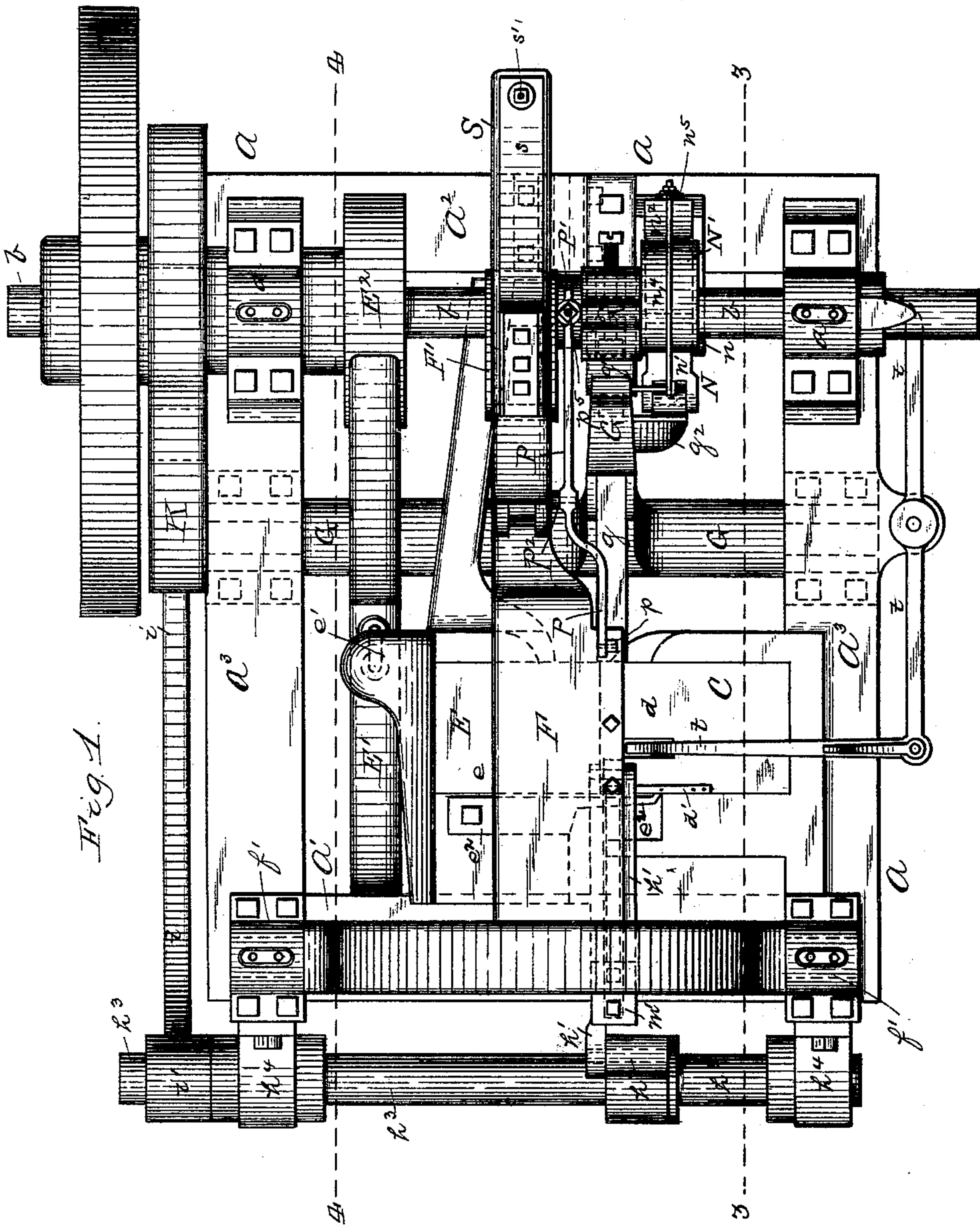


5 Sheets—Sheet 1.

Patented Nov. 19, 1889.



Inventor.

