

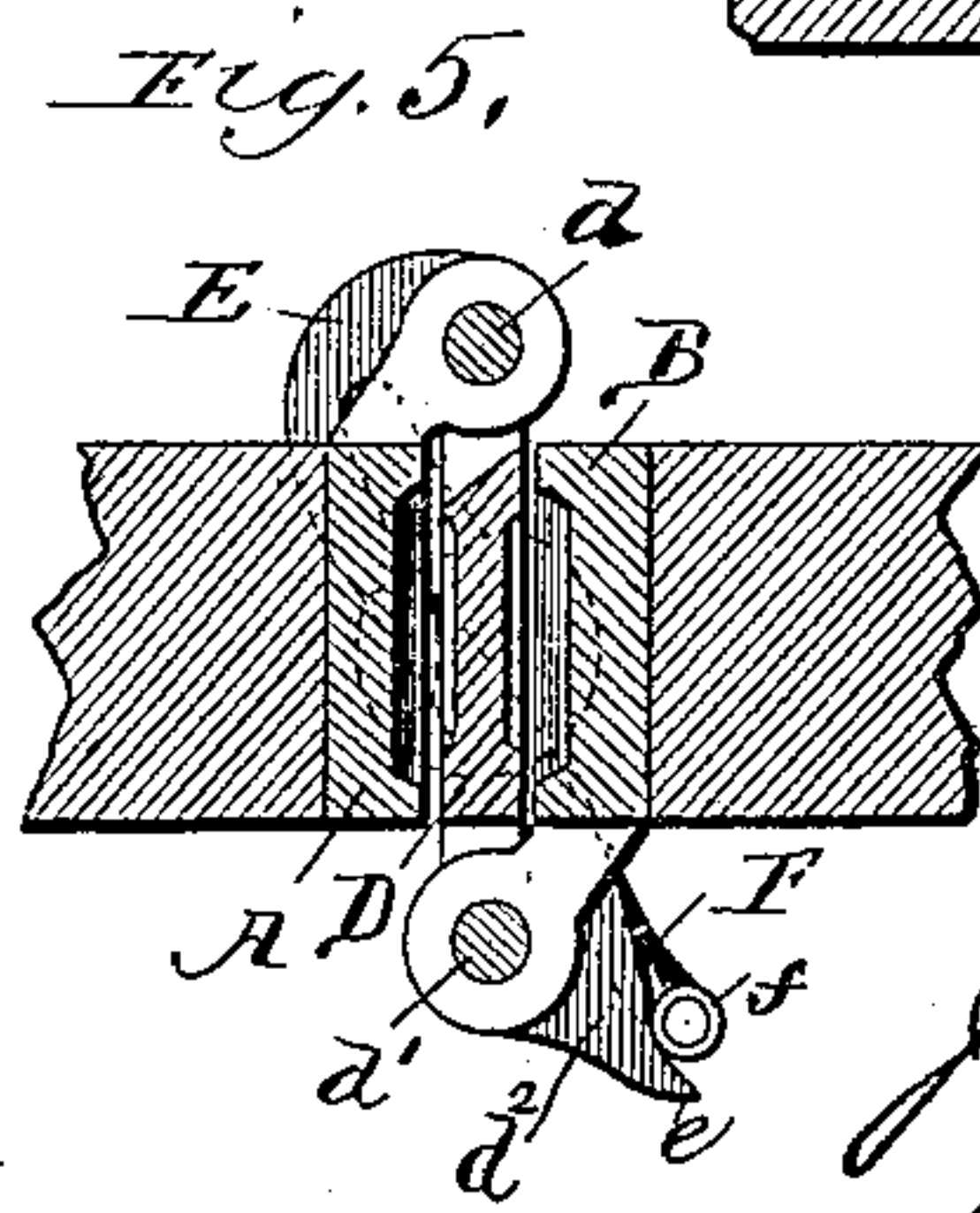
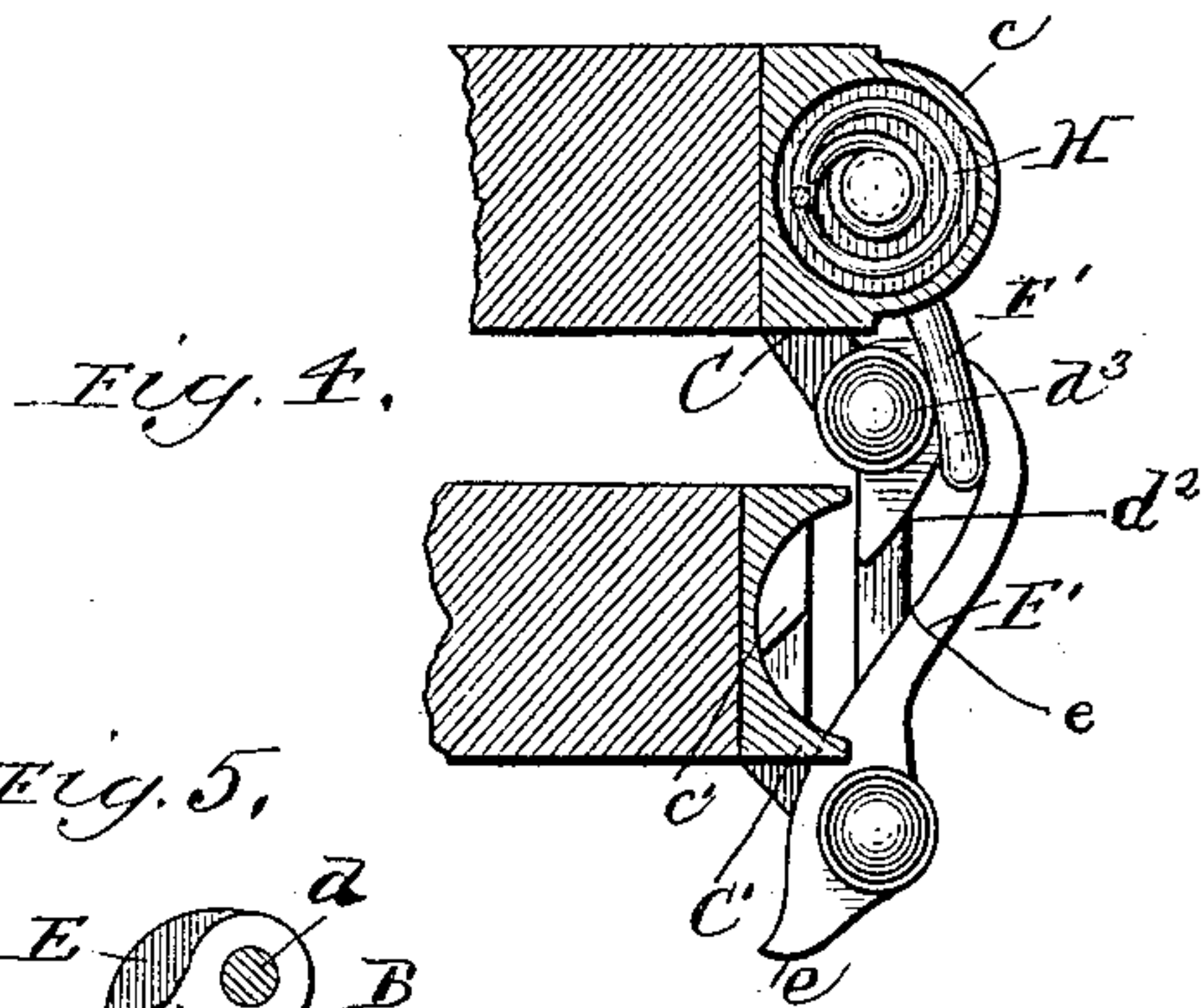
