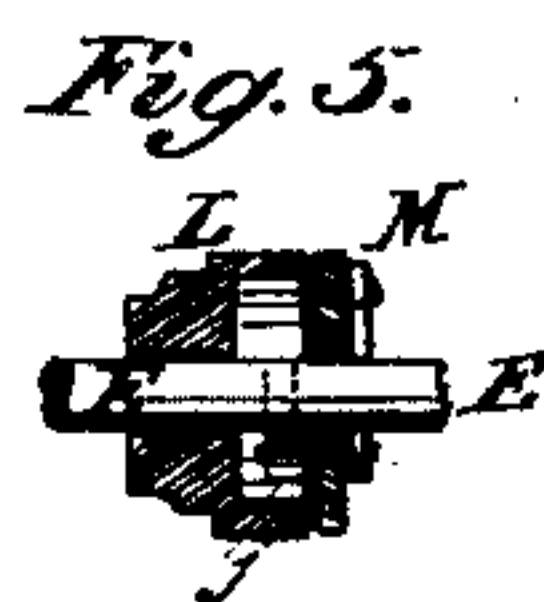
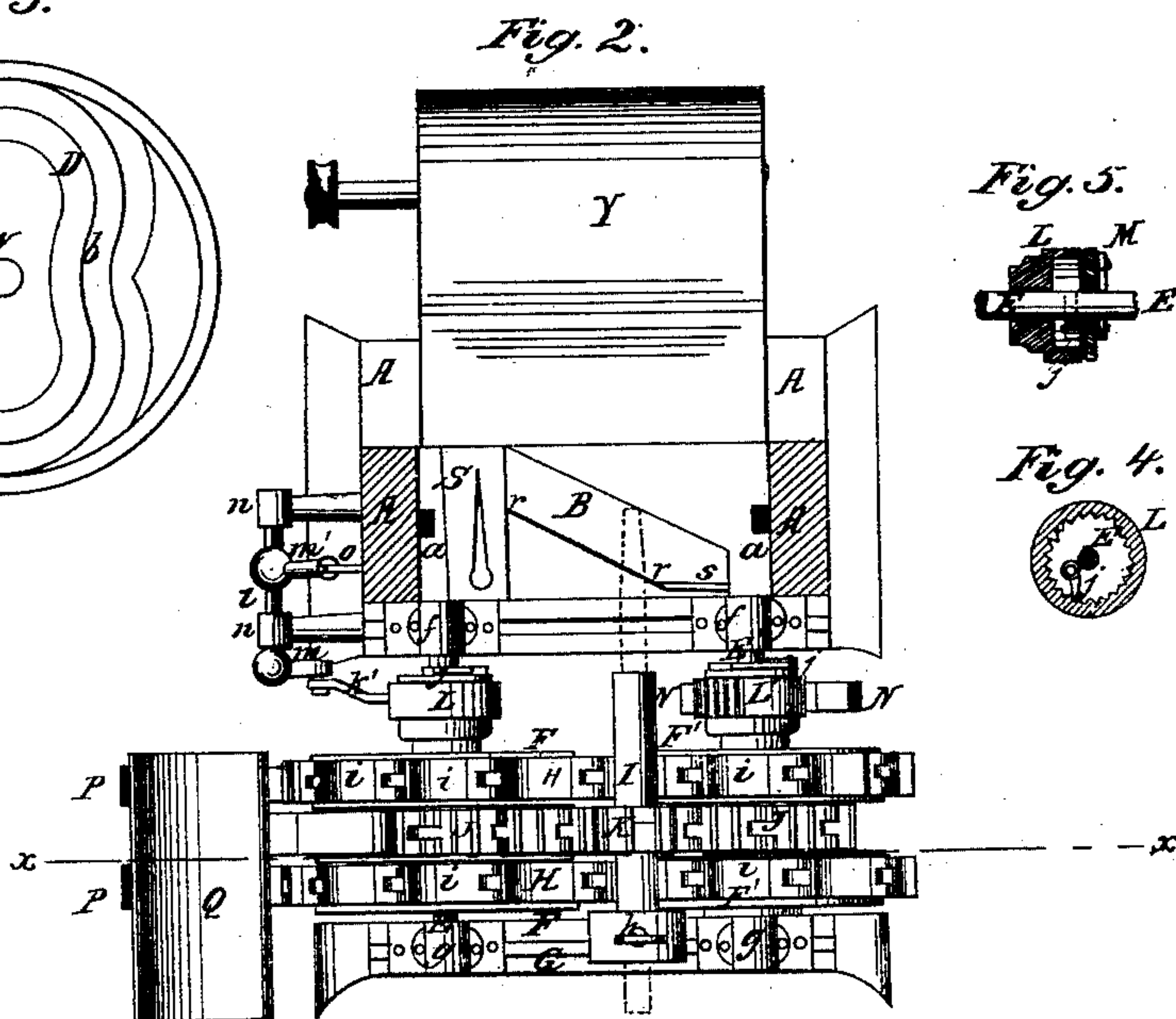
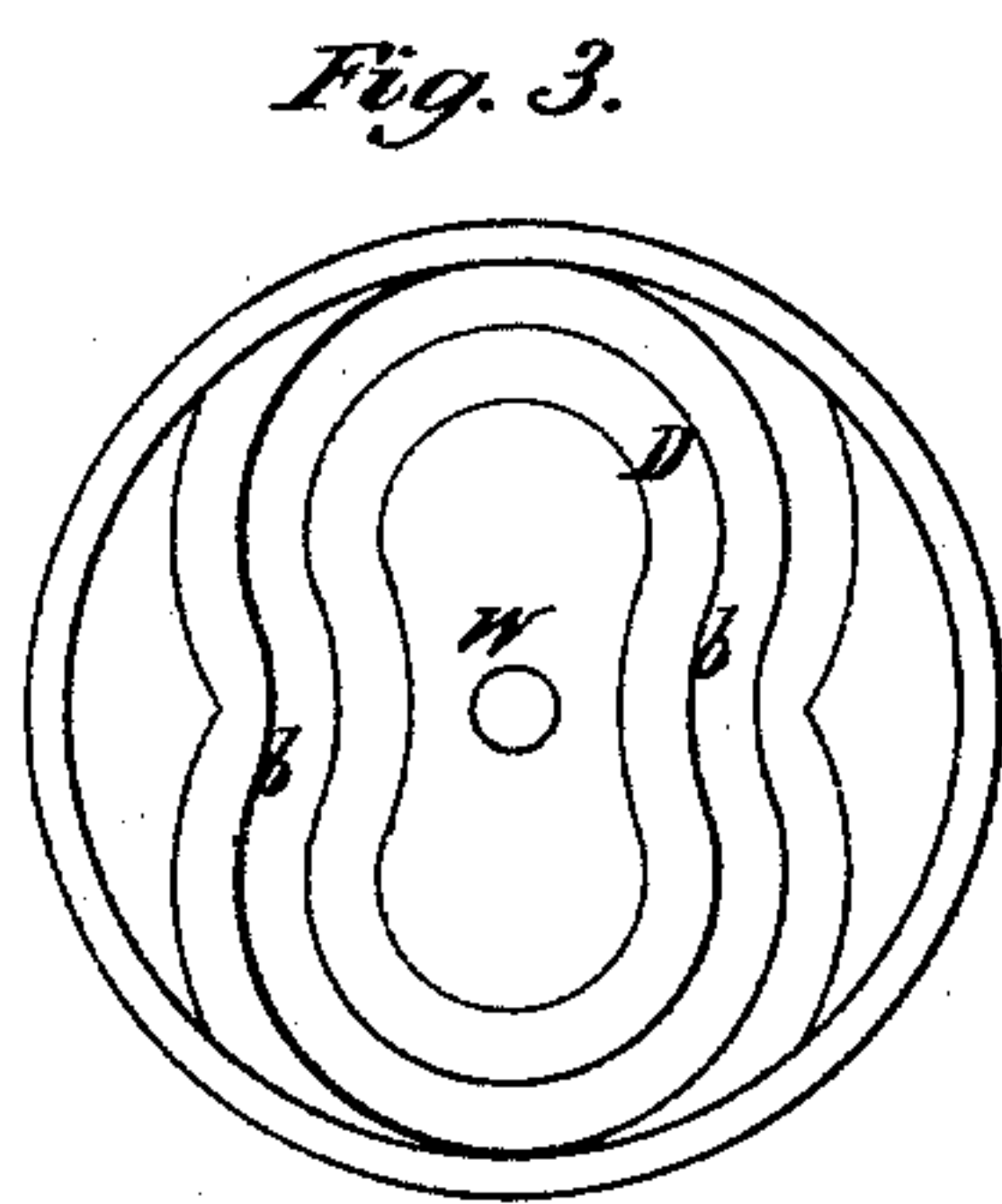
