

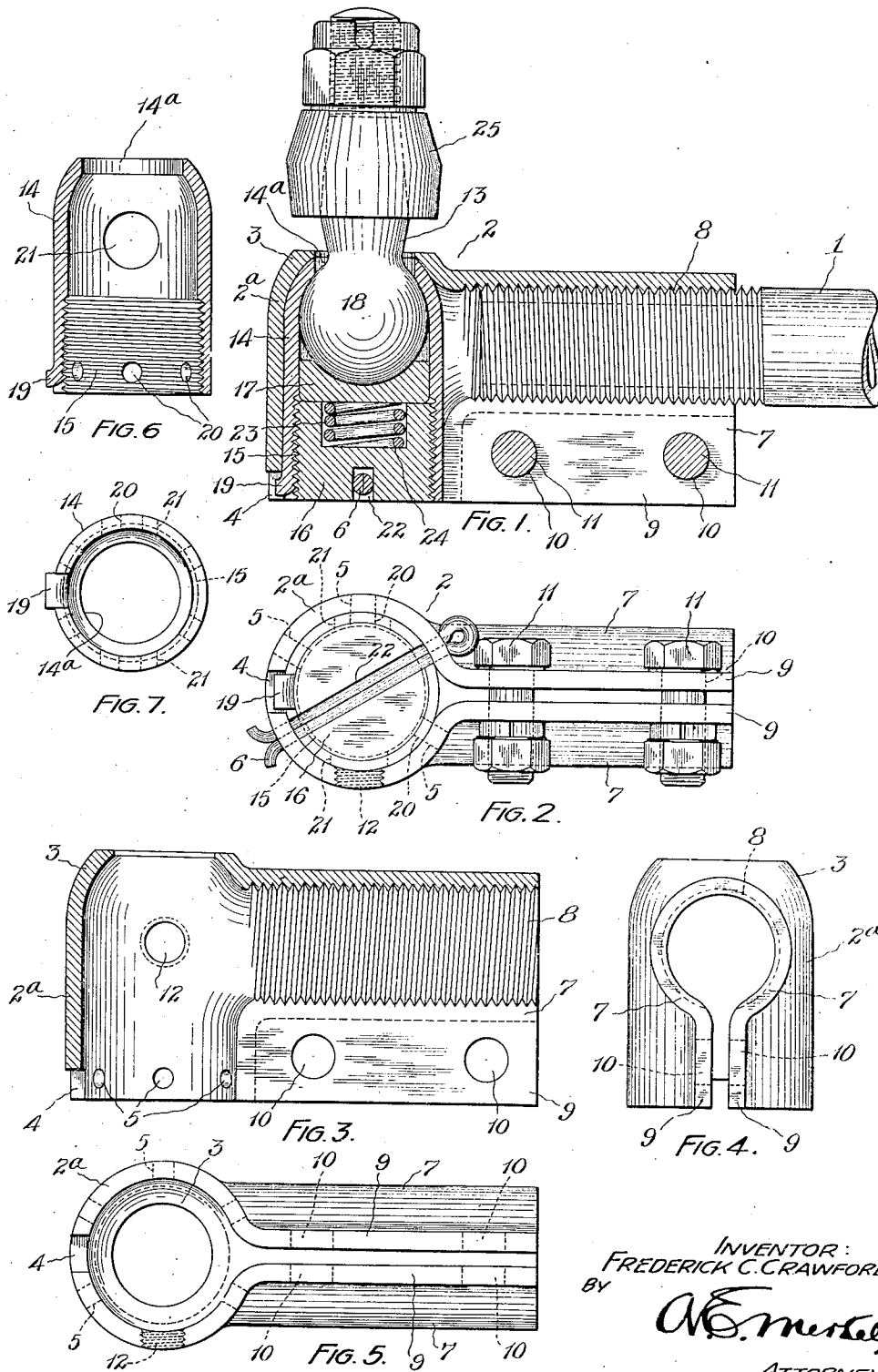
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TIE ROD END CONSTRUCTION

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TIE-ROD END CONSTRUCTION

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The invention relates to constructions for the ends of tie rods or connecting rods. As is well known, the tie rod or connecting rod of an automobile is that rod which connects one arm of a front steering knuckle to a like arm on the opposite side to compel simultaneous turning of the front wheels when one of the steering knuckles is moved by the operation of the steering wheel. This invention is particularly applicable to such a tie rod, but it is applicable also to any rod to the end of which it is desired to connect a ball joint.

The object of the invention is to lessen the manufacturing costs of such constructions without sacrificing the advantages of prior devices of this character, and at the same time secure additional advantages as will appear from the following description.

