2 Sheets—Sheet 1.

A. WHITTEMORE.

Horse Shoe Nail Machine.

No. 58,520. Patented Oct. 2, 1866.

Fig. 3.

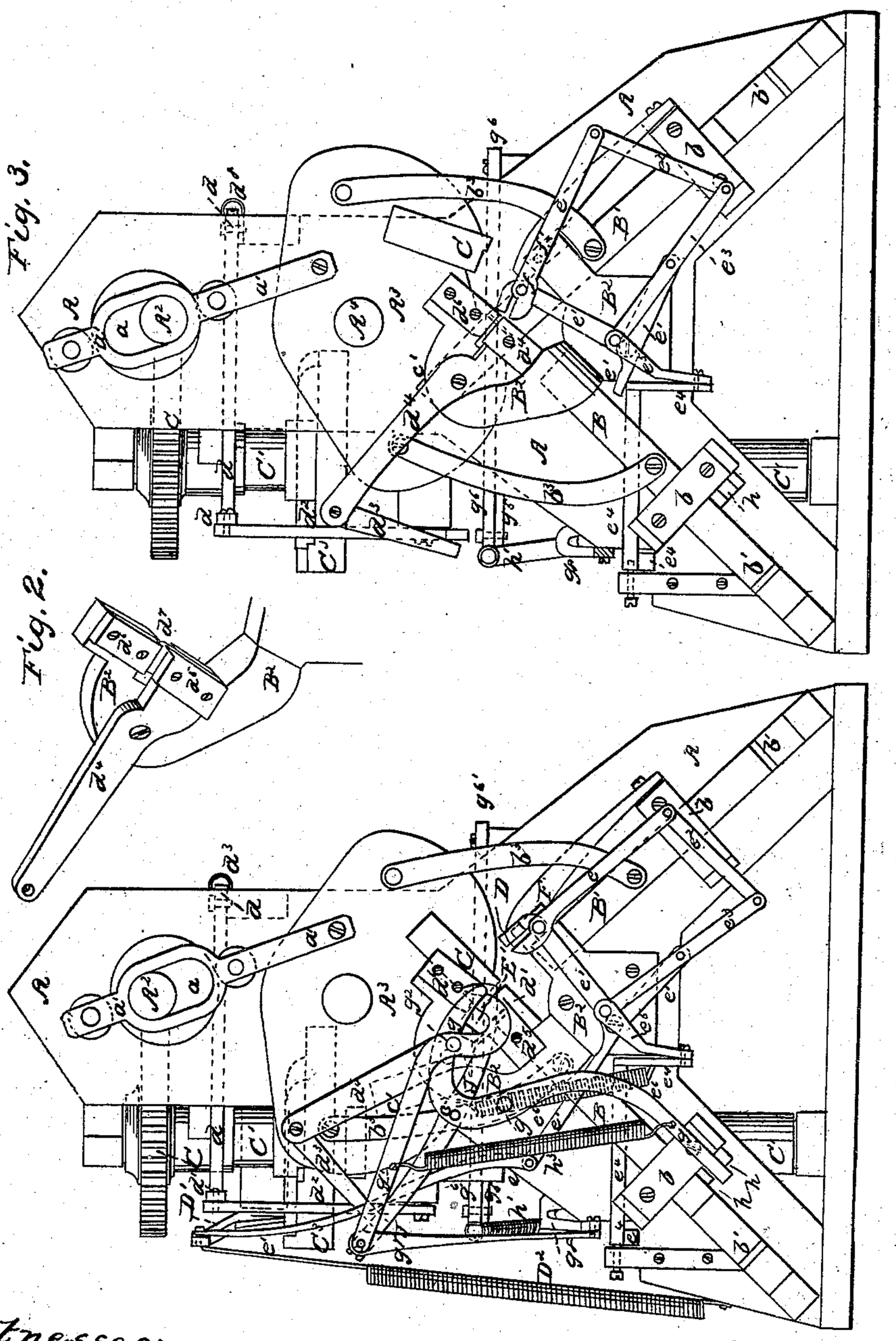

Fig. 2.

