

FRANCIS CURTIS.

Improvement in Machines for Making Machine Screws.

No. 120,044.

Patented Oct. 17, 1871.

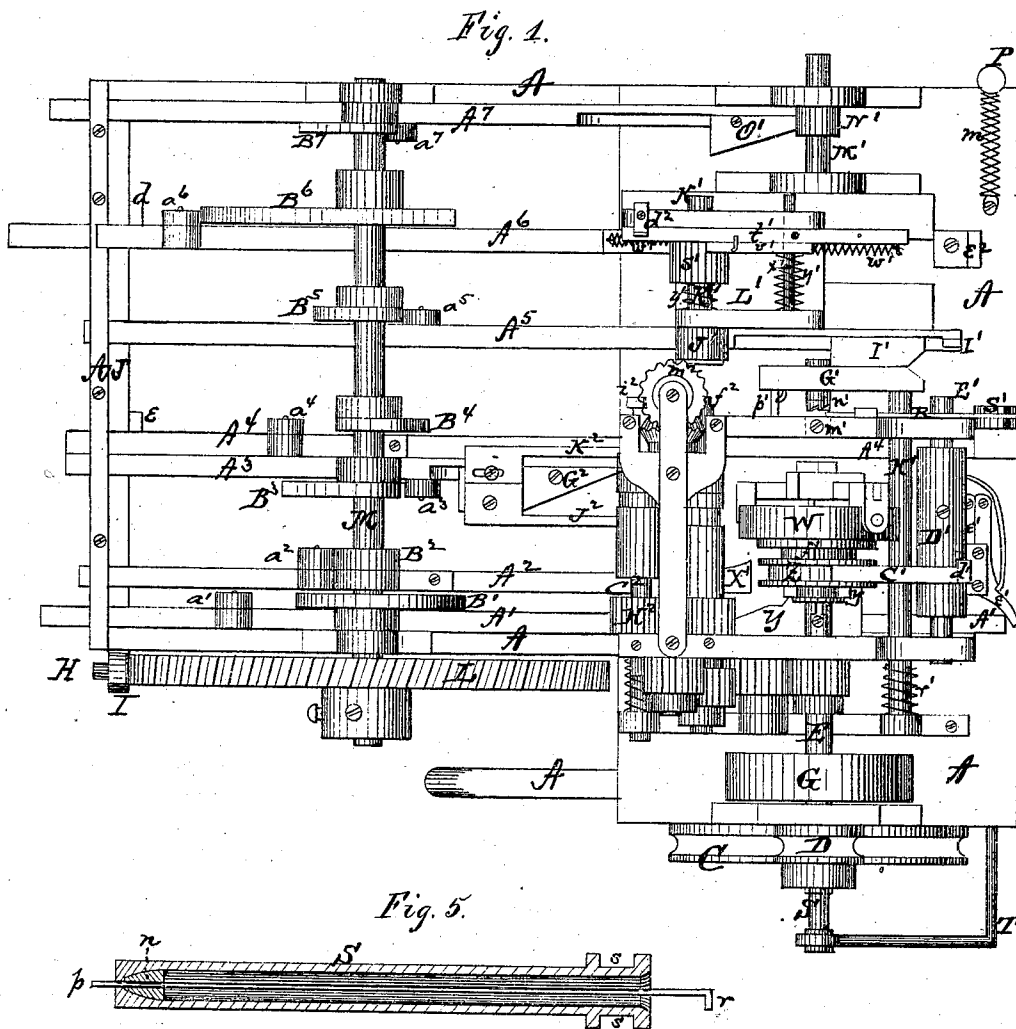
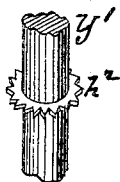


Fig. 14.



Witnesses:

Henry A. Miller
C. L. Ewert.

Inventor

Francis Curtis.
per
Alexander Watson
Attorneys.

FRANCIS CURTIS.

4 Sheets--Sheet 2.

Improvement in Machines for Making Machine Screws.

