

# A. JOHNSTON. Metal-Screw Machine.

No. 211,911.

Patented Feb. 4, 1879.

Fig. 1.

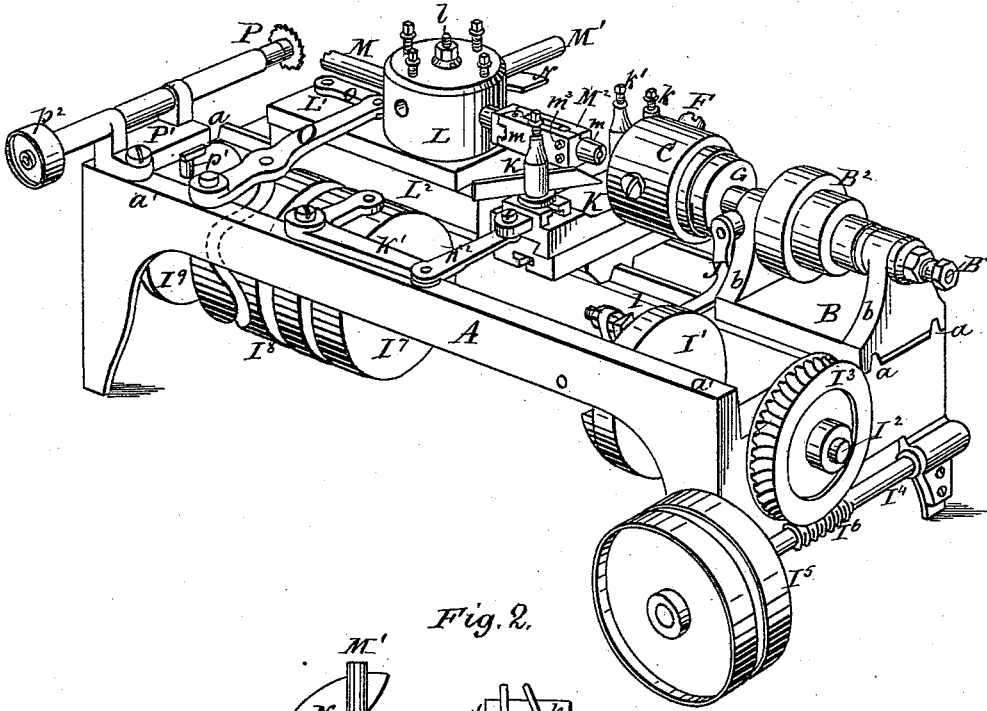


Fig. 2.

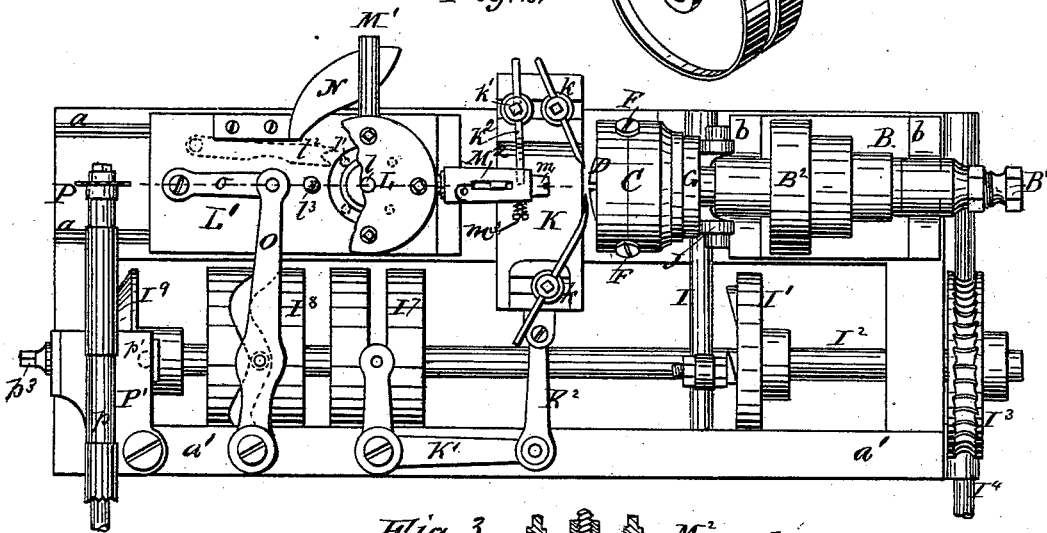
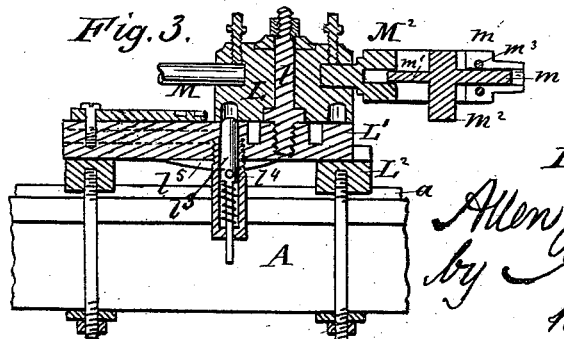


