

No. 758,041.

PATENTED APR. 26, 1904.

R. L. BARCLAY.
PROCESS OF FORMING TWIST DRILLS.

APPLICATION FILED FEB. 28, 1903.

NO MODEL.

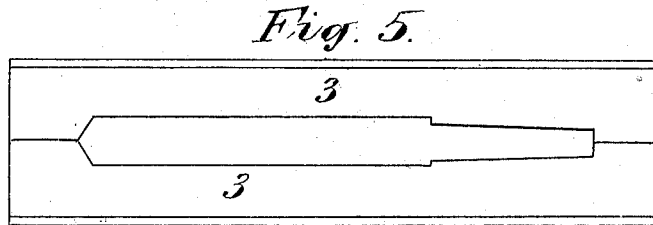
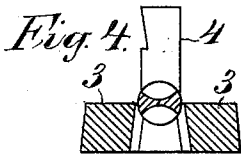
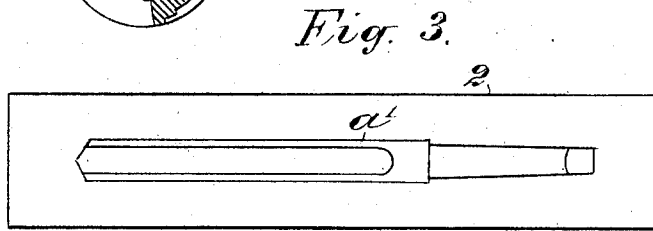
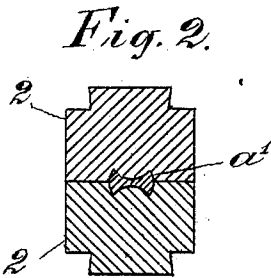
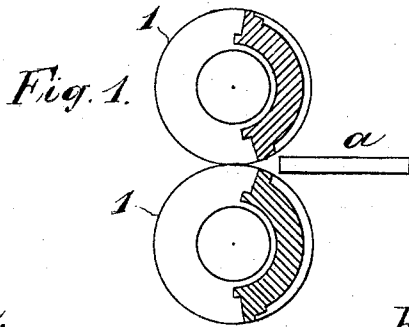


Fig. 8.

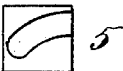


Fig. 7.

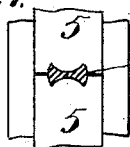


Fig. 6.

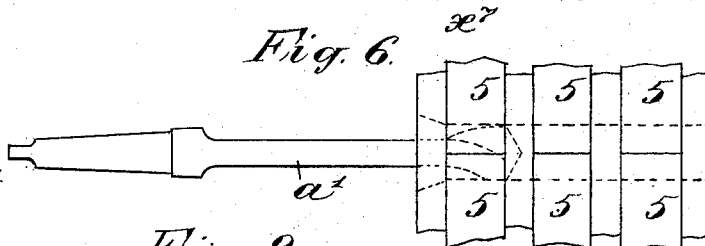


Fig. 9.

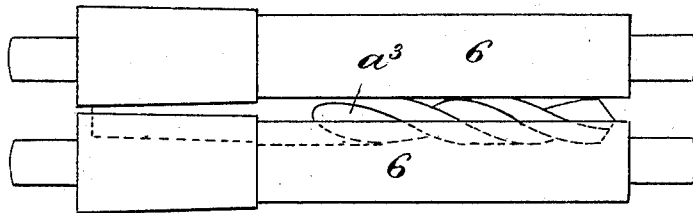
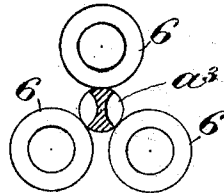


Fig. 10.



WITNESSES:

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ROBERT L. BARCLAY, OF NEW YORK, N. Y.

PROCESS OF FORMING TWIST-DRILLS.

SPECIFICATION forming part of Letters Patent No. 758,041, dated April 26, 1904.

Application filed February 28, 1903. Serial No. 145,593. (No model.)

To all whom it may concern:

Be it known that I, ROBERT L. BARCLAY, a citizen of the United States, residing in the borough of Brooklyn, in the county of Kings and city and State of New York, have invented an Improved Process of Forming Twist-Drills, of which the following is a specification.