No. 120,044.

Patented Oct. 17, 1871.

Fig. 2.

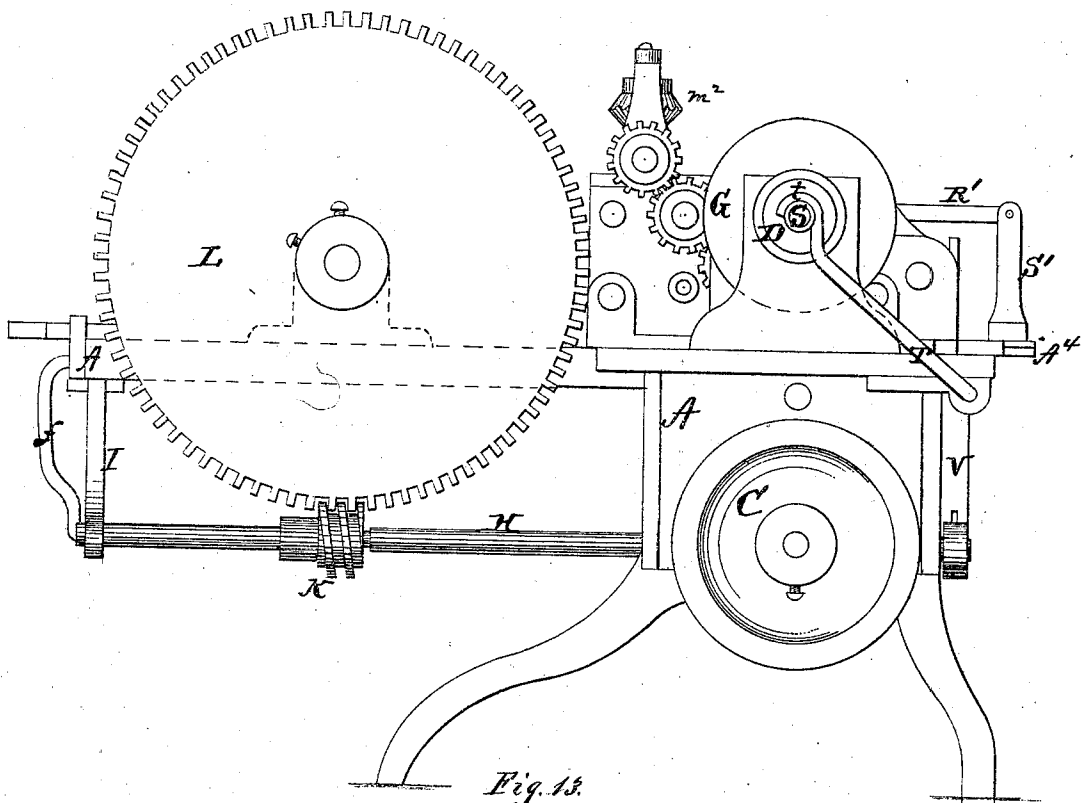
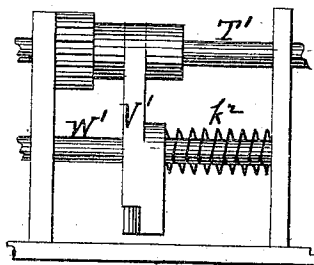


Fig. 13.



Witnesses:

Henry A. Miller
C. L. Ewert.

Inventor

Francis Curtis.
per. Alexander Mason

Attorneys.

FRANCIS CURTIS.

Improvement in Machines for Making Machine Screws.

No. 120,044.

Patented Oct. 17, 1871.

