with the wheel 24 and the rods 64 are moved downwardly in the direction of the arrow f_2 by the inclined holes 68. The rods 62 are themselves lowered by the pins 67a engaging the lower ends of the elongated holes 62a, the end of each rod 62 thus being disengaged from the corresponding cup 61, and the screen is unbolted.

If now one of the crank handles 47 and 53 is actuated in the direction of the arrow f_7 , or one of the crank handles 48 and 49 is actuated in the direction of the arrow f_9 , the wheel 26 is driven, and as a result the wheel 24 is driven in the direction of the arrow f_{11} (FIGURE 5). The drum 22 is therefore driven in the direction to wind up the screen and the latter is brought to the open position in which the rollers 63 are maintained spaced away from the lower face of the screen by the action of the inclined holes 68.

To reclose the screen, one of the hand levers 37 and 40 is first actuated to its end position in the direction of the arrow f_4 (FIGURE 5). This has for its effect, on the one hand, to couple the sliding sleeve 27 and the shaft 25 with the wheel 32 and, on the other hand, to

5

move the coupling bar 38 in the direction of the arrow f_6 . The inclined holes 68 act on the pins 67b to cause upward displacement of the rods 64. In this displacement the pins 67a slide in the elongated holes 62a of the rods 62, the latter being held in position by the rollers 63 being urged elastically against the lower surface of the screen.

By actuating one of the crank handles 47 and 53 in the direction of the arrow f_8 , or one of the crank handles 48 and 49 in the direction of the arrow f_{10} , rotation of the shaft 25 is effected and as a result the wheel 32 rotates in the direction opposite to that of the arrow f_{11} . The chain 54 transmits this movement to the shaft 56a and as a result the chains 58 are moved in the direction of the arrow f_{12} to close the screen.

When the forward edge of the screen comes to the end of its closing movement the cups 61 will be brought opposite the rods 62. The latter, under the action of the springs 65, which have been maintained under compression since the hand levers 37 and 40 were brought to their limit positions in the direction of the arrow f_4 , will enter into the cups 61 for bolting the screen in the closed position.

The hand levers 37 and 40 may be constrained to rest in the limit position in the direction of the arrow f_4 by any suitable locking means such as seals or the like to keep the screen locked in its closed position.

Of course modifications may be made to the embodiments of the invention which have been described above, in particular by the substitution of equivalent mechanical means, without thereby departing from the scope of the invention as defined in the ensuing claims.

What I claim is:

1. An open railway car provided with a movable roof device comprising in combination, on each side of the car, a guide rail constituted of a channel bar secured on the top of the side wall of the car with its flanges directed upwards and of an angle iron longitudinally disposed with a horizontal flange parallel and above the tips of the flanges of said channel bar and with its other flange vertical and located outwardly from said side wall; a screen formed of transversely disposed elements jointed and coupled together, each element consisting of a shaped panel having its trailing edge folded twice at right angles, first upwardly then in the forward direction, and its leading edge forming an inverted trough-like portion engaging the folded trailing edge of the ahead adjacent element, said screen lying with its flat underside on the flanges of said channel bar with its side ends extending past the outermost flange of each channel bar, terminating a small distance from the inner surfaces of the vertical flanges of said angle irons, and being loosely engaged under the lower surfaces of the horizontal flanges of said angle irons; a winding drum transversely supported at one of the longitudinal ends of the car, means for securing the last element of said screen to said winding drum; an endless chain on each side of the car; a driving shaft horizontally and transversely supported at the end of said car supporting said winding drum; a pair of driving sprocket wheels keyed on either end of said shaft; idle rollers conveniently secured on each side wall of said car and adapted to support said chains and to guide each of them from one of said sprocket wheels in a path comprising a pair of runs parallelly disposed with each side end of said screen and between said screen and the vertical flange of said adjacent angle iron; and means for securing the leading element of said screen on each side thereof to one of the runs of said chains moving in the same direction.

2. An open railway car provided with a movable roof device as claimed in claim 1 further comprising a strip of spongy or absorbent material disposed between the flanges of each of said channel bars and filling said channels up to the lower side of said screen, said strips ex-

6

tending throughout the length of said bars thus eliminating all possibility for the water of passing into the car.

3. An open railway car provided with a movable roof device as claimed in claim 1, in which said screen is divided in two similar portions, a winding drum being transversely supported at each longitudinal end of the car and adapted to wind and unwind one of said screen portions respectively; the control mechanism comprising the pair of chains, driving shaft, sprocket wheels, idle rollers and means securing the leading element of the screen being duplicated and arranged symmetrically on each longitudinal end of the car, said means cooperating respectively with the leading element of each screen portion moving from one end of the car to the median plane approximately of said car and with the runs of the adjacent pair of chains moving in this direction; one of said leading elements carrying a strip of flexible sealing material and the other leading element having its front surface shaped to fit with said strip of sealing material.

