(No Model.)

M. W. REDSHAW.

METAL SCREW MACHINE.

No. 252,515. Patented Jan. 17, 1882.

fig. 1

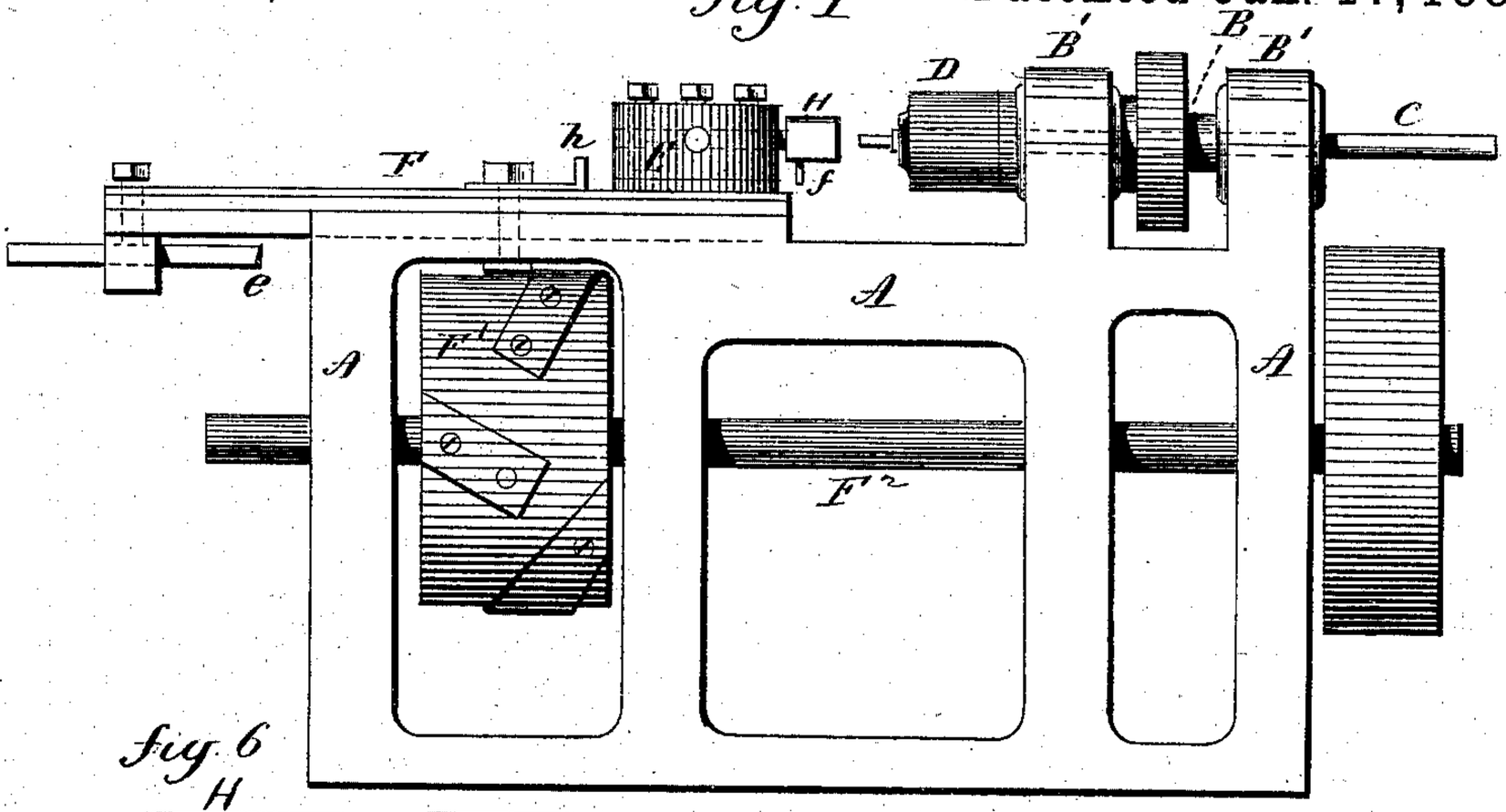
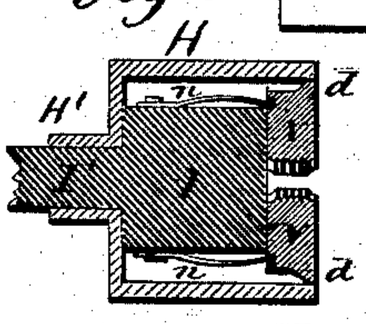