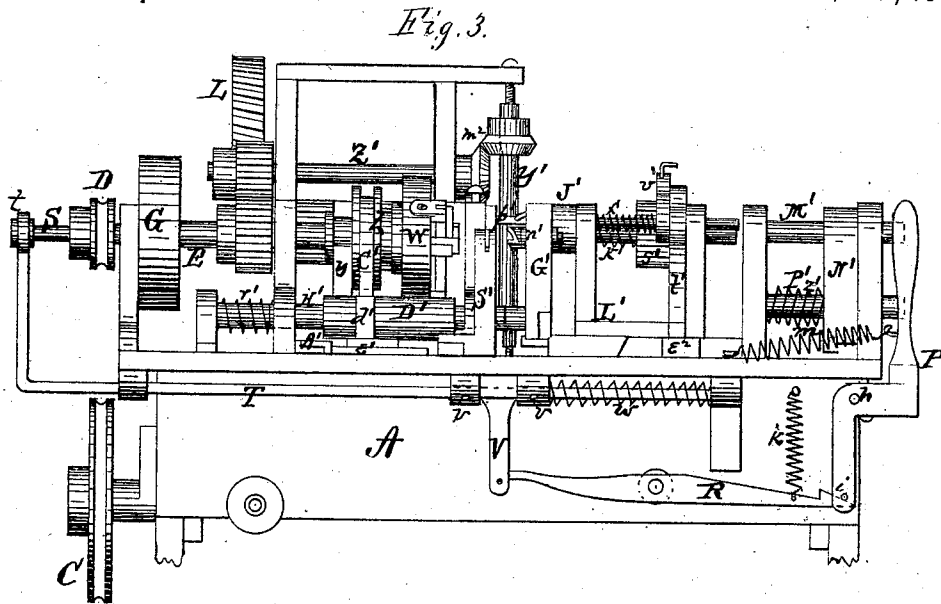


Fig. 6.

Fig. 9.

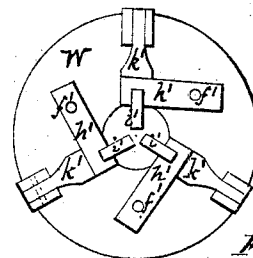
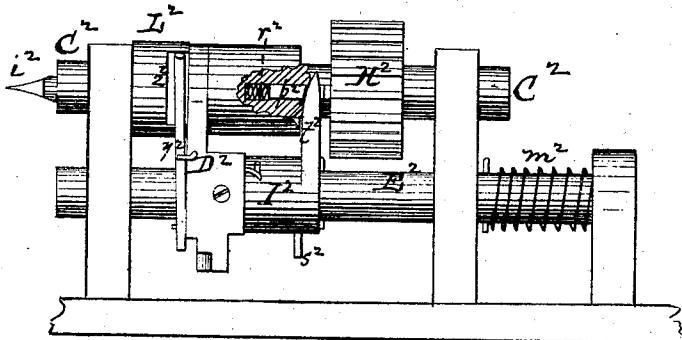


Fig. 10.

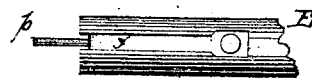


Fig. 11.

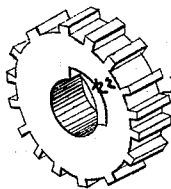
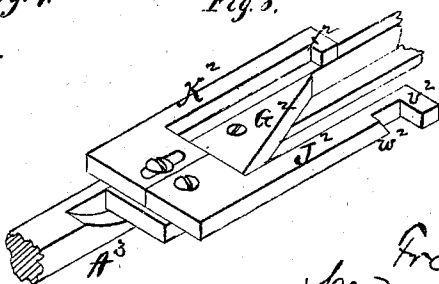


Fig. 8.

Fig. 8.



Witnesses:

Henry N. Miller

C. L. Ewert.

Inventor

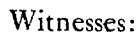
Francis Curtis

Alexander Watson

Attorneys.

No. 120,044.

Patented Oct. 17, 1871.



Henry N. Miller

C. L. Ewert.

Inventor

Inventor
Francis Curtis.
per Alexander Massey

Attorneys.

UNITED STATES PATENT OFFICE.

FRANCIS CURTIS, OF BRATTLEBOROUGH, VERMONT.

