United States Patent

[11] **3,613,902**

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[54] **ROTARY DUMP COUPLER**
11 Claims, 5 Drawing Figs.

[52] **U.S. Cl.** **213/72, 213/67**
[51] **Int. Cl.** **B61g 9/04**
[50] **Field of Search** 213/62, 64, 67, 69, 72

[56] **References Cited**
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ABSTRACT: In a rotary coupler assembly, the butt of a coupler is retained within a pocket in a yoke by spaced keys. Spherical surfaces on the butt engage corresponding surfaces on the yoke and keys during rotation of the coupler. A follower plate contacting a draft gear is rotatably engaged with the rear of the butt through mating concave-convex surfaces. Stops on the yoke straps limit forward movement of the follower. Force exerted through the follower in combination with a top spherical surface on the butt that engages a cylindrical surface on the yoke resists drooping of the coupler head.

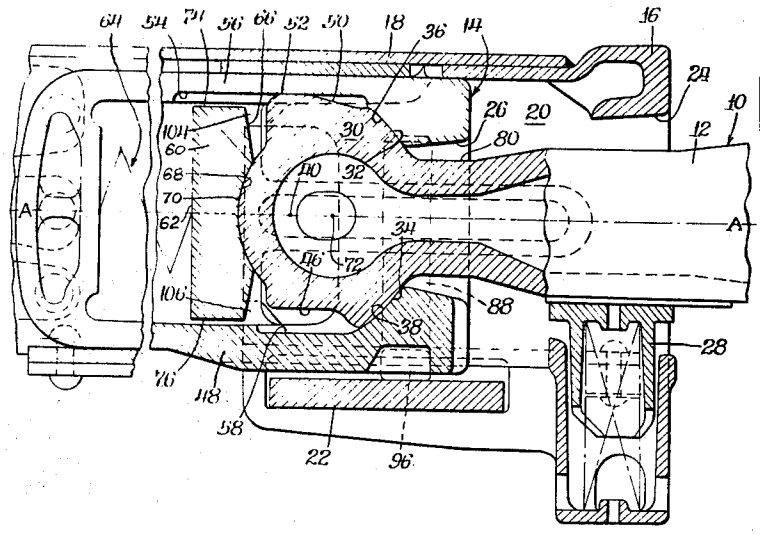
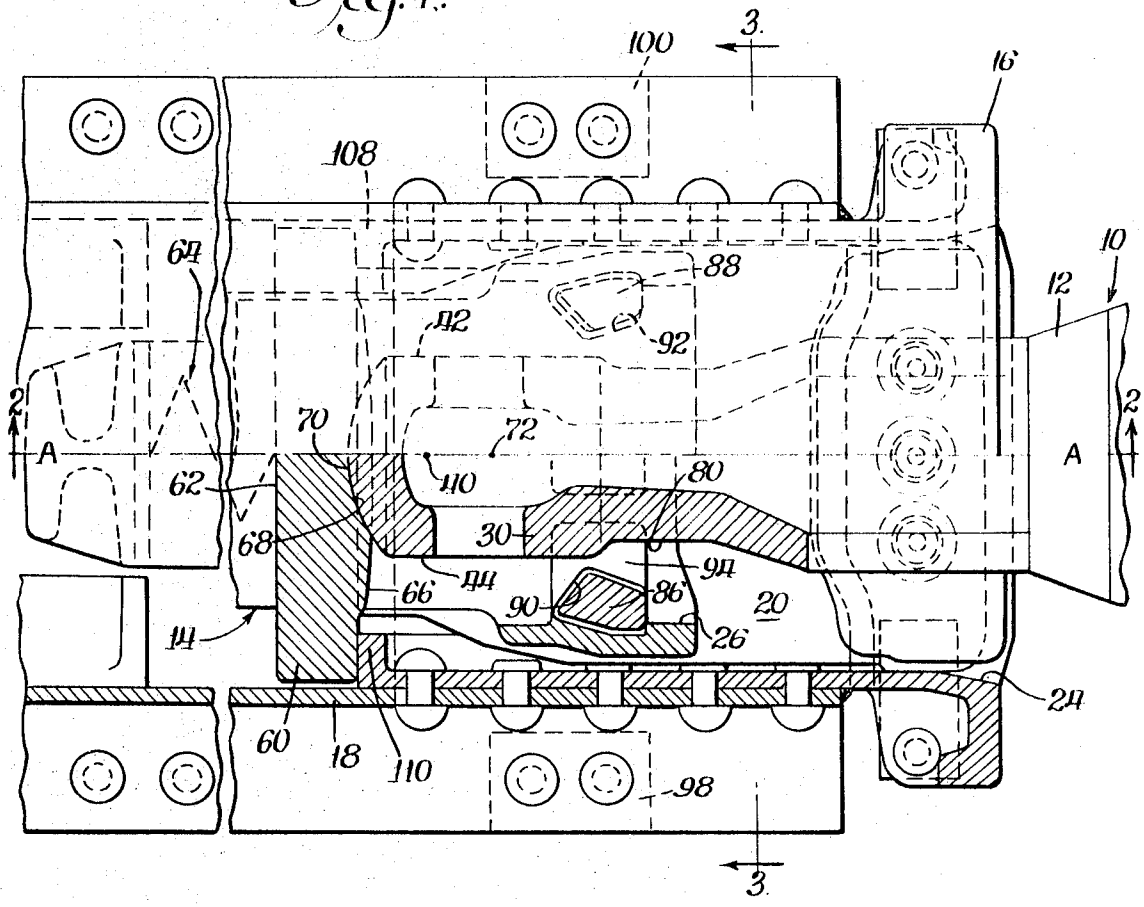