fig. 6



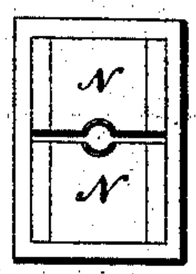


fig. 7

fig. 2

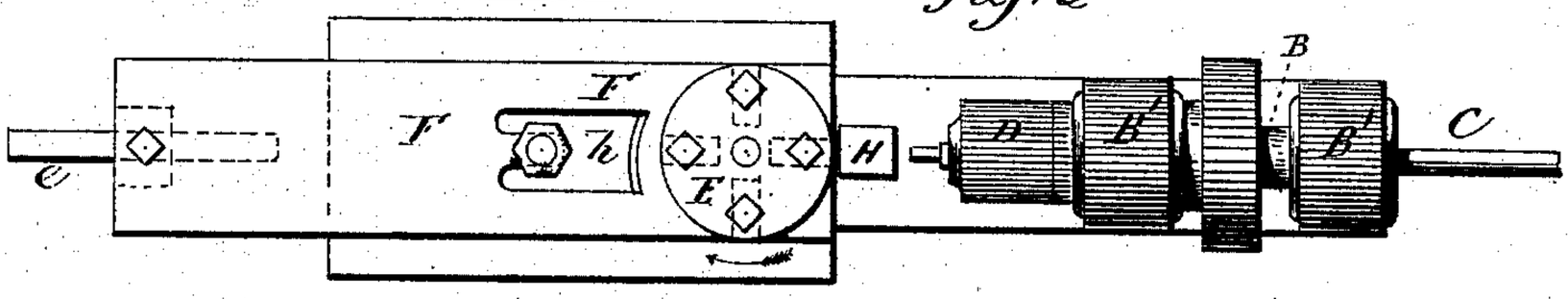


fig. 3

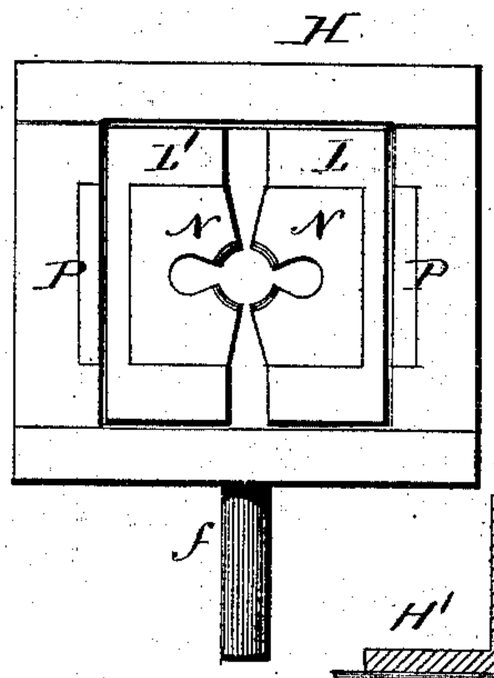


fig. 4

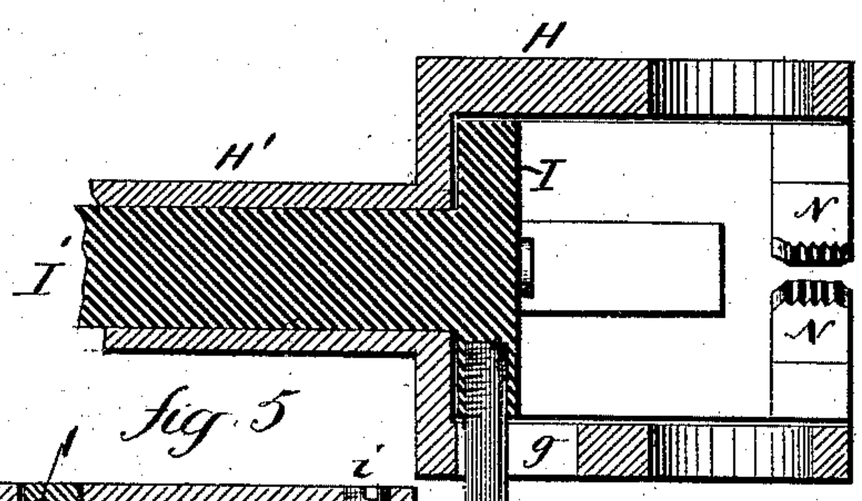
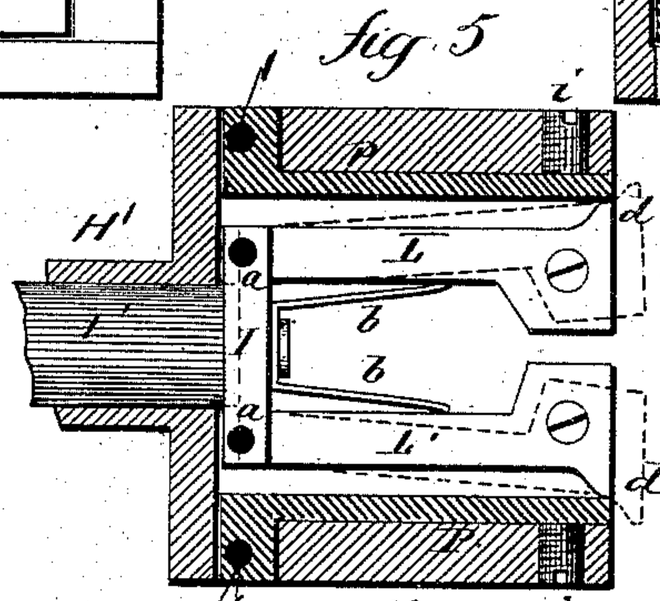


fig. 5



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UNITED STATES PATENT OFFICE.

MOSES W. REDSHAW, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO THE WHEELER & WILSON MANUFACTURING COMPANY, OF SAME PLACE.

METAL-SCREW MACHINE.

SPECIFICATION forming part of Letters Patent No. 252,515, dated January 17, 1882.

Application filed May 31, 1881. (No model.)

To all whom it may concern:

Be it known that I, MOSES W. REDSHAW, of Bridgeport, in the county of Fairfield and State of Connecticut, have invented new Improvements in Metal-Screw Machines; and I do hereby declare the following, when taken in connection with the accompanying drawings, and the letters of reference marked thereon, to be a full, clear, and exact description of the same, and which said drawings constitute part of this specification, and represent, in—

Figure 1, a side view; Fig. 2, a top or plan view; Fig. 3, an end view of the thread-cutting dies and holder enlarged; Fig. 4, a vertical longitudinal section through the center of the same enlarged; Fig. 5, a horizontal longitudinal section through the holder, showing a top view of the dies enlarged; Figs. 6 and 7, modifications.

This invention relates to an improvement in that class of screw-cutting machines for making what is commonly called "fine-thread work" or "machine-screws"—that is to say, screws which are used for metal work, in contradistinction to wood-screws. The greatest precision as to diameter is required in order that screws of a given size may be perfectly uniform. In the manufacture of this class of screws a solid die is generally used, as there can be no variation in the diameter of the screws cut by such a