

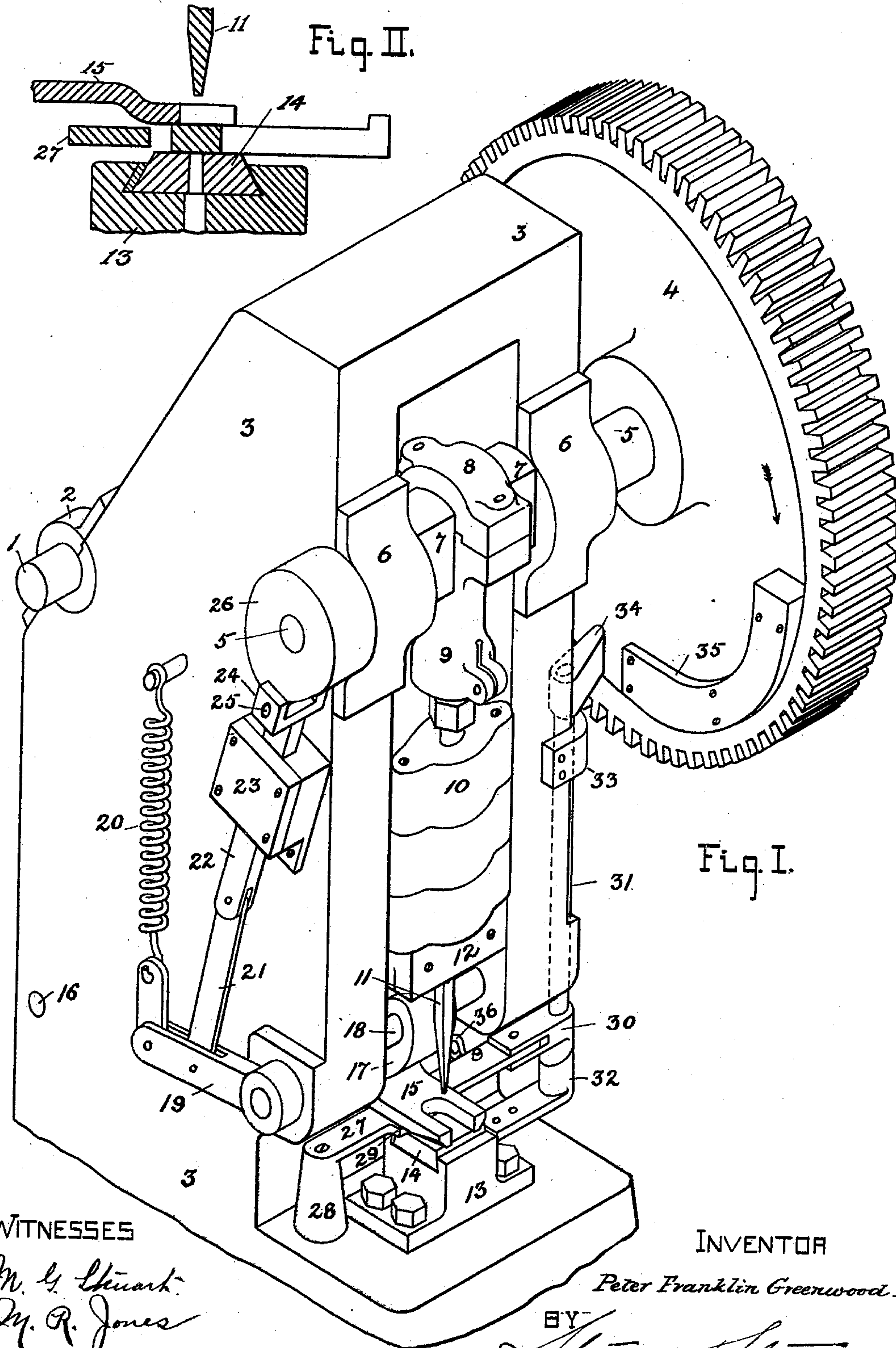
No. 618,866.

Patented Feb. 7, 1899.

P. F. GREENWOOD.
PUNCHING MACHINE.

(Application filed June 9, 1898.)

(No Model.)



WITNESSES

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PETER FRANKLIN GREENWOOD, OF RICHMOND, VIRGINIA.

PUNCHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 618,866, dated February 7, 1899.

Application filed June 9, 1898. Serial No. 683,026. (No model.)

To all whom it may concern:

Be it known that I, PETER FRANKLIN GREENWOOD, a citizen of the United States of America, and a resident of Richmond city, State of Virginia, have invented certain new and useful Improvements in Punching-Machines, of which the following is a specification.

My invention relates to punching and similar machines; and it has for its object the provision of means whereby the punching may be effected in a complete manner without loss of time and extra cost for finishing.

Though my invention may be applied to various kinds of punching-machines, it is particularly applicable to and useful in machines for punching the nail-holes in horse and mule shoes. The punch used in this class of machine is usually somewhat tapered and is rectangular in cross-section, and the die has passing through it a hole slightly larger than the end of the punch and of similar shape. After having been in use for a short time the edges and corners of the die and punch lose their sharpness and fail to cut the bur clear of the metal of the shoe. The bur sticks to the shoe and frequently hangs in the die. It is then necessary to free the shoe from the die, remove the bur from the shoe, and finish the face of the shoe by grinding or other means. This grinding, objectionable in that it entails loss of time and extra cost, also defaces the shoe to some extent. Again, though the bur may be separated from the shoe the edges of the hole in the shoe may be rough and have a ragged fin attached to them. This "ragging" of the holes gives rise to almost as much trouble as does an undetached bur.

By the use of my invention I am able to overcome both of these obstacles in a perfect and useful manner without loss of time or extra cost in the operating.

In the drawings, which form a part of this specification and in which like numerals refer to like parts, Figure I is a view in isometric perspective of one of a class of punching-machines frequently used in the punching of horse and mule shoes with my improvement attached. Fig. II is a broken detail view in section of the punch, die, die-block, stripper, a shoe, and of a part of my improve-

ment to show the relative positions of each to one another.

I will now describe the parts and the working of the punching-machine shown in Fig. I, so that the operation of my improvement may be the more readily understood.

In Fig. I, 1 is the driving-shaft, mounted in bearings 2, (of which only one is seen in the drawings,) attached to the frame 3. At the other end of the shaft 1 is a pinion gearing with the large spur-wheel 4, which is mounted on the shaft 5, which is carried in bearings 6, which are attached to the frame 3. Forming a part of the shaft 5 is the crank 7 7, having a journal, on which is mounted the cross-head 8, which forms a part of the ball-and-socket connection 9. 10 is the socket. 11 is the punch held in the punch-holder 12, which forms the lower end of the socket 10. 13 is the die-block, 14 the die, and 15 the stripper, which is operated to hold the piece to be punched on the die and to strip the punched piece from the punch after the punching has been effected. This stripper 15 is pivoted on the shaft 16, at the back of the frame, and it is raised from the die by means of a spring attached to it and to the frame a short distance back from its forked end. The stripper is depressed by means of the cam 17, which is mounted on the shaft 18, which has attached to it the lever 19, which is operated upwardly to release the cam 17 by means of the spring 20 and downwardly to cause the cam 17 to depress the stripper by means of the link 21, the slide-bar 22 sliding in the guide 23 and having at its upper end a fork 24, which carries a friction-roller 25, which, with the fork 24, the slide-bar 22, the link 21, and the lever 19, is depressed by means of the cam 26, which is attached to the shaft 5.

The operation of the various parts described above is as follows: The shoe or other piece to be punched is held upon the die 14. Motion is imparted by means of belting or gearing to the shaft 1. The pinion, which is attached to the shaft 1 and which gears with the spur-wheel 4, causes the latter and the shaft 5 and the cam 26 to revolve in the direction indicated by the arrow. The stripper 15 is depressed to hold the shoe upon the die 14. The punch 11 descends and punches a

hole in the shoe, the bur passing through a hole in the die and a hole in the die-block to a receiver below. The punch then rises, the stripper 15 remaining stationary and stripping the shoe from the punch. The stripper then rises slightly to allow the operator to remove the shoe or to shift it to punch another hole. The operation above described is then repeated.