Fig. 1.



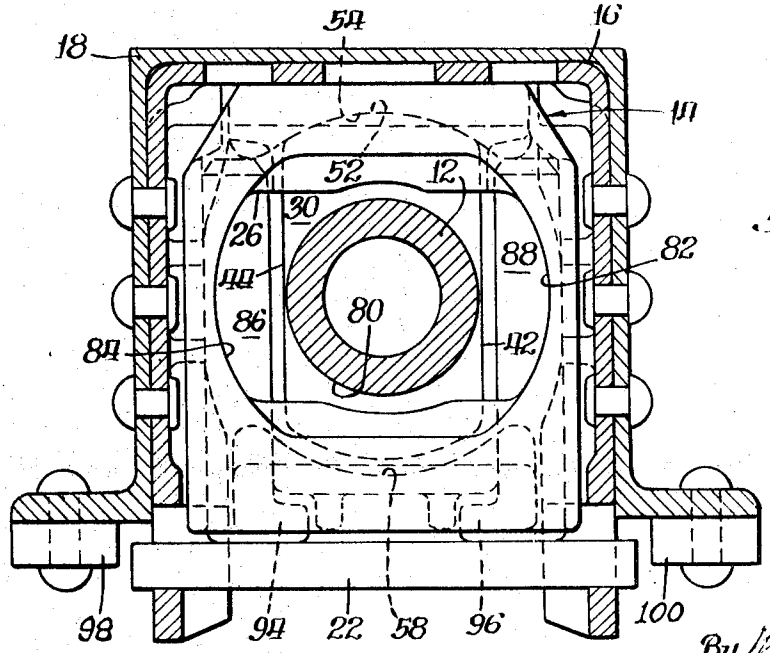


Fig. 3.

