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Crummett

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[54] **COUPLER PIN RETAINER**

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[52] **U.S. Cl.** **213/8;** 213/50.5; 213/69

[51] **Int. Cl.²** **B61G 9/02**

[58] **Field of Search** 213/50.5, 61, 62, 63, 64, 213/65, 66, 67, 68, 69, 70, 71, 72

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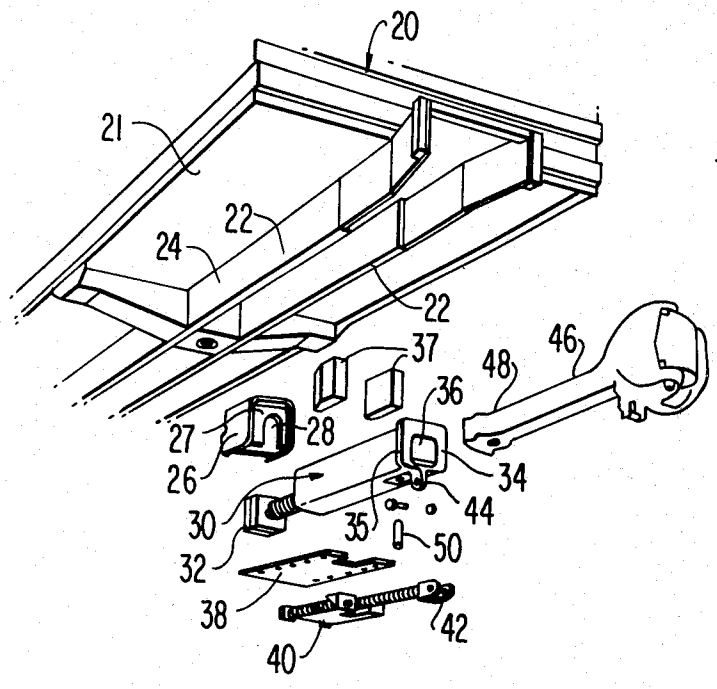
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Assistant Examiner—Gene A. Church
Attorney, Agent, or Firm—John H. Tregoning

[57] **ABSTRACT**

A coupling pin retaining mechanism for a railway car coupler assembly comprising a plate slidably connected to the coupler assembly and operable to underlie the coupling pin to retain the coupling pin within the coupling assembly.

