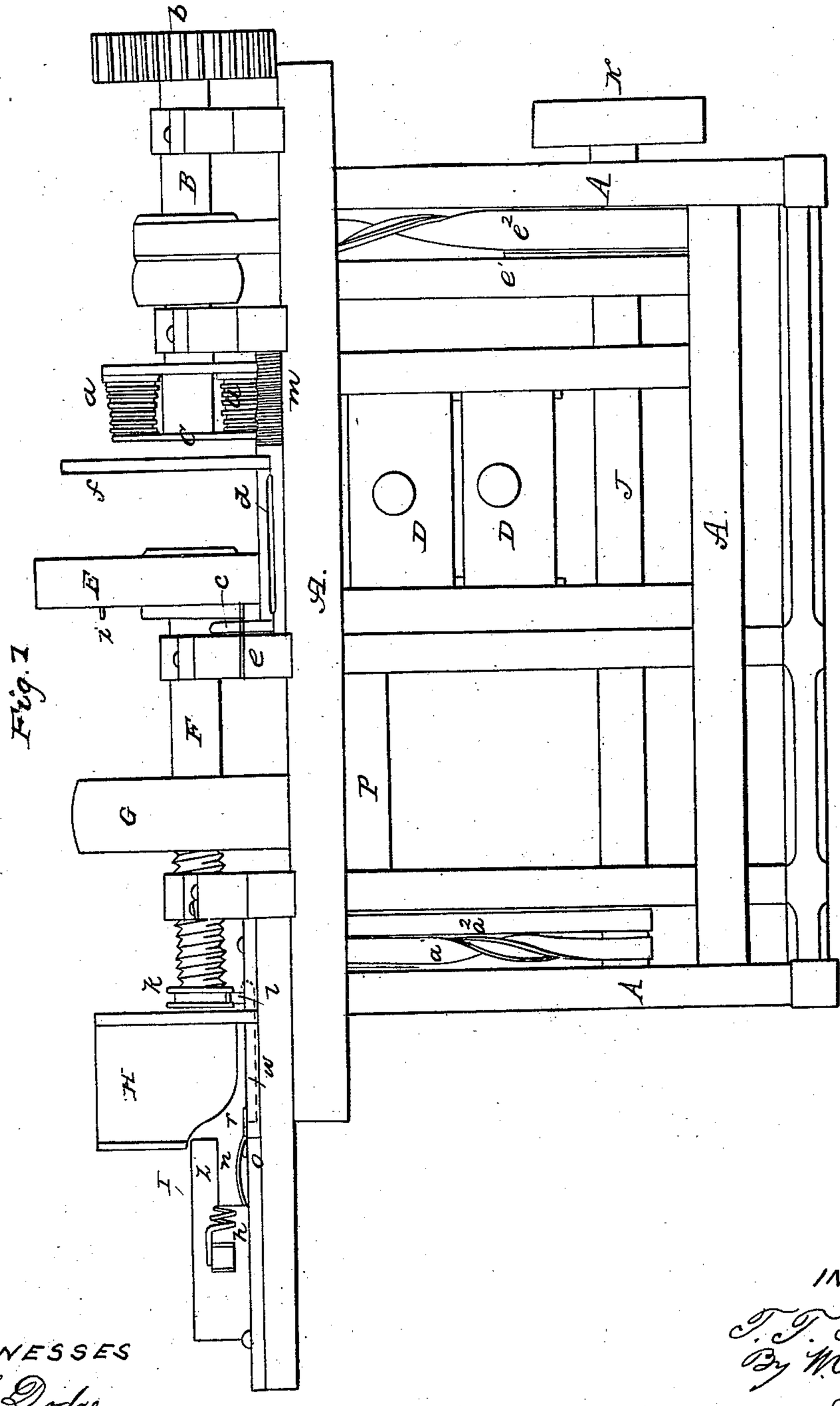
2 Sheets—Sheet 1.

T. T. PROSSER.

Machine for Making Screws.

No. 58,134. Patented Sept. 18, 1866.

