

(No Model.)

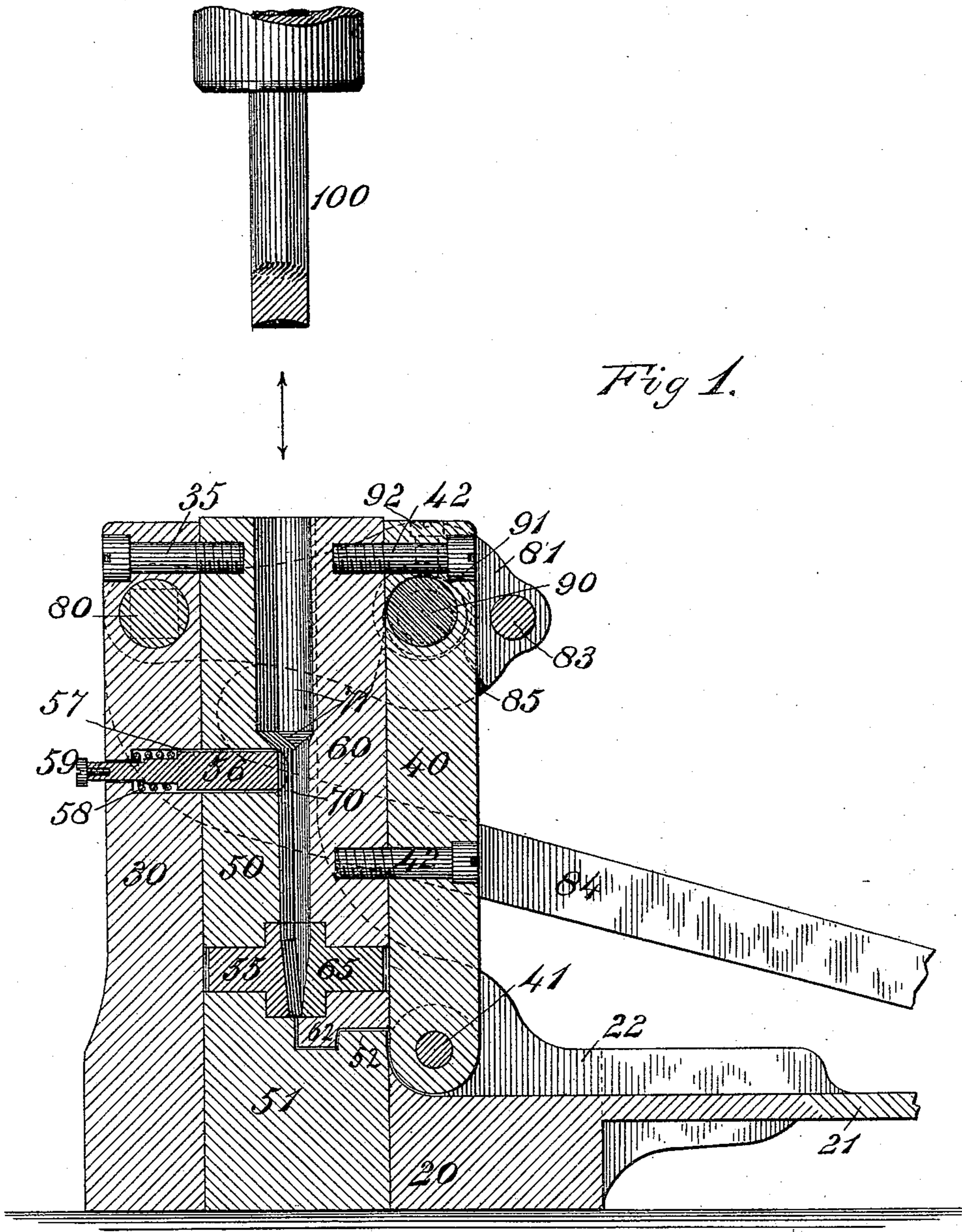
6 Sheets—Sheet 1.

E. E. ANGELL.

APPARATUS FOR MAKING RAILROAD SPIKES.

No. 454,697.

Patented June 23, 1891.



WITNESSES
E. L. Pugh
R. L. Jones.

INVENTOR
Edwin E. Angell
By J. B. Jones,
Attorney

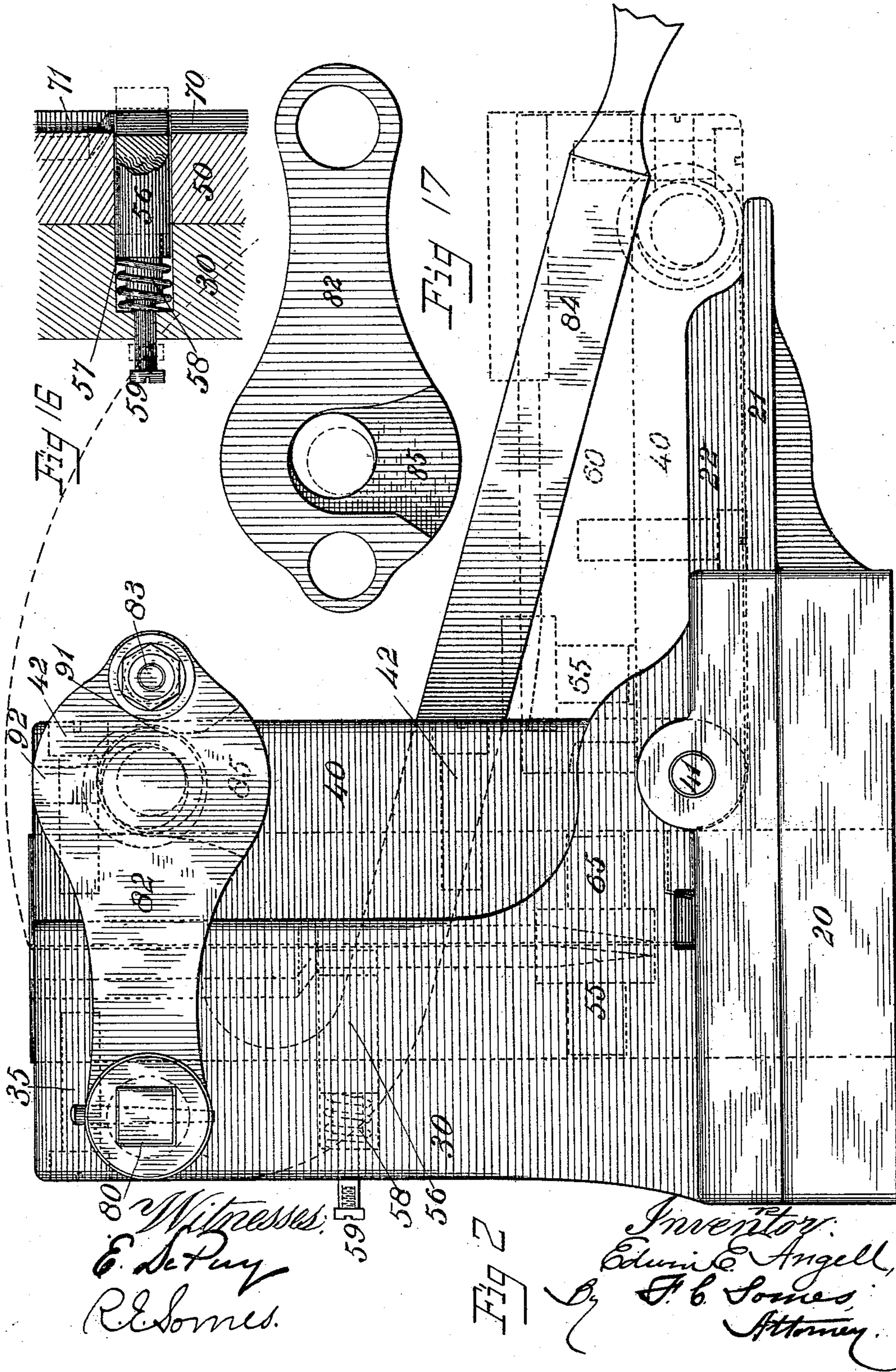
(No Model.)