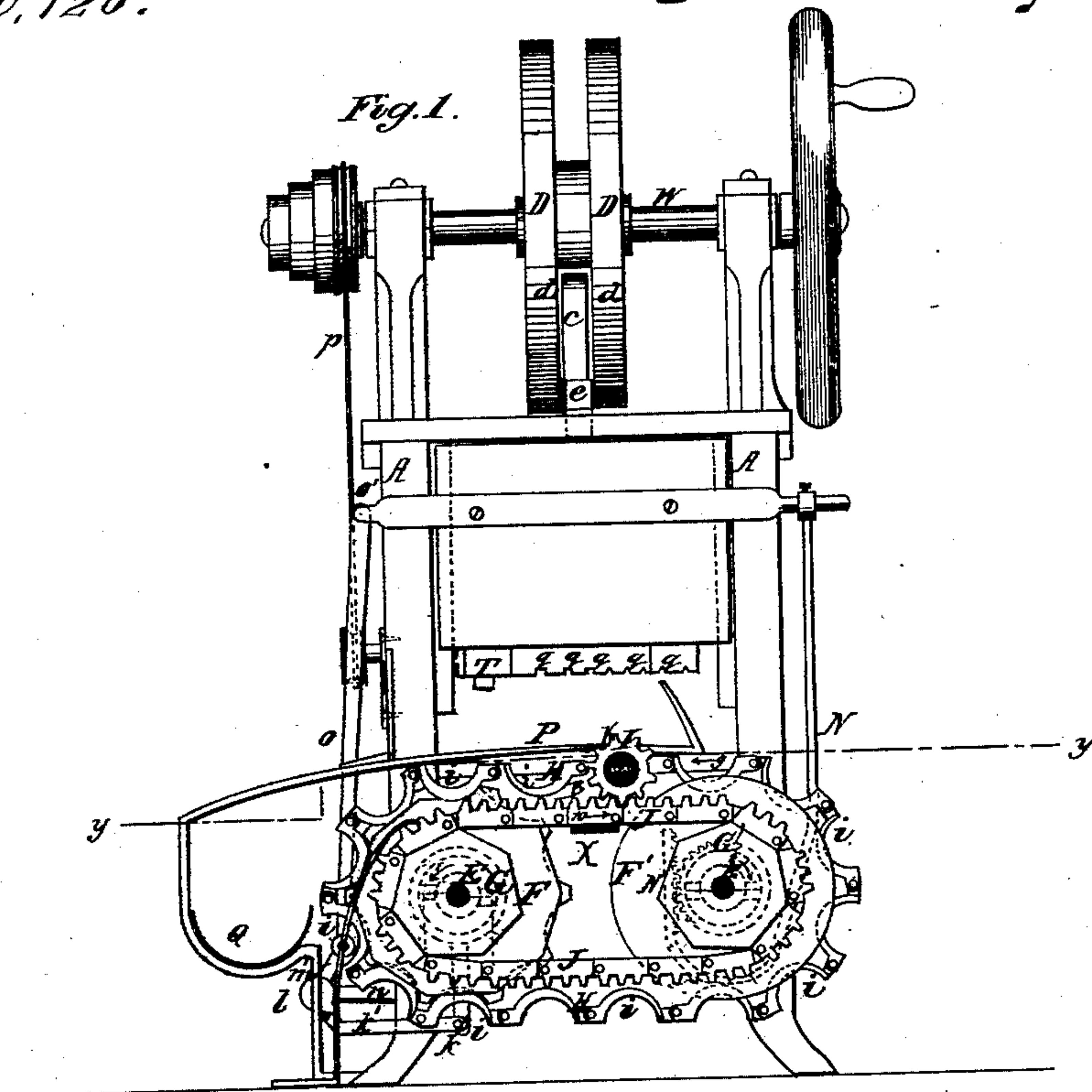


