June 9, 1953 A. E. ZIMMER ET AL 2,641,198

LATCHING MECHANISM FOR DOORS FOR HOPPER TYPE RAILWAY CARS

Filed Aug. 24, 1949 5 Sheets-Sheet 1

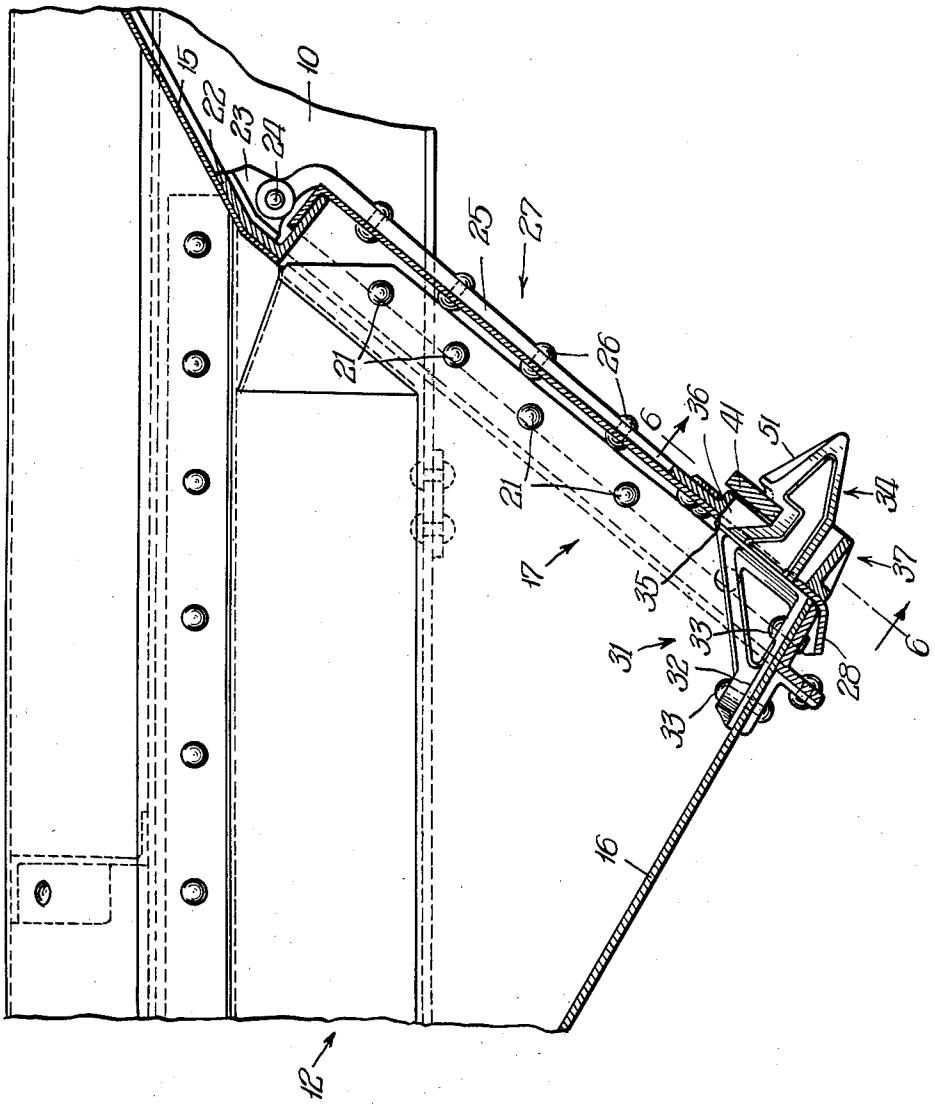


Fig. 1.

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Filed Aug. 24, 1949 5 Sheets-Sheet 2

