(No Model.)

T. HOOKER.

Machine for Making Twist Drills.

No. 235,534. Patented Dec. 14, 1880.

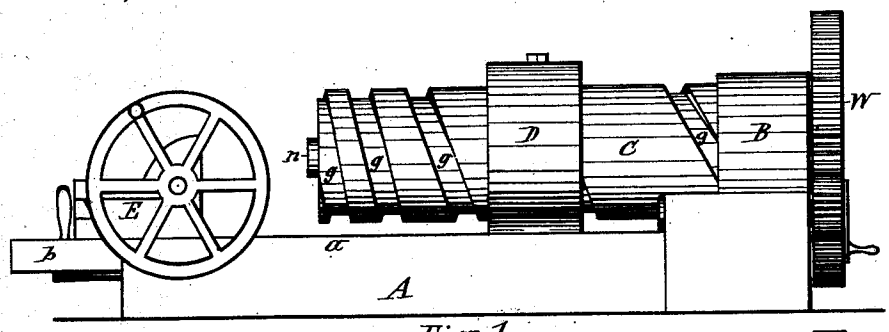


Fig. 1

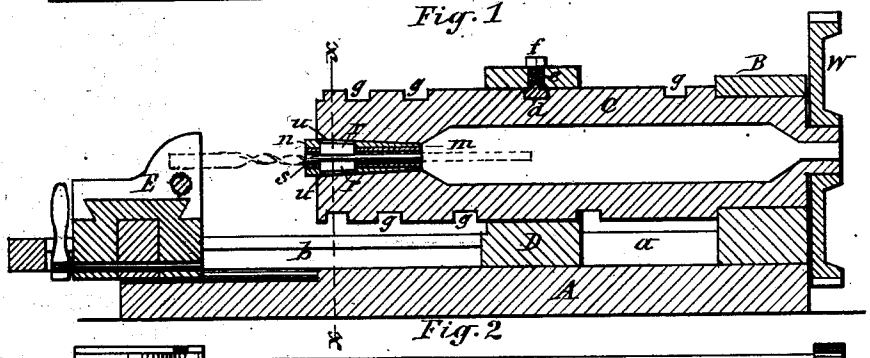


Fig. 2

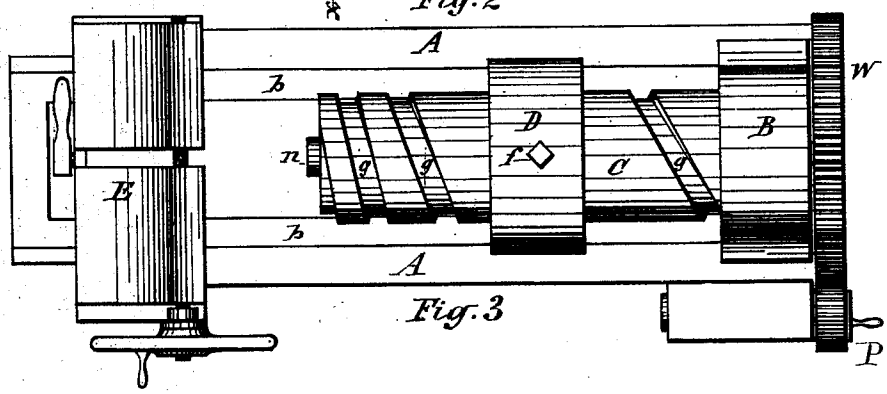


Fig. 3

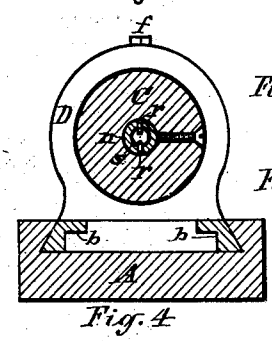


Fig. 4

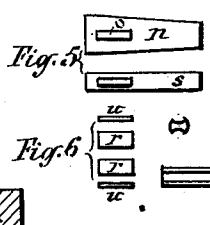


Fig. 5

Fig. 6



Fig. 7

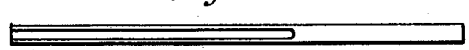


Fig. 8

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UNITED STATES PATENT OFFICE.

THOMAS HOOKER, OF SYRACUSE, NEW YORK.

MACHINE FOR MAKING TWIST-DRILLS.

SPECIFICATION forming part of Letters Patent No. 235,534, dated December 14, 1880.

Application filed April 23, 1880. (No model.)

To all whom it may concern:

Be it known that I, THOMAS HOOKER, of Syracuse, in the county of Onondaga, in the State of New York, have invented new and useful Improvements in the Manufacture of Twist Drills and Bits, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

This invention relates to certain novel, simple, and effective devices by means of which twist drills and bits are formed with great accuracy, dispatch, and economy.

To enable others skilled in the art to make and use my invention, I will first describe the construction of my improved machine for forming twist drills and analogous tools, and then set forth the *modus operandi* of same.

In the accompanying drawings, Figure 1 is a side elevation of my machine for forming twist-drills, &c. Fig. 2 is a longitudinal section of same; Fig. 3, a plan view; Fig. 4, a transverse section on line *x x*. Fig. 5 are detached views of the die-holder and the bush employed in connection therewith to adapt the machine for operating on blanks of various dimensions. Fig. 6 shows the dies and washers employed therewith for the purpose aforesaid. Fig. 7 is a detached view of the tongue, which is connected with a sleeve on the sliding tool-carrying frame and engages the groove of the pattern-screw, for imparting the requisite feed-motion to the aforesaid frame; and Fig. 8 is a view of the blank from which the twist-drill is formed.

