2 Sheets—Sheet 1.

C. WHIPPLE.

Machine for Making Wood Screws.

No. 2,754. Patented Aug. 18, 1842.

Fig. 1.

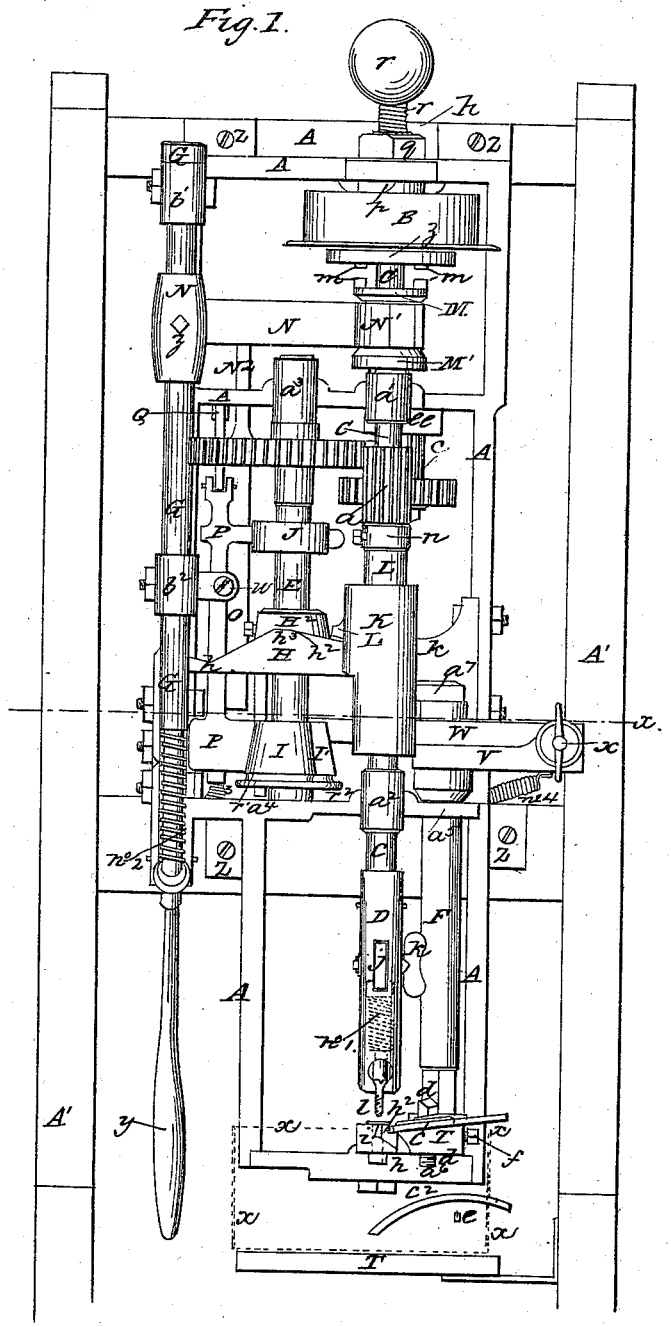

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Fig. 2.

