C. F. JACOBSON.

Machine for Making Twist-Drills.

No. 212,802. Patented Mar. 4, 1879.

Fig. 2.

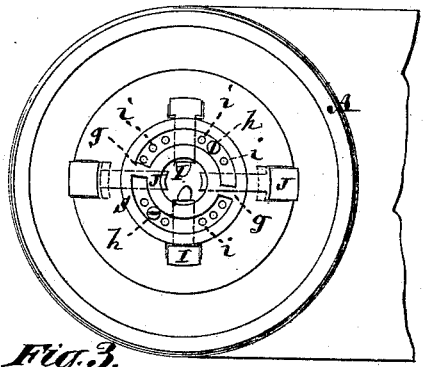


Fig. 3.

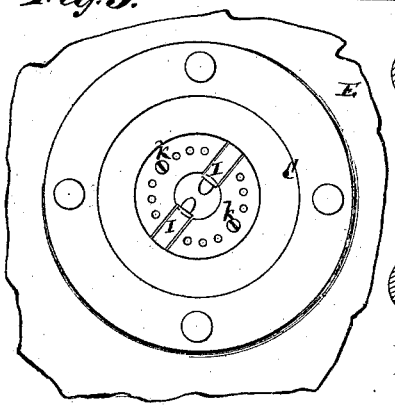


Fig. 1.

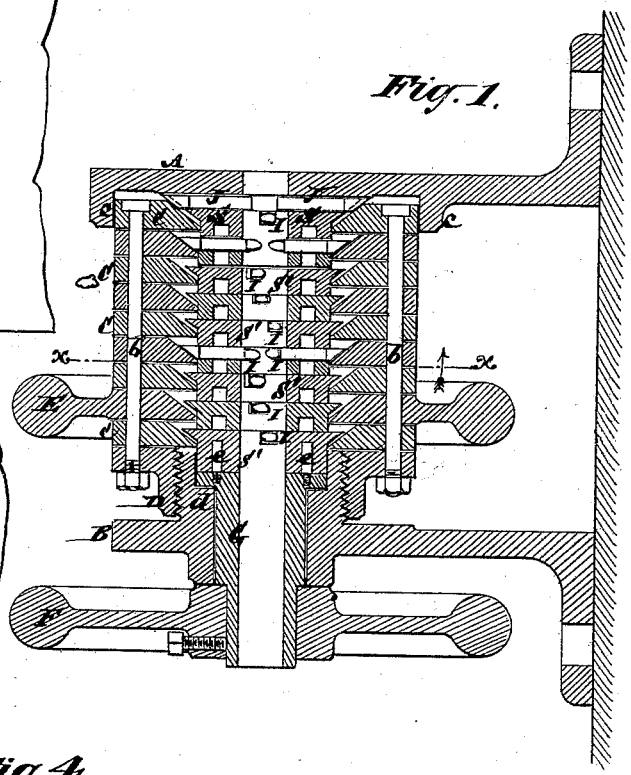


Fig. 4.

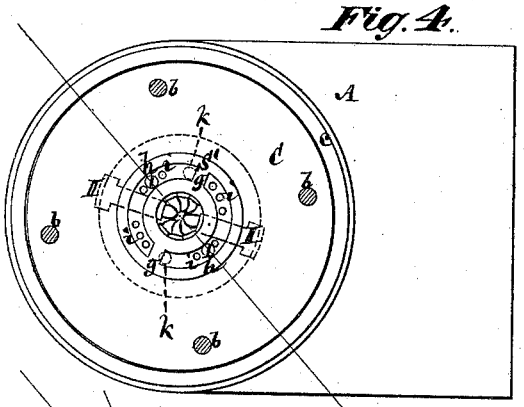


Fig. 5.

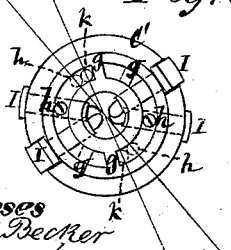


Fig. 6.

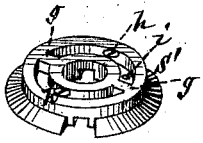
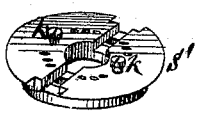


Fig. 8

Fig. 7.



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UNITED STATES PATENT OFFICE.

CHRISTIAN F. JACOBSON, OF NEW YORK, N. Y., ASSIGNOR TO HIMSELF, JAMES C. JONES, OF SAME PLACE, AND GEORGE E. MALTBY, OF NORFOLK, VA.

IMPROVEMENT IN MACHINES FOR MAKING TWIST-DRILLS.

Specification forming part of Letters Patent No. **212,802**, dated March 4, 1879; application filed July 3, 1878.

To all whom it may concern:

Be it known that I, CHRISTIAN F. JACOBSON, of the city, county, and State of New York, have invented certain Improvements in Devices for Making Twist-Drills, of which the following is a description, reference being had to the accompanying drawings, forming part of this specification.

