

E. SAWYER.  
Making Spikes.

2 Sheets—Sheet 1.

No. 7,200.

Patented March 19, 1850.

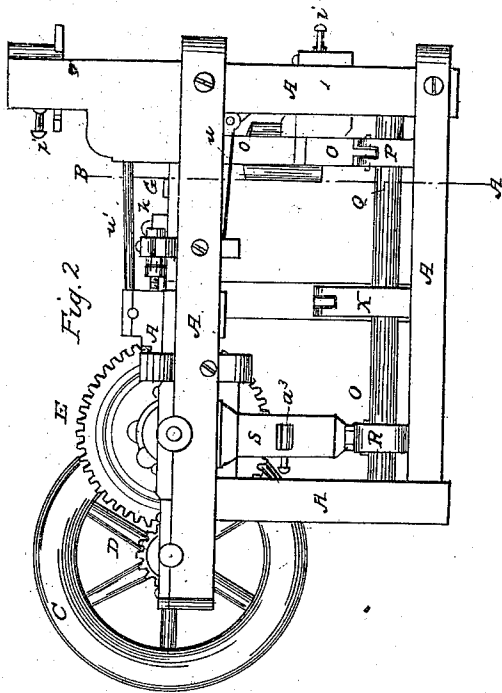


Fig. 2

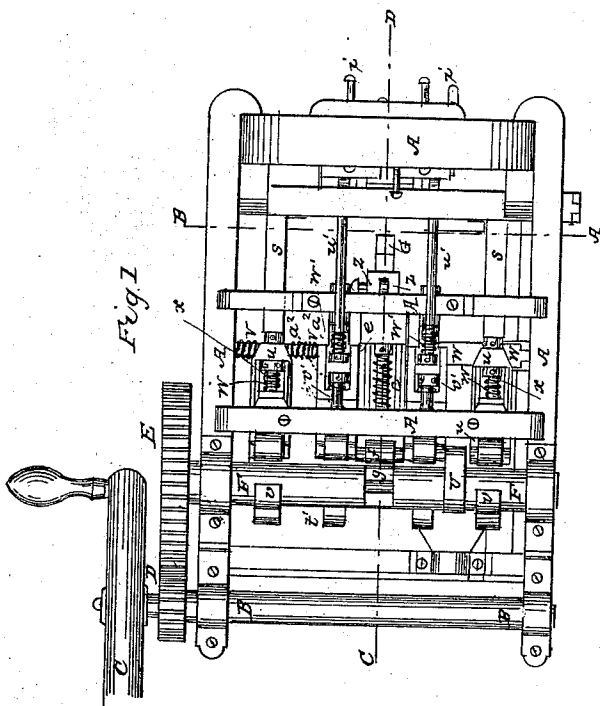
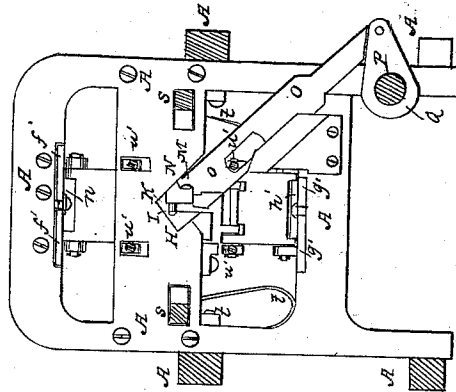


Fig. 1

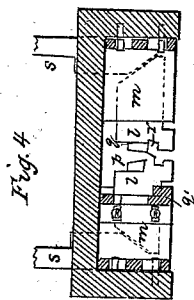


Fig. 4

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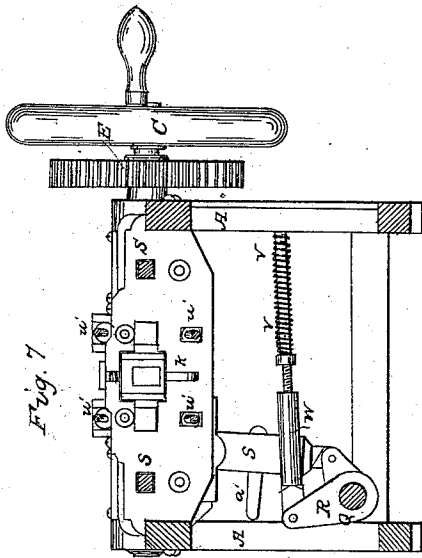