The invention consists of the novel construction and arrangement hereinafter described and claimed. The invention is capable of embodiment in various forms and combinations, but the best form which I have thus far contemplated is shown in the annexed drawings and which I shall now proceed to describe.

Referring to the annexed drawings:

Figure 1 is a longitudinal vertical section through the end of the tie rod and ball joint;

Fig. 2 is a bottom plan of the tie rod end member, disconnected from the tie rod;

Fig. 3 is a longitudinal vertical section through the end member.

Fig. 4 is an end elevation of the end member shown in Fig. 3, looking at the left hand end;

Fig. 5 is an underside plan view of the end member shown in Fig. 3;

Fig. 6 is a detail vertical sectional view through the ball casing; and

Fig. 7 is an underside plan view of the ball casing as shown in Fig. 6.

Referring to the drawings in detail, a tie rod as contemplated by my invention is made up of two tie rod end members, and an intermediate member 1, threaded at opposite ends, one end having right-hand and the other left-hand threads, whereby, by rotating it, the ball studs, at its ends, hereinafter described, may be adjusted toward or away

from each other, for a purpose well known to those skilled in the art.

The tie rod end members, designated generally by 2, are alike except that one is adapted to the right-hand thread and the other to the left-hand thread of the intermediate member, and except for another slight difference hereinafter pointed out, adapting it to its appropriate end; therefore but one of the ends will be described.

The tie rod end member 2 is made in the form of a stamping from flat metal stock, in which feature resides one of its most important advantages. It comprises a ball-joint housing 2a, shaped out of an intermediate portion of the metal stock, open at the top and bottom, drawn in slightly about the top, as indicated at 3, but of uniform diameter therebelow. The lower portion of this ball joint housing is provided with a recess 4 preferably cut out of the lower edge thereof at its outermost point, and with a plurality of apertures 5 (Fig. 3) adapted to receive a cotter pin 6. The ends of the metal stock are extended laterally from the ball joint housing, forming adjacent wings 7, each wing being formed into semi-cylindrical shape, internally threaded as indicated at 8, (Fig. 3), with a downwardly projecting flange 9, pierced by bolt receiving apertures 10, adapted to receive bolts 11, with which the flanges are brought together to firmly clamp the end members to the threaded ends of the rod intermediate and simultaneously to a ball casing 14, hereinafter described. The side of the housing 2a is provided with a lubricating aperture 12.

To serve as a retaining means and bearing for a ball stud 13, a ball casing 14 is provided of cylindrical form, drawn in at the top, which snugly fits within the ball joint housing. This casing may be made in any of the known ways of making such parts, but preferably by stamping. The lower end of the ball casing is internally threaded, as indicated at 15, thus being adapted to receive an externally threaded retaining plug 16, to retain a ball seat 17 in position to serve as a bearing for the ball 18, of the ball stud 13. The lower end of the ball casing has

an outwardly extending lug 19, preferably formed by striking up and bending out a small portion of the metal. This lug 19 is adapted to engage in the recess 4 formed in the lower edge of the housing 2a and serves to hold the ball casing against turning within the housing and also to properly register the lubricating aperture 12 in the ball casing, hereinafter described. The ball casing 14 has near the lower edge a plurality of small cotter pin receiving apertures 20, adapted to register with the apertures 5 of the housing 2a. Above the middle portion of the ball casing 14, two lubricating apertures 21 pierce the wall of the casing at diametrically opposite points, either of which may be registered with the lubricating aperture 12 formed in the housing 2a. The reason for employing two diametrically opposite apertures 21 in the ball casing although there is but one in the housing 2a, is in order that the ball casing may be used at either end. The end members 2 themselves must be made right and left hand, but the ball casing 14 is adapted for use in either end, one of the lubricating apertures being inutile; but as it is closed by the imperforate wall of the housing 2a this fact does not interfere with proper functioning. In the outer end of the retaining plug 16 a kerf 22 is formed, adapted to receive the shank of the cotter pin 6. Between the upper end of the retaining plug 16 and the ball seat 17 an anti-rattling spring 23 is interposed, preferably by seating the spring in a recess 24 in the upper end of the plug.

After wear has taken place in the ball-joint, the retaining plug 16 may be turned up to take up any looseness in the joint, the plurality of apertures 5 and 20 in the housing and ball casing permitting a fine adjustment for this purpose. In the embodiment shown on arm 25 of the steering knuckle is engaged with the shank 13 of the ball stud. Any suitable packing and spacing means and dust cover may be interposed between the top 3 of the housing and the connected arm 25.