Joseph W. Bowmayer
By James S. Kay
Attorney

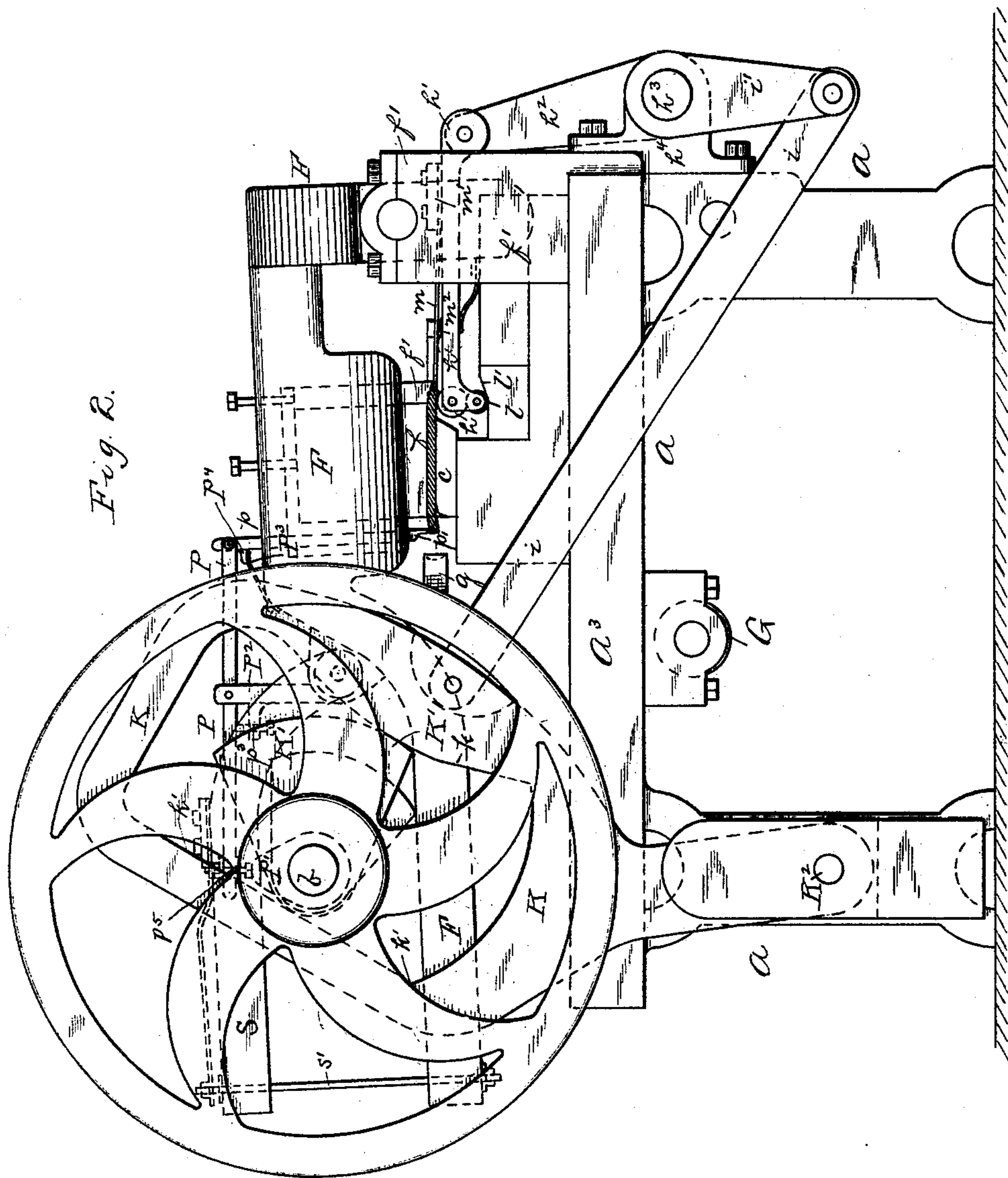
(No Model.)

5 Sheets—Sheet 2.

J. W. BOWMAN.
SPIKE MACHINE.

No. 415,494.

Patented Nov. 19, 1889.



Witnesses:

