

(No Model.)

H. P. BOYD.
DIE FOR SWAGING SCREWS.

No. 478,219.

Patented July 5, 1892.



Fig. 1.



Fig. 2.

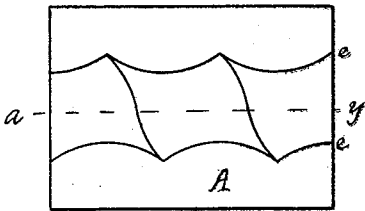


Fig. 3.

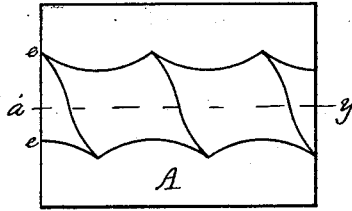


Fig. 4.



Fig. 5.

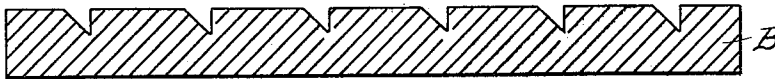


Fig. 6.

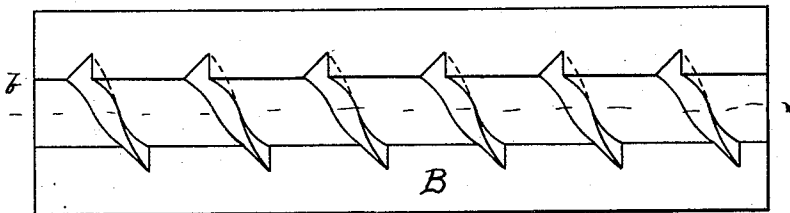


Fig. 7.

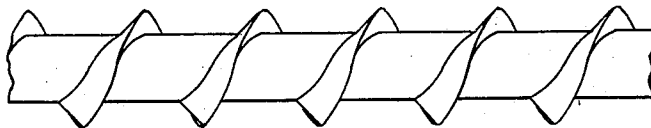


Fig. 8.

Witnesses

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UNITED STATES PATENT OFFICE.

HENRY P. BOYD, OF SOUTHAMPTON, ENGLAND.

DIE FOR SWAGING SCREWS.

SPECIFICATION forming part of Letters Patent No. 478,219, dated July 5, 1892.

Application filed March 7, 1889. Renewed December 29, 1891. Serial No. 416,475. (No model.) Patented in England April 23, 1885, No. 5,029.

To all whom it may concern:

Be it known that I, HENRY P. BOYD, a subject of the Queen of Great Britain, and a resident of Southampton, in the county of Hants, England, have invented certain new and useful Improvements in the Process of Forming Raised Ribs on Rods, (for which I have obtained a patent in Great Britain, No. 5,029, dated the 23d day of April, 1885,) of which the following is a full, clear, and exact specification.

My invention relates to improvements in methods of forging screws; and the object of my invention is to have the fiber of the forged metal follow the longitudinal form of the screw and not be cut or broken by the dies, thereby making a much stronger screw than cut screws and effecting a saving of material, as by my method the metal is stretched longitudinally and not cut away and wasted. I attain this object by the process hereinafter described, employing the forms of die shown in the accompanying drawings, in which—

Figures 1 and 2 are sections of Figs. 3 and 4 on the line *a y*. Figs. 3 and 4 are plan views of the upper and lower halves of the stretching-die. Fig. 5 is a screw as partly formed by the stretching-die. Fig. 6 is a section of Fig. 7 on the line *b x*. Fig. 7 is a plan view of one-half of the finishing-die. Fig. 8 is a view of a finished screw.

The stretching-die A has a helical convolution or convolutions, and in this respect of course resembles the finishing-die B in the stretching-die. However, the convolutions have less pitch and are of a form irrespective of the shape of thread destined for the finished screw.

The bar or blank from which the screw is to be forged is of a diameter somewhat less than the distance from *e* to *e*, (see Figs. 3 and 4,) the object of this being that the metal may have room to rise to the top of the convolution in the die. The stretching-die is made short (not to exceed two convolutions in length) that the metal may not be confined from stretching longitudinally. The blank is rotated in any suitable manner while being passed through the dies, either stretching or finishing. The blanks are passed through the

dies in any suitable manner by any suitable means adapted for the purpose.

In practice for a finished half-inch screw of half-inch pitch the pitch of the stretching-die should be about one-eighth inch less, or, say, three-eighths less, and for a screw one and a quarter inch diameter and one and a quarter inch pitch, the stretching-die would be about one inch pitch, all to allow for the additional stretching by the finishing-die. Screws forged after this method are much stronger than cut screws, and a saving of material results from this method as compared to cutting screws, because the metal is stretched longitudinally and not cut away and wasted.

To carry out the forging of screws with my improved dies, I fix one-half of the die upon an anvil and the upper part of the die on the end face of a steam or power-driven hammer-head or under a hydraulic ram, so that when the hammer-head or ram is lifted the dies are opened and upon the down travel of the hammer-head or ram the dies are forced together. I may conveniently place both the first and second dies side by side upon the same anvil and hammer or press head, so that the double operation may be proceeded with simultaneously. To forge the screw, I first prepare the plain shank with the head formed thereon. I then heat the shank and place it in the roughing-die when the dies are opened, and a rough impress of the thread is produced upon the shank by the closing of the dies. I turn the shank about in the roughing-die, taking care in such turning that the first-marked threads on the bolt remain in their respective grooves with the die, so as not to destroy or injure the thread first produced. After a few blows or squeezes the preliminary thread is formed with merely a beaded sinking, as shown in Figs. 1 and 2. I then transfer the bolt to the finishing-dies, (see Figs. 3 and 4,) and in this case I enter the bolt into the first thread of the die, allowing the blow of the upper die to operate only on the extreme point of the bolt and thereon to complete the finished thread. I now gradually turn the bolt in the proper direction of the thread, so that it enters the die farther and farther, the first formation of the thread in-

suring its proper entry into the body of the die as the bolt is gradually advanced and turned.

It might be possible with great handicraft, skill, and care to form a thread from the finishing-die alone in the manner above described; but to carry out the work in the hands of ordinary smiths or workmen the preliminary formation of the beaded thread is of great value to act as a guide in using the finishing-die, and, further, by the more gradual working up of the metal in the two operations to insure a full and solid thread in the finishing-die, which might otherwise be imperfect and scanty.

Having described my invention, its usefulness and application, that which I claim as new, and desire to secure by United States Letters Patent, is—

The combination of two split dies for forg-

ing a screw-thread, consisting of a primary split die internally threaded parallel throughout with a slightly indented and rounded primary leading-thread of a shorter pitch than that to be eventually forged on the screw and a parallel internally-threaded secondary split die with a fully-formed rectilinear thread of a longer pitch than that of the primary die to admit of elongation of the barrel of the screw during forging and corresponding to the thread finally to be forged upon the finished screw, substantially as specified.

In testimony that I claim the foregoing I have hereunto set my hand this 18th day of September, 1888.

HENRY P. BOYD.

Witnesses:

ANDREW LILLEY,
FREDK. E. HISCOCKS.