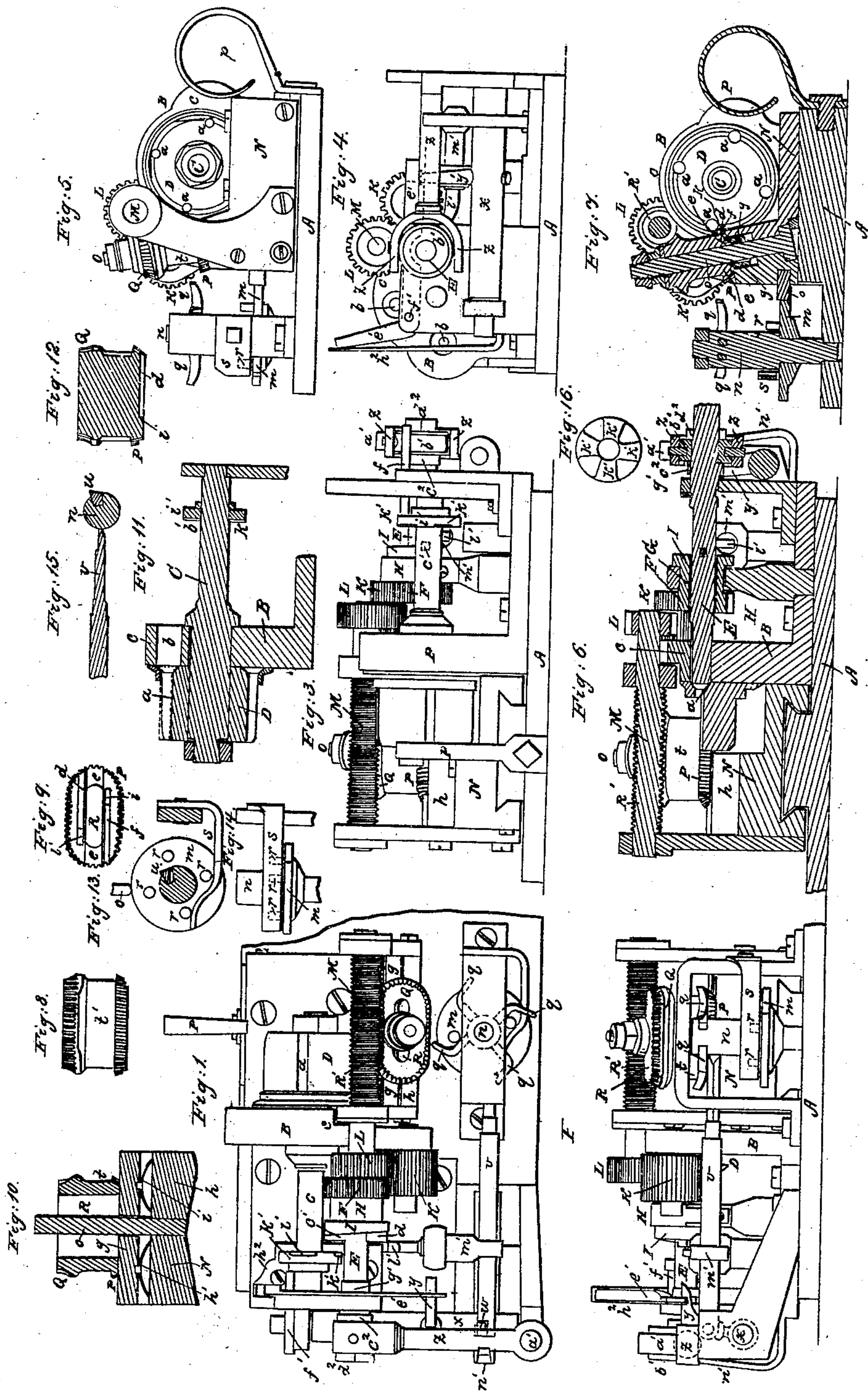


E. SAVAGE.

Machine for Making Wood Screws.

