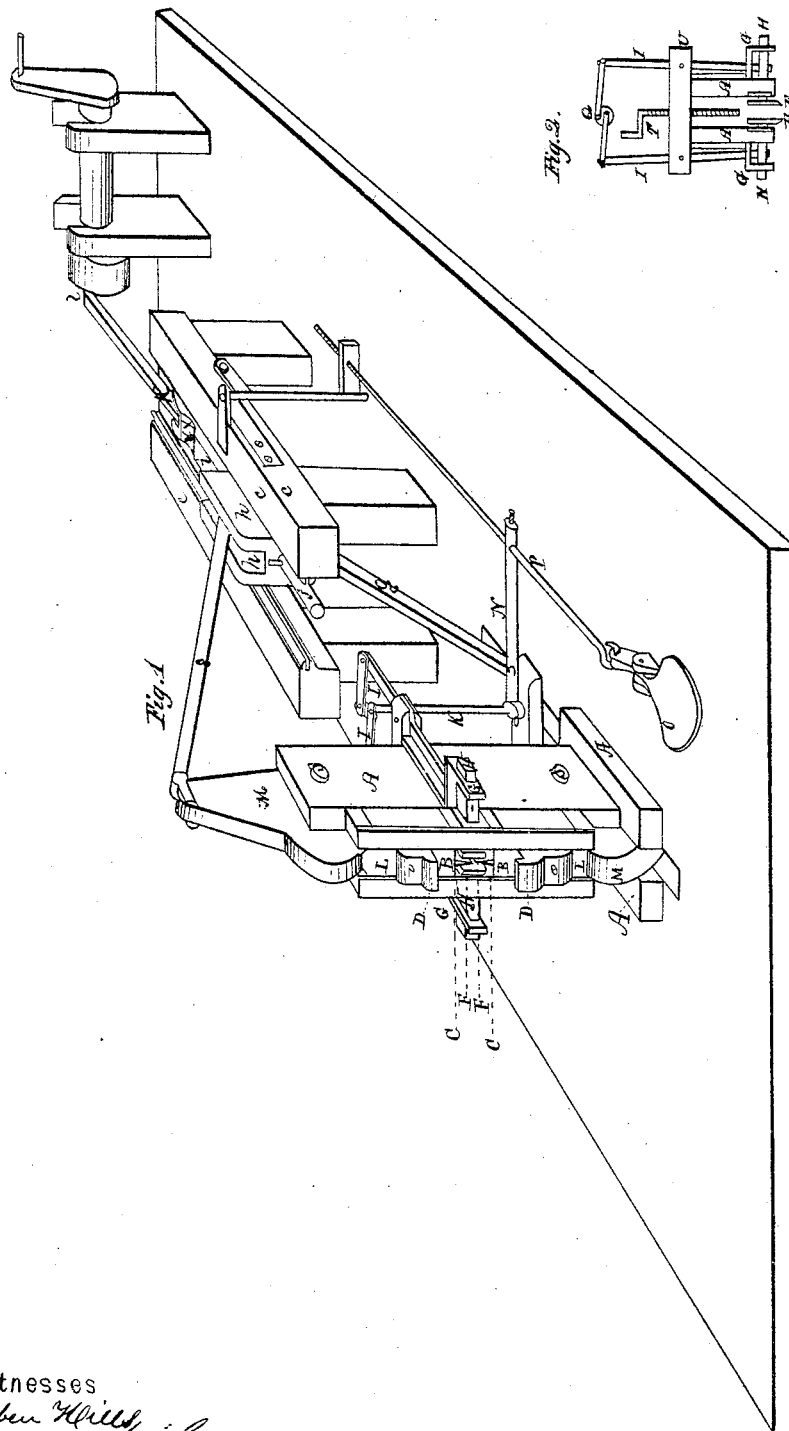


# E. H. Root. Punching Mach.

No 1027.

Patented Dec 10. 1888.



