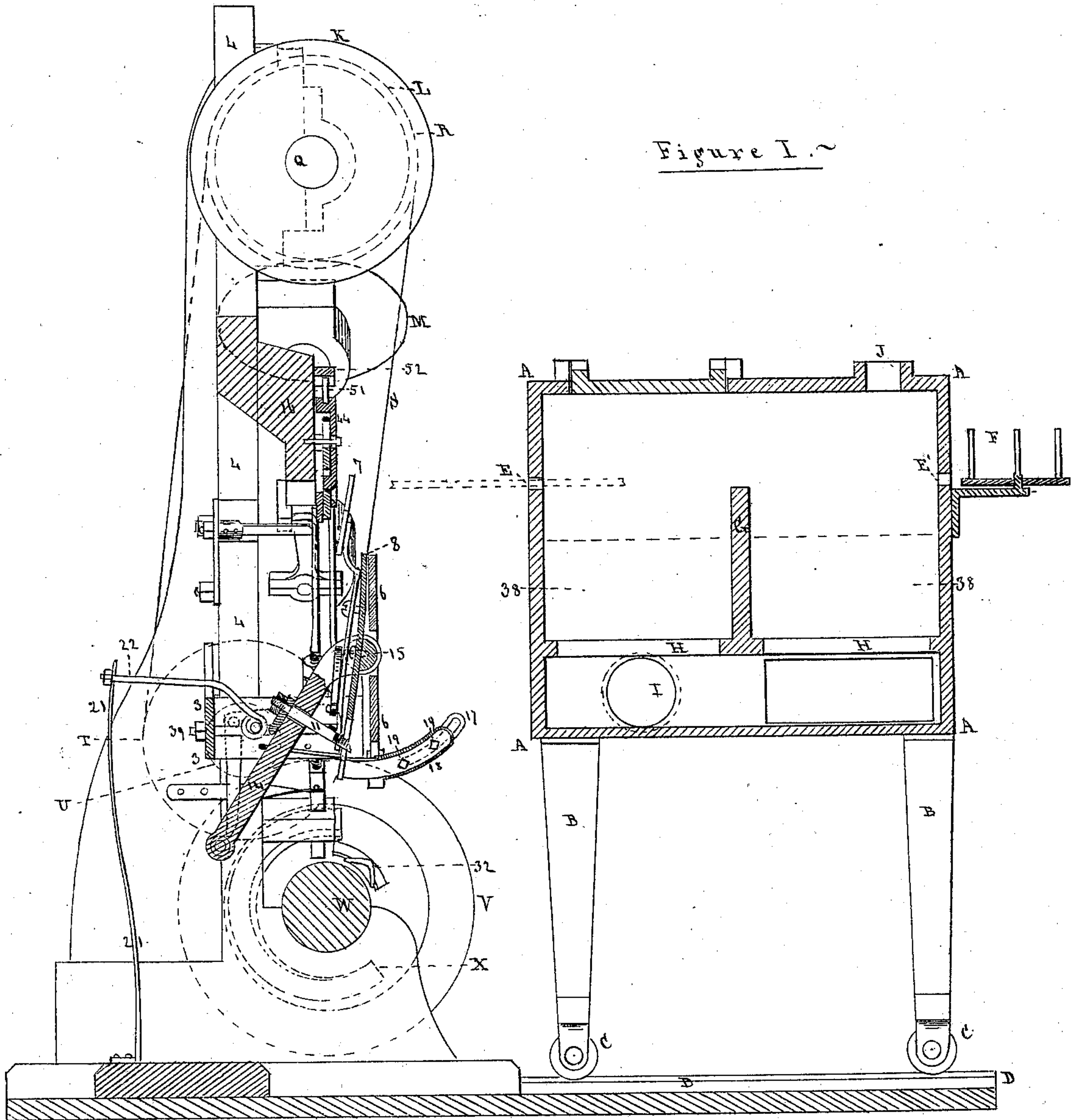


MILTON D. WHIPPLE & LYMAN W. WHIPPLE.

Improvement in Machines for Making Horseshoe Nails.

No. 125,423.

Patented April 9, 1872.



In presence of
John M. Butchelder
for. Stmr.

Inventors.

