A. JOHNSTON.

Thread-Cutting Tool for Metal-Screw Machines.

No. 211,742. Patented Jan. 28, 1879.

Fig. 1.

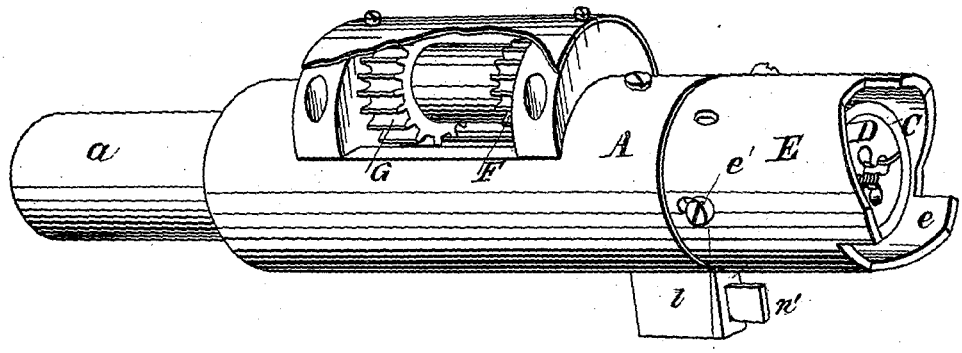


Fig. 2.

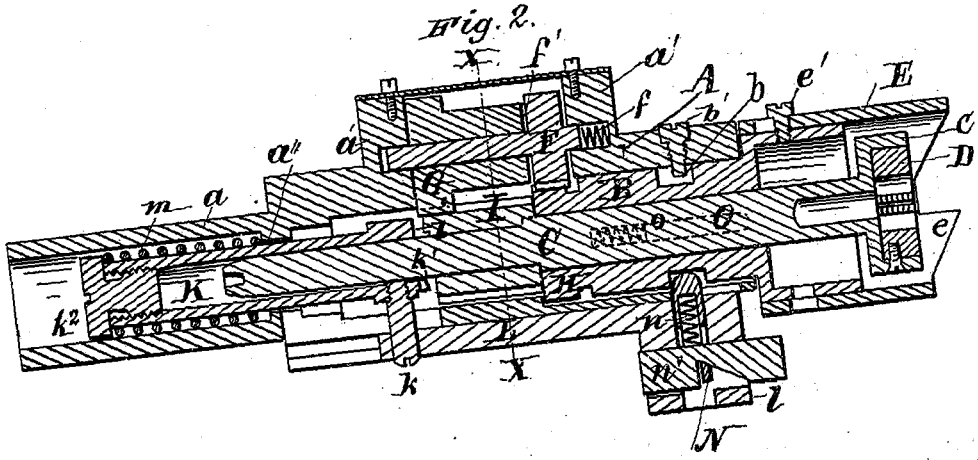


Fig. 3.

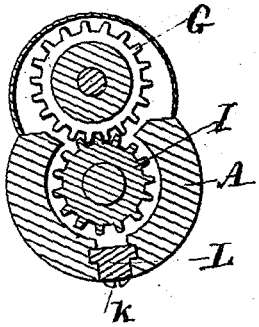
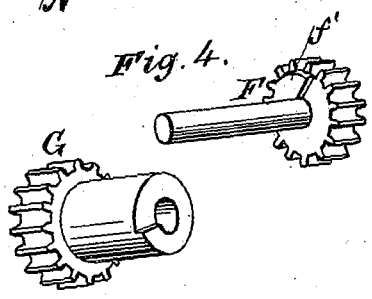


Fig. 4.



Witnesses:

E. A. Dick

D. P. Cook

Inventor:

Allen Johnston

by A. Pollok

his attorney.

UNITED STATES PATENT OFFICE.

ALLEN JOHNSTON, OF OTTUMWA, IOWA.

IMPROVEMENT IN THREAD-CUTTING TOOLS FOR METAL-SCREW MACHINES.

Specification forming part of Letters Patent No. **211,742**, dated January 28, 1879; application filed November 8, 1878.

To all whom it may concern:

Be it known that I, ALLEN JOHNSTON, of Ottumwa, in the county of Wapello and State of Iowa, have invented a new and useful Improvement in Thread-Cutting Tools for Metal-Screw Machines, which improvement is fully set forth in the following specification:

This invention relates to screw-cutting tools, to be used in the manufacture of screws by machinery, for cutting the thread upon the wire, which is grasped and revolved by a suitable chuck on a hollow lathe-spindle, the tool itself being presented to the wire to act thereon, and withdrawn when the screw-cutting die has been released from the newly-formed thread by suitable mechanism.

The invention consists in mechanism carried by the body of the tool for releasing the screw from the die after the thread is cut thereon without reversing the chuck, by revolving the die in the same direction and at a greater speed than the chuck revolves; in means for deriving the motion for revolving the die faster than the chuck, and in the same direction thereas, directly from the chuck or chuck-spindle by engagement therewith; in means for permitting to the die and its holder a free endwise movement within the body of the tool during the unwinding of the screw; in the construction and combination of mechanism, and in the tool itself composed of the various parts, as hereinafter more fully described.

