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W. H. FARR

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METHOD OF FORMING HUBS

Filed April 27, 1929

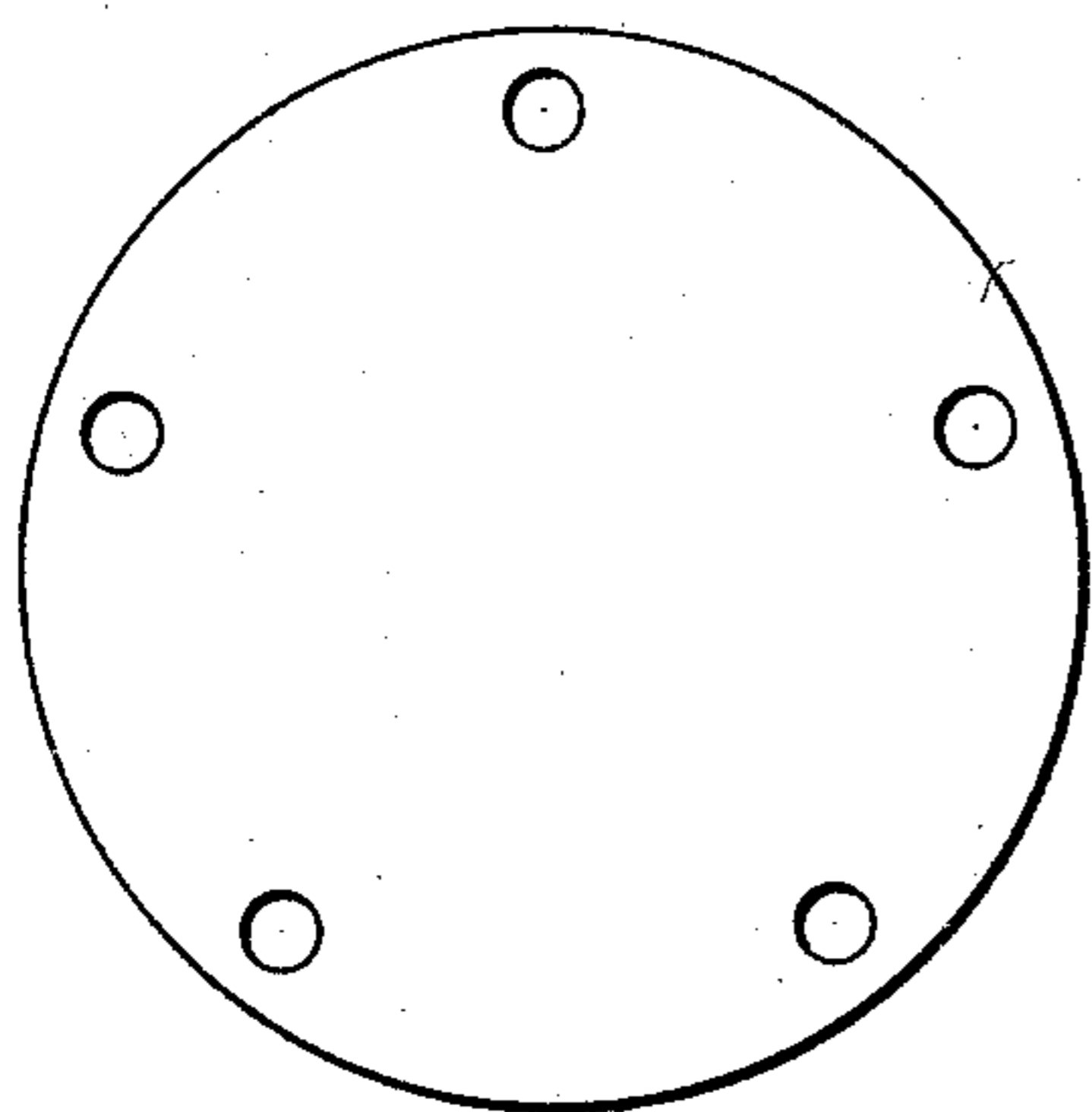


FIG. 3



FIG. 4

