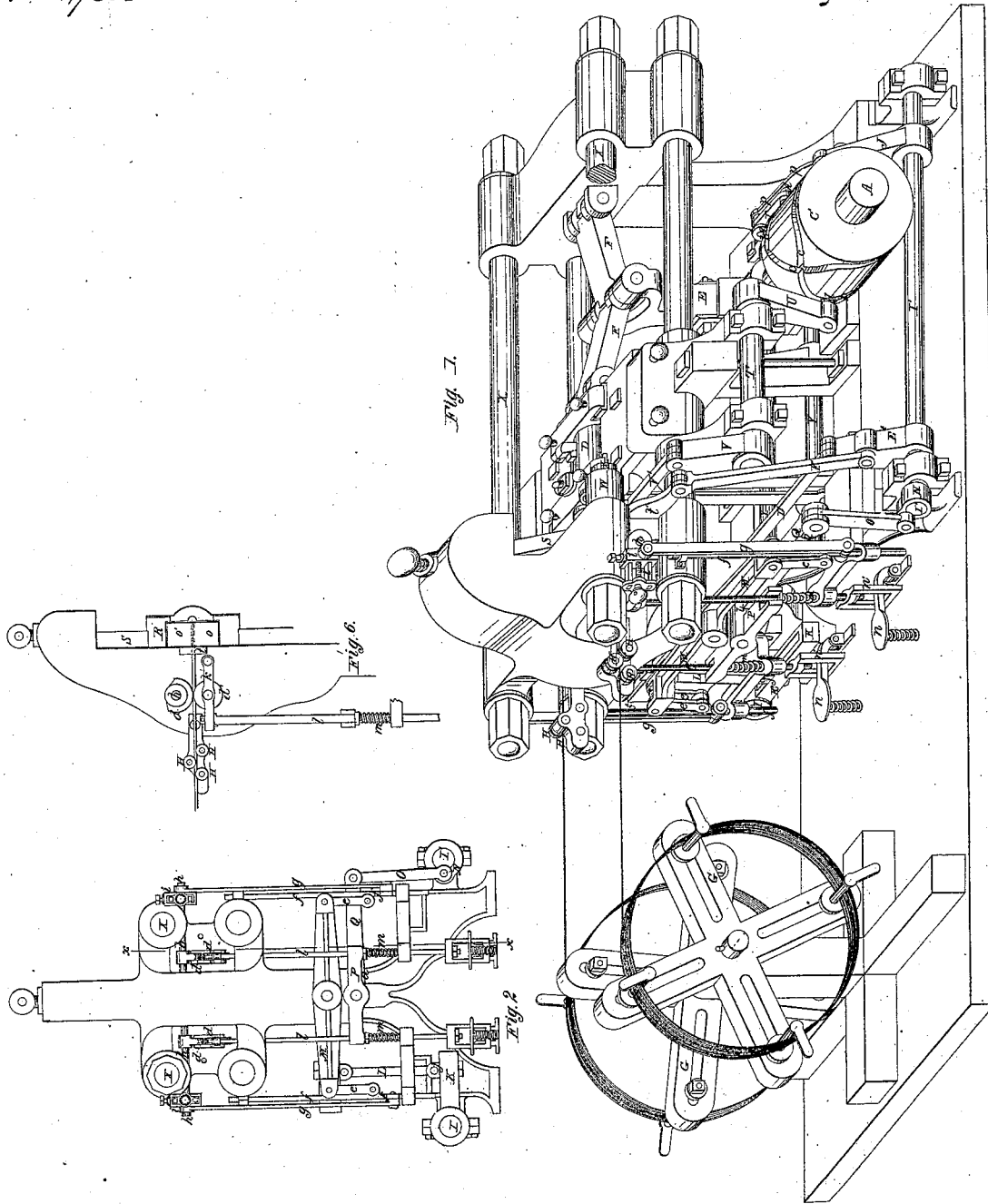


T. W. Harvey

Making Wood Screws,

Patented Sep. 3, 1846.

No. 4,738.



