

G. H. DAY.
 SPRING HINGE.
 APPLICATION FILED AUG. 10, 1908.

911,949.

Patented Feb. 9, 1909.

Fig. 1.

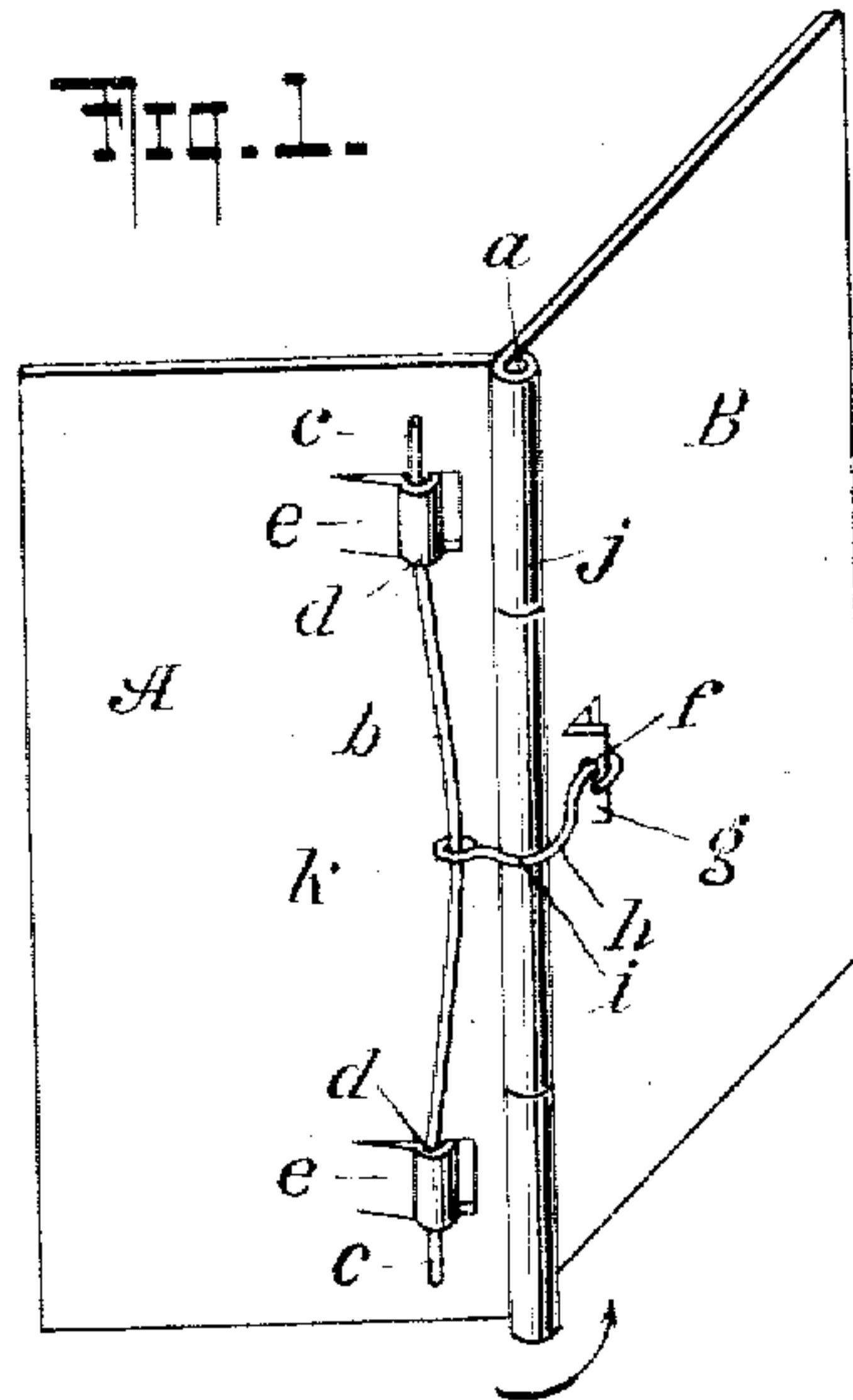


Fig. 2.

