Aug. 14, 1923. 1,464,755

J. DITSON ET AL

FORGING MACHINE

Filed July 6, 1922

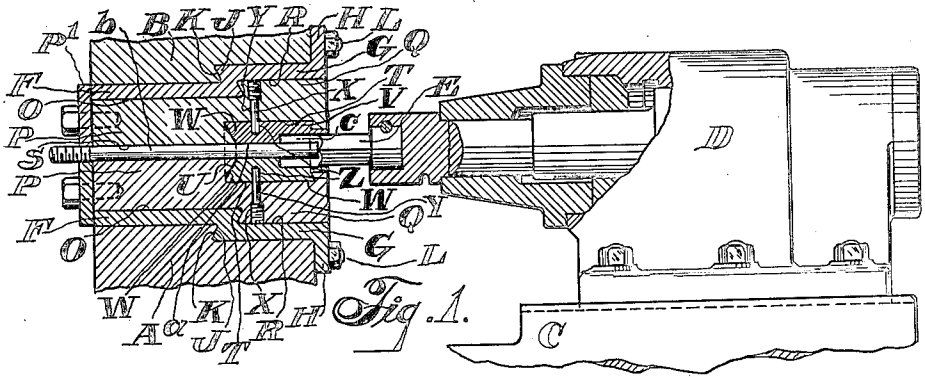


Fig. 1.

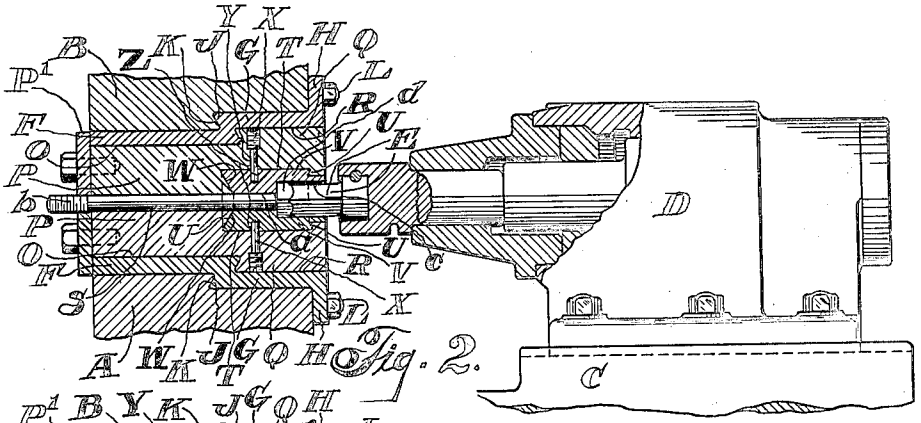


Fig. 2.

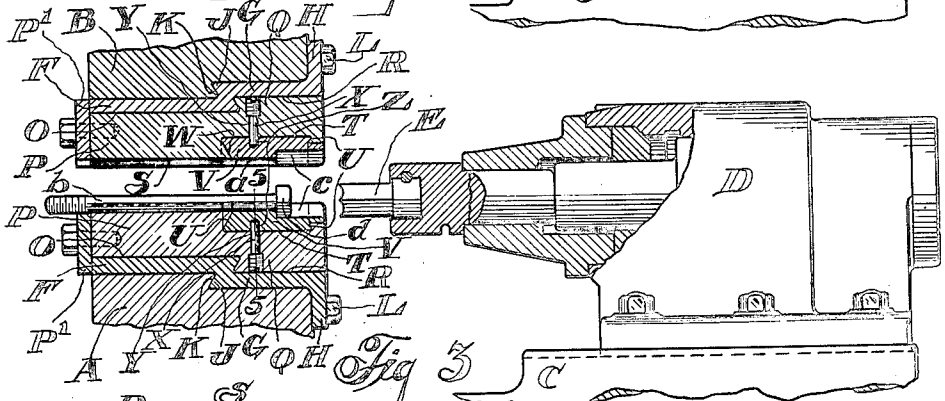


Fig. 3

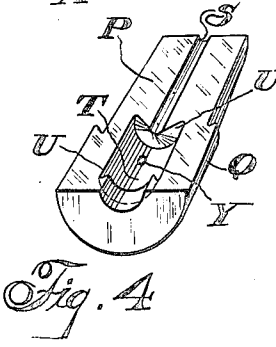


Fig. 4

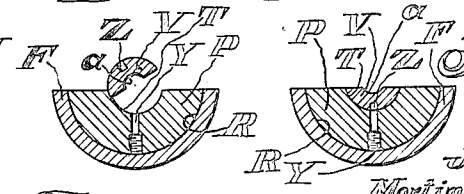


Fig. 5.

