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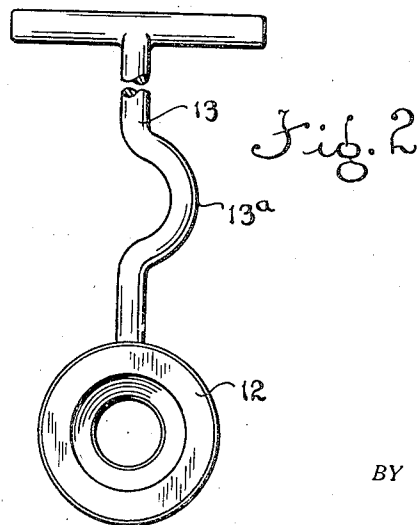
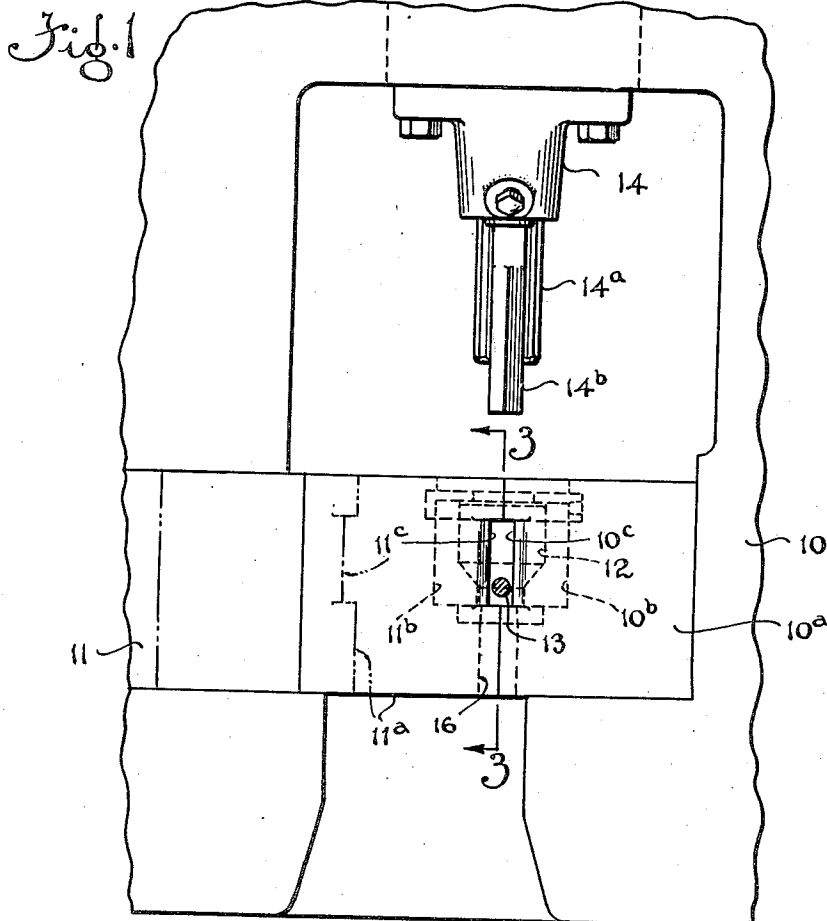
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PROCEDURE AND EQUIPMENT FOR FORGING OR FORMING ARTICLES