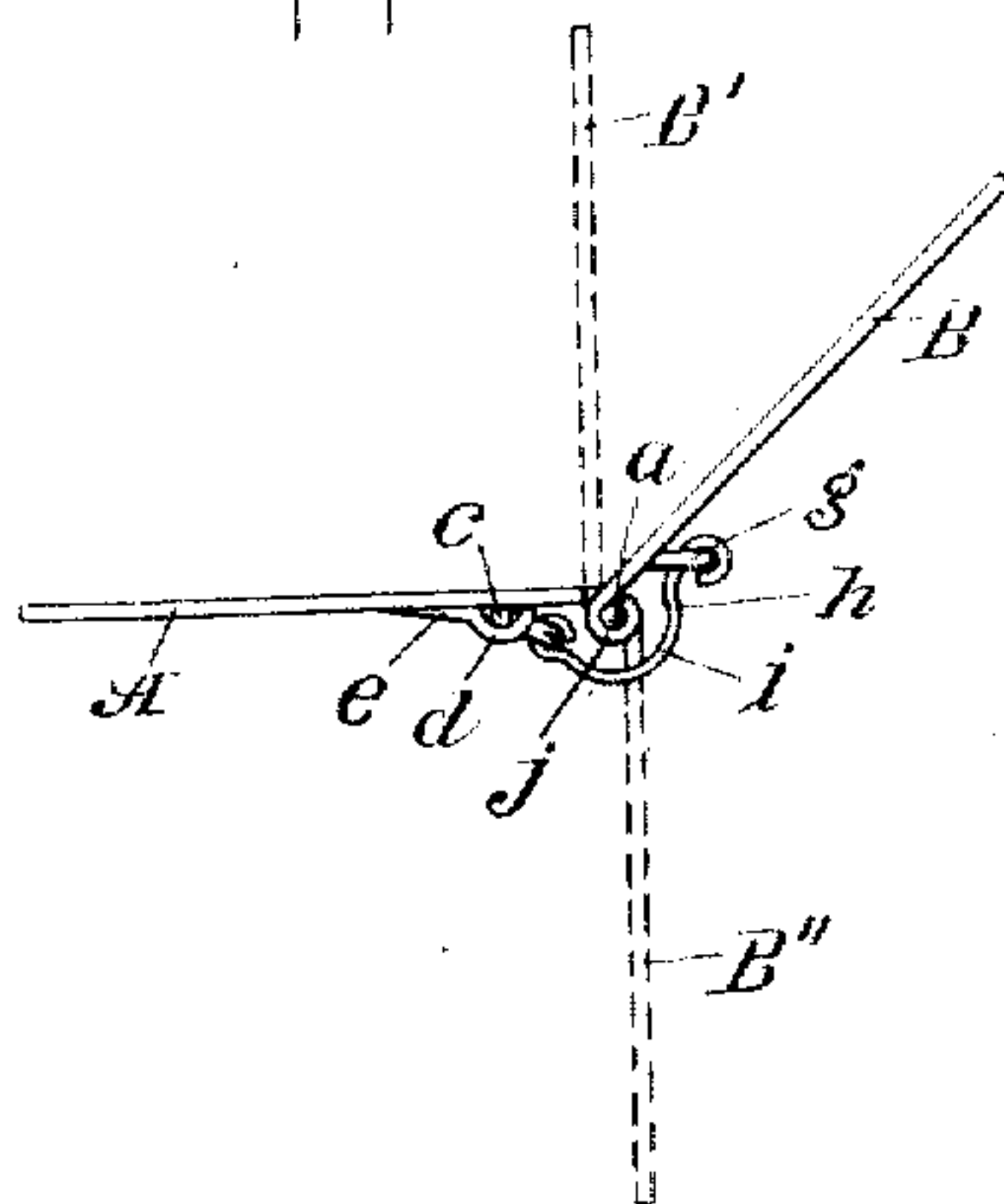