10 In order to overcome the hereinbefore-mentioned obstacles to clean and perfect punching, I use what I term a "pusher." This pusher, consisting of the piece 27, situated between the stripper and the die, is pivoted at
15 28 and preferably has a projecting part 29, the width of which is about the same as that of the die 14. The pusher is so located that its projecting part 29 shall, when at rest, be a short distance behind the shoe when it rests
20 on the die in a position to be punched. The other end of the pusher is pivoted in the forked arm 30, which is rigidly attached to the vertical shaft 31, which is carried by the foot-step 32 and the bracket 33. On the upper
25 end of the vertical shaft 31 is a head 34, the end of which lies in the path of the inclined plane or cam-plate 35, which is attached to the spur-wheel 4. Attached to the pusher is a spring 36, the other end of which is attached
30 to some convenient part of the frame 3. The cam-plate 35 is preferably constructed as shown in the drawings, for machines of this class are usually fast, making at least one revolution per second. The time available
35 for the action of the pusher is about one-sixth of one revolution. Therefore it is permissible to use a cam-plate whose length shall be about one-sixth of the circumference of a circle whose radius is equal to the
40 distance of the cam-plate from the center of rotation and which is concentric with the circumference of the spur-wheel. In a quick-acting machine, such as the above, the long cam-plate has an easier action on the head 34,
45 which preferably has a friction-roller mounted at its end, and at the same time the said action is sufficiently quick to enable the pusher to fulfil its purpose. Were a much shorter
50 cam-plate to be used its action on the head 34 would be so sudden as to damage the pusher mechanism in course of time.

The operation of the pusher is as follows: As the spur-wheel 4 revolves and just after the punch is raised clear of the face of the
55 shoe and before the stripper releases the shoe from the die the cam-plate 35 strikes the head 34, causing it and the shaft 31 to revolve through a small arc. The forked arm 30 swings sharply outward, causing the
60 pusher 27, to which it is connected, to do the same. In so doing the projecting part 29 of the pusher 27 gives the back of the shoe a smart blow, sufficient to cause it to move such a distance across the face of the die
65 (while it is still held by the stripper to the face of the said die) as will enable the edges

of the hole in the die to shear off any bur or fin which may be attached to the hole just punched in the shoe. This is done very
70 neatly and perfectly, and any further processes of grinding the face of the shoe, &c., are unnecessary. After the cam-plate 35 has passed the head 34 the pusher mechanism is returned to its original position by means of
75 the spring 36.

Having now described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

1. In combination with a die and a punch, a pusher arranged to strike the punched
80 piece to cause it to pass over the face of the die to shear off undetached burs or fins which may project from the punched piece, substantially as described.

2. In a punching-machine, the combination of a die, a punch, a stripper to hold the piece to be punched on the die and to strip the punched piece from the punch, a pusher to strike the punched piece after the stripper has stripped the punched piece from the
90 punch and before the stripper releases the punched piece from the die to cause the said punched piece to move across the face of the die to shear off undetached burs or fins which may project from the punched piece into a
95 hole in the die, and mechanism to operate the pusher.

3. In a punching-machine, the combination of a die, a punch, a stripper, a pusher all arranged and operated as described, a vertical
100 shaft having an arm pivotally attached by one end to the pusher and a head or arm arranged to be engaged by a cam to operate the said pusher, substantially as described.

4. In a punching-machine, the combination of a die 14, a punch 11 located above the same and reciprocating thereto, a stripper 15 located above the die and holding the work thereon to strip it from the punch, a pusher
110 27 located below the stripper and in position to push the work off the die when finished, a vertical shaft 31 located upon the side of the machine having an arm 30 projecting toward the pusher and coöperating therewith to move
115 it, a head 34 by which motion is given to the vertical rocking shaft 31 and to its arm 30 or head 34 projecting into the path of a cam-plate 35 upon a fly-wheel, a cam-plate 35 upon a fly-wheel rotating in position to strike and move the head 34, a spring 36 connected
120 to a suitable part of the machine at one end and to the arm 30 at the other end to draw the pusher back to its normal position when the cam 35 has passed the head 34, all arranged and operated substantially as described as and for the purpose specified.
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Signed by me, at Richmond city, Virginia, this 4th day of June, 1898.

PETER FRANKLIN GREENWOOD.

Witnesses:

WM. C. NOLAND,
ARTHUR SCRIVENOR.