Fig. 3.



Witnesses:

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Inventor:

*Allen Johnston*  
by *A. Pollok*  
his attorney

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Fig. 4

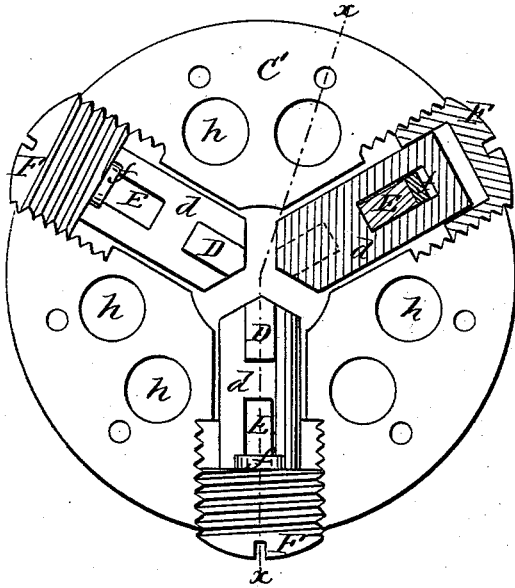


Fig. 5

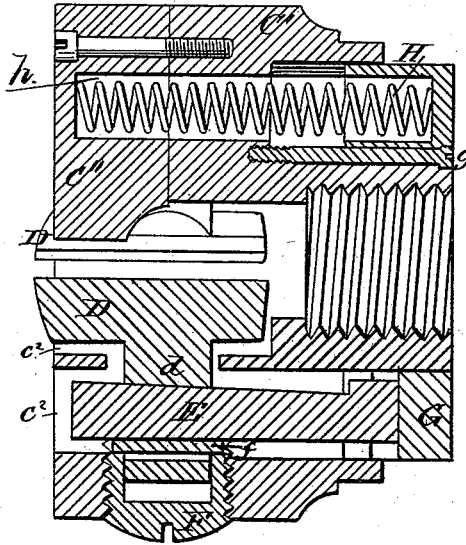


Fig. 6

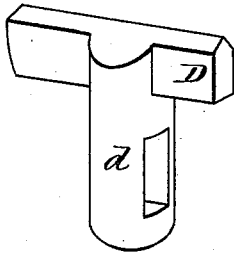


Fig. 7

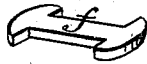


Fig. 8

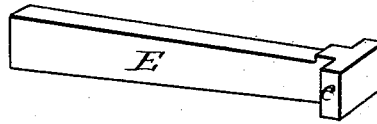
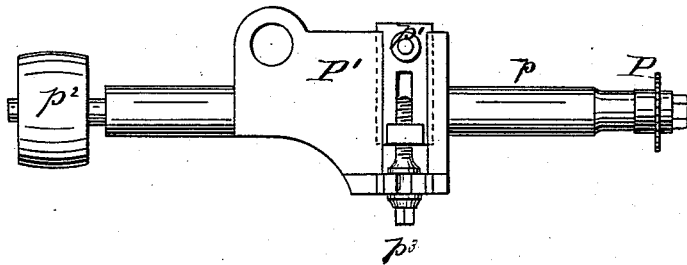


Fig. 9



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# UNITED STATES PATENT OFFICE.