Fig. 1.

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2 Sheets—Sheet 2.

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Fig. 6.

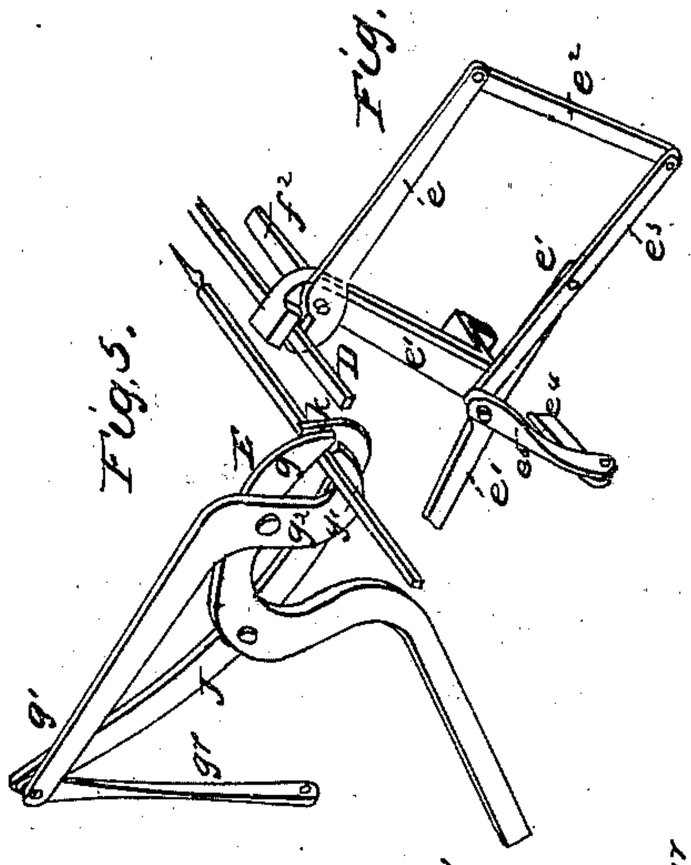


Fig. 5.