Fig. 7

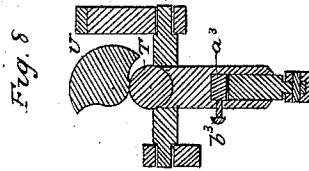


Fig. 8

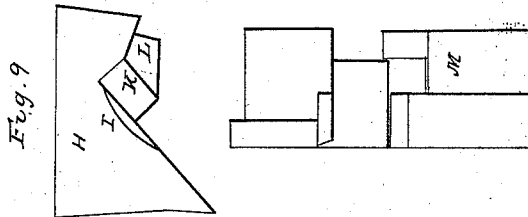


Fig. 9

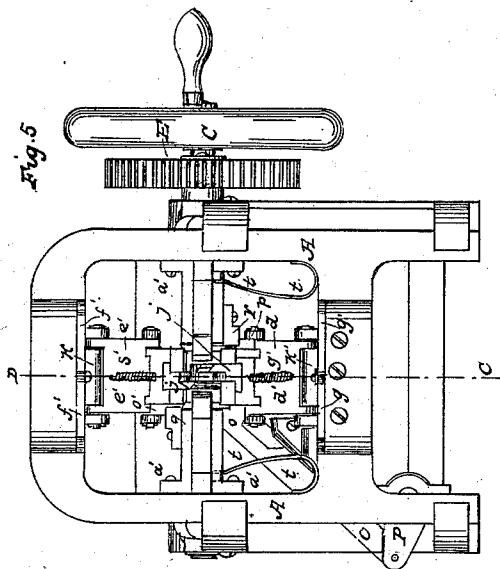


Fig. 5

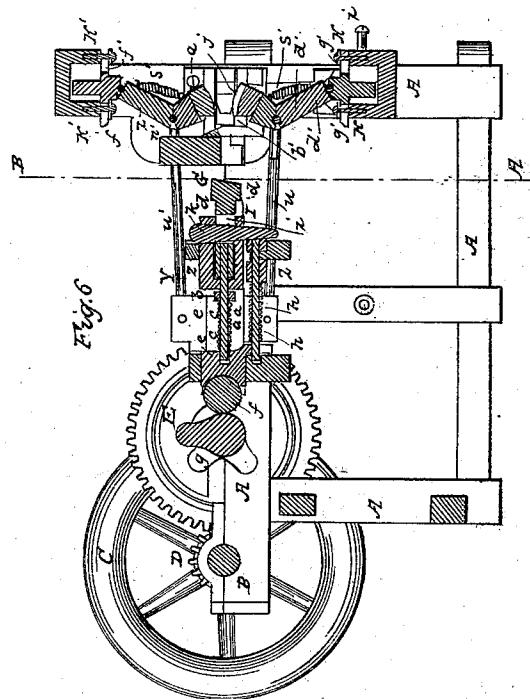


Fig. 6

# UNITED STATES PATENT OFFICE.

EDMUND SAWYER, OF BOSTON, MASSACHUSETTS.

## MOVEMENT OF THE POINTING-DIES IN SPIKE-MACHINES.

Specification of Letters Patent No. 7,200, dated March 19, 1850.

*To all whom it may concern:*

Be it known that I, EDMUND SAWYER, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Machinery for Making Wrought-Iron Spikers, and that the following description, taken in connection with the accompanying drawings, hereinafter referred to, forms a full and exact specification of the same, wherein I have set forth the nature and principles of my said improvements, by which my invention may be distinguished from others of a similar class, together with such parts as I claim and desire to have secured to me by Letters Patent.