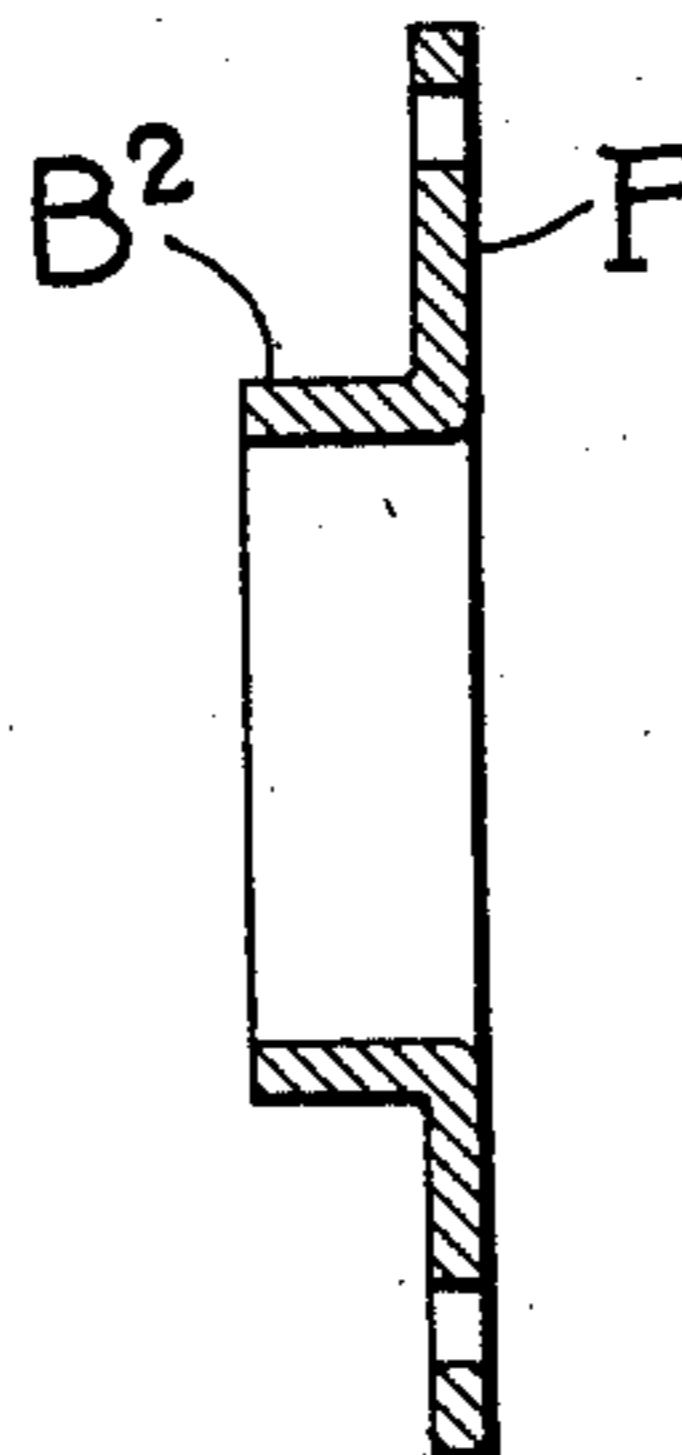


FIG. 5

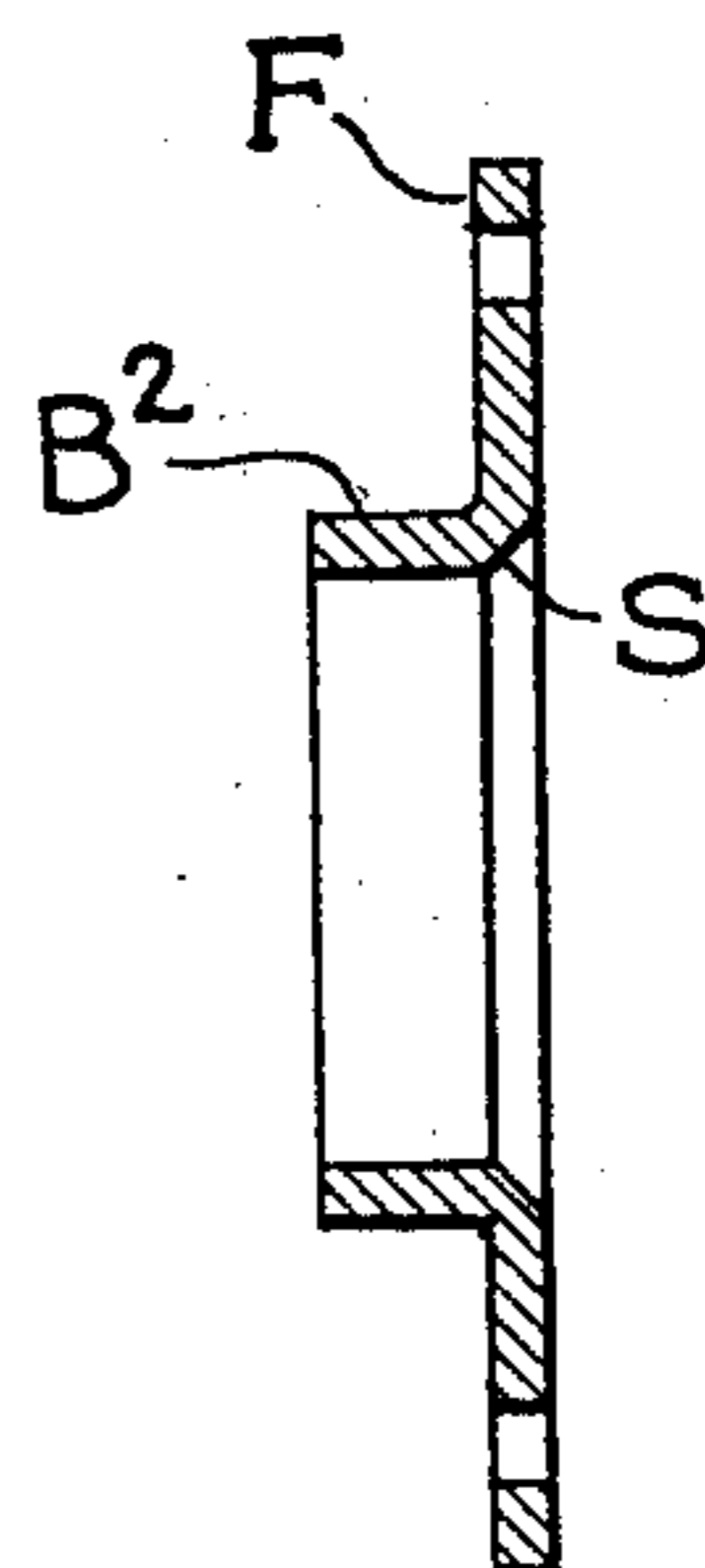