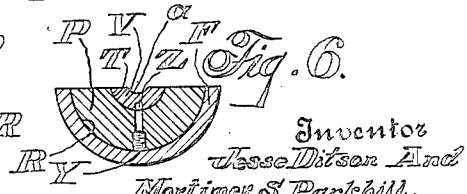


Fig. 6.

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By their Attorney
Robert G. Ogden

Patented Aug. 14, 1923. 1,464,755

UNITED STATES PATENT OFFICE.

JESSE DITSON AND MORTIMER S. PARKHILL, OF LITTLETON, COLORADO, ASSIGNORS TO INGERSOLL-RAND COMPANY, OF JERSEY CITY, NEW JERSEY, A CORPORATION OF NEW JERSEY.

FORGING MACHINE.

Application filed July 6, 1922. Serial No. 573,155.

To all whom it may concern:

Be it known that we, JESSE DITSON and MORTIMER S. PARKHILL, both citizens of the United States, and residents of Littleton, county of Arapahoe, and State of Colorado, have invented a certain Forging Machine, of which the following is a specification accompanied by drawings.

This invention relates to forging machines and particularly to the arrangement of forming and upsetting dies in drill sharpening machines to enable such machines to be used for imparting a desired conformation to steel blanks, such, for instance, as required in forming bolts.

In drill sharpening machines of the type adaptable for these purposes the main holding dies which are fitted to the stationary and movable jaw members usually bear the full impact of the percussive element incident to the operation of upsetting the end of a metal blank. The shock and strain incident to such impact causes the main holding dies to wear rapidly, necessitating complete replacement of the dies when deformed. This is expensive besides being otherwise unsatisfactory.

The primary object of the present invention is to enable the main holding dies, forming dies and other parts which bear the shock and wear, to be so positioned relatively to each other that the shock and strains may be distributed throughout the parts to reduce the impact of the percussive element, thus lessening to a great degree the deleterious effect of such impact. A further object is to enable the removable forming dies to be easily, quickly and cheaply replaced or renewed without replacing or renewing the main holding dies.

A further object is to retain the forming dies in the main holding dies against unintentional displacement. Still further objects will later appear and to all of the ends set forth the invention consists in the features of construction and operation set forth in the following specification and illustrated in the accompanying drawings forming a part hereof, in which—

Figure 1 is a side elevation partly in section of a drill sharpening machine embodying the invention, showing the percussive tool and dolly in position to commence the bolt-heading operation,

Figure 2 is a view similar to Figure 1, showing the position of the parts during the bolt-heading operation,

Figure 3 is a view similar to Figure 2, showing the position of the parts upon completion of the bolt-heading operation,

Figure 4 is a perspective view of one of the main holding dies,

Figure 5 is a sectional view on the line 5—5 of Figure 3, showing one of the removable and renewable dies about to be inserted in the main holding die, and

Figure 6 is a view similar to Figure 5, showing the removable die and main holding die assembled.

In the drawings the invention is shown in connection with a drill sharpening machine which in essential characteristics is similar to the machine illustrated in the prior patent of Jesse Ditson No. 1,436,699, dated November 28, 1922. The machine proper includes a base (not shown) supporting a stationary lower clamping jaw A and a movable upper clamping jaw B, the jaw B being mounted on a vertically reciprocable plunger (not shown), so that the jaws are adapted to be brought close together for performing the various operations for which the machine is adapted. An arm C extends from the base and a percussive element in the form of a pneumatically actuated tool D is slidably mounted on the arm C, so that the reciprocable dolly E, which may form a part of the percussive element, is in alignment with the space between the opposing surfaces of the jaw members A and B and may be moved toward and away from the jaws.

Upper and lower die holder guides or seats are fitted over the opposing surfaces of the jaws A and B. These seats F are provided with offset portions G and turned ends H, and are adapted to be inserted in the jaws A and B so that the inclined shoulders J on the seats F abut against correspondingly inclined shoulders K on the jaws, thus rigidly securing the seats F against longitudinal movement in the direction opposite to the percussive tool D. The turned ends H are secured to the jaws A and B by bolts L.

The inner opposing surfaces O of the die seats F in the jaws A and B respectively, are curved and form longitudinal semi-cir-

cular recesses for receiving and retaining the main holding dies in place between the jaws A and B. The main holding dies P are semi-cylindrical in form, the outer sides adjacent to the outer end being provided with dove-tailed flanges Q which fit semi-circular recesses R in the opposing die seat surfaces O. The main holding dies P are retained in the die seats F against longitudinal movement by suitable plates P'.