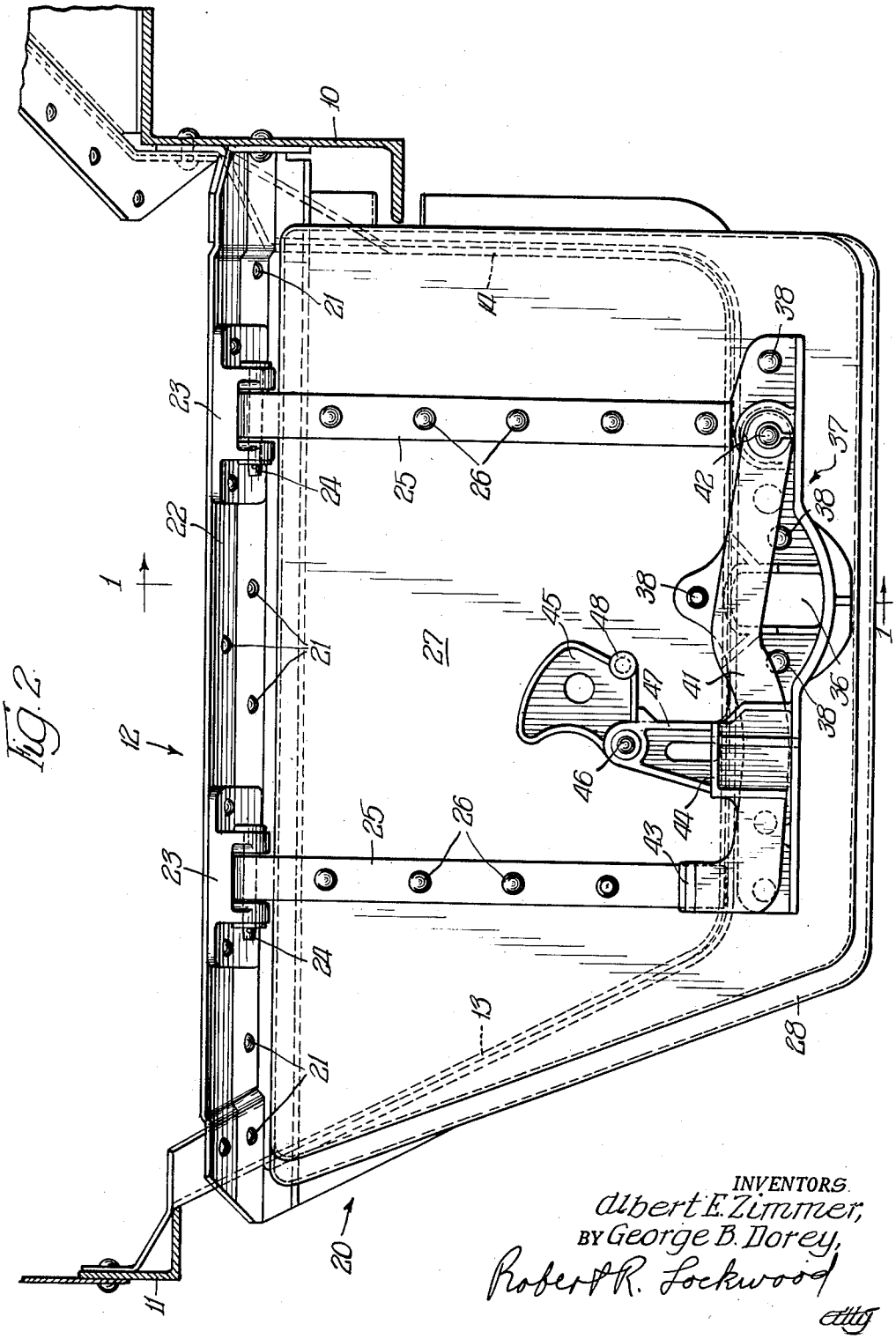


Fig. 2.