6 Sheets—Sheet 2.

E. E. ANGELL.
APPARATUS FOR MAKING RAILROAD SPIKES.

No. 454,697.

Patented June 23, 1891.



E. E. ANGELL.
APPARATUS FOR MAKING RAILROAD SPIKES.

No. 454,697.

Patented June 23, 1891.

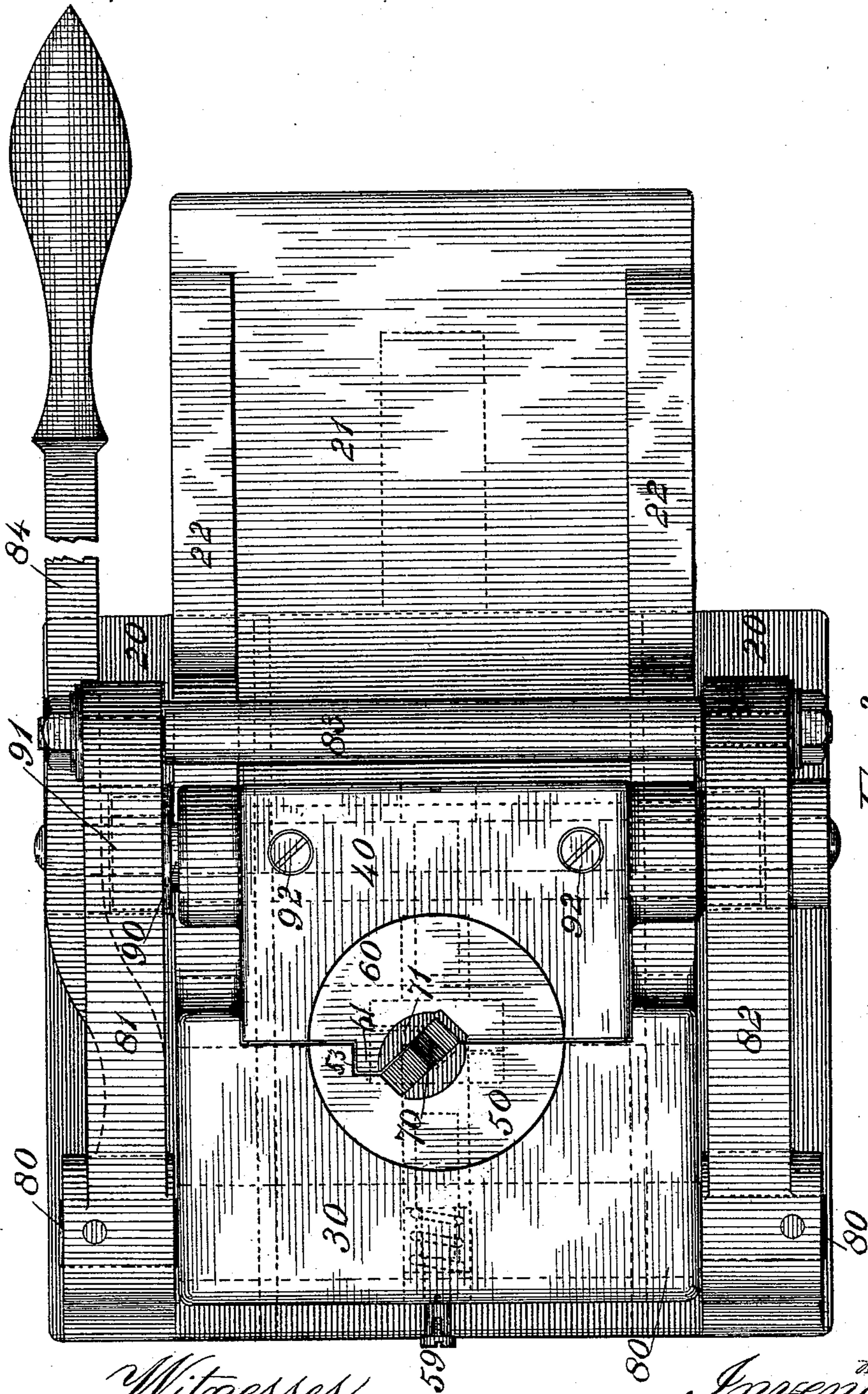


Fig. 3

Witnesses:
E. Le Roy
R. L. Somes.

Inventor
Edwin E. Angell,
By J. C. Somes,
Attorney.

E. E. ANGELL.
APPARATUS FOR MAKING RAILROAD SPIKES.

No. 454,697.

Patented June 23, 1891.