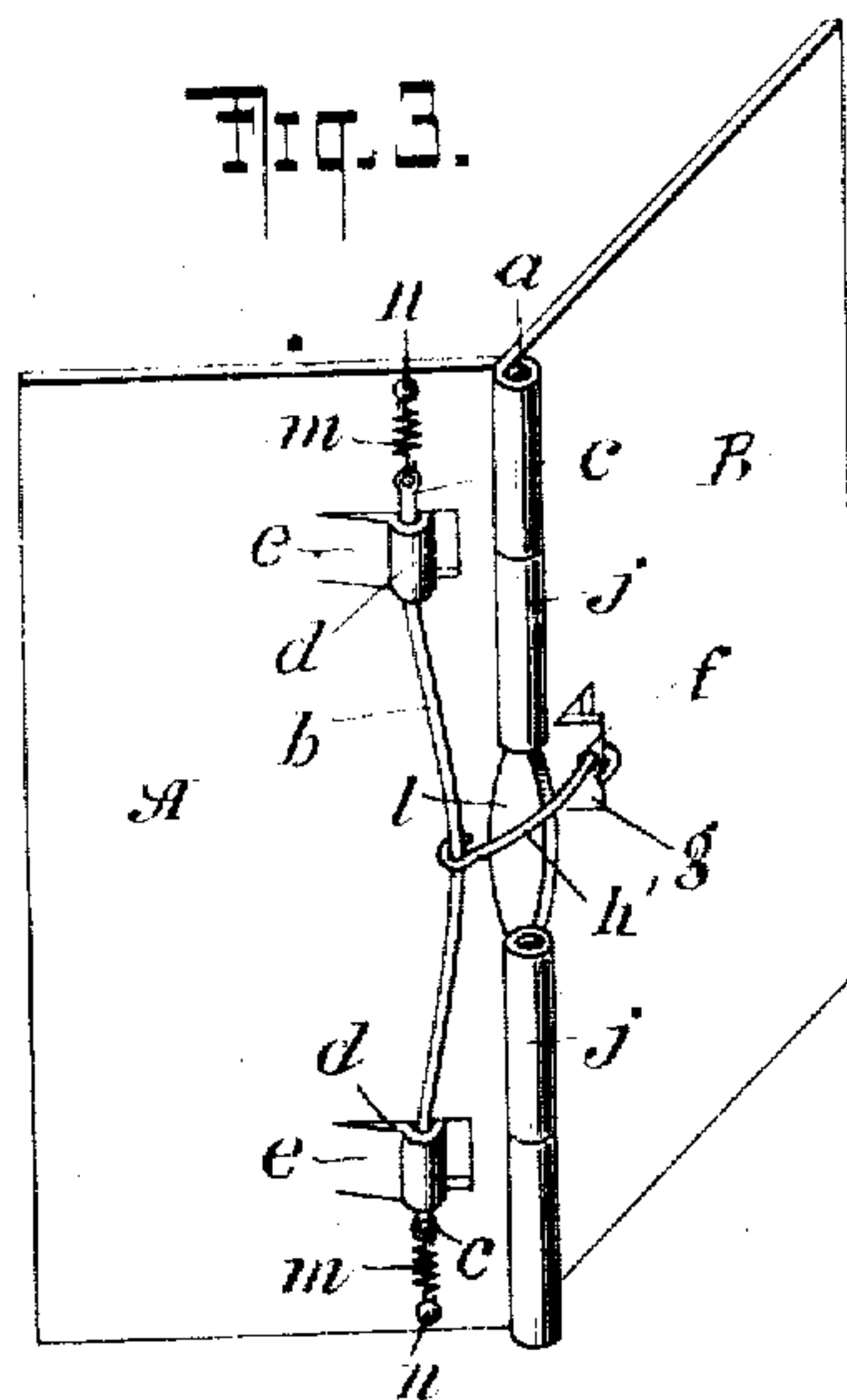