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LATCHING MECHANISM FOR DOORS FOR HOPPER TYPE RAILWAY CARS

Filed Aug. 24, 1949 5 Sheets-Sheet 3

Fig. 3

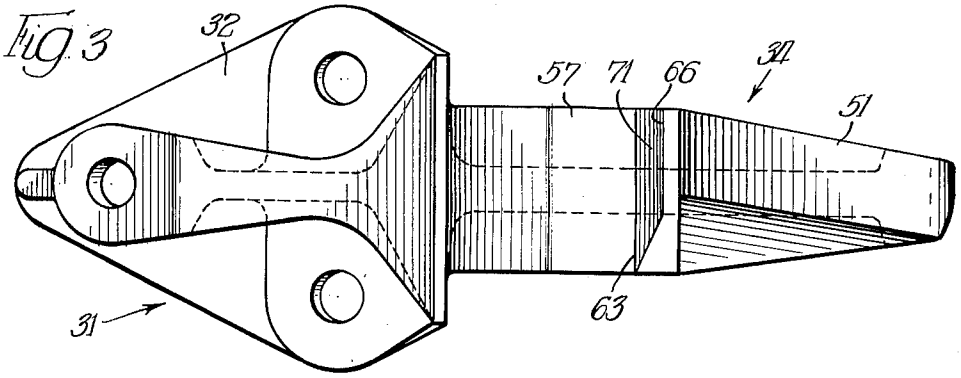


Fig. 4

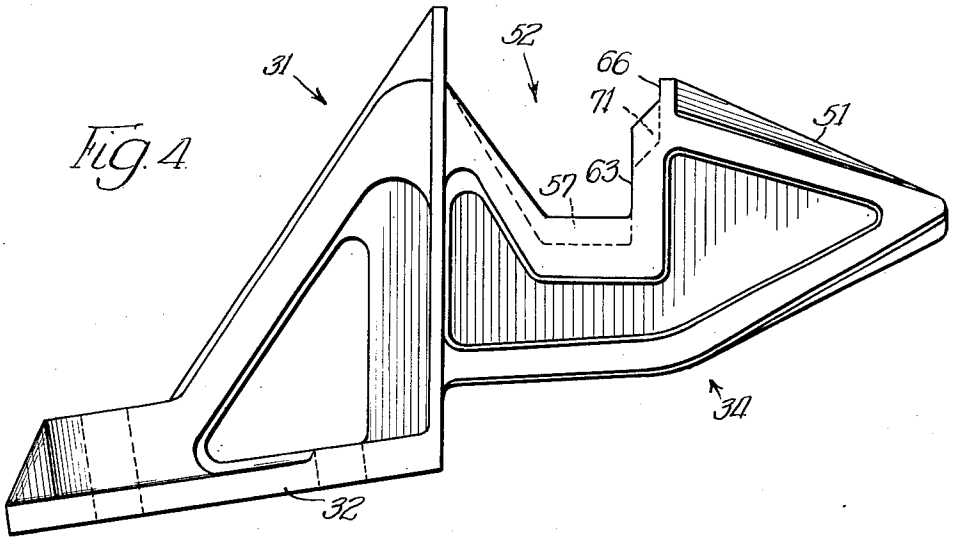
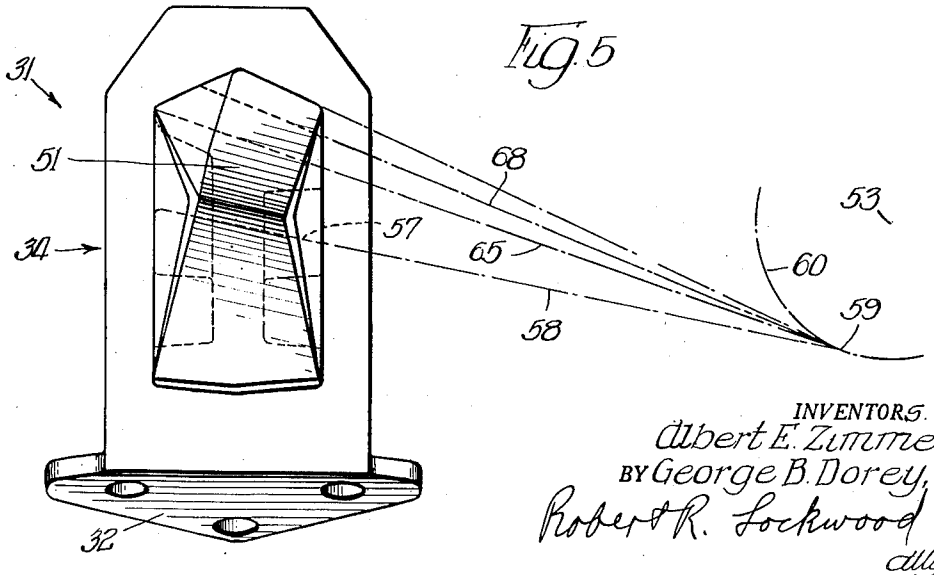


