

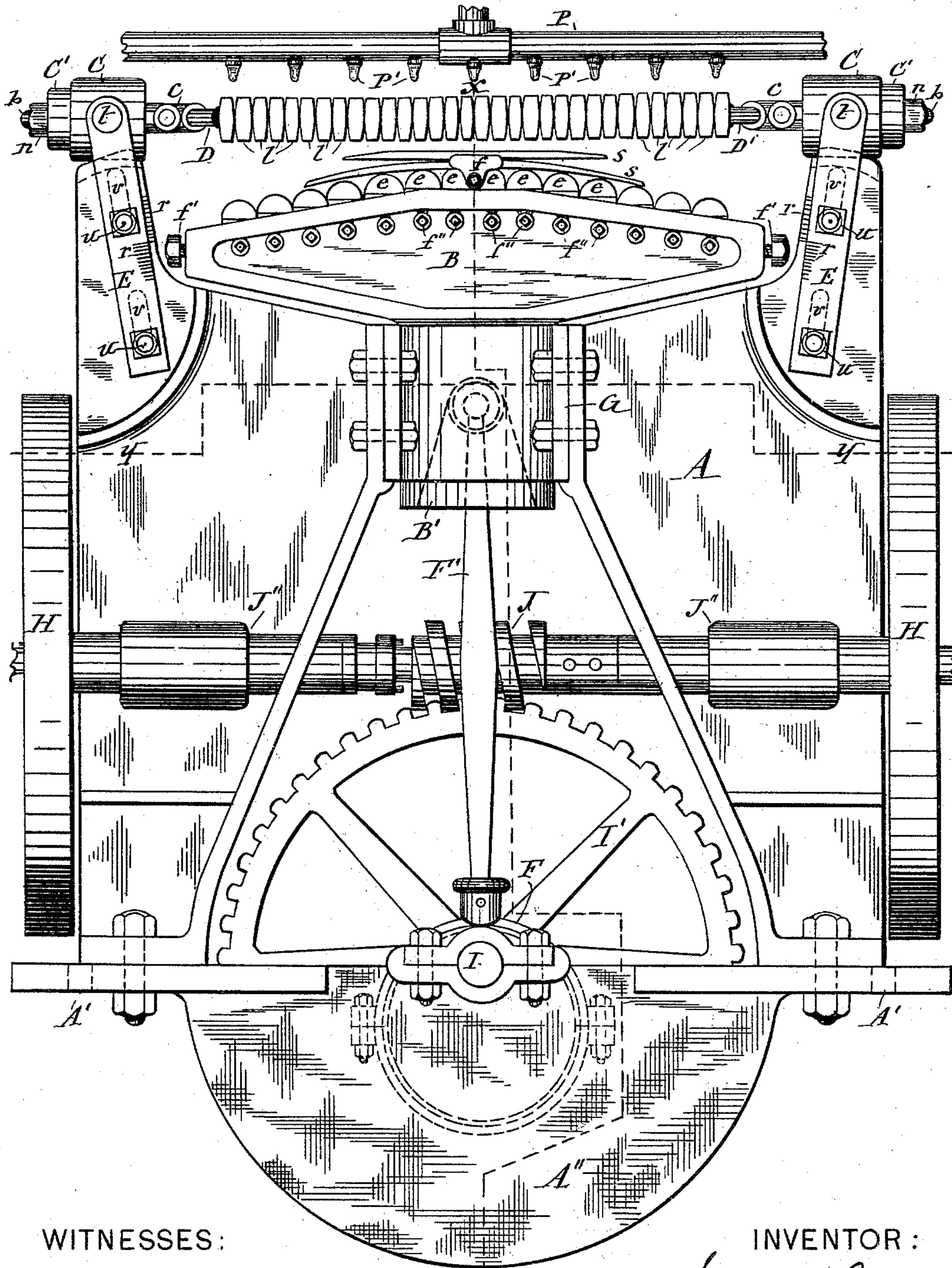
(No Model.)

6 Sheets—Sheet 1.

E. CLIFF.  
SPRING SETTING MACHINE.

No. 457,073.

Patented Aug. 4, 1891.



WITNESSES:

A. F. Walz  
J. J. Loasz.

Fig. 1

INVENTOR:

Edward Cliff  
By *Blount, Loasz & Co.*  
his ATTORNEYS.

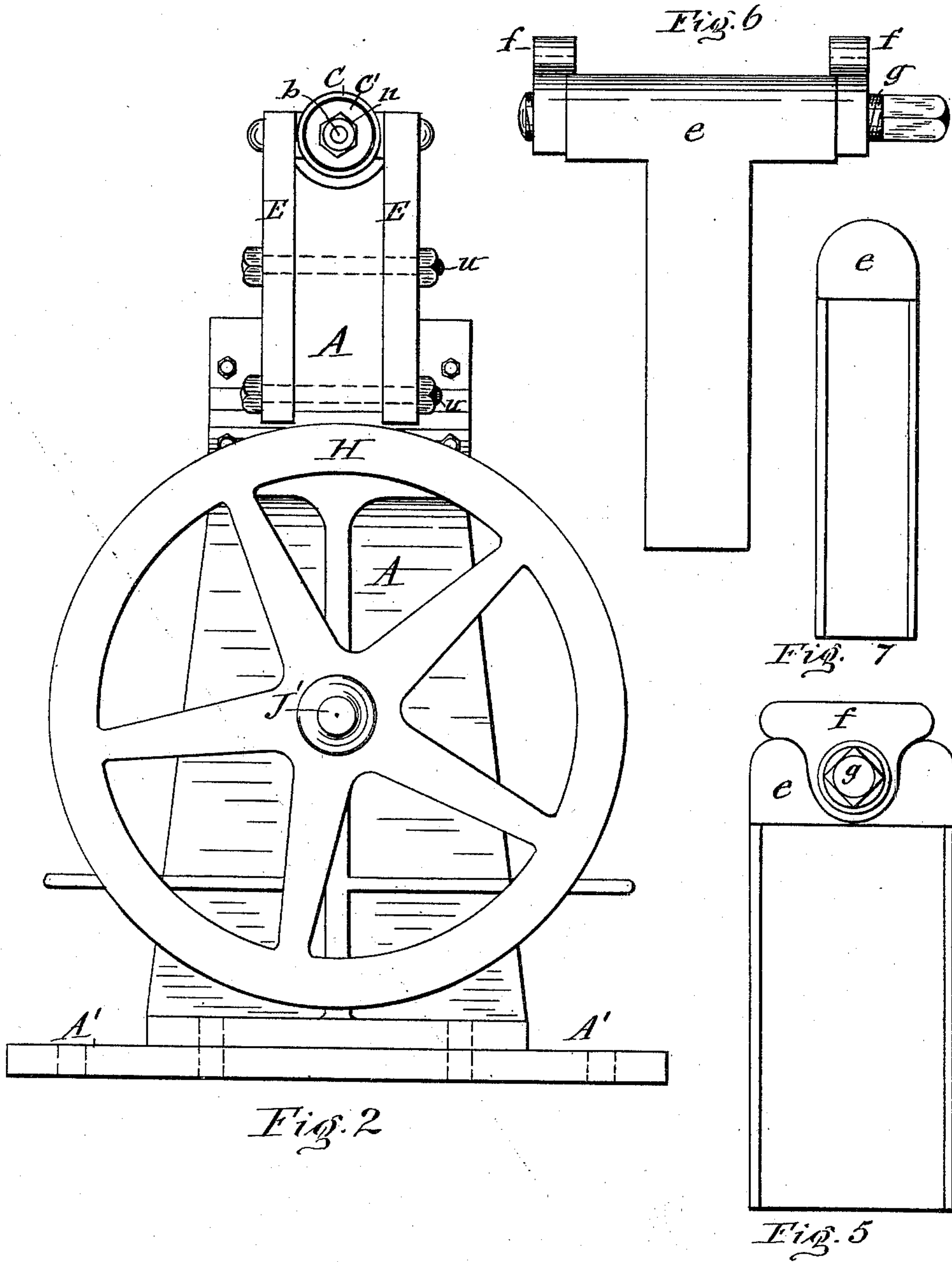
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WITNESSES:

