This invention relates to railway couplers and more particularly to a novel mounting accommodating relative rotary movement between a coupler and its supporting structure facilitating assembly and disassembly of the coupler.

A more specific object of the invention is to devise a novel ball and socket connection between the coupler and its supporting structure facilitating assembly and disassembly of the coupler.

A further object of the invention is to devise an arrangement such as above described wherein the coupler shank and yoke are interconnected by keys, and means are provided for reducing bending stresses on the keys when the coupler is subjected to pulling or draft forces.

Another object of the invention is to provide novel bearing blocks between the keys and a ball end of the coupler shank whereby pulling forces on the coupler are transmitted through said blocks to the keys.

Another object of the invention is to provide novel means for limiting rotational movement of the bearing blocks relative to the yoke.

A further object of the invention is to provide means for reducing bending stresses on the keys when the coupler is subjected to pulling or draft forces.

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casting 85 is preferably provided and is removably attached as by rivets 88 to the center sill 24 of the car body. The striker casting of the laded with openg 90 of the body in form although it will be understood that, if desired, the opening 90 may be provided in an integral part of the car body.

The opening 90 is particularly formed and arranged to cooperate with the center Shank portion of about 25° relative to the normal plane 124 of the car body to prevent excessive lateral offset of the coupled body when its supporting car body is rotated approximately 90°. Under such conditions, in prior art arrangements, excessive offset between the coupler of the rotating the car body and the mating coupler of a non-rotating car has developed, resulting in excessive binding upon rotation of the car body beyond 90° to raise its coupler back to level. This condition has heretofore been regarded as a necessary consequence of providing a striker opening of conventional width to accommodate coupler side motion or lateral angling in service operation around curves. However, an important feature of the present invention resides in the fact that the opening 90 is of conventional width to accommodate coupler side motion under service operations wherein its supporting car is upright, in combination with a novel configuration of opening 90 which limits lateral offset of the coupler relative to its car body during rotation of the latter.

This feature of the invention is illustrated in Figures 5 to 12, inclusive, and referring first to Figure 5 it will be noted that the opening 90, as shown in Figure 1, is so formed and arranged above the level of the car body and coupler Shank are in "normal" position (that is, when the car is upright and level and the Shank 6 is level and centered, as shown in Figure 5), the distance between any point on the surface 92 and a coaxial radially on the Shank portion 6 lying on a common radius from the rotational axis X of the car body, is substantially equal to the distance between said point on the Shank and said axis X, which coincides with the longitudinal axis of the Shank portion 6 when the car body and Shank are in "normal" position, as heretofore defined.

For example, referring to Figure 5, point 94 on the surface 92 is substantially closer to a coaxial radially on the Shank portion 6 lying on a common radius from the rotational axis X of the car body and the Shank are at the normal position of Figure 5 and lateral movement of the Shank portion 6 is limited by engagement with the opening 90 along the short axis Y thereof which is again disposed in a vertical plane. Under these conditions there is no

of a camming action by the carrier plate 16 without further compressing its supporting springs.

In Figure 7, the car body is illustrated in a further position of clockwise rotation about 45° from the normal position of Figure 5; and under these conditions, the Shank portion 6 is engaged with the surface 92 at a point 102 on a radius 104 from the axis X, the radius 104 being at an angle of about 25° with respect to the short axis Y of the opening 90. The longitudinal axis Z of the Shank portion 6 has moved downwardly and laterally from the position of Figure 6 to a position of maximum lateral angling of Shank portion 6 during rotation of the car body. It will be noted that in the position of Figure 7 the carrier plate 16 has been compressed to a position indicated at 16a and its lower lug 28 is spaced from the stop 30 at the lower side of the opening 90 under these conditions.

In Figure 8, the car body is illustrated in a rotational position about 60° from the normal position of Figure 5, and lateral movement of the Shank portion 6 is limited by engagement thereof with the surface 92 at point 106 on a radius 108 drawn from the axis X at about 26° with respect to the axis Y. Under these conditions, the longitudinal axis Z of the Shank portion 6 has moved downwardly and laterally from the position of Figure 7 but has not moved further laterally from the position of Figure 6. It will be noted that the Shank portion 6 remains in the compressed position indicated at 16a, with its lower lug 28 spaced from the stop 30 at the lower side of the opening 90.