Milton D. Whipple
Lyman W. Whipple

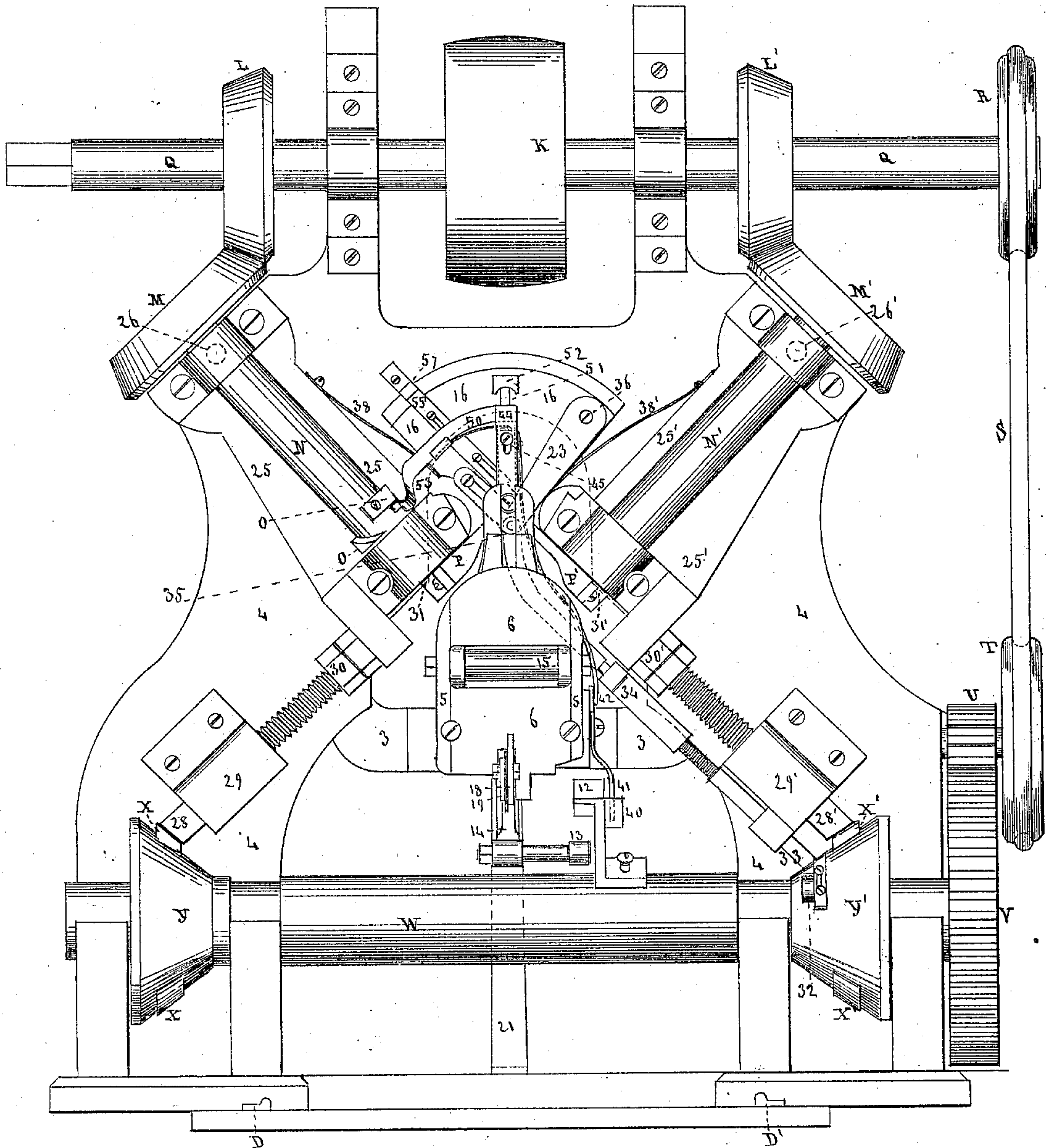
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Figure II.



In presence of
John M. Batchelder
Jos. Stone.

Inventors.