17 Claims, 6 Drawing Figures



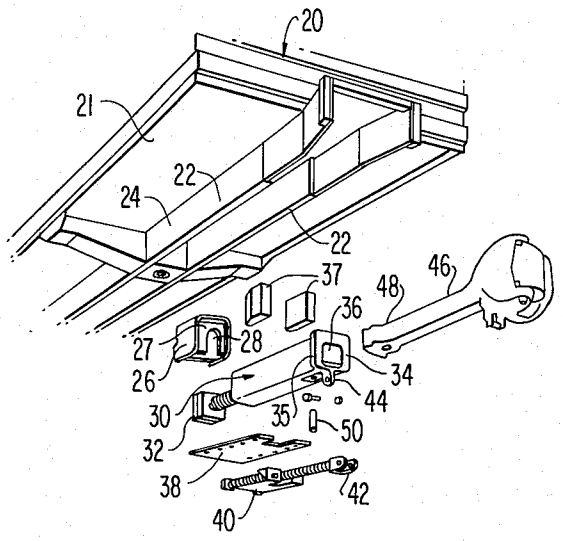

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FIG. 1

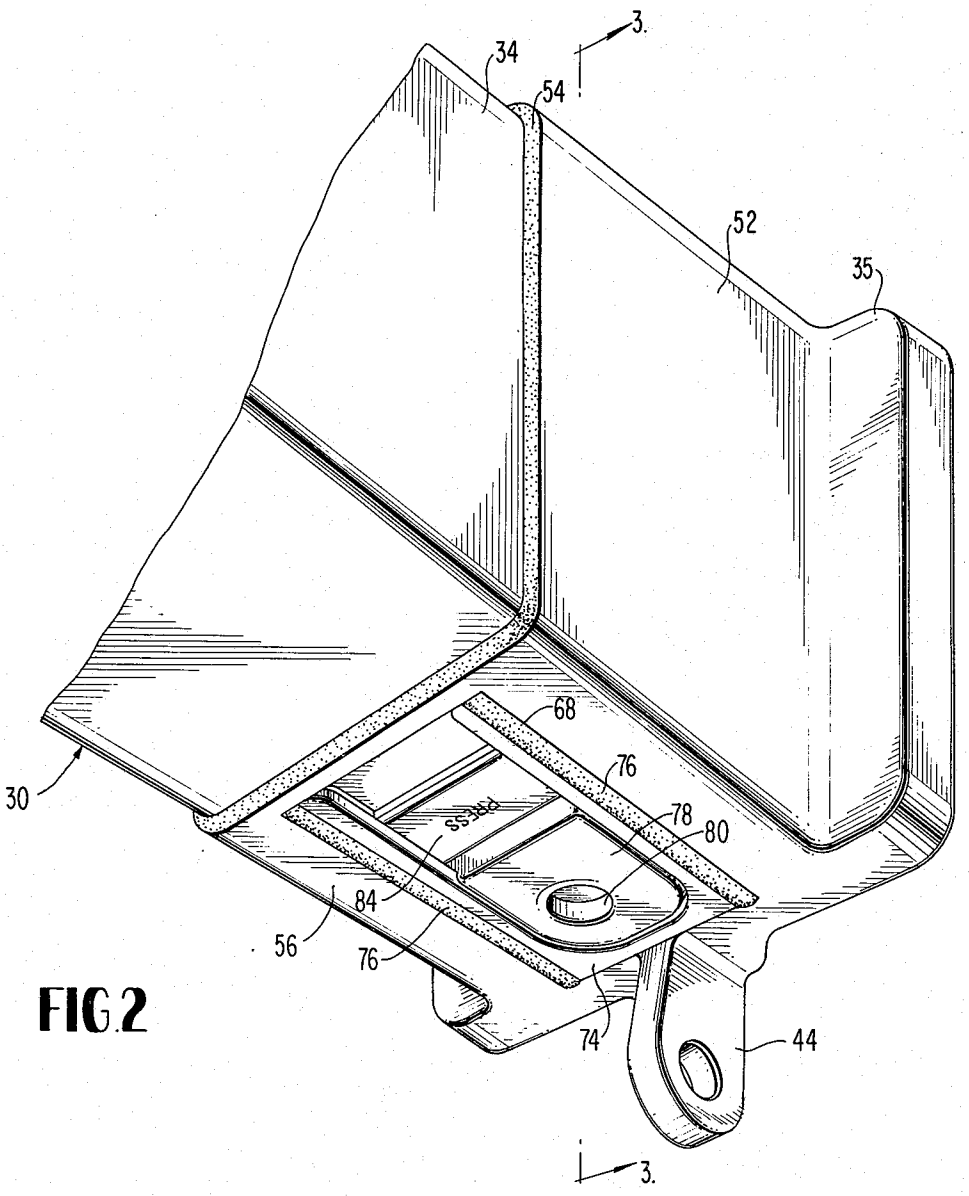
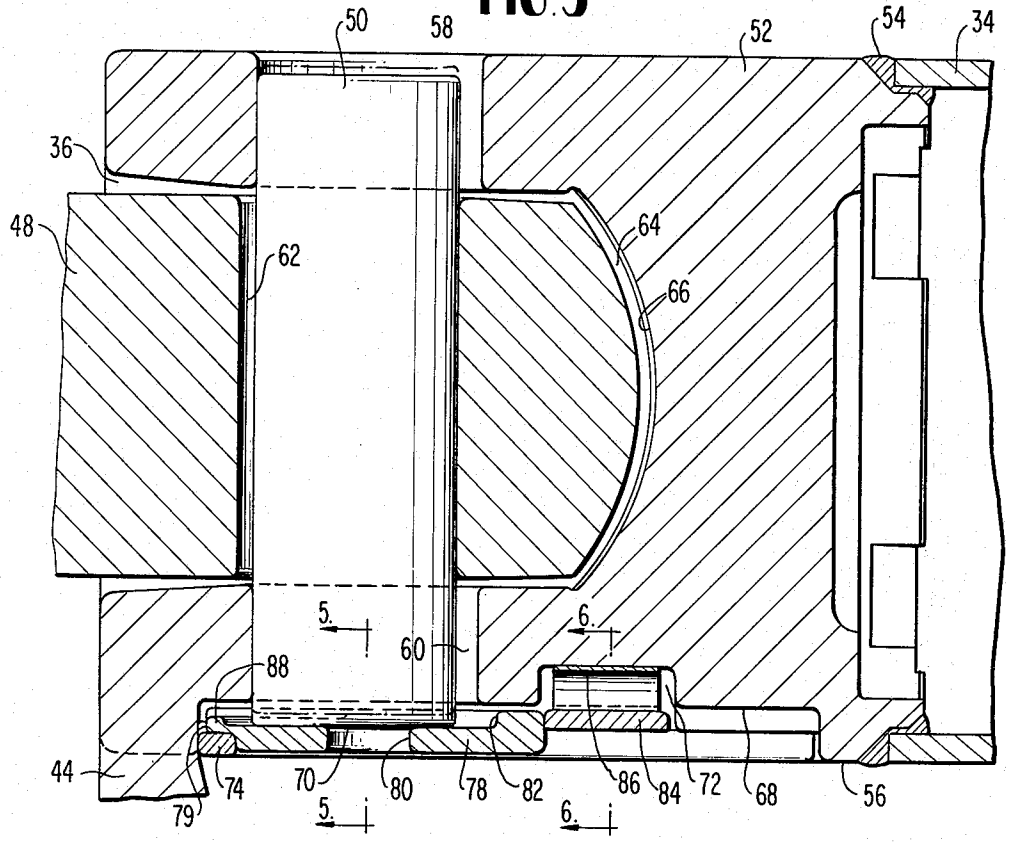