A. F. Walz  
J. J. Laasy.

INVENTOR:

Edward Cliff  
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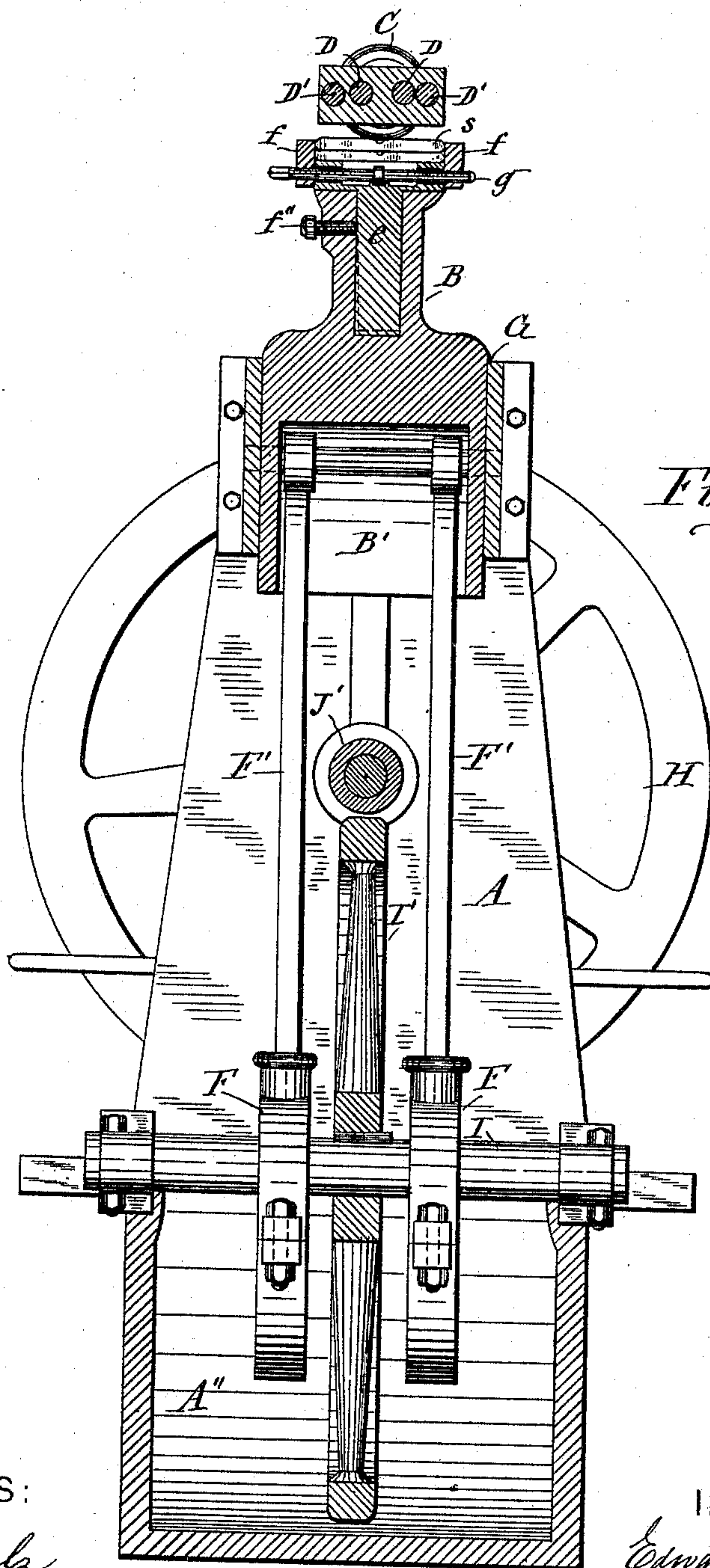
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*Fig. 3*

WITNESSES:

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(No Model.)