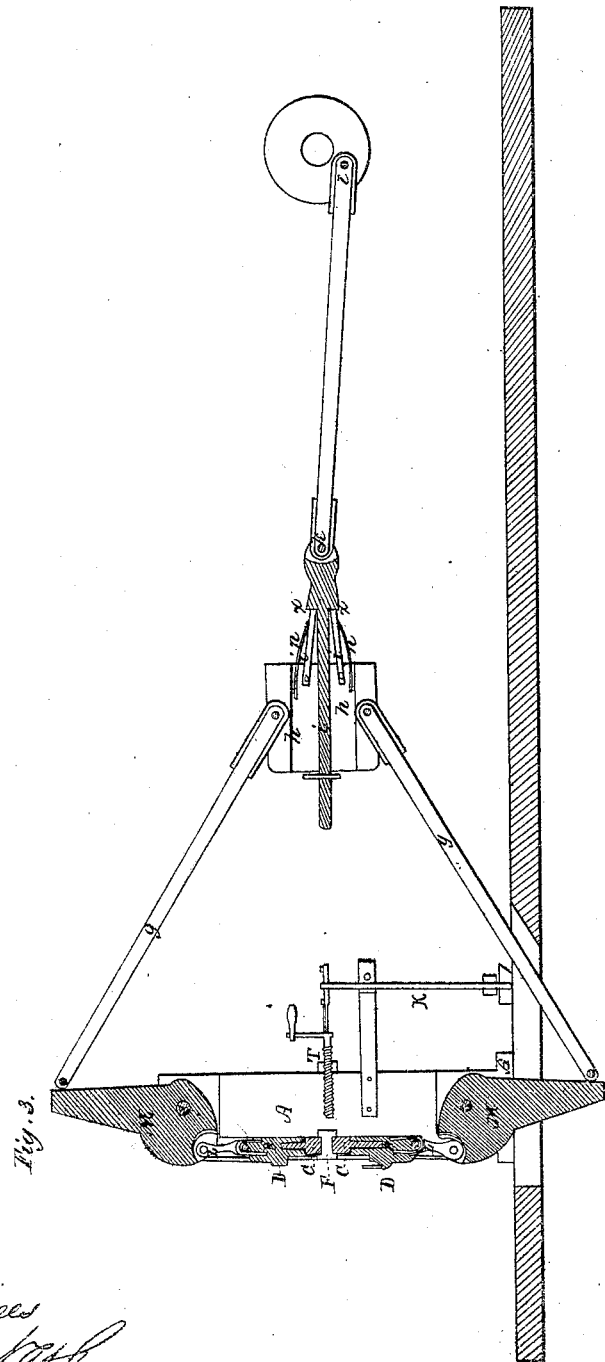
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*E. H. Root.*  
*Punching Mach.*

*No 1027-*

*Patented Dec 10. 1838.*



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# UNITED STATES PATENT OFFICE.

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## METHOD OF PUNCHING OR FORMING THE EYES OF AXES, HATCHETS, &c.

Specification of Letters Patent No. 1,027, dated December 10, 1838.

*To all whom it may concern:*

Be it known that I, ELISHA K. ROOT, of Collinsville, in the town of Canton, county of Hartford, and State of Connecticut, have  
5 invented a new, useful, and Improved Machine for Punching and Forming the Eyes of Axes and Hatchets; and I hereby declare that the following is a full and exact description.

10 The object and use of my machine are to cut, punch and form, in solid iron, at a single heat, and with great despatch and accuracy, the eyes of axes and hatchets of various forms and sizes, as may be wanted,  
15 whereby an important saving is made in the iron, coal and labor, and the ax and hatchet eyes are rendered more perfect and uniform.

To enable others skilled in the art to make and use my invention, whenever the  
20 right shall accrue to them, I will now describe its construction, and the manner of putting the same to use.

For greater clearness I present herewith a model of my machine; also a perspective  
25 view; and sections of the same machine, and of parts thereof.

The printed letters in the following description refer to the drawings which accompany this specification—viz., a perspective  
30 view, and sections.

