

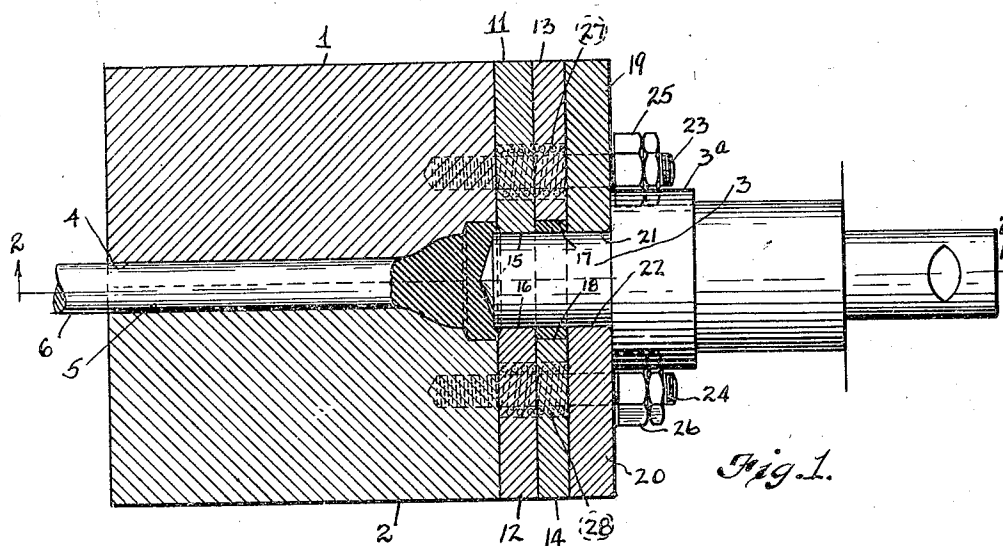
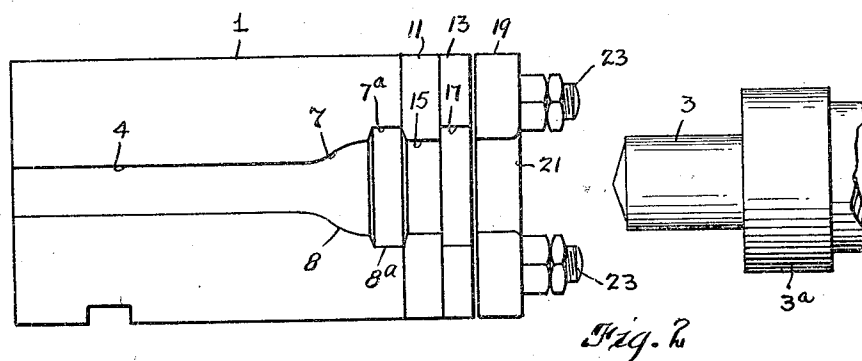
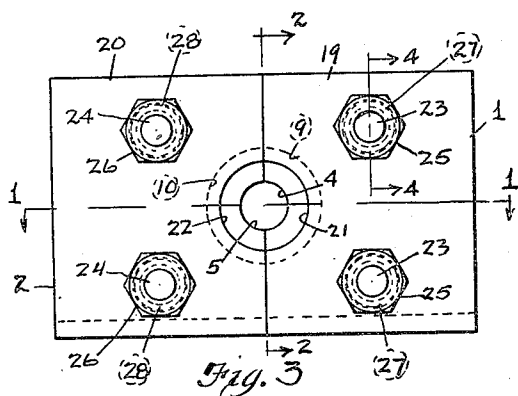
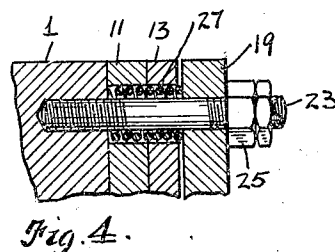
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FORGING MECHANISM

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FORGING MECHANISM.

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The present improvements relate more particularly to metal working or forming mechanism designed to make nut blanks, rings or other articles of general annular form by upsetting the end of a solid rod or bar of stock and then punching out a central portion in order to produce the finished article. One object of the invention is to provide a mechanism of this character wherein the metal punched from the center of the article being formed is utilized to preliminarily form the next succeeding blank. Thus, in the case of forming a simple article such as an end blank or ring, the external shape of the succeeding blank is completed by the punching operation on the previously finished blank. A further object is to provide means for applying supplemental or increased pressure on the ring after it has been severed from the blank by such punching operation so as to insure more perfect definition for the external surfaces of such ring and thus produce a perfectly finished article.

To the accomplishment of the foregoing and related ends, the invention, then, consists of the means hereinafter fully described and particularly pointed out in the claims, the annexed drawing and the following description setting forth in detail certain mechanism embodying the invention, such disclosed means constituting, however, but one of various mechanical forms in which the principle of the invention may be used.

In said annexed drawing:—

Fig. 1 is a transverse longitudinal central section taken on the line 1—1 of Fig. 3 through a pair of dies, and a co-operating punching tool embodying my present improvement, such dies being shown as closed on the stock and such tool being shown in its advanced position; Fig. 2 is an elevational view of the inner face of one of the complementary die members taken on line 2—2 of Figs. 1 and 3, the punching tool being shown in retracted position; Fig. 3 is a front elevation of the complementary die members, as viewed from the right in Figs. 1 and 2, the punching tool not appearing; and Fig. 4 is a vertical section of a detail, the plane of the section being indicated by the line 4—4, Fig. 3.