FIG. 6

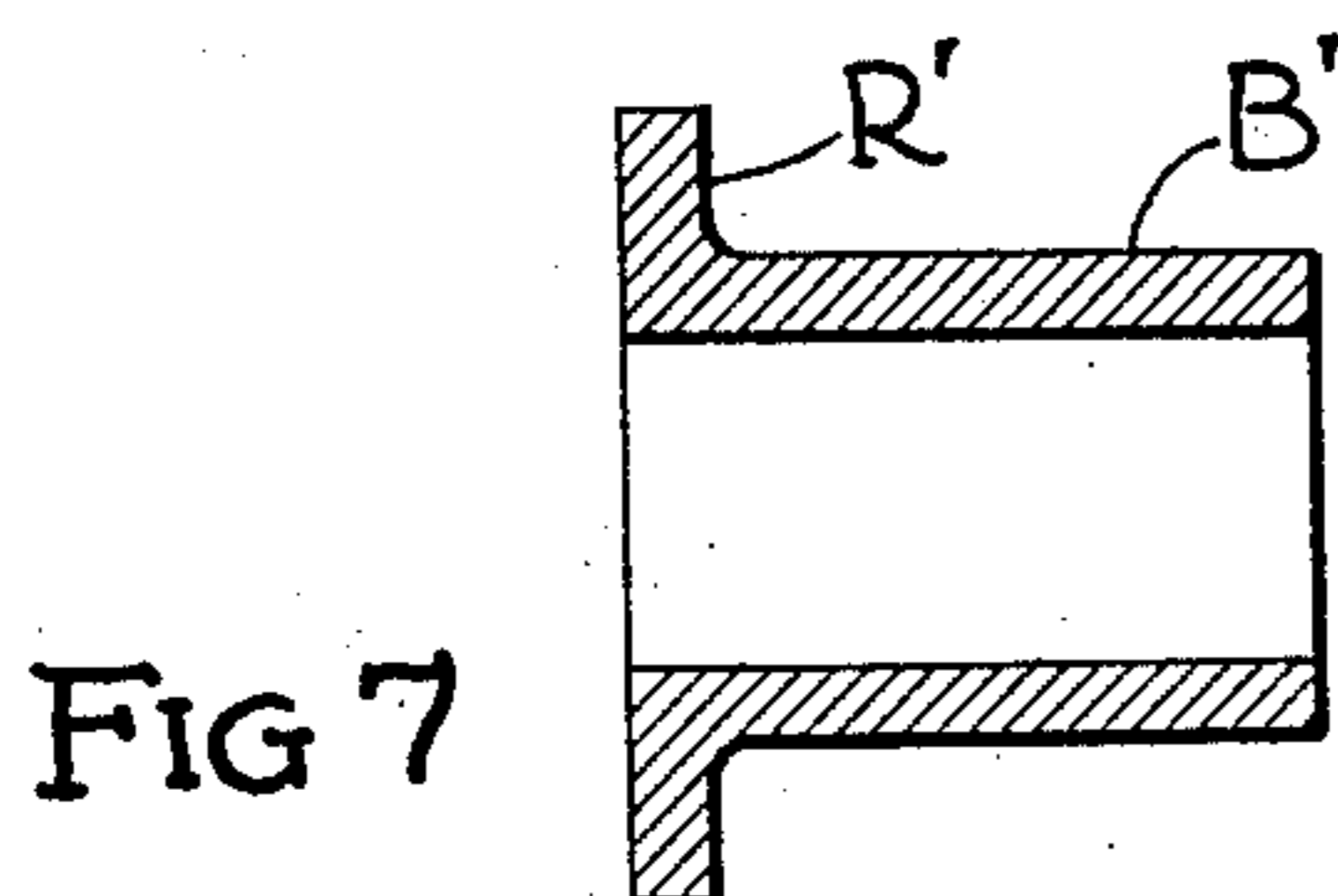


FIG. 7

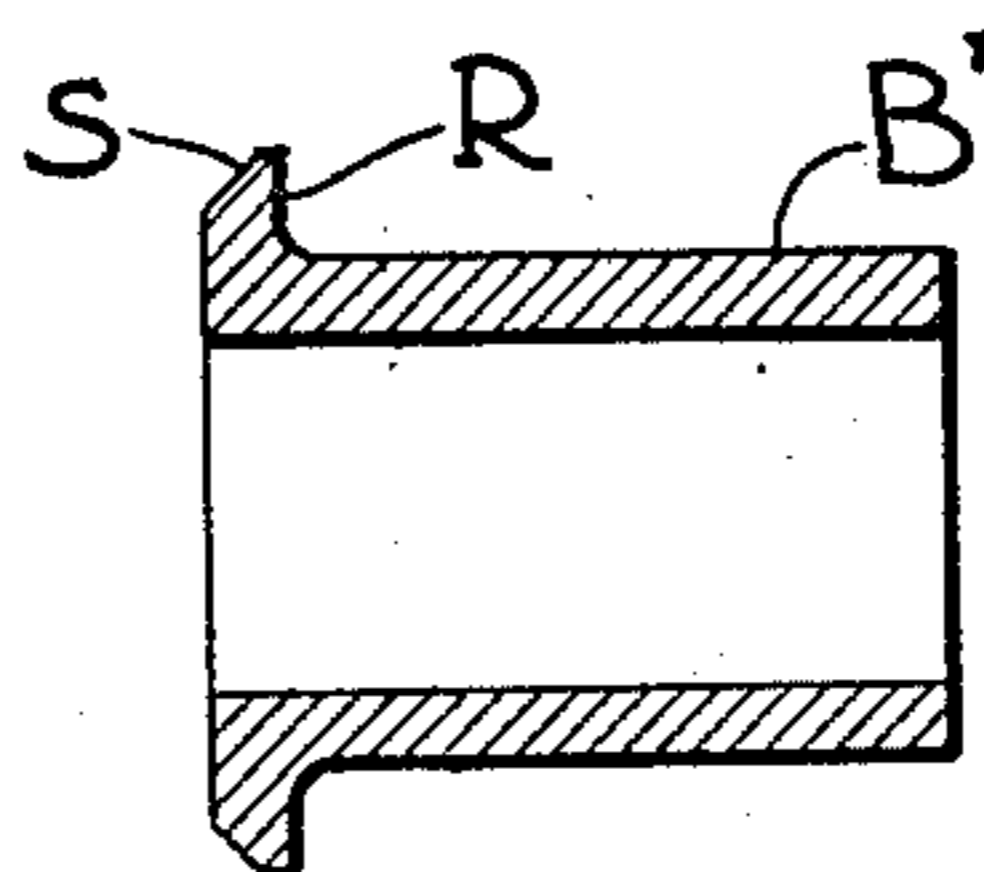