Fig. 1



WITNESSES

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2 Sheets—Sheet 2.

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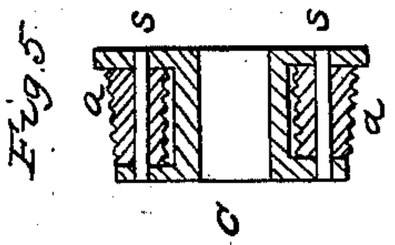
Fig. 5



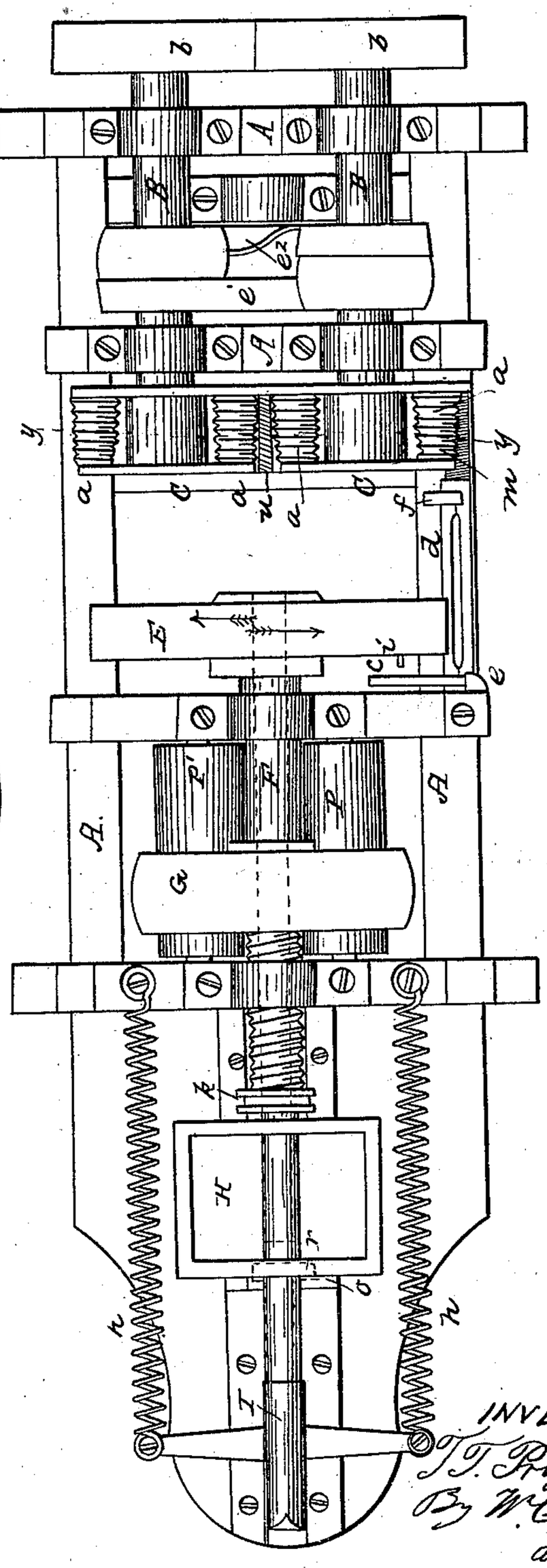


Fig. 4

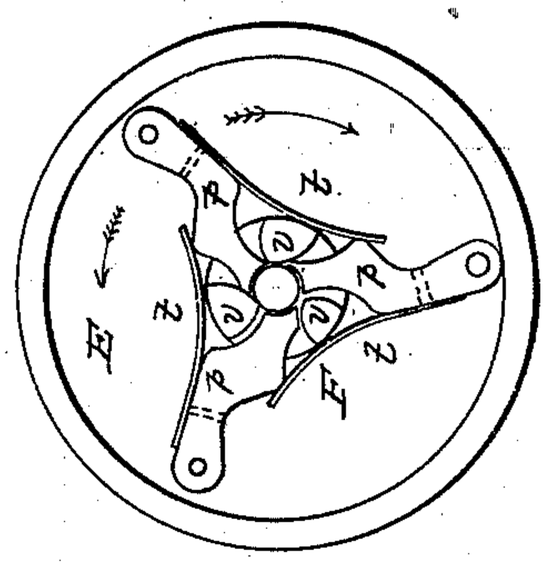
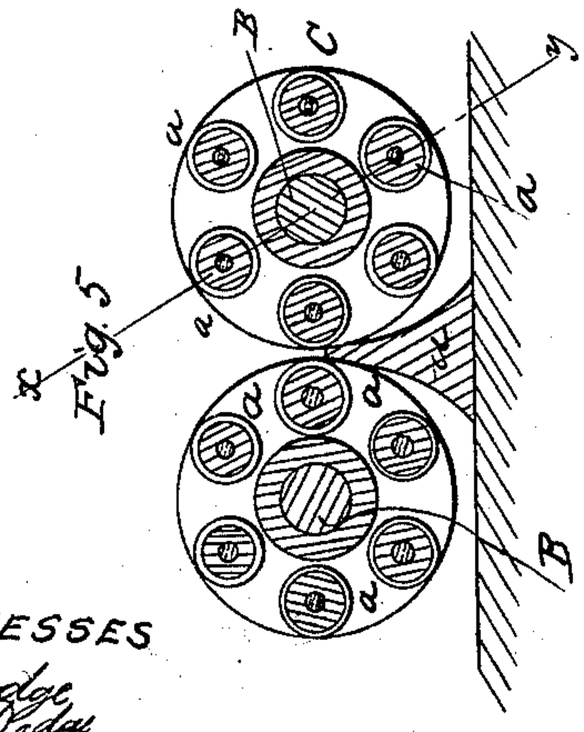


Fig. 5



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UNITED STATES PATENT OFFICE.

TREAT T. PROSSER, OF CHICAGO, ILLINOIS, ASSIGNOR TO HIMSELF, G. W. GILLETT, J. A. EASTMAN, D. KIMBARK, JR., AND D. H. WELLS, OF SAME PLACE.

IMPROVEMENT IN MACHINES FOR MAKING SCREWS.

Specification forming part of Letters Patent No. **58,134**, dated September 18, 1866.

To all whom it may concern:

Be it known that I, TREAT T. PROSSER, of the city of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in the Manufacture of Screws and Bolts; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making part of this specification, and to the letters of reference marked thereon, like letters indicating like parts wherever they occur.

To enable others skilled in the art to construct and use the invention, I will proceed to describe it.

My invention relates to the manufacture of metal screws, including both those denominated "wood-screws" and "bolts;" and it consists in forming the thread thereon by a process of rolling instead of cutting away a portion of the metal, as is usually done.

It also consists in the construction of a machine specially adapted to this process, as hereinafter more fully explained.

Figure 1 is a side elevation of the machine. Fig. 2 is a top-plan view of the same; and Figs. 3, 4, and 5 are views of portions of the machine detached and more fully shown in detail.