6 Sheets—Sheet 4.

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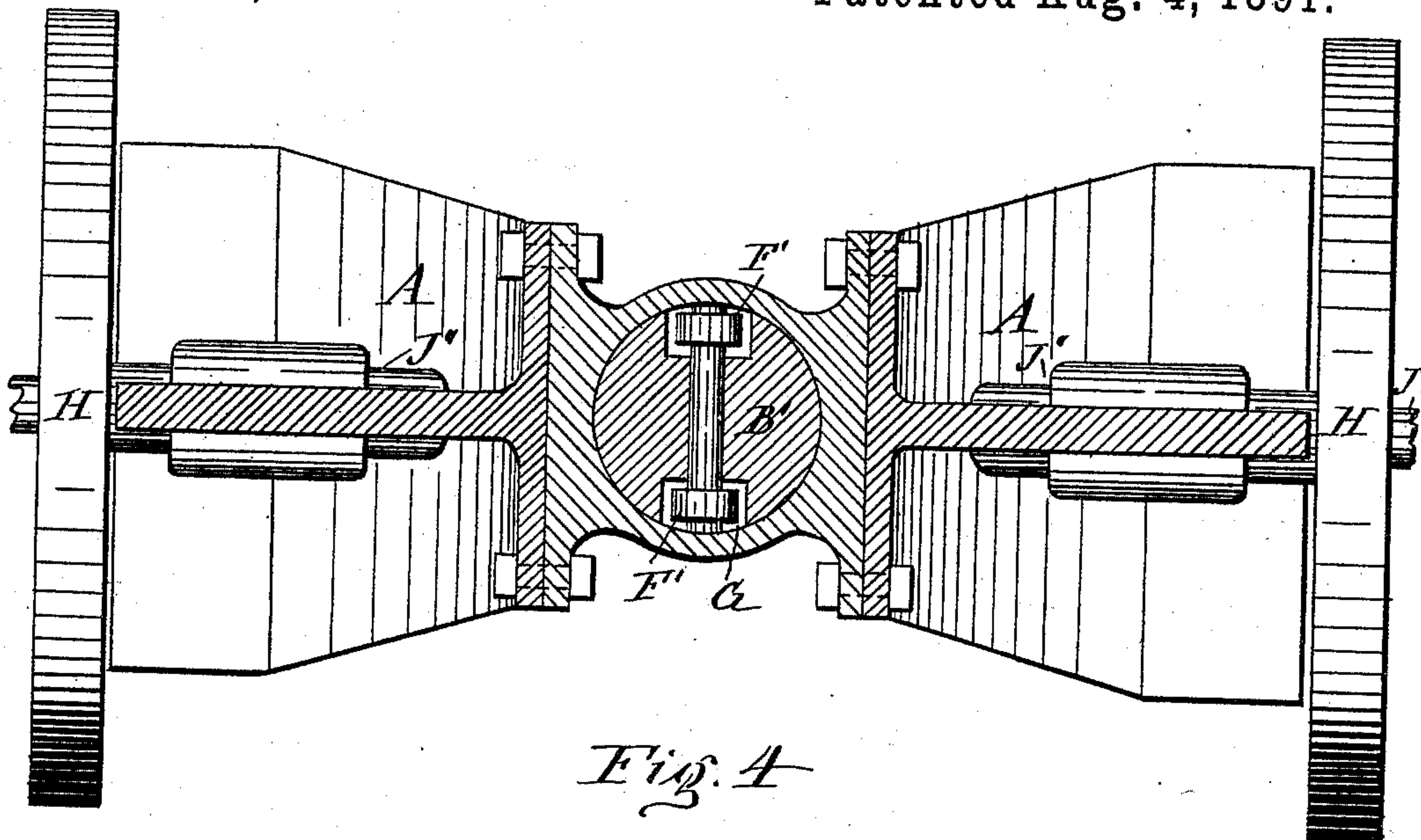