Fig. 5

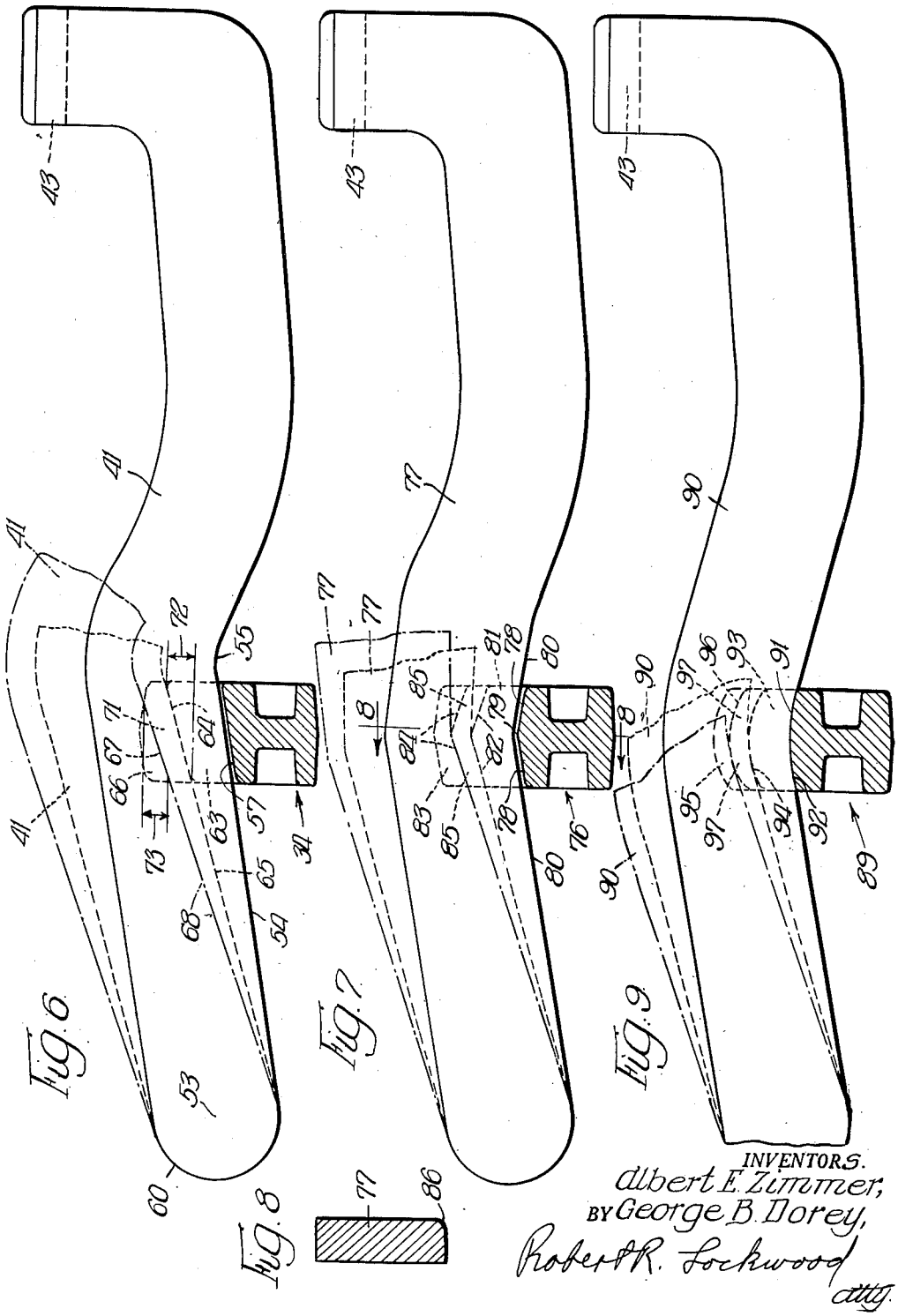


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LATCHING MECHANISM FOR DOORS FOR HOPPER TYPE RAILWAY CARS

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LATCHING MECHANISM FOR DOORS FOR HOPPER TYPE RAILWAY CARS

Filed Aug. 24, 1949 5 Sheets-Sheet 5

Fig. 10

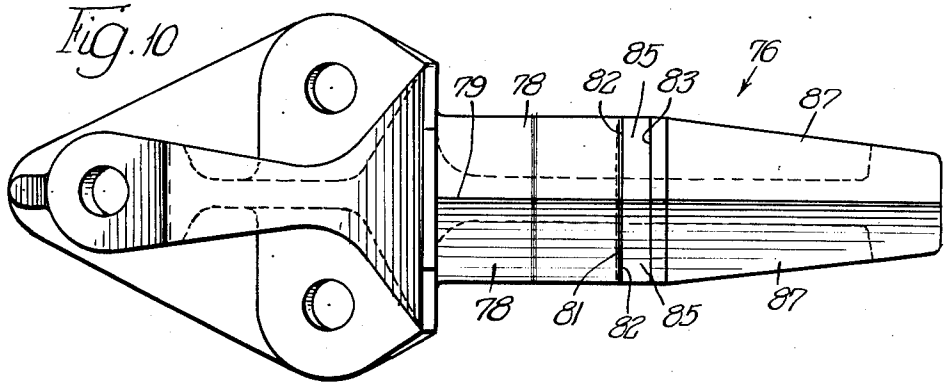


Fig. 11

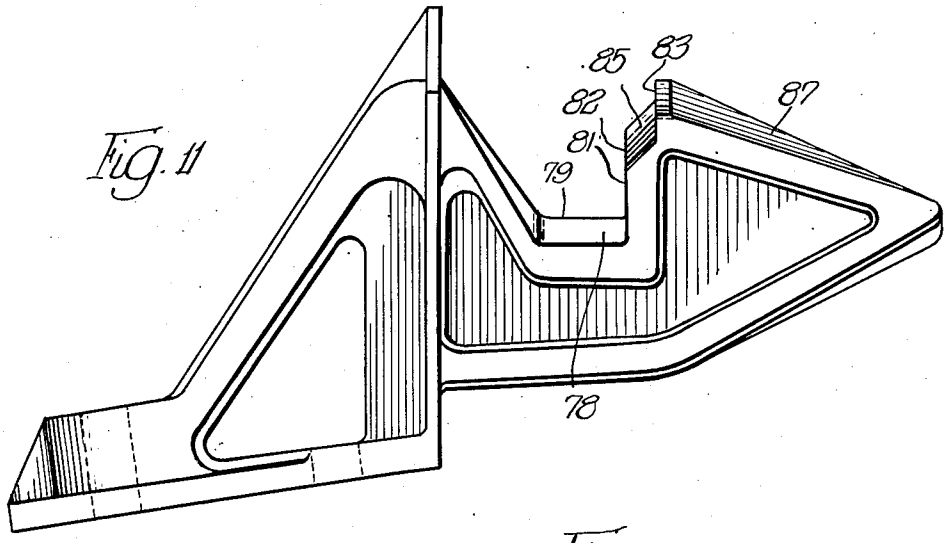
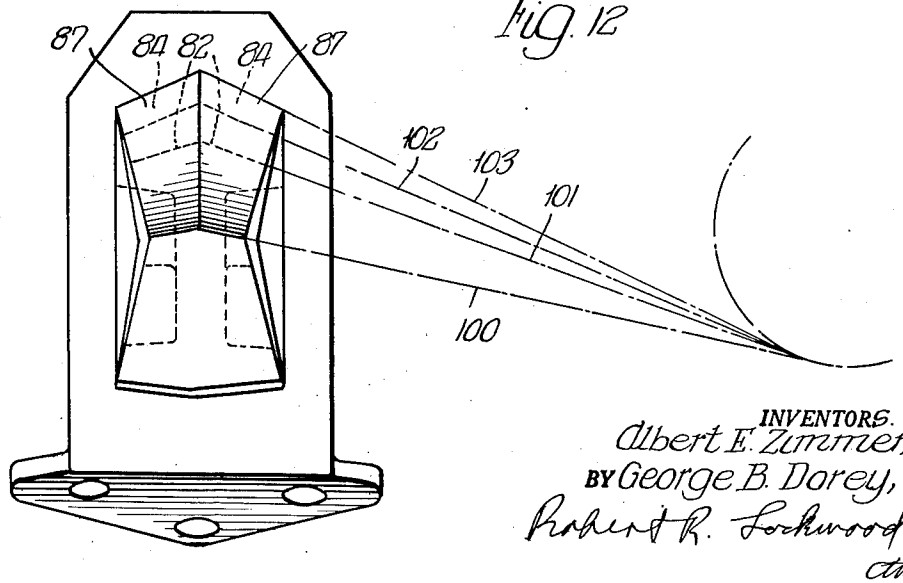


Fig. 12



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LATCHING MECHANISM FOR DOORS FOR HOPPER TYPE RAILWAY CARS

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Application August 24, 1949, Serial No. 112,034

3 Claims. (Cl. 105—308)

1

This invention relates, generally, to hopper type railway cars, and it has particular relation to mechanisms for latching closed the doors thereof.

Among the objects of this invention are: To provide a smooth transition of the latching bar of such a latch mechanism from one position to another in engagement with a cooperating hook; to accomplish this by interconnecting the several contact surfaces of the hook along radial lines; to increase the area of engagement between the hook and the latching bar in the fully latched position; to provide main and secondary latching shoulders in parallel relation on the hook and interconnect them with an inclined wedging surface joined along its edges to the surfaces of these shoulders generally along the lines which are angularly disposed with respect to each other and constitute projections of radial lines emanating from a center adjacent the pivot axis of the latching bar; and to construct the hook so that it can be used with latching bars pivoted on either side thereof.

Other objects of this invention will, in part, be obvious and in part appear hereinafter.

This invention is disclosed in the embodiments thereof shown in the accompanying drawings and it comprises the features of construction, combination of elements and arrangement of parts which will be exemplified in the constructions hereinafter set forth and the scope of the application of which will be indicated in the appended claims.

