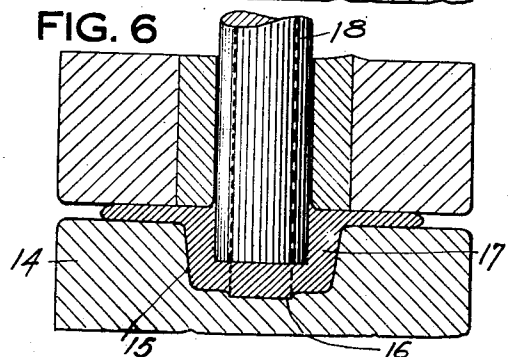
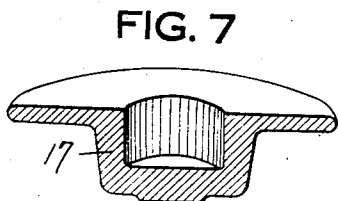
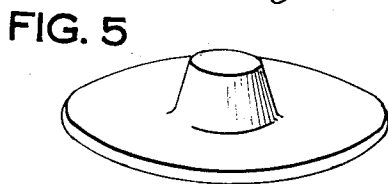
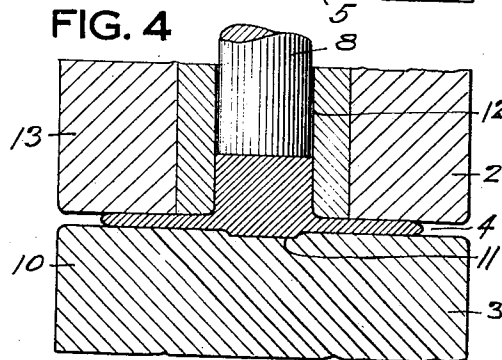
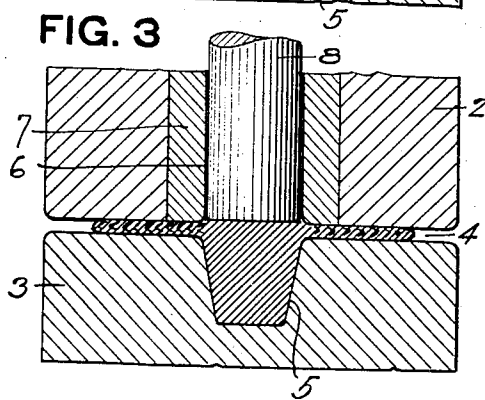
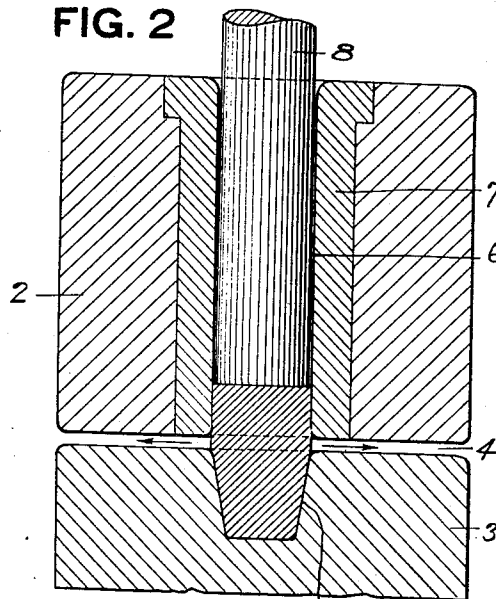
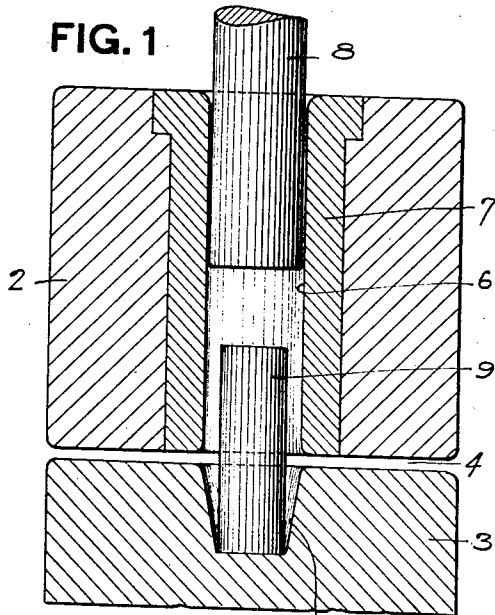


T. D. DALLMEYER, G. G. BROWN, AND J. R. SCHULTZ.
METHOD OF FORMING METAL HUBBED ARTICLES.

APPLICATION FILED MAR. 22, 1919. RENEWED JUNE 16, 1921.

1,410,093.

Patented Mar. 21, 1922.



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UNITED STATES PATENT OFFICE.

THOMAS D. DALLMEYER, OF PITTSBURGH, AND GOUVERNEUR G. BROWN AND JAMES R. SCHULTZ, OF OAKMONT, PENNSYLVANIA, ASSIGNORS TO VALLEY FORGING COMPANY, OF OAKMONT, PENNSYLVANIA, A CORPORATION OF DELAWARE.