No. 9,652.

Patented April 5, 1853.



UNITED STATES PATENT OFFICE.

ELLIOT SAVAGE, OF BERLIN, CONNECTICUT.

IMPROVED MACHINE FOR CUTTING THE THREADS OF WOOD-SCREWS.

Specification forming part of Letters Patent No. 9,652, dated April 5, 1853.

To all whom it may concern:

Be it known that I, ELLIOT SAVAGE, of Berlin, in the county of Hartford and State of Connecticut, have invented a new or Improved Machine for Cutting the Threads of Wood-Screws; and I do hereby declare that the same is fully described and represented in the following specification, and the accompanying drawings, letters, figures, and references thereof.

Of the said drawings, Figure 1 denotes a top view of my said machine. Fig. 2 is an elevation of one side of it. Fig. 3 is an elevation of the opposite side of it. Fig. 4 is an elevation of the front end of it. Fig. 5 is an elevation of the rear end of it. Fig. 6 is an upright or nearly upright section taken through the screw-driver. Fig. 7 is a transverse and vertical section taken through the endless elongated chaser and its feeding apparatus. Fig. 8 is a side elevation of the said chaser, and Fig. 9 is an under side view of it. Fig. 10 is a longitudinal and central section of it and the spring-guide rail under it.

In the said drawings, A denotes the frame-work bed-plate for supporting the operative parts of the machine. It has raised upon and fastened to it a puppet B, that carries a mandrel or shaft C. On one end of this mandrel or shaft is the screw-blank-holding block D, which has four or any other suitable number of sockets *a a*, &c., made in it near its circumference and at equal distances apart, as seen in the drawings. Each of these sockets should be so made as to hold a screw-blank within it and allow it to project sufficiently out of it for the elongated screw-chaser to operate and form the screw-thread on the blank to the required depth.

In Fig. 11 I have given a vertical and longitudinal section of the screw-blank holder, its shaft, and puppets, the screw-blank being exhibited in red lines. It is inserted in the socket of the holder by being passed point foremost through a hole *b* made through the bead *c* of the puppet.

In connection with the holder of the screw blank or blanks I employ what I term the "driver," which consists of a shaft E, whose front end is formed like that of a common screw-driver and is intended to enter the nick or groove of the head of the screw-blank and by the rotation of the shaft cause a rotation

of the screw-blank. This driver or shaft slides through a gear-wheel F, that is supported on a tubular shaft G, sustained by and so as to rotate in a post or upright H. There is a clutch-wheel I fixed on the opposite end of the shaft G, its clutch-teeth or shoulders being formed on its outer side. They act in connection with two teeth or arms *c' d*, that project from opposite sides of the shaft or driver.

The power by which the machine is put in operation may be applied to the shaft or driver E. The gear-wheel F is made to engage with a transmission gear-wheel K, which engages with another gear L, fixed on a shaft M. Each of the said three gears is provided with the same number of teeth, so that the shaft M is made to rotate with the same velocity and in the same direction as does the shaft or driver E.

A carriage N supports the shaft M, such carriage being made to slide on a T-rail fastened on the upper surface of the bed-plate, as seen in end view in Fig. 3 and in longitudinal section in Fig. 7. From the said carriage a stationary cylindrical spindle O is projected, as seen in the drawings, it being made to stand at a small declination from the vertical. This spindle serves to support the elongated endless chaser P and its elongated worm-gear Q, the two being connected together and having an elongated slot R formed down through them, such slot being formed with parallel sides and semicircular ends concentric with the semicircular ends of the elongated worm-gear. The said endless elongated worm-gear is made with parallel sides and semicircular ends, around which screw-teeth are formed, as seen in the drawings, such screw-teeth being adapted to work between the threads of a screw R' formed on the shaft M. The screw R' has the same pitch as the elongated endless chaser, and when it is put in revolution it will so act in the elongated worm-gear as to put the gear and chaser in movement, as follows: That is to say, they will be moved in a straight line against the screw-blank and parallel to its axis until the curved end of the chaser next the point or end of the screw comes up to the same, and the curved end of the slot R abuts against the spindle O. During this movement the chaser is forming the