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FIG. 2

FIG. 3



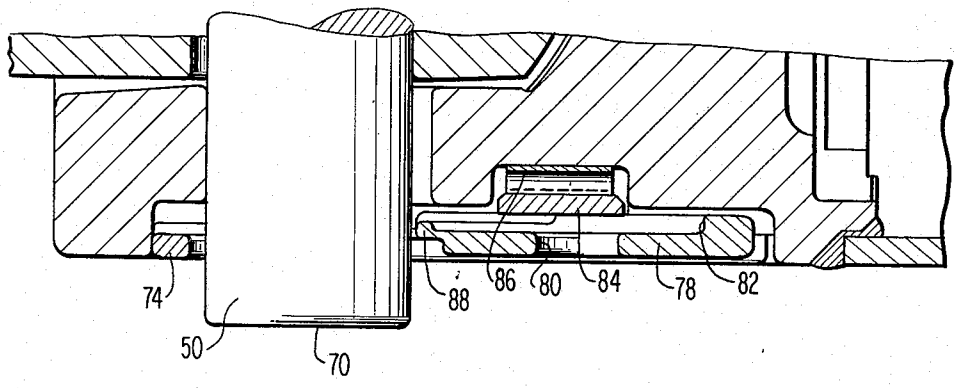
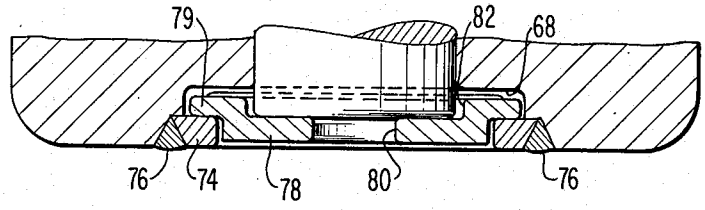


FIG. 4

FIG. 5



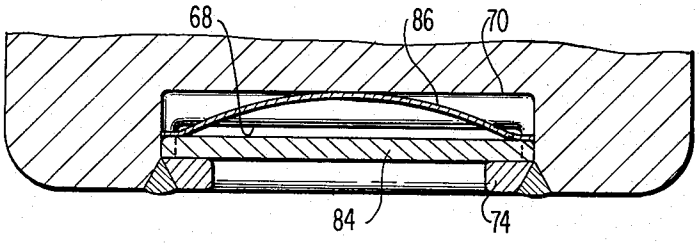


FIG. 6

COUPLER PIN RETAINER

This invention pertains to a method and apparatus for retaining a coupling pin in a railway car coupler assembly. More particularly, the invention relates to a slidably mounted plate which is carried within a coupler assembly in an underlying relationship to a coupling pin and to methods of retaining and removing the coupling pin from the coupler assembly.

Since emerging in the last half of the nineteenth century as an efficient mode of transportation, railroads have been employed to convey a major portion of the goods involved in national and international commerce. This may be due in large part to the fact that railroad transportation provides an ideal method for transporting goods long distances overland. Large quantities of goods, including materials far too heavy for transportation by truck, can be carried and dispersed through a vast network of railroads by the simple expedient of uncoupling and switching to different trains, cars carrying a particular cargo.