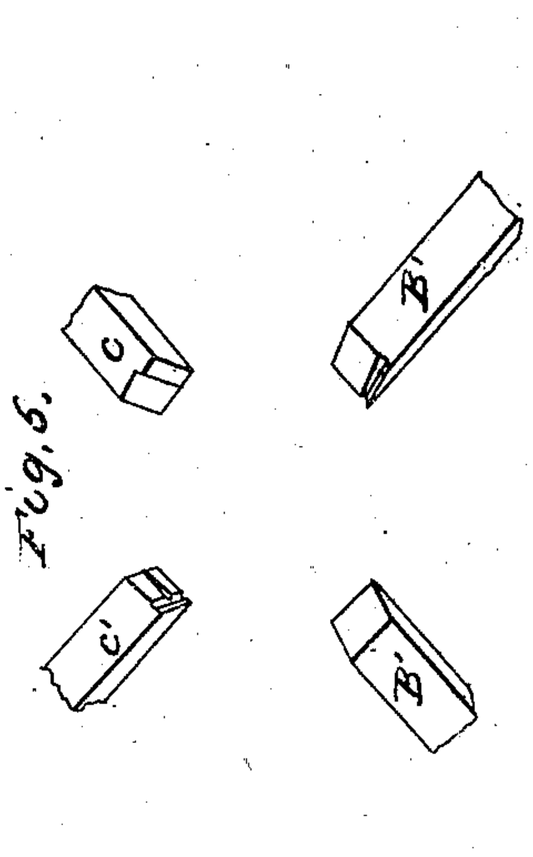
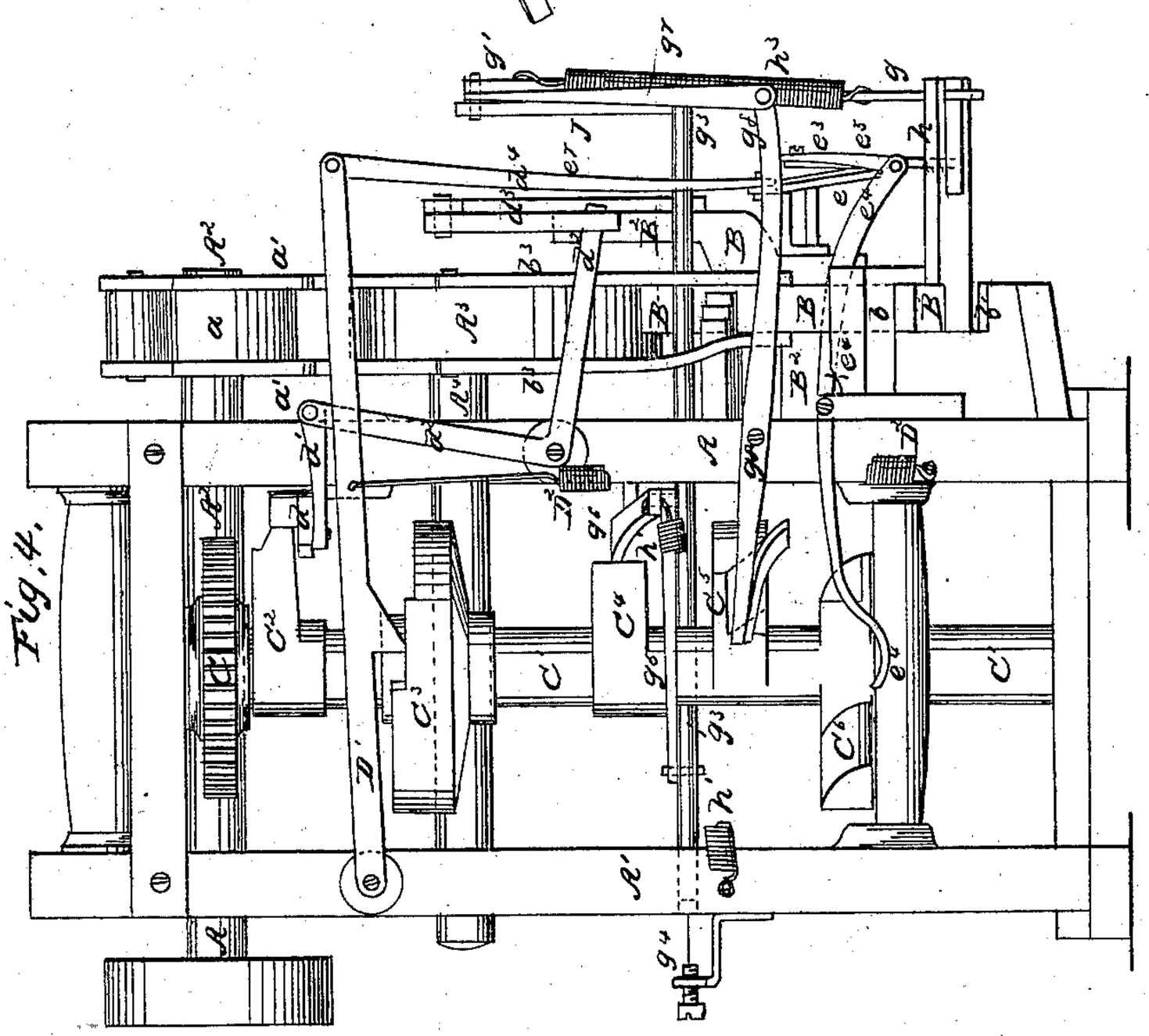


Fig. 4.



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UNITED STATES PATENT OFFICE.

AMOS WHITTEMORE, OF CAMBRIDGEPORT, MASSACHUSETTS, ASSIGNOR TO THE CAMBRIDGE HORSE NAIL COMPANY.

IMPROVEMENT IN MACHINERY FOR MAKING HORSESHOE-NAILS.

Specification forming part of Letters Patent No. **58,520**, dated October 2, 1866.