screw-thread on the blank. The chaser will next begin to turn on the spindle, and in turning one hundred and eighty degrees will in a measure form a conical point on the screw-blank and a thread on such point. During this rotation movement of the chaser it is advanced or fed up toward the screw-blank, so that at its next movement in a straight line it will cut still deeper into the cylindrical part of the screw-blank. Such movement of the chaser in a straight line will succeed its rotative movement, as described, and will continue until the other curved end of the slot meets and abuts against the spindle, which taking place another rotative movement of the chaser will follow, during the period of which a similar action on the point or end of the screw-blank takes place, accompanied by a farther feeding or movement of the chaser toward the screw-blank. The chaser is to be formed so as to cut the thread on the screw-blank and to form it with a conical point and screw on such point, the cutting-teeth of such chaser being formed by running the chaser as it moves in the machine and against a scored screw of the pitch and form necessary to cause the chaser when put at work against a screw-blank, as above specified, to impart to it the necessary form of screw and end. The mode of cutting the chaser will be well understood by mechanics versed in the art of cutting screws and worm-gears.

In order that the chaser may correctly perform its right-line movements, it is provided with three parallel grooves *d e f* on its under side. The middle groove *e* works in connection with a movable rail *g*, which plays freely up and down within the bed *h*, on which the chaser rests. This rail is supported on springs *h' i*, and there is a projection *k* from the inner side of it, which has a stud or pin *l* extended upward from it. The two outer grooves *d f* do not extend entirely from end to end of the chaser; but each extends from one end of it toward and terminates near to the other end of it and in an inclined plane, as seen at *l'* in Fig. 12, which denotes a longitudinal section of the chaser taken through one of the grooves. The two inclined planes of the two grooves are respectively placed on opposite ends of the chaser, and they are to be so arranged that while either is moving on the stud *l* it shall depress the same just before the endless chaser commences to rotate or turn on its spindle, the object of the inclined plane being to depress the stud, and consequently the rail *g*, entirely below the groove *e* in order to allow the chaser to revolve. As soon as the revolution of one hundred and eighty degrees has been completed, the rail will be relieved, and by its springs will be moved up into the groove *e*, and will serve to keep the chaser in a right-line movement until it commences the next rotation movement, as described.

In order to feed the chaser up to the screw-

blank, I make use of a cam *m*, fixed on an upright shaft or spindle *n*. The cam works against a stud *o*, extended from the carriage *N*, and said carriage has a spring *p*, applied to it to produce a counter movement of it when necessary or at the termination of the cutting of a screw on a blank. Four bent arms or teeth *q q*, &c., extend from the spindle *n*, and there are also four studs or pins *r r*, &c., raised at equal distances apart on the cam and around the spindle, as seen in Figs. 13 and 14, which respectively denote top and side views of the cam. A stop-spring *s* is applied to these pins, as seen in Fig. 14, it being also seen in Fig. 2. During each rotary movement of the screw-chaser one hundred and eighty degrees the part *t* between it and the worm-gear strikes against one of the arms *q q* and turns the cam and, in conjunction with the spring *s*, rotates the cam ninety degrees. It is intended that the chaser should be fed forward four times against the screw-blank before it completes the operation of forming the screw-thread, and therefore it is that at each rotation movement of the chaser one hundred and eighty degrees of a circle the cam is moved but ninety degrees.