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## IMPROVEMENT IN METAL-SCREW MACHINES.

Specification forming part of Letters Patent No. 211,911, dated February 4, 1879; application filed November 12, 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 Metal-Screw Machines, which improvement is fully set forth in the following specification.

This invention relates to machines for manufacturing metal screws; and it consists in the construction of a chuck to grasp the wire, with mechanism for operating and adjusting the jaws thereof; in the combination, with the chuck, of mechanism of the lathe for automatically effecting the opening and closing of the jaws; in the combination, with one shaft, of a series of cams adapted to operate the chuck, and to bring the screw cutting and severing and nicking tools into the proper positions for operation; in the construction of the screw holder or carrier; and in the combination of parts to form an improved machine, as hereinafter more fully explained.

The following description will enable those skilled in the art to which it appertains to make and use my invention.

In the drawings, Figure 1 represents a perspective view of the machine; Fig. 2, a top view; Fig. 3, a longitudinal central section through the turret frame or carriage, representing the turret and the screw holder or carrier secured in position therein; Fig. 4, an enlarged front view, partly in section, of the chuck, with the cap or front part of the body or shell of the chuck removed; and Fig. 5, a section on line *x x*, Fig. 4, with the cap or front portion of the body of the chuck in position. Figs. 6, 7, and 8 are detached views of particular parts; and Fig. 9 is an enlarged bottom view of the nicking-tool, with the adjusting mechanism thereof.

A represents the frame of the machine, of an oblong rectangular form, having a longitudinal partition extending from end to end, on the top of which partition and one of the sides parallel thereto are guides. The other long side is somewhat elevated above the level of the guides, the projecting portion being marked *a'*. B is a frame or plate, secured in position on the guides *a*, and supporting, by bearings in brackets *b*, the hollow lathe-spindle B<sup>1</sup>, on which are secured the graduated pulleys B<sup>2</sup>, and on which is also secured, but at one end,

the chuck C. The chuck C consists of the body or shell, made in two parts, C' C'', the latter of which may be considered as a cap or face plate. This cap or front portion is slotted radially from its center, and through the slots project the ends of the clamping-jaws and wedges, to be afterward described. One of these slots is shown in Fig. 5, and marked *c*<sup>2</sup>. The interior of the chuck is hollow, and at one end there is a screw-thread for securing it to the spindle.

D D are the clamping-jaws, having shanks *d* at right angles to their lengths, and slotted to admit the wedges E, which have their bearings therein.

The ends of the shanks *d* rest in screw-sleeves F, which have screw-threaded bearings in the body of the chuck.

Small double-headed pieces of metal, *f*, (shown detached in Fig. 7, and in position in Figs. 4 and 5,) are placed in the slots in the shanks *d*, and serve to give increased bearing-surfaces to the wedges, which otherwise would bear against the edges of the screw-sleeves. The movement of the screw-sleeves serves to adjust the clamping-jaws in accordance with the size of the wire used in the machine.

G is a movable disk or collar, to which the wedges E are secured by means of T-heads or flanges *e* on the wedges and undercut grooves on the movable disk.

A series of spiral springs, H, located in openings *h* in the body of the chuck, press against the circular disk G and force it outward. A pin, *g*, limits this movement of the disk, and also prevents it from turning independent of the chuck. When the disk is thus pressed outward the wedges E are drawn back in the slots in the shanks *d*, and force the jaws together to clamp the wire, which is passed centrally through the chuck.

I is a rock-shaft, having its bearings in the frame A, and an arm or projection, J, fixed to said shaft is pressed against the movable disk G by the action against a similar arm at the other end of said shaft of a cam on the wheel I<sup>1</sup>, secured on the shaft I<sup>2</sup>. This latter shaft has its bearings in the machine-frame, and runs lengthwise thereof. A transverse shaft, I<sup>4</sup>, communicates motion, through the medium of the worm-gearing I<sup>3</sup> I<sup>6</sup>, to the shaft I<sup>2</sup> from a band-pulley, I<sup>5</sup>.