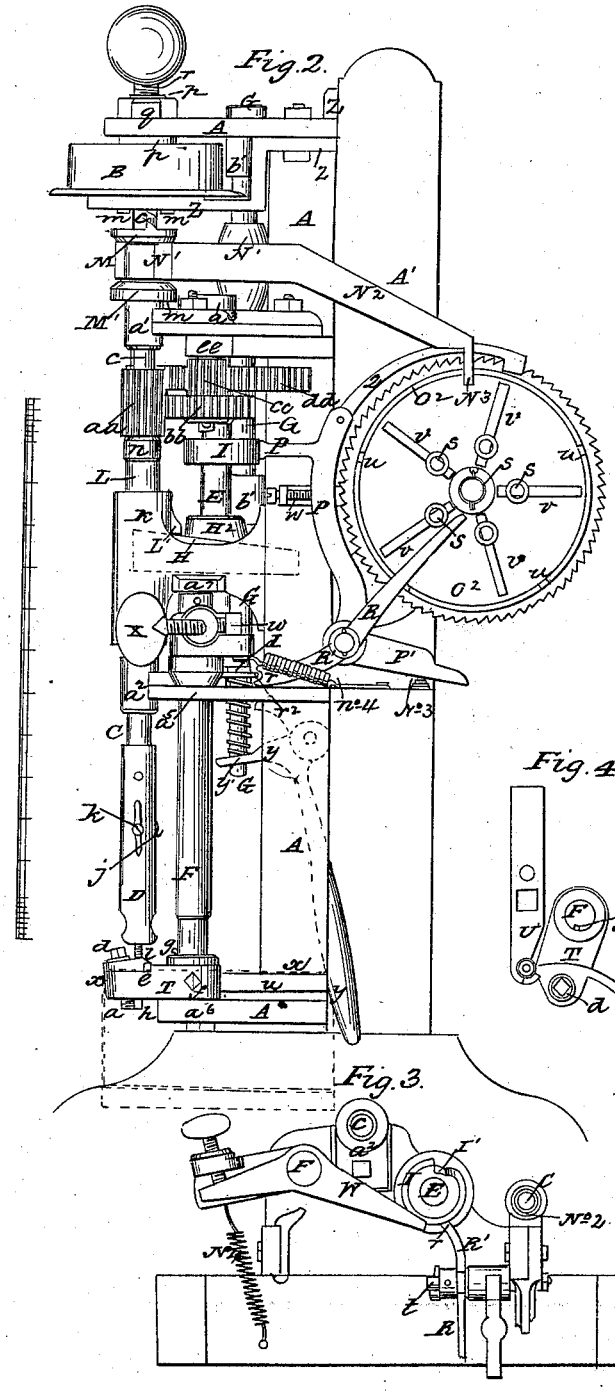

Fig. 4.

Fig. 3.

UNITED STATES PATENT OFFICE.

CULLEN WHIPPLE, OF PROVIDENCE, RHODE ISLAND, ASSIGNOR TO ALEX. HODGES.

MACHINE FOR CUTTING THE THREADS OF WOOD-SCREWS.

Specification forming part of Letters Patent No. **2,754**, dated August 18, 1842.

To all whom it may concern:

Be it known that I, CULLEN WHIPPLE, of the city of Providence, in the county of Providence and State of Rhode Island, have invented a new and useful Machine for Cutting the Threads upon Wood-Screws, and which machine may be applied also to the cutting of screws of other descriptions; and I do hereby declare that the following is a full and exact description thereof.

This machine is intended simply to cut the threads or worms upon the blanks which are to be formed into wood-screws after the heading and the cutting of the nicks or slits in the heads have been completed.

In the accompanying drawings, Figure 1 is a front and Fig. 2 a side elevation of my machine, the respective parts being represented of the size in actual use.

A A A is the frame, which I usually make of cast-iron, and to which I ordinarily attach an auxiliary frame and stand A′ A′, of wood.

B is a driving-pulley, which may be turned by a band from a drum actuated by any motive power, and which is to be made to revolve with great rapidity—say at the rate of five hundred times in a minute.

