

D. DODGE.
MACHINE FOR FORGING NAILS.

No. 9,051.

Patented June 22, 1832.

Fig. 1.

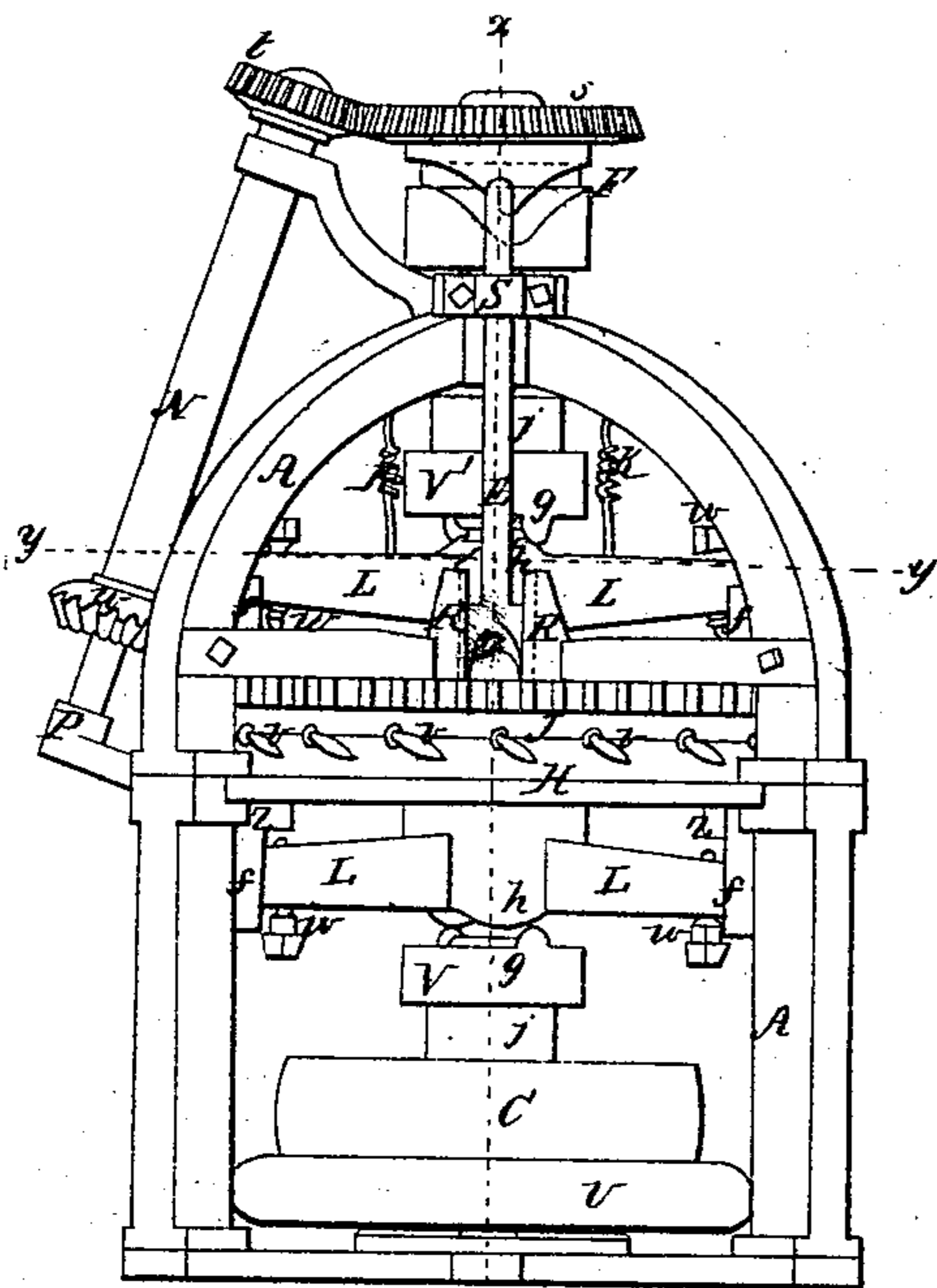


Fig. 2.