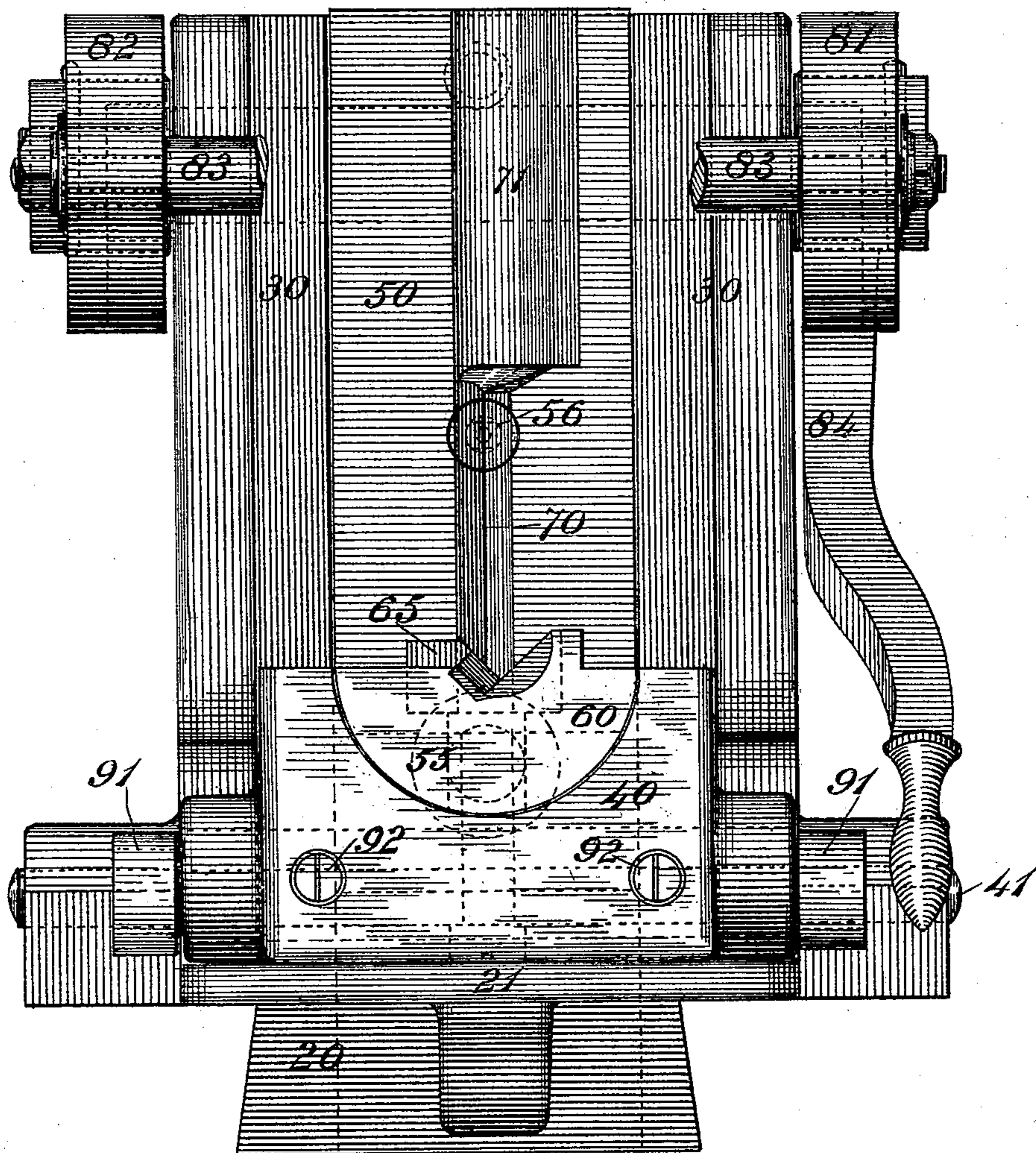


Fig. 4 -

Witnesses
E. de Puy
R. L. Somes.

Inventor
Edwin E. Angell
By J. C. Somes
Attorney.

(No Model.)

6 Sheets—Sheet 5.

E. E. ANGELL.
APPARATUS FOR MAKING RAILROAD SPIKES.

No. 454,697.

Patented June 23, 1891.

