A. WARD.

MEANS FOR FORMING TWIST DRILLS.

APPLICATION FILED JULY 1, 1909.

950,646. Patented Mar. 1, 1910.

Fig. 1.

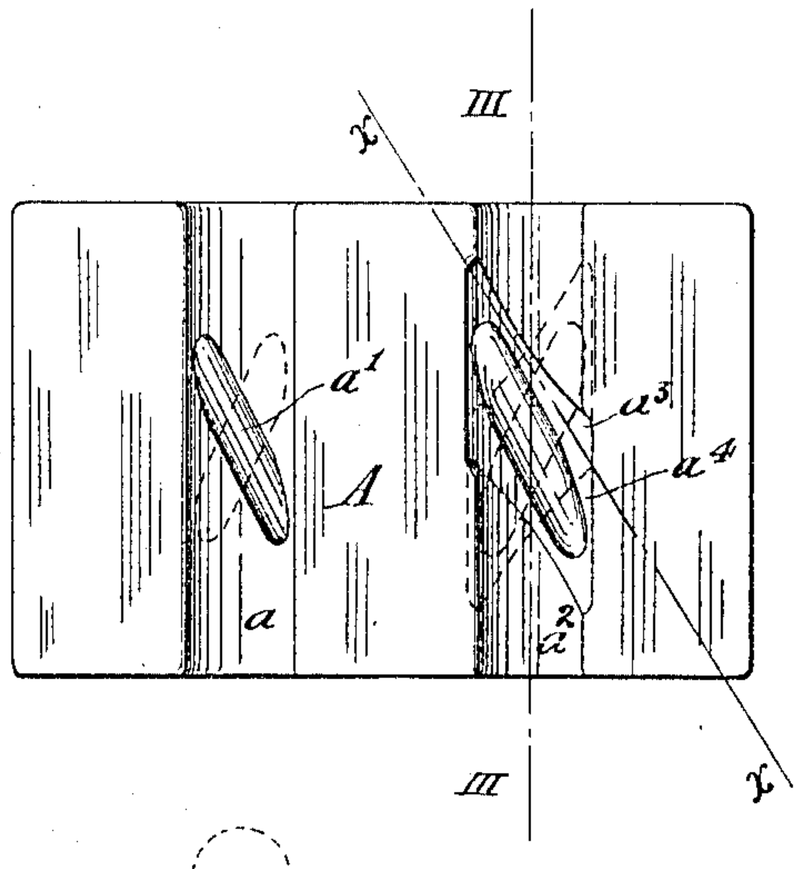
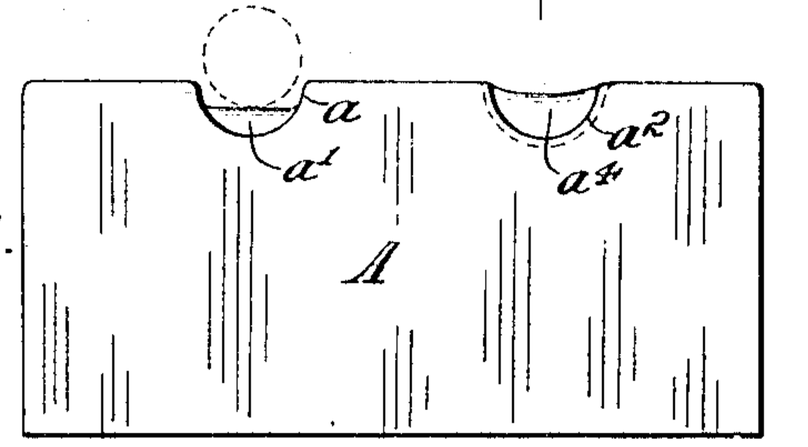


Fig. 2.



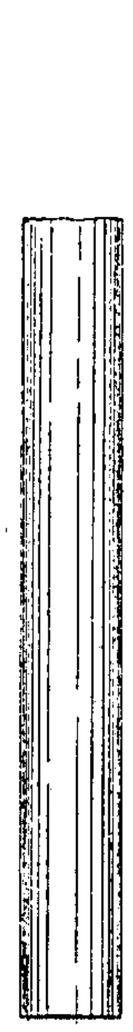


Fig. 4.

Fig. 5.

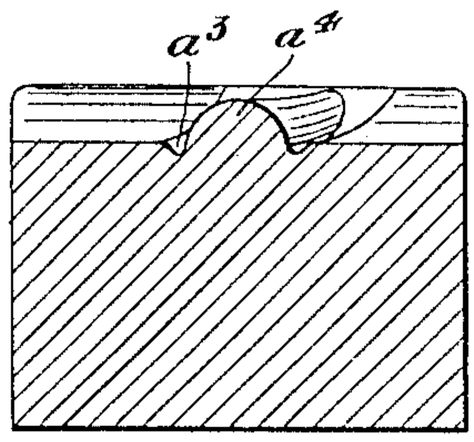


Fig. 3.

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UNITED STATES PATENT OFFICE.

ALVIN WARD, OF CLEVELAND, OHIO, ASSIGNOR TO THE CLEVELAND TWIST DRILL COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO.

MEANS FOR FORMING TWIST-DRILLS.

950,646. Specification of Letters Patent. Patented Mar. 1, 1910.

Application filed July 1, 1909. Serial No. 505,351.