To all whom it may concern:

Be it known that I, AMOS WHITTEMORE, of Cambridgeport, in the county of Middlesex and State of Massachusetts, have invented a new Machine for Making Horseshoe-Nails; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1, Sheet 1, is an elevation of the front of the machine, showing the feeding-nippers in a position for receiving the nail-rod. Fig. 2 is a perspective view of the shears for cutting off the finished nails when drawn out by the discharging-nippers. Fig. 3 is a front elevation of the machine, with the discharging or retracting nippers detached, and showing the feeding-nippers in a position for feeding the nail-rod to its work after the operation of the shears upon a finished nail on another rod. Fig. 4, Sheet 2, is an elevation of one end of the machine. Fig. 5 is a perspective view of the retracting-nippers holding a nail-rod with a nail formed on it. Fig. 6 is a perspective view of the feeding-nippers holding a nail-rod to be fed up to the hammers. Figs. 7 show the ends of the two hammers and their respective dies.

Similar letters of reference indicate corresponding parts in the several figures.

This invention relates to certain novel improvements on machinery which is designed for producing forged horseshoe-nails.

The main object of my invention is to dispense with the use of vibrating hammers in machinery for forging horse-nails, as such hammers soon crystallize and break, on account of the shocks to which they are subjected being received transversely to the length of the grain of their metal rods, and to employ, instead thereof, hammers which reciprocate in right lines, and which are so arranged as to strike alternately upon the ends of dies that are applied to an oscillating working-beam, the ends of which hammers and dies are so formed as to draw out a portion of the nail-rod and produce therefrom a horseshoe-nail, as will be hereinafter described.

Another object of my invention is to reciprocate the hammers by means of a working-beam, which carries the dies against which the hammers strike, and to so arrange said hammers that the weight of one shall counteract the weight of the other, thus admitting of a regular movement being communicated to the working-beam, and preventing injurious concussions, as will be hereinafter described.

Another object of my invention is to provide for allowing the upper or striking ends of the rectilinear reciprocating hammers a slight elastic yielding movement during their rising strokes, for the purpose of preventing the concussions from causing said hammers to bind in their guides, or to break off such guides, as will be hereinafter described.

Another object of my invention is to employ two pairs of nippers which shall operate automatically, one pair of which feeds the nail-rod up to a position for being acted upon by the hammers, and delivers the rod between the jaws of the other pair of nippers, which gripe and sustain this rod during the formation of the nail, and then retracts the rod to a position where the nail will be cut off by means of shears, after which the nippers release the rod, to be carried to the furnace by the attendant, as will be hereinafter described.

Another object of my invention is to provide for supporting the nail-head during the operation of the shears in severing the nail from the nail-rod, so that a square cut shall be made instead of an oblique cut, as will be hereinafter described.

To enable others skilled in the art to understand my invention, I will describe its construction and operation.

In the accompanying drawings, A A′ represent two upright plates, which are secured together at suitable distance apart by strong horizontal brace-rods, so as to form a substantial bearing for supporting the several parts which I am about to describe. Near the upper end of this frame is a horizontal driving-shaft, A^2, carrying on one end a belt-wheel, and on the opposite or front end an eccentric, *a*. This eccentric is intended for oscillating a working-beam, A^3, in the lower side of which the dies are secured, for which purpose I employ two yoked pitman-rods *a′ a′*, which are pivoted to the beam A^3 on opposite sides of it, and extend up on each side of the said eccentric, so that the shaft A^2 passes through the yokes and forms guides for these rods, as shown in the drawings.

Above and below the eccentric *a* are anti-friction rollers, which are applied upon transverse rods passing through the pitman-rods *a' a'*, which rollers are acted upon by the eccentric *a*, so as to communicate to the working-beam A^3 a very rapid but regular motion.

Instead of employing an eccentric, *a*, to oscillate the working-beam, a small engine might be employed in its stead, so applied as to communicate the power direct. I prefer, however, to use the eccentric with its yoked pitman rod or rods for this purpose, as a much steadier movement can be obtained than by the use of a crank, and by having the pitman-rods yoked and applied to the driving-shaft, as described, this shaft forms a guide for their reciprocating movements.