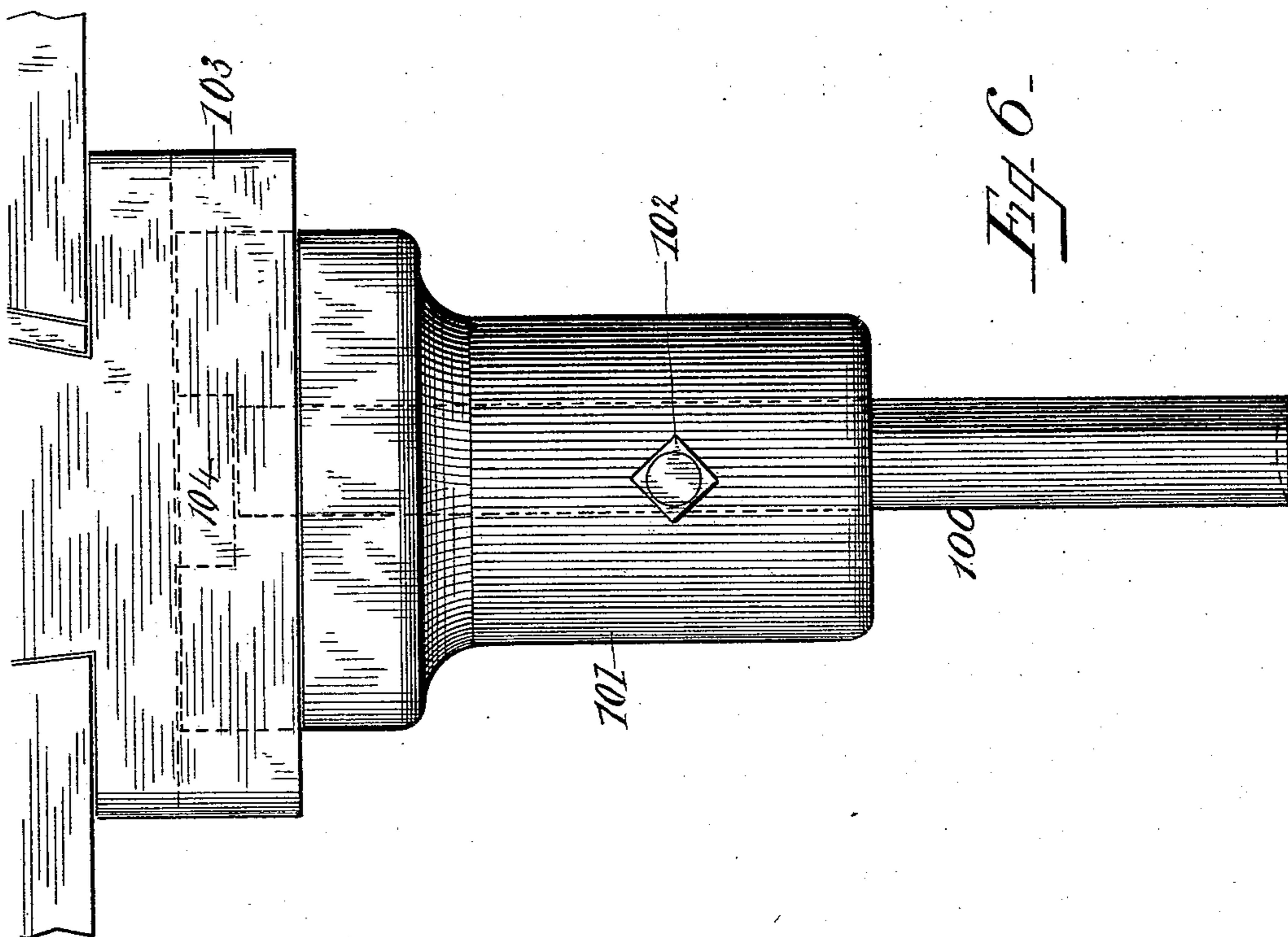


Fig. 6-

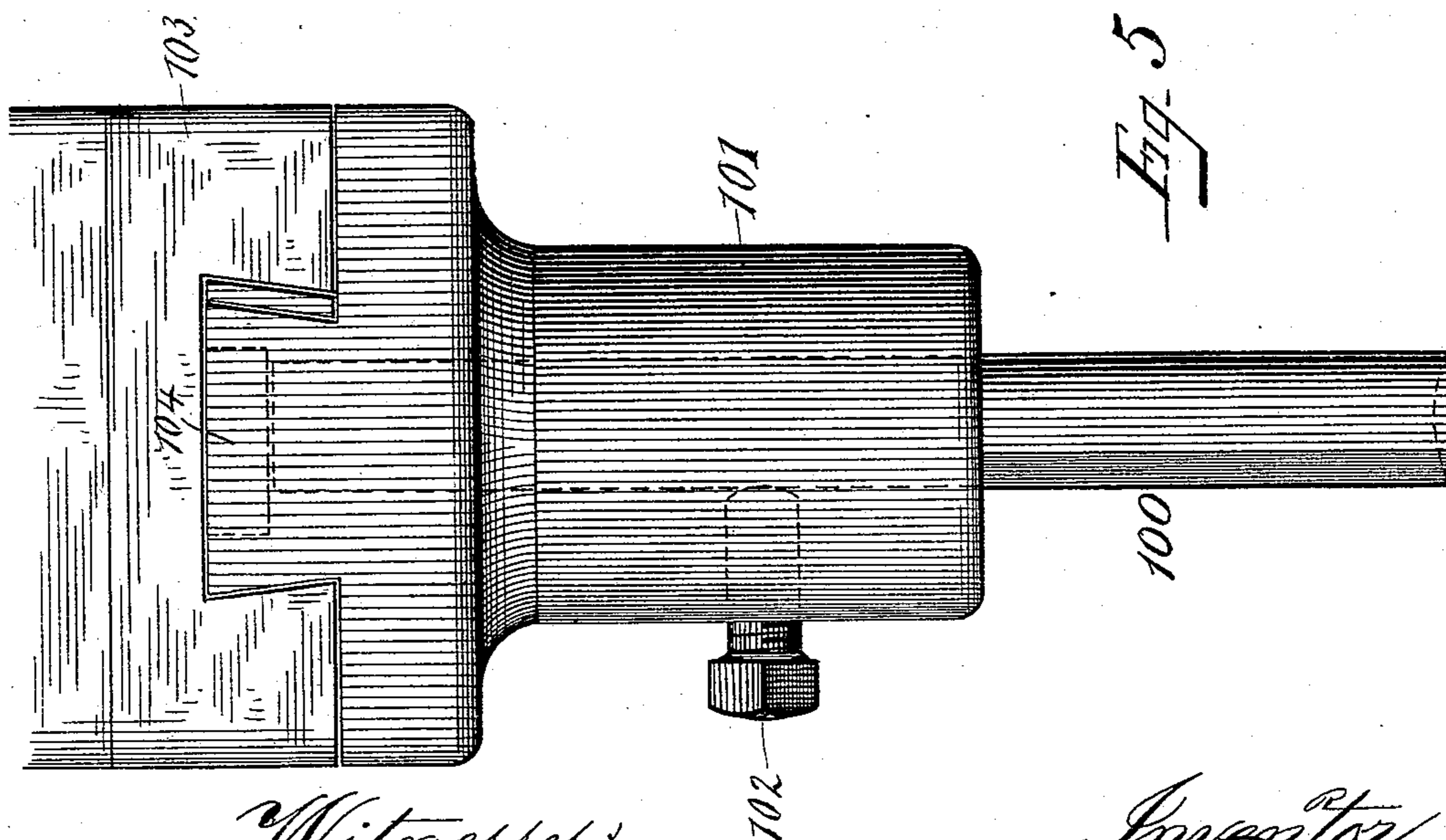


Fig. 5-

Witnesses:
E. L. Fung
R. L. Somes

Inventor
Edwin E. Angell
By J. B. Somes
Attorney

E. E. ANGELL.
APPARATUS FOR MAKING RAILROAD SPIKES.

No. 454,697.

Patented June 23, 1891.