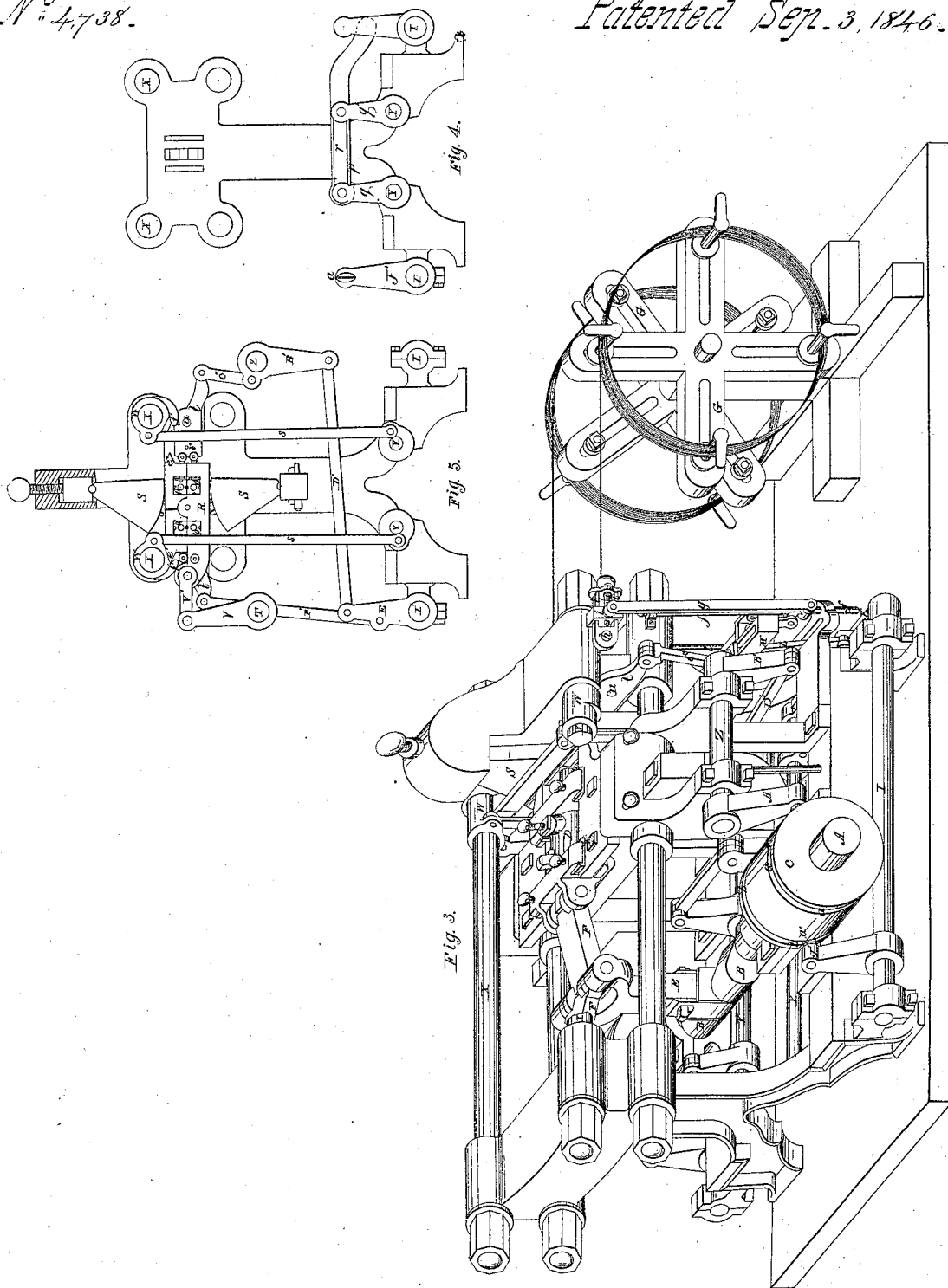
T. W. Harvey,

Sheet 2 - 2 Sheets.

Making Wood Screws

No. 4,738.

Patented Sep. 3, 1846.



UNITED STATES PATENT OFFICE.

THOS. W. HARVEY, OF NEW YORK, N. Y.

MACHINE FOR HEADING SCREW-BLANKS.

Specification of Letters Patent No. 4,738, dated September 3, 1846.