FIG. 8

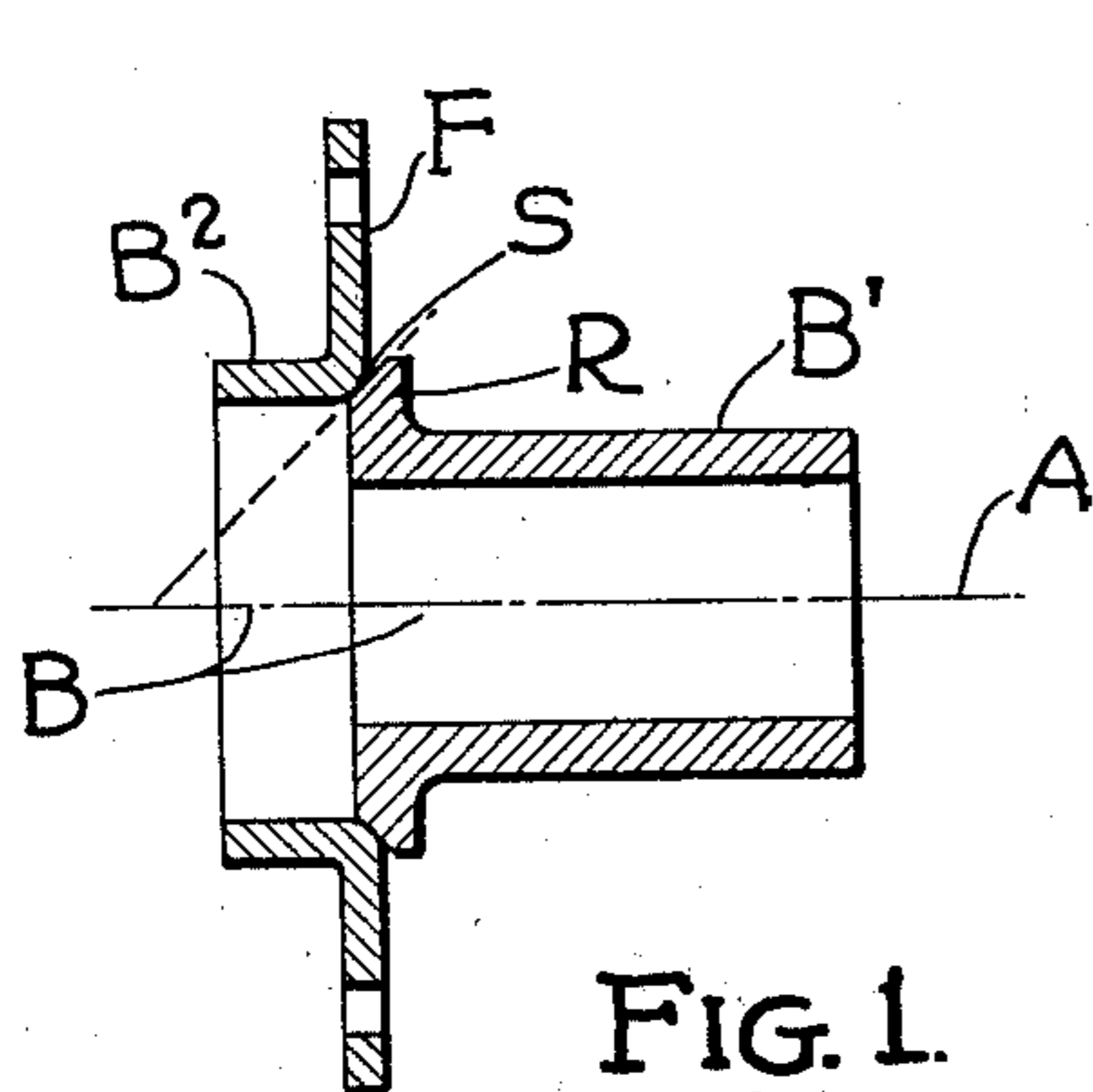


FIG. 1.