The opposing inner surfaces of the main holding dies P are longitudinally recessed, forming a cylindrical bore S, and this bore S is diametrically enlarged at one end, forming opposite die receiving recesses T having inclined end walls U in the holding dies P. A pair of removable semi-cylindrical dies V having inclined end walls corresponding to the end walls U of the recesses T are adapted to be inserted transversely in the recesses T, these dies being cut away at their ends as shown at W in correspondence with the inclined walls U so that the bushings are retained in the recesses T against vertical movement. Locking pins X are adapted to pass thru central holes Y in the holding dies P and into corresponding recesses Z in the dies V to hold the dies against transverse movement. These locking pins may be threaded so that a degree of pressure may be exerted on the movable dies V to hold the dies tightly in position. For a portion of their length the dies V are provided with opposite longitudinal recesses *a* which are adapted to effect clamping engagement with the shank of a bolt blank *b* upon which a head is to be formed. Adjacent to one end, however, the recesses *a* are enlarged so that together they form an open ended upsetting recess *c*. The walls of the upsetting recess *c* are adapted to cooperate with the dolly E and act as forming surfaces for imparting the desired conformation to the article being formed. In the present instance, the dies and dolly E are adapted to forge a head *d* on the end of the bolt blank *b*. The bolt blank *b* is securely held between the dies *a* and die holders P when the jaw member B is lowered, the blank having first been inserted the required distance. Operation of the percussive tool D then causes the dolly E to reciprocate rapidly against the end of the blank *b* and the head is formed on the blank under the forging process, the conformation of the head being defined by the dolly E and the configuration of the recess *c*, under the influence of the percussive element D. The percussive element is adapted to move bodily toward and away from the jaws A and B to the proper position for carrying out the several steps in the operations as indicated in Figures 1, 2 and 3.

In assembling the parts the dies are inserted transversely in the recesses T of the main holding dies P and the pins are passed through the aligned holes Y and recesses Z. The main holding dies are then held so that the flanges Q are aligned with the recesses T in the seats F and are then slid arcuately into place in the die seats, the movable jaw of the sharpener having first been raised to its uppermost position. When thus inserted the outer edges of the dies, main holding dies and die seats in each group are in alignment and form plane surfaces.

The points of rapid wear in a machine of the character described, are the interior surfaces of the dies which are subject to the forging process exerted by the dolly under the influence of the percussive tool. The wear and shock taken up by the dies deforms them after a time and when such dies are integral with the main holding dies, or when the die surfaces are formed on the main holding dies themselves, it becomes necessary to replace the main holding dies at more or less frquent intervals. This is an expensive proceeding which the use of separate readily removable and renewable dies as described herein avoids. The dies are comparatively inexpensive, and a supply can be kept on hand so that no time is lost in the use of the machine. Also, whether separate dies are employed or not, the main holding dies P are subject to shock and wear at the points of engagement with the jaws of the drill sharpener. The present arrangement of mounting the dies by means of the die seats F having concentric undercut shoulders corresponding to undercut shoulders in the main holding dies affords strong and substantial shoulders or abutments on the parts for taking the shock and impact of the dolly in swaging the head of the bolt, and enables the strains to be distributed, thus minimizing the shock in all the parts. The undercut shoulders and recesses of the die seat, die holder and die in each of the jaws A and B, are located out of vertical alignment with each other. This serves to further distribute and equalize the strains incident to the forging operation throughout the structure.

We claim:

1. A device of the character described, including a percussive element, relatively stationary and movable jaws, die seats having undercut shoulders fitting corresponding undercut recesses in said jaws, and die holders having cooperating semi-cylindrical bores, said bores being enlarged adjacent to one end and having undercut ends, and replaceable dies having inclined inner and outer end surfaces fitting the undercut ends of said enlarged portions, said dies being adapted to engage the article to be formed and said enlarged portions being adapted to define the conformation of an article therein under the influence of blows administered by said percussive element.

2. A device of the character described, including a percussive element, relatively stationary and movable jaws, die seats having undercut shoulders fitting corresponding undercut recesses in said jaws, and die holders having cooperating semi-cylindrical bores, said bores being enlarged adjacent to one end and having undercut ends, and replaceable dies having inclined inner and outer end surfaces fitting the undercut ends of said enlarged portions, said dies being adapted to engage the article to be formed and said enlarged portions being adapted to define the conformation of an article therein under the influence of blows administered by said percussive element, the corresponding undercut shoulders and recesses of the die seats, die holders and dies in each jaw being located in non-vertical alignment.

In testimony whereof we have signed this specification.

JESSE DITSON.
MORTIMER S. PARKHILL.