To all whom it may concern:

Be it known that I, THOMAS W. HARVEY, of the city of New York, in the State of New York, have invented certain new and useful improvements in machinery for preparing blanks for forming screws of iron and other metal, commonly denominated "wood-screws," said blanks being prepared by the cutting of wire into suitable lengths, and the forming of heads thereon; and I do hereby declare that the following is a full and exact description thereof.

In my machine for cutting off the wires, and for forming the heads thereon, preparatory to the other operations necessary to the perfecting of wood screws, the wire is fed into the machine from two coils, from each of which a wire is alternately cut and headed by the two cutters and one heading punch, the feeding in of one wire being in progress while the head is being formed on that previously fed in; an arrangement by which much time is saved, and the heading is more effectively performed.

In the accompanying drawings, Figure 1 is a perspective view of my machine showing the front, or feeding end thereof, and the side to the right hand of said feeding end. Fig. 2 is an elevation of the feeding end; Fig. 3 is a perspective view of the side and end opposite to those shown in Fig. 1. Fig. 4 represents the inner side of the rear head or end of the machine, and Fig. 5, a view of the inner side of the front head, together with the die holder and dies, the gripping segments that act on said dies, and other parts connected therewith, and to be presently described.

In each of these figures where the same parts are represented, they are designated by the same letters of reference.

A, is the main driving shaft, to which the motive power is to be applied. This at its center has a crank B, that operates the slide D, of the adjustable heading punch, by means of the connecting link E, by which it is connected with the toggle-joints F, F. On the shaft A, there are also two grooved cams C, and C', that operate the several rock shafts which give the requisite motion to various parts of the machine. The first series of these motions that I will describe, are those that govern the feeding in of the wire.

G, G, are the reels that contain the coils of

wire, which wire first passes between straightening rollers H, H, as in other machines for a like purpose. As two wires are to be fed in on opposite sides of the center, the apparatus for that purpose is repeated on both sides of the machine, with the difference only that the operating parts are so arranged as to act alternately, the wire on one side being fed in while a blank is being headed on the opposite side. The situation of the cutter, and of the dies, into which the wire is fed, are also shown in Fig. 6, and designated by their appropriate letters. The cams C, and C', (Figs. 1 and 3,) are each furnished with a double groove a, a, and b, b, which are conjoined by grooves c, c, crossing the lateral grooves as seen in Fig. 1. From the straightening rollers the wire passes between two feeding wheels, seen at d, d', Fig. 2, the uppermost of these is not in fact a wheel, but is a segment of a wheel; this is made to vibrate so as to feed in the wire, and the lowermost wheel is borne up against it by spiral, or other springs, so as to cause it to clasp the wire firmly.

I, I', are two rock shafts that govern the feeding apparatus, and are otherwise connected with the moving parts. The arms J, J', on these shafts have on them broad cam pins, or guide pieces, a', a', that swivel in the arms and enter the grooves a, a, b, b, on the cams C, C'; these guide pieces may be two or three inches wide, so as to have a good bearing, and to insure their correct action in the crossing grooves. The shaft I, has attached to its fore end, the arm K, which is connected by means of the jointed rod L, (Fig. 2,) to the vibrating lever M, that effects the feeding on each side of the machine; this lever is connected by the links e, e, to guide rods f, f, that slide up and down in suitable sockets affixed to the frame; these guide rods are attached to, and carry with them, the rods g, g, that move the shafts h, h, of the upper feeding wheels d, (or rather segment of a wheel) to a sufficient extent to carry in a suitable length of wire. The rods g, g, are made adjustable on the arms i, i, that are attached to the shafts h, which they vibrate. The rod L, is also adjustable on the arm K, and on the lever M, the joint pieces j, j, (Figs. 1 and 2) being movable in slots on the arm K, and in the lever M, in order to regulate the feed by

determining the distance to which the upper feeding wheels, or segments, on the shafts *h*, shall vibrate.