The figures of the accompanying plates of drawings represent my improvements. In Plate 1, Figure 1 is a plan of my machine. Fig. 2 is a side elevation. Fig. 3 is a transverse vertical section taken in the plane of the line A B Fig. 1. Fig. 4 is a detailed sectional view which will be explained in the sequel. In Plate 2 Fig. 5 is an end elevation of the machine, Fig. 6 is a central longitudinal vertical section taken in the plane of the line C, D Fig. 1, Plate 1 and Fig. 5 Plate 2, and Fig. 7 is a transverse vertical section taken in the plane of the line A B Fig. 1, Pl. 1 and Fig. 2 Pl. 2, but looking in the opposite direction to that represented in Fig. 3 Pl. 1 and taken in the same plane, and Fig. 8 is a detail sectional view to be hereafter explained.

In the various machines which have heretofore been contrived for the manufacture of wrought iron spikes, it has been necessary to provide for gripping the rod after it is fed into its position, to compress a portion of the inner end of said rod into a proper die to form the head, to cut off the iron to form the length of the spike, and to point the outer end by proper compression.

In all the machines heretofore constructed, it has been exceedingly difficult, and indeed almost impossible, to produce a sufficiently sharp point or one without fans, as they are called or irregular flanges, while it has not been attempted to narrow the point a little on the sides of the spike by compression. By my improvements, the pointing may be effected to any degree of nicety, as the operation is performed by two curved dies which roll over and compress the iron to a sharp edge, said dies being set in the adjacent ends of a set of toggles operated by cams as ex-

plained in the sequel, while the narrowing of the sides of the spike point, before suggested, is performed just before this pointing by dies attached to the cutters which separate the piece of iron to be shaped from the long rod, said cutters and dies moving laterally. In order to narrow the point as above specified and to use the toggle joint for pointing, it is necessary so to arrange the gripping tools or dies, as to have them give a little after the heading is effected, so as to permit the spike to slide back when the pointing dies are working, and this is provided for in my improved machine by a peculiar curvature of the cam which operates said dies as will be explained hereinafter. I have also improved upon the manner of locking said gripping tools on the two parts of which the mold for the underside of the spike head is arranged, while at the same time I have made provision for so altering the header as to vary the thickness of the spike head, or make it more or less flat. And finally, the parts of my machine are so arranged, as to bend laterally a portion of the iron rod sufficient for the head of the next spike, at the same time that the preceding spike has been cut off. The routine of operation for forming a spike in my machine, is first to grip the rod, second to form the heads, third to cut off the length for a spike and at the same time narrow the point a little on the sides, the iron being also then bent for the head of the next spike, and lastly, to roll out the point by means of the toggle joint as specified, the gripping dies relaxing their hold a little to let the spike slip back a trifle, as it necessarily must when the tremendous pressure of the toggles and rolling dies is brought to bear upon the point.

A A A A in the several drawings represents the framework of the machine, which should be strongly fastened together.

B B is the driving shaft, having a fly wheel C on one end to regulate its movements, and a cogged pinion D, the teeth of which engage with those of the cogged wheel E on the cam shaft F F and thereby impart the requisite rotary motion to said shaft. The rod having a little portion bent for the head of the first spike is fed in after being heated in a long furnace, the bent end turning upward at the front of the machine, until it comes against the front face of the adjustable heading die G, hereinafter again re-

ferred to. After being thus fed in, the next operation to be accomplished, is to grip the rod just within the bend for the head, by the gripping dies.

