2 Sheets—Sheet 1.

# W. E. WARD.

## Making Bolts, Rivets, &c.

No 7.538.

Patented July 30, 1850.

Fig. 1.

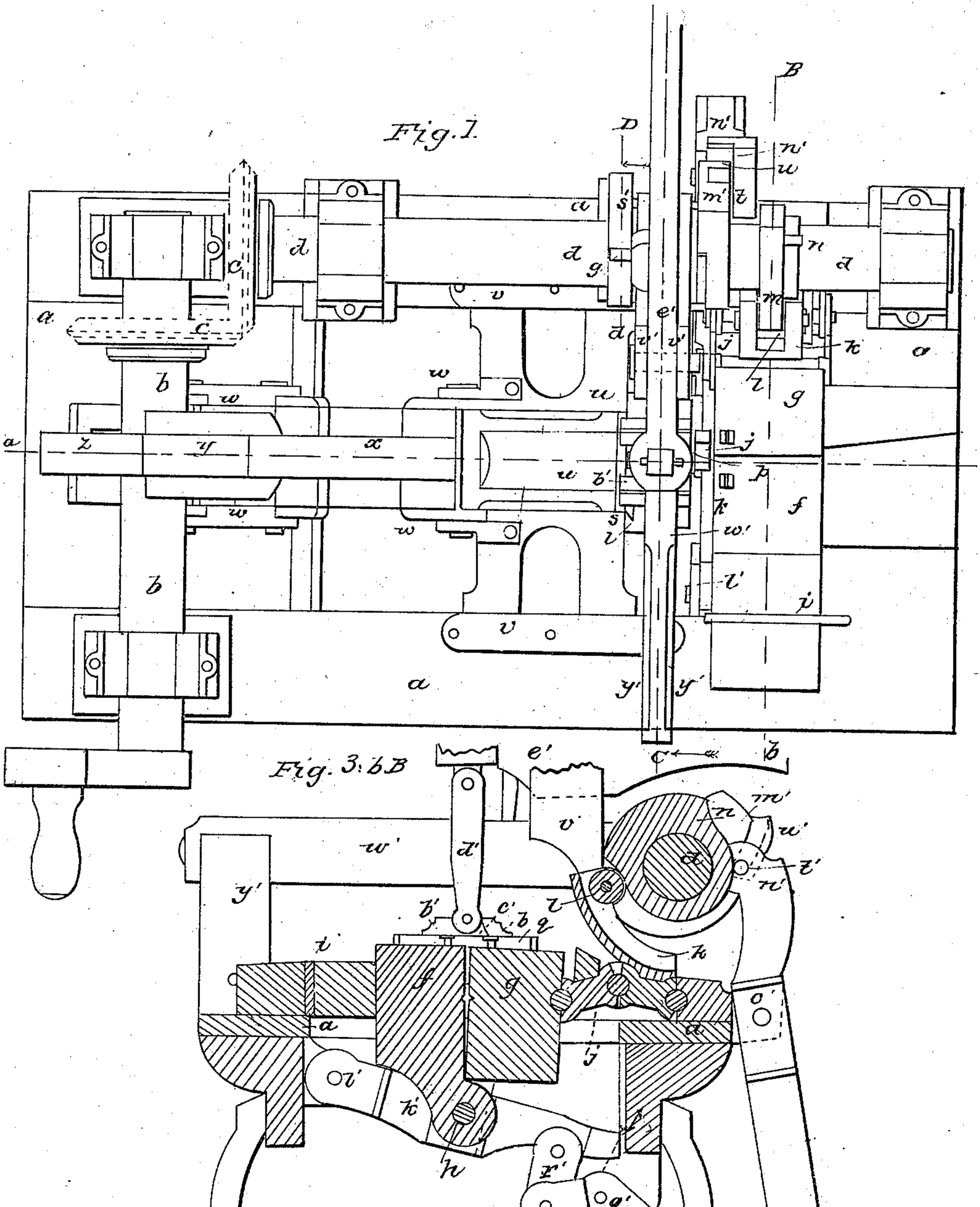


Fig. 1.

