E. T. McPHERSON.

DIES FOR FORGING AUGER BITS AND THE LIKE.

APPLICATION FILED MAY 20, 1915.

1,184,111.

Patented May 23, 1916.

2 SHEETS—SHEET 1.

Fig. 1.

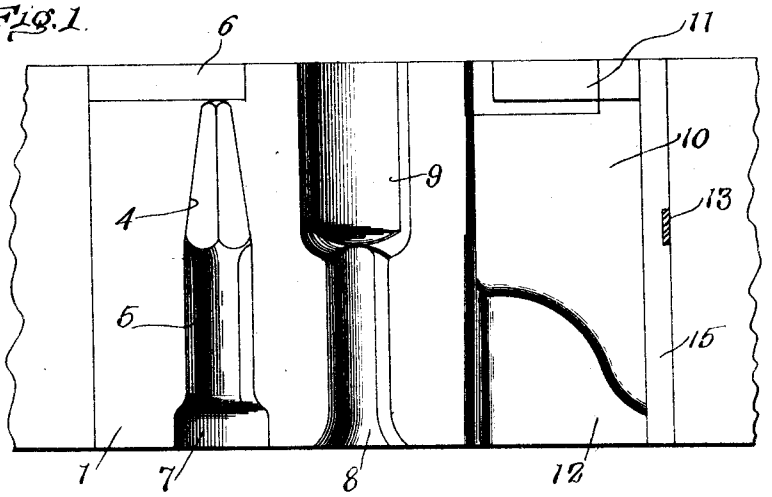

Fig. 2.

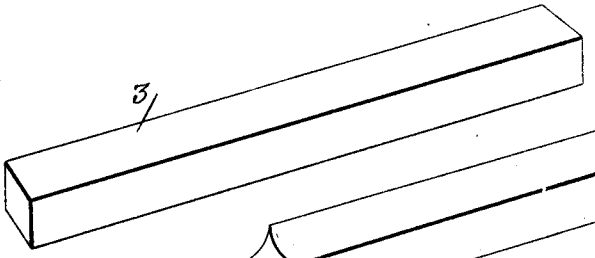

Fig. 3.

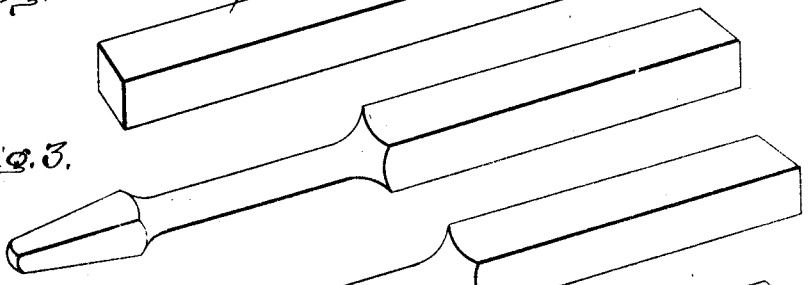

Fig. 4.

Fig. 5.

Fig. 6.

Witness

G. H. Walmsley.

Inventor

Elmer T. McPherson,

By

Attorneys.

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2 SHEETS—SHEET 2.

Fig. 7.

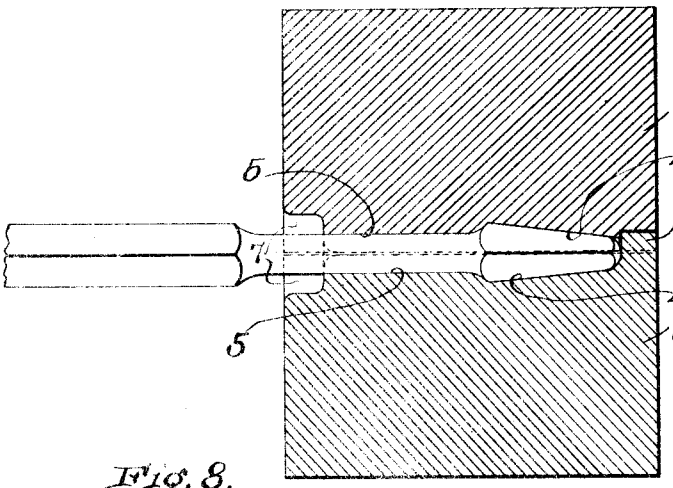


Fig. 11.

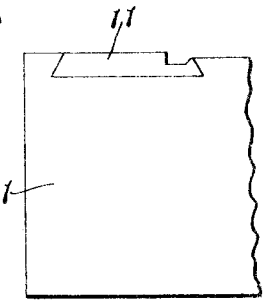


Fig. 8.