A stout cast iron or other frame, (A, A,) is made, containing two corresponding sides, set parallel to each other, and wide enough to receive the necessary working parts of  
35 the machine. The frame stands upright, and is strongly secured to a very firm foundation. Perpendicular ways of metal are formed on and attached to the front of each side of the frame, to guide and govern  
40 the movements of the punching slides.

Two punching slides, (B, B,) of cast iron or other metal, are fitted and adjusted to move up and down alternately in the ways of the frame. (I first called them carriages—but now slides to distinguish them  
45 from the carriage which joins and supports the sweeps mentioned herein.) A socket is formed in the upper end of the lower punching slide, and a like socket in the lower end  
50 of the upper punching slide. These sockets receive the shanks of various sized punches or chisels, which can be taken out, put in, and changed at pleasure. The punches are made fast in the sockets by means of keys,  
55 wedges, or screws.

Two punches or chisels, (C C) are se-

cured, one in each slide, with their edges standing opposite to each other, for making the first cuts or punchings in the iron, toward forming the ax or hatchet eye. At the  
60 joining of the shank and blade of the punches shoulders are formed, which press against the ends of the slides, during the operation of punching. I prefer punches or chisels made of cast steel, with rounded and  
65 rather blunt edges and corners, suitable for punching hot iron. The forms and sizes of the punches must, of necessity, vary to correspond with the various forms and sizes of ax and hatchet eyes, which may be wanted. 70  
I make the punch of uniform width from the edge to the shoulder, and about one eighth part narrower than the length of the finished eye is wanted. This proportion between the width of the punch and the length  
75 of the eye when finished, may be varied, but the width of the punch should be something less than the required length of the finished eye. The thickness of the punch increases gradually from its edge back to the shoulder,  
80 so that after being forced into the iron and withdrawn, the opening left in the punched edges of the iron may be as wide as is wanted in the eye of the finished ax or hatchet.

85 Iron stands or projections, (D D) are cast or strongly riveted, one to the front of each side. On the upper end of the stand attached to the lower slide, a groove is formed large enough to admit the end of the eye-pin when forced through the iron in the  
90 progress of forming the eye and a guard plate of iron or other metal is cast on or attached to the front of the same slide and rises above the end of it, to confine the iron  
95 over the groove, and prevent it from slipping when the eye pin is forced through. The eye pins used are of common and well known forms, and of suitable length to place one end under the upper stand, when  
100 the sharpened end is placed in the punched iron, and is then to be forced through the eye by the stands, on starting the machine and putting the slides in motion. The end of the eye pin should be rounded to an edge  
105 similar to the punches, and suitable to enter and follow through the cuts previously made by punches, and the eye pin being forced through the cuts, by the motions of the slides, the eye will thereby be formed  
110 and shaped to the figure of the eye pin.

I use a pair of jaws or clamps, (F F) so

arranged as to fix and hold the iron centrally between the edges of the punches, so that when the punches are forced into the iron they divide it in the middle, and thus  
 5 leave an equal quantity of iron for the cheeks on each side of the eye. The clamps may be made to open and to close upon and hold the iron in various ways, by means of screws or by levers, which may be worked either by  
 10 machinery or by the hand or foot. A good method is shown in the drawings. It consists of levers each playing on an axis near the back of the upright frame. One end of each lever is let into the clamp bars. The  
 15 other ends by means of jointed elbows are attached to crank pins or studs in opposite sides of a horizontal plate, whose center is made fast on the top of the vertical shaft. Another lever is made fast, one end of it  
 20 to, and near the foot of, the shaft, the other end to the horizontal treadle rod which is used to start the punching machine, with a toggle joint between the rod and the shaft. By pressing the step of the treadle with the  
 25 foot, the treadle rod is brought forward, carrying along the toggle and jointed lever, and thereby turning the vertical shaft. By this motion the elbowed ends of the clamp levers are thrown farther apart, causing the  
 30 opposite ends to approach, and carrying the clamps toward each other, until they close upon the iron. Another method of bringing the clamps or jaws near enough together to hold the heated metal, is by a  
 35 right and left handed screw, as mentioned in my caveat which I lodged in the Patent Office in 1837, and still another method is by a hand lever applied to the elbow levers, which any good mechanic can easily adapt  
 40 and apply to close and open the clamps. The clamp bars, (H H) are solid horizontal extensions of, and from the jaws. The clamp bars pass through mortises in their respective sides of the frame, and also  
 45 through guides (G G) standing outside of the frame, to steady and guide the motions of the clamps.