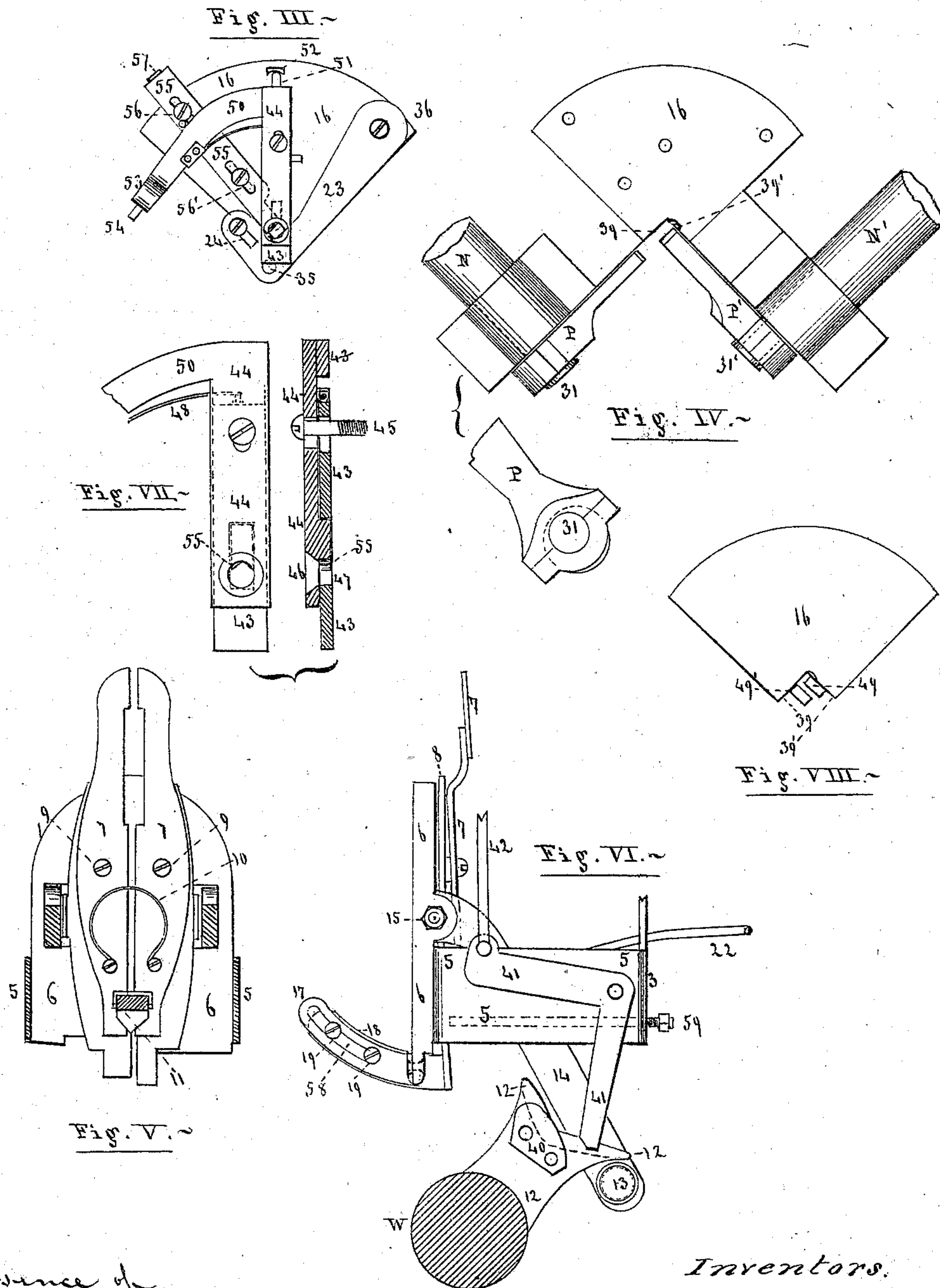
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UNITED STATES PATENT OFFICE.

MILTON D. WHIPPLE, OF BRIGHTON, AND LYMAN W. WHIPPLE, OF BOSTON,
MASSACHUSETTS.

IMPROVEMENT IN MACHINES FOR MAKING HORSESHOE-NAILS.

Specification forming part of Letters Patent No. 125,423, dated April 9, 1872.

Specification describing certain Improvements in Machines for Making Wrought-Nails, invented by MILTON D. WHIPPLE, of Brighton, county of Middlesex and State of Massachusetts, and LYMAN W. WHIPPLE, of Boston, county of Suffolk and State aforesaid.

This machine is intended for the production of wrought-iron nails, of any required length or size, from a continuous coil of wire or nail-rod, which is wound upon a reel and drawn thence through a furnace. On issuing from this the rod is of suitable temperature to be formed into a nail by means of the machinery now to be described.