In order to facilitate the dispersion of individual carloads of goods through the railroad network, most distribution centers have large freight yards in which railway vehicles can be loaded, coupled, switched, and unloaded. Typically, a railway vehicle is loaded with a finished product or with raw materials in a particular part of the freight yard or on a loading spur leading into the freight yard. Once the railway vehicle is loaded, it may be coasted or, coupled to a switching locomotive and, drawn onto a different track where a train which is to travel toward the desired destination of the railway vehicle is being made up.

It may be that the ultimately desired destinations of the various cars in the train are somewhat divergent. If this is the case, each car will in all likelihood pass through a number of intermediate freight yards where the car is uncoupled and switched to another train. Ultimately, through the uncoupling, switching, and coupling process the car originally loaded in a distant freight yard or on an associated loading spur becomes a part of a train which travels to the desired destination.

The process outlined in the preceding is achievable in material part through the provision of coupling assemblies which are employed in connecting modern railway vehicles together. Such assemblies normally include a coupler bar comprised of a coupler head and an elongated shank depending therefrom. The shank, in one form of assembly known as an "F-type" coupler, is pivotally connected through a circular cylinder coupler pin to a part of a railway vehicle. In this construction the coupler pin is vertically oriented and is normally carried by a yoke. The open end of the yoke embraces the end of the coupler shank most distal from the coupler head. This arrangement permits the coupler bar to pivot in a horizontal plane to accommodate movement of a series of railway vehicles along curved segments of track. All of the load which is applied to a railway vehicle by a locomotive is applied through the coupler bar and, in draft, the entire load is sustained by the coupler pin and the associated supportive yoke.

At each stage in the movement of a railway vehicle as set forth in the preceding, and in particular when the loaded railway vehicle is at rest and is then set in motion by a locomotive, considerable impact loads may be applied to the coupler bar, yoke and coupler pin. If, for instance, the railway vehicle is set in motion by the application of draft forces, an impact load is transmitted directly from the shank into the coupler pin and from the coupler pin into the yoke carrying the pin. Since the coupler pin bears against the yoke during draft, sudden and rather large stress concentrations may be developed therein by virtue of the abrupt character of the loading and the circular cylinder configuration of the pin. Similarly, since the coupler pin is normally restrained only at opposite ends by the legs of the yoke, and since the coupler shank normally acts upon a central portion of the coupler pin, relatively large bending stresses may be developed in the pin. Over the useful life of a railway vehicle, the magnitude and cyclic character of the stresses introduced into the coupler pin and yoke may render these members subject to considerable wear.

Accordingly, under nominal operating conditions, it is necessary to periodically remove the coupling pin from the coupler assembly for inspection and possible replacement and/or for disengagement and inspection of the coupler bar and yoke assembly. It would therefore be desirable to provide a coupling assembly which would admit to rapid and convenient assembly and disassembly. In order, however, to minimize the possibility that a vertically oriented coupling pin will not drop out during operation coupling pins are normally retained within the coupling assembly by plates welded or riveted in place.

More specifically, in this latter connection one previous approach has been to provide the coupling pin with an underlying plate that is supported by laterally disposed slots under the coupler assembly. However, to prevent movement of the plate, each end must be provided with a block which is typically bottled or riveted to the coupler assembly. Such a pin retention system, however, while relatively secure, must be cut apart in order to remove the coupler pin.

In another known coupling pin support, a support plate is carried below a coupler assembly by serveral flanges which also support locking pins that hold the plate in position. Locking pins, however, are susceptible to accidental failure with the concomitant potential for train parting during service.

An independent difficulty attendant conventional coupling assemblies relates to the possible accumulation of dirt or granular material between the coupling pin and an underlying support. In such situations, the coupling pin frequently becomes misaligned in the clevis-like yoke that receives the coupling pin. Misalignment may lead to premature failure of the coupling pin since the asymmetrical loading of the coupling pin tends to amplify shearing forces therein.

The problems suggested in the preceding are not intended to be exhaustive but rather are among many which have tended to reduce the effectiveness of previously known coupling pin supports. While other noteworthy problems may exist, those discussed above should suffice to demonstrate that the previously known coupling pin supports have not been entirely satisfactory. A coupling pin support according to the present invention is intended to at least obviate or minimize problems of the type previously noted.