The working-beam A^3 is made of the form shown in the drawings, for the purpose of obtaining a considerable body of metal, which will afford steadiness of motion, and prevent the jars and concussions which are caused by the hammers striking this beam from being communicated to other parts of the machine to any injurious extent. This working-beam is arranged directly beneath the eccentric *a*, and in the same vertical plane therewith, and it is keyed on the end of a horizontal shaft, A^4, which has its bearings in the two vertical plates A A' of the main frame.

Beneath the beam A^3, and in the same vertical plane, are two straight bars or hammers, B B', which are arranged to reciprocate in right lines and in inclined planes, as shown in Fig. 3. These hammers are held by guides *b b* near their lower ends, and abut against elastic blocks *b' b'* at the termination of their descending strokes, which blocks are applied to abutments that are formed on the guides *b b*. The upper portions of said hammers B B' are supported by means of a Y-shaped portion, B^2, that is formed on the plate A directly below the shaft A^4, and these hammers are held down in place upon said support by means of strong springs b^2, one of which is shown in Fig. 4, which springs are designed to allow the upper ends of the hammers to spring slightly upward when or just before they strike their respective dies *c c'*, thus preventing the machine from being broken or deranged. I have found that upper guides corresponding to the lower guides, *b b*, will not answer a good purpose, as the hammers have a slight upward thrust when they strike, which breaks off the guides; but by having elastic guides b^2 placed on top of these hammers they will yield and prevent any injurious shocks. Such spring-guides may be made of several steel plates or leaves secured firmly into the frame-plate A, and supported, near their outer ends, upon the wings of the fixed block B^2.

Each hammer receives its motion from the working-beam A^3 by means of two curved pitman-rods, b^3 b^3, so that as each arm of this beam rises it carries with it its respective hammer with a quick motion. These hammers B B' are so arranged with reference to their respective dies *c c'* that the latter will be brought in a position to be struck by the ends of the former at the termination of their upward strokes. I desire to give the hammers very quick motions and to have their connecting-rod pivots play sufficiently loose to effect this object. The hammers will thus be allowed to rebound from the nail-rod a short distance immediately succeeding each blow.

The dies *c c'*, between which and the ends of the hammers the nails are forged, are suitably secured into recesses which are formed in the working-beam A^3, so that they can be removed at pleasure. The ends of these dies which are exposed are shaped somewhat as I have shown in Fig. 7, for serving, in conjunction with the ends of the hammers, to produce a nail of the proper shape. The end of the hammer B and the end of the opposite die *c* operate to produce the flat sides of the nails, and the ends of the hammer B' and die *c'* produce the shape required for the edges and heads of the nails.

Upon the driving-shaft A^2, between the frame-plates A A', a worm-screw is keyed, which engages with the teeth of a horizontal spur-wheel, C, which is keyed on the upper end of a vertical cam-carrying shaft, C', that is supported by upper and lower bearings, as shown in Fig. 4. This shaft C' carries five cams, C^2 C^3 C^4 C^5 C^6, which are intended for giving the required movements of two pairs of nippers, and also to a pair of shears. The uppermost cam, C^2, operates to close the shears through the medium of a spring-lever, *d*, connecting-rod *d'*, an angular lever, d^2, and a connecting-rod, d^3, which latter is pivoted to the upper end of the shear-lever d^4. This shear-lever d^4 is pivoted to a curved projection of the portion B^2, and has a shear-blade, d^5, secured to it, which operates, in conjunction with the fixed blade d^6, on the portion B^2, to cut off the nail from its rod. The shear-lever d^4 extends along just behind the cutting-edge of the blade d^5, and serves as a support for the nail-head during the operation of severing the nail from the rod.

By reference to Fig. 2, it will be seen that there is a short hook or spur, d^7, formed on one corner of the movable shear-blade d^5, which is intended for preventing the nail-rod from slipping during the operation of cutting off a nail.

The shears should be arranged in a line which coincides with the point where the nail is formed, between the hammers and dies, as shown in Fig. 3, and at such a distance in front of the beam A^3 as to allow the nails to drop free from the machine when cut off.

