

United States Patent

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[15] 3,635,357

[45] Jan. 18, 1972

[54] MODIFIED PINHOLE FOR RAILWAY COUPLERS

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[22] Filed: Aug. 10, 1970

[21] Appl. No.: 62,540

[52] U.S. Cl. 213/64, 213/62, 213/69

[51] Int. Cl. B61g 9/00

[58] Field of Search 213/62, 64, 67, 69

[56] References Cited

UNITED STATES PATENTS

2,889,940 6/1959 Metzger 213/69

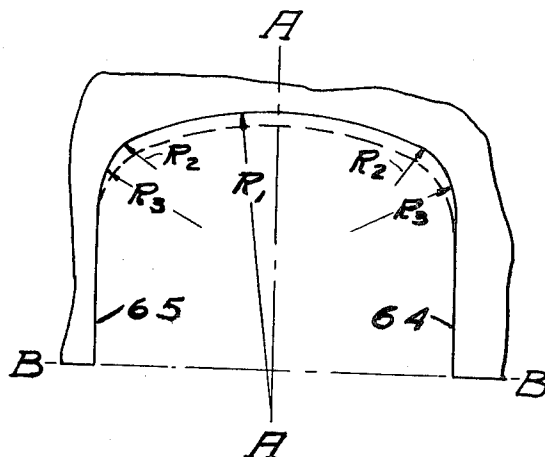
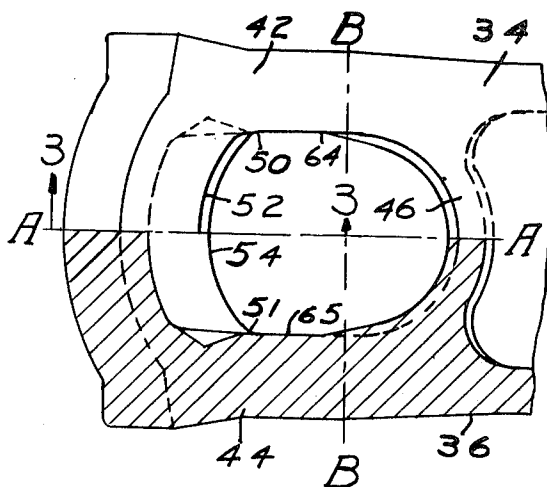
2,973,103 2/1961 Tack 213/64
3,402,825 9/1968 Gray et al. 213/64
3,568,857 3/1971 Altherr 213/64

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[57] ABSTRACT

An improved pinhole for a standard A.A.R. (Association of American Railroads) type "F" coupler having a top and bottom strap formed in a compound curve generated by multiradii. The straps formed thusly provide reduced stress levels in tension and compression through the coupler centerline as well as through the rear corner radii at the pinhole thereby minimizing coupler failures at these points.