I use a screw gage, (T, Figs. 2, 3) which may be set in and out at pleasure. The  
 50 pieces of iron successively introduced between the punches are met and stopped by the gage, the set of which regulates the length of the iron to be left solid beyond the punches, for the future poll or the bit, according as the one end or the other is placed  
 55 toward the gage, when introducing the piece of iron.

Rests of metal may be attached one to the back and the other to the front of the ways  
 60 within which the slides and punches move. The use of the rests is to place the heated iron on, and support the same horizontally, ready for the clamps to take hold of, preparatory to the punching. Or the iron may

be held in tongs for the clamps to seize with- 65  
 out using rests. The rests are so plain and easy to apply that they are left off the model and drawings, to show more perfectly other parts of the machine.

In working the punching slides forward 70  
 and back, I employ levers or cams each turning on its respective fulcrum or axis, (S S) which passes through and is secured in the opposite sides of the frame. I attach the outward end of each slide to the driving 75  
 arm of its cam or lever, by a strong intermediate link, (L L) of iron, which plays on a movable joint at both ends, one in the slide and the other in the cam. The connecting link works at both ends, after the 80  
 manner of a link in a watch chain. Another method of working the slides toward and from each other is as follows. Stout cogs or teeth are cast on the back side of each of the slides, or in lieu thereof a stout 85  
 rack is screwed or otherwise attached thereto. The slides are made to move the requisite distance, up and down, in the ways of the frame, by means of segments of corresponding cogs or teeth on the periphery of 90  
 wheels or rollers, geared into those at the back of the slides. A sufficient alternating motion, revolving forward and back, may be given to the wheels and rollers in various 95  
 ways, by means of jointed sweeps, connected to a crank or wrist on the end of a fly wheel shaft, similar to those attached to the cams or levers as shown in the drawings. The  
 100 cams, or segments of teeth on wheel or rollers, whichever are used, must be driven by an adequate power, with an alternating motion of such sweep or extent as will suffice to bring the edges of the punches together, when worked toward each other, and  
 105 when the motion is reversed, to separate the punches far enough apart to free the punched iron, and to admit between them pieces of iron of any width required to be punched.

There are several different ways of giving 110  
 an alternating or forward and backward motion to the cams, or toothed segments, (whichever be used) to force the slides and punches together and apart; and operate the  
 115 punching machine, and also of engaging and disengaging the sweeps with the propelling power, which will suggest themselves to any competent mechanic. The method which I use and prefer is the same described in my  
 120 specification of an improvement in the mode of manufacturing axes, which was patented to me March 30, 1836. For greater clearness the same is exhibited in the drawing which accompanies this description, showing the  
 125 manner of connecting the punching machine with the fly wheel shaft, or the propelling power (here represented by an axle or shaft turned by a crank,) also exhibiting

the extent of alternating motion, and the apparatus for starting, reversing and stopping the motion of the slides and punches.