Filed May 28, 1943

2 Sheets-Sheet 1



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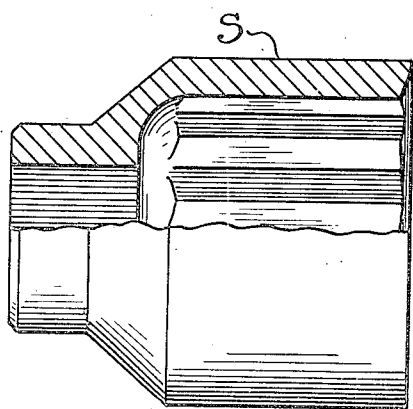
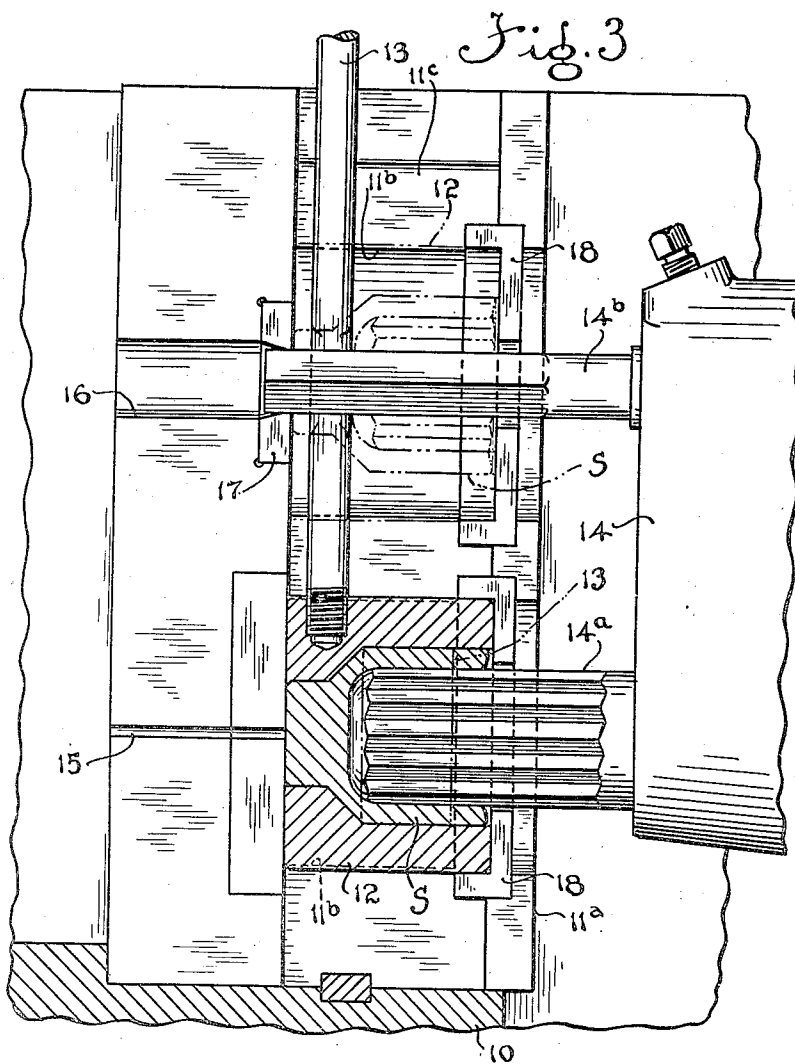
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UNITED STATES PATENT OFFICE

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PROCEDURE AND EQUIPMENT FOR FORGING OR FORMING ARTICLES

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8 Claims. (Cl. 78—13)

This invention relates to improved procedure and equipment for forging or forming various articles so as to facilitate plural forging or forming or associated operations and to minimize subsequent finishing operations.

Heretofore, articles of metal have been forged in one-piece or integral dies, but the procedure and equipment for doing so have not been entirely satisfactory.

One purpose of the present invention is to provide an integral one-piece forging or forming die and die holders for receiving and supporting the same and adapted to be mounted on the relatively movable die-carrying members of a suitable forging machine, the die preferably being provided with a handle whereby it may readily be placed between the die supporting members of the forging machine in association with said die holders, and removed and if necessary replaced between other die holders in the same or different forging or forming machines and removed and if necessary placed in a suitable device for ejecting the finished forging.

Another purpose of the invention is to provide an improved procedure for forging or forming metal or other articles in a one-piece or integral die, which comprises providing such a die with a handle and transporting the die from one set of die holders to another in one or more forging, forming, or ejecting machines or devices.

The foregoing and other purposes of the invention are attained by the equipment and procedure illustrated in the accompanying drawings and described below. While the invention is illustrated as utilizable for the forging of wrench sockets, it is to be understood that it is not limited to such application, but is capable of general use in forging or forming operations.

Referring to the drawings:

Figure 1 is a plan view partly in section showing portions of a standard forging machine showing the die holders and die, embodying and adapted to carry out the present invention, associated therein.

Figure 2 is an elevation of the integral or one-piece die with its handle.

Figure 3 is a section on line 3—3 of Figure 2.

Figure 4 is an elevation partly broken away and in section of a wrench socket which has been forged in the equipment and by use of the method illustrated.