I<sup>7</sup>, I<sup>8</sup>, and I<sup>9</sup> are cam-wheels located on the shaft I<sup>2</sup>, and revolving therewith. Their purpose will be hereinafter explained.

K represents a slide-rest in two parts, supported on the guides *a a*, and adapted to be secured in the desired position thereon. The upper part supports the tool-posts *k k*, and is free to move in ways on the top of the lower half across the machine to bring the tools into contact with their work. One of the tool-posts holds the tool for severing the screw from the wire, and the other may support a head-shaping tool, or, if not needed, may be omitted.

An additional tool-post, *k*<sup>1</sup>, may be provided to support a bar, *k*<sup>2</sup>, which projects in front of the tool-holding turret, the use of which bar will be hereinafter set forth.

Motion is imparted to the slide-rest from the cam-wheel I<sup>7</sup> through the bell-crank lever K<sup>1</sup>, pivoted on the raised part *a'* of the frame A and connecting-link K<sup>2</sup>.

L represents the turret, in apertures in the sides of which the tools for regulating the length of wire, for shouldering it, for cutting the thread, and for holding the screw during the severing operation, and carrying it around to be nicked, are secured by set-screws. A pin, *l*, passes through the turret, which is free to turn thereon, and is fastened thereby to the frame or carrier L<sup>1</sup>. This frame or carrier is free to move back and forth in ways on the frame L<sup>2</sup>, secured in position on the guides *a*. The turret L is provided on its lower side with a series of pins, *l*<sup>1</sup>, corresponding in number with the tools carried by the turret. They project into an annular depression in the face of the carrier.

A toothed bar or pawl, *l*<sup>2</sup>, is secured to the frame L<sup>2</sup>, and arranged to work in a groove on the under side of the carrier to engage with these pins to revolve the turret. A steady-pin, *l*<sup>3</sup>, pressed upward by a spring, passes through the face of the carrier L<sup>1</sup> into one of a series of recesses in the lower face of the turret, and is adapted to be withdrawn therefrom by the action of the pin *l*<sup>1</sup> against the inclined planes *l*<sup>3</sup>, secured to the frame L<sup>2</sup>; as the carrier is moved thereon, so as to permit the partial rotation of the turret by the pawl *l*<sup>2</sup> and pins *l*<sup>1</sup>.

M represents the shouldering-tool; M<sup>1</sup>, the tool for regulating the length of the screw, and M<sup>2</sup> the screw holder and carrier. The latter is composed of a pair of shouldered jaws, *m*, slotted, to permit the entrance of the nicking-saw, and pressed together by springs placed under the heads of the pins *m*<sup>3</sup>. (See Fig. 2.) The springs cause the jaws to grasp the screw firmly, and the shoulders on the interior thereof prevent the entrance of the screw-head beyond a certain distance. The rod or pin *m*<sup>1</sup> serves to discharge the screw, being forced out by the cam N, acting against the projection *m*<sup>2</sup>. The projection or bar *k*<sup>2</sup> on the post *k*<sup>1</sup> acts to restore the rod to its first position.

The thread-cutting tool I have not shown;

but it is to be placed in the vacant hole. I have invented a tool of this character, adapted to be used in connection with the other parts of this machine, for which I have made separate application for Letters Patent of the United States.

O represents a lever, pivoted to the raised portion *a'* of the frame, and adapted to communicate, by the intervention of the link *o*, a back-and-forth movement to the carrier L<sup>1</sup> from the cam-wheel I<sup>8</sup> on the shaft I<sup>2</sup>.