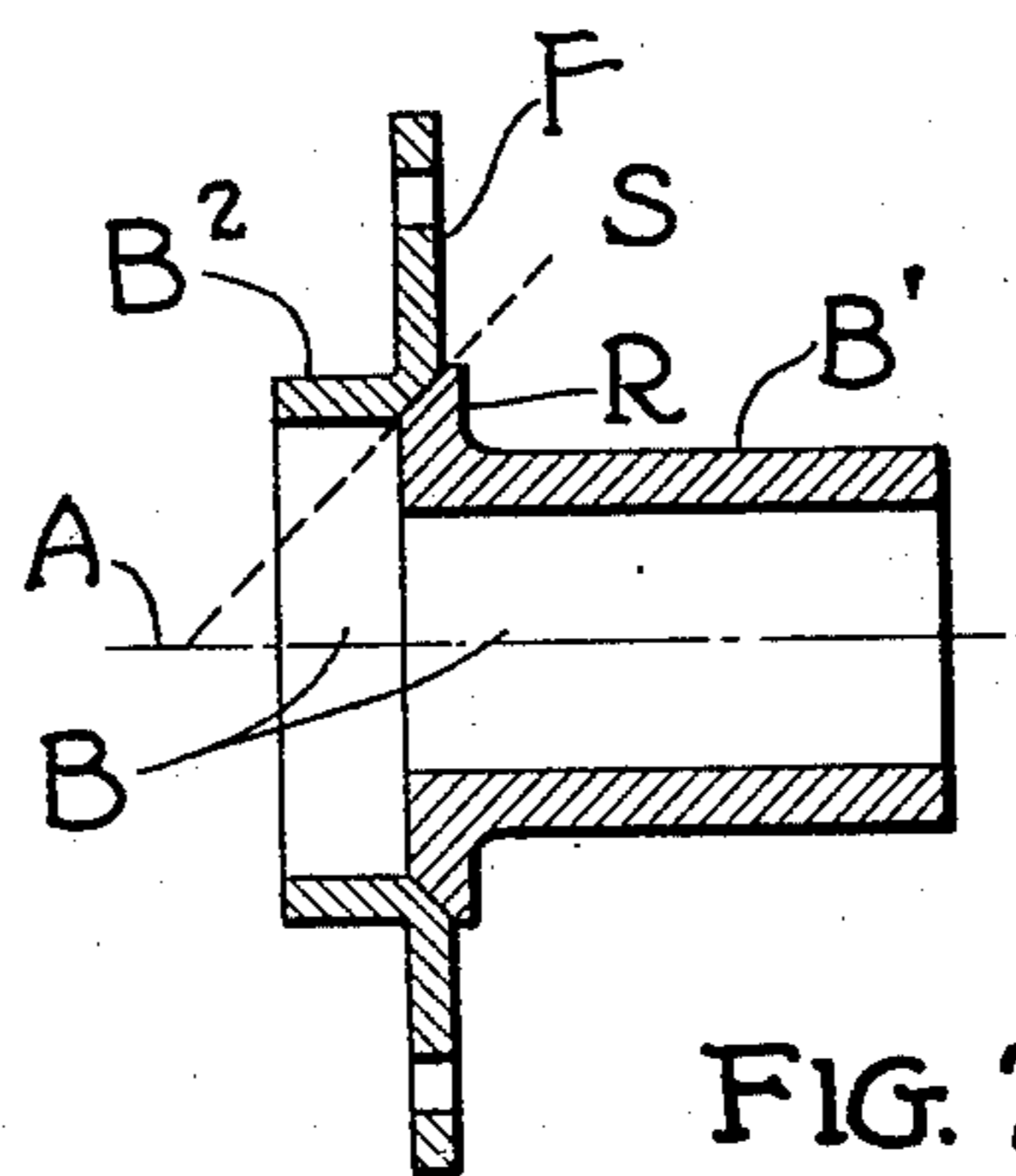


FIG. 2

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## UNITED STATES PATENT OFFICE

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## METHOD OF FORMING HUBS

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The field of hub making for automotive vehicles is that in which my invention belongs. In this field the manufacturers are confronted with great difficulties incident to the formation of long barrels most times of relatively small external diameter and many times of small internal diameter. In most if not all hubs the bore extends all the way through, and the hub is over all usually of considerable length. Small external diameter brings about difficulties in forging, the dies are more difficult to fill and under the high heats resorted to insure filling and the high pressures, the dies do not stand up so well. Moreover, it is extremely seldom when the internal bores are very considerable that any part of the interior material can be removed from the bore during the forging operation. Most of it needs be removed by machine operations. Machine operations are, of course, relatively expensive as compared with forging operations.

It is a principal object of my invention to overcome these difficulties so far as possible in connection with a hub of the type I disclose or similar types, as my invention has application to other types of hubs as will be readily perceived.

In the main, the invention is of especial advantage in connection with the type of hub having a radially extending flange intermediate its opposite ends. This flange supports both the brake drum and the body of the wheel in most cases, and in all cases, supports or partially supports the body of the wheel. According to the method of my invention I forge or draw this flange or a major portion of it integral with that portion of the hub lying on one side thereof, and butt weld that portion of the barrel of the hub lying on the opposite side thereof to the cornice formed by the angle between the integrally formed flange and barrel. More in detail, I form such a hub initially in two parts divided at the root of the flange on a substantially conical surface at an acute angle to the axis of the hub in such manner that that portion of the barrel of the hub lying on one side of the hub is formed integrally with the flange and thereafter butt weld the

two separately formed parts together by abutting them on the surface of the division.

In the drawings I show in axial cross section such a hub in Figs. 1 and 2, Fig. 2 being a slight modification, in Figs. 3 and 4 plan and axial sections of a stamping from which one part is formed, in Figs. 5 and 6, axial sections of this part in final form, Fig. 6 being a modification, and in Figs. 7 and 8 axial sections of a forging from which the other part is formed.