The drawings illustrate a standard forging machine including a relatively fixed die-supporting member 10 and a relatively movable die-supporting member 11 which may recede from coopera-

tion with member 10, as shown, to the chain-dotted line position thereof shown in Figure 1.

Member 10 supports a removable die holder 10a and member 11, a removable die holder 11a, formed with registering or mating recesses of suitable shape at 10b and 11b respectively, so as to provide a cavity for embracing or securing therein a removable one-piece die 12 having an article-forming cavity extending therethrough. The die 12 preferably has thereon a handle 13 for assistance in placing it in position between the die holders when they are apart, usually in the recesses of one or the other so that it will be gripped and supported between the holders for a forging or other forming operation.

As appears from Figures 1 and 3, two sets of die holder recesses are provided, one above the other in the forging machine shown which may have two forging or forming plungers or dies carried on the reciprocal pressing or forging member thereof, the pressing or forging member designated 14 in the drawings, being in the particular installation shown provided with a wrench socket forging member 14a and a wrench socket punch 14b, the latter arranged above the former.

As best illustrated in Figure 3, the die 12 may be placed in one cavity or the other either in position for a forging operation thereon by plunger 14a or a punching operation by plunger 14b, the die holders being cut away or apertured as at 10c, 11c to provide spaces through which handle 13 may extend when the die holders are closed in registry, whether the die is placed in one or the other of the upper and lower cavities. The die handle 13 has an offset 13a therein for clearing the plunger or punch 14b when the die is arranged in the lower set of recesses 10b and 11b and a forging operation is performed by plunger 14a.

The die 12 herein shown as for wrench sockets is open at both ends longitudinally thereof and the die may be vented through a vent aperture 15 in the holder opposite plunger 14a during the socket-forming operation. The holder opposite punch 14b may have a bore 16 therein through which the punching is ejected. A shear plate is shown at 17 with which punch 14b cooperates as will be understood.

To the end that the socket in the die 12 will not be displaced therefrom by withdrawal of the plungers 14a or 14b, stripper plates 18 are associated with the die holders so as to overhang the larger opening in the die as shown.

In carrying out the procedure and in use of the improved equipment a billet 13 (chain-dotted in

Figure 3) of metal is heated to forging temperature and placed in die 12 as indicated. Die 12 is then placed in registry in a lower holder cavity while the holders are apart (chain-dotted position of Figure 1), the die holders then being closed in registry by the forging machine. Next, the machine is operated to force plunger 14a into the article forming cavity of die 12 from one end thereof, to forge or form socket S against backing portions of die holders 10a and 11a restricting or blocking the other end of the die cavity and against the surfaces of the die cavity after which the plunger is withdrawn.

After this forging operation, the die holders are moved apart as will be understood, whereupon, die 12 containing socket S is moved up to and placed in registry with upper die holder cavity which subsequently are closed and plunger 14b is advanced to punch a squared aperture through the bottom of socket S, one end of the die cavity being blocked by backing portions of the holders 10a and 11a to take the force of plunger 14b. Plunger 14b is then withdrawn and the die holders separated by the usual operations of the forging machine whereupon the die may be removed and placed in another holder (not shown) for operation of an ejecting plunger against the bottom of the socket S through the bottom of die 12 to eject the socket.

The socket S may then be finished by machining or grinding such surfaces as require it. Because of the use of an integral die, the outer cylindrical surface of the socket may be effectively finished in a centerless grinder.

While the invention is illustrated in connection with the forging of metal, it is obvious that it may be utilized for forming or molding objects of metal, plastic materials or the like.

Modifications of the invention may be resorted to without departing from the spirit thereof or the scope of the appended claims.

What is claimed is:

1. Forging or forming equipment comprising a one-piece die having an article-forming cavity extending longitudinally therethrough, die-supporting members relatively movable toward each other to support said die in relatively fixed position with one end of said article-forming cavity blocked, and an article-forming member relatively movable into and out of said die cavity from the other end thereof to form the article against the die-supporting member and against the surface of the die cavity, said die being insertable in or removable from between said die-supporting members while the same are separated.