Fig. 3. bB

2 Sheets—Sheet 2.

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Fig. 2. A a

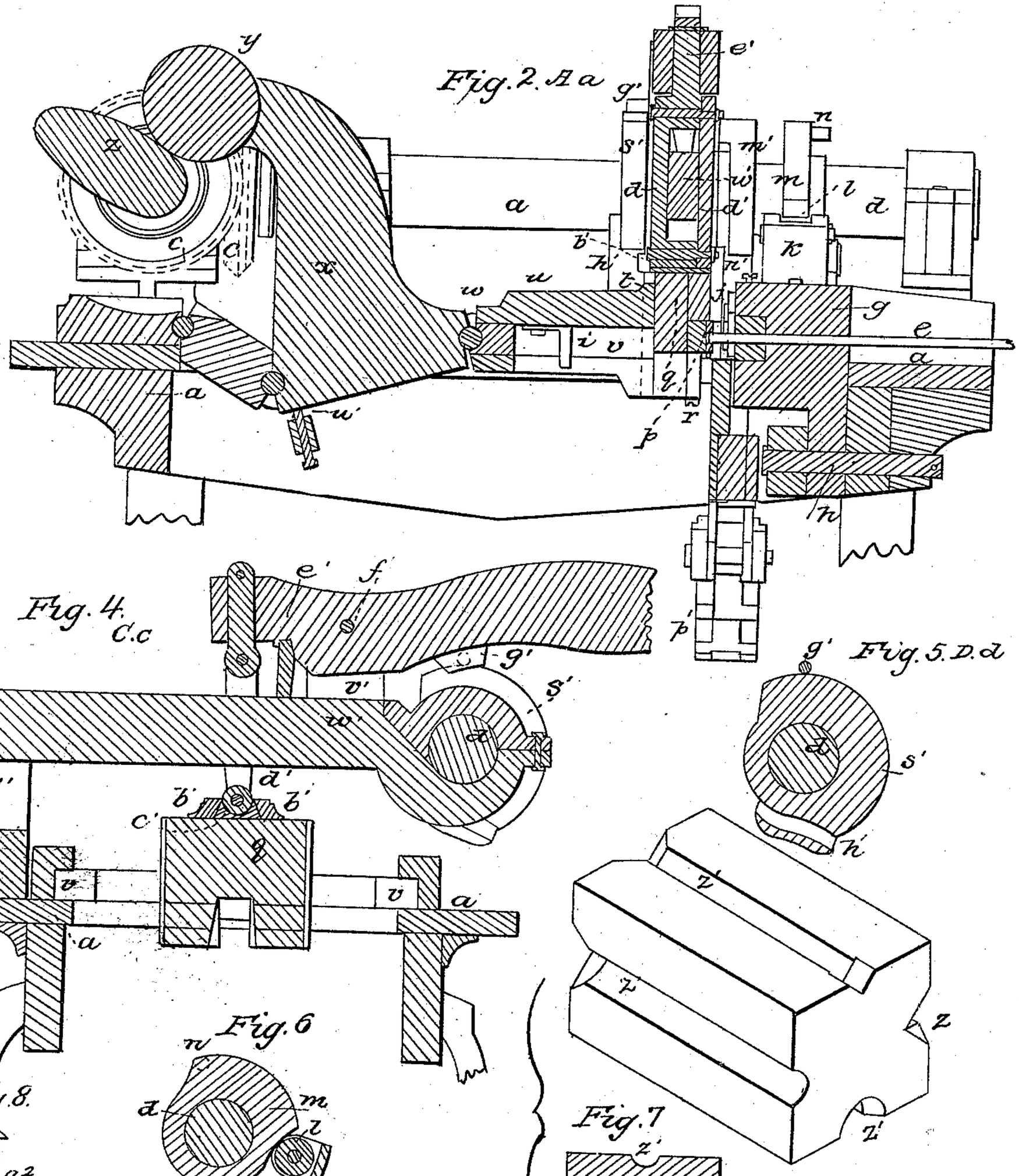


Fig. 4. C.c



Fig. 5. D. d



Fig. 6

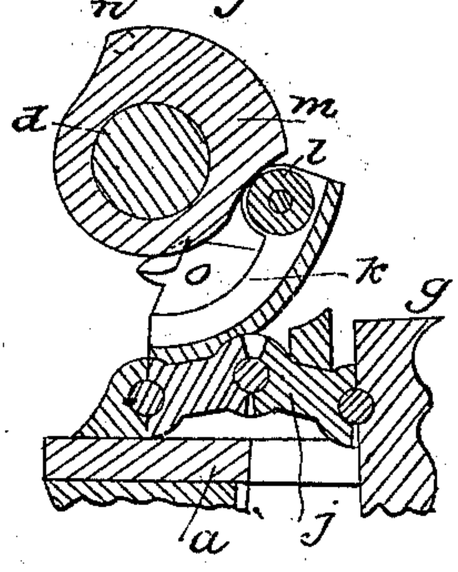
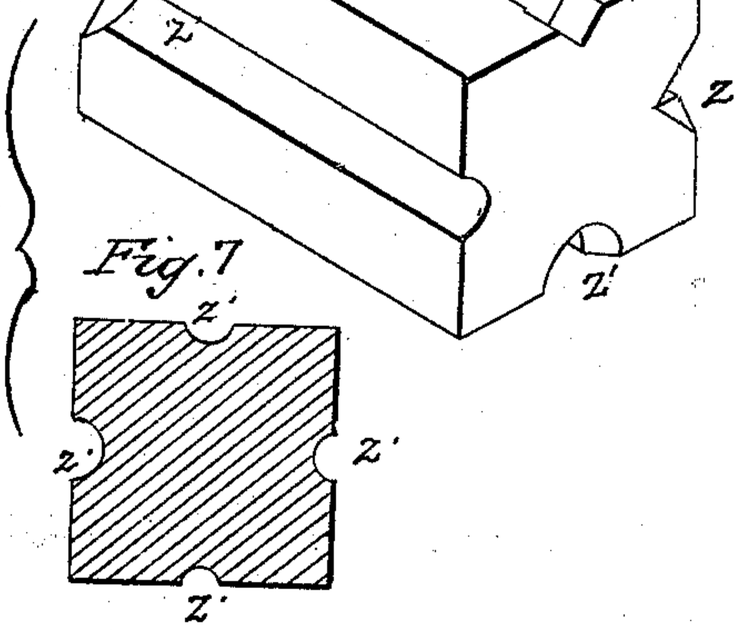


Fig. 8.

Fig. 7



# UNITED STATES PATENT OFFICE.

WILLIAM E. WARD, OF PORTCHESTER, NEW YORK.

## BOLT AND RIVET MACHINE.

Specification of Letters Patent No. 7,538, dated July 30, 1850.

*To all whom it may concern:*

Be it known that I, WILLIAM E. WARD, of Portchester, in the county of Westchester and State of New York, have invented certain new and useful improvements in machines for making bolts, stove-rods, screw-blanks, rivets, and other similar articles of metal, and that the following is a full, clear, and exact description of the same, and of the principle or character which distinguishes them from all other things before known, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1, is a plan of the machine, Figs. 2, 3, 4 and 5 are vertical sections taken at the lines A, *a*, B, *b*, C, *c*, and D, *d*, of Fig. 1, Fig. 6, a vertical section on the line B, *b* looking in the reverse direction of Fig. 3, Fig. 7, a perspective view and section of one of the gripping dies, and Fig. 8, a separate view of a headed bolt.

The same letters indicate like parts in all the figures.