5 One of the gripping dies is stationary, as denoted at H, being set firmly in a cross brace of the frame work A A A A, as shown in Fig. 3, Pl. 1, and having that portion of the mold which makes one side flange, and  
10 the underside of the head formed in it, as shown in said figure at I and K. It also has a proper shoulder formed on it at L, as shown in detail Fig. 9, Pl. 2, against which the rear face of the movable gripping die  
15 M fits or is locked, which prevents said die M from giving when the header is brought to bear, to form the head of the spike. The movable die has the mold for making the other side flange as shown at N, and by being  
20 arranged with the stationary die so as not to give or yield as above suggested, no such redundant or irregular flange or projection is formed on the head of the spike, as is now formed in the machines heretofore  
25 contrived. This movable gripping die is set in the end of a diagonal sliding arm O O moved by a crank P on the longitudinal shaft Q Q Figs. 2 and 3 Pl. 1 and Figs.  
30 5 and 7 Pl. 2. Said shaft has a reciprocating rotary motion imparted to it, by means of the crank arm A, at one end of the vertical arm S, which has a friction  
35 roller T in its top, on which roller the cam U on the cam shaft F F operates as shown in detail in Fig. 8, Pl. 2; these parts operating  
40 together, move the movable gripping die up against the stationary one, and the spiral spring V V pressing against the transverse arm W W and central crank arm X  
45 of the shaft Q Q, move it back or away from said stationary die (when the cam U is not bearing on the roller T) as will be apparent from inspection of Fig. 5, Pl. 2. The movable  
50 gripping die may be made to grip the rod more or less firmly by means of the wedging key A; which operates to lengthen or shorten the vertical arm S as shown in  
55 Figs. 7 and 8 Pl. 2, the key being confined by the set screw 7, in any position. That portion of the face of the cam U which  
60 moves the movable gripping die up against the stationary one, is circular as shown in Fig. 8, but in order to permit the spike to slide back a little, as is herein above sug-  
65 gested to be necessary while the narrowing and pointing is going on, the curve of the rest of the face of said cam is flattened a little, which allows the movable gripping die to fall back a little as desired.

The adjustable heading die G, before referred to, as operating as a gage in feeding in the rod, is fitted on the end of a cylindrical arm or shank Y Y, which passes through a proper mortise in the compressing hammer Z Z, its rear end being secured

to a screw *a a* Fig. 6 Pl. 2. A nut *b*, working on this screw, bears on one side against the rear face of the hammer, and by being turned in one direction or the other moves the die G out or in as the case may be, and regulates the portion or length of iron to be used for the head of the spike, a spiral spring *c c* arranged around the screw *a a* keeping the heading die out in proper position for this purpose. The heading die G has a shoulder or bearing face at *d d* Fig. 6 Pl. 2 where it is attached to the shank Y Y, against which the front face of the compressing hammer may bear when brought up for forming the head of the spike. This compressing hammer is attached to a sliding frame *e e*, which moves forward and back in proper guiding mortises in the frame work A A A &c., and said frame has at its rear end a friction roller *f*, against which, the cam *g* bears as the cam shaft  
70 revolves, and forces the said hammer against the header, which compresses the bent end of the iron into the molds of the gripping dies and gives the requisite shape to the head of the spike.

When the cam *g* does not press upon the sliding frame *e e*, it is retracted by the spiral spring *c c* before referred to, and that denoted at *h h*, the arrangement and operation of which will be understood by inspection of Fig. 6 Pl. 2.

The head may be made more or less flat or thin, by regulating the distance the compressing hammer moves before it presses against the header. This is effected by forming an elongated longitudinal vertical slot *i* in the shank Y Y of the header, and also a shorter one in the compressing hammer, and inserting through the two, as shown in Fig. 6, the tapering or wedge shaped key *k*, by raising or lowering which key the compressing hammer will traverse a shorter or longer distance before the front edge of said key is brought against the front edge of the slot *i* and moves the header.

The spike being headed, the next consecutive operations in my machine, are, to cut off the requisite length of iron, to compress the point a little on the sides, and to bend a portion of the rod for the head of the succeeding spike. These several operations are all accomplished, by dies set on the same frames, and at the same time, and which work or slide toward each other laterally. The sliding frames to which these dies are attached, are represented in the detail sectional view Fig. 4 Pl. 1 at *l l*, and they move forward and back, as shown by dotted lines in said Fig. 4, in proper mortises in the adjustable auxiliary framework *m m m* Fig. 4 Pl. 1.