die; but in order to use such a die it is necessary, after the thread has been cut, that the revolution either of the screw or the die should be reversed in order to remove the screw from the die. This reversing the revolution—"backing off,"—causes a loss of a considerable portion of the time required in making the screw. The work is complete as soon as the screw has completely entered the die, and no more can be done until the screw is removed. Numerous devices have been contrived to use an open or divided die, and still hold the parts of the die so as to be practically solid; but in such devices a mechanism has been required to be applied to the dies to open them at a predetermined time in their work, intended to be when the thread was complete. The operation of such mechanism requires time, and generally a stop in the rotation of the blank or dies. In this class of machines the dies are usually stationary—that is, have no revolution—the blank only being revolved.

The object of this invention is to dispense with this mechanism for opening the dies, and cause the screw itself to open the dies so soon as the thread is formed; and it consists essentially in the arrangement of the dies in a holder, in connection with a cross-head in said holder, said cross-head and dies being free for longitudinal movement within said holder, combined with a stop to arrest the advance of the die-holder at a predetermined point, whereby the screw being cut operates to draw the dies from the holder to release the screw and cease the cutting, and mechanism to draw the dies back into the holder, as more fully hereinafter described, and particularly recited in the claims.

In illustrating this invention I show it as applied to a machine for making milled work—that is to say, making the screws from a rod introduced through a revolving mandrel—a class of machines too well known to require minute description in this specification.