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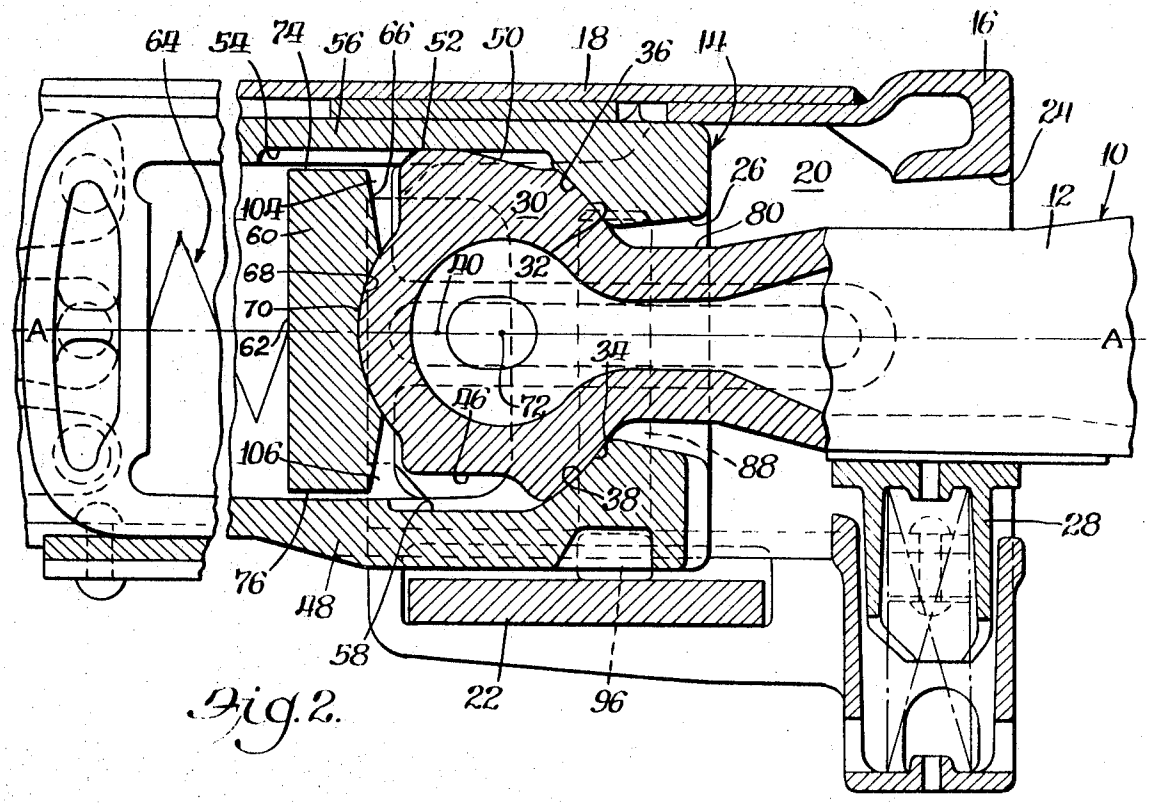
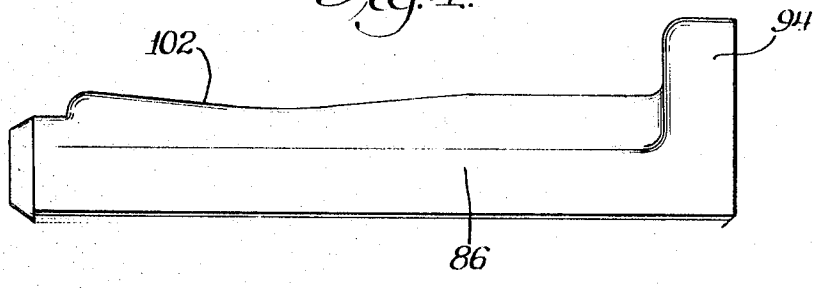


Fig. 2.

Fig. 4.



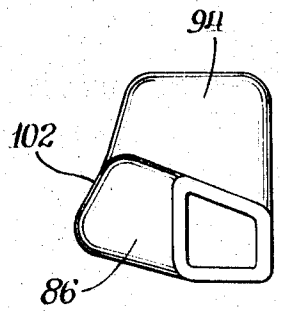


Fig. 5.

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ROTARY DUMP COUPLER

BACKGROUND OF THE INVENTION

This invention relates to an improved rotary dump coupler assembly for railway cars.

Rotary dump couplers have been exhibiting an undesirable galling and gouging of the surfaces of the butt and front follower plate. Excessive wear and abrasion has also been noted on the pulling face of the couplers and yokes as well as on the retaining keys. Some of this wear may be accounted for by axially misaligned surfaces of the yoke and retaining key.