For a more complete understanding of the nature and scope of this invention, reference can be had to the following detailed description, taken together with the accompanying drawings, in which:

Figure 1 is a view, partly in side elevation and partly in section, taken along the line 1—1 of Figure 2 showing a latching mechanism for the door of a hopper of a railway car constructed in accordance with this invention;

Figure 2 is a view, in front elevation, of the door for the hopper shown in Figure 1, the door being shown in the open position where it hangs downwardly;

Figure 3 is a top plan view, at an enlarged scale, of the shouldered locking element which is illustrated as being mounted on the floor of the hopper in Figure 1;

Figure 4 is a view, in side elevation, of the locking element shown in Figure 3;

Figure 5 is a view in end elevation of the locking element shown in Figure 4;

2

Figure 6 is a view, taken generally along the line 6—6 of Figure 1, illustrating different positions of the latching bar with respect to the different shoulders on the hook shaped portion of the locking element;

Figure 7 is a view, similar to Figure 6, but showing the locking shoulders arranged so that the latching bar can be pivoted on either side without requiring the provision of a locking element on the floor of the hopper of opposite hand;

Figure 8 is a detail sectional view, taken along the line 8—8 of Figure 7, showing the outline of the latching bar;

Figure 9 is a view, similar to Figure 7, but showing the shoulders on the locking element bounded by lines which define curvilinear surfaces;

Figure 10 is a top plan view of the hook shaped portion shown in Figure 7;

Figure 11 is a view, in side elevation, of the hook shaped portion shown in Figure 10; and

Figure 12 is a view, in end elevation, of the hook shaped element shown in Figure 11.

Referring now particularly to Figures 1 and 2 of the drawings, it will be observed that the reference character 10 designates a center sill of a hopper type car having a side frame 11 spaced therefrom with a hopper, indicated generally at 12, located therebetween. The hopper 12 is formed by side walls 13 and 14, a top wall 15, and a floor 16 which slopes downwardly to the hopper opening 17. Surrounding the hopper opening 17 and the walls and floor is a frame, indicated generally at 20, which is formed of structural shape. It may be secured by rivets 21 to the hopper 12 as shown. The frame 20 includes an upper beam portion 22 from which hinge butts 23 project and which carry hinge pintles 24 that support hinge straps 25. The hinge straps 25 may be secured by rivets 26 to a door, shown generally at 27, which may be pan shaped and have an outflared peripheral flange 28.

On the upper surface of the floor 16 adjacent its lowermost edge, there is mounted a shouldered locking element which is indicated, generally, at 31. It has an integrally formed base portion 32 which may be secured by rivets 33 to the floor 16 as illustrated in Figure 1. The locking element 31 has a hook shaped outer portion, indicated generally at 34, which, when the door 27 is closed, projects through an opening 35 therein and also through an opening 36 coextensive therewith in a beam 37 which may be secured by rivets 38 along the lower edge of the door 27 as shown more clearly in Figure 2.

The hook shaped portion 34 of the locking ele-

ment 31 is arranged to interengage with a latching bar 41 which is pivoted by means of a rivet 42 which extends through the beam 37 near its right hand end as viewed in Figure 2. Integrally formed with the latching bar 41 is a projection 43 at the end opposite the pivot end and it is arranged to receive an operating bar (not shown) one end of which is adapted to be positioned upon a fulcrum ledge 44 that is formed integrally with the beam 37. It will be understood that the purpose of this arrangement is to facilitate the prying out of the latching bar 41 from the latched position with lading bearing against the inner side of the door 27.

With a view to locking the latching bar 41 in the fully closed position, a locking dog 45 is pivoted on a rivet 46 which extends through a pair of ears one of which is illustrated at 47. It will be understood that the ears 47 are cast integrally with the beam 37. A knob 48, formed integrally with the locking dog 45, is provided to permit application of the operating bar thereagainst for moving the locking dog 45 to and from the locked position.

The present invention is directed particularly to the construction of the hook shaped portion 34 of the locking element 31 and the cooperating latching bar 41. Their details of construction are illustrated more clearly in Figures 3 through 6 of the drawings to which reference now may be had. It will be observed that the hook shaped portion 34 has an inclined surface 51 at its outer end. The purpose of this is to fit underneath the latching bar 41 when the door 27 is swung to the closed position so as to automatically lift the latching bar 41 and move it upwardly where it will be in a position to be moved into a notch 52 where it serves to hold the door 27 in the fully closed position.