IMPROVEMENT IN MACHINES FOR MAKING MACHINE-SCREWS.

Specification forming part of Letters Patent No. 120,044, dated October 17, 1871.

To all whom it may concern:

Be it known that I, FRANCIS CURTIS, of Brattleborough, in the county of Windham and State of Vermont, have invented certain new and useful Improvements in Screw-Machines; and do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawing and to the letters of reference marked thereon making a part of this specification.

The nature of my invention consists in the construction and arrangement of a screw-machine, as will be hereinafter more fully set forth.

In order to enable others skilled in the art to which my invention appertains to make and use the same, I will now proceed to describe its construction and operation, referring to the annexed drawing, in which—

Figure 1 is a plan view of my machine. Fig. 2 is a side view, Fig. 3 a front view, and Fig. 4 a bottom view of the same. Fig. 5 is an enlarged longitudinal section of a hollow tube through which the screw-blank passes. Figs. 6, 7, and 8 are enlarged detached views of the mechanism which operates a screw-driver to release the screws after they are completed. Figs. 9, 10, and 11 are enlarged detached views of the chuck and its attachments. Fig. 12 is a view of a sliding wedge at the rear end of the machine. Fig. 13 is a detached view of the mechanism for operating the header, and Fig. 14 is a perspective view of the saw that cuts the slot in the screw-head.

A represents the frame-work of my machine, constructed in any suitable and convenient manner, to support the various parts of which my machine is composed. On the right side of the frame A is a short horizontal shaft, B, passing into the frame, and having on its outer end a pulley, C, to which motion is imparted by a belt from a pulley, D, on a hollow spindle, E, located above and parallel with the shaft B. The motion to the hollow spindle is communicated from the motive power through a belt around a pulley, G, on said spindle. Upon the inner end of the shaft B is a miter-wheel, *a*, gearing with a similar wheel, *b*, upon a shaft, H, the front end of which has a stationary bearing in the front side of the frame A, while its rear end has its bearing in an arm, I, extending from one end of a bar, J, which is located on the inner side of the

rear end of the machine. The opposite end from the arm I of the bar J is pivoted to the frame A, which allows the end with the arm to be raised and lowered at will, by means that will be hereinafter described. Upon the shaft H is a worm or screw, K, which is to gear with a large cog-wheel, L, upon the end of a horizontal shaft, M, situated across the rear end of the frame A, and carrying a series of cams for operating the various parts of the machine. When the end of the bar J, with the arm I, is elevated the worm K gears with the wheel L and consequently turns the shaft M, but when said bar and arm are allowed to drop down by their own weight the worm will be thrown out of gear with the wheel L and stop the motion of the shaft M. The motion of the bar J is caused by a wedge-shaped bar, N, situated under said bar J and supported by two guides, *d* and *e*, the former attached to the bar J and the latter to the frame A. To the end of the wedge-shaped bar N is attached or formed a downwardly-projecting arm, O, in the lower end of which is inserted a crank, *f*, upon a rod, *h*. This rod runs along the opposite side of the frame from the shaft H, and on the front end of said rod *h* is attached an angular lever P. The lower end of this lever is forked and has a pin, *i*, through it, which pin is, when said end of the lever P is thrown inward, caught by a hooked lever, R, pivoted on the front side of the frame A, and the hooked end drawn upward by a spring, *k*, as shown in Fig. 3. When the hooked end of the lever R is released from the pin *i* a spring, *m*, attached to the upper end of the angular lever P, throws the same back in position. The first-described movement of the lever P throws the wedge-shaped bar N inward, raising the bar J and causing the worm K to gear with the wheel L, while the second movement draws the wedge-shaped bar outward, throwing the worm out of gear. The throwing out of gear may be performed both by hand and automatically when the rod from which the screws are made is used up.