More specifically, the instant invention is directed toward an improved apparatus for retaining and supporting a coupling pin in a railway car coupler assembly.

The improved apparatus includes a slidably mounted plate which underlies the coupling pin to retain it in the coupler assembly. The plate includes both a recess in the top surface to receive a base portion of a coupling pin and an opening through which dirt and miscellaneous foreign matter may be discharged from the coupling pin environment.

To positively position the plate in supporting relationship to the coupling pin, a spring-biased-downwardly locking bar is positioned to interfere with sliding movement of the plate. Similarly, the recess of the plate defines a vertically upstanding lip which prohibits sliding movement of the plate.

In keeping with the structural aspects of the invention, the invention is also directed toward improved methods for retaining and removing a coupling pin from a railway car coupler assembly. The improved method of retaining a coupling pin comprises supporting the coupling pin by a slidably mounted plate which underlies the pin and which includes several retention devices to prevent unintended or premature movement of the plate with respect to the pin.

More particularly, the removal method entails (1) lifting a coupling pin to disengage one retainer mechanism, (2) releasing a second retainer mechanism which interferes with sliding movement of a supporting plate, and (3) sliding the plate to a non-supporting position which allows withdrawal of the coupling pin from the coupler assembly.

THE DRAWINGS

Although the specification concludes with claims which particularly point out and distinctly claim the subject matter of the present invention, a preferred embodiment is described in the following detailed description which may be best understood when read in connection with the accompanying drawings in which:

FIG. 1 is a partially exploded pictorial view of a coupler assembly incorporating the subject invention;

FIG. 2 is a partial pictorial view of the external configuration of the coupling pin retaining mechanism of the subject invention;

FIG. 3 is a partial longitudinal cross-sectional view taken along section line 3—3 of FIG. 2;

FIG. 4 is a partial cross-sectional view similar to that of FIG. 3 which illustrates the coupling pin during insertion or removal;

FIG. 5 is a partial transverse cross-sectional view taken along section line 5—5 of FIG. 3; and

FIG. 6 is a partial transverse cross-sectional view taken along section line 6—6 of FIG. 3.

DETAILED DESCRIPTION

Context of the Invention

With particular reference now to FIG. 1, the underside of one end of a railway car 20 is illustrated. The underside 21 typically is provided with a pair of generally longitudinally aligned walls 22 which are laterally spaced from one another to define an open sill 24.

In one preferred embodiment a hydraulic cushioning unit is mounted within the sill 24 by a mounting bracket 26 which includes a generally vertical plate 27. The plate 27 may have a downwardly opening generally U-shaped slot 28. One end of the railway car hydraulic cushioning apparatus 30 may be provided with a generally square block 32 which is received within the mounting bracket 26. The U-shaped slot 28 prevents the block 32 from being longitudinally pulled out of the mounting bracket 26.

The front end 34 of the hydraulic cushioning apparatus 30 is fashioned with a laterally extending flange 35 on each side thereof. A buff stop 37 is preferably placed between each side of the hydraulic cushioning apparatus 30 and the corresponding longitudinal wall 22. The buff stops 37 cooperate with laterally extending flanges 35 to prevent excessive longitudinal motion of the hydraulic cushioning apparatus 30 relative to the railway car 20 when the apparatus 30 experiences buff forces.

The generally longitudinal walls 22 may be further provided with a generally flat carrier plate 38 which is suitably mounted therebelow. The carrier plate 38 may have a conventional restoring mechanism 40 mounted therebelow which may be provided with a clevis end 42. The forward end 34 of the hydraulic cushioning apparatus 30 includes a downwardly extending projection 44 for connection with the clevis end 42 of the restoring mechanism 40. Accordingly, the restoring mechanism 40 is operable to generate a force which restores the hydraulic cushioning apparatus 30 to a neutral position with respect to the railway car 20.

The forward end 34 includes a generally rectangular longitudinally aligned opening 36 operable to receive an "F-type" coupler. A vertically disposed coupling pin 50 is provided to pivotally connect the coupler bar 46 and the hydraulic cushioning apparatus 30. Accordingly, the forward end of the cushioning apparatus 30 constitutes a form of a yoke surrounding the butt end of the coupler bar.

