

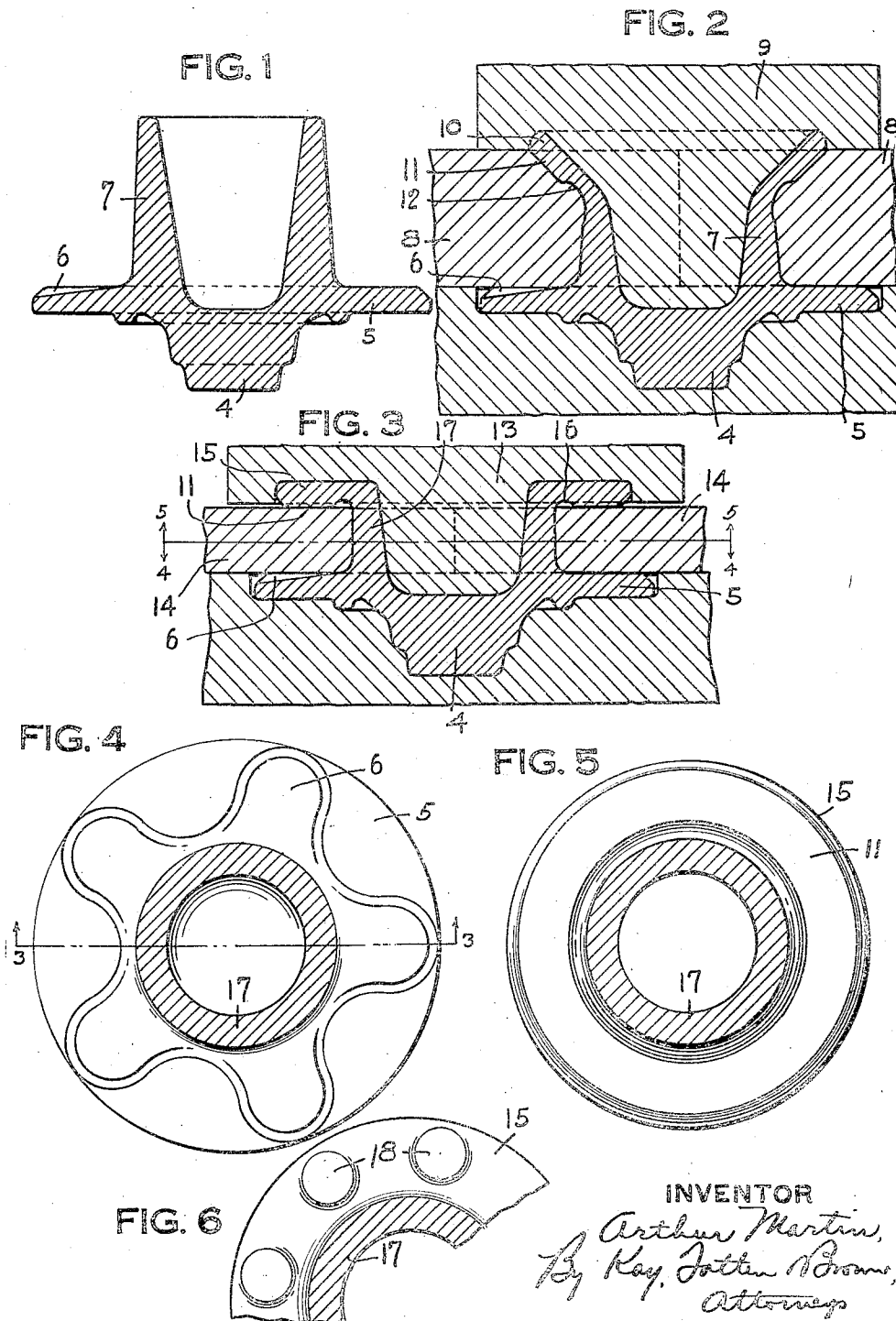
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A. MARTIN

METHOD OF FORMING FLANGED ARTICLES AND PRODUCT THEREOF

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ARTHUR MARTIN, OF PITTSBURGH, PENNSYLVANIA.

METHOD OF FORMING FLANGED ARTICLES AND PRODUCT THEREOF.

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To all whom it may concern:

Be it known that I, ARTHUR MARTIN, a citizen of the United States, and resident of Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Methods of Forming Flanged Articles and Product Thereof; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to the art of forging metal articles having spaced parallel flanges, and it has special reference to the forging of hubs for disc wheels.

One object of my invention is to provide a method of forging in one piece a metal article having spaced parallel flanges where it is necessary to provide bolt pads or other projections between the flanges.

Another object of my invention is to provide a hub for disc wheels forged in a single piece.

Hubs for disc wheels are made with two parallel flanges which extend from the bearing portion of the hub, one of these flanges being attached to the brake drum and the other to the disc of the wheel. In order to provide for the necessary bolts, bolt-pads are provided on the inner sides of the flanges, and on account of the fact that these bolt pads project into the space between the flanges it has heretofore been thought impossible to forge this kind of hub in one piece, because the bolt pads would prevent the dies from being withdrawn from between the flanges after the forging operation. For this reason it is now customary to make this hub in two halves, each half being forged separately and carrying one of the flanges, and the two halves being then welded together to form the finished hub.

My present invention aims to forge the above indicated kind of hub in one piece, and to this end employs three successive operations. In the first operation, the cap portion of the hub and one of the flanges, with its bolt pads, is formed by ordinary forging means, the metal for the remaining flange being left as an extension of the bearing portion of the hub. In the second forging operation the second flange is flared out and forced part way toward its finished position, the bolt pads being at the same time formed on its surface and the flaring and bending operation being stopped in such a position that the dies surrounding the forg-

ing can be readily removed. The third forging step consists in surrounding the partly formed forging with a set of dies of the proper thickness to produce the proper space between the finished flanges, and having plain and parallel upper and lower faces, and then forging the partly formed flange into its final position, after which the plain dies may readily be removed since they do not enter the recesses formed by the bolt pads.