A represents the frame of the machine, supporting a hollow mandrel, B, in bearings B′, through which the rod C, from which the screws are to be made, is introduced and firmly held in the head D, in the usual manner for this class of work, and so that the rod will revolve with the mandrel.

E is a revolving turret or tool-holder arranged upon a longitudinal slide, F, to which a reciprocating movement is imparted by means of a cam, F′, on the driving-shaft F^2, in the usual manner for this class of machines. The turret is provided with the usual tools for cutting down the body of the screw, and so that the rod revolving the turret presents the tools successively to perform their work, one tool being first presented as the turret advances, then, the turret rotating, the second tool is presented, and so on, the several tools successively doing their work in the production of the screw. The tools employed, aside from the thread-cutting devices, are those well known in this class of machines, and require no description.

H is the screw-cutting-die holder, which is of box shape, and is introduced in the turret so as to project radially therefrom, as seen in

Fig. 2. The outer end of the die-holder is open, its opposite end being provided with a hollow shank, H′, by which it is secured in the turret. In Fig. 4 an opening is shown both in the top and bottom of the holder, near the outer end, which affords access to the interior of the holder, as well as an escape for chips or other obstructions which may enter the holder. As shown in the drawings, the dies are made in two parts, and in such arrangement the interior of the die-holder is rectangular or four-sided, as shown in Fig. 3.

Within the die-holder is a cross-head, I, fitted to or formed on the end of a spindle, I′, which enters and fits the hollow shank H′, so as to move freely longitudinally therein. To this cross-head a pair of levers, L L′, are hinged, as at *a*, (see Fig. 5,) which permits them to vibrate or swing toward or from each other. Between the two levers is a spring or springs, *b*, the tendency of which is to force the levers asunder. The said levers from outside to outside occupy a space less in width than the interior of the holder, but at their outer end they are each constructed with a projection, *d*, which bears upon the interior of the holder, so that when in the holder, as seen in Fig. 5, the holder confines them, so that they cannot be forced asunder, or one from the other. The projections *d* are inclined on their backs, or cam-shaped, as shown in Fig. 5, so that when the levers are drawn outward the projections *d* escape from their rigid bearings on the holder and are forced asunder, or the one from the other, as indicated in broken lines, Fig. 5. When again the levers are forced into the holder the inclines on the projections *d* cause them to approach each other and come back to their rigid closed positions. The adjacent faces of the levers L L′ are each provided with one part, N, of the screw-cutting die, the two together forming the complete die, fitted to cut the thread on the body of the blank in the usual manner.

Supposing the levers, with their dies, to be in the closed position, as seen in Fig. 5, and in their working place on the turret, the turret advances the dies to the revolving blank in the usual manner, and just fast enough to follow the thread until the further advance of the turret is arrested by a stop, *e*, on the slide, this stop striking the bed of the machine; or it may be otherwise arranged, it only being essential that the forward or advancing movement of the turret shall be positively arrested at a predetermined point, that point being just before the thread of the screw is completed. In this condition the revolving screw, still within the closed die, will draw the levers L L′, to which the dies are attached, from the holder, until the projections *d* escape from their bearings, and then the jaws instantly spring apart and the screw is free, so that the turret may instantly return and draw the dies from the screw and be rotated to present the next tool. Before the screw-cutting dies come around for a second operation they must be drawn back into the holder, and this is best done by means of a stud, *f*, attached to the cross-head I, extending through a slot, *g*, in the holder, and arranged to pass a stationary cam, *h*, in its rotating movement—that is, in passing around to its turn for the next operation. This cam is inclined or eccentric to the turret, so that when the stud *f* strikes the surface of the cam the cross-head will be forced inward, carrying with it the levers L L′ into their closed and locked position.

In order to adjust the dies relatively to each other, a cheek-piece, P, is hung in each side of the die-holder, upon which the projections *d* ride, and through the side of the holder set-screws *i* are arranged to bear against the cheek-pieces and force them inward, so as to contract the space between which the levers work, and correspondingly force the dies N N nearer together, or vice versa. The cheek-pieces P are preferably hinged at their inner ends, as at *l*, the outer ends only being adjustable; but other means of adjustment may be applied.

It is true springs are shown and described the tendency of which is to open the dies when they are drawn from the holder; but, in fact, they only hold the dies open, because the screw itself, as it draws the dies from the holder, will force them open, the thread of the screw serving as a cam upon the face of the dies, so that as fast as they are drawn from the die they are, by that cam-like action of the screw, forced asunder; or the V-shaped thread itself, constantly bearing upon the jaws, will separate them whenever they are free to be opened. The springs are not therefore necessary to the opening of the dies, nor are they necessary for any purpose. It is, however, preferable to employ springs which will hold the dies open, so as not to drag upon the thread of the screw being withdrawn.