To form a common horseshoe-nail the length of rod required is about three-fourths of an inch; and we will first describe the heating apparatus and those parts that gripe and carry forward this length of rod and place it in the right position for receiving the blows, pressure, and rolling motion of the hammers.

Sheet A, Figure I, side view of the machine and furnace; Sheet B, Fig. II, front view; Sheet C, Fig. III, front view of anvil and attached parts; Sheet C, Fig. IV, front view of anvil and hammers; Sheet C, Fig. V, back view of the nippers or tongs; Sheet C, Fig. VI, side view, showing the nippers and attached parts.

The movable furnace A, Fig. I, is supported upon legs B, having wheels or casters C that rest upon the horizontal rails D.

When the machine is in operation the furnace is brought forward, so as to leave as little space as possible between the hole E, from which the heated rod issues, and the anvils.

The furnace is provided with suitable grate-bars H, draught-holes I, and smoke-pipe J, and has at the end furthest from the machine a reel, F, upon which the rod or wire from which the nails are to be made is wound.

A partition, G, may be used in the furnace, dividing the fire into two parts to facilitate the proper adjustment of the heat. A few feet of the rod is drawn through the holes E' E above the fire 38, to be heated previous to starting the machine.

The machine is driven by a gear or a belt applied to the central pulley K affixed to the horizontal shaft Q. Upon this shaft, to the right and left of the central pulley, are two miter-

gears, L L', which drive the gears M and M', affixed, respectively, to the diagonal or inclined shafts N N'. A hammer, P, is fixed to the bottom or lower end of the left-hand shaft N, and another hammer, P', is fixed to the end of the right-hand shaft, both being attached to and moving upon the eccentrics 31 and 31'. A pulley, R, on the main shaft Q carries a belt and pulley T. A pinion, U, upon this pulley drives the gear-wheel V upon the horizontal shaft W, which has, near its opposite ends, the cone-shaped projections Y and Y'. The smaller ends of these cones are directed toward the center of the machine, and thus afford a base or support for the cams or wipers X X' and 32.

The nippers or tongs are shown in the enlarged views, Figs. V and VI, and in Figs. I and II.

A back bar, 3, Fig. II, extends across the main frame 4 of the machine. To this are bolted two solid arms, 55 and 55', which project forward, and have bolted to their front ends the fixed plate 6, Figs. V, VI, which serves as a support for the back plate 8 and the tongs 7. This iron plate 8 in the rear of the fixed plate 6 receives two pivots, 9 9', which are the fixed fulcrums of the tongs, the motion of opening and closing the tongs being about these points as a center. The back plate 3 also holds one end of the rod and screw 59. The other end of this rod abuts upon the tongs-plate 8, and thereby governs the length of rod that is fed forward, or, in other words, governs the length of feed of the nippers. The tongs are held open by the curved spring 10, and are closed by a wedge, 11, at the proper intervals.

The operation of the wedge for closing the tongs, and the mode of moving the tongs toward the anvils after having gripped the nail-rods, are as follows: An adjustable cam or wiper, 12, is affixed to the lower main shaft W, which revolves with the shaft W once during the whole time consumed in making one nail. This cam comes in contact with the friction-wheel 13 on the bent lever or arm 14 and depresses it. The wedge 11 is thus forced forward; and this wedge, operating between the lower legs of the nippers, first closes the nippers on the rod, then feeds the rod forward, and lastly opens the nippers, and they return

for another feed, the distance traversed by the upper or gripping end of the tongs being equal to the length of nail-rod that is required for making a nail. The distance to be traversed by the tongs is adjusted, as above named, by the screw 59 striking against the plate 8. Just before the rod and tongs move toward the anvils the wedge 11 (which projects nearly at right angles from the inclined arm 14) has entered between the lower legs of the nippers and forced them apart, thus closing the upper jaws and gripping the nail-rod tightly. The firm hold of the tongs is increased by the entry of the wedge still further as the tongs move forward. The wedge, after the nippers have gripped the rod tightly, moves on, which tips the upper ends of the nippers toward the anvil. The depression of the arm 14 bends the spring 21 forward, the arm and spring being connected by the bent rod 22. As soon as the arm 14 is relieved from the action of the cam 12 the spring 21 recovers its position and brings the wedge and the tongs-plate, with the tongs, by the curved rod *o*, back to place. The tongs are used for gripping and carrying the nail-rod forward. They traverse a distance equal to the length of rod that is required for making one nail, and then give place to a secondary gripping apparatus, that takes hold of the rod at a point nearer to the anvils in order that the rod may be held firmly while the nippers are returning for another feed and while the nail is being made, and, at the same time, the nail-rod is being moved alternately to the seats 39 39', which are at right angles with each other at the base of the anvils 16. The nail-rod is carried to the right and left on the anvil for the purpose of having the flat side and the edge of the nail-rod receive the successive blows of the hammers P P'. These positions of the nail-rod and nail are shown in Fig. VIII at 49 49'.