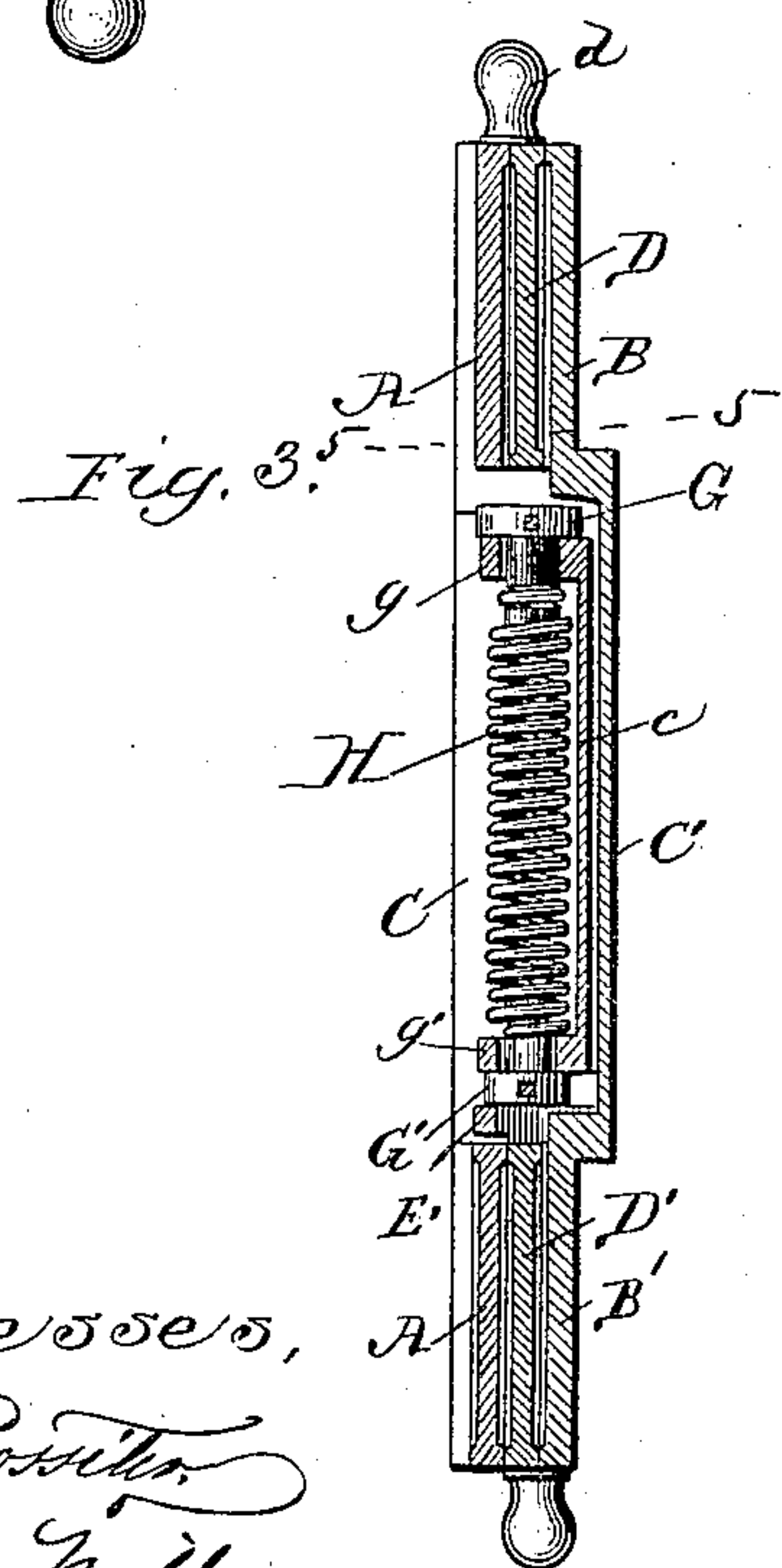