*Green & Gordon,*  
*Making Wrought Nails,*  
*N<sup>o</sup> 20,126. Patented Apr. 27, 1858.*





# UNITED STATES PATENT OFFICE.

H. GREENE AND W. J. GORDON, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNORS TO HENRY GREENE AFORESAID.

## NAIL-MACHINE.

Specification of Letters Patent No. 20,126, dated April 27, 1858.

*To all whom it may concern:*

Be it known that we, HENRY GREENE and WILLIAM J. GORDON, both of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a new and useful Improvement in Machines for Forging Horseshoe and other Nails; and we do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a vertical section of a machine with our improvements applied, taken in the line *x, x*, of Fig. 2. Fig. 2 is a horizontal section in the line *y, y*, of Fig. 1. Fig. 3 is a section of the cam which drives the hammer, taken in a plane perpendicular to the axis. Figs. 4 and 5 are sections at right angles to each other, of one of the ratchet boxes which drives the chains by which the nail rods are moved under the hammer. Fig. 6 is a view of one of the links of the chains which carry the nail rod holders.

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

This invention consists in certain means of turning the nail rods for the purpose of enabling all sides thereof to be hammered upon by a single hammer or one of a series of hammers moving simultaneously in the same direction, and of moving the rods laterally at the same time as they are turned, viz, between the successive blows of the hammer or hammers, upon a properly arranged anvil to cause the operation of forging the nails to commence near the head and gradually proceed toward the point, thus imitating the operation of forging by hand.

The invention further consists in a certain arrangement of the anvil relatively to the lateral motion of the nail rods, for the purpose of drawing the nails from head to point in the forging operation.

To enable others to make and use our invention, we will proceed to describe its construction and operation.

A, is a main frame of the machine, having an opening, at the bottom of which is situated the anvil B, and at the sides of which are guides *a, a*, for the hammer C, which slides vertically therein. The anvil is of considerable length and the face of the hammer is of corresponding length. The hammer derives the necessary motion from

a cam D D, on a shaft W, which works in bearings on the top of the frame A. The said cam is formed of two similar pieces arranged at a short distance apart as shown in Fig. 1, each of said parts containing a groove *b, b*, of the form shown in Fig. 3, and the hammer being connected with it by a rod *c*, at the upper end of which there is on each side a pin *d*, which is received in one of the grooves *b*. The rod *c*, works in a guide *e*, in the upper part of the frame A.