Automatically it is performed in the following manner: In the hollow spindle E is inserted a hollow tube, S, and in the inner end of the same is inserted a small tapering collar, *n*, the hole in which is just large enough for the rod *p*, of which the screws are made, to pass through. The outer end of this rod *p* is formed with a hook or other projection, *r*, as shown in Fig. 5. As this rod is

being fed into the machine the hook r will at last catch on the collar n , and said collar, not being able to pass through the inner end of the tube S , must draw said tube inward further into the hollow spindle E . Now, upon the outer end of the hollow tube S is a circumferential groove, s , formed by flanges or collars attached to the same or in any other convenient manner. In this groove is laid a hook, t , formed upon the end of a bent rod, T , which passes through suitable bearings on the front side of the frame A in such a manner that it can turn in said bearings, and also be moved a short distance in and out. On this rod at a suitable point are secured two collars, v and v' , between which, on the rod, is loosely placed an arm, V , the lower end of which is forked or slotted, and fits over the inner end of the lever R . As the tube S is moved inward the rod T is also moved in the same direction, the hook t being laid in the groove s , and by this movement of the rod the arm V operates on the inner end of the lever R in such a manner as to release the hooked end of the same from the pin i in the angular lever P , and thus throw the machine out of gear, as above described. A spring, w , placed around the rod T between the inner collar and the inner bearing, throws the rod and its arm out again when the machine is stopped. The rod p , passing through the collar n and hollow tube S , goes through the inner end of the hollow spindle E , where are arranged three springs, x , to hold the rod steady and guide the same through the chuck W . The springs x are attached in grooves on the outer side of the hollow spindle, and their outer ends are V-shaped, and bent inward over the end of the hollow spindle. These springs hold the wire or rod so that it will revolve with the spindle, and also keep it from sliding back when the chuck and its jaws slide to take another grip. The chuck W is placed loosely on the inner end of the hollow spindle E , over the springs x , and is provided with an elongated hub extending in on the spindle. This hub is provided at its end with a groove, in which is placed a forked arm, y , attached to a shaft, X , under the bed-plate of the frame. The forked arm, with its shaft, is moved to one side by a wedge, Y , attached to a slide, A^1 , which is operated by a cam, B^1 , on the shaft M , and as soon as said wedge is withdrawn a spring, z , surrounding a portion of the shaft X , throws the same back again, thus giving at the proper time to the chuck its sliding motion on the hollow spindle. On the elongated hub of the chuck is placed a circumferentially-grooved collar, Z , which moves with the chuck, and also independently of the same, on the hub. In the groove on the collar Z is placed a forked arm, C^1 , attached to a sleeve, D^1 , on the shaft E^1 , as shown in Fig. 1. On the side of the sleeve D^1 is a pin or arm, d^1 , which is held by a pair of spring-jaws, e^1 and e^1 , so as to prevent the forked arm C^1 and collar Z from moving until at the proper time, the front end of the slide A^1 opens said jaws and allows the fork to move. From the collar Z three pins, f^1 , pass through the chuck to the face thereof, where a button, h^1 , is attached to each pin. Each of these buttons operates a pivoted lever,

k^1 , to which a jaw, i^1 , is attached, as shown in Fig. 9. Supposing the chuck has moved inward on the hollow spindle, and the wedge Y commences to move the chuck forward; at the commencement of this movement the forked arm C^1 and collar Z are held back by a shoulder on the inner jaw e^1 until the jaws i^1 and i^1 of the chuck have grasped the rod p , when the movement of the slide A^1 releases the arm C^1 , when all move forward together. Then, as soon as the screw has been cut off from the rod, as hereinafter described, and the wedge Y is returning to its place, the spring z on the shaft X moves the chuck inward on the hollow spindle again. At the commencement of this movement the arm C^1 and collar Z are held stationary by the jaws e^1 and e^1 until the jaws i^1 and i^1 of the chuck are opened, which lets the wire loose. Then the movement of the slide A^1 opens the jaws e^1 and e^1 , and the entire chuck moves back to its place on the spindle ready for another grip. The rod p , as it is fed by the chuck W , as above described, passes through a bushing, m^1 , and is received by the burrer n^1 , which mills the body or shank, and then flies back into its place leaving the rod in said bushing.