Fig. 3.



WITNESSES

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SPRING-HINGE.

No. 911,949.

Specification of Letters Patent.

Patented Feb. 9, 1909.

Application filed August 10, 1908. Serial No. 447,674.

To all whom it may concern:

Be it known that I, GEORGE H. DAY, a citizen of the United States, and a resident of Southbridge, in the county of Worcester, State of Massachusetts, have invented a new and useful Improvement in Spring-Hinges, of which the following is a specification.

My invention relates to that class of spring hinges in which the members are constrained, through the action of a suitable spring arrangement, to assume one or the other of two opposite limiting positions according to the relative initial position of the members, and has for its object the production of such a hinge which shall be at once simple, effective, inexpensive to construct, and reliable in operation.

My invention consists in certain novel features of construction and arrangement of parts as are more particularly set forth in the following description and claims and in the drawings accompanying.

Figure 1 is a perspective view of my improved hinge in a partially open position. Fig. 2 is a plan view of the same, and Fig. 3 is a perspective view of a modification of the hinge shown in Fig. 1.

A and B are the two hinge members joined by the pivot, or pintle, *a*; a piece of spring wire *b*, having substantially straight ends *c*, and any desired area and shape of cross-section, round, square, or otherwise, and of any suitable spring material, has its ends slid into channels *d*, which are fixed to the member A, parallel with the pivot *a*; where the hinge members are not too thick I prefer to make these channels by punching flaps *e*, *e*, from the body of the member and then forming the channel *d* on the ends of such flaps. These channels do not grip the ends *c* tightly but so as to have an easy sliding fit.

In B is provided an eye *f*; this may be formed separately and attached to B in any suitable manner such as by riveting or soldering, but I prefer to proceed as I do for the channels *d*, *d*, viz., punch out a flap or tongue *g* from the body of the member in which flap I may drill the eye *f*.

h is a link of suitably sectioned wire which I use to join the eye *f* to a central part of the spring wire *b*, the ends of *h* being turned over into suitable hooks so as to engage the eye and spring respectively without risk of slipping off.

In use my hinge is commonly set so that

one of its members has a pivotal range of movement through about 180° with reference to the other member, the limiting positions of one member being about 90° on one side and 90° on the other side of the plane of the other member. Thus in Fig. 2, B' and B'' show, in dotted outline, the limiting or extreme positions of the hinge member B as regards the other hinge member A.

The link, *h*, may be bent in an outward curve, *i*, to clear the hinge knuckle, *j* when the member B takes the position B'. It must also be chosen of such length that when B is in the limiting position B'' that portion of the spring *b* lying between the channels *d* will be deflected somewhat from the axial line of its ends *c*, *c*, thus exerting a force tending to diminish still further the angle between A and B (now B'').

The action of the hinge is as follows: Suppose the door or box lid to which it is attached to be closed when the hinge members have the position A, B'', of Fig. 2. Spring *b*, through the link *h* and eye *f*, tends to keep the hinge in this position since the spring is drawn aside at its center from its normally straight position. As the hinge is opened (in the direction of the arrow, Fig. 1) this central part is deflected more and more from the axial line of its ends and therefore resists such opening with a corresponding increasing force. This resistance increases until B has been rotated to a position where the point of connection of link *h* and flap *g* (approximately the eye *f*) reaches the plane passing through the juncture *k* of *h* with *b* and the axis of the pintle *a*. This position constitutes a "dead center" for the member B in which it will tend neither to resume its former position nor to continue its onward movement with relation to A. If, now, B is rotated still further on the pintle *a* so that the eye *f* passes through the plane, above referred to, of *k* and the pintle *a*, spring *b* will again exert its rotary force but with its line of action on the other side of pintle *a*, thus tending to place B in the limiting position B'. And if, now, we reverse the operation and close the door to which the hinge is attached, i. e., carry B from the position B' to that of B'' (counter to the arrow of Fig. 1) we shall find this operation resisted by spring *b* until the eye *f* shall again reach the plane of *k* and pintle *a*, after which the spring will aid the closure.