Fig. 4

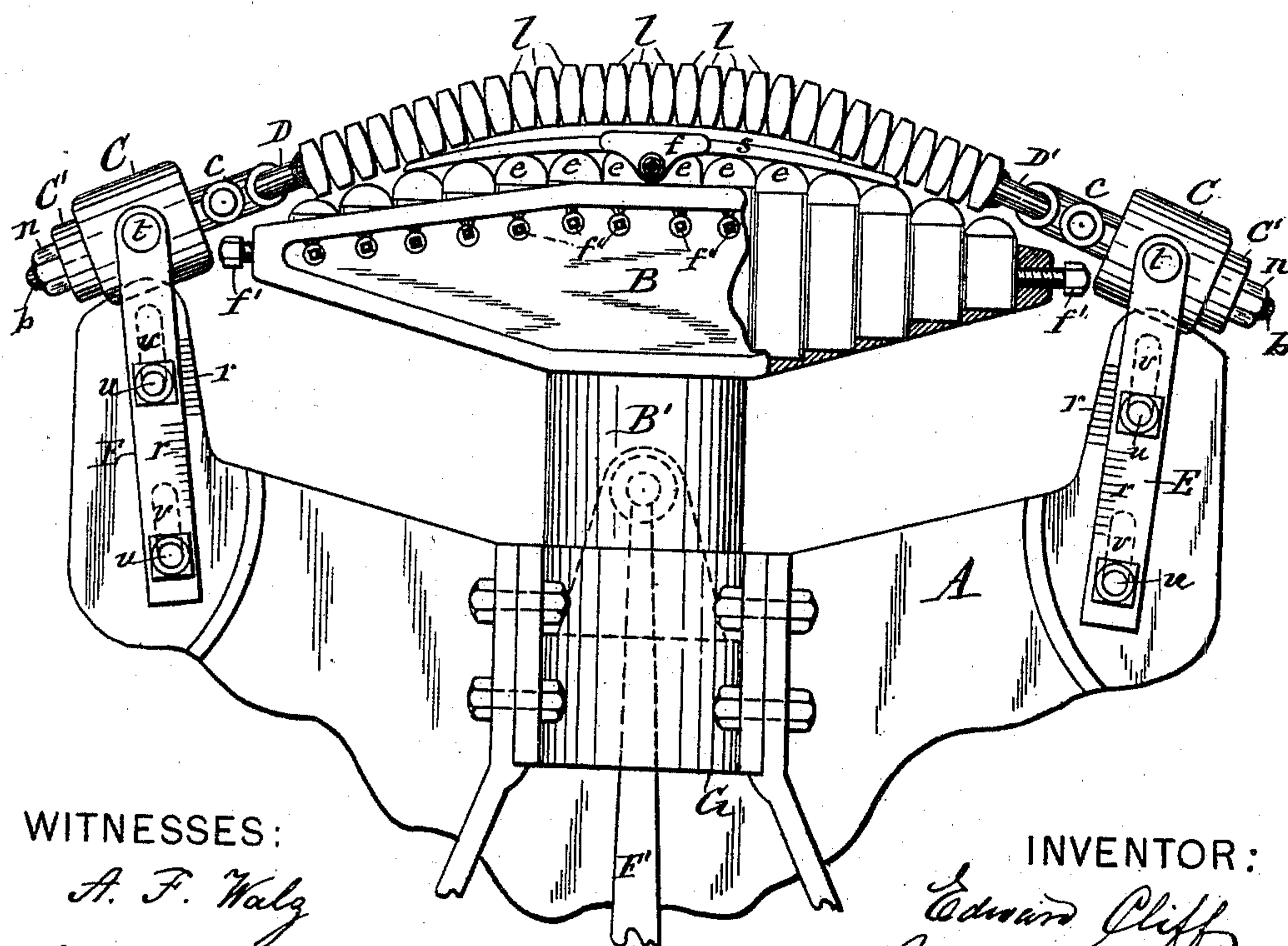


Fig. 8

WITNESSES:

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J. J. Gass.

INVENTOR:

Edmund Cliff  
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(No Model.)

6 Sheets—Sheet 5.

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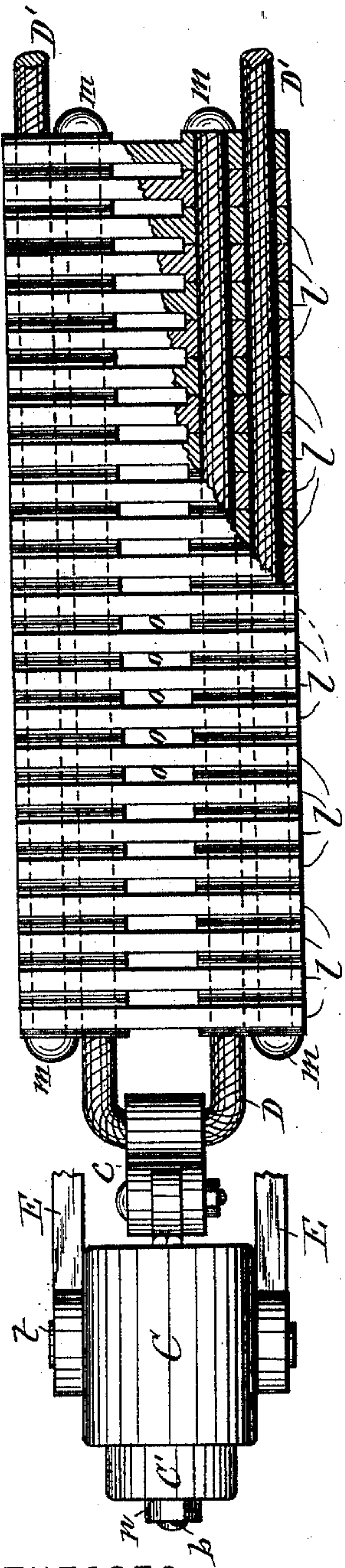