J. Moakley
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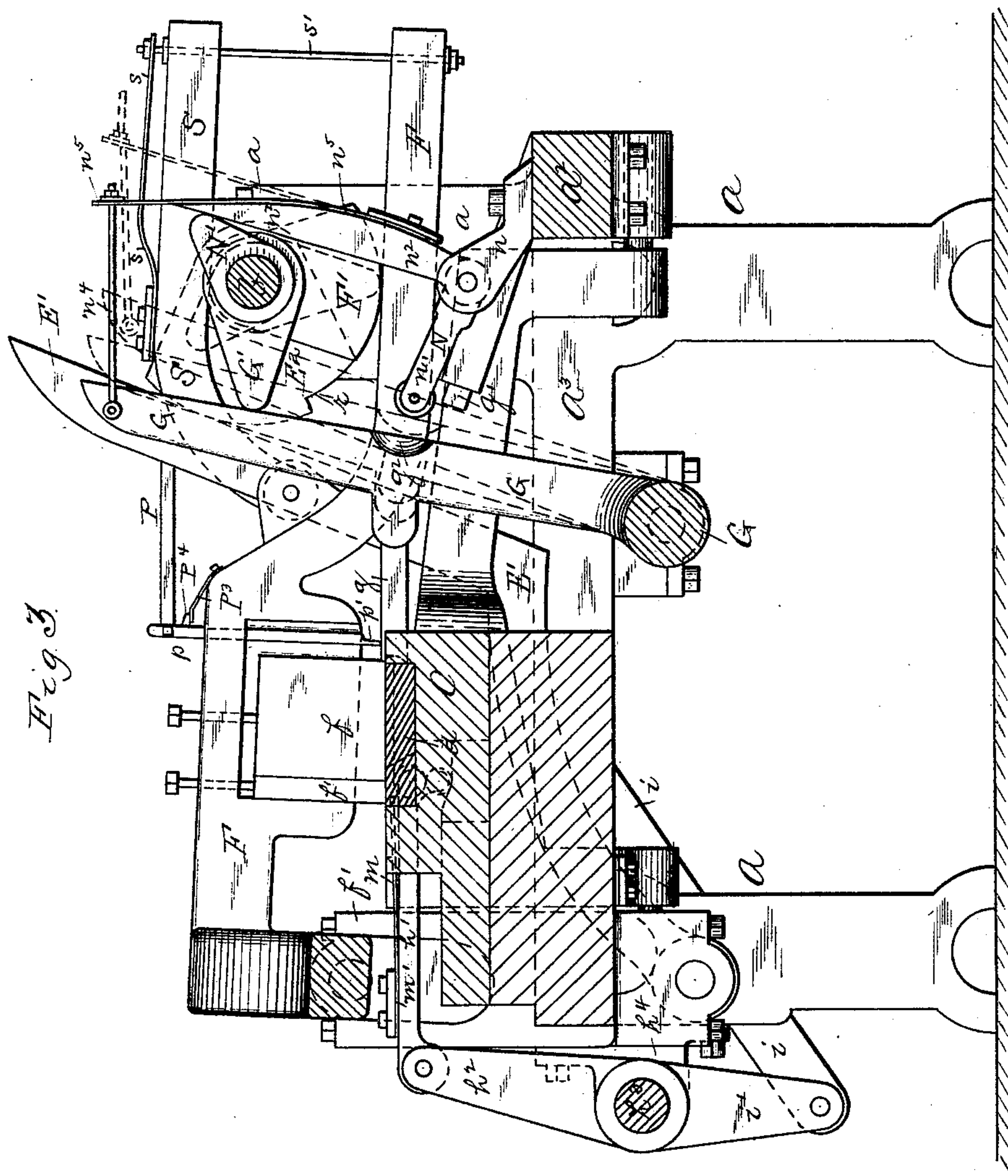
(No Model.)

5 Sheets—Sheet 3.

J. W. BOWMAN.
SPIKE MACHINE.

No. 415,494.

Patented Nov. 19, 1889.



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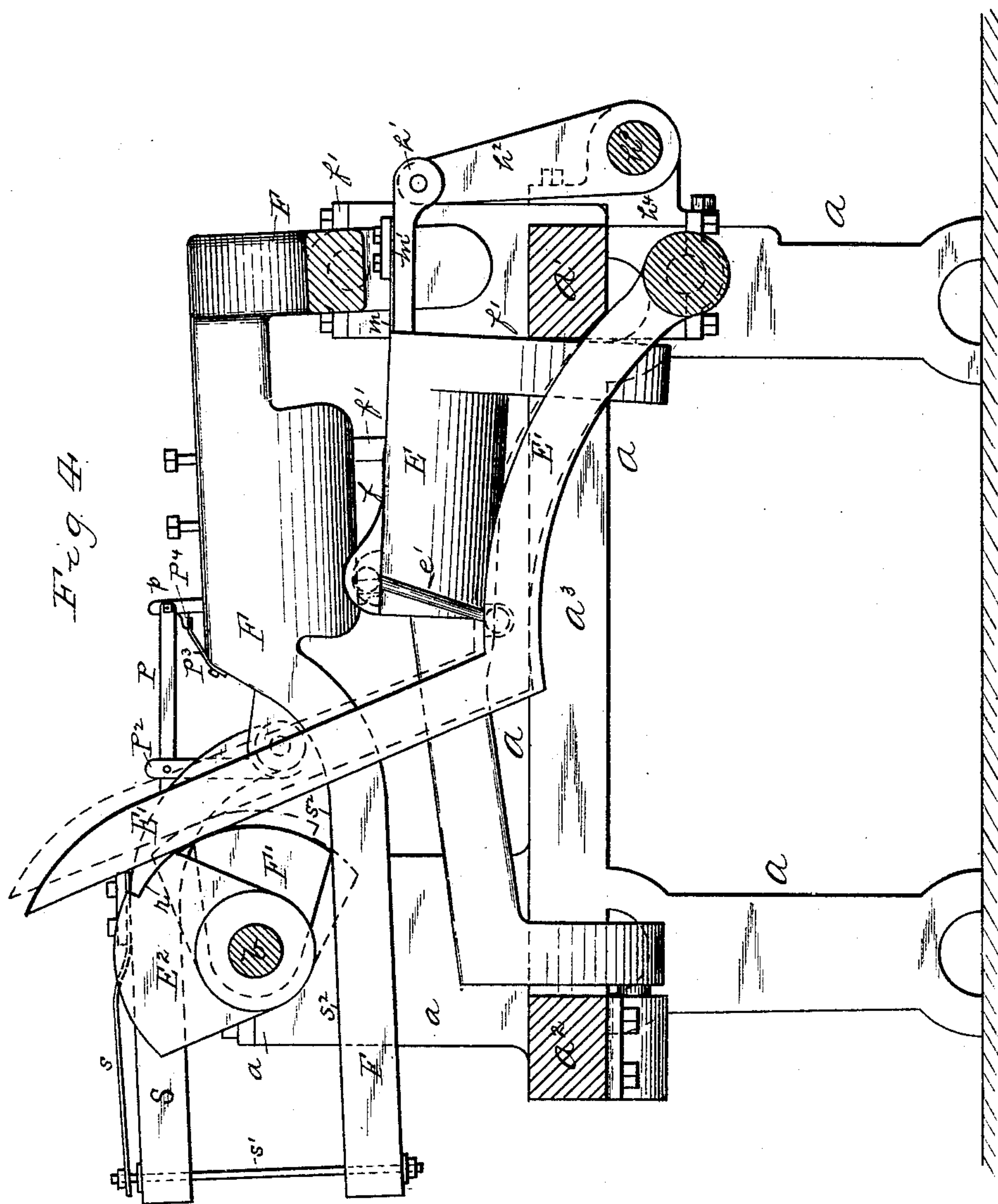
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5 Sheets—Sheet 4.