E, E<sup>1</sup>, are two horizontal shafts arranged in front of the lower part of the machine, with journals at their rear ends fitted to bearings *f, f*, in the frame A, and journals at their front ends fitted to bearings *g, g*, on a low standard G, erected some distance in front of the frame A. This standard is shown in Fig. 2 but not in Fig. 1. The shaft E carries two chain wheels F, F, arranged at some distance apart and another chain wheel G, arranged between F, F; and the shaft E<sup>1</sup> carries two chain wheels F<sup>1</sup>, F<sup>1</sup>, similar and similarly arranged to those F, F, on shaft E and another chain wheel G<sup>1</sup> similar and similarly arranged to G. The four chain wheels F, F, F<sup>1</sup>, F<sup>1</sup>, carry two chains H, H, whose links are constructed as shown in Figs. 1 and 6, each with a concave recess *i*, to receive the nail rod holders I, one of which is shown in Figs. 1 and 2, the said holders each consisting of a tube or hollow shaft through which the nail rod passes and in which it is secured by a set screw *h*. The wheels F, F, F<sup>1</sup>, F<sup>1</sup>, are so arranged that the links of the two chains H, H, stand opposite to each other, so that the nail rod holders I, resting in them may occupy positions at right angles to the length of the said chains, which may be termed carrying chains; their duty being to carry the nail rods across the anvil. The two chain wheels G, G<sup>1</sup>, carry an endless chain J, the face of which is toothed to constitute an endless toothed rack; and the nail rod holders are furnished each with a gear K, which gears with said rack, while the holder is in the bearings or recesses *i, i*, of the chains H, H. The said gears K, fitting between the chains H, H, serve to confine the holders I, longitudinally as they are carried by the chains H, H. The chain J is held up into gear with the gear K, by a rest X, secured to the standard G.

The chain wheels F, F, are fast upon their



shaft E, but those  $F^1$ ,  $F^1$ , are loose on their shaft  $E^1$ ; the first shaft E being the driver of the chains H, H. On the contrary, the chain wheel  $G^1$  is fast on its shaft  $E^1$ , and  
 5 that G is loose on its shaft E; the shaft  $E^1$  being the driver of the chain J.

The chains H, H, and J, receive intermittent motions in opposite directions, both moving and stopping at the same time; the  
 10 said motions being given through the agency of ratchet boxes L,  $L^1$ , fitted loosely on the shafts E,  $E^1$ , and disks M,  $M^1$ , secured tightly on the shafts, and carrying dogs  $j$ , engaging with the ratchets inside the boxes L,  $L^1$ , the  
 15 dogs being respectively set to drive the shafts in opposite directions which are indicated by arrows in Fig. 1. The ratchet box derives the necessary reciprocating motion on its shaft to produce the intermittent rotary  
 20 motion thereof by its being provided with an arm  $h$ , which connects by a rod  $h^1$ , with an arm  $m$ , of a rock shaft  $l$ , which works in fixed bearings in brackets  $n$ ,  $n$ , attached to frame A; the said rock shaft deriving  
 25 its motion by the connection of its arms  $m^1$ , with a rod  $o$ , which is connected with the hammer at  $o^1$ . The ratchet box derives its motion to produce the intermittent rotary motion of the shaft E, from a bent rack bar  
 30 N, which is connected rigidly with the hammer and gears with teeth on the periphery of the said box.

The horizontal upper portions of the chains H, H, are covered each with a guard  
 35 bar P, to confine the nail rod holders to their bearings or recesses  $i$ ,  $i$ , in the links of said chains and keep the gears K, in gear with the rack chain J. At one end of the chains there is a trough Q, to catch the nail  
 40 rod holders as they fall from the chains after passing down some distance from over the centers of the wheels F, F.

Y, is a blower arranged at the back of the machine and driven by a belt  $p$ , from the  
 45 shaft E to blow a stream of air upon the nail rods to increase the heat thereof, during their subjection to the hammering process.

S, is a stationary die, arranged at one side  
 50 of the anvil B, and T is a punch attached to the corresponding side of the hammer, for the purpose of cutting off the nail from the rod after the forging operation.

