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2,213,448

METHOD OF MANUFACTURING UNIVERSAL JOINTS

Filed March 22, 1938

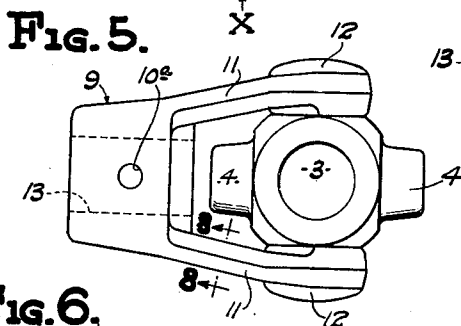
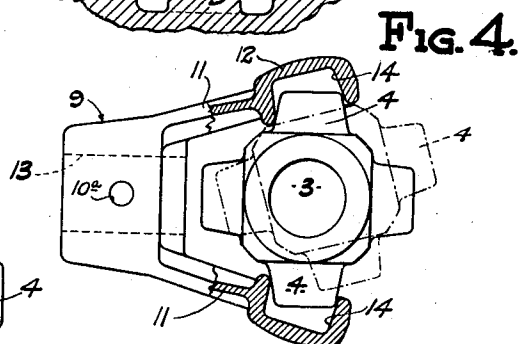
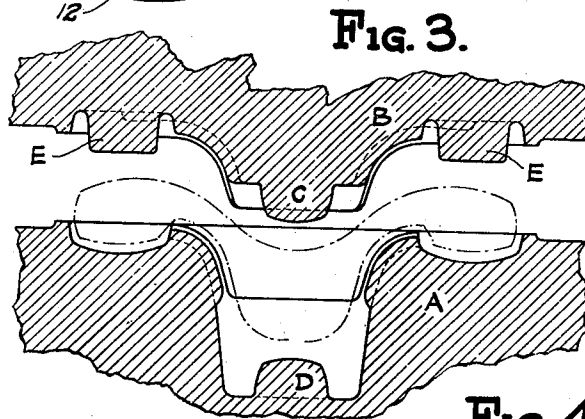
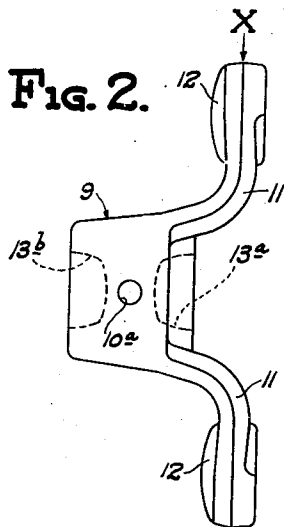
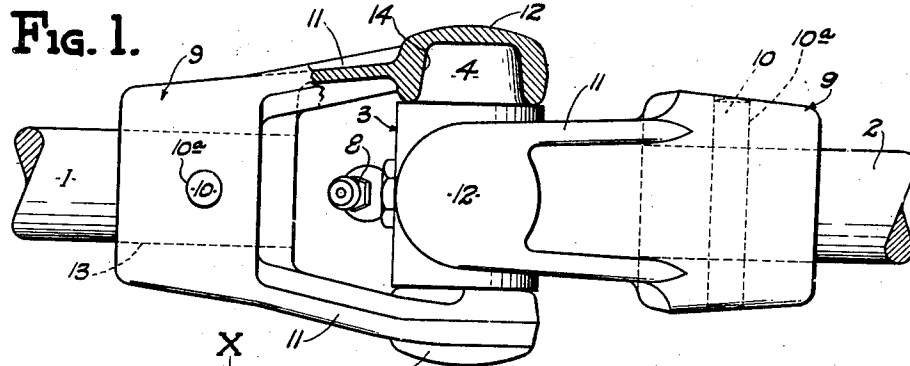


FIG. 6.

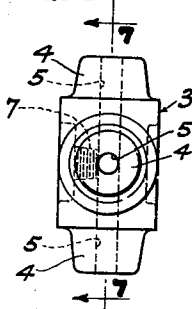


FIG. 7.

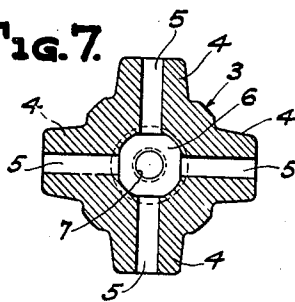


FIG. 8.



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METHOD OF MANUFACTURING
UNIVERSAL JOINTSCharles K. Morton, Cleveland, Ohio, assignor to
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4 Claims. (Cl. 29—148.2)

This invention relates to forged universal joints of the type wherein a central cross member is provided with trunnions rotatably supported within seats provided therefor in the arms carried by the hubs which are attached to the shaft sections connected by the said joints. As joints of this type have been constructed heretofore, the forged arms containing the closed-end or cupped bearing seats for the trunnions have been welded onto the hubs, the hubs being made from tubing or bar stock.

It is the general purpose and object of this invention to provide a method of making forged joints of this character which will be superior in quality and cheaper of production than those which have been constructed heretofore.

