

(No Model.)

J. W. EASTON.
LIGHTNING ARRESTER.

No. 449,903.

Patented Apr. 7, 1891.

Line

Fig. 1.

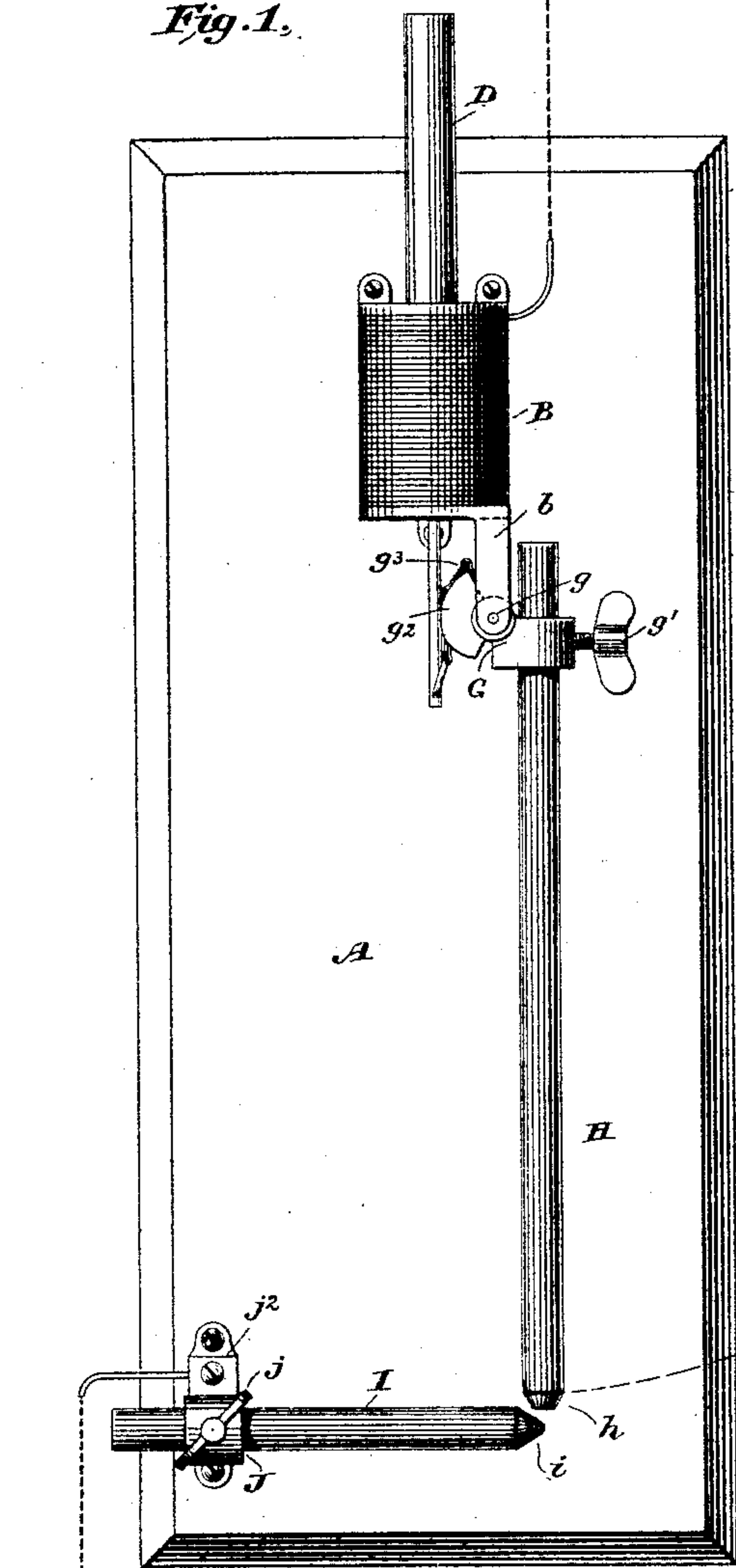


Fig. 2.