Fig. 9

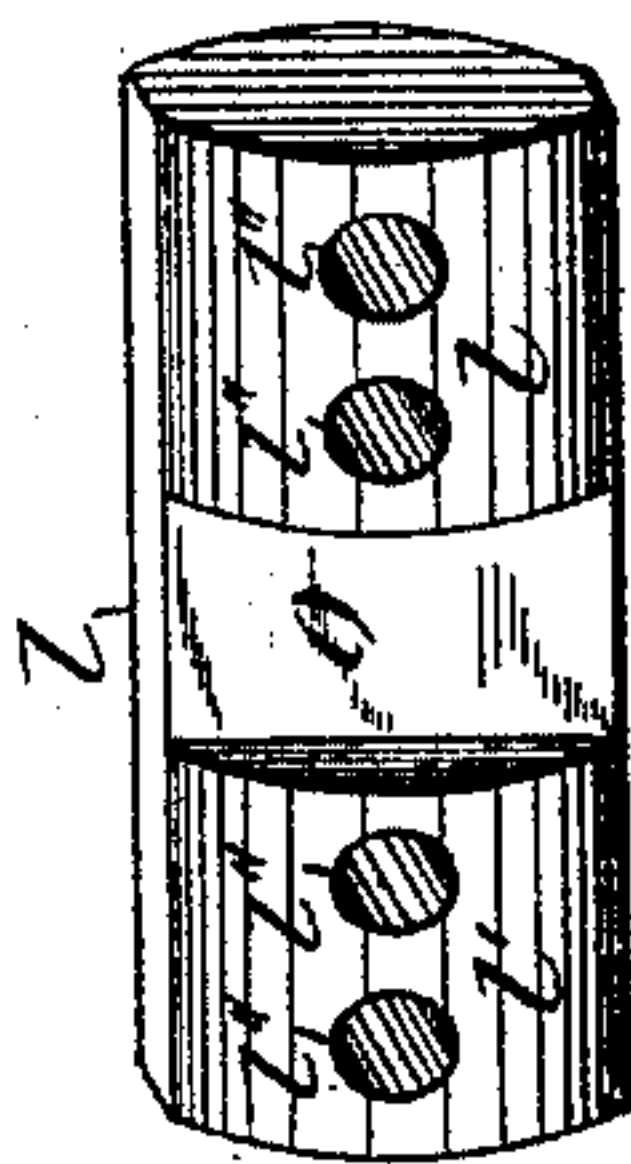


Fig. 11

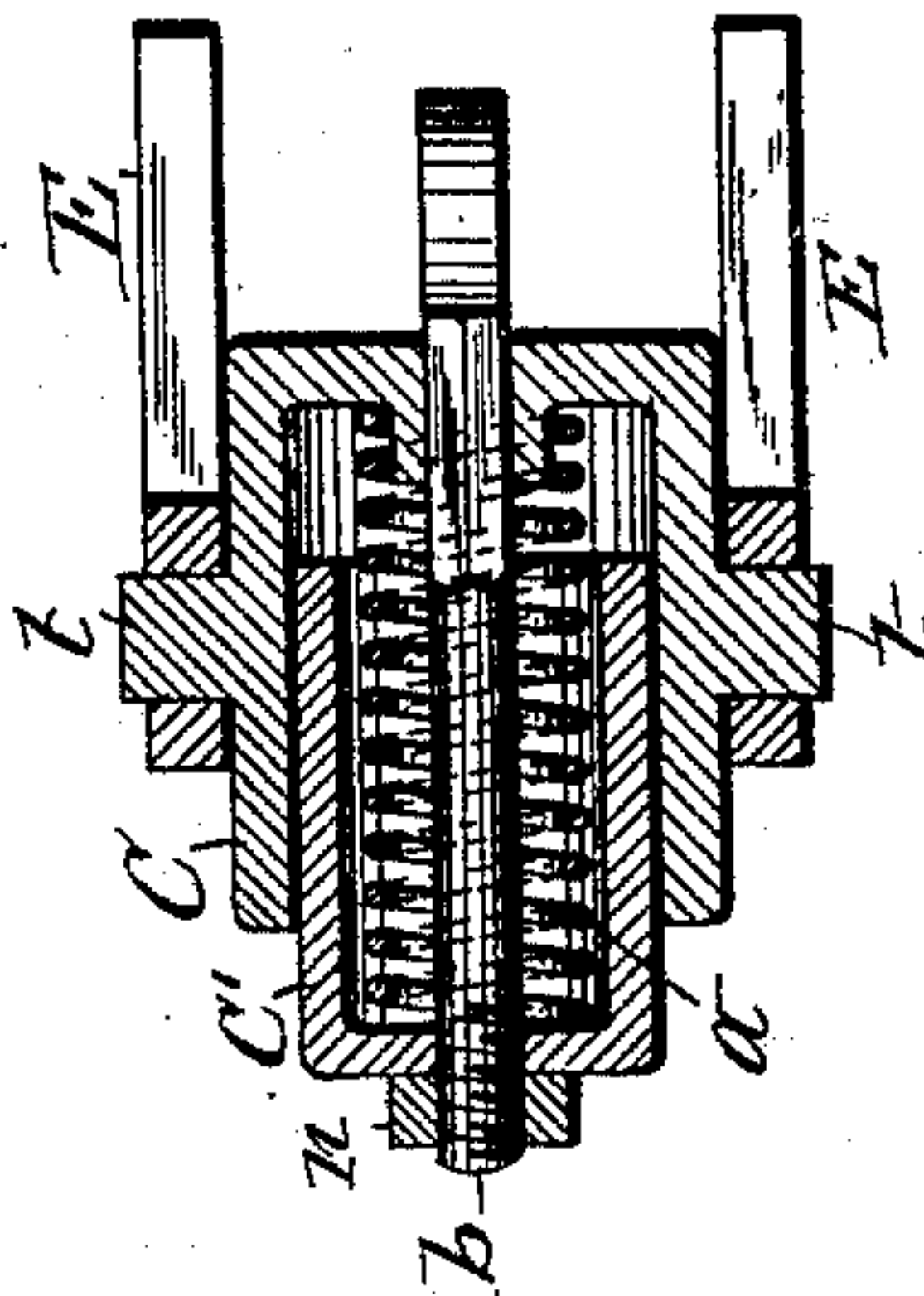


Fig. 10

WITNESSES:

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INVENTOR:

Edward Cliff  
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(No Model.)

6 Sheets—Sheet 6.

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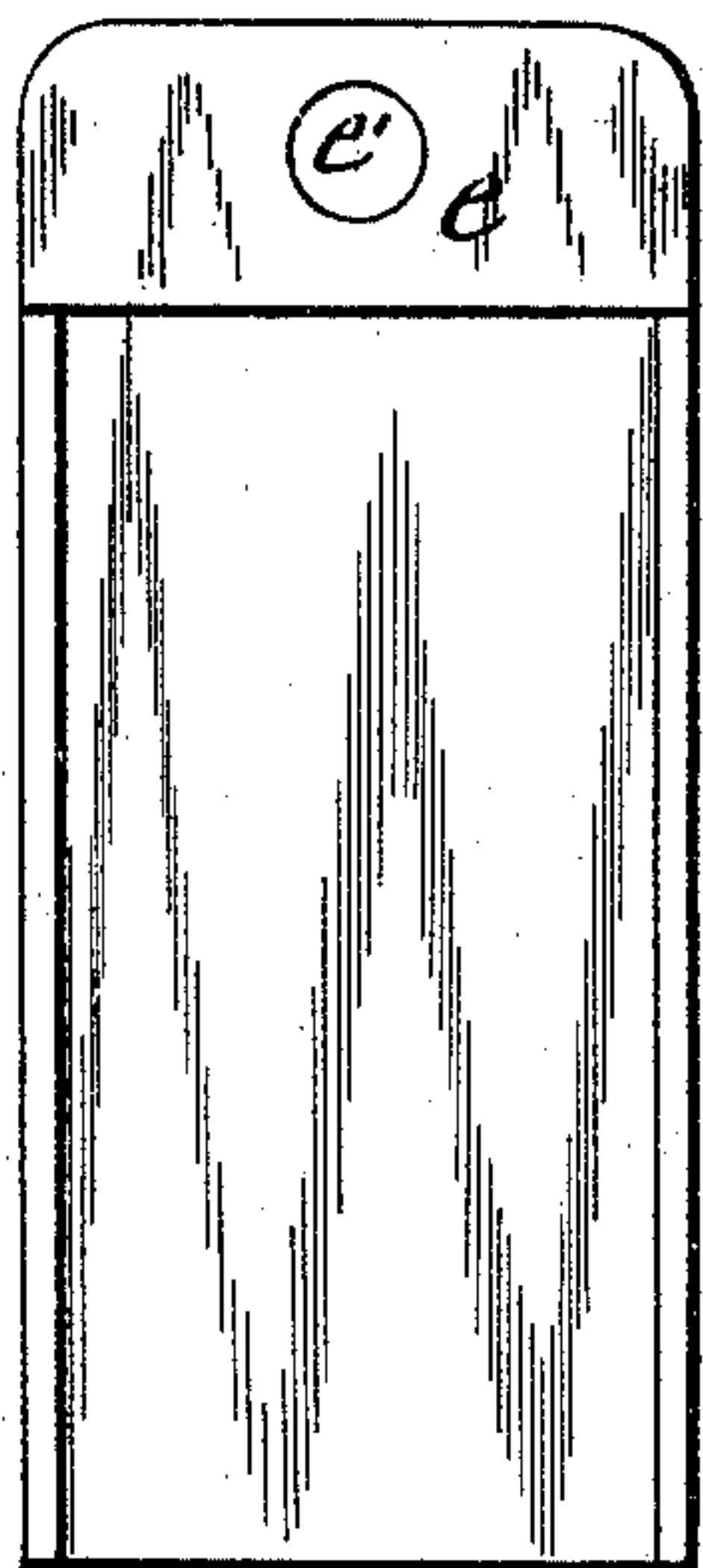