This construction and arrangement of the dies, as applied to milled work, is sufficient to enable those skilled in this art to apply them to other classes of machines—that is to say, machines which receive the screw-blanks individually between a pair of jaws which hold the blank and move it toward a revolving screw-cutting die, or machines in which the blank is held stationary and the rotating screw-cutting die advances, or machines in which both the screw-cutting die and blank revolve and either or both advance. In any case, when the advancing ceases, the screw within the die draws the parts of the die, or the device in which they are confined, from the holder, so as to be automatically opened simply by the draft of the thread of the screw upon the dies.

It will be understood by those skilled in the art that in the class of machines for milled work which, instead of a revolving turret, are provided with a transverse carriage on the longitudinal slide F, said carriage carrying several tools, the cam *h* must be arranged accordingly—that is to say, in the path of

movement of the die-holder, so that the stud *f* will, in passing the said cam, force the dies back into their holder; or, in case the machine is simply a threading-machine and the die-holder consequently is not moved out of the axial line of the blank, other mechanism must be applied to close them, and which will readily suggest itself to those skilled in the art to which this invention pertains.

The dies may be made in more than two parts, and in that case the interior of the holder will be shaped accordingly.

I do not confine myself to the construction of the dies separate from and attached to the lever, as they may be formed in the adjacent faces of the levers or jaws. Neither do I confine myself to the hinged levers to support the dies, as they may be otherwise attached to the slide or cross-head—as, for instance, as shown in Figs. 6 and 7, where the cross-head I is made to fill the holder, the face of the cross-head being grooved radially to receive the parts N of the die, so that they may slide therein toward or from each other, and the outer ends or backs of the parts N being constructed with the same inclined projection *d* as the levers. Springs *n* are attached to the cross-head and extend forward into connection with the dies, as shown, the springs acting to press the dies radially outward, as do the springs *b* in the first illustration. In this modification there will be the same free longitudinal movement by means of the screw being cut, and the same opening of the dies because of such longitudinal movement.

I do not wish to be understood as broadly claiming the parts of a screw-cutting die arranged in the end of swinging or vibrating levers, so as to be automatically opened when the threading of the screw is complete, as such, I am aware, is not new; but

What I do claim is—

1. In a screw-threading machine, the combination of the dies arranged in a holder, and in connection with a cross-head in said holder, said cross-head and dies free for longitudinal movement within said holder, a stop to arrest the advance of the die-holder at a predetermined point, whereby the continuous revolution of the screw being cut itself operates to draw the dies from the holder, such withdrawal of the dies permitting them to release the screw, and thereby cease their cutting, and mechanism, substantially such as described, to draw the dies back into the holder, whereby they are closed for a new cut, substantially as described.

2. In a screw-cutting machine provided with a device to hold the blank to be cut, the combination of a tool-holder arranged to present the several tools successively to perform their work upon the blank, the die-holder H, arranged in said tool-holder, combined with the levers L L′, arranged therein, free for longitudinal movement, each carrying a part of the die, mechanism, substantially such as described, to arrest the cutting operation of the die, thus permitting the screw being threaded to withdraw said levers from the holder and open the dies, a stud or extension, *f*, from said levers, outside said holder, and a cam arranged in the path of said stud as the die-holder passes from its position for one operation to its position for the next operation, whereby the dies so drawn out and opened by the screw itself will be returned and closed, substantially as described.

3. In a screw-cutting machine provided with a device to hold the blank to be cut, the combination of a tool-holder arranged to present the several tools successively to perform their work upon the blank, the die-holder H, arranged in said tool-holder, combined with the levers L L′, arranged therein, free for longitudinal movement, each carrying a part of the die, mechanism, substantially such as described, to arrest the cutting operation of the die, permitting the screw being threaded to withdraw said levers from the holder and open the dies, a stud or extension, *f*, from said levers, outside said holder, and a cam arranged in the path of said stud as the die-holder passes from its position for one operation to its position for the next operation, whereby the dies so drawn out and opened by the screw itself will be returned and closed, with mechanism, substantially such as described, for adjusting said levers relatively to each other, substantially as described.

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