This invention relates to the manufacture of twist-drills; and it has for its object to produce such a drill at one heat without cutting or turning the metal and in a manner to compact and solidify the steel in the drill. The process also enables the drills to be produced cheaper than by the usual methods and of the best quality.

In carrying out the invention the first step is to pass the heated billet through suitable rolls which draw the blank, form the two opposite longitudinal flutes therein, and form the taper shank and tenon. The next step is to drop-forge the rolled blank. This has the effect to consolidate the metal and give the final size and finish to the blank. The next step is to remove the fin from the blank which is produced in the drop-forging, and this is done in suitable dies. The next step is the twisting of the blank by means of rapidly-reciprocating dies, which further compact the metal, and the final step is the rolling of the drill to straighten it.

The process is effected at one heat, as before stated, and the product is a complete twist-drill, requiring only a little grinding and polishing to put the required finish thereon.

It will be noted that by this method of making a drill no metal is cut away in forming the flutes and that the metal is compressed and compacted at each step in the process except that of trimming off the fin formed in the forging. Furthermore, it will be noted that the sequence of the steps is conformable with the gradual fall in temperature of the blank during the process. For example, it is necessary that the blank shall be quite hot when it is rolled. It must not be so hot during the twisting operation, and it should be at a moderate temperature when passed through the straightening-rolls.

By milling out the flutes or grooves in a blank for a twist-drill the grain is cut across

and the cutting edge is impaired, as well as the strength of the drill. By rolling and drop-forging there is a saving effected of about one-third of the metal over milling out the flutes from a round bar. The forging in dies with a drop-hammer sizes the drill accurately as to its diameter and the proportions of its shank and produces that compacting and solidifying of the metal which is so necessary to the strength and to the production of a good cutting edge. This forging is effected in close dies.

The twisting is effected by means of hammering-dies in a machine of a known kind, which keeps the metal compacted during the operation. The drill being forged and twisted while hot has not the tendency to warp in tempering that is observable in a drill where the grooves are milled.

The grinding of the drill has for its object the truing up and sharpening of the spiral cutting edges.

The process described avoids the necessity of annealing, which is required when the flutes or grooves are cut, and this is very important, as the annealing and consequent hardening of the drill is quite expensive and the result is never satisfactory, as the steel loses carbon in annealing and the hardening process is only superficial.

In order to illustrate and set forth more clearly the process described above, reference may be had to the accompanying drawings, showing mechanical devices which may be employed in the series of operations.

In the drawings, Figure 1 shows the pair of rolls 1 for rolling the heated billet *a* to form in it the flutes and shank. This figure is on a relatively small scale. Fig. 2 is a cross-section of the dies 2 for drop-forging the blank *a'* to compact the metal and size the blank; and Fig. 3 is a face or plan view of the lower die, showing the blank in place therein. Fig. 4 is a cross-section of the apertured die-plates 3 and plunger 4 for removing the fin from the blank *a'*, and Fig. 5 is a plan or face view of said plates. Figs. 6, 7, and 8 illustrate the device for twisting and hammering the blank *a'*, Fig. 6 being a fragmentary side elevation showing the series of rapidly-reciprocating

twisting-dies 5, Fig. 7 a cross-section at x' in
Fig. 6, and Fig. 8 an end view of one of said
dies. Such a twisting-machine is illustrated
fully in my United States Patent No. 719,988,
5 dated February 10, 1903. Figs. 9 and 10
illustrate the rolls 6 for straightening the drill
 c' after it has been twisted. Fig. 9 is a side
elevation. It has not been deemed necessary
to illustrate this straightening device in full,
10 as a machine suited for this purpose is fully
illustrated in my United States Patent No.
720,215, dated February 10, 1903.

Having thus described my invention, I
claim—

15 The herein-described method of forming a
twist-drill, which consists in first rolling a
heated steel billet to draw the metal and form

the flutes and shank, then forging the said
blank to compact the metal and size it, then
removing the fin produced in forging, then 20
twisting and hammering the blank, and finally
straightening it by rolling, all of the said op-
erations being effected during a single heat-
ing of the blank and in the order named,
whereby each operation is adapted to the 25
gradual hardening of the metal in cooling.

In witness whereof I have hereunto signed
my name, this 27th day of February, 1903, in
the presence of two subscribing witnesses.

ROBERT L. BARCLAY.

Witnesses:

PETER A. ROSS,

H. A. CONNETT.