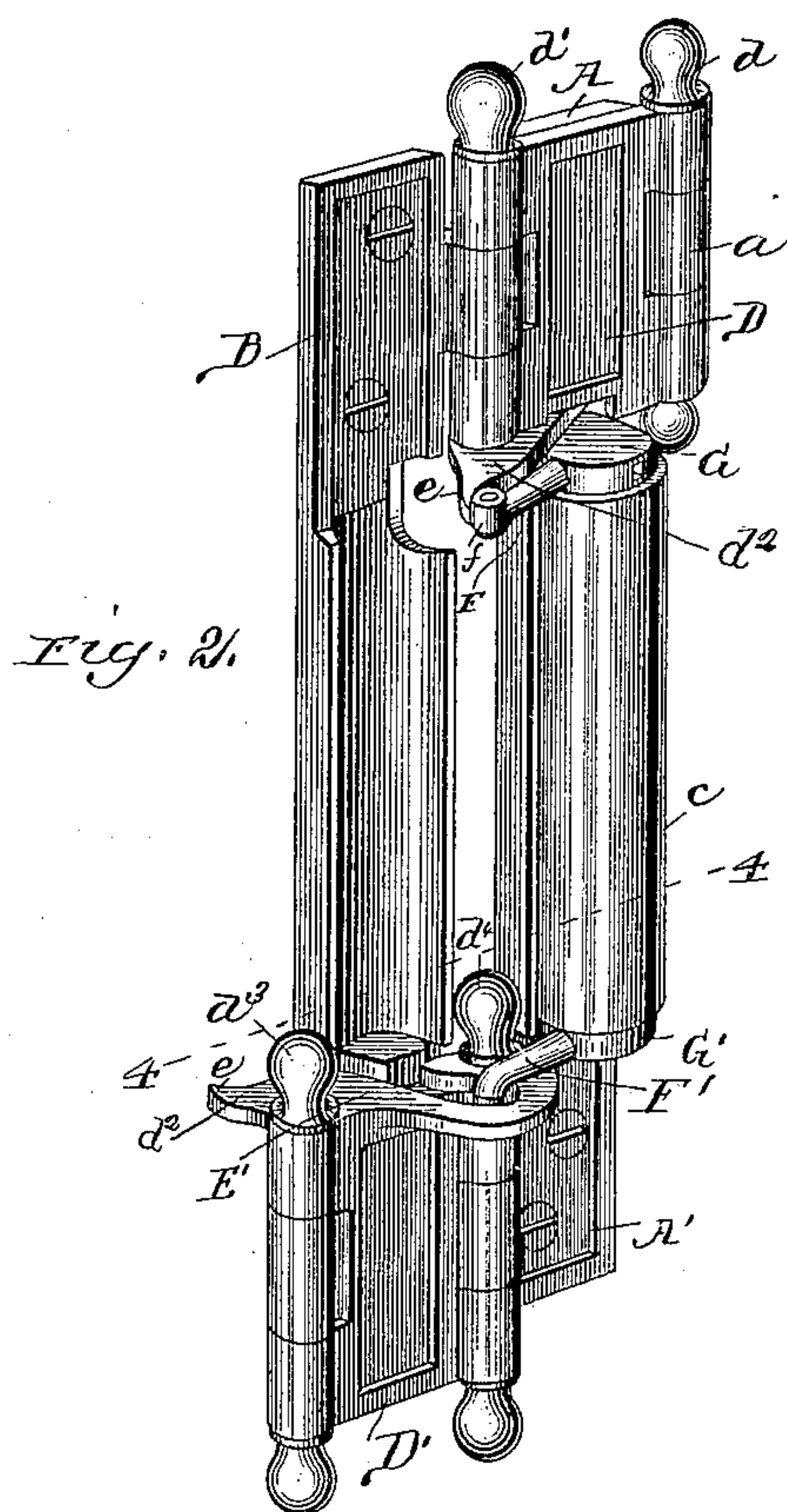
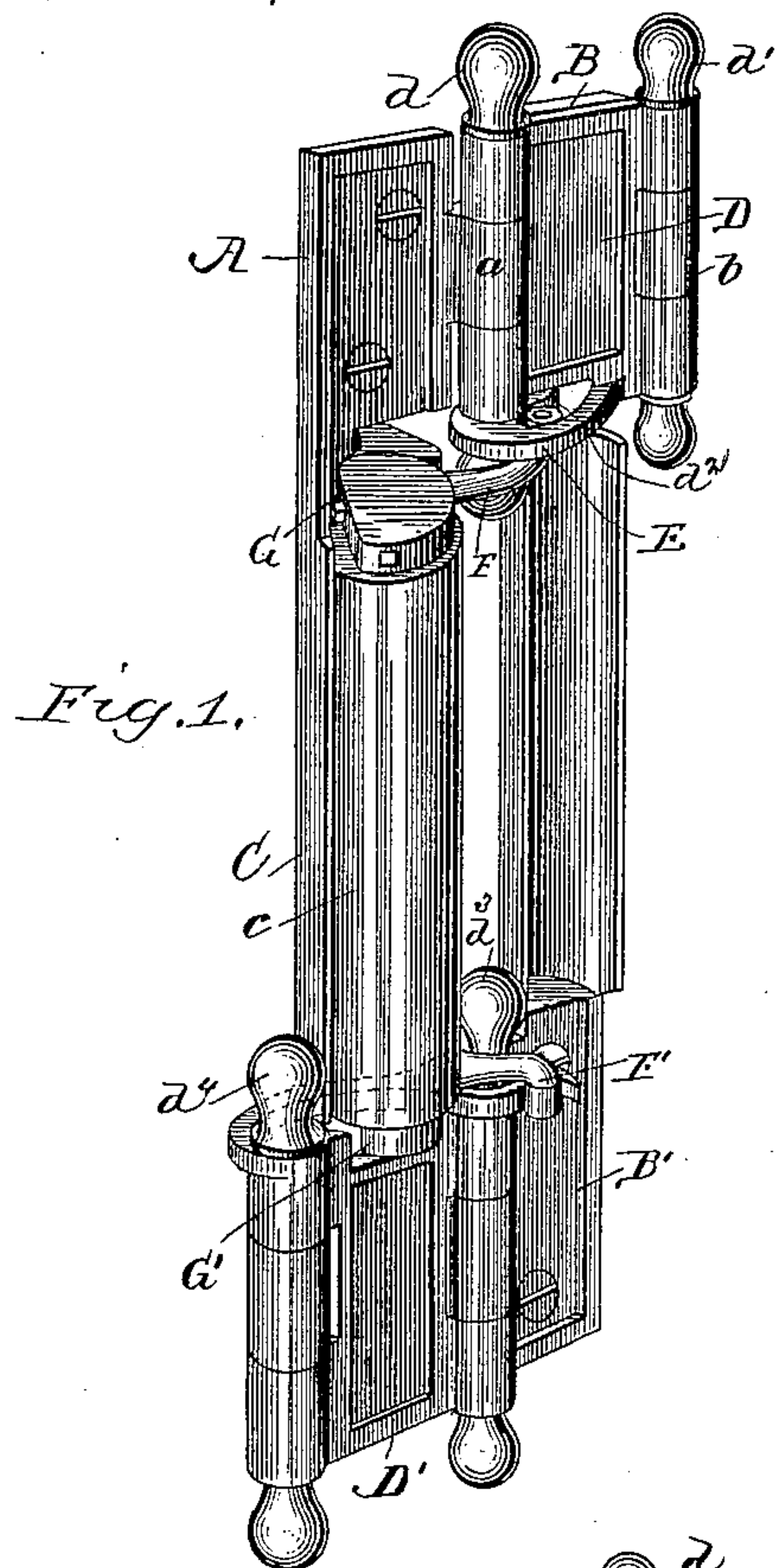
(Model.)