In the drawings, Figure 1 is a perspective view. Fig. 2 is a longitudinal central section. Fig. 3 is a cross-section on line X X, Fig. 2; and Fig. 4, a perspective view of two of the gears employed, showing the projections on the sides.

A represents the body or shell of the tool, made hollow throughout its entire length, and being slotted below and provided with an opening above. At one end it is turned off to form a shank, *a*, for holding it in a socket in the turret.

B is a tube or sleeve resting in one end of the body of the tool and free to turn therein. It has a groove, *b*, turned about it, into which a screw, *b'*, passing through the wall of the tool-shell, enters, and while allowing the rotation of said tube or sleeve prevents the removal thereof. C is the die-holder. It has its bearing in the sleeve B, in which it is free to rotate.

D is the die, secured in an enlarged portion of the holder. E is the cap or sleeve, provided with one or more jaws or projections, *e*, and secured on the end of the sleeve or tubular bearing B by screws *c'*, which pass through slots in the cap and permit its adjustment on the tubular bearing. F is a gear or spur-pinion, the journals of which rest in bearings in projections *a'* on the body of the tool. In one bearing is a spring, *f*, and upon the face of the pinion F, opposite thereto, is a projection, *f'*.

G is a pinion free to revolve on one of the journals of the gear F. It is provided, on the side next the said gear, with a projection. This projection and the one *f'* on the pinion F have inclined faces on one side, so as to permit the gears to slip past each other, the spring *f* yielding sufficiently therefor, so as not to communicate the motion of the gear G to the gear F. The other sides of the projections are adapted to engage, so that the motion of the gear F is communicated to the gear G.

H is a spur-gear secured to the tubular bearing B, and the gear F engages therewith. I is a long spur gear or pinion secured to the die-holder. It engages with the pinion G. It is provided with a projection, *i*. K is a hollow tube or sleeve, into which one end of the die-holder projects, and is sustained thereby. It is connected by a pin, *k*, passing through a slot in the body of the tool, with the slide L, which moves in guides in the body of the tool, and which is provided with a projection, *l*. The tube K has at its outer end a projection, k^1, which is adapted to engage with the projection *i* on the gear I, and thus form a clutch to hold the die-holder C stationary. A spring, *m*, located in the hollow projection *a*, tends to draw the sleeve K back, so as to release the clutch or projection k^1. It presses at one end against the collar *a''*, on the inside of the hollow body of the tool, and at the other against a cap, k^2, screwed into the end of the hollow tube K.

A pin, N, pressed upward by a spring, *n*, serves to retain the tube K in position against the retraction of the spring *m*. The pin N rests in the groove *b* on the tubular bearing B, and

is withdrawn therefrom by a key, n', which works in a slot cut in the projection l of the slide L, the inclined plane formed by a notch cut in the under side of said key serving to draw the pin down against the spring n.

O is a series of pins, located in holes in the tool-body, and pressed outward by springs located just beyond their rear ends. Their points press against a shoulder on the end of the tubular bearing.

In operation the tool is placed and secured in the turret, and having been brought into proper position is fed to the wire, which has previously been shouldered to form the screw-head. As it is fed the wire enters the die and the thread is cut thereon by the revolution of the chuck, the die being held stationary in the tool by the engagement of projections on the gear I and sleeve K. Should the feeding of the die to the work be slower than the proper cutting of the thread requires, the die and its holder are drawn forward by the newly-formed screw-thread, (sufficient endwise movement of the die-holder being permitted by the construction and arrangement of parts,) and the projection on the pinion I is drawn out of engagement with the clutch formed by the projection k^1 on the sleeve K, so that the die revolves freely with the wire, the motion not being communicated to the tubular bearing through the gears G and F, as before explained.

When the tool is again fed forward the die-holder is pressed back, and the projections k^1 engage, and the cutting of the screw-thread recommences. When this operation is completed the pin N is withdrawn from the groove in the tubular bearing of the die-holder, and the sleeve K is withdrawn, so as to allow the die-holder to revolve freely, and also to permit thereto a free endwise movement within its bearing. At the same time the tubular bearing is forced forward by the springs o, acting on the pins O, and the jaws e of the cap or sleeve E are brought into engagement with the clamping-jaws of the chuck, or with projections thereon, causing the revolution of the tubular bearing with the chuck.

The tubular bearing revolving with the chuck communicates motion, through the gears H, F, G, and I, to the die-holder. The gears H and G are larger than the gears F and I, respectively, and a more rapid motion is therefore communicated to the die-holder than the chuck and tubular bearing have, so that the die has a forward rotation relatively to the wire, which causes the unwinding of the die from the screw. The die-holder is, during the unwinding of the screw, free to move in the direction of its length, the long spur-pinion I serving to permit this motion without causing the disengagement of the gears. During this operation the turret remains stationary, the die-holder being moved backward in its bearing by the action of the screw-thread in the die, and the freedom of motion preventing all burring and jamming of the thread, which is liable to be made when the die-holder has a positive motion backward in unwinding the screw.