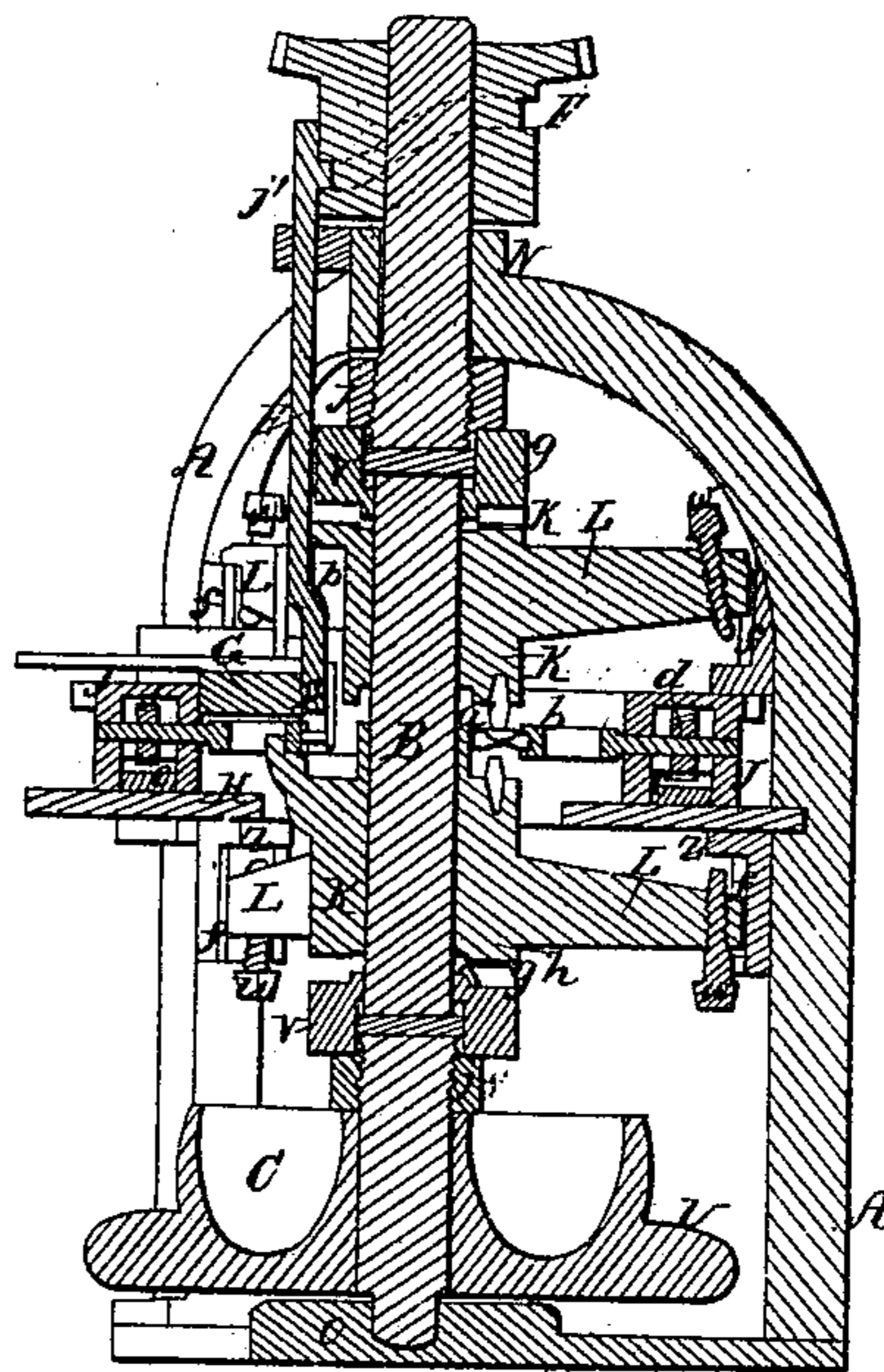


Fig. 4.