2 Sheets—Sheet 1.

J. KEENE.  
SPRING HINGE.

No. 397,190.

Patented Feb. 5, 1889.



Witnesses,  
W. B. Smith  
F. H. Mills

Inventor,  
Joseph Keene  
By R. H. Fisher  
His Atty.

(Model.)

2 Sheets—Sheet 2.

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Fig. 6.

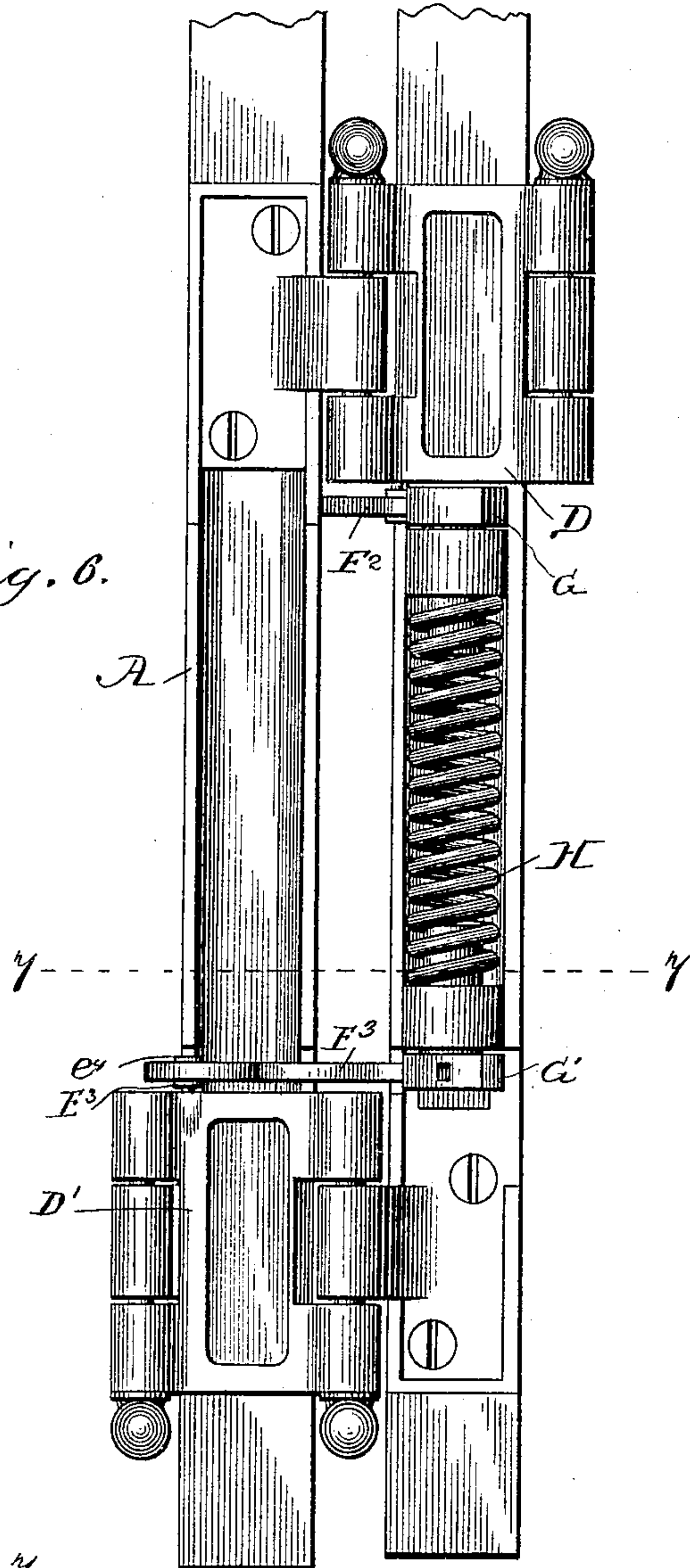


Fig. 7.