The edges of the cutting dies are shown at *n o* in said Fig. 4, the converging faces of the dies *p, q* narrow the point as desired,

and the bent end of the rod for the formation of the head of the next spike is formed in the space *r* by the pressing of the curved projection on the rear face of the cutting die *n* in a manner which will be readily understood by inspection of the aforesaid Fig. 4. These frames have their outer sides made beveled, and these beveled sides come in contact with the beveled faces of the sliding longitudinal beams *s s, s s* Figs. 1 and 4 Pl. 1., and when said beams are moved toward the front of the machine, the sliding frames *ll* will approach each other laterally, and when said beams are drawn backward, the sliding frames will be made to recede from each other by the bent springs *t t, t t* arranged as shown in Fig. 5 Pl. 2. The beams *s s* are moved forward and back by being connected to the roller frames *u, u* on which the cams *v, v*, operate as shown in Fig. 1, said beams and roller frames moving in proper guiding mortises in the cross braces of the framework *A A*, &c., and being drawn backward by the spiral springs *w w*, arranged in the roller frames as shown in Fig. 1 Pl. 1, and as before explained and shown for the sliding frame of the compressing hammer. These beams *s s, s s* may be lengthened or shortened for spikes of different lengths by being connected to the roller frames *u u* by the screws *x x*, and by having two adjusting nuts on said screws, on opposite sides of the front end of said frame, as shown in Fig. 1, Pl. 1. At the same time that these beams are extended or shortened as described, for different lengths of spikes, the auxiliary framework *m m m* should be moved or adjusted (carrying with it the sliding frames *l l*) by means of the set screws and slots, shown at *a' a'* &c. in Figs. 5 and 6, Pl. 2.

It now remains to describe my mechanical mode of pointing the spike after it is cut off as aforesaid. The dies for this operation have curved faces, which roll over the iron between them and have each a flange *j, j* to prevent the lateral spreading of the point, they are represented at *b'* and *c'* Fig. 6 Pl. 2, and are set in the upper and lower end respectively of a lower and upper toggle joint *d' d' d'—e' e' e'* Figs. 5 and 6. One end of each of these toggle joints, is connected to an adjustable plate *f' f'—g' g'* arranged so as to be moved forward and back on that portion of the framework *A A* &c. to which they are attached, by means of the series of adjusting and set screws, denoted respectively at *h' h'* and *i' i'* and *k' k' l' l'* in Figs. 1 and 2, Pl. 1, and Figs. 5 and 6, Pl. 2. The central or knuckle joint of these toggles, is on the rods *m' m'* and *n' n'* respectively, and their adjacent ends as

above suggested, contain the pointing dies, and when their central joints are pressed toward the front of the machine where the iron is fed in, the cam faces or projections *o' p'*, on the said adjacent ends, abut against the inner faces of the guiding blocks *q' r'* (set on the auxiliary framework *m m*) and cause the pointing dies to operate as above suggested. When the pressure on the two toggles is relieved, they are drawn back for another operation into their proper angular position, by means of the spiral springs *s', s'*, connected to the two front halves of each toggle and operating as clearly shown in Figs. 5 and 6 Pl. 2. The toggles are operated by the cams *t' u'*, on the cam shaft *F F*, which move the sliding frames *v', v'*, from which proceed the four connecting arms *u', u', u', u'*, which are attached to each side of the central joint of each toggle, as shown in the several figures. When the cams *t', u'* do not press upon the sliding frames they are drawn backward by the spiral springs, shown at *w' w'* &c and operating as will be readily understood without further explanation. The arms *u' u'* &c. may be lengthened or shortened, for different lengths of spikes, by having screws formed on their ends which are connected to the sliding frame *v' v'*, which screws pass through the tongues or plates *x', x'* of said frames, and have adjusting nuts *a' a'* &c. on each side of said plates, which operate in a manner well understood to secure the desired result.

It will be evident that the mold which is above described for a brad shaped head in the gripping dies may be altered so as to suit different shapes for heads of spikes. It will also be apparent that the narrowing dies may be made with flanges instead of the pointing ones which may be then be made without, and there are various modifications which may be made in the details of construction of my machine, without varying the essential characteristics of the novel features of the same.

Having thus described my improvements, I shall state my claims as follows:

What I claim as my invention and desire to have secured to me by Letters Patent is,

Operating the curved dies for pointing a spike, by setting them in the adjacent ends of two sets of toggles, arranged with the cam projections *o' p'* and guiding blocks *q' r'* and the whole operating substantially as herein above described.

EDMUND SAWYER.

Witnesses:

EZRA LINCOLN, Jr.,  
JOSEPH GAVETT.