Fig. 12

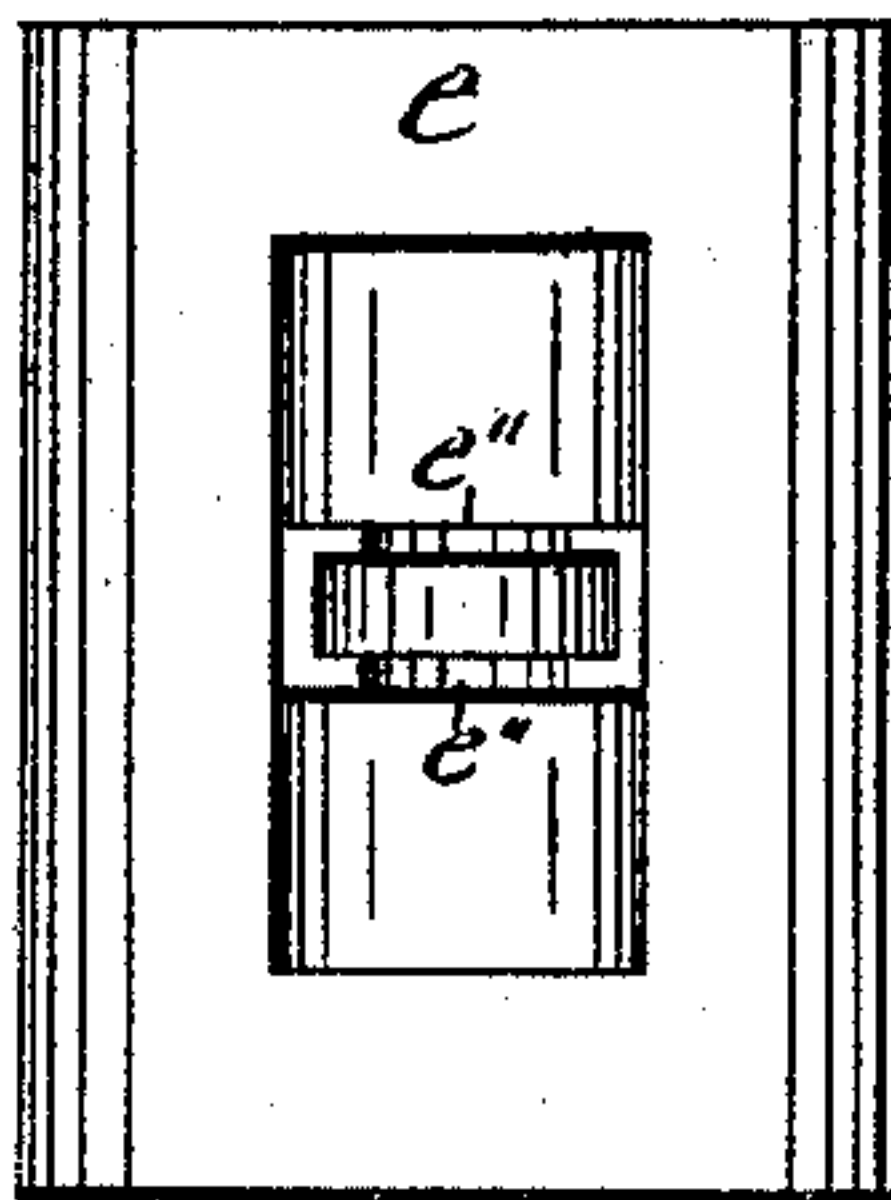


Fig. 13

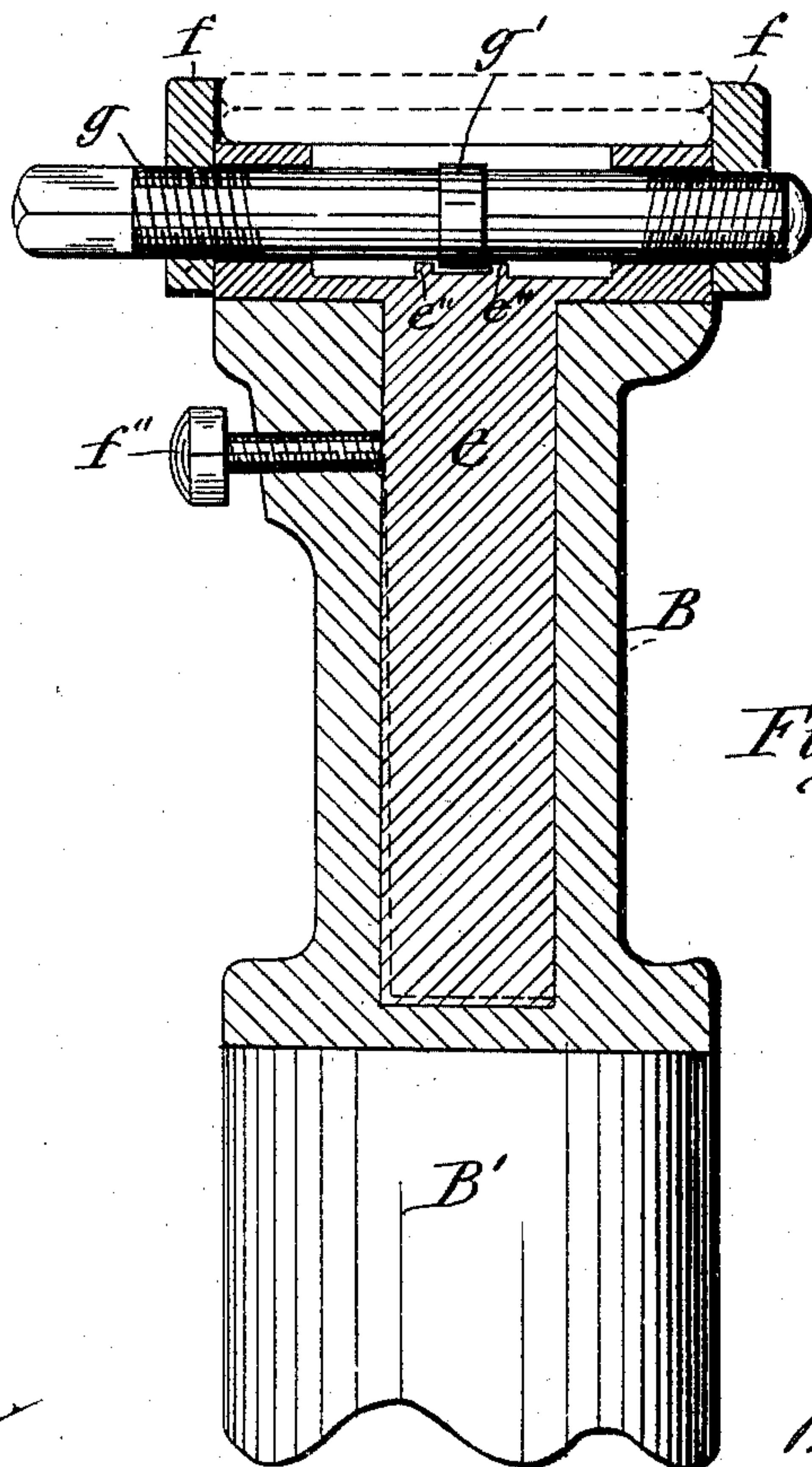


Fig. 14

WITNESSES:

A. F. Walz  
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INVENTOR:

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# UNITED STATES PATENT OFFICE.

EDWARD CLIFF, OF NEWARK, NEW JERSEY.

## SPRING-SETTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 457,073, dated August 4, 1891.

Application filed November 24, 1890. Serial No. 372,451. (No model.)

*To all whom it may concern:*

Be it known that I, EDWARD CLIFF, of Newark, in the county of Essex, in the State of New Jersey, have invented new and useful  
5 Improvements in Spring-Setting Machines, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

This invention relates to devices employed  
10 for imparting the requisite bow or arch shape to the leaves of elliptic and semi-elliptic springs; and the invention consists in an improved organization of a machine which is capable of bowing or arching the spring-leaves  
15 to the desired degree in a most effective and expeditious manner, and is adjustable to operate on spring-leaves of various dimensions.

The invention is fully illustrated in the annexed drawings, in which—

20 Figure 1 is a front elevation of a machine embodying my invention. Fig. 2 is an end view of the same. Fig. 3 is a vertical transverse section on line *x x*, Fig. 1. Fig. 4 is a horizontal transverse section on line *y y*, Fig. 1. Figs. 5 and 6 are respectively enlarged detached front and side views of the central  
25 bed-piece of the reciprocating spring-holding bed. Fig. 7 is an enlarged detached front view of another of the bed-pieces of the aforesaid bed. Fig. 8 is a front view of the top portion of the machine, showing the same in its operative position. Fig. 9 is an enlarged top plan view of a portion of the flexible spring-bending head. Fig. 10 is a horizontal  
35 transverse section of the spring-coupling of said bending-head. Fig. 11 is a perspective view of one of the bearing-blocks of said head. Figs. 12 and 13 are side and top plan views of the central bed-piece of the spring-  
40 holding bed, and Fig. 14 is a vertical section of the same seated in the said bed.

Similar letters of reference indicate corresponding parts.

A represents the main supporting-frame of  
45 the machine, which is set in an erect position and rests with its base *A'* on a suitable foundation, and when the machine is arranged to be operated by gears, as shown, the said frame is formed with a wheel-pit *A''*, which is set  
50 into the ground or foundation.

To the center of the top portion of the frame