To all whom it may concern:

Be it known that I, ALVIN WARD, a citizen of the United States, resident of Cleveland, county of Cuyahoga, and State of Ohio, have invented a new and useful Improvement in Means for Forming Twist-Drills, of which the following is a specification, the principle of the invention being herein explained and the best mode in which I have contemplated applying that principle, so as to distinguish it from other inventions.

My invention relates to means for forming twist drills, and particularly to the means employed in the method for forming twist drills described and claimed in my pending application filed February 14, 1908, Serial No. 415,981, for method of forming twist drills.

The said invention consists of means hereinafter fully described and particularly set forth in the claims.

The annexed drawing and the following description set forth in detail certain means embodying my invention, the disclosed means, however, constituting but one of various mechanical forms in which the principle of the invention may be applied.

In said annexed drawing: Figure 1 is a plan of one of the dies constituting part of my invention. Fig. 2 is an end elevation of such die, and Fig. 3 is a cross sectional view taken upon the plane indicated by line III—III in Fig. 1. Fig. 4 is an elevation of a blank rod, and Fig. 5 is a similar view of the finished product resulting from the operation of my improved dies.

The die block A is formed with a semi-cylindrical depression a which is angularly traversed by a projection a', itself of semi-cylindrical cross section. This projection is made of a height substantially equal to about one-half the extreme depth of the depression a as shown in Fig. 2 and its base intersects the cylindrical surface of the depression. The cross-sectional area of the depression a is made such that when the blank rod is laid therein and upon the projection a only a small amount of lateral play is permitted for a purpose hereinafter specified.

A similar depression a^2 is formed upon another part of the block whose extreme portions are made accurately of a semi-cylindrical form whose cross-sectional area is made exactly equal to one-half of the circular cross-sectional area of the required finished forging. An angularly placed portion a^3 of the depression a^2 is made of greater depth than the end portions of the depression a^2 as shown in Fig. 3, so as to present a greater cross sectional area on a plane having an angularity substantially equal to the angle of the required flute and indicated by the line x—x, Fig. 1. Protruding upwardly from this enlarged portion of the depression is a projection a^4 which is also angularly placed with reference to the depression's axis as shown and is furthermore of semi-cylindrical cross-section, the middle part of such cross section corresponding substantially to the cross-section of the desired finished forging. This projection a^4 is furthermore of greater height than that of projection a'.

In carrying out my improved process, the die block A is placed in a suitable foundation to form an anvil and a similar die block provided with depressions and projections exactly similar to those just described but reversed to assume the position indicated in dotted lines in Fig. 1, is secured to the head of a suitable drop, trip or steam hammer.

The blank to be operated upon is heated to a suitable temperature and then placed in the depression a and upon the projection a' so as to bring the latter in a position which will be occupied by that end of the flutes adjacent to the shank of the drill. In this position, (see dotted lines Fig. 1), as was previously stated, only a small amount of lateral movement of the blank is permitted so that the projection a' will be properly centered with relation to the blank. The hammer is now operated to bring the other portion of the die down upon the top of the blank, whereby the projection a' and the corresponding projection of the other portion of the die are caused to make two oppositely disposed depressions of opposite angularity, as will be readily understood. The blank is then given a helical movement in the direction of its axis and the hammering operation continued, the projection a' being used as a guide. Two oppositely disposed flutes are thus formed which have not, however, their final depth or form. The blank so impressed is now transferred to the groove a^2 of the die block and placed therein so as to cause the projection a^4 to engage the flutes formed in the above-described operation. The upper movable die

is now caused to descend upon the blank in a number of successive blows so as to further enlarge the impression previously formed. Such action produces a projection having the contour of the depressed portion a^3 of the depression a^2 and the projection a^4, the metal expanding into the portion a^3. After the required number of blows have been delivered to produce this contour, the blank is turned so as to impart thereto a helical movement in the direction of the blank's axis, the projection a^4 being used as a guide for such purpose. This brings a succeeding portion of the blank into the field of operation of the die and the required number of blows are now struck to produce a result upon this portion of the blank such as above described. In this manner every portion of the blank may be presented to the action of the die and two continuous helical and oppositely disposed flutes thereby formed upon the blank to produce the finished product.

The expanded portions of the blank after being formed are brought into the field of action of the cylindrical end portions of the depression a^2 and thereby caused to assume the exact required size. The completed forging is now placed in a straightening die to give it a rectilinear form. All surfaces of the depression a^2 are rounded slightly as shown and particularly those surfaces which form the connection between the cylindrical portion thereof and the depressed portion a^3 thereof so that the product of the above described operation will on completion present a smooth and uniform appearance. The action of the cylindrical end portions of the depression is such as to compress the enlarged portion formed in the vicinity of the projection a^4 which results in the slight contraction of the outer portion of the flutes. This contraction permits the edges of the flutes to present a sharp line when the drill is ground to its final exterior form.

Having fully described my invention, what I claim therefor and desire to secure by Letters Patent is:

1. In means for forging twist drills or the like, a die element with a semi-cylindrical depression traversed angularly by a projection, the cross-section of such depression being enlarged adjacent to the base of said projection.

2. In means for forging twist drills or the like, a die member formed with a semi-cylindrical depression traversed angularly by a projection, the cross-section of said depression being enlarged adjacent to the base of said projection; the area of the cross section of the remaining portion of the depression being substantially equal to one-half of the circular cross-sectional area of the finished drill.

Signed by me, this 30th day of June, 1909.

ALVIN WARD.

Attested by—
CURT B. MUELLER,
K. F. JUENGLING.