It is customary to make screws by cutting the wire or rods into blanks of the proper length, and then form the thread by cutting away a portion of the metal, leaving that portion on which the thread is formed of the same or less diameter than it was before the thread was cut. By thus cutting the metal away to form the thread of the screw the longitudinal fibers of the metal are all cut off to the depth of the thread on the screw. Consequently the screw is very much weakened, and both its tensile and torsional strength reduced thereby to about one-half of its original strength; whereas by my process I do not cut away any portion of the metal to form the thread of the screw; neither do I reduce its strength but slightly, if at all, but form the thread or threads on my screws by a process of rolling or pressing of the blank between two sets or series of revolving roller dies or swages.

One set of dies or rollers being on each side of the blank and the anvil beneath it, the rollers or dies in revolving seize the blank between them and force it down onto the anvil or stationary die, and as the rollers pass the blank indentations are made by them in the blank to correspond with the force of the rollers. Thus each pair of rollers in the heads seizes the blank once at each revolution of the head, and as the blank is revolved and thrown forward these indentations form the screw. By thus rolling it into the required shape the thread portion of the screw is raised, thus making it or the thread portion of the screw of greater diameter than the shank, and of nearly the same strength as the shank—an important result that cannot be accomplished by the old process of cutting away the metal to form the thread.