By properly locating the axis of c, c , the pintle a , and the eye f , we may fix this plane of the "dead center" approximately in the plane of $A, i. e.$, so that the door, when it is opened, will always tend to close itself until 90° is exceeded when it will tend to open itself fully. The ends c, c , of b slide in the channels d, d , so as to include a greater or less length of b between said channels according as b is deflected to a greater or less extent. The resiliency of b is not only that due to its bending at the center, but also that due to its bending at those ends, which face each other, of each channel d .

In the modification of my hinge shown in Fig. 3, I have cut away the central part of the knuckle j and pivot a , as also some from the inner edge of each hinge member, being thereby enabled to make the link h' without the outwardly curved central portion i of Fig. 1.

Should a spring tension greater than can be obtained without undue increase in the section of b be desired, I may employ suitable stretched spiral springs m joined to either or both ends c of the wire b and outwardly connected to a pin or eye n . The tension due to the stretch of the springs will then be added to that due to the bending of b .

Instead of having both ends c, c , slide, I may accomplish all the purposes of my invention by having one end fixedly secured to A and the remaining member only, slide.

The angular position of the plane of "dead center", the tension of the spring, and the difference between the maximum and minimum spring tension depend upon the relative value of a number of factors, all of which may be fixed as desired, viz., the distance between the axis of c, c , and that of a ; the distance between f and the axis of a ; the distance between the axis c, c , and A ; the distance between f and B ; the length of link h , the length between channels d, d , the gage and material of b , etc. etc. By suitably determining these various factors, also, I may advantageously use limiting angles between the two members A and B , on the one side or the other, quite different from the 90° previously referred to as commonly used. The angles actually chosen will, of course, depend upon the particular application which is to be made of the hinge.

I may, of course, vary many of the details of construction in my improved hinge as *e. g.*, the mode of attachment of the link h to the member B , of the ends of spring b to the member A , the form and mode of attachment of spring m , etc., without departing from the spirit of my invention.

My improved hinge is applicable to any of the situations for which ordinary hinges are commonly employed, but will be found peculiarly adapted for use on cupboards and bookcase doors, the small doors of bric-a-brac and filing cabinets, and for small boxes such as are used by jewelers and opticians.

Having thus described my invention I therefore claim:

1. In a hinge having two members united by a pivot, a substantially straight spring placed parallel to the pivot and attached near its ends to one of said members, said spring being linearly slidable at least as to one of said ends; and the other member engaging in the middle of said spring by a hook or link which extends toward but does not reach the axial line of the sliding spring ends.

2. In a hinge having two members united by a pivot, a spring substantially straight at its ends placed parallel to the pivot and slidable in parallel end guides, said guides being secured to one of said hinge members; and the other member engaging in the middle of said spring by a hook or link which extends toward but does not reach the axial line of the sliding spring ends.

3. In a hinge having two members united by a pivot, a substantially straight spring placed parallel to the pivot and attached near its ends to one of said members said spring being linearly slidable at least as to one of said ends; a spring connecting said slidable end to said hinge member and adapted to exert a linear pull upon the first named spring; and the other hinge member engaging in the middle of said first named spring by a hook or link which extends toward but does not reach the axial line of the sliding spring ends.

4. In a hinge having two members united by a pivot, a spring substantially straight as to its ends placed parallel to the pivot and slidable in parallel end guides said guides being secured to one of said hinge members; springs connecting said ends to said hinge member and adapted to exert a linear pull upon the first named spring; and the other hinge member engaging in the middle of said first named spring by a hook or link which extends toward but does not reach the axial line of the sliding spring ends.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

GEORGE H. DAY.

Witnesses:

C. FRED. HILL,
J. C. WELLS.