METHOD OF FORMING METAL-HUBBED ARTICLES.

1,410,093.

Specification of Letters Patent. Patented Mar. 21, 1922.

Application filed March 22, 1919, Serial No. 284,456. Renewed June 16, 1921. Serial No. 478,215.

To all whom it may concern:

Be it known that we, THOMAS D. DALLMEYER, GOUVERNEUR G. BROWN, and JAMES R. SCHULTZ, who are citizens of the United

5 States, and residents of Pittsburgh and Oakmont, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Methods of Forming Metal-Hubbed Articles; and we do hereby
10 declare the following to be a full, clear, and exact description thereof.

Our invention relates to a method of forming metal articles having hubs or enlargements formed integral therewith.

15 The object of our invention is to provide a method of forming such articles from an elongated billet, the pressure being so applied that the metal surrounding the hub portion is permitted to flow outwardly to
20 the desired size and thickness whereby the strains on the metal due to a sudden upsetting blow are avoided and the breaks or fractures at the points where the hub unites with the body of the article are practically
25 eliminated.

To these ends our invention consists, generally stated, in inserting the heated billet or blank endwise within dies permanently spaced apart, the end of said blank to which
30 pressure is to be applied being confined in one of said dies, and applying pressure to the confined end of said blank and causing the metal to flow outwardly into the space between said dies.

35 In the accompanying drawing the figures 1, 2, 3, 4 and 6 indicate the different steps in the operation of our improved method in the manufacture of articles of different shapes, and Figs. 5 and 7 show a perspective view and a section, respectively, of
40 articles made by our method.

In Figs. 1, 2 and 3, the numeral 2 designates the upper die and 3 the lower die separated by intervening space 4. The lower
45 die has the recess 5 and the upper die has the bore 6 which may be lined with a removable wear or bushing sleeve 7. A suitable ram or plunger 8 is adapted to operate in the bore 6.

50 In making an article such as shown in Fig. 5, the heated billet 9 of the required size to form the article is inserted in the dies, the lower end of said billet resting in the bottom of the recess 5 and being of the

same or substantially the same area as said 55 bottom. The walls of the recess 5 are slightly flaring to give the hub a slightly conical shape.

The billet 9 extends into the bore 6 of the upper die and when the ram or plunger 60 8 is advanced pressure is applied endwise of the billet or blank 9, and as said plunger advances the metal of the blank first fills the lower recess 5 and the bore 6, as shown in Fig. 2, before the metal begins to flow 65 outwardly. Further pressure applied by the ram 8 then causes the metal to flow into the space 4 between the dies, the metal gradually flowing out so that the strain on the metal is relieved and the working of the 70 metal takes place to give it a homogeneous structure. This gradual flow of the metal prevents the setting up of severe strains and stresses and avoids cracks and weak spots at the juncture of the body portion of the 75 article with the hub, which is liable to take place in the ordinary upsetting by hammering where the metal is subjected to a series of violent blows in quick succession.

In Fig. 4 we have illustrated our method 80 as applied to making a different form of article from that shown in the previous figures, in which the lower die 10, as shown in full lines, has a very slight recessed portion 11, so that the metal begins to flow out- 85 wardly just as soon as this shallow recess is filled and the hub portion is formed in the bore 12 of the upper die 13.

In Fig. 6 we have shown our method as applied to still a different form of article in 90 which the die 14 has the recess 15 with a smaller recess 16 to allow for perforating the hub portion 17 by the action of the ram 18.

It is apparent that many other articles of 95 many different shapes may be formed by our method, and we do not limit ourselves to any particular form or shape of dies.

While we have illustrated and described our invention in connection with dies, termed 100 upper and lower, it will be understood that we do not wish to limit ourselves in any way to dies moving in a vertical plane, as the dies might be arranged to move horizontal without in any way effecting the method. 105 By the word outwardly as used in the specification and claims we mean broadly the outward flow of the metal, irrespective of

whether the flow is at right angles to the axial line of the plunger, as illustrated in the drawing.

What I claim is:

- 5 1. The method of forming metal articles with hubs or enlargements consisting in inserting the heated blank endwise within dies permanently spaced apart, the end of said blank to which pressure is to be applied
- 10 being confined in one of said dies, and applying pressure to the confined end of said blank and causing the metal to flow outwardly into the space between said dies.
- 15 2. The method of forming metal articles having hubs or enlargements consisting in inserting the heated blank endwise within dies permanently spaced apart, the end of

said blank to which pressure is to be applied being confined in one of said dies and applying pressure to the confined end of said blank, first forming the hub portion and causing the surplus metal to flow outwardly into the space between said dies.

In testimony whereof, we the said THOMAS D. DALLMEYER, GOUVERNEUR G. BROWN, and 25 JAMES R. SCHULTZ, have hereunto set our hands.

THOMAS D. DALLMEYER.
GOUVERNEUR G. BROWN.
JAMES R. SCHULTZ.

Witnesses:

CHAS. A. CARPENTER,
HYATT M. CRIBBS.