Nothing being claimed on this bushing I have, in the drawing, only indicated its position by dotted lines in Fig. 1, it being held in place by a set-screw, as shown.

The burrer n^1 is placed in an arm, G^1 , attached to a shaft, H^1 . This arm and shaft are at the proper time turned backward until a pin or projection on the arm strikes a guide-pin, p^1 , when they are moved inward toward the bushing, the pin p^1 passing through a hole in the upper end of the arm. As soon as the burrer has performed its function a spring, r^1 , on the shaft H^1 , moves said shaft and arm outward from the bushing until the arm has cleared the guide-pin p^1 , when the arm and shaft are turned forward in position again. These movements of the arm and shaft are caused by two wedges, I^1 and I^1 , upon the slide A^2 , which is operated by the cam B^2 . As soon as the burrer has flown back in its position the die J^1 advances to cut the thread or screw. This die is placed upon a horizontal shaft, K^1 , passing through a carriage, L^1 , said carriage being attached to the slide A^2 , and operated by the cam B^2 . On the shaft K^1 is a cog-wheel, s^1 , held stationary by two dogs, t^1 and v^1 , each having a spring, w^1 , the spring for the dog t^1 throwing the same up from the wheel, while the spring for the other dog v^1 throws the same against the wheel. These dogs are both placed on the same shaft x^1 , and one of them, t^1 , extends a suitable distance beyond said shaft. The shafts K^1 and x^1 are both surrounded by springs y^1 to force them to one side of the carriage, as shown. The inward movement of the die J^1 is caused by a shaft, M^1 , pressing against the end of the shaft K^1 , said shaft M^1 being provided with a downward-projecting arm, N^1 , which is operated upon by a wedge, O^1 , attached to the slide A^2 . The arm N^1 is at its lower end attached to another shaft P^1 , which is surrounded by a spring, z^1 , and moves with said arm and shaft M^1 . The object of this spring is to throw the shaft M^1 back

again to allow the shafts K^1 and x^1 to resume their positions, and thus take the die back again with the screw, the rod having in the meantime been cut off by means that will be hereinafter set forth. During the inward movement of the die J^1 , and while said die is cutting the thread or screw, the die is held stationary by the dogs $t^1 v^1$ on the wheel s^1 , the rod p being constantly revolving and the dogs being held against the wheel s^1 by being under a gauge, d^2 , attached to the carriage L^1 . As soon as the die has moved inward far enough to cut the required thread the dogs pass from under said gauge, when they are thrown up from the wheel s^1 by the spring w^1 of the dog t^1 , allowing the screw-rod p to rotate the die while the screw is being cut off from the rod. As soon as the screw is cut off the spring y^1 on the shaft K^1 throws the die back in its place, while the dogs remain up from the wheel s^1 . The carriage now commences to move toward the rear, when an incline, e^2 , on the bed of the machine, raises the rear end of the dog t^1 , causing the front end to be depressed so that the spring y^1 on the shaft x^1 will be enabled to throw the same under the gauge d^2 , the dog v^1 in the meantime turning the wheel s^1 either to one side or the other, so that the dog t^1 may enter in the teeth freely. R^1 is the knife working horizontally, said knife being attached to a standard, S^1 , on the front end of the slide A^1 , which is operated by means of a cam, B^1 , on the shaft M , so that the knife will cut off the screw immediately after the die has cut the thread and while the die is revolving with the screw, as above mentioned. In the backward movement of the carriage L it stops opposite a header, f^2 , which shapes the head of the screw; it then passes by a horizontally-revolving saw, h^2 , which cuts the slot in the head. The carriage then completes its backward movement, stopping opposite a screw-driver, i^2 , which takes the screw from the die, and the screw drops off all finished. As soon as the screw is removed from the die the carriage is thrown suddenly forward in place again. The header f^2 is attached to a horizontal shaft, T^1 , which is connected by suitable gearing with and receives its rotary motion from the hollow spindle E . This shaft is also, by an arm, V^1 , connected with a shaft, W^1 , placed below and parallel with the header-shaft. The header is moved toward the die which holds the screw by means of a wedge, X^1 , attached to the slide A^2 , said slide being operated by means of the cam B^2 on the shaft M . A spring, k^2 , surrounding the shaft W^1 , throws the header back as soon as the wedge X^1 is withdrawn. The saw h^2 is circular and placed horizontally on a perpendicular shaft, y^1 , connected, by suitable miter-gearing m^2 , with a horizontal shaft Z^1 , which in turn is, by suitable gearing, connected with the header-shaft T^1 , thus causing the saw to rotate continuously. The screw-driver i^2 is inserted in the end of a horizontal shaft, C^2 , which, by an arm, D^2 , is connected with another shaft, E^2 , placed below and parallel with the screw-driver shaft. One end of this lower shaft E^2 is surrounded by a spring, m^2 ,

