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FORGING DIE BUTTON TYPE

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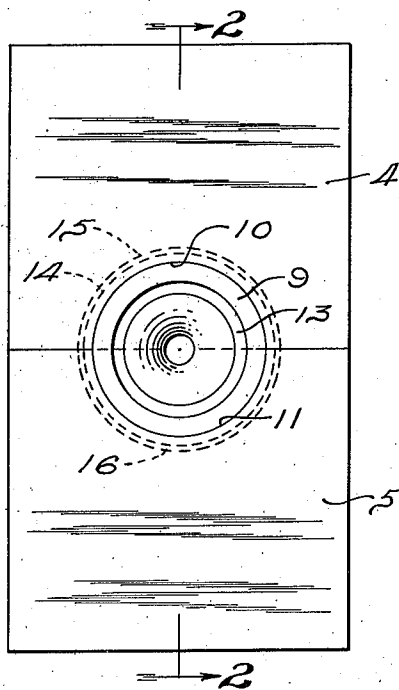


FIG. 1.

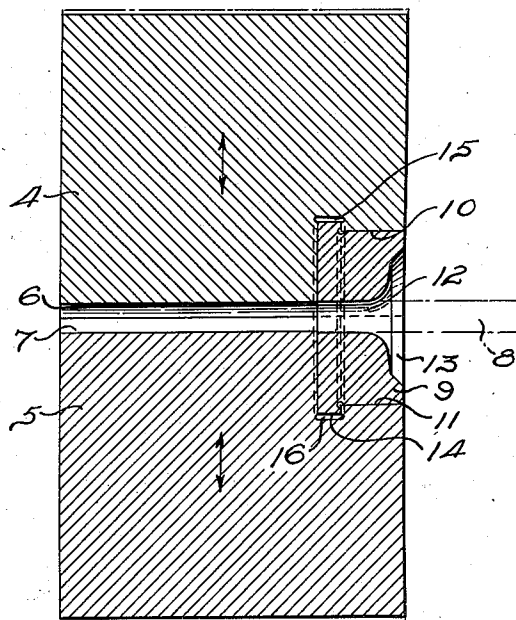


FIG. 2.

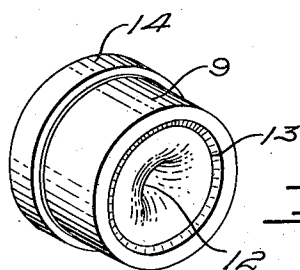


FIG. 3.

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FORGING DIE—BUTTON TYPE

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2 Claims. (Cl. 78—60)

This invention relates to a die assembly particularly useful for forming heads on rods to produce such an article as a mushroom type internal combustion motor valve.

5 The main objects of this invention are to provide an improved form of a multiple part die; to provide a die assembly of this character in which mushroom type valves may be formed of improved and superior quality; to provide a die
10 assembly of this character in which the valve formed therein will require less subsequent machine work for finishing the same than has heretofore been required; to provide a die assembly of this character in which the valve formed there-
15 in may be made of rough ground stock so that after forming the valve will require a finish grinding only; and to provide a die assembly of this character in which valves may be manufactured in a more economical manner than has
20 heretofore been possible.

An illustrative embodiment of this invention is shown in the accompanying drawing, in which—
Fig. 1 is a front or face view in elevation of the improved die assembly.

25 Fig. 2 is a sectional view taken on the line 2—2 of Fig. 1, looking in the direction indicated, the open position being shown in dotted outline.

Fig. 3 is a view in perspective of one of the die members forming a part of the assembly.

30 Heretofore in the manufacture of valves of the mushroom type commonly used in internal combustion engines, it has been customary to form the stock in a two piece or split gripping die which embraces that portion of the rod of stock which becomes the valve stem, another portion
35 of the rod being forged or upset to form a valve head.

When making valves in such a die, the formed product upon leaving the die has thin fins or
40 ribs, at diametrically opposite sides thereof at lines where the two dies fit together, i. e. at the "split" and into which the stock has been forged by blows of the forming hammer. The valves which are thus completely formed in a split die
45 cannot be held to close limits as to size and the formed head is often not exactly perpendicular to the axis of the valve stem. As a result, it is necessary to subject the valve to a coining operation for sizing and eliminating the fins under
50 the valve head. The valve stem is then straightened, the flash around the top edge of the head turned off and the bearing face is rough turned. The valve stem is then rough ground; the bearing face rough ground; the stem is then finish
55 ground and the bearing face finish ground.