Fig. 9.

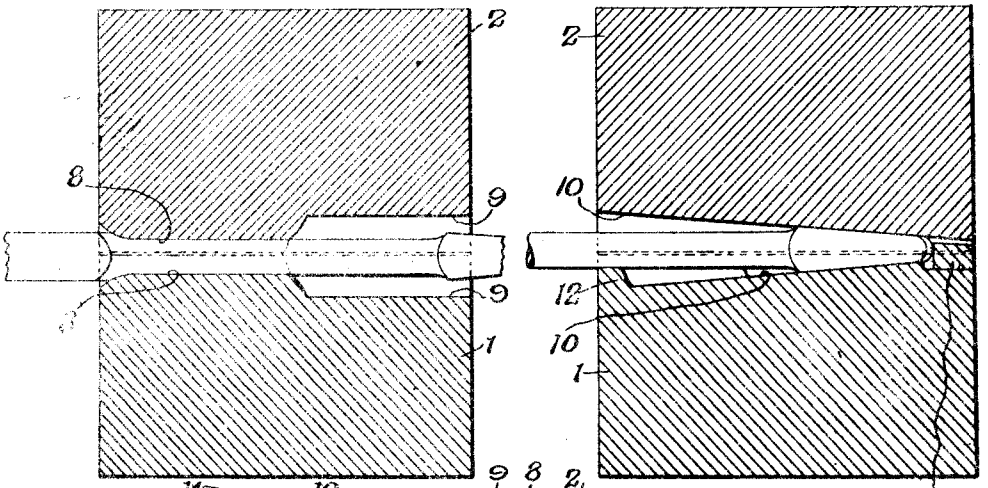
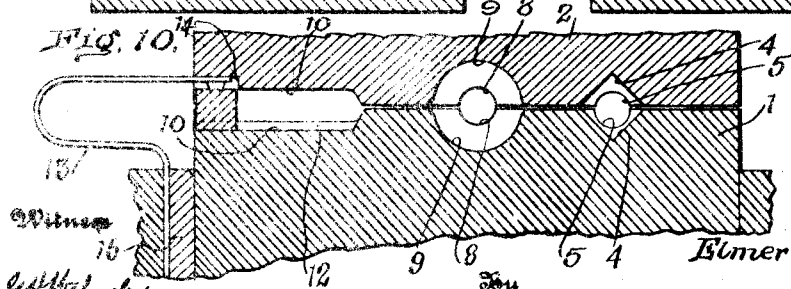


Fig. 10.



Witness

Inventor

Elmer T. McPherson,

By

Attorneys

UNITED STATES PATENT OFFICE.

ELMER T. McPHERSON, OF WILMINGTON, OHIO, ASSIGNOR TO THE IRWIN AUGER BIT COMPANY, OF WILMINGTON, OHIO, A CORPORATION OF OHIO.

DIES FOR FORGING AUGER-BITS AND THE LIKE.

1,184,111. Specification of Letters Patent. Patented May 23, 1916.

Application filed May 20, 1915. Serial No. 29,284.

To all whom it may concern:

Be it known that I, ELMER T. McPHERSON, a citizen of the United States, residing at Wilmington, in the county of Clinton and State of Ohio, have invented certain new and useful Improvements in Dies for Forging Auger-Bits and the like, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to dies for forging auger bits and the like and more particularly to dies for forging the square and round portions of such bits. In the manufacture of auger bits and similar articles it is customary to forge the bit from a bar of steel which is usually square or round in cross section. The forging of the shank of the bit, including the round and tapered square portions thereof, requires a series of operations and it is accomplished by means of power operated hammers provided with dies of the proper shape. The dies commonly used for this purpose are such that the character of the work is left more or less to the judgment or skill of the operator. As a result there is apt to be considerable variation between different articles which are supposed to be exactly alike. This is particularly true in connection with the tapered shanks of the bits. In a given size of bits these shanks are supposed to be of exactly the same dimensions but in practice they will frequently vary to a noticeable extent in width or thickness and in the length of the taper.

The object of this invention is to provide a set of dies of such a character that the finished product will be uniform; and further, to produce a set of dies which will accomplish this result without complicating the character of the die and without adding materially to the expense of making the same.

It is also an object of the invention to provide means for controlling the length of the finished shank of the bit.