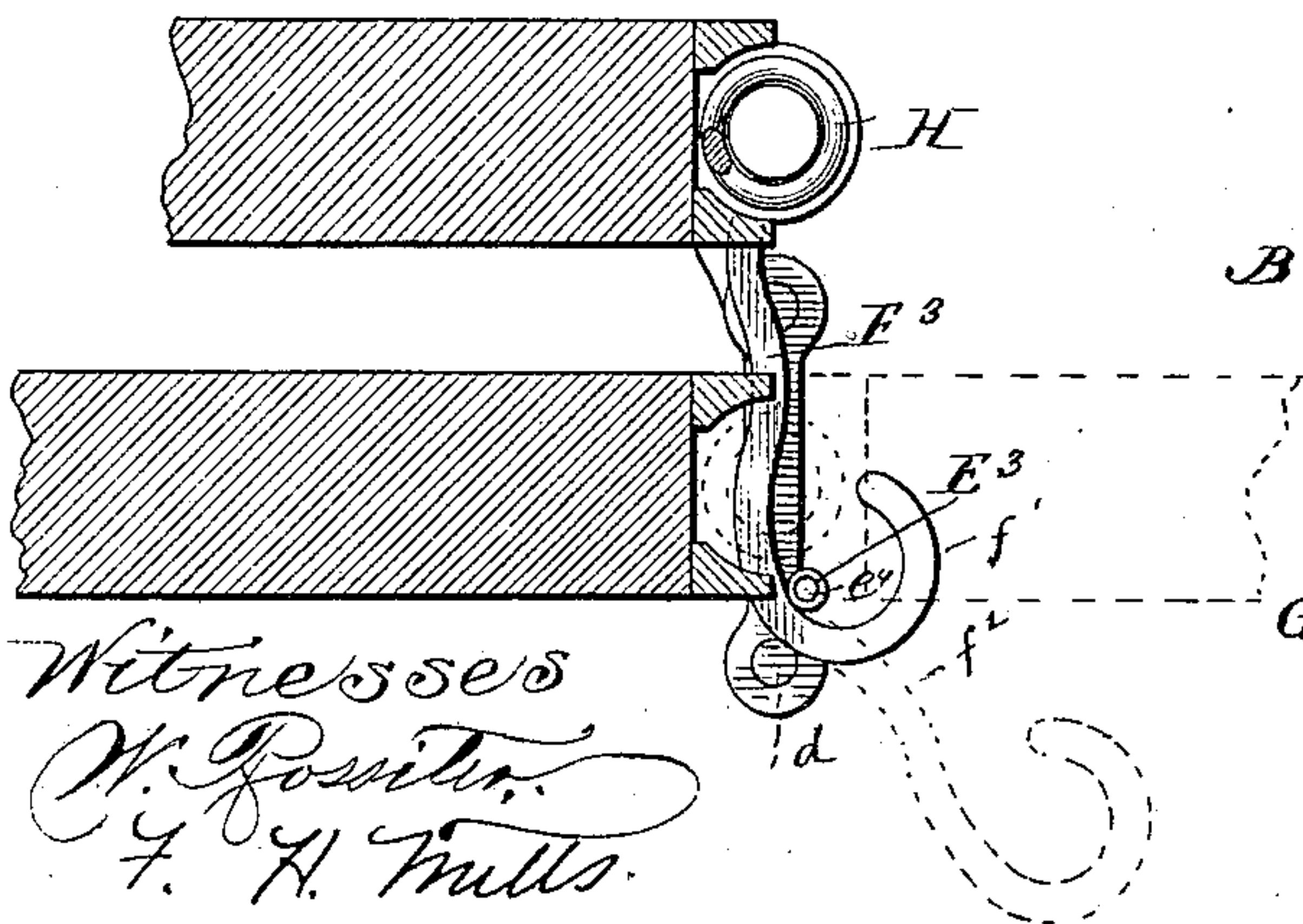
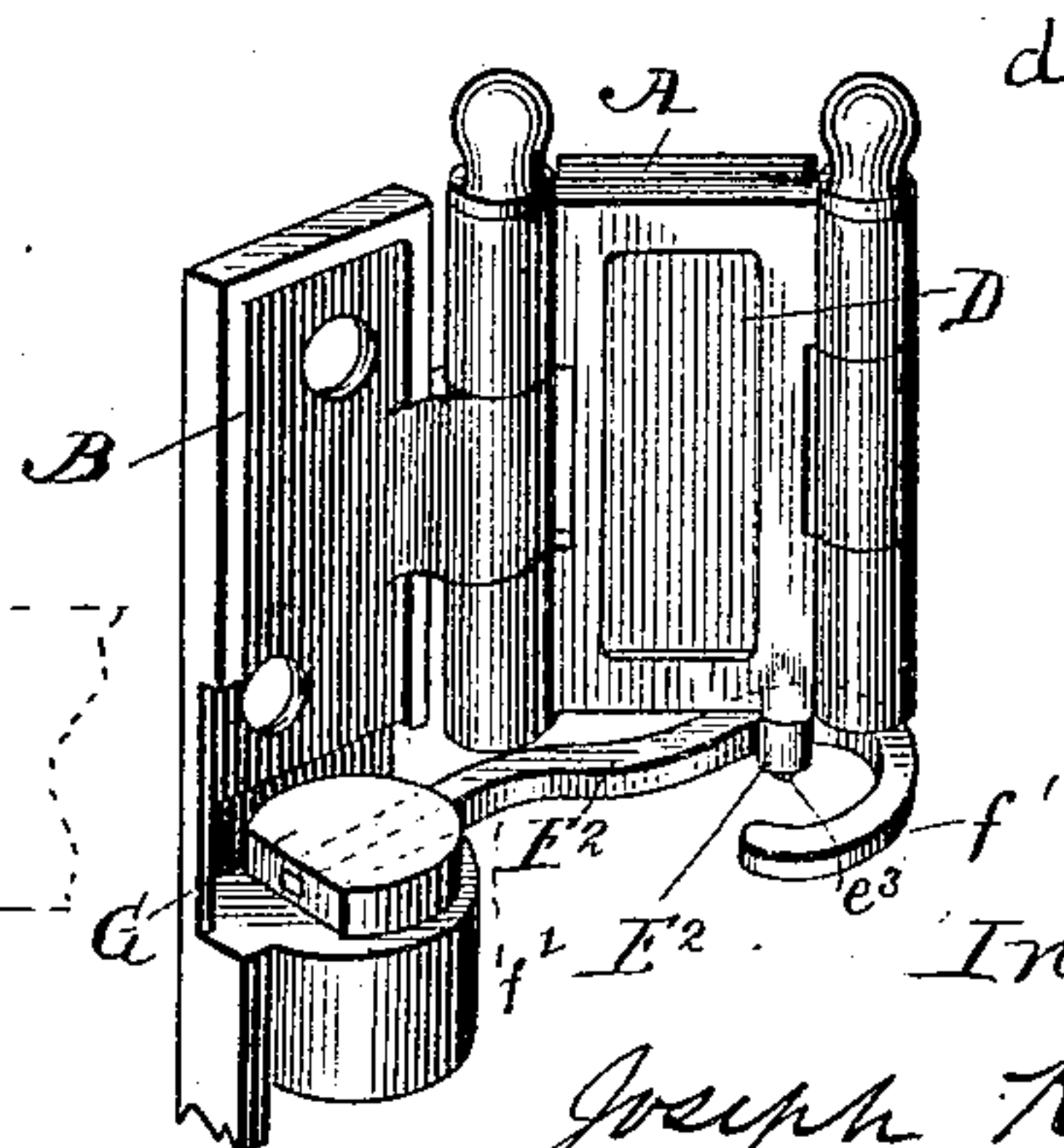