To make this style of screw I construct a machine consisting of a frame, A, of any suitable size and style, as represented in Figs. 1 and 2. Upon this frame, at one end, is mounted a pair of parallel shafts, B, having spur-wheels *v* applied at one end, and engaging one with the other for the purpose of causing the two shafts B to revolve with perfect uniformity, these shafts being driven by belts e' and e^2 from the driving-shaft J, (shown more clearly in Fig. 2,) one of said belts being crossed to give the required motion to the shafts B and devices attached thereto. Upon the opposite ends of these shafts B are secured two circular heads, C. In each of these heads, between the flanges, a series of hardened-steel rollers, *a*, are secured by a bolt or axis, S, upon which the rollers *a* revolve when they come in contact with the screw. The periphery of these rollers is provided with circumferential grooves of the form and size of the thread to be formed upon the screw that is intended to be made, these grooves forming rings around the rollers at right angles to the axis of the rollers.

In Fig. 3 is shown a longitudinal section of the circular heads C of the steel roller-dies *a*, and of the axis S, taken through the line *x x* of Fig. 5; and in Fig. 5 the two heads C, steel roller-dies *a*, axis S, and shafts B are repre-

sented in transverse section taken through or on the line *y y* of Fig. 2.

The hardened-steel rollers or dies *a a* are shown in their working position on each side of the anvil or stationary swage *w*, and as the shafts B B revolve each pair of rollers or dies are carried forward and pass the anvil in the same relative manner.

It will be seen that the stationary anvil *w* has its upper surface grooved to correspond with the thread of the screw to be formed, which constitutes all of my swaging or rolling apparatus proper.

To feed the blank forward to the dies or rollers, and to hold and rotate it while the thread is being formed, I provide the shaft F, which has a hole bored longitudinally through it, and is so located that a blank forced through it will be delivered between the revolving heads and seized by the cast steel roller-dies *a a* and forced down onto the anvil *w*. Upon the rear portion of this shaft F is cut a screw-thread, having the same inclination or pitch of thread as that intended to be formed on the screw-blank; and as this portion of the screw-shaft works in a bearing having a corresponding female screw, the shaft is thus forced forward when revolving one way and back when revolving in the opposite direction. This shaft is driven by a friction-pulley, G, which is driven by pulleys P and P′, which latter are hung in an oscillating frame, so that either of them may be brought into contact with the pulley G, as desired, and as these pulleys revolve in opposite directions by means of belts a' and a^2 from the driving-shaft J, the shaft F is thereby made to advance or recede with a speed proportional to its velocity of rotation. Upon the front end of this shaft F is secured a chuck, E, for holding the blank while the shaft F presents it for the action of the roller swages or dies, and withdrawing it therefrom.

The chuck consists of a disk, E, mounted loosely on the shaft F, and is recessed on its face of proper depth to receive the arms *p* and permit a face-plate to be screwed over them, leaving the latter free to move in the plane of the rotation of the disk.

The arms or jaws *p* are pivoted at their outer ends to the disk E, their inner ends extending through openings formed in the sides of the shaft F to the hole in said shaft, as shown in Fig. 4. A spring, *b*, is attached to each of the arms *p*, as shown in Fig. 4, the opposite end of the spring pressing upon the projection formed on the edge of the adjoining jaw *p*, as shown, these springs thus tending to throw or press the jaws *p* inward toward the center until they rest against the solid portion *v* of the shaft. The inner ends of these jaws *p* are beveled or inclined, as shown, so that as they approach each other these inclined ends will grasp and hold the blank that may be forced along the hole in the shaft F, and thus be brought between them, the pressure of the spring *t* tending to turn the disk E on the shaft F in the direction indicated by the black arrow, by which the jaws *p* are closed and made to grasp and hold the blank tightly. To release the blank from the grasp of the jaws it is only necessary to turn the disk in the opposite direction, as indicated by the red arrow, by which the jaws will open.