The operation of the machine is as follows: Rotary motion being given to the main  
 55 shaft W, the hammer derives from the cam D a reciprocating motion, making two strokes for every revolution of the cam. Every time the hammer rises from the anvil,  
 60 it imparts to the wheels F,  $F^1$ , respectively, a movement in direction of arrows 7, 8, marked near them in Fig. 1, and thus causes the chains H, H, to move in direction of arrow 9, and that J, in direction of arrow  
 65 10; but, when the hammer descends, the

shafts E,  $E^1$ , and the chains are all stationary, by reason of the dogs  $j$ , slipping over the teeth in the ratchet boxes.

The nail rods are inserted in the holders I, and secured by the set screws  $h$ , with  
 70 sufficient portions protruding from the holders to present a proper length of rod upon the anvil B, when the holders are in the bearings  $i$ ,  $i$ , of the carrying chains H, H, as shown in Figs. 1 and 2, where a  
 75 nail rod is represented in red color. The ends of the rods are heated, and the holders containing them placed one at a time in the machine as the bearings  $i$ ,  $i$ , in the links of the carrying chains H, H, severally arrive  
 80 on the top of the wheels F, F. The first movement of the chains H, H, taking place during the ascent of the hammer brings the rod on the anvil where it remains stationary during the descent of the hammer and re-  
 85 ceives the blow thereof. As the hammer rises again, the chains H, H, carry on the holder I, and the rod a short distance in the direction of the arrow 10, while the toothed chain J, moving a short distance in  
 90 the opposite direction, operates on the gear K, to give the holder and the rod a quarter revolution. The hammer descends again and strikes the rod, and as it again rises, the  
 95 rod is moved along the anvil and turned again in the same manner, which operation is repeated between the successive blows of the hammer till the rod has moved all along the face of the anvil, and has received several  
 100 blows on all four sides in turn. The hammer is formed to draw the nail to a tapering form, and said hammer may have a plane face or be filled with a number of dies, as shown at  $g$ ,  $g$ , in Fig. 1, to give the nail any desired form. After passing off  
 105 the anvil, the rod is carried by similar movements of the chains over the die S, over the front edge of which it is cut off by the punch T. The holder afterward falls into the trough Q, whence it is taken by an at-  
 110 tendant, who unscrews the screw  $h$ , then pushes the rod forward in it, and places the rod in the fire to be heated again, preparatory to its reintroduction to the carrying chain. Several rods may be operated upon  
 115 at once, by making the anvil of proper length; a new holder and rod being put into the carrying chains every time that a bearing  $i$ ,  $i$ , arrives on the top of the wheels  
 120  $F^1$ ,  $F^1$ .

The arrangement of the anvil by which the drawing of the nails from head to point, in imitation of forging by hand is effected, is illustrated in Fig. 2, such arrangement consisting in placing the anvil with its front  
 125 edge or a portion thereof in an oblique direction relatively to the movement of the carrying chains, as shown at  $r$ ,  $r$ , in Fig. 2 so that the distance of said edge from said chains increases as said chains move onward. 130



The hammer is arranged in a corresponding manner. The effect of this arrangement is that the hammer, when it first comes into operation on the rod, strikes it near the holder; and as the rod moves along, it strikes farther and farther from the holder; thus drawing toward the extremity of the rod, which forms the front of the nail. The portion *r*, *s*, of the edge of the anvil on which the first one or two blows are given, and the corresponding portion of the hammer, are however made parallel with the movement of the chain to give the head of the nail the proper shape.

15 What we claim as our invention, and desire to secure by Letters Patent, is:—

1. The combination of the carrying chains H, H, and the rack chain J, with the nail rod holder in the manner substantially as described, to move the rods laterally along the anvil and turn them simultaneously.

2. The arrangement of the front edge *r*, *r*, of the anvil obliquely to the direction of the movement of the carrying chains substantially as described, for the purpose of causing the nails to be drawn from head to point in the forging process.

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WM. J. GORDON.

Witnesses:

H. H. SHOEMAKER,  
REUBEN HAINES.