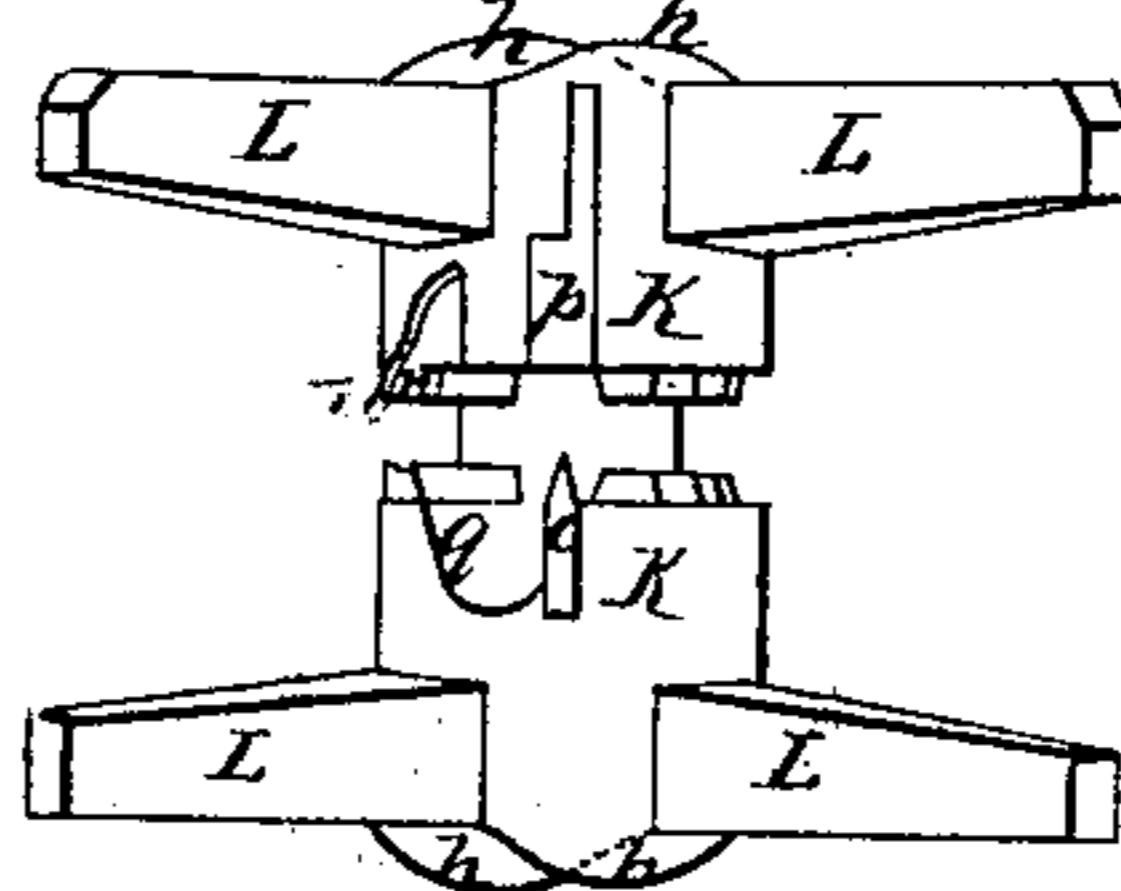