4. An open railway car provided with a movable roof device as claimed in claim 3 further comprising on the front end of one of said leading elements a gutter disposed under said strip of flexible sealing material extending along the whole width of said screen ensuring the outflow of water at the side edges of said roof.

5. An open railway car provided with a movable roof device comprising in combination, on each side of the car, a guide rail constituted of a channel bar secured on the top of the side wall of the car with its flanges directed upwards and of an angle iron longitudinally disposed with a horizontal flange parallel and above the tips of the flanges of said channel bar and with its other flange vertical and located outwardly from said side wall; a pair of screens moving longitudinally in opposed directions, each of said screens being formed of transversely disposed elements jointed and coupled together, each element consisting of a shaped panel having its trailing edge folded twice at right angles, first upwardly then in the forward direction, and its leading edge forming an inverted trough-like portion engaging the folded trailing edge of the ahead adjacent element, said screens lying with their flat undersides on the flanges of said channel bars with their side ends extending past the outermost flange of each channel bar, terminating a small distance from the inner surfaces of the vertical flanges of said angle irons, and being loosely engaged under the lower surfaces of the horizontal flanges of said angle irons; a winding drum for each screen, said drums being transversely supported at each of the longitudinal ends of the car respectively; and for each assembly comprising one of said screens and its cooperating drum a control mechanism selectively operating the leading element of its screen, for drawing said element in the closing direction of said screen, and the winding drum for rolling up said screen on said drum during the opening of said screen, each control mechanism comprising a driving shaft drivingly connected through a chain-drive with a chain-wheel keyed on an intermediate shaft, a pair of idler chain-wheels rotatably supported on said intermediate shaft, means for selectively coupling one or the other of said idler chain-wheels with said intermediate shaft and simultaneously uncoupling the other of said wheels, a first driving chain operatively connecting the first one of said idler chain-wheels to the winding-drum of said screen, a second driving chain operatively connecting the second of said idler chain-wheels to a sprocket wheel keyed on a transverse shaft rotatively supported at the upper part of the car end, a pair of similar sprocket wheels keyed on each end of said transverse shaft, a pair of sprocket-chains passing on said similar sprocket wheels and extending parallel to said screen up to a loose roller located adjacent the transverse middle plane of said car, means for securing each of said sprocket chains to the leading element of said screen, means for operating said selective coupling means and coupling one or the other of said first and second idler

7

chain-wheels with said intermediate shaft, and means for operatively rotating said driving shaft in one or the other direction for moving said screen to its open position or its closed position.

6. An open railway car provided with a movable roof device as claimed in claim 5 further comprising on each side of each of said screens a cup secured on the upper surface of said screen in alignment with an aperture provided in one of the elements of said screen, a bolt cooperating with each cup and its aligned aperture in the screen comprising a vertical rod provided with a roller at its upper end, urged upwards by spring means and guided vertically in a position in alignment with said cup and aperture when said screen is in its closed position, said rod being tubular at least on its lower portion for accommodating a second rod telescoping in said tubular portion, the wall of said tubular portion having an elongated hole therethrough parallel to the axis of said rod, a first pin secured to said second rod extending through said elongated hole, a second pin secured to said second rod extending at right angles to said second rod in a position below said spring means acting on said tubular rod, said second pin cooperating with a cam surface operated by said means operating selectively said coupling means associated with said first and second idler chain-wheels for coupling one or the other of said wheels with said intermediate shaft, said cam surface being adapted to lower said second pin when the chain-wheel coupled to said intermediate shaft controls the opening movement.

8

of the screen and to raise said second pin when the chain-wheel coupled to said intermediate shaft controls the closing movement of the screen, whereby said first pins are moved upwards in said elongated holes when said means are disposed in the closing position and the rollers provided at the upper ends of said bolts are kept in rolling engagement with the underside of said screen by the action of said spring means till the cups secured on the upper surface of said screen are brought in alignment with said bolts.

7. An open railway car provided with a movable roof device as claimed in claim 3 in which each of said winding drums is loosely supported on a shaft transversely secured in a fixed position at each end respectively of said car, and is provided with a spring return device for rotating said drum in its winding direction for winding one screen portion thereof when said control mechanism is operated in that direction tending to move said leading element of said screen portion from its closed position adjacent the median plane of said car to its open position at the end of the car where said drum is supported.

References Cited in the file of this patent

UNITED STATES PATENTS

1,274,789	Schedlbauer	Aug. 6, 1918
1,598,471	Williams	Aug. 31, 1926
1,937,540	Abel	Dec. 5, 1933
2,167,306	Kundert	July 25, 1939

25