Similar letters of reference indicate corresponding parts.

A represents the bed of the machine, having permanently fixed to one end thereof a head-stock or pillow-block, B, in which is journaled a mandrel, C, extended over the bed and parallel therewith, and restrained from longitudinal movement by being shouldered against the head-stock B and by the shoulder of a gear-wheel, W, attached to its extremity at the opposite side of the head-stock.

The mandrel C is provided, externally, with a spiral groove, *g*, having its pitch gradually diminished toward the forward extremity of the mandrel, said mandrel constituting the pattern for the twist of the drill to be formed, as will be hereinafter demonstrated.

The bed A is provided with longitudinal guides *a a*, between which slides a horizontal frame or carriage, *b*, which has rigidly fixed to the end facing the head-stock B a sleeve, D, embracing the mandrel C. To the interior of said sleeve is removably secured a tongue, *d*, which is fitted in the groove *g* of the mandrel, and has a female-threaded stud, *e*, passing through the body of the sleeve and a set-screw, *f*, inserted in said stud from the exterior of the sleeve, whereby said tongue is held at a proper depth in the groove *g*. Upon the opposite end of the sliding-frame *b* is adjustably secured a tail-stock or suitable blank-holder, E, arranged to hold the drill-blank in line with the axis of the mandrel.

The mandrel has an axial cavity, *m*, extending the length thereof, and made with a slight inward taper at the end facing the tail-stock E. In this tapered part of the cavity *m* is inserted a correspondingly-tapered sleeve or tubular center-piece, *n*, which is retained therein by a set-screw inserted radially through the mandrel. The interior of the sleeve *n* is cylindrical, and in radial slots *o*, through the body of the sleeve, are inserted dies *r*, in the form of keys, which slightly protrude at the interior of the sleeve for the purpose of bearing on the flattened or channeled part of the blank to be operated on, as hereinafter more fully described.

s denotes a bushing, applied to the interior of the sleeve *n* whenever required to operate on blanks of smaller diameter, the dies *r* being extended through said bushing and backed by liners or washers *u* of the requisite thickness.

I am aware that mandrels of drill-twisting machines have been formed with a hole of proper form and size to receive the auger or drill blank endwise; but such a construction requires a separate mandrel for each of the various sizes of the blanks to be operated on; whereas, by the employment of the dies *r*, inserted removably in the mandrel in the manner before described, I obviate the aforesaid inconvenience and loss of time, and the consequent extra expense in the manufacture of twist-drills.

The operation of my described machine is as follows: By means of a pinion, P, provided with a crank or connected with suitable power,

and meshing in wheel W, a rotary motion is imparted to the mandrel or pattern-screw C. The latter, by the connection of its groove *g* with the tongue *d* in the sleeve D, moves the carriage *b* back and forth in line with the mandrel, according to the direction of motion given to the mandrel. The carriage being thus moved so as to bring the tail-stock near the end of the mandrel, said tail-stock is clamped in position. The grooved portion of the drill-blank is then inserted its whole length in the central cavity of the mandrel, and the shank or rear end of said blank clamped in the tail-stock. After the blank is thus secured in position the mandrel is rotated in such a direction as to cause its groove *g* to carry the sliding frame away from the mandrel, thereby drawing the blank lengthwise between the dies *r*, held in the rotating mandrel and bearing in the longitudinal grooves or channels of the blank. The shank of the blank being in the meantime restrained from rotation by the gripe of the tail-stock, produces the requisite twist in the blank. The varied pitch of the groove *g* on the mandrel imparts a varying feed-motion to the carriage *b*, thereby producing a drill with a gradually-increased twist toward the bit or point, and also making the necessary allowances for the elasticity of the blank as the twisting approaches the extremity thereof.

One of the main objects of the varying pitch of the groove *g* is to adapt the machine for the manufacture of drills of various diameters. The larger the drill to be formed the greater the pitch of the mandrel-groove employed for moving the carriage.

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

1. The combination, with the mandrel C, provided with the axial cavity *m*, of removable and interchangeable dies *r*, substantially as described and shown.

2. The pattern-screw C, provided with the differentially-pitched spiral groove *g*, the axial cavity *m*, and dies *r* within said cavity, and restrained from longitudinal movement in the manner described, in combination with the carriage *b*, provided with the blank-holder E, and having a sleeve, D, embracing the screw C, substantially in the manner set forth.

3. In combination with the carriage *b*, provided with the sleeve D, the mandrel C, having the spiral groove *g* pitched differentially, substantially in the manner and for the purpose shown and set forth.

4. The mandrel C, provided with the axial cavity *m*, the tubular center-piece *n*, secured in said cavity, the bushing *s*, inserted in the center-piece, and the dies *r*, extended through radial slots in said center-piece and bushing, and adjusted by liners *u*, interposed between said dies and the face of cavity *m*, all constructed and combined substantially in the manner specified and shown.

In testimony whereof I have hereunto signed my name and affixed my seal, in the presence of two attesting witnesses, at Syracuse, in the county of Onondaga and State of New York, this 13th day of April, 1880.

THOMAS HOOKER. [L. S.]

Witnesses:
E. LAASS,
WM. C. RAYMOND.