The foregoing comprises a brief summary of a preferred context of the invention. For a more complete description of a hydraulic cushioning structure, reference may be had to U.S. Seay et al. Pat. No. 3,589,527 issued June 29, 1971 and assigned to the assignee of the subject application. The entire disclosure of the Seay et al patent is hereby incorporated by reference as though set forth at length.

While the foregoing preferred context of the invention indicates that a coupling pin 50 connects a coupler bar 46 with a hydraulic cushioning apparatus 30, it should be noted that other draft gear assemblies, such as friction or rubber draft gear units, may be substituted for the apparatus 30 without departing from the subject invention.

Coupler Pin Retainer

Referring now to FIGS. 2 and 3, the shank 48 of the coupler bar 46 is received within the opening 36 of a casting or yoke 52. The casting is preferably connected to the front end 34 of the cushioning apparatus 30 by a seam weld 54. The casting 52 is provided with generally cylindrical openings 58, 60 in the top and bottom portions thereof. The diameters of the openings 58, 60 are such that, when the coupling pin 50 is received therein, there still remains a clearance between the periphery of the coupling pin and the interior cylindrical surface of the openings 58, 60.

The shank 48 of the coupler bar 46 may also be provided with a generally cylindrical opening 62 which receives the coupling pin 50. The diameter of opening 62 is also somewhat larger than the diameter of coupling pin 50 in order to permit ready insertion and removal of the coupling pin.

In FIG. 3, the coupler bar 48, the coupling pin 50 and the end casting 52 are in a draft configuration. In this draft posture, it will be noted that a clearance 64 is defined between the butt end of the shank 48 and the rearmost surface 66 of the opening 36. The diameters of openings 58, 60 are sized relative to the diameter of the coupling pin 50 such that when the coupler bar 46 experiences buff forces, the butt end of shank 48 abuts the rearmost surface 66 of the casting 52. Accordingly, the coupling pin 50 does not experience buff shearing forces which would otherwise be present. The diameter of the opening 62 in the shank 48, however, is preferably dimensioned to engage the coupling pin and translate the pin slightly rearwardly in the casting 52 during buff movement. This coupling pin movement is useful to assist in dislodging foreign matter which may accumulate between the coupling pin 50 and the openings 58, 60 and 62 which receive the pin 50.

With renewed reference to the combination of FIGS. 2 and 3, the lower surface 56 of the casting 52 is provided with a generally rectangular recess 68. The forward edge of the recess 68 overlaps the bottom surface 70 of the coupling pin 50. A second generally rectangular recess 72 is fashioned within the casting 52 near the center portion of the recess 68.

The bottom surface 56 of the casting 52 is fitted with a generally U-shaped retainer plate 74. The plate 74 is preferably disposed within the recess 68 and is permanently attached therein by a seam weld 76 on each lateral edge of the plate 74.

A slidable plate 78 which includes a central opening 80 is mounted in the recess 68 and above the U-shaped retainer plate 74. Opening 80 permits access for an assembly and disassembly tool and synergistically provides an exit post for foreign dislodged during movement of the coupling pin as previously discussed.

From FIGS. 3 and 4, it will be noted that the plate 78 is operable to slide longitudinally within the recess 68 and relative to the U-shaped plate 74. In this regard the plate 78 is fashioned about its periphery with a generally U-shaped raised lip 79 which operably slides upon retainer plate 74.

The upper surface of the sliding plate 78 is provided with a generally elliptical recess 82 which has a length substantially greater than the diameter of the coupling pin 50.

As illustrated particularly in FIG. 3, the bottom 70 of the coupling pin 50 is supported by the plate 78 and is received within the recess 82. The elongate character of recess 82 prevents the pin from loading the plate 78 during lateral movement of the pin with respect to the yoke.

The plate 78 is prevented from accidentally sliding within the recess 68 by a locking bar 84 which is positioned within the second rectangular recess 72. The locking bar 84 is spring-biased downwardly by means of a leaf spring 86. The leaf spring 86 is preferably received within the recess 72 and acts against the top surface of the locking bar 84. While the bias of leaf spring 86 is preferred it should be noted that if the leaf spring 86 breaks or becomes inoperative for any reason, the locking bar 84 will retain its position interfering with the sliding motion of plate 78 by virtue of the influence of gravity thereon. Thus, the locking bar 84 comprises a detaining mechanism which is, in all essential respects, fail-safe.