to throw the screw-driver outward after it has moved inward and withdrawn the screw from the die. The screw-driver is moved inward by means of a wedge, G^2 , attached to the slide A^2 and working against the lower end of the arm D^2 , said slide being operated by means of the cam B^2 on the shaft M . On the screw-driver shaft C^2 is loosely placed a cog-wheel, H^2 , which meshes with the gearing on the header-shaft T^1 . On the inner circumference of this wheel upon one side is an inclined notch, n^2 , as shown in Fig. 7. In the shaft C^2 is a longitudinal slot or groove, in which is inserted a bar having two cogs, p^2 , and a spring, r^2 , also inserted in said slot or groove, presses the cogged bar into the notch n^2 on the wheel H^2 , thus causing said shaft to turn with the wheel. On the shaft E^2 is placed a loose collar, I^2 , provided with a finger or pawl, t^2 , extending upward against the side of the shaft C^2 , and also with a pin, s^2 , extending downward, as shown in Fig. 6. When the pawl t^2 is thrown against the shaft C^2 , said shaft being revolving, the pawl will come in between the cogs p^2 and draw the same out of the cog-wheel H^2 , thus stopping the motion of the screw-driver shaft; and, as soon as the pawl t^2 is thrown away from said shaft, the spring r^2 throws the cogs p^2 into the wheel H^2 , when the shaft at once commences to revolve.

These motions of the pawl are effected by means of an arm, J^2 , attached to the slide A^3 , said arm having upon its forward end a hook, v^2 , and shoulder w^2 , as shown in Fig. 8. As the slide A^3 moves forward, the carriage L^1 having in the meantime brought the screw to the point where the screw-driver i^2 is situated, said screw-driver entering the slot cut by the saw h^2 in the head of the screw, the shoulder w^2 strikes the pin s^2 , turning the pawl sufficiently far away from the shaft C^2 to allow said shaft to revolve as above mentioned. As soon as the screw-driver thus commences to rotate to remove the screw from the die the wedge G^2 commences to operate on the arm D^2 , drawing the screw-driver away from the die in which the screw was held. As soon as the screw-driver has entirely drawn the screw out the screw falls down and the wedge G^2 commences its return movement, when the spring m^2 moves the shaft C^2 with the screw-driver outward again. Just at the moment when this motion is completed the hook v^2 takes hold of the pin s^2 and throws the pawl t^2 against the shaft C^2 , stopping its revolving motion, so that the screw-driver i^2 will be left in proper position to enter the slot in the head of the next screw. On the slide A^3 is another arm, K^2 , with hook x^2 , which operates a lever, y^2 , pivoted on the side of the arm D^2 , and at the same time as the pawl t^2 is thrown against the shaft C^2 the hook x^2 throws said lever against a collar, L^2 , on the shaft C^2 , and in a notch, z^2 , on said collar, thus insuring the stoppage of the screw-driver in the proper position.

