ABSTRACT: A standard A.A.R. (Association of American Railroads) type "F" coupler is improved in the pinhole area of the shank to reduce cracks and shank end failure. The pinhole is partially defined by the butt which has top and bottom straps and by a pair of sidewalls connected to the butt. Radial surfaces generated by 1 inch radii are tangential to the sidewalls and the straps. The straps are further blended into the upper and lower surfaces of the coupler and a concave bearing surface in the butt.
Fig. 1.

Fig. 2.

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RAILROAD COUPLERS

This is a continuation-in-part of my copending U.S. Patent application, Ser. No. 747,778, filed July 18, 1968, and now abandoned. This invention relates generally to railroad car couplers and more particularly to the shank end of A.A.R. type "F" couplers.

The A.A.R. (Association of American Railroads) prescribes physical and dimensional standards for railroad components. Among these components is the A.A.R. approved type "F" coupler which is used extensively throughout the United States. The dimensions of the type "F" coupler are closely controlled and the casting requires little machining.

One of the purposes of the A.A.R. standards is to make the knuckle the weakest part on the coupler. Failure of the knuckle prevents the coupler from severing in another location causing possible coupler disengagement, underframe damage and derailment.

It has been known for some time that under heavy load conditions, severance of the shank of A.A.R. couplers has resulted in failure of the shank. The shank has generally severed proximate the pin hole area. Cracks, starting at the intersection of the sidewalls of the pinhole and the butt, radiate outward, transverse to the shank, until failure occurs. Other cracks have also been found in the butt along the longitudinal centerline of the coupler. These later cracks generally start along the top and bottom straps of the butt proximate the pinhole weakening the shank and often causing the butt to sever.

It is therefore an object of this invention to provide a shank for a type "F" coupler which has improved stress characteristics under heavy load conditions.

Another object of this invention is to provide an improved shank for a type "F" coupler which may be used with standard A.A.R. parts.

An additional object of this invention is to provide a contour in the pinhole of the shank of a coupler which will prolong the coupler's service life.

Still another object of this invention is to provide an improved type "F" coupler which will warrant approval of the A.A.R. in substitution of the present type "F" coupler in current use.

Various other objects and advantages of this invention will become apparent from the following description and the accompanying drawings wherein:

FIG. 1 is a fragmentary side elevational view, partly in section, of an A.A.R. type "F" coupler 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 sectional view taken on line 3-3 of FIG. 2 illustrating a new contour in dot-dash lines on an A.A.R. type "F" coupler with the old contour shown in solid lines;

FIG. 4 is a fragmentary top plan view of FIG. 3 illustrating the new contour in dot-dash lines on an A.A.R. type "F" coupler with the old contour shown in solid lines; and

FIG. 5 is a fragmentary bottom plan view of FIG. 3 illustrating the new contour in dot-dash lines on an A.A.R. type "F" coupler with the old contour shown in solid lines.

Referring now to the drawings, FIG. 1 illustrates an A.A.R. type "F" coupler, generally designated 8 having a rearward shank end 10 and a forward knuckle end 12. A pin 14 has its ends journalled in a yoke 16, only a part of which is shown, and projects through a pinhole 18 in the shank 10. A pin bearing block 20 located in the pinhole 18 is engaged with the pin 14 in a pivotal universal connection of the coupler 8. The shank 10 is supported proximate the pinhole 18 by a wall 22 of the yoke 16 and at its forward end by a flexible coupler carrier 24 mounted on a striker casting 26. The yoke 16 and striker casting 26 are secured to the underframe 28 of a railway car (not shown). The butt 30 of the shank 10 contacts a front follower 32 which in turn engages a draft gear (not shown).

As illustrated in FIGS. 1 and 2, the shank 10 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 side walls 34 and 36, and a radial 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 49 on the pin bearing block 20 (FIG. 1).

When the coupler 8 is subjected to heavy service, cracks form at the intersections 50 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 30 to sever from the shank 10. Other cracks start along the longitudinal centerline A-A of the shank 10 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 pin 14 may be located by A.A.R. dimensions that are readily available to those skilled in the art. The radius of 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 of the sidewalks (only one shown) may angle away from their respective A.A.R. dimensioned upper and lower sidewalk 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 of the sidewalks may also be located by standard A.A.R. dimension.