3 Claims, 5 Drawing Figures



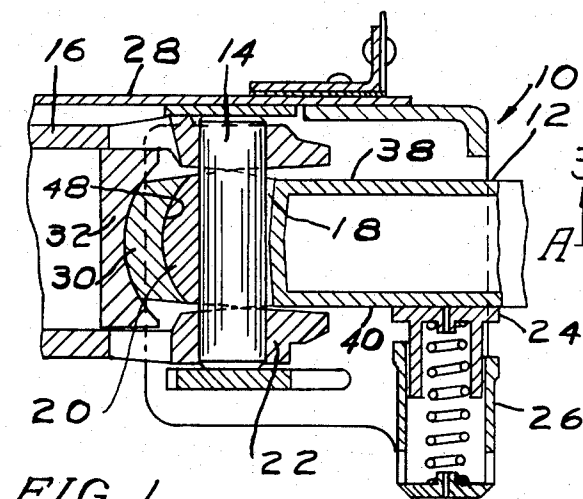


FIG. 1

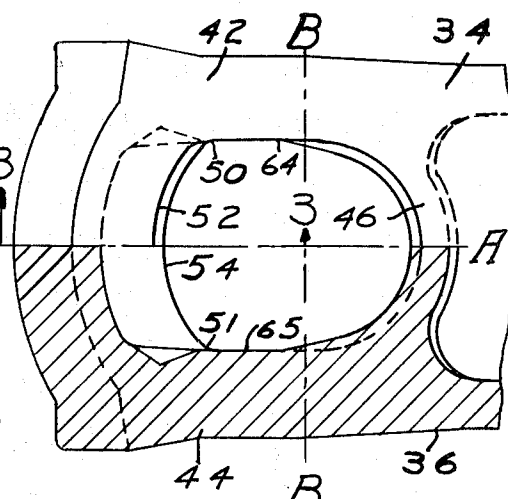


FIG. 2

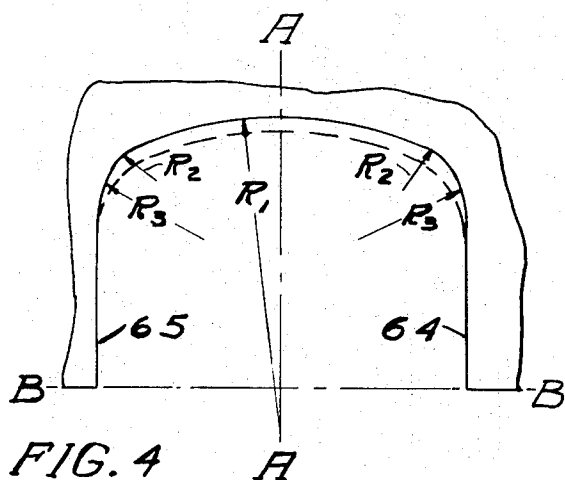


FIG. 4

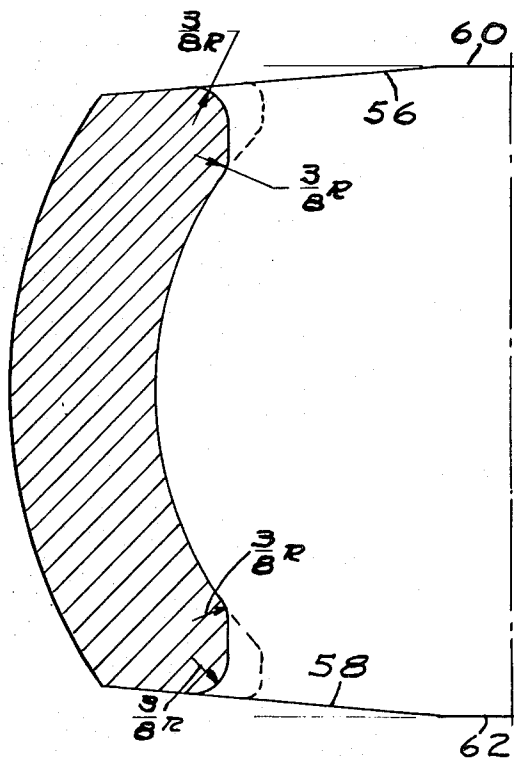


FIG. 3

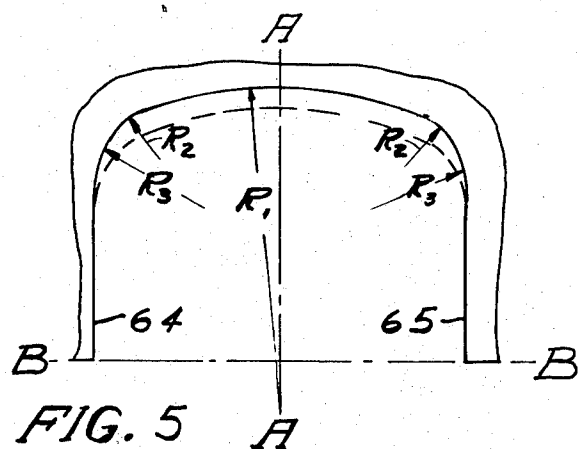


FIG. 5

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MODIFIED PINHOLE FOR RAILWAY COUPLERS

BACKGROUND OF THE INVENTION

This invention relates generally to railway car couplers and more particularly to the pinhole through the shank end of an A.A.R.-type "F" coupler.

The Association of American Railroads prescribes both physical and dimensional standards for railway car couplers of the A.A.R. approved type "F" coupler which is used extensively throughout the United States. The dimensions of the "F" type coupler are closely controlled and the coupler casting requires no machining.