A is secured a vertical guide *G*, in which is fitted to slide a hub *B'*, formed integral with or rigidly attached to the center of the under side of the spring-holding bed *B*. This bed  
55 receives a vertical reciprocating motion or up-and-down movement by means of eccentrics *F F*, fixed to a horizontal shaft *I*, which is journaled in suitable bearings on the base of the frame. Pitmen *F' F'* connect the eccen-  
60 trics with the hub *B'*, and rotary motion is imparted to the eccentrics by means of a gear-wheel *I'*, with which engages a worm *J*, secured to a shaft *J'*, which is journaled in boxes *J'' J''* on the frame *A*, and has driving-pulleys *H H*  
65 attached to its ends.

The spring-holding bed *B* consists of an elongated frame, in which are seated the bed-pieces *e e e*, the heads of which project above the top of the said frame. Said bed-pieces  
70 are contiguous to each other and are clamped in the frame by set-screws *f' f'*, inserted in opposite ends of the frame and bearing on the outer sides of the two end bed-pieces *e e*. All of the bed-pieces are adapted to be  
75 moved vertically in the frame and to be set so as to cause the tops of said bed-pieces to come to a line more or less arching according to the degree of the arch or crown to be im-  
80 parted to the spring to be operated on. By means of a series of set-screws *f'' f''*, inserted in the side of the frame and bearing against the inclosed portions of the bed-pieces *e e e*, the latter are retained in their adjusted posi-  
85 tions. To properly hold the spring *s* on the reciprocating bed *B*, I clamp on opposite sides of the central bed-piece *e* two jaws *f f*, and in order to accommodate springs of various widths I make said jaws adjustable in rela-  
90 tion to the width between them. For this purpose I preferably provide the jaws *f f* with eyes, which are screw-threaded in opposite directions from each other, and pass trans-  
95 versely loosely through the central bed-piece *e* a right and left screw *g*, which works with its opposite ends in the screw-threaded eyes of the jaws. By turning the screw *g* in one direc-  
100 tion the jaws *f f* are caused to recede from each other to allow the spring *s* to be placed between them, and then by turning the aforesaid screw in the opposite direction the jaws are caused to approach each other and grasp



between them the spring *s* so as to hold the same firmly in place. In order to insure the retention of the said spring central over the bed-pieces, I provide the central bed-piece with shoulders *e'' e''* and rigidly secure to the screw *g* a collar *g'*, which is entered between the aforesaid shoulders, and is thereby confined laterally, and thus the screw *g* is prevented from moving longitudinally in the bed-piece *e*.