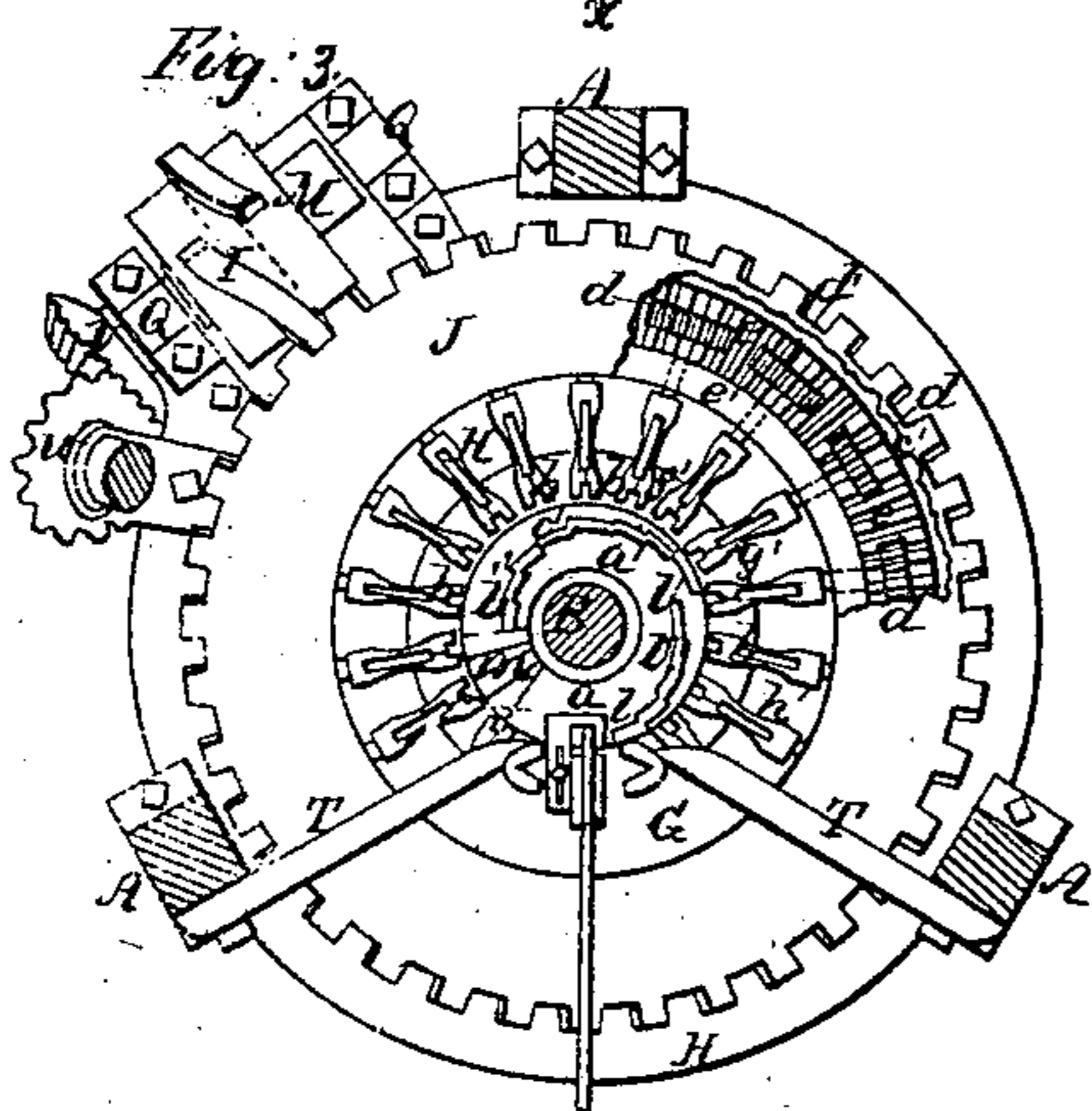