There is a small cam *u* applied to the shaft *n*. (See Fig. 15, which is a horizontal section of it and the shaft.) This cam is so placed on the shaft that when the screw is finished on the blank it (the cam) may act against and press in a direction away from the shaft a pitman *v*, whose outer end is jointed to a short arm *w*, extended upward from a horizontal rocker-shaft *x*. Another bent arm *y* projects upward from the rocker-shaft and rests against a forked lever *z*, that turns horizontally on a pin or fulcrum *a'*. In the fork of the lever is a ring or tube *b'*, to which the fork is jointed, so that when the lever is moved the ring shall move with it. The ring is placed on the driver or shaft *E* and between two shoulders *c² d²*, the shaft freely rotating on the ring. A bent lever *e'*, turning on a fulcrum at *f'*, is borne down by a spring *h²* into a groove *g'*, formed around and in the driver, the said lever resting at its front end on the horizontal part of the bent arm *y*. From the above it will be seen that a retrograde movement of the pitman *v*, caused by the cam *u*, as described, will turn the rocker-shaft and lift the lever *e'* out of the circular groove of the driver and move the driver longitudinally or backward out of the nick of the screw-blank, so as to permit the blank-holder to be rotated far enough to bring the next or another blank around into the proper position to be acted on by the chaser. Such rotation of the blank-holder *D* is effected by one of the arms or teeth *c' d'* being by the back movement of the driver drawn into contact or engagement with a gear-wheel *i'*, fixed on the shaft *C*, and having teeth formed on its side, as seen more particularly at *k' k' k' k'* in Fig. 16, which is a side view of the said gear. When or just before this movement of the blank-holder has

been effected, the other of the two teeth $c' d$ comes into contact with a cam l' on the end of a second sliding pitman m' and presses said pitman in a direction toward the pitman v , and as the pitman v is made to pass through the rear part of the pitman m' , such movement of the latter will throw or move the pitman v off its cam u and allow a spring n' to move the forked lever Z , and thereby so move the driver as not only to force it up to the head of the screw-blank in line with it, but clutch it to the tubular shaft G , so as to again put in operation the screw-thread-cutting machinery. When the driver is moved up into the nick of the head of the screw-blank, the spring h^2 throws the locking-lever e' down into the groove g' , and thus while the lever so remains in the groove it prevents any back longitudinal movement of the driver.

I do not claim the invention of the combination of mechanism for holding and rotating a screw-blank and mechanism for carrying a cutter or chisel against the blank and regulating the movements of that cutter by a screw; but

What I do claim as my invention or improvement is—

1. The endless elongated chaser, as constructed and made, to turn and move on a pin or its equivalent and to act against a screw-blank while in rotation and movement, as specified.

2. In combination with the elongated endless chaser and the screw-blank holder, the feeding cam m or apparatus, as applied, so as to be operated by the chaser and feed it forward against the screw-blank, substantially as specified.

3. In combination with the elongated end-

less chaser and its sustaining carriage, the movable rail g and its groove e , together with mechanism for elevating and depressing the rail in the manner and for the purpose as stated, the mechanism, as above described, for such purpose being the two grooves $d f$, with their inclined planes and the stud l and the springs of the rail.

4. In combination with the elongated endless chaser and its operative screw and elongated endless worm-gear and the feeding apparatus of the chaser, mechanism for withdrawing the driver from the head of the screw or releasing the screw from the machinery by which it is put in rotation, mechanism for removing the cut screw from the endless chaser and presenting another screw-blank to the operation of it, as described, and mechanism for restoring the driver and other parts to their correct positions to again set in motion the screw-cutting machinery, the machinery, as described, for actuating the driver being the cam u , the pitman v , the rocker-shaft x , the bent arm y , and the forked lever z , that for removing the cut screw from the chaser and presenting to it a fresh screw-blank being the rotary blank-holder D , the gear-wheel i' , and the arms $c' d$, that for restoring the driver and other parts to their correct positions to again set in motion the screw-cutting machinery being the pitman m' and the spring n' , the whole being applied and made to operate together, substantially as specified.

In testimony whereof I have hereto set my signature this 27th day of January, A. D. 1853.

ELLIOT SAVAGE.

Witnesses:

FRANKLIN ROYS,
EDWARD WILCOX.