The pivot point of the latching bar 41 is indicated at 53 in Figure 6. This coincides with the axis of the rivet 42 on which the latching bar 41 is pivoted. It will be observed that the bottom surface 54 of the latching bar 41 extends upwardly in Figure 6 to a point indicated at 55 beyond which the bottom surface 56 is curved downwardly and outwardly beyond the hook shaped portion 34. The upper surface 57 of the bottom of the notch 52 is correspondingly inclined so that the bottom surface 54 can have surface engagement therewith when the latching bar 51 is in the fully closed position.

Referring to Figure 5, it will be observed that the upper surface 57 of the bottom of the notch 52 extends along a radial line 58 which extends from the vicinity of a point 59 along a circle 60 whose center is the pivot point 53 of the latching bar 41. Now it will be observed that the radial line 58 is coextensive with the bottom surface 54 of the latching bar 41 when the latter is in the position illustrated in Figure 6 where it holds the door 27 fully closed. In this position the outer surface of the latching bar 41 bears against the surface of a main shoulder which is indicated at 63. The upper edge of the surface of the main shoulder 63 is indicated at 64 which lies along a radial line 65, Figure 5, which also is in the plane of the bottom surface 54 of the latching bar 41 when it has been moved to the position shown by the broken lines in Figure 6. The line 65 is a radial line which extends from the vicinity of the point 59 as shown in Figure 5.

There is a secondary shoulder 66 at the upper end of the notch 52 against which the latching bar 61 bears to hold the door 27 in the partly closed position. This position of the latching bar 41 is shown in Figure 6 by the dot and dash lines. The lower edge of the surface of the secondary shoulder 66 is indicated by the broken line 67 which is a projection of a line 68 that corresponds to the position of the lower surface 54 of the latching bar 41 when the latter is moved to the position shown by the dot and dash lines. The line 68, as shown in Figure 5, is a radial line which extends from the vicinity of the point 59.

With a view to providing a smooth transition for the latching bar 41 in its movement between the main shoulder 63 and the secondary shoulder 66, the surfaces thereof are interconnected by an inclined wedging surface 71 the lower boundary edge of which is joined to the upper edge of the surface of the main shoulder 63 along the line 64. Likewise the upper edge of the inclined wedging surface 71 is joined to the lower edge of the secondary shoulder 66 along the inclined line 67.

It will be observed that the hook shaped portion 34 has appreciable width to provide corresponding width principally for the main shoulder 63.

The sidewise approach of the latching bar 41 to the main shoulder 63 permits of the extension of this shoulder upwardly into the plane of the wedging surface 71 as indicated at 72 in Figure 6. This assures appreciable area of contact between the latching bar 41 and the main shoulder 63 and thus provides a stable support for the latching bar 41 in holding the door 27 in the fully closed position against the weight of the lading.

In a similar manner the secondary shoulder 66 extends into the plane of the wedging surface 71 to the extent indicated at 73 in Figure 6.

The positioning of the main shoulder 63 and the secondary shoulder 66 so that their surfaces overlap with intervening wedging surface 71 provides exceptional latching security without incurring the necessity of a shouldered portion of extended length such as is required when the various stepped faces of the prior art constructions are arranged in tandem instead of being obliquely disposed with respect to the latching bar 41 in the position which it occupies in the fully latched position.

In Figure 7 of the drawings another embodiment of the latching mechanism is illustrated. Figures 10, 11 and 12 show additional views. A hook shaped portion 76 is there illustrated which can be employed in lieu of the hook shaped portion 34 described hereinbefore. It is arranged to cooperate with a latching bar 77 which is generally similar to the latching bar 41 previously described. At the bottom of the notch in which the latching bar 77 interfits, upper surfaces 78 are provided which are arched upwardly to a peak at 79. Undersurfaces 80 of the latching bar 77 are similarly inclined. This symmetrical arrangement permits the use of a single hook shaped portion 76 for either right hand or left hand pivoting of the latching bar 77. While different latch bars 77 are required for opposite hand mounting, the same hook shaped portion 76 can be employed for either. It will be understood that the upper surface 78 on either side lies along a radial projection 100, Figure 12, corresponding to the line 58 shown in Figure 5 and described hereinbefore.

The main shoulder for engaging the latching bar 77 in the fully closed position is indicated at 81. Its upper edge is defined by inclined lines

82 which are radially disposed in the manner described as shown as 101, Figure 12. A secondary shoulder 83 is provided at the upper end of the hook shaped portion 76 and it has inclined lower edges 84 which extend along radial lines 102 as described. Inclined wedging surfaces 85 interconnect the parallel surfaces of the main shoulder 81 and secondary shoulder 83. It will be understood that these wedging surfaces 85 are bounded by the upper edges 82 of the surface of the main shoulder 81 and the lower edges 84 of the secondary shoulder 83.