Fig. 8.



Witnesses  
W. Posner  
F. H. Mills.

Inventor  
Joseph Keene  
By R. W. Fisher  
His Attys.



# UNITED STATES PATENT OFFICE.

JOSEPH KEENE, OF CHICAGO, ILLINOIS.

## SPRING-HINGE.

SPECIFICATION forming part of Letters Patent No. 397,190, dated February 5, 1889.

Application filed August 20, 1888. Serial No. 283,232. (Model.)

*To all whom it may concern:*

Be it known that I, JOSEPH KEENE, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Spring-Hinges, of which I do declare the following to be a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

My present invention, while applicable in part to the construction of hinges designed to be applied to doors that are to be opened in one direction only, is more particularly designed as an improvement upon that class of spring-hinges intended to be applied to doors adapted to be opened in both directions, so as to bring the door to its normally-closed position after it has been moved therefrom in either direction. An example of this type of spring-hinge is illustrated in Letters Patent No. 227,786, granted to D. W. Housley, May 18, 1880.

The object of my present invention is, primarily, to provide an improved construction of hinge in which the torsion-spring that serves to restore the door to its closed position shall be held within fixed bearings, so as to be incapable of outward movement, but shall exert its pressure upon the intermediate leaf or leaves of the hinge through the medium of a projecting arm or arms adapted to engage with suitable bearing-pieces upon said intermediate leaves.

My invention consists in the various novel features of construction hereinafter described, illustrated in the accompanying drawings, and particularly pointed out in the claims at the end of this specification.

Figure 1 is a perspective view of a spring-hinge embodying my invention. Fig. 2 is a perspective view with the parts in reverse position from that shown in Fig. 1. Fig. 3 is a view in vertical longitudinal section through the hinge with the parts in closed position. Fig. 4 is a view in transverse section on line 4 4 of Fig. 2. Fig. 5 is a view in transverse section on line 5 5 of Fig. 3. Fig. 6 is a view of a modified form of my invention. Fig. 7 is a view in transverse section on line 7 7 of

Fig. 6. Fig. 8 is a perspective view of the upper part of the modified form of hinge shown in Fig. 6.

A and B denote what, for convenience, may be termed the "door" and "jamb" leaves of the hinge, since when applied to use one of these leaves will be attached to the door and the other will be fastened to the jamb, and A' and B' denote a lower corresponding set of door and jamb leaves, these upper and lower sets of leaves being by preference united together by suitable connections, C and C', while the connection C' unites the upper and lower leaves B and B'. It is obvious, however, that in case one set of leaves only is employed these connections may be omitted.