In the accompanying drawing, Fig. 1 is a lengthwise sectional view taken centrally through the product of the first forging steps; Fig. 2 is a sectional view similar to Fig. 1, showing the result of the second forging step; Fig. 3 is another sectional view showing the result of the final forging step, the section being taken substantially on the line 3—3, Fig. 4; Fig. 4 is a plan view, partly in section, showing the lower flange of Fig. 3, the section being taken substantially on the line 4—4, Fig. 3; Fig. 5 is a bottom plan view, partly in section, showing the upper flange of Fig. 3, the section being taken substantially on the line 5—5, Fig. 5; and Fig. 6 is a fragmentary view of the upper flange of Fig. 3 showing a modified form of bolt pad.

The first operation consists in forging a circular billet, which may be done by means of ordinary drop-forging dies, thereby producing the partly formed article shown in Fig. 1, where the numeral 4 indicates the cap portion of the finished hub and 5 indicates the lower flange which, in this first forging operation is given its finished shape with the bolt pads 6 which are best shown in Fig. 4. The circular central portion 7 of the forging is of the tapering shape shown in Fig. 1, and this portion contains sufficient metal to form the bearing part of the hub and also the second flange.

The partly formed forging shown in Fig. 1 is then acted upon by a second set of forging dies to produce the shape shown in Fig. 2. The dies 8 surround the forging and the punch 9 descends and flares out the upper part of the tubular central portion 7 to produce the shape shown at 10, Fig. 2. The dies 8 are so shaped as to produce the bolt pads 11 and also to produce an annular recess 12. It will be evident that after the second forging operation illustrated in Fig. 2 the dies 8, which are split vertically, may be readily withdrawn laterally from the forging, since

the recesses formed in the forging do not interlock with any part of the dies.

The product of the forging operation shown in Fig. 2 is then acted upon by a third set of forging dies, including a punch 13 and a set of side dies 14 which are flat on their upper and lower surfaces and are of the proper thickness to produce the required space between the two flanges of the hub. The punch 13 forces the upper flange to a position parallel with the lower flange 5, as shown at 15, Fig. 3. It will be seen that after this operation the side dies 14 may be removed, since they do not interlock with the recesses formed by the bolt pads 6 and 11. It will also be seen, by comparing Figs. 2 and 3, that the recess 12 is contracted to form the final recess 16, the original recess 12 being properly designed to provide sufficient metal at this point while leaving the recess 16 as shown. The bearing portion 17 of the hub is reduced in thickness by the successive forging operations, and is finished by the punch 13 in the final operation to the shape shown in Fig. 3.

As shown in Fig. 5, the bolt pad 11 on the upper flange 15 is made in the form of a continuous ring. If desired, individual bolt pads may be formed on this flange such, for example, as the circular pads 18 shown on Fig. 6. It will be understood that my invention is not restricted to the use of any particular number, shape or arrangement of bolt pads, as these may be changed as desired.

The forging operations described above may be performed by any usual or desired type of forging apparatus, such as a drop-press, a hydraulic press, a steam hammer or a forging machine, and it will be understood that my invention is not limited to the use of any particular kind of forging means.

I am aware that flanged articles have been forged in one piece where the opposed surfaces of the flanges are smooth, but I believe I am the first to attempt to forge a flanged article from one piece where one or more opposed surfaces of the flanges are modified by projections or otherwise.

While my invention is of particular utility as applied to the forging of hubs for disc wheels, it will be evident that the same principles may be employed in the forging of other flanged articles where projections occur between the flanges, and where ordinary flange-forming methods can therefore not be employed. It will therefore be understood that my invention is not restricted to the manufacture of hubs of the particular kind described above, and that the details herein shown and described may be

varied within the scope of the appended claims.

I claim as my invention:

1. The method of forging flanged articles that comprises forging a blank to produce one of the flanges, partially forming another flange having a modified surface on the side toward said first-named flange, and finally forcing the said second flange into parallel relation with said first flange, the said modified surface being capable of production only at said partially formed stage.

2. The method of forging flanged articles that comprises forging a blank to produce one finished flange surrounding a tubular unfinished portion, flaring the said tubular portion against a recessed die to produce a second flange having thickened portions, and then forcing the said second flange into parallel relation with said first flange.

3. The method of forging flanged articles having projections on one or more of the opposed surfaces of its flanges, which comprises forging a billet to produce one finished flange surrounding a tubular unfinished portion between dies, one of which is recessed, flaring the said tubular portion to produce a second flange inclined with respect to said first flange and having thickened portions, and then forcing said second flange into parallel relation to said first flange.

4. The method of forging a wheel hub having spaced parallel flanges provided with bolt pads that comprises forging a blank to produce the cap portion of the hub, and also to produce a finished flange surrounding a tubular unfinished portion, flaring the said tubular portion to form a second flange, inclined with respect to said first flange, and simultaneously forming one or more bolt pads on its surface, and then forcing said second flange into parallel relation to said first flange.

5. As a new article of manufacture, a flanged metal article forged in one piece and having a plurality of flanges integral therewith, at least one of which has a modified surface on the side toward the adjacent flange.

6. As a new article of manufacture, a wheel hub forged in a single piece and having spaced flanges integral therewith that are provided with bolt pads on their inner surfaces.

In testimony whereof I, the said ARTHUR MARTIN, have hereunto set my hand.

ARTHUR MARTIN.

Witnesses:

JOHN F. WILL,
HENRY HOLZ.