P is the nicking-tool, the spindle *p* of which has its bearings in brackets on the pivoted frame P', and to the outer end of said spindle is secured a belt-pulley, *p*<sup>2</sup>, by which motion is derived by a belt from pulley on shaft I<sup>4</sup>. The tension of the belt tends to draw the nicking-tool away from the work. It is brought into contact therewith at the proper time by the cam-wheel I<sup>9</sup> on the shaft I<sup>2</sup> acting against the projection *p*<sup>1</sup>, (shown in Fig. 1 and in dotted lines in Fig. 2,) on the lower side of the pivoted frame P'. The position of the projection *p*<sup>1</sup> is adjusted by the screw *p*<sup>3</sup>, in the manner shown in Fig. 9.

The operation of the machine is as follows: The wire is passed through the hollow spindle B<sup>1</sup>, and between the jaws of the chuck, by which it is clamped. It is provided with a spring or weights to constantly press it forward, so that when the jaws of the chuck are opened it will be fed sufficiently to form a new screw. The tool M<sup>1</sup> is supposed to be in position to regulate the amount fed.

Power is communicated to the pulleys B<sup>3</sup> on the chuck-spindle and to the pulley I<sup>5</sup>, and from the pulley I<sup>5</sup>, through the worm-gearing I<sup>6</sup> and I<sup>3</sup>, to the shaft I<sup>2</sup>, and by means of a belt to the pulley *p*<sup>2</sup> on the spindle of the nicking-tool.

As the shaft I<sup>2</sup> revolves, the cam-wheel I<sup>1</sup> operates the rock-shaft I, which presses in the disk or collar G of the chuck, so that the wedges E, attached thereto, are moved forward, and the clamp or bite of the jaws D on the wire is relieved, and the latter is immediately advanced by the weight or spring attached till it meets the end of the tool M<sup>1</sup>. When the pressure of the rock-shaft against the collar G is relieved by the further revolution of the cam-wheel I<sup>1</sup>, the springs H force the collar and wedges strongly and quickly back, and cause the clamping of the wire by the jaws.

By the operation of the cam I<sup>8</sup> and the intermediate mechanism, as before explained, the turret is drawn back and rotated to bring the shouldering-tool M into position. It is then fed forward, and the shoulder or head of the screw is made by the revolution of the chuck and wire, while the cutting-tool remains stationary. By the continued movement of the cam-wheel I<sup>8</sup> the turret is moved backward, partially rotated, and returned to feed the thread-cutting tool to the wire. In like manner the screw holder and carrier is presented. The spring-jaws hold the screw, while the tool

on the slide-rest which severs the wire is brought into contact therewith by action of the cam-wheel I<sup>7</sup> and levers K<sup>1</sup> K<sup>2</sup>. At the next partial rotation and forward motion of the turret the tool M<sup>1</sup> is presented, the jaws of the chuck are opened by the cam-wheel I<sup>1</sup> and rock-shaft I, and the wire for another screw is fed forward, and the clamping, shouldering, and other operations proceed as before. The screw which has been severed is carried by the holder M<sup>2</sup>, and is, by the movement of the turret, brought opposite the nicking-tool P. This tool is moved into contact with the head of the screw by the action of the cam-wheel I<sup>9</sup> against the projection p<sup>1</sup> on the under side of the swinging frame P<sup>1</sup>.

The mode of adjusting the jaws of the chuck, and also the depth of cut of the nicking-tool, I have before described.

It is evident that the chuck may be reversed automatically by any suitable mechanism—as, for example, by a cam on the shaft I<sup>2</sup> operating one or more levers to shift a clutch or belt—when it is desired to use a thread-cutting tool in the turret which requires a reversal of the motion of the chuck to unwind the screw-thread from the die.

If the screw-cutting tool for which I have made separate application for Letters Patent, as aforesaid, be used, no other mechanism is required.

It is evident, also, that various details of construction may be altered without changing, essentially, the construction and operation of the machine, and I do not intend to limit myself to such details.

Having described my said invention, and the manner in which the same is or may be carried into effect, what I claim, and desire to secure by Letters Patent, is—

1. A chuck for screw-machines, the jaws of which are worked by wedges located in suitable bearings in the shanks of the said jaws, which latter are made adjustable with respect to the axis, and in accordance with the size of wire, by means of screw-sleeves on the shanks, the said wedges being operated within the chuck by a movable disk or collar actuated from without, substantially as set forth.