The method whereby my joints are manufactured will be described in connection with the accompanying drawing wherein Fig. 1 represents a side elevation, with parts broken away, of a completed joint made in accordance with my invention; Fig. 2 a side elevation of one of the yokes produced in accordance with the first step of my method; Fig. 3 a detail in section taken through the forging dies which produce the construction shown in Fig. 2, the position of the rough forging with relation to the said die being shown in dot-and-dash lines; Fig. 4 a view in elevation, with parts broken away, and showing in dot-and-dash lines the position of the parts of the cross member while the latter is being inserted between the arms and also showing in full lines the position of the parts of the cross member when opposed trunnions thereof are properly aligned with respect to the cupped ends of said arms; Fig. 5 a view in elevation showing the positions assumed by the parts at the conclusion of the final step of my method; Fig. 6 a side elevation of the central connecting or cross member; Fig. 7 a sectional view corresponding to the line 7—7 of Fig. 6; and Fig. 8 a sectional view taken on the line 8—8 of Fig. 5.

Describing first the completed joint shown in Fig. 1 and the portion of the joint shown in Fig. 5, 1 and 2 denote shaft sections which are connected by the joint. The joint comprises a cross member having a body 3 provided with integral trunnions 4, each having a bore 5 for lubricant communicating with a central lubricant chamber 6, which receives lubricant through a passage 7 adapted to have any standard type of filling connection 8 threaded thereinto.

Cooperating with the cross member 3 are yokes comprising each a hub 9 secured to its shaft section in any conventional manner, as by means

of pins or screws 10 mounted in apertures 10^a in each hub. Projecting from the hubs are the arms 11, each provided with a cap 12 having therein a cupped or closed-end bearing seat 14 for the reception of a trunnion 4.

In order to overcome the objections noted hereinbefore, I have formed my joint in the following manner: The rough-forged blank shown in dot-and-dash lines in Fig. 3 is shown as resting upon the lower die member A, the said die member being so shaped as to enable the hub portion and the longitudinally extending portions of the arms and portions of the caps 12 to be formed therein. The upper die member B is so shaped as to complete the shaping of the arms and the caps at the ends of the arms and to form the cupped or closed-end bearing seats within said caps. It is also preferably provided with a central projection C adapted to form a portion of the bore for the hub 9, the lower die member being provided with a central projection D which is adapted to form another portion of the said bore. The projections for forming the cupped or closed-end bearing seats in the caps are shown at E. When the die members are closed, the forging will assume the shape shown in Fig. 2, wherein the line X—X indicates the parting line between the die members and 13^a and 13^b the portions of the hub bore that have been produced by the projections C and D, respectively. The seats 14 which have been formed in this operation are coin-pressed, so as to render it unnecessary to subject them to any further finishing operation.

Following the forging operation, the hub is drilled to complete the bore 13 therethrough. The arms are then subjected to forming dies which press them into the positions shown in Fig. 4, whereby the trunnions of the cross member 3 may be inserted between their respective seats 14. After the trunnions have been so inserted between and in line with their seats, the arms are subjected again to the action of forming dies which press them into the final positions shown in Figs. 1 and 5.

The cooperating yoke assembly is formed in the same manner and is united to the other trunnions of the cross member in the same manner as described in connection with the one shown in Figs. 2 to 5, inclusive.

The material which I prefer to use for the yoke constructions is drop-forged steel; and, because of the material employed and the method of making the yokes and coupling them with the cross members, I am enabled to produce universal joints of very high quality, without liability of

injuring the arms during the coupling operation and with a material saving in expense over the same type of joints when made in accordance with prior practices.

5 Having thus described my invention, what I claim is:

1. In the method of manufacturing a universal joint of the type comprising a pair of opposed yoke members having each a hub and arms and an intermediate cross member having trunnions, 10 producing a rough forging having a central hub projection and arms extending outwardly from said hub projection and each having a bearing projection at its outer end; subjecting the said rough forging to the action of forging dies there- 15 by to impart the final external shape to the hub projection and to provide the bearing projections each with a closed-end bearing seat for the reception of a trunnion; providing the hub thus 20 formed with a bore suitable for the reception of a shaft; pressing the arms toward each other with the ends thereof spaced apart a sufficient distance to enable opposed trunnions of a cross member to be received between the closed-end 25 bearing seats thereof; inserting opposed trunnions of the cross member between said seats; and pressing the arms into a position to enable the seats to assume their final positions with respect to said trunnions.

30 2. In the method set forth in claim 1, forming a

portion of the bore of the hub by the aforesaid operation of the forging dies.

3. In the process set forth in claim 1, coin pressing the cupped bearing seats within the ends of the arms. 5

4. In the method of manufacturing a universal joint of the type comprising a pair of opposed yoke members having each a hub and arms and an intermediate cross member having trunnions, producing a rough forging having a central hub 10 projection and arms extending outwardly from said hub projection and each having a bearing projection at its outer end, subjecting the object thus produced to the action of the following dies; first, to forging dies serving to impart the final 15 external shape to the hub projection and to provide the bearing projections each with a closed-end bearing seat for the reception of a trunnion, and second, to the action of forming dies serving to press the arms toward each other with the 20 ends thereof spaced apart a sufficient distance to enable opposed trunnions of the cross member to be received between the closed ends of the bearing seats thereof; inserting opposed trunnions of the cross member between said seats; and press- 25 ing the arms by forming dies into a position to enable the seats to assume their final positions with respect to said trunnions.

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