J. W. BOWMAN.
SPIKE MACHINE.

No. 415,494.

Patented Nov. 19, 1889.



Witnesses:

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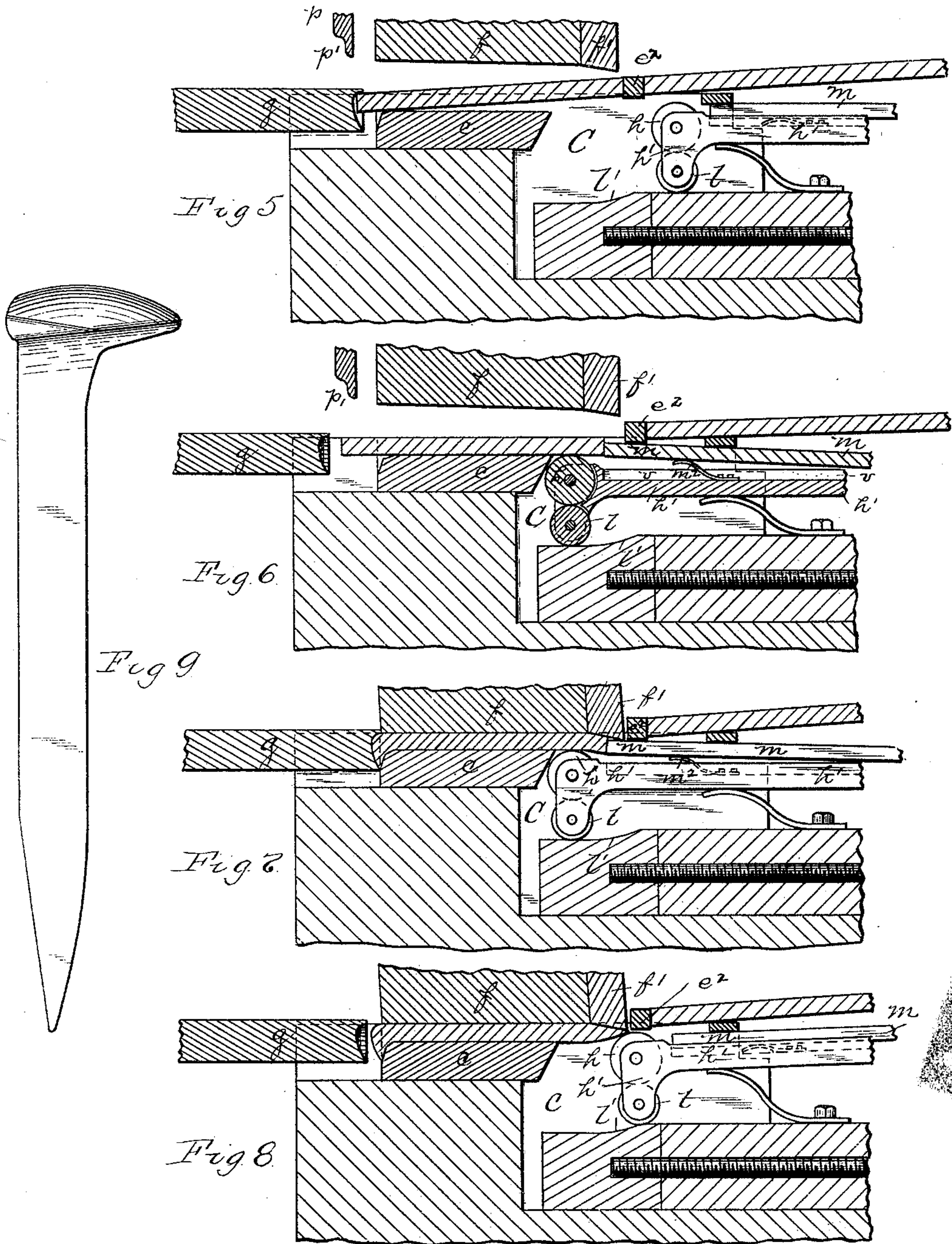
(No Model.)