Between the door and jamb leaves A and B is held in well-known manner the intermediate leaf D, this leaf being pivotally connected by a pintle, *d*, with the leaf A, and by a pintle, *d'*, with the leaf B, the pintles *d* and *d'* passing, respectively, through a suitable knuckle-joint, *a*, of the leaf A and through a knuckle-joint, *b*, of the leaf B, as clearly shown in Figs. 1 and 2 of the drawings. At the base of this intermediate leaf D is formed what, for convenience, I term a "bearing-piece," E, the precise shape of which is more particularly shown in Fig. 5 of the drawings, and by preference this bearing-piece has its wearing-face inclined across the plane of the intermediate leaf and of irregular outline, so that in its co-action with the arm that projects from the torsion-spring the pressure of such spring may be more effectively exerted upon the door. In the construction shown in Figs. 1 to 5 of the drawings this bearing-piece E at one end approaches very nearly the offset *d'* at the base of the leaf D, and at its outer end is by preference provided with a somewhat abruptly-curved face, *e*, for a purpose to be presently stated. Against the wearing-face of this bearing-piece E of the intermediate leaf D, and riding freely over said bearing-piece in the action of the hinge, bears the angular end of the arm F, that is suitably fixed to the enlarged portion of the spindle G, that extends through a suitable bearing, *g*, and is suitably connected, as shown, with the upper end of the coiled torsion-spring H. The angular end of this projecting arm



F is by preference provided with a small friction-sleeve, *f*, to save wear upon the arm and the bearing-piece E, over which it rides.

It will be observed that the lower end of the coiled spring H is provided with a spindle, G', similar in construction to the spindle G at its upper end, this spindle G' being in like manner held within a bearing, *g'*, so that by means of these spindles the coiled spring will be securely held against movement in outward direction, the spindles being free, however, to turn within their bearings during the operation of the hinge. The bearings *g* and *g'*, in which the spindles G and G' are journaled, are preferably formed in piece with the connection C, that serves to unite the upper and lower leaves A and A' of the hinge, and these bearings are at such point that the body of the spring while extending in vertical direction shall largely project beyond the outer face of the leaves A and A', and I prefer to provide this connection C with a semi-cylindrical casing, *c*, that shall serve to cover the spring when it is in position for use. My purpose in so sustaining the coiled spring H that a great part of its body shall extend beyond the outer face of the leaves A and A' is to avoid the necessity of cutting away so much of the door or the jamb as would be required if the entire body of the spring were located at the back of the connection which serves to unite the upper and lower leaves. I also prefer when a connection, C', is used between the leaves B and B' to provide this connection with a recess, *c'*, adapted to receive the cylindrical casing *c* when the hinge is in closed position.

Between the lower set of door and jamb leaves, A' and B', is held the intermediate leaf D', that is pivoted, respectively, to these door and jamb leaves, and in construction and function corresponds with the intermediate leaf D. This intermediate leaf D', between the lower set of leaves, A' and B', has its upper edge provided with a bearing-piece, E', corresponding with the bearing-piece E upon the lower edge of the upper intermediate leaf, D, this bearing-piece E' serving to engage with the angular end of the arm F', that projects from the spindle G' at the lower end of the coiled spring.

By reference more particularly to Figs. 1, 2, and 5 of the drawings and to the relative positions of the parts there shown it will be readily seen that when the door is moved in one direction—as, for example, in the direction shown in Fig. 1—the turning of the door will occur upon the pintle *d*, that connects the leaf A with the intermediate leaf D, and upon the pintle *d*<sup>3</sup>, that connects the lower intermediate leaf, D', with the lower leaf B', and it will be apparent also that during this outward swinging of the door the projecting arm F will ride freely over the bearing-piece E of the intermediate leaf D, while at the same time this projecting arm will be turned against the torsional strain of the coiled spring.

When the door is in its normally-closed position, the parts of the hinge will be in the relative position shown in Fig. 5 of the drawings, and it is obvious that as the parts are turned from this position to that shown in Fig. 1, and as the angular end of the arm F rides freely over the wearing-face of the bearing-piece E, the force of the spring will be at all times exerted; but during this movement it is plain that since the angular end of the arm F applies the initial pressure at a point farthest from the pintle *d*, that constitutes the fulcrum or pivot-point on which the hinge is to be turned, the force of the spring will be exerted most strongly when the door is in closed position. As the door is swung open from the closed position shown in Fig. 5 to the position shown in Fig. 1, the angular end of the projecting arm F will be brought gradually nearer the pintle *d* as this arm rides over the face of the bearing-plate E, until, when the door is fully swung back, the projecting arm F will bear so near to the pintle *d* that the spring will exert comparatively little force and merely sufficient to start the door inward toward its closed position.

By inclining the wearing-face of the bearing-piece E from a point in front of to a point back of the intermediate leaf, as I prefer to do, the force of the torsion-spring exerted through the projecting arm F upon the bearing-piece is applied in a most effective manner, while a freedom of movement of the arm is allowed, and by providing the outer end of the bearing-piece E with the abruptly-curved portions *e* not only is all danger avoided of the arm F slipping off the bearing-piece at such point, but a stronger resistance is also offered to the initial movement of the door from its normally-closed position. It will be readily understood by reference more particularly to Fig. 2 of the drawings that when the door is swung from its closed position to the open position shown in Fig. 2 the swinging of the door will occur upon the pintle *d*', that connects the intermediate leaf D with the leaf A, and upon the pintle *d*<sup>4</sup>, that connects the lower intermediate leaf, D', with the lower leaf A', and during this movement of the door the action of the spring will be exerted through the medium of the lower projecting arm, F', upon the bearing-piece E' on the upper edge of the lower intermediate leaf, D'. Hence it will be seen that when the door is turned from its normally-closed position to the position shown in Fig. 2 the angular end of the projecting arm F' will ride over the face of the bearing-piece E', the operation being similar to that of the projecting arm F and the bearing-piece E, hereinbefore described.