The barrel B is shown divided into two portions an outer portion  $B^1$  and an inner portion  $B^2$ . The division is on a conical concentric surface S at an acute angle to the axis A of the hub and so related to the root R of radially extending flange F that this flange remains with the inner barrel  $B^2$  of the portion.

In the particular embodiment shown the outer portion  $B^1$  of the barrel is of smaller diameter both externally and internally than the inner portion  $B^2$ . The portion  $B^2$  emanates from flange F intermediate its root R and its perimeter. The root R is divided along the surface S from the main body of the flange F and may be formed integrally with the outer portion of the barrel  $B^1$ .

Thus, the initial steps of my method comprise the separate formation of a part  $B^1$ , R and the part  $B^2$ , F. The part  $B^1$ , R is preferably forged, being of relatively heavy mass and having a relatively long barrel portion  $B^1$ . The surface S may be formed either by the forging operation initially and then cleaned off by grinding for the welding operation.  $B^2$ , F is initially formed as a die stamping, the barrel portion  $B^2$  being of such large diameter and the gauge of the metal being relatively lighter so that it can be efficiently formed by die stamping. (See Figs. 3 to 6.) But it may also be formed by forging either hot or cold. It needs but little if any machining following such operation. The cornice formed by the angle between the elements  $B^2$  and F of this part may be beveled by the initial forming operation and subsequently ground or machined for the forging operation, (see Figs. 2 and 6) or it may be presented for the forging operation just as

- it comes from the forging machine with the cornice either rounded or beveled complementary to all or a portion of the surface S. (See Figs. 1 and 5.) I have found that a rounded cornice makes a good weld. Any relative shaping of the opposed surfaces to be butt welded known to be good practice in the art may be resorted to by subsequent cutting or cleaning processes.
- 10 The parts B<sup>1</sup> R and B<sup>2</sup> F so formed are then abutted upon the complementary or at least coacting surfaces S and butt welded through any of the well known butt welding processes. A thoroughly homogeneous weld results as I have shown by actual tests and microscopic examination. A fully accurate and more than adequately strong hub structure is produced as I have shown by subjecting it to mechanical tests.
- 20 There are had, as a result, all of the advantages I have hereinabove set forth, including economy in dies, and economy in machining operations.
- What I claim as new and useful and desire to protect by Letters Patent is:
1. The method of forming hubs the bodies of which are provided with radial flanges intermediate their ends which consists in separately forming the body and the flange, forming a beveled seat on the body having an acute angle to the axis of the hub, and butt welding together the flange and the beveled seat.
  2. The method of forming hubs having barrel portions of different diameter and radially extending flange portions intermediate the ends thereof and interconnecting the barrel portions which consists in separately forming the hub in parts divided in that portion of the flange intermediate the two barrel portions of different diameter, and thereafter butt welding the said two parts together.
  3. The method of forming hubs the body portions of which have radially extending flanges intermediate their ends which consists in forming the barrel in separate parts whereby one part so separately formed carries the flange and is of angle cross section, beveling the adjoining end of the other part at an acute angle to the axis of said last mentioned part and butt welding the cornice of the angle section of the first mentioned part to the beveled end of the last mentioned part.
  4. The method of forming hubs the bodies of which are provided with radial flanges intermediate their ends which consists in employing a flat plate and a tubular barrel portion, forming a tubular portion on said plate, bevelling the edges of said plate and said barrel, and butt welding said bevelled edges together.
  5. The method of forming hubs the bodies of which are provided with radial flanges intermediate their ends which consists in employing a flat plate and a tubular barrel portion, forming a tubular portion on said plate
- of a diameter different from that of said barrel portion, forming a flange on said barrel portion and bevelling the edge of said flange, bevelling the edge defined by said flat plate and the tubular portion thereon, and butt welding said bevelled edges together.
- In testimony whereof he hereunto affixes signature.
- WARREN H. FARR.