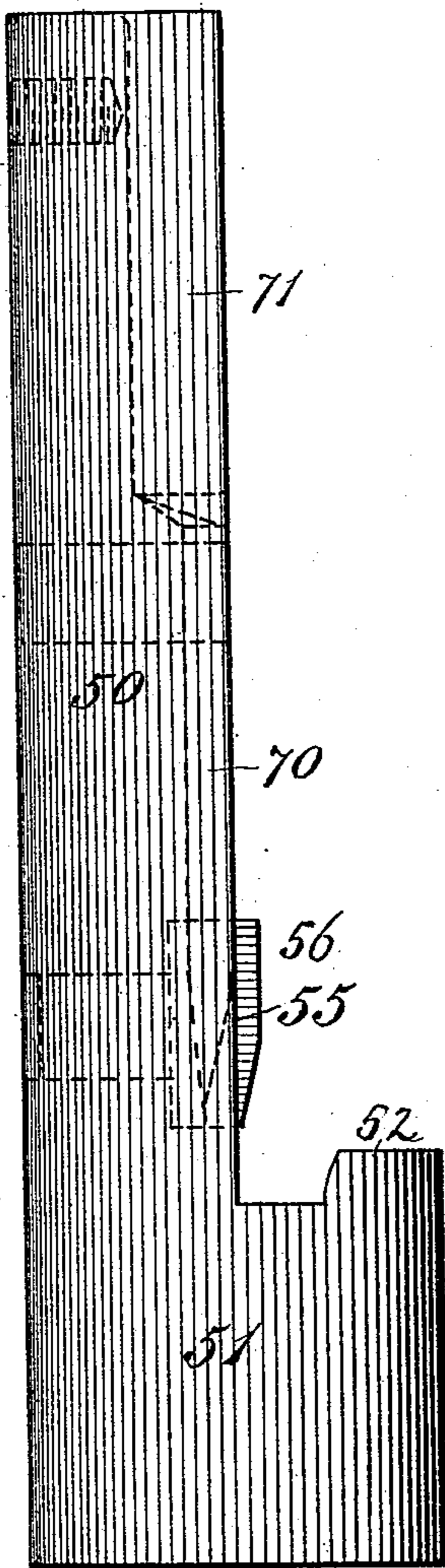
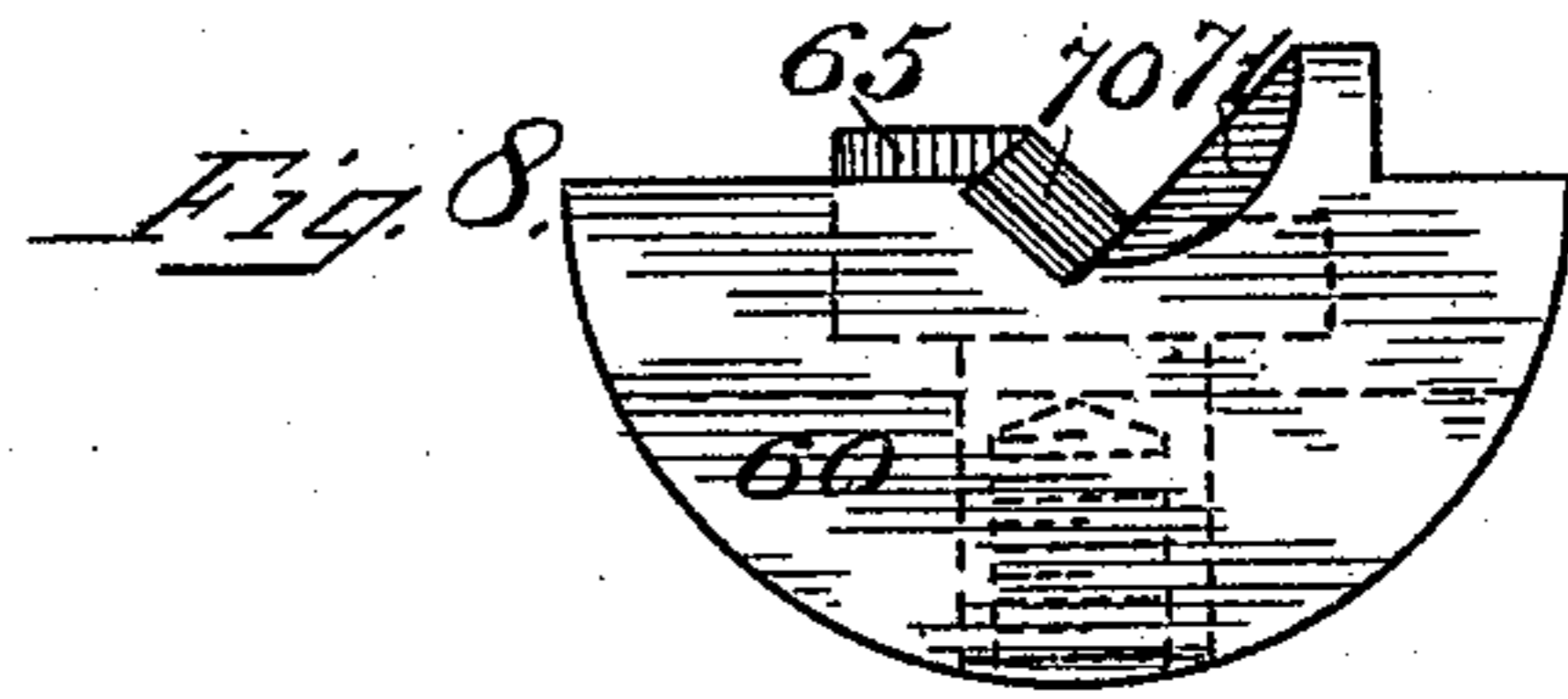
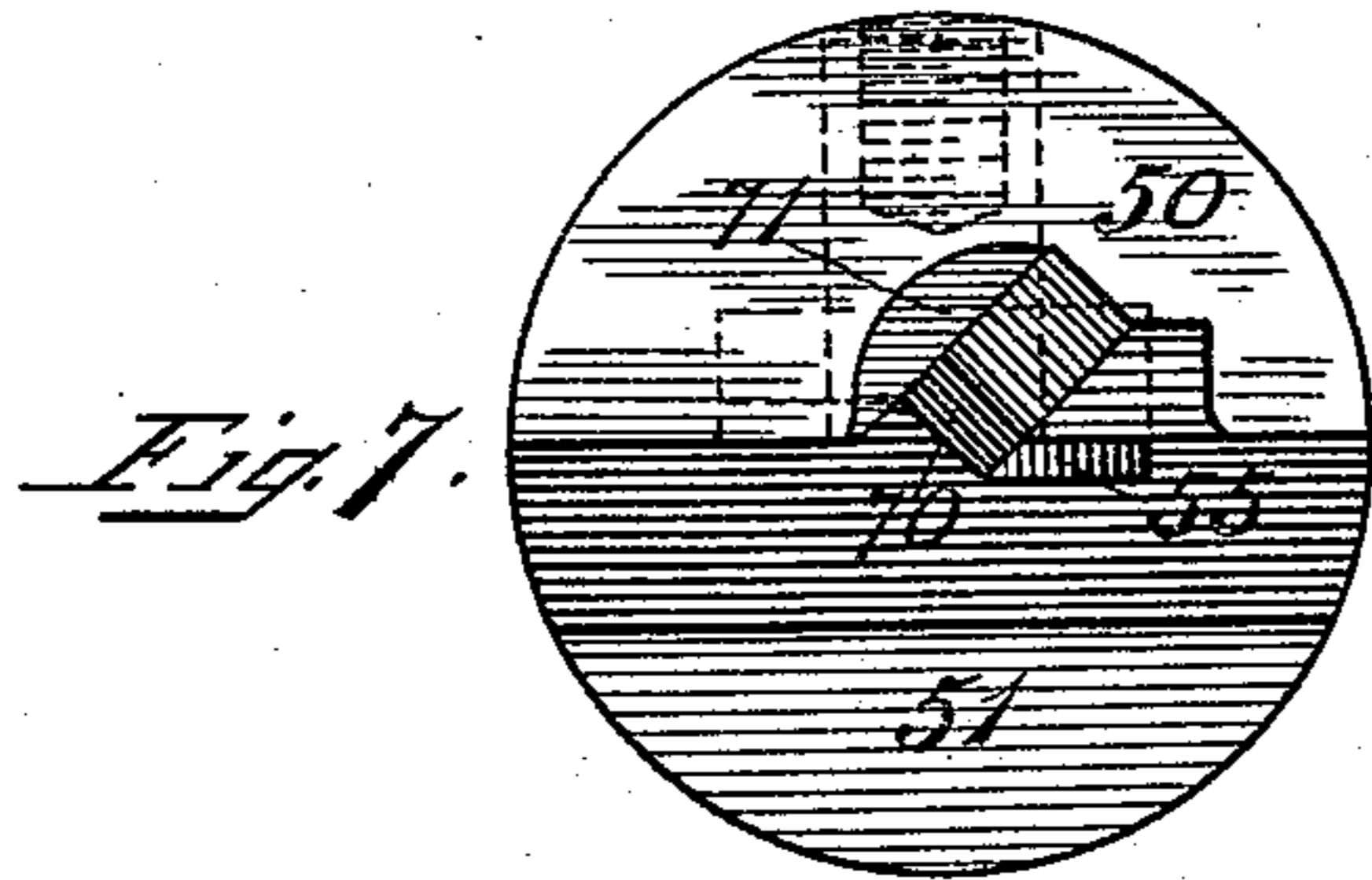


Fig. 9.