2. The combination, with the clamping-jaws, wedges, and a movable disk or collar of a chuck, of mechanism as described, the same consisting of a rock-shaft worked by a cam on the lathe arranged to open the jaws, and of one or more springs arranged to press against said movable disk or collar, and thereby suddenly close said jaws to clamp the wire, as set forth.

3. In a chuck, the combination of the jaws having shanks arranged at right angles to the lengths of the jaws, and the screw-sleeves surrounding said shanks, and resting in screw-threaded bearings in the body of the chuck, the shanks of said jaws being free to move in the recesses of the screw-sleeves, but limited as to the amount of such motion outward by

the adjustment of the screw-sleeves in their bearings, substantially as set forth.

4. In a chuck, the combination of clamping-jaws having slotted shanks, and a series of wedges having bearings in the slots thereof, and connected with a movable disk or collar by means of a connection to permit the radial adjustment of the wedges, with means for effecting such adjustment and regulating the bite of the jaws in accordance with the size of the wire, as set forth, whereby, through the motion of said disk and wedges, the opening and closing of said jaws are effected, as specified.

5. A chuck for screw-machines, composed of the following elements, viz: the body or shell of the chuck, a series of screw-sleeves resting in screw-threaded bearings, a series of clamping-jaws, the shanks of which have bearings in the screw-sleeves, a slotted cap or face plate to retain the jaws and screw-sleeves in position, a series of wedges having bearings in the slots in the shanks of the jaws, a movable disk or collar connected with the wedges, and a series of springs adapted to maintain the disk and wedges in position to clamp the jaws unless released from without, substantially as set forth.

6. The combination, with the chuck, slide-rest, turret, and nicking-tool of a screw-machine, of a series of cams placed upon one and the same shaft parallel with the length of the machine, and resting in bearings in the frame thereof, and relatively arranged to release and clamp the wire, and to bring the tools into the proper position for making the screw, through the medium of mechanism substantially as described.

7. In a screw-making machine, the combination, with a reciprocating intermittingly-rotating turret adapted to hold a tool for receiving, carrying, and presenting the screw to be nicked, a rotary cam-shaft parallel with the frame of the machine, arranged to move said turret by means of suitable levers, and a power-shaft arranged at right angles to said cam-shaft, and geared thereto, of a nicking-tool composed of a pivoted frame supporting a spindle, cutter, and pulley, and arranged to be brought into action for cutting the nick by means of a cam on aforesaid cam-shaft, and to be revolved by a band on said pulley deriving its motion directly from aforesaid power-shaft, substantially as described.

8. In a screw-machine, the screw holder or carrier adapted to receive and hold the screw while it is severed from the wire, and to carry the same around and present it to the nicking-tool, the same consisting in a pair of shouldered jaws pressed together by spring-pressure, and a piston or rod adapted to be moved by suitable means to push out the screw after the nicking operation, substantially as described.

9. The combination, with the frame of a screw-making machine, of the following ele-

ments, constructed and arranged as described, viz: a chuck with hollow spindle resting in proper bearings, and pulley secured thereto, the said chuck serving to grasp the wire by jaws opened and closed by means of a movable disk or collar at the back of said chuck; a rock-shaft resting in suitable bearings, and adapted to produce by its partial rotation a movement of the said disk or collar; a shaft parallel to the spindle of the chuck, resting in bearings and provided with means for communicating power; a cam arranged on said shaft to operate said rock-shaft; a slide-rest for tools and a tool-holding turret, provided with the specified means for securing the proper rotation thereof, both operated by a system of levers secured to the machine-frame, as shown, and actuated by cams on the afore-

said shaft parallel with the chuck-spindle; and a nicking-tool, the spindle of which is provided with a pulley, and rests in bearings in a frame pivoted to move in a horizontal plane, and adapted to be brought into position for cutting by a cam on the aforesaid shaft, the depth of cut being regulated by altering the position relatively to the frame of the projection against which the cam works, substantially as set forth.

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

ALLEN JOHNSTON.

Witnesses:

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G. P. DOWMAN.