This invention relates to devices for making twist-drills and screw-augers, for which Letters Patent No. 190,592 were granted May 8, 1877, to C. F. Jacobson, J. C. Jones, and G. E. Maltby as assignees of myself, and in which a hollow conical die-holder, fitted with sectional dies which projected within the holder, and a longitudinally-adjustable conical outer case bearing upon the backs of the dies were used to twist the drill-blank as it was forced longitudinally through the dies. In such device the hollow conical die-holder was constructed with spiral slots throughout its length for the reception of the sectional dies, which thus were spirally arranged within the holder. Such construction not only involved difficulties in the manufacture, and much expense, both as regards the die-holder and its dies, but there were other defects, all of which it is the object of this invention to avoid; and in carrying out my invention I further avail myself of a system of construction in tools for a like purpose, in which, instead of a single die-holder, a series of die-plates or disks, arranged one in rear of the other, are used and organized so that the first of said die-plates, when it is turned, actuates the next die-plate in succession a given distance, and so on in succession throughout the whole series of die-plates until all are turned sufficiently, whereby on the passage of the drill-blank through the die-plates said blank will be twisted as required, and on reversing or releasing the die-plates the twisted drill will be dropped out or delivered from the twisting device.

This invention consists in a combination of an outer longitudinally-adjustable hollow truncated cone or series of truncated cones with a series of circularly-movable die-plates or disks within said cone or cones, geared or connected to actuate each other successively when turned, and a series of independent radial dies within the die-plates having their movement controlled by the outer truncated cone or cones; also, in a combination with said devices of a fixed die-plate within the cone or cones; and, furthermore, in certain means of adjustment to vary the twist from a regular to an irregular one, accordingly as the twist-drill is required to be of a uniform pitch or of an increasing or diminishing one.

Likewise the invention consists in a special construction and combination of parts of the apparatus, whereby a very perfect action is obtained.

In the accompanying drawings, Figure 1 represents a vertical section of an apparatus for manufacturing twist-drills constructed in accordance with my invention. Fig. 2 is a view, looking upward, of a stationary upper plate or head provided with radial dies. Fig. 3 is a plan in part with the stationary upper head and its attached die-plate removed. Fig. 4 is a transverse section on the line $x\ x$, looking upward. Fig. 5 is an inverted plan of a pair of die-plates arranged one above the other. Figs. 6 and 7 are views, in perspective, from reverse sides, of one of the movable die-plates detached, and Fig. 8 is a view, in perspective, of one of the radial dies detached.

The apparatus as represented in the drawings is arranged to occupy an upright position, and with its end through which the drill-blank is entered uppermost, to facilitate the clearance or dropping out of the drill after it has been twisted; but the position of the apparatus may be reversed, end for end, or it may be arranged horizontally or otherwise.

The drill-blank to be twisted has grooves rolled, drawn, or otherwise formed in it, as usual, before introducing it to the apparatus. Said blank may be twisted as required to form the twist-drill, either by driving or otherwise forcing it through the radial dies of the apparatus after they have been turned to give them their necessary spiral arrangement for the purpose, or said blank may be twisted by introducing it between the radial dies while in

straight line with each other throughout the apparatus, and afterward turning the dies into the necessary spiral relation with each other to give the twist.

A is the upper head of the apparatus, having attached to its under side a stationary die-plate, S, and B the stationary lower head of the latter. C C represent a series of rings mounted one upon the other between the plates or heads A B, and united together and to a lower screw-box, D, by bolts *b b*, to provide for the longitudinal adjustment collectively of said rings by turning a hand-wheel, E, fast to one of said rings, and whereby the screw-box D is made to rise or fall upon a screw-nozzle, *d*, fast to the lower head, B. These several rings C C have their inner edges constructed to present tapering surfaces, all flaring in an upward direction, whereby said rings constitute hollow truncated cones, so far as their internal and acting surfaces are concerned. The upper one of these hollow truncated cones may enter a circular projection, *c*, on the under side of the plate or head A to steady the series of cones as they are raised or lowered by the turning of the hand-wheel E to the right or to the left.

Arranged concentrically within the screw-nozzle *d*, and passing down through the head or plate B, is a hollow mandrel, G, having a shoulder-support within the screw-nozzle and fitted below with a handle or hand-wheel, F. The bore of this hollow mandrel corresponds with the central openings of a series of circularly-adjustable die-plates, S′ S′, mounted one upon the other within the hollow truncated cones C C, and resting collectively upon the hollow mandrel, with which the lower one of said die-plates connects by one or more drivers, *e*. The upper head, A, which has attached to it the stationary die-plate S, is also perforated in line with the bore of the hollow mandrel G, and the hole thus formed in it and through the mandrel should be sufficiently large to admit of the passage therethrough of the largest-sized drill to be twisted by the apparatus.

