Nov. 22, 1932. F. H. RAGAN 1,888,835

METHOD OF MAKING AXLE HOUSINGS

Filed Oct. 18, 1930

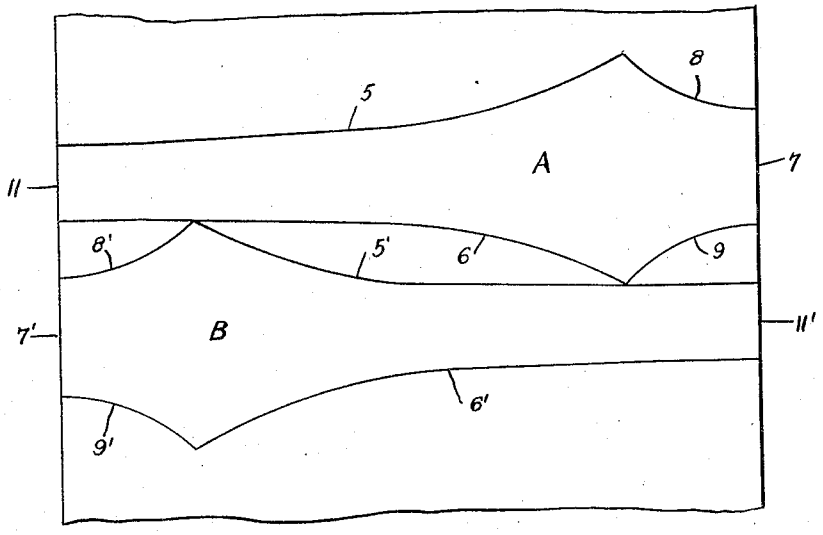


Fig. 1

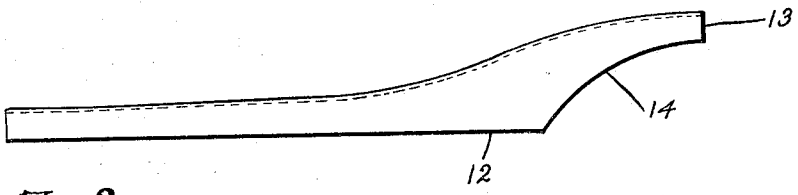


Fig. 2

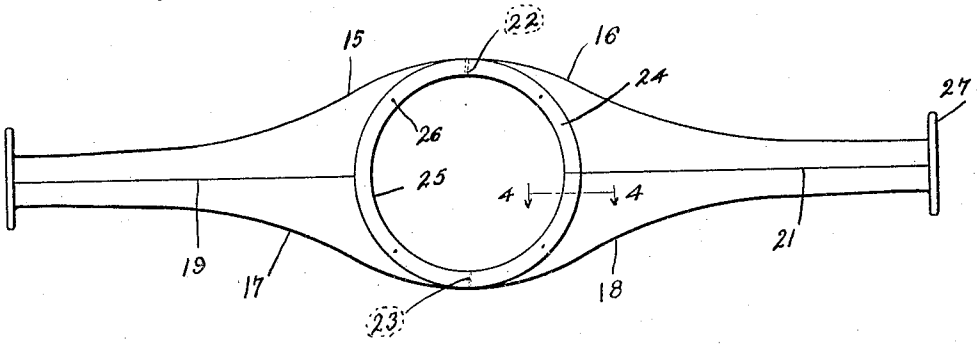


Fig. 3

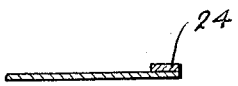


Fig. 4

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METHOD OF MAKING AXLE HOUSINGS

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This invention relates, as indicated, to a method of making axle housings, specifically housings adapted to be employed in self-propelled vehicles such as automobiles and the like, and relates particularly to a method which is more economical and more expeditious than any methed heretofore employed.