Referring now to Figure 9, the car body is illustrated in a further rotational position about 90° from the normal position of Figure 5, and lateral movement of the Shank portion 6 is limited by engagement with the surface 92 at point 110 on a radius 112 drawn from the axis X at about 26° with respect to the short axis Y of the opening 90. Under these conditions, the longitudinal axis Z of the Shank portion 6 has moved downwardly from the position of Figure 7 but has moved close to the rotational axis X of the opening 90 than in the position of Figure 9, thereby further reducing lateral offset of the Shank portion 6.

Referring to Figure 11, the car body is shown in a further rotational position about 120° from the normal position of Figure 5, and lateral movement of the Shank portion 6 is limited by engagement with the surface 92 at point 114 on a radius 116 drawn from the rotational axis X of the opening 90, the radius 114 coinciding with the short axis Y of the opening 90. Under these conditions, the carrier plate 16 is in a position indicated at 16a, with its lower lug 28 spaced from the lower stop 30; and the longitudinal axis Y of the Shank portion 6 has moved downwardly from the position of Figure 9 but has moved close to the rotational axis X of the opening 90 than in the position of Figure 9, thereby further reducing lateral offset of the Shank portion 6.

Figure 12 illustrates the car body in a rotational position 150° from the normal position of Figure 5, and the longitudinal axis Z of the Shank portion 6 is in a vertical plane intersecting the plane of the Figure 5. Under these conditions, the Shank portion 6 has moved laterally and upwardly from the rotational axis X of the car body as the result of a camming action by the carrier plate 16 without further compressing its supporting springs.
lateral offset of the coupler shank relative to the car body, and the carrier plate lugs 28 are again in contact with the stops 30. In the position of Figure 12, lateral movement of the shank portion 6 is resisted by engagement thereof with the surface 92 at points 122 and 124 along radii 126 and 128, respectively, each disposed at an angle of about 29° with respect to the short axis Y of the opening 90. Thus it will be seen that in any rotational position of the car body less than 135° from normal position thereof, lateral movement of the coupler shank portion 6 is preferably limited by engagement with the elliptoidal surface 92 at a point thereon lying on a radius from the rotational axis X of the opening 90 at an angle not substantially greater than 26° with respect to the short axis Y of the opening 90. Thus referring again to Figure 5, wherein the radius 98 is drawn at approximately 26° to the axis Y, it will be seen that the distance between co-radial points 94 and 96 on the surface 92 and the exterior surface of the shank portion 6, respectively, is not substantially greater than about 45% of the distance between the radius 98 and the axis X from which the radius 98 is drawn. This fact, in combination with the fact that the surface 92 is substantially elliptoidal in shape above the level of the carrier 16 when the car body and coupler shank are in "normal" position, with the distance between any point on the surface 92 and a co-radial point on the external surface on the shank portion 6 being less than that distance between the point on the shank portion 6 and the rotational axis X of the opening, accommodates full lateral angling of the coupler shank 6 when the car body is in normal level position and greatly restricts lateral offset of the shank portion 6 with respect to the car body when the latter is rotated during a dumping operation.

Furthermore, when the car body is being rotated 180° from its normal level position, as shown in Figure 12, the shank portion 6 is restrained by contact with the surface 92 at 122 and 124 against lateral angling from the horizontally centered position shown in Figure 12.  

1. A coupler comprising a yoke having a socket with a parti-spherical surface, a coupler having a shank with an extremity in said socket seated against said socket along a complementary parti-spherical area of said socket, a plurality of separable bearing blocks in said yoke engaging said socket extending thereon facing complementary parti-spherical areas of said socket, and substantially rigid, nonresilient key means engaged with rearwardly and forwardly facing surfaces of the yoke and blocks, respectively, to limit forward movement of the blocks.

2. A coupler comprising a yoke having a socket, a coupler having a shank with an extremity projecting into said socket and seated against the yoke along complementary parti-spherical surfaces of the shank and yoke, respectively, a plurality of separable bearing blocks in said yoke outwardly of said socket and engaged with said shank along complementary parti-spherical surfaces of the shank and blocks, respectively, substantially concentric with the first mentioned surfaces, a substantially rigid, nonresilient key engaging the outer sides of the blocks and extending through aligned slots in the yoke, and means on the yoke between said slots engageable with said key for cutting bending stresses thereon when the shank is subjected to pulling forces.

3. A coupler comprising a yoke, a coupler having a shank projecting into the yoke and engaged therewith along complementary parti-spherical surfaces, a plurality of separable bearing blocks engaged with said shank along complementary parti-spherical surfaces, substantially rigid key means removably connected to the shank for limiting outward movement of the blocks with respect of the yoke, and means on the yoke between the blocks and engageable therewith to position said blocks.