The object of my invention as indicated by the title, is to make bolts, stove-rods, rivets, screw blanks, and other similar articles, which are formed by striking up the head on the end of a rod or wire from which the shanks are formed; but instead of first cutting off the length of wire or rod to form the shank and then striking up the head, I invert this order of procedure by first striking up the head and then, after the shank has been liberated, measuring out the length required for the shank, and cutting it off, by means of which invented process, I am enabled to use the same gripping dies for all lengths of bolts, &c., having the same diameter of shank, instead of being under the necessity of having one set of dies for each length of shank.

The nature of the first part of my invention consists in gaging the length of the shank to be cut off after the head has been formed by feeding in the rod against a rest beyond the header which has a lateral movement to permit the head to pass by it, and, by the operation of cutting off the shank, determining or gaging the length of wire which shall project beyond the dies to form the next head. And the last part of my invention consists in cutting off the length of shank by the return lateral motion of the header in combination with the movable rest.

In the accompanying drawings (*a*) represents the frame which may be varied in construction at the discretion of the constructor, and (*b*) the main driving shaft which receives motion from any first mover, and which by bevel cog-wheel (*c*, *c*,) communicates motion to the cam shaft (*d*).

The metal wire or rod (*e*) from which the bolts, &c., are to be made is introduced by hand or otherwise between two gripping dies of the usual construction secured in recesses (in the usual manner) in two jaws, (*f*, *g*,) both of which turn on a fulcrum pin at (*h*). The one (*f*) is the stationary jaw, and is movable merely for the purpose of adjustment by means of a wedge (*i*) at the back, and the other is connected with a toggle joint lever (*j*) by means of which the gripping and opening of the jaws is effected, one of the arms of the toggle joint having an arm (*k*) that carries a friction roller (*l*) against which the periphery of a cam (*m*) (on the cam shaft (*d*,)) acts to effect the gripping; and after the cam has passed, the jaw is opened to liberate the rod or wire by means of a pin (*n*), at the side of the cam, which is acted upon by the inner eccentric face (see Fig. 6) of a projecting piece (*o*) on the arm (*k*) of the toggle lever. In this way the rod is gripped and liberated once for each rotation of the cam shaft, which cam shaft makes one revolution for each entire operation of the machine. The projection of the gripping part of the cam, its length, and position relatively to the other cams, is represented in the drawings. After the rod or wire has been gripped the heading operation takes place.

The heading die (*p*) is to be made with the face of any desired form depending upon the form of head intended to be produced. It is inserted in a cavity made in a heading block (*q*) and therein adjusted and secured by set screws (*r*, *r*). The heading block is formed on the face opposite the die with vertical ways (*s*, *s*,) which embrace the projecting part (*t*) of a cross head (*u*) that slides on horizontal ways (*v*, *v*,) attached to the frame, and the cross head is connected with a toggle joint (*w*) that has its opposite bearing in the frame, one arm of the toggle having an arm (*x*) with a roller (*y*) on the end of it that is acted upon by a cam (*z*,) on the main driving shaft (*b*), to force up the header to strike up the head; and when the cam has passed by in its rotation,