2. Forging or forming equipment comprising a one-piece die having an article-forming cavity extending longitudinally therethrough, die-supporting members relatively movable toward and from each other, said die-supporting members being recessed to provide a plurality of die-receiving cavities when the die-supporting members are relatively moved toward each other, said die being insertable in or removable from one or other of said die-receiving cavities by relatively moving said die-supporting members, a plurality of forging or forming members operable into and out of one end of the die received in either of said die-receiving cavities, and backing means on said die-supporting members for blocking the other end of said die cavity.

3. Forging or forming equipment comprising a one-piece die having an article-forming cavity extending longitudinally therethrough, die-sup-

porting members relatively movable toward and from each other, said die-supporting members being recessed to provide a plurality of die-receiving cavities when the die-supporting members are relatively moved toward each other, said die being insertable in or removable from one or other of said die-receiving cavities by relatively moving said die-supporting members, a plurality of forging or forming members operable into and out of one end of the die received in either of said die-receiving cavities, and backing means on said die-supporting members for blocking the other end of said die cavity, said die having a handle thereon to facilitate insertion in or removal from said die-receiving cavity.

4. Forging or forming equipment comprising a one-piece die having an article-forming cavity extending longitudinally therein from an end thereof, die-supporting members relatively movable toward and from each other, said die-supporting members being recessed to provide a plurality of spaced die-receiving cavities when the die-supporting members are relatively moved toward each other, said die being insertable in or removable from one or other of said die-receiving cavities by relatively moving said die-supporting members, and a plurality of spaced forging or forming members operable into and out of said die-receiving cavities, said die having a handle thereon to facilitate insertion in or removal from said die-receiving cavities, said handle having an offset portion in spaced relation to said die to provide clearance for operation of one of said forging or forming members when said die is supported between said die-supporting members in cooperative relation to another of said forging or forming members.

5. Forging or forming equipment comprising a one-piece die having an article-forming cavity extending longitudinally therethrough, die-supporting members relatively movable toward and from each other, said die-supporting members being recessed to provide a plurality of die-receiving cavities when the die-supporting members are relatively moved toward each other, said die being insertable in or removable from one or other of said die-receiving cavities by relatively moving said die-supporting members, a plurality of forging or forming members operable into and out of one end of the die received in either of said die-receiving cavities, and backing means on said die-supporting members for blocking the other end of said die cavity, said die having a handle thereon to facilitate insertion in or removal from said die-receiving cavities, said die-supporting members being apertured at the joining portions thereof outwardly of said die-receiving cavity for receiving said handle to extend outwardly of the die-supporting members.

6. Forging or forming equipment comprising a one-piece die having an article-forming cavity extending longitudinally therethrough, die-supporting members relatively movable toward and from each other, said die-supporting members being recessed to provide a die-receiving cavity when the die-supporting members are relatively moved toward each other, said die being insertable in or removable from said die-receiving cavity by relatively moving said die-supporting members, a forging or forming member operable into and out of one end of the die received in said die-receiving cavity, and backing means on said die-supporting members for blocking the other end of said die cavity, said die having

a handle thereon to facilitate insertion in or removal from said die-receiving cavity, said die-supporting members being apertured at the joining portions thereof for receiving said handle to extend outwardly of the die-supporting member.

7. Forging or forming equipment comprising a one-piece die having an article-forming cavity extending longitudinally therein from one end, die-supporting members relatively movable toward each other to support said die in relatively fixed position, an article-forming member relatively movable into and out of said die cavity from said end thereof, said die being insertable in or removable from between said die-supporting members while the same are separated and stripper means supported by said die-supporting members, said stripper means having an inwardly extending portion or portions engageable by an article formed in said die to prevent removal of the article therefrom upon withdrawal of said forging or forming member from the die.

8. Forging or forming equipment comprising

5 a one-piece die having an article-forming cavity extending longitudinally therein from an end thereof, die-supporting members relatively movable toward and from each other, said die-supporting members being recessed to provide a plurality of die-receiving cavities when the die-supporting members are relatively moved toward each other, said die being insertable in or removable from one or other of said die-receiving cavities by relatively moving said die-supporting members, a plurality of forging or forming members operable into and out of said die-receiving cavities and stripper means mounted in association with each of said die-receiving cavities, said stripper means having inwardly extending portions engageable by articles formed in said die to prevent removal of the article therefrom upon withdrawal of a forging or forming member from the die.

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