The slides A^1 , A^2 , A^3 , &c., are provided with friction-rollers a^1 , a^2 , a^3 , &c., respectively, against which the cams B^1 , B^2 , B^3 , &c., work, and on the under sides said slides are provided with springs

b^1 , b^2 , b^3 , &c., respectively, to bring them back again in position after having been operated upon by their respective cams.

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

1. The combination, with the gear-wheels K L and shaft H, of the bar and wedge I J N O, crank-rod h , and lever P, substantially as and for the purposes herein set forth.

2. The combination of the lever P, hooked lever R, rod T, and mechanism to reciprocate the same, arm V, and springs k , m , and w , all substantially as and for the purposes herein set forth.

3. The combination of the rod T, by means of its hooks t , with the tube S, grooved and otherwise constructed as described, the tapering collar or plug n within said tube, the hooked rod p , and reciprocating jaws for grasping said rod and feeding it forward to the screw-making instrument, substantially as herein set forth.

4. The hollow spindle E and springs x , the chuck W sliding on said spindle over the springs and provided with elongated hub, grooved collar Z, pins f^1 , buttons h^1 , levers k^1 , and jaws i^1 , all constructed and arranged to operate substantially as and for the purposes herein set forth.

5. The combination, with the subject-matter of the fourth clause, of the forked arm y , shaft X, spring z , and wedge y , and mechanism to reciprocate said wedge, substantially as and for the purposes herein set forth.

6. The combination of the chuck W, collar Z, arm C¹, pin d^1 , sleeve D¹, spring-jaws e^1 e^1 , and slide A¹, all constructed and arranged to operate substantially as and for the purposes herein set forth.

7. The combination of the burrer n^1 , rocking arm G¹, shaft H¹, spring r^1 , and guide-pin p^1 , all constructed and arranged as described and operated by means of the wedges I¹ I¹ on the slide A⁵, substantially as and for the purposes herein set forth.

8. The combination of the die J¹, shaft K¹,

spring y^1 , reciprocating carriage L¹, shafts M¹ and P¹, arm N¹, spring z^1 , and reciprocating wedge O¹, all substantially as and for the purposes herein set forth.

9. The combination, with the carriage L¹, shaft K¹, and spring y^1 , of the cog-wheel s^1 , dogs t^1 and v^1 , and their springs w^1 , the gauge d^2 , and incline e^2 , all constructed and arranged to operate substantially as and for the purposes herein set forth.

10. The combination, with the die J¹ and chuck W, of the knife R¹, standard S¹, slide A⁴, and cam and spring B⁴, substantially as and for the purposes herein set forth.

11. The combination of the header f^2 , shafts T¹ and W¹, arm V¹, spring k^2 , reciprocating wedge X¹, spindle E, and the gear-wheels connecting shaft T¹ with said spindle, substantially as and for the purposes herein set forth.

12. The combination of the screw-driver i^2 , shafts C² E², connecting-arm D², spring m^2 , reciprocating wedge G², cog-wheel H², and the cog-wheel on the header-shaft T¹ substantially as and for the purposes herein set forth.

13. The combination of the reciprocating carriage L¹, die J¹, mechanism for operating said die as described, the vertical revolving shaft y^1 , and the horizontally-operating saw h^2 , substantially as and for the purposes herein set forth.

14. The combination of the screw-driver shaft C², cog-wheel H² with notch n^2 , cogs p^2 and spring r^2 , the collar I², pawl t^2 , pin s^2 , and reciprocating arm J² with hook v^2 and shoulder w^2 , all substantially as and for the purposes herein set forth.

15. The combination of the collar L² with notch z^2 , lever y^2 , and reciprocating arm K² with hook x^2 , all substantially as and for the purposes herein set forth.

In testimony that I claim the foregoing I have hereunto set my hand and seal this 31st day of August, 1871.

FRANCIS CURTIS.

Witnesses:

ALEXANDER M. HIGGINS,
KITTRIDGE HASKINS.

(14)