Each die-plate S S′ is centered by its arrangement within or through the hollow truncated cone C, inclosing it. Said die-plates are respectively provided with oppositely-disposed radially-sliding dies I I, the inner ends of which are of suitable construction to enter the longitudinal grooves in the drill-blank and to twist the latter. The outer ends of these dies, which may be beveled or chamfered off corresponding to the taper of the hollow truncated cones C C, are arranged to overlap or project within the beveled surfaces of said cones, so that on raising said cones by their collective longitudinal movement, as hereinbefore described, they will act upon the dies I to force them inward within the longitudinal grooves of the drill-blank, and on lowering said cones away from the dies provision will be made for the dies to move outward or backward, and thereby to release or free the twisted drill.

The lower one of the die-plates, S′, is in positive connection, free from separate circular adjustment, with the hollow mandrel G, by means of the drivers *e*, and the upper die-plate, S, has no circular adjustment, but is stationary. Said upper die-plate, however, and the circularly-adjustable die-plates S′, between it and the lower one of the several die-plates, are each provided within their lower faces with duplicate stops *g h*, on either one side only, or, as here represented, in duplicate, on opposite sides of the axis of each plate. The stops *g* have a fixed relation within the die-plates, but the stops *h* it is preferred to adjustably connect with said plates by entering them within any one of a series of holes, *i*, in the faces of the die-plates to vary their distance apart from the other or fixed stops *g*. Upon the upper surface or back of each of said die-plates, excepting the upper one, S, are one or more drivers or studs, *k*, which project up between the stops *g h* of the next adjacent die-plates above them.

By this combination of studs or stops and arrangement of the dies in the several die-plates relatively to each other and to the studs or stops of the several die-plates, it is only necessary to slightly turn the hand-wheel F in one direction to bring the several dies on opposite sides of the axis of the die-plates in line with each other. This adjustment of the dies provides for the entry of the longitudinally-grooved drill-blank down through or between the dies, and for the entry of the latter within the longitudinal grooves of said blank by turning the hand-wheel E to force the hollow truncated cones C up against the sloping back ends of the dies I, thereby forcing the latter radially inward.

After this the hand-wheel F is again turned to give the necessary twist to the drill by the dies I, each of the die-plates S′, commencing with the lowermost one, operating in succession to circularly move the next one above it, by the studs or drivers *k* of each die-plate in succession bearing against the stops *h* of the die-plate next above it till the stud *k* on the die-plate immediately below the upper one of said plates is arrested by the stop *h* in the upper stationary die-plate, S. The wheel E may then be turned to release the hollow truncated cones C from the back ends of the dies I, when the twisted drill will be at liberty to drop out of the apparatus.

In the successive circular adjustment of the die-plates S′, to give the twist, the movement of the studs or drivers *k* is necessarily restricted to the distance between the stops *g h*, between which they work, and by adjusting the stops *h* in each die-plate within any one of the series of holes *i*, so that the distance apart of the stops *g h* is increased or diminished progressively throughout the several die-plates having said stops, a quicker pitch in a

given direction instead of a regular pitch, as before, is given to the twist of the drill. By changing the stops *h* on to the opposite sides of the stops *g* provision is made for reversing the turning of the die-plates to give the twist, and so reversing the twist of the drill from right to left, or vice versa.

The upper stationary die-plate, S, may, if desired, be furnished with a pair of clamping-dies, J J, for grasping the shank of the drill-blank and centering the latter while being twisted. Instead of turning the die-plates about the drill-blank to give the twist, said die-plates may be first turned into their twisting position and be held from further turning while the drill-blank is forcibly driven through between them. Twist-drills and screw-augers of different sizes may thus readily be made by the same apparatus, only changing the dies I to suit different sizes.

This improved apparatus is easily made, its working parts simply or mainly requiring turning and milling with little or no filing.

Instead of a series of hollow truncated cones C being used, a single hollow truncated cone or conical outer case receiving the die-plates and their radial dies within it might be employed; but under such arrangement the conical acting surface of the outer case on the back or outer ends of the dies would necessarily have to be less flaring, and consequently have a slower or longer action, excepting by largely increasing the diameter or dimensions of the apparatus, than when a series of hollow truncated cones, as here shown, is used.

I claim—

1. The combination of one or more longitudinally-adjustable hollow truncated cones with a series of circularly-movable die-plates or disks within said cone or cones, drivers and stops for gearing or connecting said die-plates together, to be moved in succession one by the other, and a series of independent radial dies arranged within the die-plates, and having their movement controlled by the hollow truncated cone or cones, substantially as specified.

2. The combination of a fixed die-plate with a series of movable die-plates actuated one by the other, a series of independent radial dies within the die-plates, and one or more hollow truncated cones containing the die-plates within them, and arranged to control the movement of the dies, essentially as described.

3. The combination, with the circularly-movable die-plates and radially adjustable or moving dies carried by said plates, of drivers and adjustable stops connected with said die-plates, whereby the pitch of the twist of the drill may be changed from a uniform to an irregular or increasing one, substantially as specified.

4. The series of longitudinally-adjustable hollow truncated cones C C, in combination with the series of die-plates S S′, the stops *g h*, the studs or drivers *k*, and the radially-adjustable dies I I, essentially as herein described.

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