The shears are operated by the cam C^2 once in every revolution of the shaft C', and when the shear-arm is released from said cam a spring, d^8, opens the shears again.

The circular cam C^3, which is located below cam C^2 on the shaft C', is intended to assist the cam C^6, which is near the lower end of the shaft C', to operate the feeding-nippers D,

of metal which is forced out from the back side of the dies and hammers, or point of the nail, in consequence of varying thicknesses of nail-rods. Should such be the case, I shall employ a pair of shears for cutting off such metal.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. Oscillating dies operating in conjunction with hammers which move back and forth in a right line, are arranged in inclined positions, and operate substantially as described.

2. The combination of two hammers, B B′, with the oscillating die head or beam A^3 and connecting-rods b^3 b^3, arranged to operate substantially as described.

3. The combination of the die-beam A^3, inclined hammers B B′, eccentric *a*, and yoked pitman-rods *a′*, the latter being guided by the driving-shaft A^2, substantially as described.

4. The application of spring or yielding guides b^2 to the reciprocating hammers, substantially as described.

5. The rocking feed-nippers D, constructed and operated so as to gripe the nail-rod, and then deliver this rod between the nippers E, in a position to be acted upon by the hammers and dies, substantially as described.

6. The application of a support and guide, f^2, to the nippers D, for guiding the end of the nail-rod up to the gage F, substantially as described.

7. The adjustable gage F, in combination with the rocking feed-nippers D, substantially as described.

8. The pair of shears d^5 d^5, constructed and operated substantially as described, and arranged in front of the point where the nails are forged, and in such position as to allow of the feeding of the nail-rod to a proper position by the nippers D, substantially as described.

9. Communicating motion to the shears, and also to the feeding-nippers, from the driving-shaft A^2 through a cam-shaft, C′, by means substantially as described.

10. The employment of the reciprocating retracting-nippers E, so arranged and operated as to take the nail-rod from the feeding-nippers, hold it until the nail is finished, and then retract the nail from the hammers and dies, substantially as described.

11. The combination of the hooked rod or lever *j* with the nippers E, substantially as and for the purposes stated.

12. Effecting the opening and closing of the nipper-jaws *g g′* and hook *k* substantially as described.

13. Connecting the nippers E to a rectilinear reciprocating rod, g^3, which passes transversely through the frame-plates A A′, and is operated by means of a cam on the cam-shaft C′ and a spring, substantially as described.

14. The adjusting-screw g^4, or its equivalent, applied to the rod g^3, for regulating the length of its strokes, substantially as described.

15. The combination of the hook or stop d^7 on the lower shear-blade, d^5, with the retracting nippers E, substantially as and for the purposes described.

16. The combination of rocking feed-nippers D, the retracting-nippers E, and the shears with devices for forging horseshoe-nails, said parts being arranged substantially as described.

AMOS WHITTEMORE.

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which are arranged on the left of the shears, as shown in Figs. 1 and 3.

The two levers e e' of the nippers are pivoted together nearly at right angles to each other to form the griping-jaws. The rear end of the jaw-lever e is pivoted to a short connecting-rod, e^2, which is again pivoted to the rear end of a rod, e^3, that is pivoted to a right-angular lever, e^4, by means of a link, e^5. The lever e^4 is pivoted to projections from the frame-plate A, and its inner end is curved, as shown in Fig. 4, so as to be lifted by the cam C^6 once in every revolution of this cam. The spring e^6 depresses the inner end of lever e^4, and closes the nipper-jaws when released from cam C^6. The connecting-rod e^3 is pivoted at an intermediate point between its ends to the short arm of the lever e', so that by the vibration of the lever e^4 the nipper-jaws will be opened and closed. The lower end of the lever e' is suitably pivoted to the block B^2, so that it will be allowed to vibrate about this pivot; and the right-hand end of this lever e' is connected by a rod, e^7, to a transverse arm, D′, which is pivoted at its rear end to a projection of the frame-plate A′, and which is held down upon the upper face of the cam C^3 by means of a spring, D^2. This cam C^3 is constructed with two elevated or stepped faces upon it, upon which the toe of the arm D′ rests. By the revolution of the cam C^3 the arm D′ is elevated upon the highest plane thereof, which moves the nippers D back to a position (shown in Fig. 1) for receiving between their jaws the nail-rod; then, when the toe of arm D′ drops upon the second elevation or step of the cam C^3, the nippers are moved up to the position shown in Fig. 3, where they are arrested until the shears open, after which the toe of lever D′ drops down upon the lowest surface of the cam C^3, and brings the nipper-jaws in a position to allow the hammers to act upon the end of the nail-rod. The nippers hold the nail-rod in the latter position until the second pair of nippers, E, move up and gripe it, when cam C^6 opens the jaws of said nippers D, when they retire and leave the rod firmly griped by nippers E.