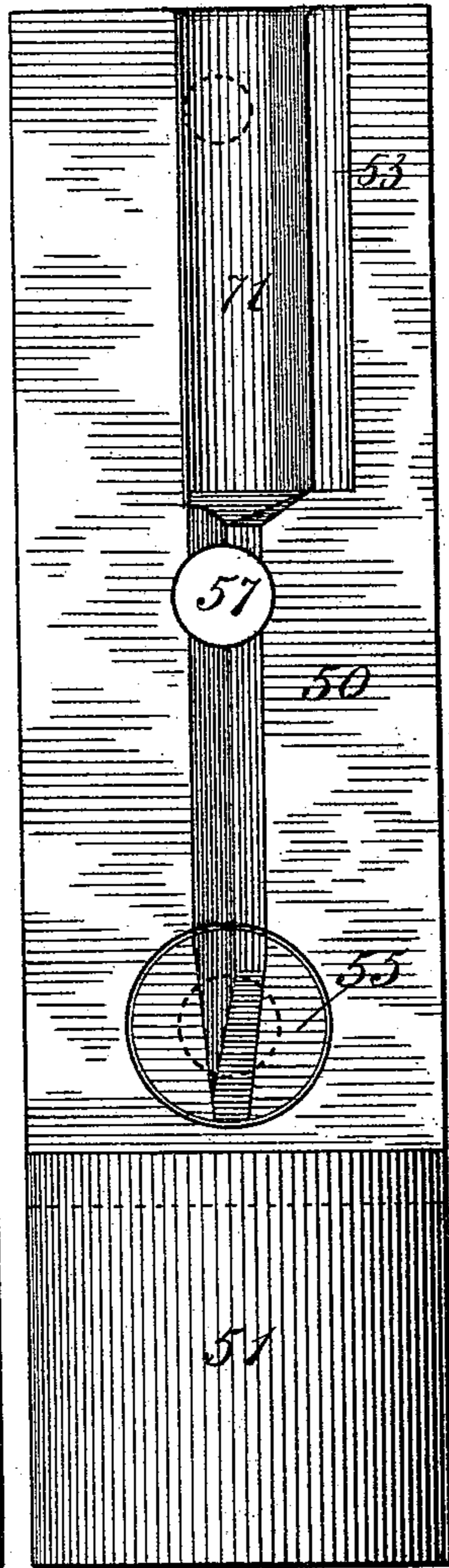


Fig. 10.

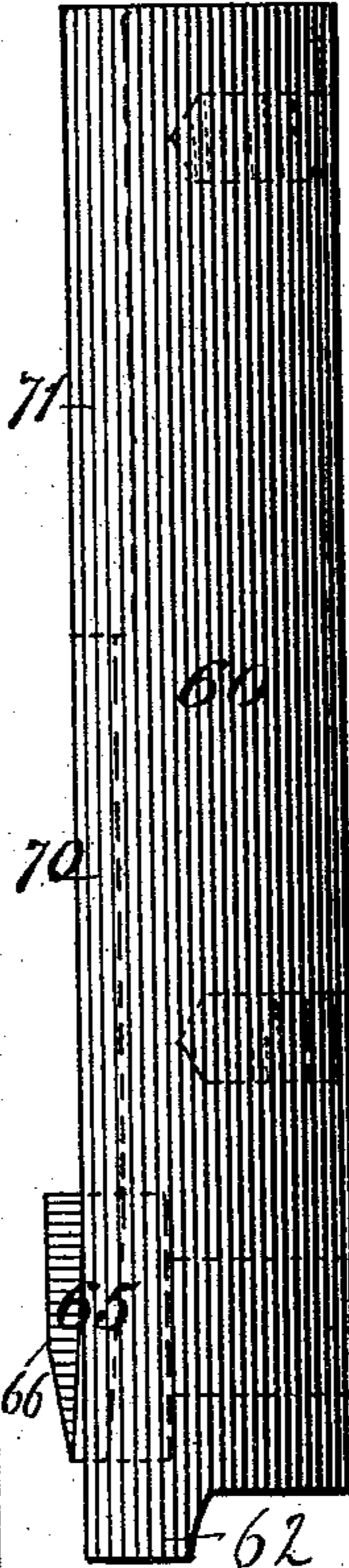


Fig. 11.