Furthermore, an axial load from a draft gear combined with rearward movement of a yoke results in an extremely high axial load on the butt of the coupler forcing the pulling face of the coupler and yoke into tight engagement and increasing the amount of force needed to rotate the coupler. This high axial load combined with slight rotational movement of the coupler also greatly adds to coupler, yoke, follower plate and retaining key wear.

A third problem that exists is coupler droop which causes the butt to wedge upwardly against the follower plate resulting in the raising of the follower plate and vertical misalignment of the corresponding surfaces. Such misalignment results in excessive wear of both the follower plate and butt.

SUMMARY OF THE INVENTION

Applicant has solved the above problems and others by providing a rotary coupler assembly that has limited vertical and lateral angling with a maximum of vertical positioning control. A minimum of rotational resistance and a maximum of resistance to structural damage within the realm or practical fabrication is also provided in the assembly design.

Corresponding spherical pulling surfaces are provided on the yoke and the butt to transmit draft loads. A further spherical surface, having the same center as the pulling surfaces, is located on the top portion of the butt and contacts a segment of a cylindrical surface of the yoke to permit vertical and lateral angling or rotation of the coupler without binding and to prevent coupler droop resulting from the weight of the coupler that is formed of the coupler carrier.

Buff loads are transmitted to the draft gear through corresponding convex and concave surfaces respectively located on the butt and front follower. The center of the convex-concave surfaces is located at a distance from the center of the spherical surfaces previously referred to. The magnitude of the distance is dependent upon the vertical clearance of the front follower within the yoke straps.

Projections are further provided on the interior of the top and bottom yoke straps. These projections serve as stops for the front follower to prevent axial loads from the draft gear from squeezing the butt between the concave surface of the front follower and the pulling surface of the yoke. Such force creates a detrimental frictional resistance to angling and rotation of the coupler.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a fragmentary, sectional, top plan view of a rotary coupler assembly partially taken on the centerline of the coupler;

HFIG. 2 is a sectional view of FIG. 1 taken on line 2—2;

FIG. 3 is a sectional view of FIG. 1 taken on line 3—3 and illustrating the entire assembly in cross section;

FIG. 4 is a side elevational view of a retaining key; and

FIG. 5 is a top plan view of FIG. 4.

DETAILED DESCRIPTION OF THE DRAWINGS

Referring now to the drawings, FIGS. 1 and 2 illustrate a fragment of a rotary coupler assembly in a normal operative or coupled position comprising a rotary coupler 10 having a shank 12 operatively engaged with a yoke 14. A striker casting 16 connected to the underframe 18 of a railway car (not shown) retains the yoke 14 in a known manner.

The yoke 14 is free to move longitudinally relative to the railway car within a cavity 20 defined by the striker casting 16 and the underframe 18. A retainer plate 22 supports the front end of the yoke 14 in a known manner. In assembly, shank 12 of coupler 10 projects through an opening 24 in the front of striker casting 16 and through a forward opening 26 in the front of yoke 14. A coupler carrier 28 supports the shank 12 in a known manner.

The butt 30 of coupler 10 has forward upper and lower spherical surfaces 32 and 34 which are mateably engaged with corresponding upper and lower spherical surfaces 36 and 38 on yoke 14. The center, indicated by point 40, of the surfaces 32, 34, 36 and 38 may be located on line A—A which corresponds to the centerline of draft in FIGS. 1 and 2. The sides 42 and 44 of butt 30 are preferably parallel and equally spaced from line A—A as illustrated in FIG. 1.

The bottom surface 46 of butt 30 may be cylindrical and spaced from the lower strap 48 of yoke 14 while the top surface 50 of butt 30 has a spherical surface 52 struck from center 40. When the coupler is in a normally operative position as shown in FIG. 2, spherical surface 52 contacts a segment of a cylindrical surface 54 on the upper strap 56 of yoke 14. A second segment of a cylindrical surface 58 is located on lower strap 48.