The gripping apparatus is seen in the detached views, Figs. III, VI, and VII. After the tongs have fed the rod forward the lower arm of a bent lever, 41, comes in contact with the cam 40 affixed to the side of the cam 12 and depresses a rod, 42, the upper end of which is attached to the back-plate 44 of the gripe. This draws down the back plate 44 and enlarges the hole 46 and 47. The plate 44 is held to the plate 43 by means of a pivot or bolt, 45, both plates having a hole, 46 47, and the plate 44 a vertical reciprocating motion imparted to it. The downward movement to enlarge the hole between the plates is imparted by the rod 42, as referred to above, and the upward movement is made by a spring, 48, on the quadrant-arm 50. It will be seen that when the plate 44 has finished its downward movement the hole through the two plates is opened or enlarged, so that the rod can be fed through free; and when this plate rises it closes the hole or decreases the size of the hole, and thus grasps the rod. Through both of these plates, 44 and 43, a pivot, 45, passes, and is made fast in the anvils 16. Slots made in one of the plates and a stub on the other allow

the back plate to move up or down. A spring, 48, fastened to the quadrant-arm 50 bears upon the top of the back plate 43, which has a square shoulder, 55, formed at the lower end, just above the holes in the plates, to fit upon and gripe the rod. At the top of the front plate 43 a short stud, 51, is fixed, which bears upon the cup-shaped stud 52 fixed just above it in the anvils 16.

The action of the two hammers or compressors P P' is as follows: (See Figs. II and IV.) The diagonal shafts N and N' are set nearly at right angles with each other, and are driven from the shaft Q by the gears L M and L' M'. They are supported and turn in bearings affixed to the back pieces 25 and 25', these back pieces being themselves supported by strong pivots 26 and 26', which pass through the frame 4, and are secured at the back of the frame by the nuts 27 and 27'. The pivots 26 and 26' in rear of the dotted lines, Fig. II, are the center of motion of the vibrating pieces 25 and 25', and the lower ends of these parts are thrust diagonally upward by the direct action of the bars 28 and 28', which are moved by the cams or wipers X and X' affixed to the conical-shaped ends Y and Y' of the bottom shaft W. These bars 28 and 28' traverse in guides or boxes 29 and 29', and a part of their length is formed into a screw, provided at the upper end with nuts 30 and 30' that abut upon the lower ends of the hammer-shaft pieces 25 and 25'. The springs 38 and 38' attached to the parts 25 and 25' bear against the sloping sides of the anvils 16. The reaction of these springs and gravity bring the hammer-shaft plates back to place.

In making a nail, the cross-section of which, when finished, is rectangular, one of the hammers, P', acts upon the edge of the nail 49, and the other hammer, P, upon the flat side 49'. The hammers are forced forward by the cams X X' to hammer the nail, and, at the same time that they work the iron of the heated nail-rod toward the point of the nail by their rolling action, a peculiar thrusting and progressive motion is imparted to the curved faces of the hammers by the action of the eccentrics 31 and 31' placed at the lower ends of the two hammer-shafts N and N'. The position of the eccentrics is seen in Fig. IV, the hammer P' being forward and the hammer P back at its furthest point, and ready for a stroke forward or toward the anvils 16.

The two positions of the nail upon the anvils, as shown in Fig. VIII and before referred to, are effected as follows: The quadrant-arm 50 is attached to the top of the front plate 43, Figs. II, III, and VII, and has, at its free end, a bow-spring, 53, provided with a guide-pin, 54, which plays upon the cam O affixed to the hammer-shaft N. The cam is of such form as to act upon the guide-pin 54 and move the combined gripping-plates 43 and 44 about the pivot or center 45. The holding-orifice 46 47 in the plates is, by this means, vibrated back and forth, and moves the nail-rod alternately to

the two positions 49 and 49'. When the nail is shaped and the point formed, which is all done by the hammers, the bars 28 and 28' leave the two cams X X' and the hammers fall back from the anvils, their backward movement being facilitated by the springs 38 and 38'.