5 Sheets—Sheet 5.

J. W. BOWMAN.
SPIKE MACHINE.

No. 415,494.

Patented Nov. 19, 1889.



Witnesses:

J. H. Barker
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Inventor
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By James S. Day
Attorney

UNITED STATES PATENT OFFICE.

JOSEPH WM. BOWMAN, OF PITTSBURG, PENNSYLVANIA.

SPIKE-MACHINE.

SPECIFICATION forming part of Letters Patent No. 415,494, dated November 19, 1889.

Application filed July 25, 1889. Serial No. 318,641. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH WM. BOWMAN, a resident of Pittsburg, in the county of Allegheny and State of Pennsylvania, have
5 invented a new and useful Improvement in Spike-Machines; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to spike-machines, its
10 object being to improve the construction of this class of machines in certain particulars. In certain classes of spikes adopted as the standard by certain railroads it is required that the head of the spike shall be heavy, and
15 at the same time that the point of the spike shall be formed a particular shape, which cannot be produced by compression between dies, and is therefore necessarily rolled. On account of the size of the heads of these spikes,
20 it is found practically impossible to form them in the automatic spike-machines in which the blank is pointed and cut from the bar through the medium of rolls and then fed to the heading mechanism, and the only
25 way in which these spikes have heretofore been successfully produced has been to feed the blank to a regular spike-machine for heading the same, and subsequently to feed the headed blank to a separate machine for
30 rolling the point thereon. This not only requires the employment of extra men, but there was liability of the blank becoming too cold to be properly drawn in the pointing-machine, and consequently a large number of
35 waste or imperfect spikes have been formed.

One object of my invention is to so improve the construction of the ordinary spike-machine as to enable it to both form the large
40 head in the blank and to roll the point thereon, so forming the finished spike at one operation.

My invention also relates to the operation of the bender employed to bend the "head
45 end of the blank," so as to bring it in proper position for heading; to the operation of the top gripping-lever and the side gripping-lever, and to other improvements in the construction of the machine, all of which will be
50 more fully hereinafter described and specifically claimed.

To enable others skilled in the art to make

and use my invention, I will describe the same more fully, referring to the accompanying drawings, in which—

Figure 1 is a plan view of a spike-machine 55 embodying my invention. Fig. 2 is a side view of the side gripping-die, its operating-levers being removed. Fig. 3 is a longitudinal section on the line 3 3, Fig. 1. Fig. 4 is a longitudinal section on the line 4 4, Fig. 1. 60 Figs. 5, 6, 7, and 8 are detail views showing the different steps in making the spike; and Fig. 9 is a side view of the finished spike.

The machine in connection with which I have illustrated my invention, and to which 65 I prefer to apply it, is what is known as the "Koplin Spike-Machine," and, as such spike-machine is well known in the art, I will only describe the same in general terms, except where it is found necessary to particularly describe the parts in order to bring out 70 the improvements desired to be covered.

The machine-bed A has mounted in bearings *a* at the rear thereof the driving-shaft *b*, which, through suitable cam mechanism, 75 operates the different parts of the machine, as hereinafter described. Supported on the body A is the stationary die-bed C, which supports the stationary bottom die *c* and the stationary side die *d*, together with the stationary knife *d'* of the shear. The movable 80 side die E is pivoted to the front and rear cross-beams A' A² of the machine, and is operated by the lever E', pivoted to the front cross-beam A', and extending back and engaging with the cam E² on the shaft *b*, the 85 side gripping-lever E and its operating-lever E' being connected by a toggle-bar *e'*. The gripping-lever E carries the side gripping-die *e* and also the movable knife or blade *e'* of 90 the shear. Mounted in standards *f'* at the forward end of the machine is the top gripping-lever F, which extends back and under the driving-shaft *b*, being operated by the cam F'. This lever carries the top gripping- 95 die *f*. Mounted on bearings depending from the longitudinal side beams A³ of the body of the machine is the heading-lever G, which extends up in front of the driving-shaft *b* and is operated by the cam G', this heading-lever 100 G carrying the header *g*. These parts are those generally employed in the spike-ma-

chine, and are shown as illustrative of any suitable form of spike-machine to which my invention may be applied, and, except as hereinafter described, may be considered as of the ordinary construction, so that a more particular description thereof will not be found necessary.

In the formation of the ordinary spike by such machine the blank, after being cut by the shears; is grasped by the side dies d and e and the bottom die c and top die f , these dies forming the die-box, and is held thereby during the heading operation, the die being pointed by compression between the stationary bottom die and the reciprocating top die, which are of suitable form for the purpose. In providing for the formation of rolled points upon the blank I remove the forward part of the stationary bottom or "heading" die c , so as to provide space for the roller h and provide for the rolling of the point on the blank. This roller h is carried in a roller-holder h' , connected to the crank-arm h^2 on the shaft h^3 , which is mounted in bearings h^4 in front of the machine. The shaft h^3 is operated through the crank-arm i' , to which, through the connecting-bar i , motion is imparted by the pivoted cam-box K , which is operated by the cam K' on the drive-shaft b , said cam-box being pivoted at a suitable point below the driving-shaft b , as at K^2 .