The front follower 60 is rectangular in lateral cross section and has a flat rearward surface 62 that contacts a known draft gear 64 (schematically shown). The front surface 66 of follower 60 has a concave surface 68 that is mateably engaged with a convex surface 70 on the rear of butt 30. The center of the convex and concave surfaces 68 and 70 is indicated by a point 72, on line A—A a given distance forward of center 40. The magnitude of this given distance is dependent upon the vertical clearance of the front follower 60 within upper and lower yoke straps 56 and 48 as will be hereinafter explained.

During interengagement of the convex and concave surfaces 70 and 68, as shown in FIG. 2, the upper and lower surfaces 74 and 76 of follower 60 are respectively spaced from the yoke straps 56 and 48 providing the vertical clearance previously referred to. The draft gear 64 tends to retain the rear surface 62 of follower 60 perpendicular to line A—A. As shank 12 pivots vertically around pivot 40 in FIG. 2, the forcing of the rear surface 62 to a perpendicular position by draft gear 64 and the interengagement of surfaces 68 and 70 causes the front follower 60 to raise or lower until contact is respectively made between upper surface 74 and upper strap 56 or lower surface 76 and lower strap 48. This contact preferably occurs at the same time contact is made between the surface 80 of shank 12, which may be circular, and the opening 26 of yoke 14. It is further desirable to maintain the radius of convex and concave surfaces 68 and 70 as large as possible. The center 72 should be chosen with the above facts in mind.

As noted in FIGS. 1 and 2, the distance between the bottom surface 46 and the top surface 50 of butt 30 is greater than the distance between the sides 42 and 44. The opening 26 in yoke 14 may be rectangular in nature and have circular sides 82 and 84 to permit passage of bottom and top surfaces 46 and 50. In removal or assembly, the coupler 10 is rotated 90° from its illustrated position permitting passage of butt 30 through opening 26.

Once the butt 30 is located within yoke 14 right- and left-hand retaining keys 86 and 88 may be inserted into openings 90 and 92 in yoke 14 on each side of opening 26. The keys 86 and 88 have feet 94 and 96 which slide upon the retainer plate 22. Blocks 98 and 100 secured to striker 16 prevent the removal of plate 22. The rearward surface 102 (FIGS. 4 and 5) of each key 86, 88 has a spherical surface corresponding to the spherical surfaces 36 and 38 on yoke 14. In assembly, these spherical surfaces 36, 38 and 102 are aligned for smooth interengagement with the corresponding surfaces 32 and 34 on butt 30 during rotation of coupler 10. Since the keys 86 and 88 are independent, movement of one key due to pressure applied by butt 30 will not affect the location of the other key.

In operation, draft gear 64 forces follower 60 against butt 30 moving the front spherical surfaces 32 and 34 into engagement with the surfaces 36 and 38. Upper and lower stops 104 and 106 may be respectively located on straps 56 and 48 of yoke 14. These stops 104 and 106 permit a certain amount of interengagement of convex and concave surfaces 70 and 68 while eliminating squeezing force on the butt 30 that might be created by draft gear 64 acting against follower 60 and yoke 14. As known in the art, stops 108 and 110 may also be present on striker 16 to retain follower 60 from moving too far forward and squeezing butt 30. These striker stops 108 and 110, though, may not contact follower 60 when the yoke is forced rearward into cavity 20. In such rearward position such squeezing force would be eliminated by stops 104 and 106 on yoke 14.

The shank 12 of coupler 10 rests on carrier 28. The carrier 28 tends to eliminate drooping of the coupler head (not shown). This drooping tendency is further resisted by interengagement of spherical surface 52 and cylindrical surface 54 in combination with the force exerted by draft gear 64 on follower 60 and the location of centers 40 and 72. During pivotal or rotational movement of coupler 10, spherical surface 52 slides across cylindrical surface 54.

Although the invention has been described by making detailed reference to a preferred embodiment, such detail is to be understood in an instructive, rather than in any restrictive sense. Many other variations of the invention are possible.