Fig. 3.



UNITED STATES PATENT OFFICE.

DANL. DODGE, OF KEESEVILLE, NEW YORK.

WROUGHT-NAIL MACHINERY.

Specification of Letters Patent No. 9,051, dated June 22, 1852.

To all whom it may concern:

Be it known that I, DANIEL DODGE, of Keeseville, in the county of Essex and State of New York, have invented a new and useful Machine for Forging Horseshoe-Nails, Board-Nails, Spikes, or other Articles to which an Analogous Process is Applicable; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawings, making a part of this specification, in which—

Figure 1 is a front elevation, Fig. 2 a vertical section in the line X, X, of Fig. 1, Fig. 3 is a horizontal section in the line Y, Y, of Fig. 1, the upper hammer being removed, and Fig. 4 a vertical front view of the hammers detached from the other parts of the machine; the same letters having reference to like parts in all the figures.

My invention consists in such a construction and arrangement of the cutter, grippers and hammers that when a rod of suitable dimensions is properly introduced into the machine a piece of sufficient length to form a nail will be cut off, caught into grippers and passed under a series of hammers, receiving one stroke from each as it progresses, and revolving during its transition from one hammer to another, so that its different sides may be acted on alternately until it has passed the entire series and is reduced to the requisite size and form, after which it is discharged.

The construction and operation of my machine is as follows. The principal parts are the frame A A A, the main shaft B, the hammers K K the grippers *b*, *b*, the gripper frame J J the horizontal shaft M, the oblique shaft N, and the cutter D. The frame A A A, is a substantial structure of cast iron. It has boxes at O, P, Q to support the three shafts B, M, N. It has guides at R R and S to support and guide the cutter D, also at *f*, *f*, *f*, to guide the hammers and prevent their turning with the shaft. *z*, *z*, are stops which check the force of the hammer strokes. The circular plate H, supports the gripper frame J, J, and the beams, T, T, support the cutter bed G, which supports the gage *a*. The main shaft B is vertical. It passes through the center of the two hammers in which it is loosely fitted. Near the lower end is the fly wheel U and immediately above this the pulley C'. The

collars V, V' are fitted to the shaft and turn with it, being secured by keys or feathers. Each of these collars has two projections or cams which act upon like projections on the hammers as the shaft revolves and produce the hammer strokes. They may be adjusted by means of the screw-nuts *j*, *j*, so as to bring the hammer faces to the proper distance from each other. On this shaft above the upper bearing W is the cam F which communicates motion to the cutter (D) and the cog wheel *s* which engages with a pinion on the shaft N.

The hammers.—These are two. Each consists of a circular hub fitted loosely on the shaft (B) with arms extending to the guides *f*, *f*, *f*. Each has two projections *h* *h* upon its back on opposite sides of the shaft (B) to receive the action of the cams *g* *g*, in the collars (V, V'). Each has a recess *p*, *q*, on one side, the upper one to receive the cutter, the lower one to allow the nails to discharge. The upper one is suspended by the springs *k* *k*, which draw it up against the collar V'. The lower one may be drawn downward by similar springs when its own weight is not sufficient. Thus arranged the two hammers face each other. To construct the faces I draw radii dividing the face surfaces into as many equal sections as the nail requires strokes to forge it. In each of these sections I insert a steel face beginning next the cutter and proceeding in the direction in which the grippers are designed to traverse. All these faces except the last three or four are narrow and beveled, so as to elongate the blank more effectually without widening and flawing it. The first of these narrow faces I place farthest from the center so as to strike the blank near the grippers. The next I place a little nearer the center, and the third nearer still and so on to the last which must be placed as far in as the point of the nail will extend when it is forged. When necessary two series, as shown at *b'* *c'* in Fig. 3 instead of one may be employed so as to hammer the nail twice over. After these several broad faces adapted to the required form of the nail and designed to give it several whole length finishing strokes should be inserted. The faces nearest the center are most elevated from the surface of the hammers so that when they strike these approach nearest reducing the end of the blank toward the center to a point, and the eleva-