The nail is now to be cut off from the rod. This is effected as follows: The cam 32 on the conical end Y' of the shaft W comes in contact with the direct-acting rod 33, the length of which is adjustable at the turn-buckle 34. This rod is parallel with the rod 28, and is curved upward near its upper end, at which point it is fixed to a pivot, 35, (see Fig. III,) at the lower end of the curved knife 23. This knife is pivoted at 36 to the anvils 16, and has at its opposite end a slot and pin, 24, by which the knife is held close to the anvils, and makes a clean cut when it is thrust forward by the combined action of the cam 32 and the knife-rod 33.

Attached to the anvils 16, by two slots and pins, 56 and 56', and nearly at right angles with the knife 23, there is a narrow plate, 55', for supporting the nail-rod. At its upper end there is a spring, 57. When the knife rises this bar or plate is moved upward, and when the knife is liberated the recoil of the spring 57 that bears upon the top of the bar 55 assists in carrying the knife back to its place. The lower end of the plate 55' bears upon the nail-rod and prevents it from being twisted or thrown out of place by the cutting action of the knife. The flat side of the knife also serves as a guide to the hammers as they traverse in front of it. When the gripping-plates 43 and 44 let go of the nail the hammers have fallen back and the finished nail drops without obstruction.

The friction segment-plates 17 and 18, Fig. VI, are intended to regulate the strength of the gripe of the tongs when, from any reason, it requires a stonger gripe to pull the rod forward—as, for instance, when a coil comes in the rod—and equalize the motion when the tongs seize or let go of the nail-rod. One of these plates is fastened to the fixed front plate 6 and the other to the movable tongs-plate 8, and they are held in contact with each other by the adjusting-screws 19, the ends of which enter the plate 18, while the heads of the screws play in a curved slot, 58, formed in the opposite plate 17. By turning the screws 19 the friction of the plates is increased or dimin-

ished, thereby increasing the force that is necessary to force the plate 8 forward.

In making a horseshoe-nail the head is of about the same size as the original rod that is fed to the machine, and there is a die in the face of the hammers for making the head. In case it is desirable to reduce the size of the head, or to give it any peculiar form, the shape of this die can be changed for that purpose. The anvils have also a corresponding indentation in their faces.

What we claim, and desire to secure by Letters Patent, is—

1. The combination of the hammers P P', eccentrics 31 31', shafts N N', and the anvils, as and for the purpose set forth.

2. The combination of the hammers P P', eccentrics 31 31', shafts N N', the anvils, pivoted plates 25 25', bars 28 28', and cams X X', or their equivalents, substantially as described.

3. The device herein described for gripping and holding the rod while the nail is being formed, consisting, in part, of the sliding plate 44, plate 43, having holes 46 47 in them, spring 48, and rod 41, as and for the purpose set forth.

4. In combination with the gripping device referred to in the next preceding claim, I claim an arm, 50, and cam O for oscillating the gripping-plates and for transferring the rod to the two anvils, as and for the purpose set forth.

5. The combination of the pivoted nipper-jaws 7 7, plates 8 and 6, spring 10, wedge 11, cam 12, arm 14, spring 21, and connecting-rods 22 and o, as and for the purpose set forth.

6. In combination with the mechanism referred to in fifth clause, I claim the screw 39 for regulating the length of feed of the nippers, as and for the purpose set forth.

7. In combination with the mechanism referred to in fifth claim, I claim the friction-segments 17 and 18 and the bolts 19, as and for the purpose set forth.

8. I claim the combination of the anvils, the pivoted cutter 23, sliding plate 55', rod 33, and cam 32, as and for the purpose set forth.

9. The combination of the reel F, the furnace A, the tongs 7, the holders 43 44, the hammers P P', the cutting apparatus 53 55, and the anvils, substantially as described.

MILTON D. WHIPPLE. [L. S.]

LYMAN W. WHIPPLE. [L. S.]

In presence of—

JOHN M. BATCHELDER,
JOS. STONE.