When the nippers D are in a position for receiving the nail-rod from the hands of the attendant, as shown in Fig. 1, they are directly opposite the upper end of a gage, F, against which the inner end of the nail-rod is caused to abut until it is griped by the nippers. This gage F is pivoted at its lower end to the left-hand guide b, and secured at its upper end by means of an adjusting screw, f, and an adjustable abutting-screw, f'. In conjunction with this gage I employ a support, f^2, and, if desirable, two curved guides, for keeping the nail-rod in place while it is moved up to the work. By adjusting the upper end of the gage F the amount of metal required to enter the space between the hammers and dies to form a nail can be regulated.

The retracting-nippers E consist of two curved griping jaws or levers, g g', which are pivoted together at g^2, and arranged in front of the shears, so as to move in a right line up to and from the same. The upper jaw, g, is curved, as shown in Figs. 1 and 5, and secured rigidly at g^3 to a horizontal transverse rod, g^3, which passes freely through the two frame-plates A A′, and at certain times abuts against the end of an adjusting-screw, g^4, which is tapped through a bracket on the back side of the plate A′, as shown in Fig. 4. The lower end of the arm of jaw g passes through and is guided by the forked arm h.

To the rod g^3, and near its rear end, a curved rod, g^5, is pivoted, which proceeds forward and is pivoted at its front end to a vibrating arm, g^6. This arm g^6 is acted upon by the cam C^4 on shaft C′ once in every revolution of the latter, and the rod g^3, with its shears E, is moved outward the proper distance to bring the finished nail in such a position between the shears as to allow the latter to cut off the nail from its rod. As the cam C^4 moves around, the spring h' will move the rod g^3, with its shears, up to a position for again griping and drawing out the nail-rod.

The adjusting-screw g^4, against which the inner end of the rod g^3 abuts when the cam C^4 releases its arm g^6, is intended for regulating the length of strokes of the shears E, so that the finished nail can be drawn out to a proper position for being severed from its rod by the shears.

The lower jaw, g', is curved, as shown in Figs. 1 and 5, and its arm is pivoted to the upper end of a connecting-rod, g^7, the lower end of which is pivoted to an arm, g^8, which is acted upon by the cam C^5 on shaft C′. The arm or lever g^8 is pivoted to the frame-plate A so as to vibrate in a vertical plane, and its inner end is bent, so as to be depressed by the cam C^5 once in every revolution of the shaft C′.

The spring h^3 is used for closing the jaws g g' when the cam C′ ceases to operate upon the lever g^8.

In conjunction with the griping-nippers E, I employ a lever, j, having a hook formed on one end, as shown at k, Figs. 1 and 5, for the purpose of bringing the nail-rod in a proper position between the two jaws g g', as these jaws take the nail-rod from the feeding-nippers. The lever j is pivoted to the upper jaw at i, and its outer end is forked, so as to play upon the pin which pivots the lower jaw to its connecting-rod.

In the operation of making horseshoe-nails with the machine above described, one person is required to attend the machine for heating the rods, presenting them between the feeding-nippers, and removing them from the retracting-nippers. A furnace for heating the rods should be arranged near the machine, so that as fast as the rods are released from the retracting-nippers E they can be removed and heated, and then introduced between the jaws of the feeding-nippers, when the latter are in the position shown in Fig. 1.

In the operation of forging the nails it may be found necessary to cut off the superfluity