C C is the main arbor or shaft, upon which the pulley B is situated. This pulley revolves freely upon the shaft C, excepting when clutched by the sliding clutch M, which, when raised, engages with the pulley by means of the horns or catches *m m* on the clutch and pulley. The shaft then revolves with the pulley B, the shaft and clutch being connected by a feather. The clutch M is raised by the shipper N N, the end N′ of said shipper embracing the neck of the clutch between its collars M M′. The shipper N N is attached by a set-screw *z* in the socket N to an upright sliding rod G G, which passes through the sockets *b′ b²*. The head G′ prevents the rod from descending too low, and it is raised by means of the handle Y, which constitutes a bent lever, as shown at Y Y′, Fig. 2, the part Y′ being formed into a ring embracing the rod G and bearing against the spiral spring No. 2 surrounding said rod, said spiral spring causing the rod to rise with an elastic or yielding motion. The handle Y is to be drawn forward, so as to cause the shaft C to revolve during the time a screw is being cut. When let go it will fall back by its own weight and by that of the rod G, and the pulley B will be out of gear and revolve loosely upon its shaft. The shaft C C revolves and slides up and down freely in the collars or sockets *a′* and *a²*, which are stationary and attached permanently to the frame. At its lower end the shaft C carries the holder D, which receives and holds the blank that is to be cut. This holder is in the form of a hollow socket or tube pinned or otherwise fastened to the shaft, and may be changed at pleasure to suit blanks of different sizes. It has within it a driver or sliding bolt *i*, furnished with a projecting edge at its lower end, which fits into the nick or slit in the head of the blank in the manner of a screw-driver and holds it while it is being cut into a screw. The sliding bolt *i* is borne up by a spiral spring, (shown in dotted lines at No. 1,) which spring surrounds it, and it is forced down by a cam or eccentric *j*, that is turned by the thumb-piece *k*. When a screw has been cut, as shown at *l*, Fig. 1, the shaft C rests in the position represented in the drawings, admitting of the ready removal of the screw and the feeding with a blank, which is effected by the hand of the attendant.

The shaft C C is made to slide up and down in the following manner while the screw is being cut: H is a cam or circular wedge, which is fixed onto the shaft or arbor E by means of its hub H², which may be secured in place by a screw or wedge, and may be changed at pleasure for screws of different sizes. This cam or circular wedge, with its shaft E, is made to revolve by suitable gearing from the shaft C C in the following manner: *a a* is a pinion on the shaft C, which pinion is made sufficiently long to keep it in gear while the shaft slides up and down. It is attached to the shaft by means of a feather and rests upon a collar *n*, which is made fast to the shaft by a set-screw *o*, thus admitting of the adjusting of the place of the pinion *a a* upon the shaft. This pinion gears into a wheel *b b*, which has attached to it the pinion *c c*, gearing into the wheel *d d* on the cam-shaft E.

It will be manifest to every machinist that the manner of arranging the respective wheels and pinions and of communicating

motion from the shaft C to the shaft E may be varied; but I have given that which I have used and consider the most simple and convenient.

K is a box or socket through which the shaft C passes without touching it, the opening through it being sufficiently large for that purpose.

L is a tube which is fitted onto the shaft C and slides up and down with it. Said tube is received within the box K, and has a piece L^2 projecting from its lower end, which rests upon the circular wedge H, there being a slot through the side of the box K, through which the piece L^2 passes, admitting the tube L to slide up and down, and at the same time checking it from revolving with the shaft. The upper edge of the circular wedge H, if opened out, would form a regular inclined plane from the point h' to the point h^2, the rise of which is to be equal to the length to which a screw-thread is to be cut, the cutting continuing during the time the shaft C is rising. A straight wedge or inclined plane might, in fact, be substituted for the circular wedge and might be actuated by a rack and pinion, or the tube L might be raised by a snail-motion or other mechanical equivalent. When the piece L^2 arrives at the point h^3, the cutting is suspended, and the shaft C descends as L^2 passes down the inclination from that point to h', when the cutting again proceeds.

Z Z (seen most distinctly in Fig. 2) is a stand or support under the pulley B and making part of the frame of the machine.

p is a hollow stud to hold the driving-pulley, and q a nut on its end.

r r are a weight and stem, the latter of which bears upon the upper end of the shaft C, insuring its descent.