One purpose of the A.A.R. standards is to make the knuckle the weakest part of the coupler. A failure of the knuckle is preferred in order to prevent the coupler from severing in other locations and causing possible coupler disengagement, underframe damage and derailment.

It has been known for some time that under heavy load conditions, severance of the coupler shank in the pinhole area has occurred prior to the failure of the knuckle. Minute cracks starting at the intersections of the sidewalls of the pinhole and the butt, radiate outwardly transverse to the shank until failure occurs. Other cracks have also been found in the butt along the longitudinal centerline of the coupler which previously has their origin along the top and bottom straps of the butt in the pinhole area thereby weakening the shank and often causing the butt to sever.

SUMMARY OF THE INVENTION

In order to alleviate the problem of coupler shank failure due to cracks in the pinhole area, the present invention provides a new and novel improved pinhole for the standard A.A.R.-type "F" coupler. The pinhole has a top and bottom strap which is formed in a compound curve generated by a plurality of radii.

Accordingly it is an object of the invention to provide a new and novel pinhole for a coupler shank which results in reduced stress levels in tension and compression through the coupler centerline as well as through the rear corners of the pinhole.

Another object of the invention is to provide a new and improved pinhole for a type "F" coupler which results in improved coupler life and minimal coupler shank failure.

These and other objects and advantages will become apparent after reading the following description of the preferred embodiment and from a study of the drawing.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a fragmentary side sectional view of an A.A.R.-type "F" coupler shank connected to the underframe of a railway car;

FIG. 2 is an enlarged fragmentary top plan view, partly in section, illustrating the pinhole area of the shank of an A.A.R.-type "F" coupler;

FIG. 3 is an enlarged side section view taken along line 3—3 of FIG. 2 illustrating the new contour of the pinhole area with the old contour shown in dashed lines;

FIG. 4 is a fragmentary top plan view of FIG. 3 illustrating the new contour of the pinhole area with the old contour shown in dashed lines; and

FIG. 5 is a fragmentary bottom plan view of FIG. 3 illustrating the new contour of the pinhole area with the old contour shown in dashed lines.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawing in general and particularly to FIG. 1, there is shown an A.A.R.-type "F" coupler generally designated by the numeral 10 which comprises a rearward shank 12 and a forward knuckle not shown in the drawing. A pin 14 has its ends journaled in a yoke 16 and projects through a pinhole 18 in the shank 12. A pin-bearing block 20 located in the pinhole 18 is engageable with the pin 14 for pivotal universal connection of the coupler 10.

The coupler shank 12 is supported in the area of the pinhole 18 by a wall 22 of the yoke 16 and also at its forward end by a flexible coupler carrier 24 mounted in a striker casting 26.

The yoke 16 and striker casting are secured to the underframe 28 of the railway car not shown in the drawing. A butt 30 of the shank 12 contacts a front follower 32 which in turn engages a draft gear not shown in the drawing.

Referring now to FIGS. 1 and 2, the shank 12 comprises a boxlike section defined by sidewalls 34 and 36, a top wall 38 and a bottom wall 40. The pinhole 18 is located rearward of this section and is defined by the butt 30, walls 42 and 44 which are extensions of the sidewalls 34 and 36 and a transverse front wall 46 which encloses one end of the boxlike section. A spherical bearing seat 48 is located in the pinhole 18 on the butt 30 and is in mating engagement with a cooperating spherical bearing surface on the pin-bearing block 20.

When the coupler is subjected to heavy service, cracks form at the rear corner of the pinhole at intersections 50 and 51 of the butt 30 and the pinhole walls 42 and 44. These cracks radiate outward transverse to the walls 42 and 44, eventually causing the butt to sever from the shank 12. Other cracks start along the longitudinal centerline A—A of the shank 12 on the top and bottom straps 52 and 54 of the butt 30 resulting in separation of the butt in this area.