The rock shaft *I'*, serves to give a vertical motion to the lower feeding wheels, which have to be relieved from their pressure on the upper feeding wheel, or segment, when it is moved back to feed in a fresh length of wire. The manner of raising and depressing these wheels cannot be fully seen in either of the figures referred to, but is in part shown in Fig. 6, which is a side view of said wheels and parts connected therewith in the line *x*---*x* of Fig. 2. In this figure, *d* is one of the upper, or segment feeding wheels affixed on the vibrating shaft *h*, and *d'*, is one of the lower feeding wheels, which is sustained by, and turns on a pivot on the arm *h*, that works on a joint pin at its rear end; *l* is a rod that bears by means of a spiral spring on the outer end of the arm *h*, and presses the wheel *d'*, against the segment *d*; there being a similar arrangement on each side of the machine. The rods *l*, *l*, are shown also in Figs. 1 and 2, and they are operated on in the following manner. The spiral springs *m*, *m*, keep the lower feeding wheels against the upper, when not relieved by being forced down, which is done by the action of the rock shaft *I'*. This has a short arm or crank pin *N*, (Figs. 1 and 2) on its outer end, which carries the connecting rod *O*, that rocks the vibrating lever *P*, to a short distance, the arm *Q*, being made fast to the rear side of said lever, or to the hub with which it turns. As the springs *m*, *m*, are alternately depressed by the rocking of the lever *P*, the pressure is taken off from each of the wires in succession, this taking place at the instant the segment wheel *d*, is returning to feed in a new portion of wire. When a new wire is to be passed into the machine while it is in operation, the lower feeding wheels *d'*, may be depressed by placing a foot on the treadles *n*, *n*, that draw on the stirrups *n'* *n'* Fig. 1.

In Fig. 5, *o*, *o'* are the dies that embrace the wire and form the head. The die holder *R*, traverses back and forth to receive a new length of wire, and to carry each die into a line with the heading punch. The vibrating segment pieces *S*, *S*, hold the dies firmly together during the process of heading; they are made adjustable so as always to operate correctly. These segments are moved back and forth by the sliding of the holder *R*, there being pins, or teeth on them that take into the edges of the holder. The holder is vibrated in the following manner.

T, Fig. 1, is a rock shaft that is operated on by the arm *U*; the cam *C'*, serving to give motion to the arm *U*, just as it does to the arm *J*. The rock shaft *T*, carries the

arm *V* (Figs. 1 and 5) which vibrate the holder *R*, by means of the connecting link *V'*, as shown in the drawing.

W, *W* are gripping tumblers that open and close the dies *o'*, *o'*, for admitting the wire for a fresh blank, and at the same time liberating the one just finished, and to close upon the wire when a fresh blank is cut off by the shears. The dies *o*, *o'*, are of a thickness equal to the length of the intended blank, and each pair may undergo four changes of position, one half of the circular opening that is to receive the wire being formed on each of their sides. The gripping tumblers *W*, *W*, are shown as embracing the rods *X*, *X*, that make a part of the side frame of the machine, being secured to the heads by screw-nuts. These tumblers move freely round on said rods, and are operated in the following manner.

Y, *Y*, are two rockshafts that pass from end to end of the frame of the machine, and these are vibrated by the arm *J*, which turns loosely on the rock shaft *I'*, Fig. 1; the manner of connecting the arm *J*, with the rock shafts *Y*, *Y*, is distinctly shown in Fig. 4. A bar *p*, is connected by a joint pin to the arm *J*, and at its other end to the arm *q*, attached to one of the rock shafts *Y*, and this is in like manner connected to the other rock shaft *Y*, by means of a joint piece *r*, and the arm *q'*. To the opposite ends of the shafts *Y*, *Y*, are attached, by crank pins, the rods *s*, *s* (Fig. 5,) that operate the tumblers *W*, *W*, at the proper time for the alternate opening and closing of the dies *o'*, *o'*, said dies working on a joint pin *o'*. The dies *o'*, *o'*, are alternately opened to a very small distance, by the horns *e'*, *e'*, Fig. 5, being alternately brought, by the sliding motion of the die holder *R*, into contact with the projecting lifters *f'*, *f'*, on the gripping tumblers *W*, *W*.

The cutting off of the wire is effected as in other heading machines, but as the feeding is double, provision is of course made for this, on both sides of the machine.

t, *t'*, Fig. 5, are the cutters that vibrate on joint pins *u*, the wire being received within the hole *v*, on its way to the dies. The cutters, and the apparatus by which they are moved, is in part shown in Figs. 1, and 3. The cutters are moved in the following manner.