Over or in front of the spring-holding bed B, and extending lengthwise thereof, is a flexible spring-bending head, which is normally straight and at right angles to the guide G. Said spring-bending head consists, essentially, of a series of bearing-blocks *l l l*, distributed in front and lengthwise of the reciprocating spring-holding bed B, and flexible ties connecting said blocks together and to the frame A. Inasmuch as in the operation of the machine the said flexible spring-bending head is deflected in the shape of an arch by the pressure of the reciprocating bed B and spring *s* lying thereon, I form the bearing-blocks *l l* with convex checks *l' l'* on their adjacent sides to allow said blocks to turn into the different angles which they have to assume in the aforesaid operation of the machine, as illustrated in Fig. 8 of the drawings.

For the flexible ties D and D' I prefer to employ suitable wire cables, each of which I bend at the center of its length so as to bring the two end portions parallel side by side. Each of the bearing-blocks *l* I provide with two pairs of transverse perforations *l' l'*, as shown in Fig. 11 of the drawings. Each of the cables passes through one of the pairs of perforations of the bearing-blocks *l l l*, and is tied at its extremities by a knob or head *m* on the same.

To allow the normally-straight spring-bending head to be sprung into the shape of an arc by the pressure of the reciprocating spring-holding bed B, I connect the said head to the frame A by means of suitable spring-couplings, and also preferably provide said couplings with hinges *c c*. To insure efficiency in the operation of the said spring-couplings, I form each of a box C, which has trunnions *t t* on opposite sides and is open at its outer end. Said box is pivoted by its trunnions to the upper ends of arms E E, secured to the front and rear of the top portion of the frame A and extending upward therefrom. In the box C slides a piston C', and between said parts is interposed a stout spiral spring *a*, as shown in Fig. 10 of the drawings. Axially through the said piston and box passes the coupling-bolt *b*, the inner end of which is connected to the cable D by a hinge *c*, and the outer end of said coupling-bolt is screw-threaded and provided with a nut *n*. By tightening said nut the tension of the spring *a* is adjusted to the requisite degree to exert the necessary resistance to the draft of the cables D D' incident to the

deflection thereof when subjected to the pressure of the spring-holding bed B. The degree of the pressure of the bed B against the flexible spring-bending head is rendered adjustable by regulating the normal distance between the said parts, and for this adjustment I dispose the arms E E with their upper ends inclined outward and connect said arms to the frame by bolts *u u*, passing through the arms and through slots *v v* in the frame A, and parallel with the arms, as shown by dotted lines in Fig. 1 of the drawings. Said slots allow the arms E E to be raised or lowered to carry the flexible spring-bending head a greater or less distance from the bed B.

Graduated scales *r r* are marked on the edges of the arms E E and adjacent portions of the frame A, by which scales the adjustment of the said arms can be determined.

For the purpose of cooling the blocks *l l l*, cables D D', and underlying parts, I extend over the top of the machine parallel with the cables D D' a water-supply pipe P, which is provided with nozzles P' P', as shown in Fig. 1 of the drawings, and the blocks *l l l* form with vertical grooves *o o* on their adjacent sides to allow the water to pass down to the underlying spring *s* and its supporting-bed B.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In combination with the frame and reciprocating spring-holding bed, a series of bearing-blocks distributed in front and lengthwise of said bed, flexible ties connecting said blocks, and spring-couplings connecting said ties to the frame, as set forth.

2. In combination with the frame A and reciprocating spring-holding bed B, the boxes C, pivoted to the frame at opposite ends of the said bed, pistons C' C', sliding in said boxes, springs *a*, interposed between the pistons and their respective boxes, flexible ties D D', connected to said pistons, and bearing-blocks *l l l*, connected to said ties, as and for the purpose set forth.

3. In combination with the frame A and reciprocating spring-holding bed B, the boxes C, connected to the frame at opposite ends of said bed, pistons C' C', springs *a a*, hinges *c c*, connected to said pistons, flexible ties D D', connected to said hinges, and bearing-blocks *l l l* on said ties, as set forth.

4. In combination with the frame A and reciprocating bed B, the arms E E, extending upwardly from the frame and connected to said frame, longitudinally-adjustable spring-couplings connected to said arms, a series of bearing-blocks distributed in front and lengthwise of the bed B, and flexible ties connecting said bearing-blocks together and to said spring-couplings, as set forth.

5. In combination with the frame A and reciprocating bed B, the arms E E, extending upwardly from the frame and connected thereto adjustably longitudinally, the boxes C C,



pivoted to said arms, pistons C' C' in said boxes, springs interposed between said pistons and boxes, flexible ties connected to said pistons, and bearing-blocks connected to said ties, as set forth.

6. In combination with the frame and reciprocating spring-holding bed, the flexible spring-bending head consisting of the separate wire cables DD', connected, respectively, to the frame at opposite ends of the aforesaid bed, a series of bearing-blocks l l l, strung on said cables, and heads on the ends of the cables bearing on opposite ends of the series of bearing-blocks, substantially as set forth.

7. In combination with the frame and reciprocating spring-holding bed, the flexible spring-bending head consisting of the series of bearing-blocks l l l, having convexed checks l' l' and perforations l'' l'', and the wire cables D D', connected to the frame respectively at opposite ends of the spring-holding bed and passing through the perforations of the said bearing-blocks and tied at their free ends to the ends of the series of blocks, substantially as described and shown.

8. In combination with spring-holding bed, the spring-bending head provided with slots extending vertically through said head, and

the water-supply pipe P, communicating with said slots, as set forth.

9. In combination with the spring-holding bed, the bearing-blocks flexibly connected together and formed with convexed checks l' l' and grooves o o, and the water-supply-pipe P, having nozzles P' P' communicating with the grooves o o, substantially as described and shown.

10. In combination with the frame A, reciprocating spring-holding bed B, and flexible spring-bending head D D' l, the boxes C C, pistons C' C', springs a a, interposed between said boxes and pistons, the coupling-bolts b b, passing through the pistons and boxes and connected at their inner ends to the flexible spring-bending head and screw-threaded at their outer ends, and adjusting-nuts n n on said outer ends of the coupling-bolts, as and for the purpose set forth.

In testimony whereof I have hereunto signed my name this 15th day of November, 1890.

EDWARD CLIFF. [L. s.]

Witnesses:

MARK W. DEWEY,  
H. M. SEAMANS.