In both the standard and the improved design illustrated in FIGS. 3-5, the centerline B—B of the pin 14 may be located by A.A.R. dimensions that are readily available to those skilled in the art. The radius of the bearing seat 48 may also be maintained according to A.A.R. dimensions so that an A.A.R. approved bearing block 20 may be used. The top and bottom surfaces 56 and 58 may angle away from their respective A.A.R. dimensioned upper and lower sidewall surfaces 60 and 62 according to standard A.A.R. dimensions and become part of the top and bottom surfaces of the butt 30. The inner surfaces 64 and 65 may also be located by standard A.A.R. dimensions at section B—B to assure proper relationship to pin 14 during rotation of the coupler.

The dashed lines in FIGS. 3-5 illustrate the present A.A.R. approved contour for type "F" couplers at the top and bottom straps 52 and 54. The top strap 52 shown in FIG. 4 is partially defined by a surface generated by the outer point of a radius R_1 struck from a point on the longitudinal centerline A—A. A pair of side radii R_3 are then struck from a point within the pinhole 18 so that their generated arcs are tangential to the sidewall inner surfaces 64 and 65. Completing the improved pinhole contour are a pair of connecting radii R_2 which are also struck from a point within the pinhole so that their generated arc are tangential to the arcs generated by R_1 and R_3 .

In the improved embodiment shown in FIGS. 3-5 the stress concentration is greatly reduced at section A—A by the use of the large concave radius R_1 , which may range in length from 3 inches up to and including infinity. The stress concentration at the sidewalls is also greatly reduced by the use of the pair of side radii R_3 and the pair of connecting radii R_2 which results in an increase in section as the radius progresses rearward from sidewalls 64 and 65. The exact location of the pair of connecting radii R_2 is determined by the relative stiffness of the butt 30 and the sidewalls 34 and 36 to be near the point of inflection. The pair of side radii R_3 are generally greater than three-quarters of an inch in length. The bottom strap 54 shown in FIG. 5 is formed in a manner similar to the top strap 52 with the plurality of radii R_1 , R_2 and R_3 .

It has been observed that while metal is actually removed from the butt 30 and the intersections 50 and 51, the strength of the coupler shank 12 is not substantially reduced. The improved top and bottom straps 52 and 54 have been found after extensive tests to have greatly reduced stress levels in tension and compression over prior art standard A.A.R. contours thereby increasing coupler life and notably reducing failures in the pinhole area 18. Actual test results with tension and compression loadings of a prior art standard coupler and an improved coupler of the present invention show that the im-

proved coupler of the present invention materially reduced stress concentrations at the failure points.

It will be understood that the exact dimensions of the three radii R_1 , R_2 and R_3 will be determined by experimentation and may be changed within the limits defined in the claims without departing from the spirit and scope of the invention. For example, it has been found that when $R_1=3$ inches an acceptable pinhole contour is developed when $R_2=11/16$ inch and $R_3=1$ 5/16 inches. And similarly, when $R_1=3\frac{1}{2}$ inches, R_2 may be $\frac{3}{4}$ inch and R_3 may be $1\frac{1}{2}$ inches. When R_1 is increased to infinity, then R_2 may be $1\frac{1}{4}$ inches and R_3 may be $1\frac{1}{2}$ inches in length.

I claim:

1. In an A.A.R. standard type "F" coupler of the type having a shank end with a pinhole therethrough, said pinhole being partially defined by a pair of sidewalls and a concave bearing surface which opens toward the pinhole centerline, a curved top and bottom strap, symmetrical about the longitudinal centerline of the shank and formed on the bearing sur-

face and blended into the sidewalls, the improvement comprising the top and bottom strap being formed in a compound curve generated by the radii R_3 , R_2 , R_1 , R_2 , R_3 in that order wherein

- a. R_1 is a central radius struck from a point substantially on the longitudinal centerline of the shank, so that its generated arc is symmetrical about the longitudinal centerline;
 - b. R_3 is a side radius struck from a point within the pinhole so that its generated arc is tangential to the sidewalls; and
 - c. R_2 is a connecting radius struck from a point within the pinhole so that its generated arc is tangential to the arc generated by R_1 and R_3 .
2. The improvement as defined in claim 1 wherein the radius R_1 ranges from 3 inches to infinity.
 3. The improvement as defined in claim 2 wherein the radius R_3 is equal to or greater than three-quarters of an inch.

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