Notwithstanding the apparent simplicity of the construction above described a number of features are of great importance. By forming the tie rod end member of a stamping the cost of the tie rod is very substantially reduced. By reason of the arrangement shown two clamping bolts serve to securely engage the end member with the intermediate tie rod member and at the same time securely clamp the ball casing and assembled ball stud and ball seat in place in the ball joint housing. Means for lubrication of the ball-joint is provided in a very simple yet efficient way. By the means adopted a single ball casing serves at either end of the tie-rod, which lessens the cost of production as well as cost of assembling. The ball stud assembly is a unitary structure, as

it is apparent that the ball stud may be entered from the larger end of the ball casing 14, shank first, until the shank passes through the contracted opening 14' at the top of the ball casing. The ball seat may then be inserted and pressed against the ball 18, after which the screw threaded plug is inserted. In this unitary form the ball joint assembly may be handled until it is desired to assemble it with the ball joint housing, when this unitary structure may be passed into the larger end of the housing, ball shank first, and the whole secured in place by inserting the cotter pin 6 in the appropriate apertures of the housing and ball casing.

From the above description it will be seen that I have provided a construction which meets all the requirements of devices of this kind, which may be manufactured at a small cost, yet which is safe, strong and durable, and capable of ready adjustment to meet all conditions. While I have described specific details of the best form of the invention now known to me, it is obvious that the parts may be varied greatly in structure, and that different features thereof may be used with other features which may differ greatly from those shown. It is therefore to be understood that the invention includes all structures comprehended within the terms of the appended claims.

What I claim is:

1. A tie-rod end construction consisting of a stamping comprising a ball-joint housing and clamping wings extending therefrom at a right angle thereto each wing having a semi-cylindrical internally threaded portion and a lower flange, a ball casing seated in the housing, an externally threaded tie-rod seated in the internally threaded wing extensions, and means engaging the wing flanges to draw the stamping tightly into engagement with the tie-rod and the ball casing.

2. In a rod coupling, in combination, a stamping comprising a tubular ball-joint housing having an upper contracted end and clamping wings extending therefrom at right-angles thereto adapted to engage and be clamped to a tie-rod, a tubular ball-seat having an upper contracted end to fit the contracted end of the ball-joint housing, and a ball stud having its ball seated in the ball seat with its shank extending upwardly through the contracted end of said seat.

3. A tie rod end construction comprising a ball joint housing, a ball casing in said housing, clamping wings extending therefrom at a right angle thereto and adapted to simultaneously engage a tie rod end and the ball casing, the ball joint housing and the end of the ball casing having a coacting projection and indentation, and means to draw the wing sections tightly about the ball casing.

4. An end construction for a tie rod comprising a housing, clamping wings on said

housing adapted to encircle an end of a tie rod, a ball joint casing in said housing, and means for securing said wings together, whereby to clamp said housing on said casing and said tie rod end.

5 5. An end construction for a tie rod comprising a housing, clamping wings on said housing adapted to encircle an end of a tie rod, a ball casing in said housing, means for interlocking said housing and casing, and
10 means for securing said wings together, whereby to clamp said housing on said casing and said tie rod end.

6. The combination specified in claim 5 in which the means for interlocking the housing and casing consist of a projection on one of said elements and a recess in the other.

7. A tie rod end construction consisting of a stamping comprising a ball joint housing
20 and clamping wings extending therefrom at a right angle thereto, a ball casing seated therein, and means for interlocking said housing and casing comprising a lug struck from the lower edge of one of said elements and engaged in a notch in the lower edge of said
25 other element.

8. A device for joining the end of a pair of rods including a ball joint connection comprising a housing having a pair of clamping
30 wings extending therefrom and adapted to encircle an end of one of said rods, a ball joint casing in said housing, a ball stud in said casing, means for interlocking said housing and casing and means for securing said clamping
35 wings together to thereby clamp said housing about said casing and said end of one of said rods.

9. An end construction for a tie rod comprising a housing including a tubular portion
40 having a restricted upper end, clamping wings on said housing adapted to encircle the end of a tie rod, a ball casing having a restricted upper end situated in said housing, means for interlocking said housing and casing and means for securing said wings together whereby to clamp the tubular portion
45 of said housing on said casing.

10. An end construction for a tie rod including a ball joint connection and comprising
50 a relatively flexible housing having a tubular portion enclosing said ball joint, a second tubular portion at right angles to said first tubular portion adapted to encircle the end of a tie rod, said second tubular portion being split, coacting flanges along the edges formed by said split, a ball casing in
55 said housing, and means for securing said flanges together to clamp said first tubular portion on said casing and said second tubular portion about said tie rod end.

Signed by me this 25th day of November, 1925.

FREDERICK C. CRAWFORD.