H represents a hopper located directly in the rear of the shaft F, the sides of the hopper being inclined and terminating at the bottom in a cavity of sufficient width to permit but a single blank to rest therein, the bottom being so arranged that the blank resting thereon shall be exactly opposite the hole in the rear end of the shaft F, there being an opening in both front and rear sides of the hopper at the bottom. At the rear of the hopper is placed a sliding block or follower, I, the front part of which is of a size corresponding with the blank, and is arranged to enter through the rear opening of the hopper, to push a blank forward into the open rear end of shaft F from the hopper, the spiral springs *h* serving to draw the follower I forward for that purpose. On the rear end of the shaft F is a grooved collar, *k*, embracing a projection, *l*, on a sliding piece, *w*, which is located directly under the hopper, as shown in Fig. 1. At the rear end of this slide *w* is attached a cross-bar, *r*, which projects slightly on each side, and as the latter is forced back by the shaft F it presses against the end of a spring-bar, *n*, attached to the front of the follower I, thereby shoving the latter back with it and carrying the projecting point *z* out of the hopper, as shown in Fig. 1.

An incline, *o*, is located in such a position that when the follower I has been shoved back as far as required the spring-bar *n* will ride up thereon, and, being thus raised above, the cross-head *r* will be released from it, when the springs *h* will immediately draw the follower I forward, causing the point *z* to push a blank forward from the hopper into the shaft F.

A rock-shaft, *d*, is secured to the side of the frame opposite the chuck E. (See Figs. 1 and 2.) To this shaft *d* is attached an arm, *f*, which projects to such a distance that when turned down its end will come directly opposite the hole in the end of shaft F, a spiral spring, *m*, operating to keep the arm turned up. At the opposite end of this shaft *d* is secured a projecting spring-arm, *c*, which, when the shaft F is moved entirely back, is struck by the pin *i* protruding from the rear face of disk E. As the shaft F begins its forward movement the pin *i*, striking against the arm *c*, turns the rock-shaft *d*, thereby swinging the arm *f* down in front of the opening in the shaft F, the disk E, by the pressure of arms *c* against the pin *i*, being at the same time turned so as to open the jaws *p* and thus release the screw previously formed, the pressure of the follower I at the same time forcing another blank out at the front end of the shaft F until it strikes the arm *f*, the pin *i* having at the same instant slipped past the arm *c*, thereby

simultaneously permitting the jaws *p* to grasp the blank and the arm *f* to fly up out of the way, so that the blank can be carried forward between the swages or rollers *a a*.

From this description it will be seen that it is only necessary to fill the hopper H with the blanks and start the machine, a sufficient number of the blanks having previously been placed in the hollow of the shaft F to fill it, and one having been suitably arranged in the chuck, after which the operation of the machine becomes automatic.

As the blank is carried forward it rests upon the anvil *u*, and is struck and pressed by the rolls *a*, which are constantly and rapidly revolving, thereby raising the thread on the blank. As the motion of the shaft F is reversed, and the screw thus formed is drawn back, the rolls *a* still continue to revolve, and thereby serve to smooth and more perfectly finish the thread.

Having thus described my invention, what I claim is—

1. The method of forming the threads on screws by means of revolving swages or dies, constructed and operated substantially as and for the purpose set forth.

2. The grooved rollers *a*, when arranged and operating as described, for the purpose of forming threads on screws.

3. The combination of the revolving swages or dies *a a* with the anvil or rest *u*, substantially as set forth.

4. The chuck E, constructed and operating as herein described.

5. The combination of the hollow shaft F, chuck E, and rock-shaft *d*, provided with the arms *f* and *c*, when arranged to operate as and for the purposes set forth.

6. In combination with the shaft F and hopper H, the follower I, arranged to operate as described, for the purpose of feeding the blanks into the shaft F, as set forth.

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