4. A coupler comprising a yoke having a socket with a parti-spherical surface, a coupler comprising a shank with a ball end extending into said socket seated against said socket engaging said socket at an axial location thereon extending thereon facing complementary parti-spherical areas of said socket, and a slot through said ball end aligned with said slot in engagement with said socket comprising key means extending through aligned slots of the yoke, abutment means on the yoke between said slots, said abutment means facing the socket and engaged with the key means for limiting bending stresses thereon under certain conditions, and a slot through said ball end aligned with said abutment means to accommodate passage of the latter through said slot to accommodate disassembly of the coupler and yoke, upon removal of the key means.

5. A coupler comprising a yoke having a forwardly facing socket and top and bottom walls projecting forwardly therefrom, a coupler having a shank with an extremity projecting into said socket and seated against the yoke therein along complementary parti-spherical surfaces, top and bottom bearing blocks disposed forwardly of said socket and seated against the shank along complementary parti-spherical surfaces substantially concentric with the first mentioned surfaces, a pair of keys at opposite sides of the shank and extending through slots in said walls, said keys being engageable with the blocks and walls to retain said shank extremity in said socket, and abutments on said yoke between said walls engageable with respective keys to limit bending stresses thereon.

6. A coupler comprising a yoke having a socket and having top and bottom walls and spaced side walls extending forwardly from said socket, a coupler comprising a shank with a ball end seated in said socket along complementary parti-spherical surfaces of said yoke and bulb end, top and bottom bearing blocks disposed forwardly of said socket and seated against said ball end along complementary parti-spherical surfaces substantially concentric with respect to the first mentioned surfaces, a pair of keys at opposite sides, respectively, of the shank, each of said keys being removably retained within aligned slots in the top and bottom walls and bearing against the blocks to retain the latter in assembled position, lugs on the inner surfaces of the side walls engageable with forwardly facing areas of the keys to limit bending stresses thereon, and slots through said ball end from front to rear thereof in alignment with said lugs, said lugs being adapted to pass through respective slots upon removal of said ball from said yoke.

7. A coupler comprising a yoke having a parti-spherical socket and having top and bottom walls offset upwardly and downwardly thereon, respectively, and extending forwardly from said socket, said yoke comprising side walls extending forwardly from said socket and merging with said top and bottom walls, a coupler having a shank comprising a ball end with a parti-spherical surface complementary to that of said socket and seated against said socket surface, a pair of top and bottom bearing blocks disposed forwardly of said socket and having parti-spherical surfaces engaged with complementary surfaces of said ball end, all of said surfaces being substantially concentric, a pair of lugs on the inner surfaces of respective side walls disposed between said blocks to maintain them spaced relationship with respect to each other, keeper means securing the said top and bottom walls, a pair of keys engaged with the forward surfaces of the blocks and extending through the related key slots, said keys being engaged with the top and bottom walls at the forward ends of said key slots, another pair of lugs on the inner surfaces of respective side walls engageable with the engageable ends of the keys to reduce bending stresses thereon, said other lugs being aligned horizontally with the first mentioned lugs, and slots through said ball end aligned with said lugs whereby said lugs may be passed through said last mentioned slots during assembly and disassembly of the yoke and shank.
8. A coupler mounting comprising a support member, a coupler shank having arcuate thrust engagement with said support member, means for retaining said member and shank in said thrust engagement comprising a key remotely interlocked at its ends with said member, and means on said member interengaged with the key between said ends for limiting bending stresses thereon when said coupler shank is subjected to pulling forces.

9. A coupler mounting comprising a support member, a coupler having a shank member in complementary arcuate thrust engagement with said support member, readily removable means interlocking said members in said thrust engagement, said removable means comprising a key engaged at its ends with the support member, and means on said support member engaged with the key between said ends to limit bending stresses thereon when the shank member is subjected to forces tending to separate said members from said thrust engagement.

10. A coupler mounting comprising a support member, a coupler comprising a shank in arcuate thrust engagement with the support member, aligned key slots through the support member, means for retaining said members in said thrust engagement comprising a key extending through said slots and engaged with the support member, and an abutment carried by said support member between said slots, said abutment being engaged with the key to reduce bending stresses thereon under certain conditions.