In the accompanying drawings, Figure 1 is a top, plan view of the lower or anvil die forming a part of a set of dies embodying my invention; Fig. 2 is a perspective view of the stock from which the bit is to be produced; Fig. 3 is a similar view of the bit after the roughening out operation; Fig. 4 is a similar view of the bit after the round has been finished; Fig. 5 is a similar view of the bit after the tapered shank has been finished; Fig. 6 is a similar view of the bit with a number applied thereto; Fig. 7 is a sectional view taken through those portions of the dies which rough out the round and shank portions; Fig. 8 is a sectional view of the dies taken through those portions thereof which finish the round; Fig. 9 is a sectional view taken through those portions of the dies which finish the shank; Fig. 10 is a transverse, sectional view showing the marking device; and Fig. 11 is a detail view showing the adjustable stop for that portion of the anvil die on which the shank is finished.

In carrying out my invention I provide a pair of dies consisting of the lower or anvil die 1 and the upper or hammer die 2. As will be readily understood the lower die is mounted in a fixed position upon a supporting block or anvil while the upper die is carried by the hammer, or the like, and is arranged in exact alinement with the lower die. The two parts have their adjacent surfaces shaped to correspond to the character of the work which it is desired to produce, each die being cut away to form a recess of such a shape that it will receive the adjacent half of the work. Auger bits and the like are commonly formed from straight stock, either square or round bars, and I have shown at 3, in Fig. 2, a blank designed for the production of an auger bit. The first operation is the roughing out of the shank and round portions of the bit to give the same the shape shown in Fig. 3. To accomplish this I have provided the dies with cooperating portions each having an angular recess 4 and a curved recess 5. The angular recess 4 is preferably V-shape in cross section when square shanks are to be made and the curved recess is approximately semicircular in shape, although its width at the top may be more than twice its depth. The V-shaped recess is tapered and at the tapered end thereof is closed by a wall or stop 6. This stop is preferably carried by the lower die and extends above the upper surface of that die far enough to close the end of the tapered recess in the upper die when the latter die is resting upon the former thus forming a solid stop against which the end of the work may abut. It will be understood, of course, that the upper die is cut away to receive that portion of the stop

which projects above the surface of the lower die. This arrangement insures a perfect register of the parts to prevent relative shifting of the two dies. Those ends of these cooperating portions of the dies opposite the tapered portions thereof are enlarged, as shown at 7, to receive, and permit the rotation of, the unformed portion of the blank. A blank, such as shown in Fig. 2, is heated to the proper temperature and is then placed in position in the recesses 4 and 5 of the lower die and the upper die caused to strike repeatedly on the same, the stock or blank being turned between the strokes of the upper die. This operation causes the stock to assume the shape shown in Fig. 3 and because of the stop at the end of the tapered recesses in the dies the shank of the bit is of a predetermined size, as is also the round portion.

Following the roughing out of the round and shank portions of the bit the next operation is usually the finishing of the round. I have, therefore, provided the dies 1 and 2 with curved recesses 8 of such a size and curvature as will impart the desired shape to the round portion of the bit. The diameter of this curved recess is less than that of the recesses 5 of the roughing out portion of the dies and, consequently, the round shank is reduced in diameter and lengthened to give the work the shape shown in Fig. 4. It will be noted that the dies are provided with large recesses 9 to receive the shank portion of the bit during the finishing of the round, these portions being of such size that the shank can rotate freely therein without engaging either of the dies.

Following the finishing of the round comes the finishing of the shank. To accomplish this each die is provided with a flat portion 10 extending from one side inwardly, the flat portions of the two dies converging, as shown in Fig. 9. In forming these flat portions the dies are cut away so that when one die rests upon the other the space between the two inclined portions of the dies will correspond in taper and depth to the taper and thickness of the finished shank of the bit. This finishing operation of the shank tends to draw the same to a slightly greater length, as shown in Fig. 5, and to give the same a smoother finish than that imparted thereto by the roughing out portion of the dies. The length of the inclined portions of the dies is usually greater than the length of the shank of the bit and I have, therefore, provided a stop 11 against which the end of the shank may be placed and which serves to regulate the draw and the size of this taper. It will be understood that by varying the position of the stop 11 the size of the shank may be varied. In the use of the dies the roughing out portions thereof will usually wear more rapidly than the finishing portions thereof. When the die has worn to such an extent that it will no longer give accurate results it is re-cut to the next larger size. By making the stop 11 adjustable those portions of the dies which finish the shank can be utilized for finishing a different size of shank without re-cutting, which is of material importance as the cost of making dies is very great. To secure this adjustment I preferably form the stop 11 separate from the body of the die and provide it with a depending dove-tail portion adapted to enter the correspondingly shaped recess in the body of the die and to be held in this recess by a driving fit so that it may not be accidentally displaced but can be adjusted by driving the same from one position to another. The lower die 1 is provided at that end of the inclined portion 10 opposite the stop 11 with a shoulder or raised portion 12, upon which the round of the bit rests while the shank is being finished and which serves to support the bit in a proper position with relation to the inclined portions of the dies and prevent the distortion of the round.