The roller-holder h' carries not only the pointing-roller h , but a guide-roller l below the same and in contact therewith, which travels upon the bottom pointing-guide l' , the upper face of this guide corresponding in shape to the point to be rolled upon the spike, the point end of the spike being confined by the top pointing-die f' and the side dies d and e , and as the roller-holder is drawn back the pointing-roller h being caused by the bottom guide l' to travel in such course as to roll out the point against the pointing-die f , which is then held stationary. It is evident that as an equivalent construction the guide-face l' may be formed on the roller-holder and the roller l be mounted on the die-bed, the action being the same in each case. Supported on the reciprocating roller-holder h' is the guiding-bar m , for bringing the blank to its proper position longitudinally in the die-box and supporting it against end-thrust during the heading operation, so insuring the proper position of the blank for pointing, and consequently the formation of a practically perfect point on the blank at each stroke of the machine. This guide-bar m is pivoted near the forward end of the roller-holder h' , as at m' , and it preferably fits into a longitudinal groove or depression v , formed in the upper surface of the roller-holder, being raised therefrom by a spring m^2 , but being partially forced down into the depression in the roller-holder by the pointing-die f' during the gripping of the blank by the dies. The spring m^2 acts, however, to hold the bar in a raised position, so that as soon as the blank is cut

from the bar by the shears the end of the bar will engage with the forward end of the blank, and as the roller-holder is moved back will force the blank into the proper position before it is engaged by the gripping-dies, and as the gripping-dies engage with the blank the top pointing-die f' simply presses the guiding-bar m sufficiently out of the way to enable it to assume its proper position and impart the initial bend to the point end of the blank. The cam K' , which operates this mechanism, acts to impart the necessary movements thereto through the cam-box K , the cam pressing upon the forward face k of the cam-box to force the roller-holder back over the bottom guide l' and into position for drawing the spike and pressing upon the rear face k' of the cam-box to draw forward the roller-holder and its pointing-roll h , so as to roll the blank against the pointing-die f' . I have shown the cam-box K as pivoted near the base of the machine, and I prefer this construction for the reason that it can be properly supported without occupying too much space in the upper part of the machine, and the desired movement can still be obtained therefrom. It is evident, however, that the cam-box could be mounted in sliding guides, if desired.

In order to provide a proper measure for cutting the blank to the proper length, I arrange the heading-lever so that it will be held in proper position for a stop or guide in cutting the proper length of blank, and will subsequently be withdrawn sufficiently to permit the bar m to push forward the blank into proper position in the die-box, and also to leave the forward end clear to be operated upon by the bender, as will be hereinafter described. This I accomplish in the following way: The heading-lever G is forced forward by the cam G' , above referred to, and when it retracts the full distance rests against a stop g' . The heading-lever carries on one side thereof a lug g^2 , which engages with the free end of the crank-lever N , pivoted in bearings n on the rear cross-beam A^2 of the machine, the rear arm n^2 of said lever extending up into line with the cam N' , and the forward arm n' of the lever engaging with the lug g^2 of the heading-lever when the crank-lever N is in its normal position, and so holding the heading-lever in a position in front of its rest g' , and causing it to act as a gage for cutting the blank, the blank being thrust against the head of the lever and then cut from the bar. When, however, this is accomplished, the cam N' passes against the rear arm n^2 of the crank-lever N , and so raises the arm n' thereof, drawing it free from the lug g^2 and permitting the heading-lever to pass back against the rest g' . The upper ends of the heading-lever G and the arm n^2 of the lever N are connected by a suitable bar n^4 , extending from the lever G to a spring n^5 , secured to the arm n^2 , and this spring acts to draw back the heading-lever against

the rest g' as soon as the arm n' is drawn out of engagement therewith, and at the same time it also acts to draw the crank-lever N back into its normal position as the cam G' advances the header for the heading-stroke, so bringing this mechanism back to its normal position.

In this class of spike-machines it has never been considered practical to apply a bender to impart the initial bend to the head end of the blank, though such initial bend was considered desirable as reducing the labor of the header. To accomplish this I employ a sliding bender p , which passes through the top gripping-lever, as shown in the drawing, the lower end of the bender extending in front of the top die f , and on its bending stroke the bending-finger p' passing in front of the header d , but rising clear thereof during the heading operation. This sliding bender is operated in the following way: On the driving-shaft b is secured a cam P' , which operates the bending-lever P , which is mounted in a bearing P^2 , secured to the top gripping-lever F , the sliding bender being pivoted at the forward end of the lever P . The sliding bender is raised by a spring P^3 engaging with a lug P^4 thereon, and its upward movement is limited by the screw-gage p^3 on the bearing P^2 . The throw of the sliding bender is regulated by the bolt p^5 , passing through the rear end of the lever P , which bolt engages with the cam P' .