What is claimed is:

1. In a rotary coupler assembly including a yoke having an upper and a lower strap connected to a head portion, said head portion having a forward opening therein, a front follower between said upper and lower straps, resilient means to force said front follower toward said forward opening, a coupler having a butt portion engaged within said head portion of said yoke, a top portion on said butt facing said upper strap when said coupler is in its normal operative position and a shank projecting outwardly through said forward opening, corresponding forward spherical surfaces on said butt and within said head portion of said yoke in mating engagement, a concave and convex surface on the front of said front follower and the rear of said butt, the concave and convex surfaces being in mating engagement, the improvement comprising split means for retaining said butt within said yoke, a spherical surface on the top portion of said butt, and a cylindrical-shaped retaining surface on the upper strap of said yoke in mating engagement with said spherical surface on the top portion of said butt when said coupler is in a normal operative position, whereby said spherical surface and said retaining surface in cooperation with said other engaging surfaces and said resilient means resist drooping of said coupler when said coupler is in its normal operative position.

2. The assembly set out in claim 1 wherein said split means for retaining said butt comprise spaced keys within said head portion of said yoke having spherical surfaces corresponding to said forward spherical surfaces within said head portion, said keys being mateably engaged with said forward spherical surfaces of said butt during rotation of said coupler.

3. The assembly set out in claim 1 including stops on said upper and lower straps of said yoke proximate said head portion to limit forward movement of said front follower when the yoke is forced rearward.

4. The assembly set out in claim 1 wherein said concave and convex surfaces are spherical surfaces struck from a center that is located forward of the center of said forward spherical surfaces.

5. The assembly set forth in claim 4 wherein said front follower is spaced from said upper and lower straps.

6. The assembly set forth in claim 4 wherein said spherical surface on the top portion of said butt is struck from the center of said forward spherical surfaces.

7. The assembly set out in claim 6 wherein said retaining surface within said yoke has an axis in line with the centerline of draft of said assembly and said centers of said concave and convex surfaces and said forward spherical surfaces lie on said axis.

8. A rotary coupler assembly comprising a yoke having an upper and a lower strap connected to a head portion, a front follower intermediate said upper and lower straps, a coupler having a butt portion intermediate said straps, surfaces on the front of said butt and within said head portion of said yoke in mating engagement, surfaces on the rear of said butt and the front of said front follower in mating engagement, means to force said front follower into engagement with the rear of said butt, and stops on said upper and lower straps to limit forward movement of said upper and lower front follower when the yoke if forced rearward from its normal operative position.

9. The assembly set out in claim 8 wherein said surfaces on the front of said butt and within said head portion of said yoke are spherical, an upper spherical surface is located on the top of said butt, said upper spherical surface having a center corresponding to the center of said forward spherical surfaces on said butt and within said head portion, and a cylindrical surface is located on the upper strap of said yoke and is in mating engagement with said upper spherical surface, said upper spherical surface and said cylindrical surface in combination with said other engaging surfaces and said means to force resist drooping of said coupler.

10. The assembly set out in claim 9 including spaced keys within said head portion of said yoke having spherical surfaces corresponding to said spherical surfaces within said head portion, said keys being mateably engageable with said spherical surfaces on the front of said butt during rotation of said coupler.

11. The assembly set out in claim 9 wherein said surfaces on said front follower and the rear of said butt are spherical and have a center forward of said center of said spherical surfaces on the front of said butt and within said head portion, both of said centers being located on the centerline of draft of said assembly, and the axis of said cylindrical surface corresponds to said centerline of draft.

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 3,613,902

DATED : October 19, 1971

INVENTOR(S) : Russell G. Altherr

It is certified that error appears in the above—identified patent and that said Letters Patent is hereby corrected as shown below:

Column 1, line 32, "or" should read -- of --.

Column 1, line 62, delete "H" first occurrence.
Column 4, line 30, delete "upper and lower".
Column 4, line 31, "if" should read -- is --.

Signed and Sealed this

Twenty-fourth Day of *January 1984*

[SEAL]

Attest:

GERALD J. MOSSINGHOFF

Attesting Officer

Commissioner of Patents and Trademarks