tion of the whole series is so graduated that their combined effect will be to reduce the nail to the proper form. On the lower hammer in the same plane with the cutter and the axis of the shaft (B) but a little farther from the center than the cutter is a wedge *o* for opening the grippers to receive the blank. On the upper hammer at *n* is another for opening so as to cause them to discharge the nail after it is finished. The lower hammer has a thin collar *a'* projecting upward around the shaft to protect it from cinders, scales, &c. In the arms of the hammers near their ends are set screws *w*, *w*, *w*, which strike upon the stops *z*, *z*, *z*, in the frame and limit the approach of the hammers toward each other.

Grippers and gripper-frame.—Several pairs of grippers *b b b* are employed. They are all alike. Each having a shaft *d' d'* with bearings at *e' e'* and a pinion *d*. The part (*b*) toward the hammers is divided into tongs which spring together so as to grip the nail by their elastic force. Small projections meet between these tongs at *f'*, separating the space *g'*, which receive the blank, from the space *h'* where the wedge enters to open them, and forming a shoulder for the end of the blank to bear against. These grippers are arranged in a circular frame having for its center the axis of the shaft. They lie in a horizontal plane, all pointing toward this axis. They are placed at equal distances from each other and so near that one of every two contiguous sections into which the hammers were divided may have a pair of grippers corresponding to it. The circle is completed around the entire hammers including the recesses (*p q*). The pinions of the grippers are made to engage with the teeth in the circular rack *e* on the plate H. The grippers are allowed a little play on their bearings and are pressed toward the hammers to their proper places by the springs *r r*. This allows them to recede a little in consequence of the elongation of the nail, preventing it from bending when the hammers act and secures their return to the proper position to receive the next stroke. The gripper-frame (*J J*) is supported on the plate H, and has cogs *i' i'* on its periphery by which it is moved around and the grippers made to traverse and revolve. The number of these cogs should be twice that of the grippers.

The shaft M.—The sole use of this shaft is to move the gripper frame. It lies horizontal, forming a tangent to the periphery of said frame. It has bearings at Q, Q, a bevel gear at *v*, and a cam at I where it touches the gripper frame. This cam works into the cogs *i' i'*, and moves the frame. It consists of a worm encircling the shaft, and differs from one revolution of a screw thread only by a portion of the

worm's following the circumference around in a plane which would cut its axis at right angles: so that when the shaft revolves it gives the gripper frame an intermittent motion, the oblique or winding portion of the worm propelling it and the plane portion holding it at rest alternately.

The shaft N serves merely to connect the two shafts B and M communicating motion to the latter.

The cutter D consists of a vertical shaft or stock supported by the guides R R and S. It has a pin at *j'* which works into the cam F which gives it a reciprocating vertical motion, causing it to make one stroke at every revolution of the shaft B. The cutting extremity (D) is made of steel inserted in the main stock E and fastened by a screw. The cutter should act at every second stroke of the hammers and simultaneously with them. The gripper frame should progress one cog at every interval between the hammer strokes. The grippers should turn one fourth revolution at each advance of the frame. These points will be secured by observing a proper arrangement of the cams and a due proportion of the gearing.

When all parts of the machine are constructed and arranged the set screws (*w, w, w*) should be set so as to allow the hammers to approach each other exactly to the required point. The shaft (B) should then be turned so as to make the cams *g, g*, coincide with the projections *h, h*, on the hammers. The nuts *j, j*, should then be screwed toward each other until they cause all the set screws in the hammer arms to press hard against their respective stops. This will secure uniformity in the effect of the strokes; first, by preventing the hammers from being canted by inequality of resistance between the faces at opposite points, and secondly, by causing greater uniformity in the springing of the parts which produce the stroke. The importance of this last effect will be obvious when it is considered that any resistance between the hammer faces will cause the parts which force them together to spring somewhat, and that the greater this resistance is the more these parts will spring: so that the effect of the strokes will vary according as the metal acted on is hard or soft and as the quantity is more or less. But when the nuts are screwed so as to press the hammers against these stops as above described, no ordinary resistance between the faces will prevent their approaching so far as to touch the stops; and however small such resistance may be they can approach no farther; so that the effect of their action will be uniform.