After the finishing of the round or shank of the bit it is customary to place upon the shank a mark, such as a number to indicate the size or number of the bit. This is done by use of a marking tool and is commonly accomplished by hand. In the present instance, however, I have provided one die with a marking device which is supported adjacent to the flat inclined portions thereof. As here shown this marking device comprises a resilient bar or finger 13 mounted at the side and having a substantially horizontal portion extending into the space formed between the dies at that side and above the lateral portion of the inclined part 10 of the lower die. This finger is so arranged that the finished shank of the bit can be slipped beneath the same and on the next blow of the hammer the upper die will strike the finger and place the mark upon the shank of the bit, it being understood, of course, that the lower side of the finger is provided with a type face of such a shape as to make the desired mark, which is shown in Fig. 6 as the number "8". The upper die is cut away along its outer edge, as shown at 14, to accommodate the marking finger and to prevent the same being driven too far into the metal when the shank of the bit is placed beneath the same. This resilient finger may be mounted in any suitable manner. It is, however, preferably made separate from the die so that it can be changed and a new number given the die when it is re-cut, as above explained. In the present instance the resilient finger has a vertical portion or shank by means of which it is held in position along side of the lower die 1, this being accomplished by

forming a recess in the liner 15 by means of which the die is secured in position and inserting the upright or shank of the marking finger in this recess.

The operation of the dies will be readily understood. Briefly, it is as follows: The stock or blank, as shown in Fig. 2, is heated and placed in the roughing out portions of the dies where it is operated upon until the stock has been roughed out to the shape shown in Fig. 3. It is then, without reheating, transferred to the portions 8 of the dies where the round is finished. It is then, again without reheating, transferred to the inclined portions of the dies where the shank is finished, and is then placed beneath the resilient finger 13 and marked. The complete operation is performed with one heating of the metal and the location and arrangement of the several portions of the dies are such that the operations are quickly and easily performed and the work accurately controlled so that the finished articles are uniform.

In a copending application, Serial No. 68,307, filed by the applicant Dec. 23, 1915, a method of making the shanks of boring tools, such as the shanks herein described and shown is claimed, the apparatus shown, described and claimed herein being suitable for carrying out said method.

Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. In a device for forging auger bits, a lower die and an upper die, said dies having portions coöperating to rough out the round and shank portions of said bit, one of said dies having a stop extending into the plane of the other die and said other die being recessed to receive said stop, whereby the size of said shank portion can be regulated and a perfect register insured.

2. In a device for forging auger bits, a lower die and an upper die, said dies having portions coöperating to rough out the round and shank portions of said bit, one of said dies having a stop extending into the plane of the other die and said other die having a recess and shoulder, said recess adapted to receive said stop and said shoulder arranged to extend in front thereof, whereby the size of said shank portion can be regulated.

3. In a device for forging auger bits and the like, a lower die and an upper die, said dies having roughing out portions comprising coöperating angular recesses and coöperating curved recesses, said angular recesses being tapered away from the curved recesses, and said lower die having a stop arranged at the tapered end of the angular recess therein and extending above the surface of said lower die, said upper die being cut away to receive said upwardly projecting stop.

4. In a device for forging auger bits, a lower die and an upper die, said dies having flat portions sunken therein converging toward each other, a stop at the converging ends of said flat portions, a rest for the round of the bit at the diverging ends of said flat portions located on the lower die, and the flat portion of said upper die adjacent said rest being spaced vertically above the same a distance greater than the diameter of said round.

5. In a device for forging auger bits, a lower die and an upper die, said dies having flat portions coöperating to finish the shank of a bit, and an adjustable stop upon the lower die to control the finishing operation and regulate the size of the shank.

6. In a device for forging auger bits, a lower die and an upper die, said dies having portions coöperating to finish the shank of the bit, the lower die having a stop at one end to control the finishing operation and regulate the size of the shank, and a rest at the other end thereof to support the round portion of the bit in proper position relatively to said shank during the finishing operation.

7. In a device for forging auger bits, a lower die and an upper die, said dies having flat portions coöperating to finish the shank of a bit, the lower die having a stop at one end to control the finishing operation and regulate the size of the shank, the portions of the dies opposite the stop being arranged to prevent the distortion of the round or stock during the finishing operation.

In testimony whereof, I affix my signature.

ELMER T. McPHERSON.