From FIG. 6 it will be noted that the recess 70 has a transverse extent which exceeds the transverse extent of the recess 68. The increased transverse width of the recess 70 provides a positive positioning of the locking bar 84 within the recess 68.

A vertically upstanding lip 88 is defined at the forward edge of the sliding plate 78 by this generally elliptical recess 82. As will be noted from FIG. 3, the lip 88 overlaps the end 70 and thereby provides an additional retaining mechanism which prevents sliding motion of the plate 78. In this connection, it will be seen that, in order to slide the plate 78, the coupling pin 50 must be raised vertically upwardly within the openings 58, 60, 62 such that the bottom surface 70 of the coupling pin 50 is elevated above the lip 88.

Assembly Retention and Disassembly Process

Having described the structural features of the subject invention, the operation thereof during insertion, withdrawal, and retention of a coupling pin 50 in the coupler assembly will now be described.

It will be seen from FIG. 3 that in order to remove the coupling pin 50 from the coupler assembly, a suitable tool must be inserted into the opening 80 of the plate 78 to engage the bottom 70 of pin 50 and raise the pin 50 vertically upwardly. The locking bar 84 is then released by pushing it vertically upwardly against the spring bias to a position of non-interference between the locking bar 84 and sliding plate 78. With the pin 50 raised sufficiently such that the lip 88 of the plate 78 may pass therebelow, the plate 78 is slid rearwardly within the recess 68.

As the plate 78 reaches the position illustrated in FIG. 4, the coupling pin 50 may be lowered or withdrawn from the coupler assembly. Typically, the plate 78 must slide a distance of 5 inches before the pin 50 may be removed. As a practical matter, the coupling pin 50 would normally be supported from below while being withdrawn in order to prevent its weight from causing it to fall and possibly injure an operator withdrawing the coupler pin.

To insert a coupling pin 50 into a coupler assembly the pin 50 must be raised vertically upwardly into engagement with the shank 48 of the coupler bar and the forward end 34 of a yoke assembly. The corresponding openings of the shank of the coupler bar 48 and the yoke assembly must, of course, be aligned before the coupler pin is inserted. With the coupler pin fully inserted into the respective openings and supported from below, the slidable plate 78 is moved forwardly within the recess 68 of casting 52. As the plate 78 reaches the forwardmost position in the slot 68, the locking bar 84 automatically moves into interfering relationship therewith by virtue of the bias of spring 86 and the coupler pin is permitted to descend into recess 82.

In summary the coupling pin 50 is retained in operative relationship with the coupler assembly by virtue of the underlying plate 78 which supports the pin 50. The plate 78 is releasably latched in the underlying position by the latching bar 84. Similarly, the plate 78 is prevented from sliding movement by the alignment of the recess 82 with the bottom surface 70 of the pin 50 and by the vertically upstanding lip.

SUMMARY OF MAJOR ADVANTAGES

It will be appreciated from the foregoing that a coupling pin retaining mechanism according to the present invention entails certain significant advantages.

One advantage is the provision of redundant retainer mechanism to reliably hold the plate in underlying relationship with the pin which, in all material respects, is fail safe.

Another advantage is the provision of a readily releasable coupling pin retainer which permits ready removal for inspection and/or replacement.

An independently significantly advantage is the provision of a coupling pin retainer which minimizes the possibility of undesirable accumulations of water, dirt or other foreign matter within the coupler assembly.

Still another advantage is the provision of a coupling pin retainer which cannot work loose or accidentally fail.

A further advantage is the provision of a coupling pin retainer which does not require threaded fasteners or tools of any special nature to allow removal of a coupling pin.

Although the present invention has been described in conjunction with a specific embodiment thereof, it is evident that many alternatives, modifications, variations, and equivalents will be apparent to those skilled in the art. It is expressly intended that all such alternatives, modifications, variations, and equivalents which fall within the spirit and scope of this invention as defined in the appended claims, be embraced thereby.

What is claimed is:

1. A coupling pin retaining mechanism for a railway car coupler assembly including a coupler bar, yoke means generally longitudinally aligned with said coupler bar and being operably connected to a railway car underframe, removable coupling pin means operable to connect said coupler bar to said yoke means and to transmit draft forces between said coupler bar and said yoke means, wherein the improvement comprises:

a. a channel formed within a bottom portion of said yoke means adjacent to said coupling pin means;

b. retainer means, connected to said yoke means for selectively underlying said coupling pin means and retaining said coupling pin means in an operative posture with respect to said yoke means and said coupler bar and for selectively moving to a supported inoperative position within said channel which permits removal and reinsertion of said coupling pin means from said coupler assembly and to an operative position underlying said coupling pin means.