11. A coupler mounting comprising a support member having top and bottom and spaced side walls defining a cavity, and having a socket inwardly of said cavity, a coupler comprising a shank extending through said cavity, said shank having an enlarged end in said socket, retaining means for said shank comprising top and bottom bearing blocks in said cavity engaged with said end, said retaining means comprising a key extending through aligned slots in said top and bottom walls, an inwardly facing abutment projecting from one of the side walls and engaged with the key to reduce bending stresses thereon, and slots through said enlarged end aligned with said abutments whereby said abutments may be passed through said last mentioned slots during assembly and disassembly of the coupler shank and support member.

12. A coupler yoke comprising a socket and comprising top and bottom walls offset upwardly and downwardly from said socket, spaced side walls connected to the top and bottom walls, aligned key slots through said top and bottom walls for reception of associated key means, and a lug on the inner surface of at least one side wall between said top and bottom walls, said lug comprising an abutment facing the socket and adapted for engagement with said key means to reduce bending stresses thereon.

13. A coupler yoke comprising a socket and comprising top and bottom walls projecting forwardly therefrom, a side wall connected to said top and bottom walls, aligned key slots through said top and bottom walls, an abutment carried by the side wall and disposed between the top and bottom walls, said abutment being disposed forwardly of the key slots and facing said socket.

14. A coupler yoke comprising an arcuate socket and comprising spaced walls extending forwardly from said socket, said walls having aligned key slots therethrough, said yoke comprising another wall interconnecting said spaced walls, said other wall comprising a key abutment lug between said spaced walls, said lug being spaced from said slots and being disposed between said slots in alignment therewith, and said lug facing the socket for engagement with associated key means receivable in said slots.

15. A coupler yoke comprising a socket and comprising spaced walls projecting forwardly therefrom, aligned key slots through said walls, another wall interconnecting said spaced walls, and a pair of spaced lugs on the inner surface of said other wall between said key slots, said lugs being in alignment with each other and defining therebetween a space registered with said slots to accommodate insertion of associated key means therein.

16. A coupler comprising a shank with a ball end having a parti-spherical buffing surface and at least one slot through said end interrupting its surface from front to rear thereof, said slot accommodating passage of a yoke lug therethrough during assembly and disassembly of said ball end and said yoke.

17. In a railway coupler mounting for a rotatable car; the combination of an opening in said car, a coupler with a shank rotatably connected to the car and having a portion extending through the opening, and means carried by the car to resiliently support the shank; in the opening, said shank portion having arcuate exterior surfaces on its upper and lower lateral edges, and said opening being generally ellipsoidal in shape around the sides and over the top of said portion to confine the shank against excessive lateral offset relative to the car upon rotation thereof.

18. In a coupler mounting, a car body, a coupler having a shank, means connecting said shank to said body to accommodate 180° rotation of the latter on a substantially horizontal axis extending longitudinally of said body, and means on said body and shank for limiting lateral offset of the latter from said axis to a predetermined distance when the body is in normal upright position, and means for limiting lateral offset of the shank to a lesser distance from said axis when the car body is rotated on said axis from said position.

19. In a coupler mounting, a car body, a coupler having a shank, means connecting said shank to said body to accommodate rotation of the latter on a substantially horizontal axis, and means on said body and shank for restricting lateral offset of the latter from said axis to a predetermined distance when the body is in upright position and for restricting lateral offset of the shank to a lesser distance from said axis when the car body is rotated on said axis from said position, said last mentioned means comprising cooperating substantially rigid arcuate surfaces on the shank and car body.

20. In a coupler mounting, a car body having an opening, a coupler having a shank portion, means resiliently supporting said coupler in level position, means connecting said shank portion to said car body to accommodate rotation relative to said shank on a substantially horizontal axis, said opening being partly defined by a substantially ellipsoidal surface extending around the sides and over the top of said shank portion, said opening end portion being so formed and arranged that in normal position of the car body and coupler the distance between any point on said surface and a co-radial point on the exterior surface of said portion lying on a radius from said axis is less than the distance between said co-radial point and said axis, and the distance between any point of said first mentioned surface and a co-radial point on said second-mentioned surface lying on a radius from said axis at an angle not more than about 35° with respect to the normally vertical axis of said opening is not greater than about 45% of the distance between said last mentioned point and said horizontal axis whereby maximum lateral offset between said shank and car body during rotation of the latter on said horizontal axis is substantially less than maximum lateral angling of the shank when the car body is in normal upright position.

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