In the present invention a three part die is used, two parts of which serve as gripping dies to hold the stock and the third die known as a button die is embraced and retained by the gripping dies and has an opening therethrough for
5 the stock so that upon upsetting or forging of the stock there will be no seams in that part of the die against which the metal is caused to flow by the forging operation.

The coining operation, one separate heating
10 and the valve stem straightening operation are all eliminated by the use of this improved die.

In the construction shown in the drawing, a pair of complementary die members 4 and 5 are provided with semi-cylindrical registering grooves
15 6 and 7 in their adjacent faces for receiving and tightly retaining a rod of stock 8 therein. The gripping die members 4 and 5 are suitably mounted in a customary die holder with the usual means for moving them toward and away from each
20 other for the purpose of gripping and releasing the stock in the customary manner, their position when opening being shown in dotted lines in Fig. 2.

A third die member 9 of the button type is 25 embraced in complementary registering recesses 10 and 11 formed in die members 4 and 5 respectively, and concentrically with the opening formed by the grooves 6 and 7. The button die 9 is provided with an opening 12 therethrough 30 which is in registry with the cylindrical opening formed by the grooves 6 and 7 and is flared out at its outer end as shown at 13 for shaping the stock to the desired form of valve head.

The die member 9, adjacent its inner end, is 35 provided with an annular radially extending rib or shoulder 14 which is received in undercut grooves 15 and 16 formed in the gripping dies 4 and 5 respectively at the inner end of the recesses 10 and 11 respectively, thus providing co-
40 acting interfitting portions for loosely retaining the button die 9 when the gripping dies 4 and 5 are at their open or separated position to receive or discharge the rod of stock 8.

The die member 9, and the socket in which it 45 is embraced, are made with a great degree of accuracy so that the head of the valve is accurately sized and the stem is concentric therewith. The relative sizes of the button die and socket are such that a greater pressure is ex-
50 erted on the rod of stock than on the button die when the gripping dies are closed. This feature is clearly illustrated in Fig. 2 where the gripping dies are fully closed without a rod of stock there-
55 in and the opening formed by the grooves 6 and

7 is slightly smaller than the opening 12 in the button die 9.

The die assembly as hereinabove described, is mounted in the usual die holder with suitable means for actuating the gripping dies to open and closed position. The rod of stock 8 is rough ground before insertion into the die assembly and after being inserted therein the gripping dies 4 and 5 are closed to retain the rod by engaging that portion of the rod which afterwards becomes the valve stem. The rod or stock extends through the opening 12 in the button die 9 and protrudes therebeyond a sufficient distance to provide enough stock so that a head may be forged which will completely fill the flared out portion 13 of the button die.

Inasmuch as the button die has no seams terminating in the opening 12 and 13, the head portion of the valve when forged therein will not have any fins or ribs thereon as has been the case heretofore where the two part or split die has been used.

Valves formed in this improved die assembly are then ready for finish grinding, thus reducing the cost of the valve by eliminating the extra operations above described.

Although but one specific embodiment of this invention has been herein shown and described, it will be understood that numerous details of the construction shown may be altered or omitted without departing from the spirit of this invention as defined by the following claims.

I claim:

1. A die assembly for a heading machine comprising a pair of relatively movable complementary blocks having registering grooves in their adjacent faces forming an opening passing

through said blocks, adapted to receive stock extending therethrough and projecting at one end, said opening being so contoured that a section of said blocks will grip a section of stock and hold the same against the forging pressure required to upset the projecting end, each of said grooves having an enlarged section, an apertured undivided head-shaping die received in said enlarged sections for shaping said projecting end, and said enlarged section and said head-shaping die being so contoured that said die is locked in position upon closing of said blocks upon said stock and is in floating engagement therewith, but in stock-receiving position, in the open position of said blocks.

2. A die assembly for a heading machine comprising a pair of relatively movable complementary blocks having registering grooves in their adjacent faces forming an opening passing through said blocks, adapted to receive stock extending therethrough and projecting at one end, said opening being so contoured that a section of said blocks will grip a section of said stock and hold the same against the forging pressure required to upset the projecting end, each of said grooves having an enlarged section, an apertured undivided head-shaping die received in said enlarged sections for shaping said projecting end, and said enlarged sections and said head-shaping die having a sliding tongue and groove fit so that the said die is locked in position upon the closing of said blocks upon said stock and is in floating engagement therewith, but in stock-receiving position, in the open position of said blocks.

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