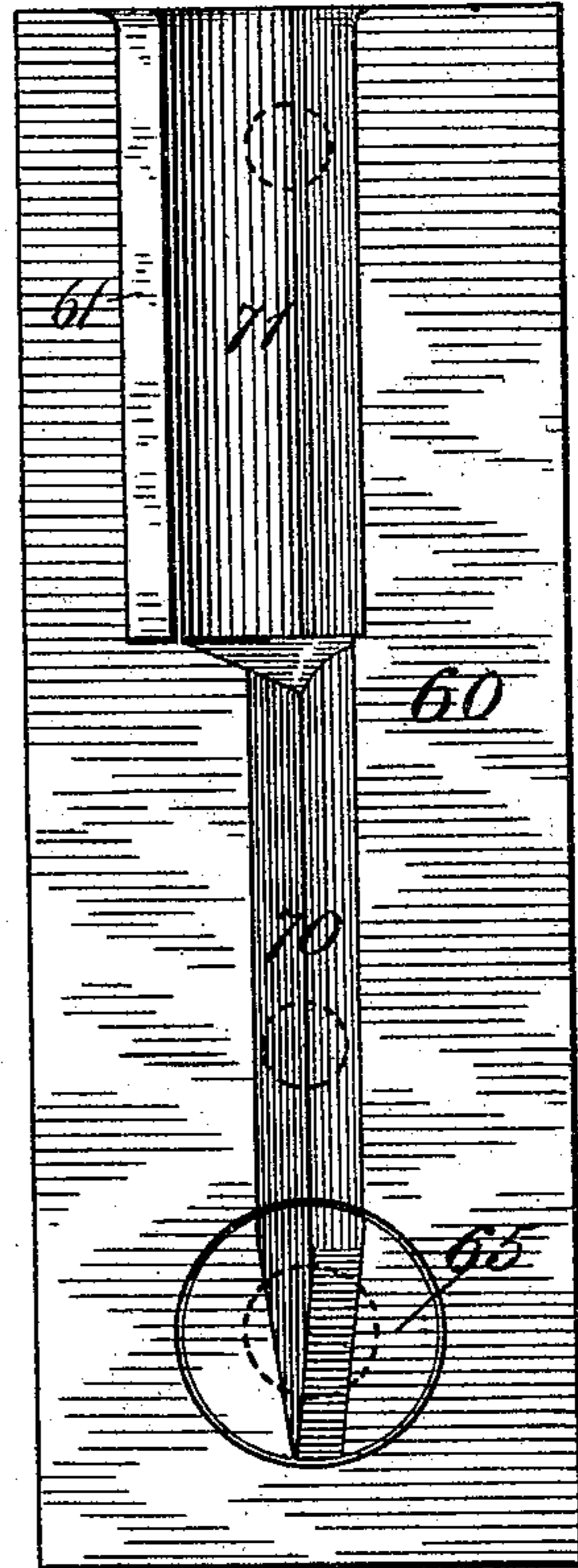
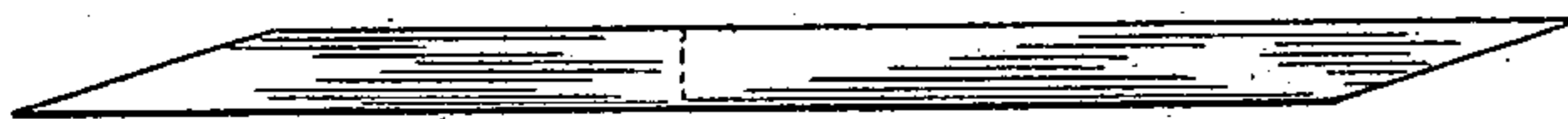
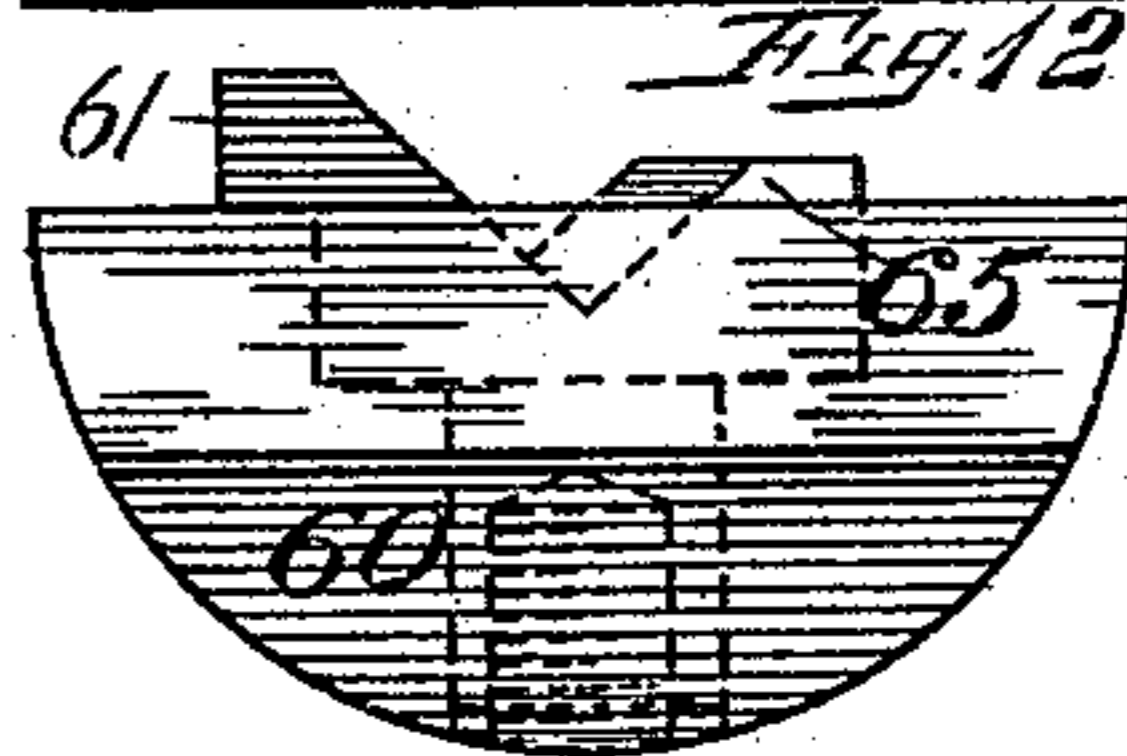


Fig. 12.



Witnesses:
E. de Troy
R. L. Somes.

Fig. 14.



Fig. 15. Invention
Edwin E. Angell.
By J. C. Somes
Attorney.

UNITED STATES PATENT OFFICE.

EDWIN E. ANGELL, OF SOMERVILLE, MASSACHUSETTS, ASSIGNOR TO THE
ELECTRICAL FORGING COMPANY, OF MAINE.

APPARATUS FOR MAKING RAILROAD-SPIKES.

SPECIFICATION forming part of Letters Patent No. 454,697, dated June 23, 1891.

Application filed February 19, 1891. Serial No. 382,043. (No model.)

To all whom it may concern:

Be it known that I, EDWIN E. ANGELL, a citizen of the United States, residing at Somerville, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Apparatus for Making Railroad-Spikes, of which the following is a specification.

This invention relates to an apparatus for carrying out the method of making railroad-spikes and similar articles described in the application, Serial No. 376,274 of myself and Stephen Porter, filed December 30, 1890. In this method the blanks are so cut as to avoid waste of stock, and the upper portion only of each blank is heated to a forging temperature, the lower portion thereof being left cool, whereby the temper of the spike body and point is preserved, and spikes of superior strength and penetrating qualities are produced in an economical manner.

In the accompanying drawings, Figure 1 represents a vertical longitudinal section of this improved spike-making apparatus. Fig. 2 represents a side elevation of this apparatus on an enlarged scale omitting the plunger, the matrix or shaping-dies being shown in closed position in full lines and in open position in dotted lines. Fig. 3 represents a plan view of the matrix. Fig. 4 represents a front elevation thereof in open position, the connecting-rod for the locking-arms being partially broken out. Figs. 5 and 6 represent side elevations of the upsetting-plunger and its support. Fig. 7 represents a top plan view of the fixed die of the matrix. Fig. 8 represents a top plan of the movable or swinging die of the matrix. Fig. 9 represents a side elevation of the detachable fixed die of the matrix. Fig. 10 represents a front elevation of said fixed die. Fig. 11 represents a side elevation of the detachable swinging die of the matrix. Fig. 12 represents a front elevation thereof. Fig. 13 represents a bottom plan thereof. Fig. 14 represents a side elevation of the blank from which a spike is formed. Fig. 15 represents a side elevation of a completed spike. Fig. 16 represents an enlarged vertical section of a portion of the standard and its fixed die, showing the die-clearer in position therein. Fig. 17 is an ele-

vation of the inner face of one of the locking-arms.