The cost of axle housings for automobiles when made in accordance with the methods hertofore employed has been excessive due to the fact that the extent of the pieces from which the housing is made is such that exceptionally large machinery and equipment is necessary to accomplish the forming operations by which such housings are made. The method of making axle housings as heretofore followed has been to stamp a flat blank of suitable sheet material from a flat sheet, such blank having the necessary outline so that after the same has been formed to the desired contour, it will produce substantially one-half of the finished axle housing. Such formed blank is then placed in juxtaposition with a complementary blank or axle housing half and the two portions welded together along diametrically opposite, longitudinally extending seams to produce the required finished structure. In the above described method the presses required to blank out the stock from which the housings are made have been exceptionally expensive in original cost as well as maintenance due to the fact that the blanks have been made to extend throughout the longitudinal extent of the housing. Another feature of the construction of the machinery employed in connection with the hereinbefore used method has been the cumbersomeness and magnitude of the presses or forming machines required to operate upon the flat blank of material and form the same into complementary axle housing halves. The entire axle housing half being made in a single unit has required the forming machine to be provided with dies which extend substantially throughout the longitudinal extent of the housing so that the forming operation could be reduced to as few steps as possible.

All of the above-named undesirable features of the hereinbefore used methods have tended toward the employment of exceptionally large machines in an endeavor to reduce the cost of the finished product by eliminating as much as possible the expenditure for manual labor. This has led to a condition which presently exists in the manufacturing field which has narrowed down the manufacture of axle housings to a relatively small number of plants due to the fact that the average size industrial unit cannot afford the expenditure of the enormous sums required for the machinery to accomplish the desired results of the old method.

It is well known in the art of machine shop practice that if a suitable unit to be operated upon can be reduced in size to within certain limits, the rate of production is speeded up much more than even directly proportional to the reduction in size of such elements. It is an object of my invention therefore to provide a method of making axle housings for automobiles and the like, which method shall contemplate the provision of a plurality of relatively small sections which can be efficiently and economically handled by relatively inexpensive equipment and further at a rate very far in excess of any rate of manufacture capable with the old cumbersome type of large elements. The manual labor element is purposely injected into the method comprising my invention in order to reduce the relative size of the component parts of the finished structure so that the same may be handled more quickly and more economically than the old single units.

By blanking out the relatively large blanks from sheets of flat stock, which blank forms extend from one end of the axle housing to another, considerable scrap material is produced between adjacent blanks as cut from the stock due to the fact that such large units do not lend themselves very readily to nesting as do units of relatively smaller proportion. The employment of relatively small units, which are later combined to form the finished structure, therefore effects a considerable saving in the amount of material required for the making of the finished housings. It is among the objects of my invention to provide a method of making automo-

bile axle housings and the like which shall have all of the above-named desirable characteristics. Other objects of my invention will appear as the description proceeds.

To the accomplishment of the foregoing and related ends, said invention, then, consists of the steps hereinafter fully described and particularly pointed out in the claim, the annexed drawing and the following description setting forth in detail one approved method of carrying out the invention, such disclosed method, however, constituting but one of the various ways in which the principle of the invention may be used.

In said annexed drawing:—

Fig. 1 is a horizontal view of two blanks A and B going to make up the axle housings; Figs. 2 is an elevation of a blank which has been bent and rounded to take the form of the housing; Fig. 3 is an elevation of the finished axle housing; and Fig. 4 is a horizontal section of a portion of the housing taken on the line 4—4 of Fig. 3.

Referring more specifically to the drawing and more especially to Fig. 1, the blank A and the blank B are flat pieces of metal stamped or pressed out of a sheet of metal of required thickness and of dimensions requisite to constitute one quarter of the housing body when the various operations to which it is to be treated subsequently have been completed. The shape of the blanks is defined by the longitudinal edges 5, 5′, and 6, 6′, the transverse edges 7, 7′, the arcuate edges 8, 8′ and 9, 9′, and by the terminal edges 11, 11′. The shape and size of these blanks, as hereinbefore referred to, is such that they may be economically cut from a sheet of metal by means of smaller and much less powerful machines than heretofore required to stamp out the large size blanks from which the entire axle housing halves have been made. As hereinbefore indicated and as apparent from this figure, the relatively small sections or blanks may be so laid out on the sheet and nested that a relatively small amount of material is wasted between successive blanks.