As it is desirable after the cutting of the blank by means of the shears that the blank shall be free to drop upon the bottom die e before it is tightly gripped by the side die e , I have constructed the cam E^2 , for operating the side gripping-lever E and its operating-lever E' , with a depression or cut-away portion at the forward end of the cam, as at r . This depression r provides for the forcing of the lever E' and side gripping-lever E a sufficient distance for the cutting of the blank and bringing the side gripping-die e close to the bottom die, so as to retain the blank within the die-box, but leaving the blank free to move in the die-box, so that the guiding-bar m can force it to its proper position longitudinally therein. As the cam e^2 is turned further this depression r is passed, and the full face of the cam, through the lever mechanism, forces the die e to grip the blank and hold it during the heading operation.

In order to raise the top gripping-lever and hold it in contact with the cam F' operating the same, it has heretofore been considered necessary to carry a bar from the same to a large spring supported in the upper part of the building containing the spike-machine, and this spring necessarily yielded to the length of stroke of the rear end of the lever as it was forced down by the cam, while a strong spring was required on account of the weight of the top gripping-lever. This connection with the building was of course considered objectionable, and I have overcome

the necessity for the same, and at the same time have reduced the distance of movement of the supporting-spring. This I accomplish by pivoting to the top gripping-lever an arm S , which passes over the top of the cam F' and extends back beyond the same. On this arm S is secured the spring s , and extending between said spring s and the rear end of the lever F is a bar s' . It is found that in the ordinary form of the cam F' there are only a few inches difference in the different diameters thereof, and that while said cam acts to force the lever F downwardly, as soon as the rear end of it, holding the face s^2 , passes from contact with the lever F , the forward end of its holding-face strikes against the arm S , and through said arm a spring raises the lever F , while any inequality in the diameter of the cam is accommodated for through the pivoting of the arm S and through the spring s . I am thus enabled to provide for the raising of the top gripping-lever through the movement of its cam, and also require a much shorter movement of the spring for the purpose.

The machine may of course have the ordinary guides and other like connections usually employed with such machines, such as the discharging-arm or "knocker-out" t , for discharging the blank from the die-box.

In forming spikes by such spike-machines having my improvements applied thereto, after the proper heating of the blank it is fed over the roller-holder h against the header g , and by the movement of the shears is cut from the bar. The roller-holder h' then advances and the guiding-bar m thereon pushes the blank into the proper position longitudinally for heading, while at the same time the header g recedes sufficiently to permit the blank to be brought to the proper position. As the blank may thus be fed over the pointing-roller, the feeding of the machine is not changed, and the movement of the pointing-roller may be directed by a guide supported on the stationary die-bed of the machine, so insuring strength of parts. The action of the guiding-bar is to bring the point end of the blank into such position within the die-box that when it is held therein the exact amount of metal is exposed to the action of the pointing-roller h to enable it to draw out the point against the top pointing-die f' and to form a perfect finished point without having any surplus metal, this guiding-bar therefore performing a very important function in the operation of pointing the blank. The blank is then gripped by the top, bottom, and side dies and the initial bend imparted to the head thereof by the sliding bender p . As the top die is forced down, its pointing-die f' presses upon the forward or point end of the blank, and in so doing bends the same slightly, and also depresses the guide-bar m , which descends out of the way of the blank, an important function being thus performed by the movable pointing-die carried by the top gripping-lever, as it

may by bending the point end of the blank impart the shape to one side of the point, except as that side is lengthened by the action of the pointing-roller. The blank is then
 5 headed by the header *g* while it is held by means of the several dies forming the die-box and by the guide-bar *m*. As soon as the heading operation is completed through the mechanism above described the pointing-roller *h*
 10 is drawn forward, being raised by the bottom guide *l'* and rolling the point end of the blank against the pointing-die *f'*, and so drawing out the point of the spike and imparting the desired form thereto. This completes the
 15 formation of the spike, and it is then discharged from the die-box by the knocker-out, the bar again fed in, the blank cut off, and the operation repeated. In this operation I am enabled to roll the point of the blank ac-
 20 curately to shape, since I am enabled to bring the blank into proper position longitudinally for such rolling operation by means of the guide bar or stop *m* on the roller-holder, which always carries the blank into such position
 25 that, considering the metal contained in the blank and the point to be formed thereon, the exact amount of metal required for rolling the point shall be presented to the roller, and on the forward stroke of the pointing-roller
 30 shall be rolled against the upper die, an accurate adjustment of the parts for the production of such result being made according to the shape and size of each spike to be formed.

I am therefore enabled to form both the
 35 enlarged head and rolled point on the spike, so producing the standard railroad-spike in a single machine and while at a high heat sufficient to insure the production of the perfect spike, and also doing away with the ex-
 40 tra workmen employed with the separate pointing-machine.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a spike-machine, the combination of
 45 a movable top die having a top pointing-die, a stationary bottom die, and a pointing-roller at the end of the bottom die below the blank and moving longitudinally to draw out the point against the top pointing-die, substan-
 50 tially as and for the purposes set forth.