the header is carried back by the weight of the arm ($x$) and roller, until the toggle comes down to the point of a set screw ($a'$) by which the range of motion of the header is determined and regulated, as the distance of the face of the heading die, when drawn back from the gripping dies, determines the length of the rod or wire from which the head is to be formed. So soon as the head has been formed and the header moved back, the gripping jaws open to liberate the rod or wire that it may be fed forward; but before this can be done the header must be moved out of the way. To effect this the header block is provided with horizontal ways ($b'$, $b'$,) at top which embrace and slide on a block ($c'$) attached to links ($d'$, $d'$,) connected with a lever ($e'$,) that turns on a fulcrum pin ($f'$). The opposite arm of this lever is provided with a wrist-pin ($g'$) which is acted upon by an inner face cam ($h'$) to depress this arm of the lever to lift up the header suspended to it to a sufficient height to allow the rod to be pushed or fed forward until the head strikes an adjustable gage ($i'$) attached to the bottom of the header block, or to the cross head connected with it, to determine the length of the shank of the bolt or other article to be made. While this is in progress a rest ($j'$), attached to a lever ($k'$) which turns on a fulcrum pin ($l'$), is elevated by means of a cam ($m'$) that acts on the upper arm of a lever ($n'$) that turns on a fulcrum pin ($o'$), the other arm of the said lever being jointed by a link ($p'$) to a lever ($q'$) which is in turn jointed by a link ($r'$) to the end of the lever ($k'$) that carries the rest. This motion carries the surface of the rest which is grooved for that purpose up to, and under the rod or wire to act as a rest or support during the cutting operation. The header is then depressed by a cam ($s'$) which elevates the lever ($e'$) with which the header block is connected, and the lower edge of the heading die and the corresponding edge of the rest ($j'$)—which are made sharp for that purpose—shear off the rod or wire thus cutting off the bolt or other article from the rod or wire leaving the required length between the face of the header and the gripping dies for the next head. The rest is then depressed by the reversed motion of the parts connected with it, the lever ($n'$) having a pin ($t'$) attached to it which is acted upon by an inner face cam ($u'$) outside of the periphery of the cam that gives to this lever the motion for elevating the rest.

The connection of the header block (by means of sliding ways at right angles) with the cross head of the toggle joint which gives the horizontal heading motion and with the lever ($e'$) which gives the lateral motion to remove the header that the rod or wire may be fed, and for cutting off the headed bolt, &c., admits of these motions of the header at right angles without any tendency to break or unduly strain the parts or their connections.

To facilitate the removal of the header block that the heading die may be adjusted or changed, the standards ($v'$) which carry the fulcrum pin of the lever ($e'$) are attached to a lever ($w'$) that is secured by a collar ($x'$) to the cam shaft and its other end is secured by links ($y'$) to the frame. When the links ($y'$) are liberated the lever ($w'$) can be elevated (turning on the cam shaft) and with it the lever ($e'$) and header, thus carrying up the header so as to give free access to the heading die that it may be adjusted or taken out.

For the purpose of adjusting the heading die (vertically) relatively to the gripping dies and the rest ($j'$), the connections of the links ($d'$, $d'$,) (which connect the header block with the lever ($e'$)) are attached to a stem which passes through a mortise in the end of the lever ($e'$), and this stem may be threaded at each end with a nut above and below the lever by the turning of which the position of the heading die can be adjusted with the greatest accuracy.

The gripping dies are made square with four faces so that they may be turned and each face adapted to different sizes of rods or wires; and the grooves ($z'$) in each face may be made with enlargements of any form desired, into which the metal of the rod will be upset by the header to make heads of any form desired—such as represented at $a^2$ Fig. 8. The grooves at either end may be different that the dies may be reversed end for end, and thus adapt each set of dies to the making of eight different forms or sizes of articles, and each of the eight may then be used for all varieties of lengths by reason of cutting off the shank after the head has been formed as stated above.

Although I have above described the form of cams and arrangement of parts which I have essayed with success and deem the best for the practical application of the principles of my invention, I do not wish to limit myself to them, as they may be variously modified, and other well-known mechanical equivalents substituted therefor, but

What I claim as my invention and desire to secure by Letters Patent is—

1. Gaging the length of the shank after a head has been formed on the end by pushing the head against a gage beyond the header which has a lateral motion to allow it to pass by substantially as described, in combination with the operations of cutting off the shank at such distance from the gripping dies as by the same operation to determine or gage the length of rod or wire

which shall be left projecting beyond the gripping dies for forming the next head substantially as described.

2. Cutting off the rod or wire, after the head has been formed, by the return lateral motion of the header, in combination with the rest, substantially as described, the edges of the rest and heading die being formed to answer the purpose of shears, as herein described.

WM. E. WARD.

Witnesses:
LOUIS F. WADSWORTH,
M. G. HARRINGTON.