After the release of the screw the turret is moved backward, and revolves to bring another tool into position. Before the screw-cutting tool is again brought into position to act on the wire, the projection l on the slide L is brought into contact with a cam or other mechanism, such as a lever or series of levers located on the lathe, and pushed forward thereby into position for cutting a thread on the next screw, and is retained in such position by the pin N.

The cap or sleeve E, coming into contact with the face of the chuck, prevents the cutting of the thread beyond a certain point.

To regulate the distance to which the cutting shall extend, and thus to vary the length of the screw-thread, the sleeve E is made adjustable with reference to the tubular holder by means of the slots therein and the screws e'.

The cap E may, if desired, be made in one piece with the tubular bearing; but the formation of the cap and bearing in separate pieces and the adjustment as described is regarded as the best construction.

The key n' is operated to withdraw the pin N by being forced, by the forward motion of the turret, against a projection on the slide-rest or body of the lathe. The projection is preferably secured to one of the tool-posts of the slide-rest.

Instead of using the key n' with the notch, as shown, I may employ a bell-crank lever, or other mechanical device, to operate the withdrawal of the pin N and the release of the clutching devices.

I have shown the cap E as provided with three jaws; but this number may be increased or diminished without altering the machine, as I have found one jaw to answer the purpose well.

The pins O and springs o are not essential to the successful working of the machine, and may be omitted. Their object is to force the cap E of the tubular bearing forward quickly to insure a speedy and certain engagement of the jaws thereof with the jaws or projections of the chuck.

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

1. In a screw-cutting tool, the combination, with the die and its holder and the body of the tool, of mechanism, substantially as described, carried by the body of the tool, adapted to revolve the die in the same direction and at a greater speed than the chuck to unwind the screw, as set forth.

2. The combination, with the die-holder of a screw-cutting tool and mechanism, substantially as described, adapted to revolve said die-holder in the same direction as the chuck, but at a greater speed, of means, substantially as set forth, adapted to engage with the chuck or chuck-spindle, and derive directly there-

from the motion for operating the mechanism for revolving the die-holder, substantially as specified.

3. In combination with the die-holder and body or shell of a screw-cutting tool, of mechanism, as described, carried by the body of the tool, and adapted to revolve the die-holder in the same direction as the chuck, but at a greater speed, and to permit to the die-holder a free movement within the body of the tool in either direction in line of its length in unwinding the screw, substantially as set forth.

4. In a screw-cutting tool of the character described, the combination, with the die and its holder, the tubular bearing of the die-holder, and mechanism for imparting to the die the motion of the tubular bearing, of a cap or sleeve secured to the tubular bearing, and provided with one or more jaws, clutches, or projections adapted to engage with the grasping jaws or projections on the chuck, substantially as set forth.

5. In a screw-cutting tool, the combination, with the die and its holder and the tubular bearing surrounding the die-holder, of a cap or sleeve secured to the tubular bearing, and adjustable relatively thereto to regulate the length of the screw-thread, substantially as set forth.

6. The combination, with the die-holder provided with a spur-pinion, of the tubular bearing surrounding the same, having at one end a spur-pinion connected, by intermediate gearing carried by the body of the tool, with the pinion of the die-holder, the parts being constructed and arranged to impart, by the revolution of the tubular bearing, to the die-holder a rotation at a greater velocity in the same direction as the chuck, substantially as set forth.

7. The combination, with the die-holder provided with a long spur-pinion, of the tubular bearing surrounding the same, having at one end a spur-pinion connected, by intermediate gearing carried by the body of the tool, with the pinion of the die-holder, the parts being constructed and arranged to impart, by the revolution of the tubular bearing, to the die-holder a rotation at a greater velocity in the same direction as the chuck, and at the same time to permit a free longitudinal motion to the die-holder, and having at the other end a cap or sleeve adapted to engage with and receive motion from the chuck, substantially as set forth.

8. The combination, with the die-holder and body of a screw-cutting tool, and with automatic clutching devices, located within the body of the tool, and adapted to retain the die and its holder stationary during the approach of the turret to the chuck, or to permit the free revolution thereof when fed too slowly for the proper cutting of the thread, of automatic releasing devices adapted to withdraw or allow the withdrawal of the said clutching devices to permit a free endwise movement of the die-holder in its bearing during the unwinding of the screw, substantially as set forth.

9. The herein-described tool for cutting screws, consisting of the die-holder having at its inner end a long spur-pinion, the tubular bearing surrounding said holder, having at one end a spur-pinion connected, by intermediate gearing carried by the body of the tool, with the pinion on the die-holder, and at the other end a cap or sleeve to engage with and receive motion from the chuck, the clutching devices to retain or permit the rotation of the die-holder during the operation of cutting the thread, the releasing devices to allow the withdrawal of the clutching devices and permit a free endwise motion to the die-holder during the operation of unwinding the die from the screw-thread, and the body or shell of the tool, arranged and adapted to operate as set forth.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

ALLEN JOHNSTON.

Witnesses:
E. A. DICK,
CHAS. J. HEDRICK.