It has not been considered necessary to show the general assembly of the forging machine, since the construction of such machine is well understood, but only to illustrate, as

indicated in the foregoing description of the figures, the two complementary die members 1 and 2 and a co-operating punching tool 3. Said die members are mounted on the bed of the machine so as to be relatively transversely movable and have their inner faces formed with complementary recesses 4 and 5 adapted when brought together to receive and grip between them the bar or rod 6 from which the articles are to be formed. The configuration of the recesses 4 and 5 will vary depending upon the shape of the stock, whether circular, as shown, or of some other cross-section. Similarly the forward ends of such dies are enlarged to form recesses 7 and 8 which will be of varying configuration, depending upon the form of the article which is to be made. Thus, in the particular form of die members shown in the drawings, such recesses 7 are of general pyriform shape with a final enlargement 7^a and 8^a of cylindrical form substantially corresponding with the external surface of the annular article which is to be formed from the stock.

Fixedly secured to the respective front faces of die members 1 and 2 are two pairs of complementary punch plates 11 and 12 and 13 and 14. Such plates 11 and 12 are provided with complementary openings 15 and 16 coaxial with the recesses in the die members 1 and 2 and having the same shape as the punch 3, while plates 13 and 14 are formed with complementary openings 17 and 18 similarly coaxial and having the same shape as that of the article which it is desired to form. In other words, such openings 17 and 18 form a recess that corresponds approximately in diameter and other dimensions with the recesses 7^a and 8^a in the forward faces of the die members 1 and 2.

Loosely attached to the front face of each die member, so as to be longitudinally movable with respect to the same, are other plates 19 and 20, formed with complementary openings 21 and 22, coaxial with the recesses 4 and 5 as in the case of the openings in the other plates but of a diameter substantially the same as that of the punch 3. Plates 19 and 20 are thus movably secured to the respective die members by means of pairs of stud bolts 23 and 24 that project from the faces of said die members and have nuts 25 and 26 threaded on their outer ends so as adjustably to limit the movement of the plates away from the faces of the die members. Compression

springs 27 and 28, housed in suitable recesses, surround said bolts 23 and 24, respectively, said springs being contained in suitable recesses formed in plates 11 and 13 and 12 and 14, respectively (see Fig. 4) so as normally to press outwardly against the backs of plates 19 and 20, as will be readily understood.

The punching tool 3 is provided with an integral or fixedly secured collar 3^a, as shown in Figs. 1 and 2, so located with respect to the front end of the punch proper that when the latter is advanced into the position shown in Fig. 1, such collar will press against plates 19 and 20 and force the same into contact with the plates 13 and 14, despite the expansive action of springs 27 and 28.

The operation of my improved forging mechanism may now be set forth. It will be assumed that the stock rod or bar 6, lying between the pair of complementary dies 1 and 2, has been previously operated upon so that its forward end is of the form shown in Fig. 1. The die members being separated or moved apart, the bar is advanced so as to bring the expanded portion thereof within the complementary openings 17 and 18 in plates 13 and 14; the die members are thereupon closed so as firmly to grip the stock and the punch 3 is advanced through the complementary openings in plates 19 and 20 until it finally assumes the position shown in Fig. 1. As a result, the central portion of the forwardly enlarged end of the rod or bar is punched out, leaving behind the annular article 9 and forcing the punched out material back into recesses 7 and 8 and 7^a and 8^a in the die members. As it advances to its final position, the collar 3^a on the punch comes into contact with the plates 19 and 20 and presses the latter closely against the front faces of plates 13 and 14 that lie immediately back of such plates 19 and 20. As a result, the annular space in which the article is confined is correspondingly reduced in its transverse dimension and the metal composing such article is forcibly compressed and caused to completely fill the residual space.

In this way I have found that it is possible to make a completely finished annular article by a single operation. In other words, such article may be made accurately to size and will require no other finishing operation than the usual polishing or grinding, which may be necessary if the article is to form a bearing ring or the like; while if it constitutes a nut blank, it will be all ready for the threading operation.

Other modes of applying the principle of the invention may be employed instead of the one explained, change being made as re-

gards the means and the steps herein disclosed, provided those stated by any one of the following claims or their equivalents be employed.

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

1. In mechanism of the character described, the combination of relatively movable die-members having complementary recesses formed in their juxtaposed faces adapted to fit around a stock bar, and two sets of enlarged recesses at the forward end of such first-named recesses, such enlarged recesses having approximately the shape of the article desired; plates movable towards and from the forward faces of said die-members and forming one confining wall for the adjacent set of enlarged recesses; and a punch co-operating with said die-members and carrying a collar adapted to engage said plates and force the same against said die-members.

2. In mechanism of the character described, the combination of relatively movable die-members having complementary recesses formed in their juxtaposed faces adapted to fit around a stock bar, and two sets of enlarged recesses at the forward end of such first-named recesses, such enlarged recesses having approximately the shape of the article desired; plates movable towards and from the forward faces of said die-members and forming one confining wall for the adjacent set of enlarged recesses; means normally moving said plates away from said die-members; and a punch co-operating with said die-members and carrying a collar adapted to engage said plates and force the same against said die-members.

3. In mechanism of the character described, the combination of relatively movable die-members having complementary recesses formed in their juxtaposed faces adapted to fit around a stock bar, and two sets of enlarged recesses at the forward end of such first-named recesses, such enlarged recesses having approximately the shape of the article desired; plates movable towards and from the forward faces of said die-members and forming one confining wall for the adjacent set of enlarged recesses; studs projecting from said die-members upon which said plates are thus movably supported; compression springs surrounding said studs and bearing against said plates so as normally to hold the same away from said die-members; and a punch co-operating with said die-members and carrying a collar adapted to engage said plates and force the same against said die-members.

Signed by me this 2nd day of April, 1924.
JOHN R. BLAKESLEE.