Similar numerals of reference indicate corresponding parts in the different figures. 55

The bed 20 is provided at one end with a heavy upright standard 30 and at the other end with a horizontal extension constituting a table 21, having side flanges 22. These parts are preferably cast in one piece. A block 40, facing the standard 30, is hinged at its lower end on a shaft or rod 41, supported in the flanges 22. 60

The matrix in which the spike is formed from a blank, in part cold and in part hot, is composed of two dies 50 and 60. The die 50 is fixed in the bed 20 and standard 30, and the die 60 is fixed in the hinged block 40. The die 50, composed of hardened steel, is preferably cast in semi-cylindrical form and fitted into a vertical recess of corresponding shape in the face of the standard 30. It is provided with a cylindrical foot 51, which enters a cylindrical recess or socket in the bed 20. A screw 35 passes through a screw-hole in the upper end of the standard 30 and takes into the upper end of the die 50 and serves to tightly hold it to its seat. The die 60 is preferably cast in semi-cylindrical form, and fitted in a recess of corresponding shape in the hinged block 40, being held therein by screws 42. 65 70 75 80

The dies 50 and 60 are provided with vertical recesses in their meeting faces, which form a spike-chamber 70 and a head-forming chamber 71. The spike-chamber is of a shape to correspond with the cross-section of a spike-blank and spike-body, and the head-forming chamber, which is disposed above and in line with the spike-chamber, is of a larger area in cross-section, corresponding with the size and shape of the head of the spike. The die 50 is provided with a vertical recess 53 along one side of the head-forming chamber, and the die 60 is provided with a tongue 61. 85 90 95

The top of the foot 51 of the die 50 is provided with an upward lip 52, and the lower end of the die 60 is provided with a downward lip 62. These lips interlock when the matrix is closed and serve to hold the dies at their lower ends firmly in position. 100

The dies 50 and 60 are provided opposite

the lower end or point of the spike-chamber with point-shaping dies 55 and 65, composed of separate pieces from the main dies and set into sockets therein. These point-shaping dies have interlapping lips 56 and 66 and tapering recesses corresponding in shape to the point of the spike to be formed and coinciding at their upper ends with the recesses of the main dies, of which they form a part. They may be made of harder steel than the main dies, and when worn they may be removed and new point-dies may be used with the old main dies.

The die 50 is provided with a die-clearer for throwing out the formed spike after the matrix is opened. The die-clearer herein shown consists of a small plunger 56, disposed in a slot 57 near the upper end of the spike-chamber, said plunger being grooved at its outer end to correspond with the sunken face of the die. A spiral spring 58 at the outer end of the slot actuates the plunger, and a stop-screw 59, threaded in the standard, passes into said recess and into the end of the plunger.

A shaft 80 is journaled in the upper end of the standard 30 and provided with squared ends projecting beyond said standard. Two locking-arms 81 and 82 are fastened at their rear ends to the squared ends of the shaft 80 on opposite sides of the machine. These arms are connected at their front ends by a rod 83, and one of them is provided with an actuating-handle 84. They are also provided near their front ends, on their inner faces, with cam-slots 85, opening at their lower edges. A cam-shaft 90 is journaled in the upper end of the hinged block 40 and provided at its projecting ends with rolls 91, set eccentrically thereon. These rolls are engaged by the cam-slots of the arms for locking the hinged die 60 in operative position with the die 50.

Set-screws 92 pass through the top of the block 40 into contact with the shaft 90 and prevent it from turning. By means of these screws the shaft may be adjusted so as to increase the tension of the rolls on the locking-arms and cause them to hold the dies firmly together.

A swaging-plunger 100, provided with any suitable support and actuating mechanism, is reciprocated in connection with the matrix.

In the drawings the plunger 100 is shown as inserted in a holder and clamped therein by a set-screw 102. The holder 101 is dovetailed to a support 103. A hardened-steel disk 104 is disposed at the upper end of the holder, between it and its support opposite the upper end of the plunger. This disk prevents the plunger from penetrating the softer metal of the support.

In the use of the apparatus blanks similar to that shown in Fig. 14 are employed. These blanks are of the cross section required for the spike to be produced and of a length nearly twice that of such spike, and they have

beveled points inclined in opposite directions at their opposite ends. They are economically produced by cutting a steel bar of the required size diagonally in parallel lines, waste of stock being thereby avoided. The upper portion of one of these blanks at the left of the dotted line is heated by an electric current or other suitable means of heating to a forging temperature, and the lower portion thereof at the right of the dotted line is left cool in the metallurgical sense of the term. The blank so heated is then placed in the matrix, its lower cool portion extending partially into the spike-chamber 70, the beveled end thereof resting against the angle formed by one of the inclined sides of the point-section and the heated portion standing in the chamber 71. The parts of the matrix are firmly locked together by the locking-arms 82, and then the plunger 100 is forced into the head-forging chamber 71 into contact with the blank and drives said blank downward until its beveled lower end swings into the pointed socket 72 at the lower end of the chamber 70, whereby said beveled end is bent into a central line with the body of the spike, forming the point thereof, and at the same stroke said plunger, acting in conjunction with the side and bottom of the head-forging chamber 71, upsets and forges the upper heated and softened portion of the blank into a spike-head. The handle 84 is then lifted, whereby the locking-arms 82 are disengaged from the rolls 91 of the shaft 90. The matrix of the block 40 may be swung down by a blow, whereby the matrix is opened. The plunger 56, under the action of the spring 58, then throws out the completed spike. The matrix is then closed and another blank placed therein and the operation repeated.

I claim as my invention—

1. In a spike-making apparatus, the combination of a bed provided with an upright standard, a die secured in said bed and standard, a block hinged to said bed, a die secured in said block, said dies having recesses forming a spike-chamber and a head-forging chamber in alignment therewith, a locking mechanism for securing said dies in closed position, and a plunger adapted to enter said forging-chamber.

2. In a spike-making apparatus, the combination of a bed provided with an upright standard, a die secured in said bed and standard, a block hinged to said bed, a die secured in said block, said dies having interlocking lips and recesses forming a spike-chamber and a head-forging chamber in alignment therewith, a locking mechanism for securing said dies in closed position, and a plunger adapted to enter said forging-chamber.

3. In a spike-making apparatus, the combination of a bed provided with an upright standard, a die secured in said bed and standard and provided with a foot having an upward lip, a block hinged to said bed, a die se-

5 cured in said block and provided with a downward lip adapted to engage the lip of the foot, said dies having vertical recesses forming a spike-chamber and a head-forging chamber in alignment therewith, a locking mechanism for securing said dies in closed position, and a plunger adapted to enter said forging-chamber.

10 4. In a spike-making apparatus, the combination of a bed provided with an upright standard, a die secured in said bed and standard, a block hinged to said bed, a die secured

in said block, a cam-shaft journaled in said block and projecting at opposite sides thereof, a shaft journaled in said standard, and 15 locking-arms attached at their rear ends to said shaft and provided at their front ends with cam-slots engaging said cam-shaft, substantially as described.

EDWIN E. ANGELL.

Witnesses:

GEO. D. BURTON,
CHESTER MARR.