When the machine is put in motion and a rod introduced under the cutter D and pressed against the gage (*a*), a piece of sufficient length to form a nail is cut off at the

same instant that the wedge (o) enters and opens the grippers. It is forced by the cutter down between the grippers when it is held by the lower extremity of the gages (which springs a little) pressing it endwise against the shoulder within the grippers while the wedge and cutter are withdrawn and the grippers grip it. It is then conveyed between the hammer faces, passing at each section to receive one stroke, and turning one fourth revolution as it progresses from one section to the next between successive strokes. The above described arrangement of faces causes the first stroke to fall near the head which consists of that part within the grippers. The second falls nearer the point, and so on until it has passed the first series which hammer it once over. This process is repeated under the second series and it then passes between the finishing faces which gives it several whole length finishing strokes after which it is discharged at g.

It will perhaps be found expedient, in some cases at least, to vary the construction and arrangement of the parts considerably from that above described. Thus, instead of one pair of hammers with faces divided into sections, several pairs may be employed, arranged in the same manner as the several faces of those above described.

The grippers, instead of being arranged in a circle, may be arranged in a straight line with hammers corresponding, and after having passed the series either pass around to the place of beginning like an endless chain, or be made to retrace, and then repeat their progressive movement. They may also be arranged in a circle with their axes perpendicular to the plane of the circle having hammers so arranged as to correspond with them in this position.

It is not essential in all cases that both hammers should move. In some cases, especially where the nail is long and requires hammering only near the point one may be made stationary, constituting an anvil.

Where the article produced requires hammering only in one place the hammer faces may be arranged in a line parallel with that in which the grippers move instead of being graduated in their distance from it so as to act upon the nail in different places.

Having thus described the nature of my invention, what I claim as new and desire to secure by Letters Patent is as follows:

1. I claim the combination of a series of hammer faces with grippers having both a

rotary and progressive motion, and so arranged as to convey the blank between the several pairs of faces successively at the same time revolving it so as to present different sides successively to the action of the hammers.

2. I claim such an arrangement of the severed hammer faces which act successively upon the blank, with regard to the distance of the lines in which they respectively move from the line in which the grippers move that when the grippers move forward in said line, thereby conveying the blank from one pair of faces to another, the successive strokes which it receives will fall on different points, thereby reducing different parts of it successively to the required size.

3. I claim in combination with such an arrangement of the faces with respect to the grippers, such a graduation in the nearness with which the several pairs respectively approach when they strike that the several parts of the blank upon which they respectively act will be reduced to different sizes and that the combined effect of the whole will be to reduce the nail to the proper form.

4. I claim the combination of the two kinds of faces, broad and narrow, with grippers so arranged as to present the blank to the action of the narrow ones until it is suitably elongated and subsequently to that of the broad ones to receive a finish.

5. I claim the arrangement of a set of grippers upon the interior of a circular hub or frame in combination with hammers placed in or near the center of the circle in which they are arranged.

6. I claim adjusting the grippers by means of a spring or its equivalent so arranged as to press them toward the hammers to their proper place, allowing them to recede as far as the lengthening of the nail requires while the hammers are acting and causing them to return again when the hammers are withdrawn.

7. I claim such a combination of stops for limiting the approach of the hammers to each other with cams or their equivalents for forcing them together as to diminish the inequality which unequal resistance between the faces has a tendency to cause the springing of the parts which produce the stroke; thereby rendering the effect of the strokes more uniform.

DANIEL DODGE.

Witnesses:

THOMAS S. HARVEY,
JOHN A. DODGE.