After the blanks have been formed from the flat stock, as hereinbefore indicated, they are next bent and rounded to constitute the quarter segments of the housing body, as most clearly shown in Fig. 2. The segment shown in this figure consists of a rounded and formed body with the longitudinal edge 12 corresponding to the edges 5, 5′ and 6, 6′ of blanks A and B, the transverse edge 13 corresponding to the transverse edges 7, 7′, and the arcuate edge 14 corresponding to the edges 8, 8′ and 9, 9′. These quarter segments due to their relatively small size are capable of being efficiently handled and transported from one point in the shop to another so that no special equipment or other provision need be made for transporting these sections from the point where they are formed to the point where they will be ultimately united to form the finished axle housing. The size of these relatively small quarters is also of advantage in placing the several sections of the finished housing in the necessary jigs or holders preparatory to being united by welding or otherwise.

In Fig. 3 is shown the assembled axle housing made up of four quarter segments 15, 16, 17 and 18, such as that shown in Fig. 2. The segments have been united at longitudinal edges 19 and 21 and at transverse edges 22 and 23. Due to the fact that the metal from which the original blanks were stamped is naturally of uniform thickness throughout, reinforcing means should and in a number of instances must be provided at points where bolt holes and like attaching means are necessary. One method by which such reinforcing means may be provided around the aperture 25 is to provide a split reinforcing ring 24 around such aperture which may be suitably secured to the body of the housing either by spot-welding or any like means. It will be noted, however, that instead of providing a separate reinforcing means such as the ring 24, that portion of the axle housing around the aperture 25 may be cut or blanked slightly larger than is required for the finished product, and this additional metal may then either be folded and bent over to form a double thickness of the metal around such aperture or an upsetting operation may be resorted to to produce the necessary thickness for the required reinforcement. The housing may be provided with radial flanges 27 on its ends, which radial flanges may be made in any one of several well known manners such as by welding a separate performed piece to the end of such housing, by having an additional amount of metal in the blanks and then folding and bending over such additional metal to form a double thickness radial flange, or such additional metal may be properly upset into the radial flange of required strength.

As indicated above, the sequence of operations in the improved method of manufacturing axle housings is as follows: Blanks are stamped from a sheet of metal with the least waste of metal between blanks; each blank is then bent and rounded to constitute a quarter segment of the housing body and the separate segments, without being welded or otherwise attached to each other, are transported to a point of assembly where they are placed in proper position to form the housing body and are then united at their edges. The manner of uniting the segments is also a part of my invention and, in the preferred method, is brought about by mounting the positioned segments on a longitudinal axis whereon the assembly is revolved in order to bring all parts of the

joint into contact with stationary welding means. At the same time the longitudinally adjacent edges of the segments are welded automatically, while the transversely adjacent edges may be welded manually or otherwise. The two welding operations take place simultaneously and the housing body is completed rapidly and expeditiously.

It will be understood, however, that the above described method of assembling the several units is not the only one contemplated within the principles of this invention, but the adjacent quarters on opposite sides of the transverse medial plane of the housing may first be welded together so as to permit the two halves of the housing to be subsequently welded along the transverse seams, and further it may be advisable for certain forms of housings to initially weld together the halves which lie on the same side of the longitudinal medial plane and then subsequently weld together the two longitudinally extending halves along the longitudinal seams. The particular procedure to be adopted will in a great measure depend upon the apparatus at hand for accomplishing the result and further due to any peculiarities in the shape or size of the housing sections which would influence the particular procedure.

The new and improved method of manufacturing axle housings described herein is cheaper and quicker than those methods ordinarily heretofore in use and effects large savings in material and equipment investment as well as a number of other savings which will be so apparent to those familiar with the art that a reiteration thereof is believed to be unnecessary.

Other modes of applying the principle of my invention may be employed instead of the one explained, change being made as regards the method herein disclosed, provided the step or steps stated by the following claim or the equivalent of such stated step or steps be employed.

I therefore particularly point out and distinctly claim as my invention:—

In the method of making axle housings, the steps which comprise first severing flat blanks from a sheet of metal, second forming one of said blanks to produce a quarter segment, third, forming complementary segments from said blanks to produce the other quarter segments, and then uniting all of said quarter segments to form the housing.

Signed by me, this 17th day of October, 1930.

FREDERICK H. RAGAN.