Z, Figs. 3 and 5, is a rock shaft that is vibrated by the cam *C*, operating on the arm *A'*, in the same way in which the shaft *I*, is vibrated by the arm *J'*. On the opposite end of *Z*, is the arm *B'*, a connecting link *C''*, (Fig. 5,) attached to this arm, operates one of the cutters.

From the arm *B'*, a connecting rod *D'*, extends across to an arm *E'*, (Figs. 1 and 5) on the rock shaft *I'*, to which it is made fast; from the arm *E'*, a long connecting

link F', extends up to, and operates the second cutter *t'*. At the time when the wire is fed in, the hole *v* coincides with that of the die into which it is to pass, and when in, the cutter receives sufficient motion to cut it off. During this operation, the wire which was fed in on the opposite side is being headed. The die holder R, is then made to slide so as to bring the cut off wire opposite to the heading punch, and the other gripping die is then so situated as to receive a new length, which is in like manner cut off, and then carried to the heading punch, and so on alternately. The feeding in of the wire discharges the headed blank.

Under the herein described combination and arrangement of the different parts of this machine, all the motions required in performing the respective operations with the exception of that of the heading punch are derived from two cams C', and C'', which are similar, and, it is believed, new in their construction; said cams being placed on the ends of the main driving, or crank shaft A. The motions which operate the parts on one side are, by vibrating levers, and connecting bars transferred to the opposite side, and are alternate in their operation. The motions for the respective operations are all performed in the same space of time, to wit, that required for a quarter revolution of the main shaft. There are four principal motions, exclusive of that of the heading punch, performed in succession—all of which are derived from the cams C', C'', and from the nature of such motions they might all be obtained from a single cam, by placing cam pins at four different points on the circumference thereof; but to prevent crowding and to distribute the rock shafts in the most advantageous manner, the use of two such cams is preferred, one on each side of the machine, and each of them made to govern two of the four motions.

To provide for the double feeding of the wire, the die holder, it will have been seen, is furnished with two sets of dies, which traverse so far back and forth that when the operation of heading is being performed upon one wire, the other die will be opposite to the point where the wire is fed in, this feeding being effected simultaneously with the heading. In the cutting off process, the motion that cuts the wire on one side raises the cutter also on the opposite side in readiness for the operation of cutting, and so on alternately. And in like manner the motion on one side by which the feeding is effected,

is accompanied by that on the other by which the segment feeding wheel is returned to a position ready to feed in on the other side, and the same remarks may be applied to the other alternating motions.

In the heading machine as ordinarily constructed, where a single wire is fed in, all the motions have to be successive, and in order to operate with the requisite dispatch, these motions have to be performed with inconvenient speed, and the work is consequently less perfectly performed than when more time is allowed. By the double feeding in my plan, the movements are all rendered easy, and the heading punch may therefore be made to act with such a degree of speed as will nearly approach the nature of a blow with a hammer, the effect of which is to produce a vibratory motion among the particles of metal, which is favorable to the soundness and perfection of the head.

Having thus fully described the manner in which I construct my machine for preparing the blanks for the formation of wood screws, and which may also be applied to the forming of rivets, and other articles of a like nature, what I claim therein as new, and desire to secure by Letters Patent, is—

1. The manner herein set forth of producing the respective alternating motions necessary to the double feeding, by combining the respective arms U, J, and A', J', with the cams C, and C', having grooves crossing each other; said cams carrying swiveling cam pins, and operating the rock shafts T, I', Z, and I, which shafts are connected with the respective operating parts of the machine, with the exception of the heading die, substantially in the manner herein made known, and this I claim whether said motions be effected by one or more cams of the kind herein described, while the operating parts are substantially the same in their arrangement and action with those herein described and delineated.

2. I also claim the arrangement and combination with the cams C, C', and with the respective rock shafts and single heading punch, of the double acting apparatus, consisting of the feeding wheels and segments *d, d'*, the cutters *t, t'*, the gripping tumblers W, W', and the sliding die holder R, the whole being made to operate substantially as herein described.

THOS. W. HARVEY.

Witnesses:

A. P. HAWLEY,
WILLARD HARVEY.