The cutter or chaser by means of which the threads are to be cut is peculiar in its form and action, as it is made to cut upon each side of the thread at the same time and finally upon the edges, by which means said edge is made perfectly smooth and even in a manner not heretofore attempted in the cutting of wood-screws. This cutter or chaser is shown in place at e e', Fig. 1, and a side view and cross-section of it are shown at e^2. Its peculiarity consists in forming a groove on its convex or cutting side of such size and depth as shall adapt it to the thread to be cut. In making these cutters I usually proceed in the following manner: I take a square piece of steel of suitable size, which I form into a hoop or ring. This I put into the lathe and face it truly on each side and turn it true on its outside or periphery, and then cut a groove in it around said periphery, as represented by the notch seen in the cutting end at e', giving to said groove the desired shape and size of the intended thread of the screw. This ring I divide into sections and harden and temper these sections throughout their whole length. The groove and cutting-face I render smooth and polished and grind the end or ends to such a bevel as to give good cutting-edges on the grooved side. The width of the cutter on each side of the groove must be somewhat less than that of the space between each thread of the screw. As these cutters become dull, they are readily sharpened, and this sharpening can be repeated until they are worn too short for use. Such steel cutters may be made straight and the groove or grooves formed in them by planing, filing, or otherwise; but the method of forming them in the lathe is to be preferred.

U is a steel bed-piece, which is bolted or fastened onto the bottom of the frame A. Through this a hole is drilled to receive a steel tube h, the bore of which corresponds with the size of the wire from which a screw is to be cut. The bed-piece U alone may be used by drilling through it a hole of suitable size. The bed-piece must be so adjusted as to bring the hole through it directly under the center of the shaft C, and it and the contained tube are to be cut away, as shown at h^4, to admit the cutter to operate on the blank.

Fig. 4 is a top view of the bed-piece U, the arm T, the tube h, and the cutter. The cutter is to be fixed in a cutter post or arm T at the lower end of a shaft F, f being a set-screw by which it may be held in place, and g a key to prevent its turning on the shaft.

c is a cap-piece, which, by means of the screw-bolt d d, holds the cutter in its place. The shaft or arbor F turns on gudgeons at its upper and lower ends in the parts a^6 and a^7 of the frame.

V is an arm made fast to the shaft F near to its upper end, and to the outer end of this arm is attached a spiral spring No. 4, which draws it back and relieves the cutter e from its action, excepting when the arm V is forced forward by means to be presently described.

X is a set-screw, which passes through the outer end of the arm V and bears upon one end of a curved lever W, the fulcrum of which is the shaft F. The set-screw X serves to regulate the position of this lever. The arrangement of this part will be shown more plainly by the sectional view, Fig. 3, which is made horizontally in the line x x of Fig. 1. In this figure, W is a top view of the above-named curved lever having its fulcrum on the shaft F, and bearing against the set-screw X at one of its ends and against what I denominate the "conical" feed-cam I at its other end. The conical feed-cam is situated on the shaft E, and slides up and down upon it by means of a feather, by which the two are made to revolve together. The cam I is in the general form of the frustum of a cone; but it has a recess or cavity I′ cut in it to receive the end of the lever W once in each revolution. This recess corresponds with the descending part h^3 h' of the circular wedge H, the lever W falling into said recess by the

action of the spiral spring No. 4 at the moment the shaft C C begins to descend, and by this means the cutter or chaser *e* is withdrawn from the screw until the shaft C has reached its lowest point, and as it begins to ascend the cam I will have turned far enough for the shoulder of the recess I′ to act on the lever W, and thereby to force the chaser or cutter against the piece to be cut.

In order to feed the cutter to the blank, the cam I is to be raised upon the shaft C at every successive action of the cutter, and as it acts by an increased diameter on the lever W it causes a new chip to be cut at each rise. The whole difference in the diameter of the upper and lower part of the cone is equal to the depth of the thread, and when the cone has been raised to its greatest height the cutting will be completed. Although I have denominated this cam the "conical cam," it is not absolutely conical; but its periphery or surface recedes from its axis or center in the manner of a scroll and causes the chip taken off by the cutter to increase slightly in thickness as it proceeds, thus giving the desired taper to the screw, the amount of which taper will depend on the amount of enlargement of the conical cam from its scroll-like form.