It will be readily understood, of course, that when the torsion-spring is exerting its force through the medium of the projecting arm F and bearing-piece E upon the upper intermediate leaf, D, the lower projecting arm, F', will simply bear against the outer portion of



the bearing-piece  $E'$ , but will be inert so far as affecting the action of the door is concerned; and the same is true also with regard to the projecting arm  $F$  when the door is opened in reverse direction to bring the arm  $F'$  and the lower bearing-piece,  $E'$ , into action.

It will be readily understood that the projecting arms  $F$  and  $F'$  may be so attached to the spindle in well-known manner that the position of these arms may be shifted to different points of the spindle when it is desired to increase the torsional force of the spring; but this, being no part of my present invention, need not be dwelt upon in detail.

In the modification of the invention illustrated in Figs. 6, 7, and 8 of the drawings the leaves  $A$  and  $A'$  and  $B$  and  $B'$ , with their connections  $C$  and  $C'$ , are substantially the same as those illustrated in the preceding figures of the drawings, and the spring  $H$  is in like manner held in position upon the connection  $C$  and attached to the spindles  $G$  and  $G'$ . So, also, in this construction the intermediate leaves,  $D$  and  $D'$ , are pivoted to the door and jamb leaves in the manner above described; but these intermediate leaves, instead of being provided with bearing-pieces such as before described, are provided with bearing-pieces of modified construction, and the arms that project from the upper and lower spindles,  $G$  and  $G'$ , are also of correspondingly-modified construction. In this form of my invention the leaf  $D$  is provided at its lower end with a bearing-piece,  $E^2$ , in the form of a simple pin or stud, preferably fitted with a friction-sleeve,  $e^3$ , and a like pin or stud,  $E^3$ , with a friction-sleeve,  $e^4$ , is fixed to the upper end of the lower intermediate leaf,  $D'$ . Against the friction-sleeve of this bearing-piece  $E^2$  of the intermediate leaf  $D$  bears the projecting arm  $F^2$ , that extends from the spindle  $G$  at the upper end of the torsion-spring  $H$ , and in like manner against the sleeve of the bearing-piece  $E^3$  at the upper end of the lower intermediate leaf,  $D'$ , bears the projecting arm  $F^3$ , that extends from the spindle  $G'$  at the lower end of the spring  $H$ . In order to enable the arms  $F^2$  and  $F^3$  to effectively exert the force of the spring upon the bearing-pieces  $E^2$  and  $E^3$  of the intermediate leaves, each of these projecting arms is bent to an irregular shape, preferably as shown, and the ends of the arms are by preference bent over, as at  $f'$ , not merely to prevent the slipping of the arms out of engagement with the bearing-pieces  $F^2$  and  $F^3$ , but also to avoid danger of garments catching on the ends of these arms.

By reference more particularly to the dotted lines of Fig. 7 of the drawings it will be seen that when the door is in its normally-closed position the bearing-piece  $E^3$  will contact with the arm  $F^3$  at such distance from the pintle  $d$ , about which the door will turn when the arm  $F^3$  is to be brought into action, that the initial pressure of the arm  $F^3$  against

the bearing-piece  $E^3$  will be very strong, and in order to further increase the strength of this initial pressure the projecting arm  $F^3$  is by preference bent, as at  $f^2$ , at a point near its inner end. When, however, the door has been swung open, as seen in Fig. 8, less pressure will be exerted by the arm  $F^2$  upon the bearing-piece to restore the door to its closed position.

It will be readily understood that when my invention is to be applied (so far as it is applicable) to doors opening in one direction only the intermediate leaves,  $D$  and  $D'$ , need not be used, and in such case the bearing-pieces will be formed directly upon one of the door and jamb leaves.

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

1. In a spring-hinge, the combination, with two or more leaves pivoted together, of a torsion-spring, a projecting arm connected therewith and having a free outer end, and a bearing-piece upon one of said leaves, against which the free end of said projecting arm can ride during the operation of the hinge, substantially as described.

2. In a spring-hinge, the combination, with the leaves for attachment to the door and jamb, respectively, and the intermediate leaf pivoted to said door and jamb leaves, of a torsion-spring, a projecting arm connected therewith and having a free outer end, and a bearing-piece upon said intermediate leaf, said arm and said bearing-piece being movably sustained with respect to each other, and one of said parts being provided with an irregular surface, against which the other is held in a manner free to ride, whereby a varying spring-pressure in the action of the hinge is secured, substantially as described.

3. In a spring-hinge, the combination, with an upper and lower set of leaves for attachment to the door and to the jamb, respectively, and intermediate leaves pivoted to said door and jamb leaves, of a torsion-spring located intermediate of said upper and lower sets of leaves, a projecting arm at each end of said spring, and a bearing-piece located upon each of the intermediate leaves, against which said arms are held in a manner free to ride, substantially as described.

4. In a spring-hinge, the combination, with two or more leaves connected together, one of said leaves being provided with a cut-away space, of a spring located within said cut-away space of one of the leaves, and extending beyond the face of the leaf with which it is connected, said spring having its ends held against outward movement, a projecting arm connected to the spring, and a bearing-piece upon one of said leaves, with which said arm engages, substantially as described.

5. In a spring-hinge, the combination, with two or more leaves pivoted together, of a spring, an arm projecting therefrom, one of said leaves being provided with a bearing-

piece having a wearing-face, over which said arm freely rides, said wearing-face extending across the plane of said leaf, substantially as described.

- 5 6. In a spring-hinge, the combination, with several leaves pivoted together, of a spring, an arm projecting therefrom having an angular end, one of said leaves being provided

with a bearing-piece, over which the angular end of said arm freely rides, substantially as described.

JOSEPH KEENE.

Witnesses:

GEO. P. FISHER, Jr.,

I. B. CARPENTER.