The method and process of punching and forming eyes for axes and hatchets by the machine before described, is as follows: Set the screw gage forward or backward, leaving space enough between the back side of the punches and the end of the gage for any desired weight and depth of poll. Cut from bars of iron of the requisite size, or otherwise prepare, suitable pieces of iron, for whatever kind of axes or hatchets is intended to be made. It is a good general rule to have the thickness of the piece of iron, equal to the thickest part wanted in the axe or hatchet, when finished. In general both the width and length of the piece of iron should be less than the required length and width of the finished axe or hatchet, to allow the iron to be drawn or spread to the required shape and proportions after the eye is punched and formed. Place pieces of iron thus cut from the bar or otherwise prepared, in a hollow fire of suitable dimensions to contain as many pieces as may be necessary to keep the foreman at the machine working to advantage. The pieces are then successively, heated to a white heat and by the person who tends the fire are conveyed, one by one, to the foreman, who takes the same in his tongs and places the piece of heated iron edgewise between the punches with one end against the gage. In this position of the iron the clamps are made to press firmly against the opposite sides of the iron, thereby adjusting and holding the iron, centrally in respect to its thickness, between the edges of the two punches. The machine is then started, which forces the punches toward each other, until they meet, or nearly meet, in the middle of the iron. By the reverse motion of the machine the punches are then withdrawn from the iron, return to their starting points, and stop. The punched iron is then withdrawn from between the punches, and placed edgewise on the stand or projection of the lower punching slide, the cuts in the punched iron being set directly over the eye pin groove in the same. An eye pin of the requisite shape and size with one end properly rounded to a punching edge and corners, is introduced into the upper cut made by the punches. The other end of the eye pin is placed under the stand on the upper punching slide. The machine is then started again and by the motion of the slides and stands the eye pin is forced through the iron in the direction of the cuts left by the previous punching, the lower end or chisel part of the eye pin passing through and below the iron, into the groove formed in the lower stand. By the reverse motion of the machine the slides

again return to their starting point and stop, leaving the eye formed to the shape of the pin, and the pin remaining in the iron. The work is then taken and finished by hand hammers, triphammers, or other appropriate means.

By a slight modification the punching machine is adapted and applied to cutting up bars of iron, either at right angles to their length, or obliquely, as wanted. For this purpose the chisels will be made of any desired width and will be secured in the sockets of the slides with their edges set in such direction as to cut across the bar of iron at any required angle. Rests or ways will be wanted and may be made in various obvious modes to support the iron and be placed at such height as will guide the bar between the chisels when standing apart. The gage which regulates the lengths of iron to be cut off may be placed either in front, or back of the machine, and the bar to be cut up will be introduced on the opposite side to the regulating end of the gage. The machine when thus adapted to cutting up bars of iron is connected with the fly wheel or propelling power, and is started and stopped, in the same manner as in punching ax or hatchet eyes.

The peculiar character of my invention consists in using two punches or chisels at the same time to punch the same ax or hatchet eye instead of one, and in punching by the force of pressure instead of by the force of blows struck by hammers, weights, or the like (although I contemplate the application of blows as practicable but less useful.) The combined action of the two punches compresses the heated iron less, and divides it more exactly and equally into opposite cheeks, than is practicable with one punch, and leaves a better shaped eye to finish on the eye pin.

The force of pressure as applied in the punching machine, so as always to carry the chisels to the desired point for forming the eye, and never beyond that point, whether the resistance be greater or less, I consider better than blows, inasmuch as the degree of resistance varies with the variety of smaller and larger tools to be punched, as well as by the iron being unequally hard or unequally heated, or both.

What I claim as my invention in this machine herein described, is—

1. The arrangement whereby a pair of punches or chisels are made to operate, simultaneously, on the opposite sides of the iron, so as to meet each other in the body thereof; and this I claim whether the punches or chisels be driven by means of the cams, levers and punching slides in the manner described, or in any other way producing the same effect by analogous means.

2. I claim also, in combination with the punches or chisels operated on as aforesaid, the jaws or clamps for holding the iron centrally.

5 3. I likewise claim in combination with such punches or chisels, the stands or projections at the front of the punching slides, constructed and operating substantially as described.

10 Not intending by these claims to confine myself to the precise mode of construction herein set forth, nor to the using of all the parts described, as some of them may be

omitted while the main features of my invention is retained, namely, the punching of 15 the eyes of axes, hatchets, etc., from the two sides of the iron simultaneously, thus dividing the iron more equally, and more uniformly and making better eyes, than can be formed by a single punch or chisel, or by 20 the force of blows applied to punches or chisels in the ordinary way.

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