Preferably the latching bar 77 is rounded along the forward corner as indicated at 86 in Figure 8 in order to insure that it will ride smoothly over one or the other of the inclined wedging surfaces 85 in its movement between the secondary shoulder 83 and the main shoulder 81. Inclined surfaces 87 guide the latching bar 77 upwardly as the door 27 is swung closed until it passes the upper edge 88 of the secondary shoulder 83, which extends along radial line 103, whereupon it drops behind the secondary shoulder 83.

It will be observed that the surfaces of the shoulders 81 and 83 are generally of a herringbone relationship since they are characterized by surfaces bounded by lines which are parallel and adjacent rows slope in reverse directions. The different positions of the latching bar 77 are illustrated by the broken lines and the dot and dash lines. The latching bar 77 is shown in engagement with the secondary shoulder 83 where it serves to hold the door 27 in the partly closed position. Here the latching bar 77 is shown by the dot and dash lines.

The latching bar 77 is shown by broken lines in the position where its lower and forward edge 86 extends along the junction between one of the inclined wedging surfaces 85 and the upper inclined edge 82 of the main shoulder 81.

The latching mechanism illustrated in Figure 9 is generally similar to that illustrated in Figure 7 and described above. Instead of employing surfaces for the main and secondary shoulders bounded by straight lines, these shoulders in the embodiment illustrated in Figure 9 are bounded by curved lines. The modified hook shaped portion is indicated, generally, at 89 and a corresponding latching bar 90 is arranged to cooperate therewith. The upper surface 91 of the bottom of the notch in which the latching bar 90 interfits is curved and the undersurface 92 of the latching bar 90 is correspondingly curved to snugly interfit with the same. The latching bar 90 is arranged to bear against the surface of a main shoulder 93 which has a curved upper edge 94 instead of the inclined upper edges 82 shown in Figure 7. A secondary shoulder 95 is provided parallel to the main shoulder 93 for engagement by the latching bar 90 to hold the door 27 in the partly closed position. The surface of the secondary shoulder 95 is defined along its lower edge by a curved line 96. Between the curved lower edge 96 of the secondary shoulder 95 and the curved upper edge 94 of the main shoulder 93 are inclined wedging surfaces 97 which correspond to the similar surfaces 85 in

Figure 7. It will be understood that the curved edges 94 and 96 are generally tangent to the radial lines corresponding to the lines 65 and 68 illustrated in Figure 5.

Since certain further changes can be made in the foregoing constructions and different embodiments of the invention can be made without departing from the spirit and scope thereof, it is intended that all matter shown in the accompanying drawings and described hereinbefore shall be interpreted as illustrative and not in a limiting sense.

What is claimed as new:

1. In a railway car having a hopper with a discharge opening and a door hinged along the upper side of said opening and swingable to an inclined position for closing the same, in combination, a shouldered element carried by said hopper having a hook-shaped portion extending generally at right angles to the hinge axis of said door and opening upwardly, and a latching bar pivotally mounted on said door to swing substantially parallel thereto for engaging said hook-shaped portion to hold said door closed, said hook-shaped portion being of appreciable width and having pairs of stepped shoulders parallel to said door with the upper and lower edges thereof defined by lines sloping in opposite directions from the central portion of said hook-shaped portion whereby secondary and main locking shoulders are provided for cooperating with said latching bar to hold said door respectively in partly and fully closed position, the upper side of the bottom of said hook-shaped portion being arched upwardly and conforming to the lower edge of said main locking shoulders, said latching bar having a surface parallel to the path of its swinging movement for engaging said locking shoulders and its underside which is coextensive with said shouldered element arched downwardly conformably to said upwardly arched side of said hook-shaped portion, said stepped shoulders being interconnected by a wedging surface and symmetrically arranged so as to be engaged by said latching bar when it is pivoted on either side of said hook-shaped portion.

2. The invention, as set forth in claim 1, wherein the lines defining the upper and lower edges of the shoulders are straight lines intersecting at obtuse angles, and the upper side of the hook-shaped portion is formed by plane surfaces intersecting at an obtuse angle.

3. The invention, as set forth in claim 1, wherein the lines defining the upper and lower edges of the shoulders are convexedly curved downwardly, and the upper side of the hook-shaped portion is a convexedly curved surface.

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