The conical cam is successively raised and other motions connected therewith are performed in the following manner: O, Fig. 2, is a wheel revolving on an arbor or stud *s*, and having ratchet-teeth cut upon its periphery. O^2 O^2 is a flange or rim projecting from the face of this wheel to the distance of half or three-fourths of an inch. N^2 is an inflexible arm in one piece with and extending back nearly at right angles from the shipper N. The end N^3 of the arm N^2 bears upon the rim O^2 as the wheel O revolves until one of the notches *u u* made through the rim is brought under N^3, which then falls into it, allowing the shipper to descend and throwing the pulley B out of gear with the shaft C. P P is a bent lever having its fulcrum at *t*, and being borne up at the end of its short arm P′ by the spring No. 3. Q is a catch jointed to the lever P and operating on the teeth of the ratchet-wheel so as to draw said wheel back to the distance of one tooth at every vibration of the lever P. This lever is acted upon by a cam J on the shaft E, and the distance of its play is regulated by a set-screw *w*. S S are pins projecting from the face of the ratchet-wheel and rising therefrom to the distance of an inch and a half, more or less. The distance of these pins from the center of the wheel may be regulated by means of screw-nuts and the slots *v v*. As the wheel O revolves the pins S S are brought successively into contact with the arm R of the lever R R′ and depress it until its end escapes from the pin. The short arm R′ of this lever has a recess or hollow *r′* in the end of it, which embraces the bead r^2 r^2 on the lower end of the conical cam, and as the wheel O is drawn round to the distance of a tooth the cam is raised to a corresponding height. The number of shavings cut from each blank will correspond with the number of teeth between each section or pin S on the ratchet-wheel, the conical cam being raised to its full height in that distance of the movement of the wheel, and the lever R escaping from one pin to be acted upon by the next in the same distance. To arrest the motion of the shaft C, so as to cause it to stand in the proper position for removing the cut screw and for supplying a blank, a notch is formed in the bottom rim M′ of the shipper, Fig. 2, and a stump *m′* is made fast to the frame, which stump is received into said notch, this being so situated as to hold the shaft in the required position.

In using this machine the blank while being acted upon by the cutter is kept within a tin or other box containing water or other fluid. The situation of this box is shown by the lines *x x*.

Having thus fully described the nature of my machine and explained the use and operation of the respective parts thereof, what I claim therein as new, and desire to secure by Letters Patent, are the following parts and combination of parts, as set forth in the foregoing specification:

1. The manner in which I have combined the shaft C C with the circular wedge H on the shaft E, so as to cause said circular wedge to raise the shaft C by its action on the projecting piece L^2, and the tube L, said tube being connected with the box K, and the whole being arranged and operating substantially as set forth.

2. The manner in which I have constructed, arranged, and combined the conical cam I, furnished with the recess I′, with the lever W, the shaft F, and the cutter-arm T, so as by their combined action and that of their immediate appendages the cutter *e* may be forced against and removed from the blank to be cut at the proper intervals and in the manner described.

3. The regulating the feed of the cutter in its successive operations on the blank by the raising of the conical cam, so as to cause a part of larger diameter to act upon the lever W.

4. The so forming of what I have denominated the "conical cam" as to give the desired taper to the screw to be cut by means of the increasing radius of its curvature as set forth.

5. The manner of raising the conical cam I by means of the lever R R′, by the action thereon of the pins S S on the ratchet-wheel O, as set forth.

6. The manner in which I have combined and arranged the lever P P′, its catch or pawl Q, the cam J on the shaft E, the rim or flange O^2 of the ratchet-wheel, and the clutch N, by means of its arm N^2, so as to co-operate with each other and with the lever R R′ in governing and regulating the cutting of the screw.

7. The manner of making or forming the cutters or chasers *e*, to be used in combination with a machine for cutting wood-screws,

said cutters having a groove formed along their cutting sides, so as to cause them to cut simultaneously on both sides of the thread, and finally to cut the edge of the thread itself, said groove being of the proper width and depth for that purpose, by which construction the cutters or chasers may be sharpened by grinding or setting them to a simple bevel at their ends without interfering with the notch or groove by which they are made to cut on each side of and to form the thread.

CULLEN WHIPPLE.

Witnesses:
HENRY MARTIN,
JAMES WILSON.