2. The coupling pin retaining mechanism as defined in clain **1** including:

first means, located within said channel, for detaining said retainer means in an operative position which underlies said coupling pin means and retains said coupling pin means in the operative posture.

3. The coupling pin retaining mechanism as defined in claim **2** wherein:

said first means comprises a spring biased interference member which is biased toward an interfering position that blocks sliding movement of said retainer means.

4. The coupling pin retaining mechanism as defined in claim **2** including:

second means, located within said channel, for detaining said retainer means in an operative position which underlies said coupling pin means and retains said coupling pin means in the operative posture.

5. The coupling pin retaining mechanism as defined in claim **4** wherein:

said second means comprises an upstanding lip provided above said retainer means, said upstanding lip being connected to said retainer means and being operable to block sliding movement of said retainer means.

6. The coupling pin retaining mechanism as defined in claim **4** wherein:

said retainer means is provided with access means therethrough operable to receive a tool for disengagement of said second means for detaining and to permit foreign material to escape from said retainer means.

7. The coupling pin retaining mechanism as defined in claim **2** wherein:

said first means comprises a spring biased interference member which is biased toward an interfering position that blocks sliding movement of said retainer means; and

a second means, located within said channel, is provided for detaining said retainer means in an operative position which underlies said coupling pin means and retains said coupling pin means in an operative posture.

8. A method of removing a coupling pin from a railway car coupler assembly comprising the steps of:

lifting the coupling pin upwardly with respect to a plate underlying the pin and a portion of the coupler assembly in the direction of the longitudinal axis of the pin;

releasing a locking mechanism from a position interfering with sliding movement of the plate;

sliding the plate transversely with respect to the pin axis and along the underside of the coupler assembly to a position which fully exposes the lower end of the pin; and

withdrawing the pin from engagement with the coupler assembly.

9. The method as defined in claim **8** wherein the lifting step includes the step of:

inserting a tool into an opening within the plate.

10. A method of retaining a coupling pin in a railway car coupler assembly comprising the steps of:

supporting the coupling pin from below while the coupling pin is positioned in an operative relationship within the coupler assembly;

sliding a plate along the underside of the coupler assembly and into underlying relationship with respect to the bottom of the coupling pin; and

lowering the coupling pin onto resting engagement with the plate slidably mounted upon the underside of the coupler assembly.

11. The method as defined in claim **10** and further including the step of:

aligning a recess in the top surface of the underlying plate with the bottom of the coupling pin such that the coupling pin is received into the recess dueing said sliding step.

12. The method as defined in claim **10** and further including the step of:

releasably latching the underlying plate in underlying relationship to the coupling pin such that the plate is prevented from inadvertent movement from the underlying relationship.

13. In a coupling pin retainer for a railway car coupler assembly of the type having a coupler bar, yoke means generally longitudinally aligned with the coupler bar and operably connected to a railway car underframe, removable coupler pin means for connecting the coupler bar to the yoke means, the improvement which comprises:

a. retainer means for substantially preventing disconnection of said coupler pin when said retainer means is in a first position and allowing disconnection and removal, from said coupler bar and yoke means, of said coupler pin when said retainer means is in a second position; and

b. connector means for connecting said retainer means to said yoke means and for allowing movement of said retainer means between the first and second positions without disattachment of any portion of said connector and retainer means from said yoke means.

14. The apparatus of claim **13,** further comprising:

c. detainer means for detaining said retainer means in said first position when said coupler pin is in a normal operating position and for allowing movement of said retainer means from said position to said second position when said coupler pin is moved to an abnormal position.

15. The apparatus of claim **13,** further comprising:

d. interference means for moving without disattachment of any part thereof from a position blocking movement of said retainer means from said first position to said second position to a position allowing movement of said retainer means from said first position to said second position.

16. The apparatus of claim **15,** further comprising:

c. detainer means for detaining said retainer means in said first position when said coupler pin is in a normal operating position and for allowing movement of said retainer means from said first to said second position when said coupler pin is moved to an abnormal position.

17. The apparatus of claim **13,** wherein:

said retainer means and said connector means are fully contained with the yoke means so that projecting said retainer means can slide above said carrier plate.

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