The solid lines in FIGS. 3-5 illustrate the A.A.R. approved contour for type "F" couplers according to A.A.R. dimensions. The top strap 52, only one-half of which is shown in FIG. 4, is partially defined by a surface generated by the outer point of a 3-inch radius struck from a point on line A-A five-sixteenth of an inch forward of centerline B-B. Radial surfaces, at the intersections 50, are generated by the outer points of 1/2-inch radii and are tangent to the inner surfaces 64 of the sidewalks 42 and 44, only one of which is shown, and the 3-inch generated surface of the top strap 52. The top strap 52 is respectively blended into the top surface 56 and the bearing seat 48 by radial surfaces tangent thereto and to the 3-inch generated surface of top strap 52.

In one embodiment of the modified design, the striking point of the 3-inch generated surface 52a may be moved rearward, along line A-A toward line B-B a distance of nine thirty-seconds of an inch to point 57, and the 1/2-inch radii may be increased to 1-inch radii. Radii from three-fourths of an inch to 1½ inches will also work. These changes have a substantial effect on the intersections 50 and greatly reduces the formation of cracks in this area. By moving the top strap 52 rearward, the radius of the upper tangential radial blending surface, as shown in FIG. 3, may be maintained at three-eighths of an inch while the radius of the lower blending surface may be increased from three-sixteenths of an inch to three-eighth of an inch thereby reducing the metal concentration in the top strap. Although these two blending surfaces are shown as being generated from radii they may also be curved surfaces. This reduction in metal concentration results in a corresponding reduction in cracks along the longitudinal centerline A-A. As illustrated in FIG. 5, the bottom strap 54, according to A.A.R. specifications, is partially formed by a surface generated by the outer point of a 3-inch radius struck from a point three-eighths of an inch forward of line B-B on line A-A. Radial surfaces generated by the outer points of 1/2-inch radii are tangential to the inner surface 64 of sidewalks 42 and 44, only one of which is shown, and to the 3-inch generated surface of the bottom strap 54. The 3-inch generated surface of bottom strap 54 is further blended into the bearing seat 48 and the lower surface 58 by tangential radial surfaces generated by 3/16-inch radii as shown in FIG. 3.

The modified bottom strap 54 may have its striking point for the 3-inch radius nine thirty-seconds of an inch rearward of the A.A.R. approved design. The 1/2-inch radii may be in-
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3. Radii from three-fourths of an inch to 1 ½ inches will also work. By moving the 3-inch generated surface rearward, the radii of the radial tangential blending surfaces, as illustrated in FIG. 3, may be increased from three-sixteenths of an inch to three-eighths of an inch. Although these surfaces are shown as radial surfaces, they may also be curved surfaces. These modifications result in a substantial decrease in the number of cracks formed in the bottom strap 54a, and in the intersections 50.

It should be noted that although metal is actually removed from the butt 30 and the intersections 50, the strength of the shank 10 is not substantially reduced. The redesigned areas 50, 52a and 54a have been found to have superior stress characteristics over standard A.A.R. contours thereby increasing the coupler’s life, and notably reducing failures in the pin hole area 18. It should be noted that although 3-inch radii are shown in the modified design, other radii or curved surfaces may be used for the strap surfaces 52a and 54a. The surfaces 52a and 54a are preferably maintained rearward of pin centerline B-B, e.g., 2% inches on longitudinal centerline A-A, to permit usage and movement of an A.A.R. standard pin bearing block 20 and an A.A.R. standard pin 14.

It is to be understood that the dimensions may be modified from the ones illustrated in FIGS. 3—5. Moving the straps 52 and 54 rearward results in a loss of strength in the shank while moving the straps 52 and 54 forward results in increased stress concentration and more rapid failure. Within given limits these changes in strength and stress are minimal. Although only one cross section of surface 52 and 54 is shown, it is to be understood that these surfaces will be blended into the surfaces 56, 58, and 48 along their length according to the changes made and standard founding practices. While the invention has been illustrated in one embodiment, it is recognized that variations and changes may be made therein.

I claim:

1. A coupler typified by the Association of American Railroads standard type “F” coupler comprising:
a shank end;
a pin hole in said shank end having a transverse centerline, said pinhole being partially defined by a butt rearward of said transverse centerline and a pair of sidewalls connected to said butt, said butt having a concave bearing surface opening toward said transverse centerline and having upper and lower surfaces;
a top strap on said butt intermediate said concave bearing surface and said upper surface, said top strap having a curved surface symmetrical about the longitudinal centerline of said shank and opening toward said transverse centerline;
a bottom strap on said butt intermediate said concave bearing surface and said lower surface, said bottom strap hav-