2. In a spike-machine, the combination of a die-box having a pointing-die, a header, a pointing-roller moving longitudinally to draw out the point against said pointing-die, and a
 55 guide bar or stop to direct the blank to proper position longitudinally within the die-box, substantially as and for the purposes set forth.

3. In a spike-machine, the combination of a die-box having a pointing-die, a header, a
 60 longitudinally-reciprocating roller-holder carrying a roller at the end thereof, and carrying a guide-bar to direct the blank to proper position within the die-box, substantially as and for the purposes set forth.

65 4. In a spike-machine, the combination of a die-box having a vertically-movable pointing-die, a header, a longitudinally-moving

pointing-roller to draw out the point against the pointing-roller, and a guide-bar to direct the blank to position in the die-box, said
 70 guide-bar being vertically movable, substantially as and for the purposes set forth.

5. In a spike-machine, the combination of a die-box having a vertically-movable pointing-die, a header, and a longitudinally-recip-
 75 rocating roller-holder carrying a pointing-roller at the end thereof and having a spring-actuated vertically-movable guide-bar to direct the blank to position within the die-box, substantially as and for the purposes set forth. 80

6. In a spike-machine, the combination of the header *g*, the stationary die-bed *C*, carrying the bottom die *c*, side die *d*, and bottom
 pointing-guideway *l'*, the movable side die *e*, the movable top die *f* and pointing-die *f'*,
 85 and the reciprocating roller-holder *h'*, carrying the pointing-roller *h*, fitting within the die-box, and the guide-roller *C*, substantially as and for the purposes set forth.

7. In a spike-machine, the combination, with
 90 the die-box, of the roller-holder carrying the pointing-roller at the end thereof, the crank-arm *h*², shaft *h*³, crank-arm *i'*, cam-box *K*, connecting-bar *i*, and cam *K'*, substantially as and for the purposes set forth. 95

8. In a spike-machine, the combination, with the die-box, of the roller-holder carrying the pointing-roller at the end thereof, the crank-
 arm *h*², shaft *h*³, crank-arm *i'*, the cam-box *K*, pivoted at *K*², cam *K'*, working therein, and
 100 connecting-bar *i* between the cam-box and crank-arm *i'*, substantially as and for the purposes set forth.

9. In a spike-machine, the combination, with a die-box, of the side gripping-lever *E*, its op-
 105 erating-lever *E'*, and the cam *E*², having the depression or cut-away portion *r*, substantially as and for the purposes set forth.

10. In a spike-machine, the combination, with the die-box, of a header, a heading-lever
 110 carrying the same, provided with a lug at one side thereof, and an arm engaging with said lug on the heading-lever to hold the lever in proper position to act as a guide for the cut-
 115 ting of the blank, substantially as and for the purposes set forth.

11. In a spike-machine, the combination, with the die-box, of a header, a heading-lever
 120 carrying the same, provided with a lug at one side thereof, and an arm engaging with said lug on the heading-lever to hold the lever in proper position to act as a guide for the cut-
 125 ting of the blank, and a reciprocating guide-bar to move the blank within the die-box after it is cut, substantially as and for the purposes set forth. 130

12. In a spike-machine, the combination, with the die-box, of a header, a heading-lever
 135 carrying the same, provided with a lug at one side thereof, an arm engaging with said lug on the heading-lever to hold the lever in proper position to act as a guide for the cut-
 140 ting of the blank, a rest *g'* for said heading-lever, and a cam acting to draw said arm out

of engagement with said lug, substantially as and for the purposes set forth.

13. In a spike-machine, the combination of the power-shaft l , heading-lever G , heading-lever cam G' , rest d' , the crank-lever N , having the arm n' , engaging with a heading-lever, the cam N' , engaging with the arm n^2 of said crank-lever, and the bar n^4 , connecting the heading-lever and the spring n^5 on the crank-lever, substantially as and for the purposes set forth.

14. In a spike-machine, the combination of a top gripping-lever pivoted forward of the die-box and extending over the same and under the driving-shaft, the cam f' in said driving-shaft, the arm S , pivoted to a lever F and passing over said cam and carrying the spring s , and the bar connecting said spring and the lever F , substantially as and for the purposes set forth.

15. In a spike-machine, the combination of the top gripping-lever F , pivoted forward of the die-box and carrying the bearing P^2 , the

bending-lever P , mounted in said bearing, the sliding bender pivoted at the forward end of the bending-lever, the spring P^3 , for raising the same, and the cam P' , operating the bending-lever, substantially as and for the purposes set forth.

16. In a spike-machine, the combination of the top gripping-lever F , pivoted forward of the die-box and carrying the bearing P^2 , the bending-lever P , mounted in said bearing, the sliding bender pivoted at the forward end of the bending-lever, the spring P^3 , for raising the same, and the cam P' , operating the bending-lever, the bolt p^5 passing through the rear end of the lever P and engaging with the cam p' , substantially as and for the purposes set forth.

In testimony whereof I, the said JOSEPH WM. BOWMAN, have hereunto set my hand.

JOSEPH WM. BOWMAN.

Witnesses:

ROBT. D. TOTTEN,
JAMES I. KAY.