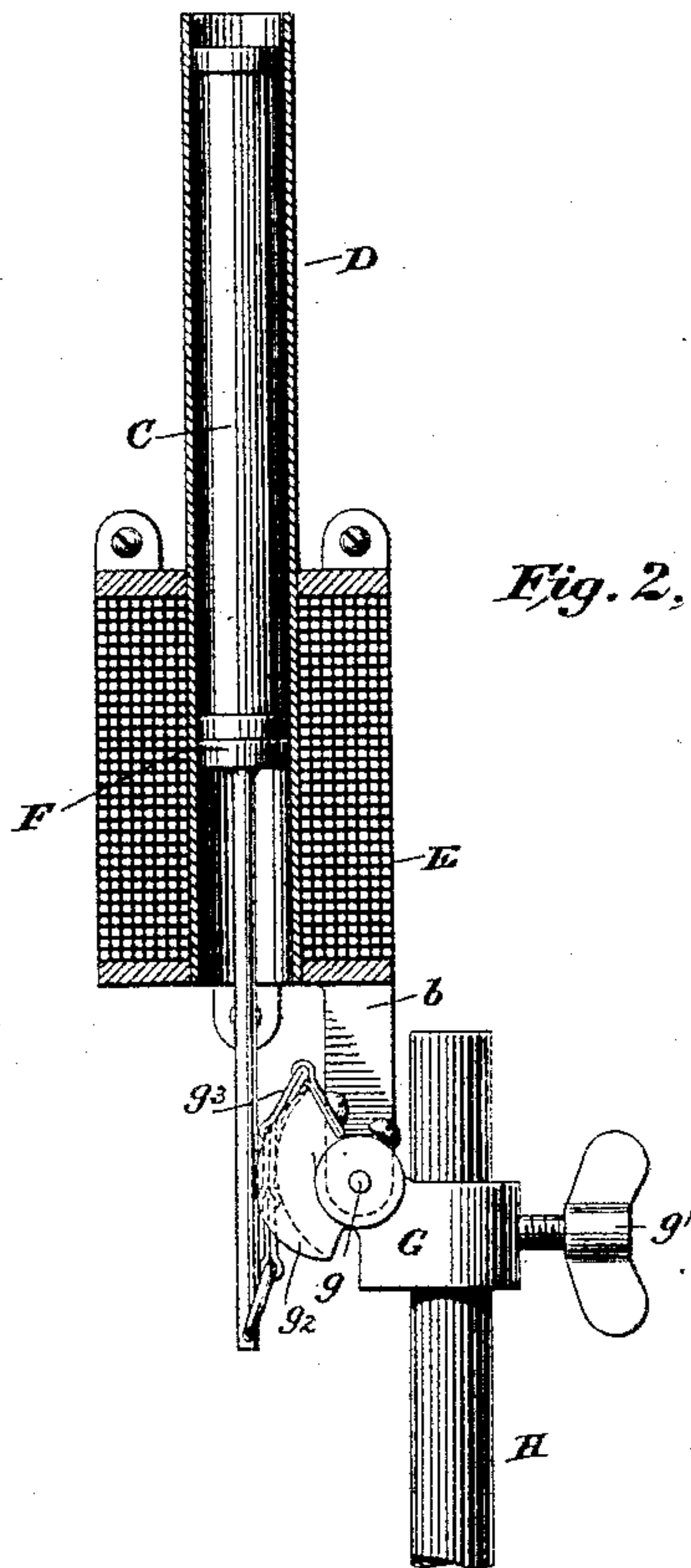


Fig. 3.

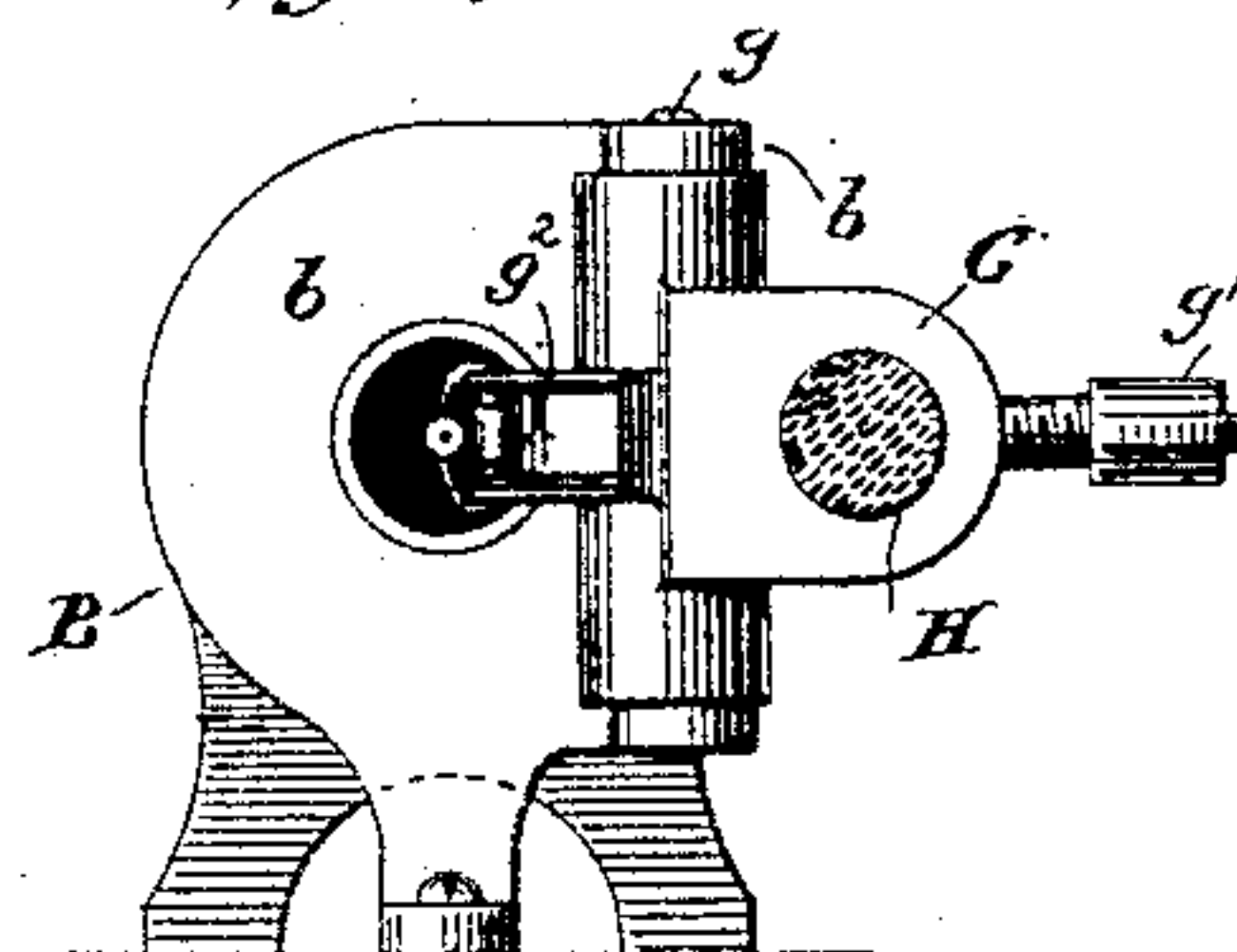
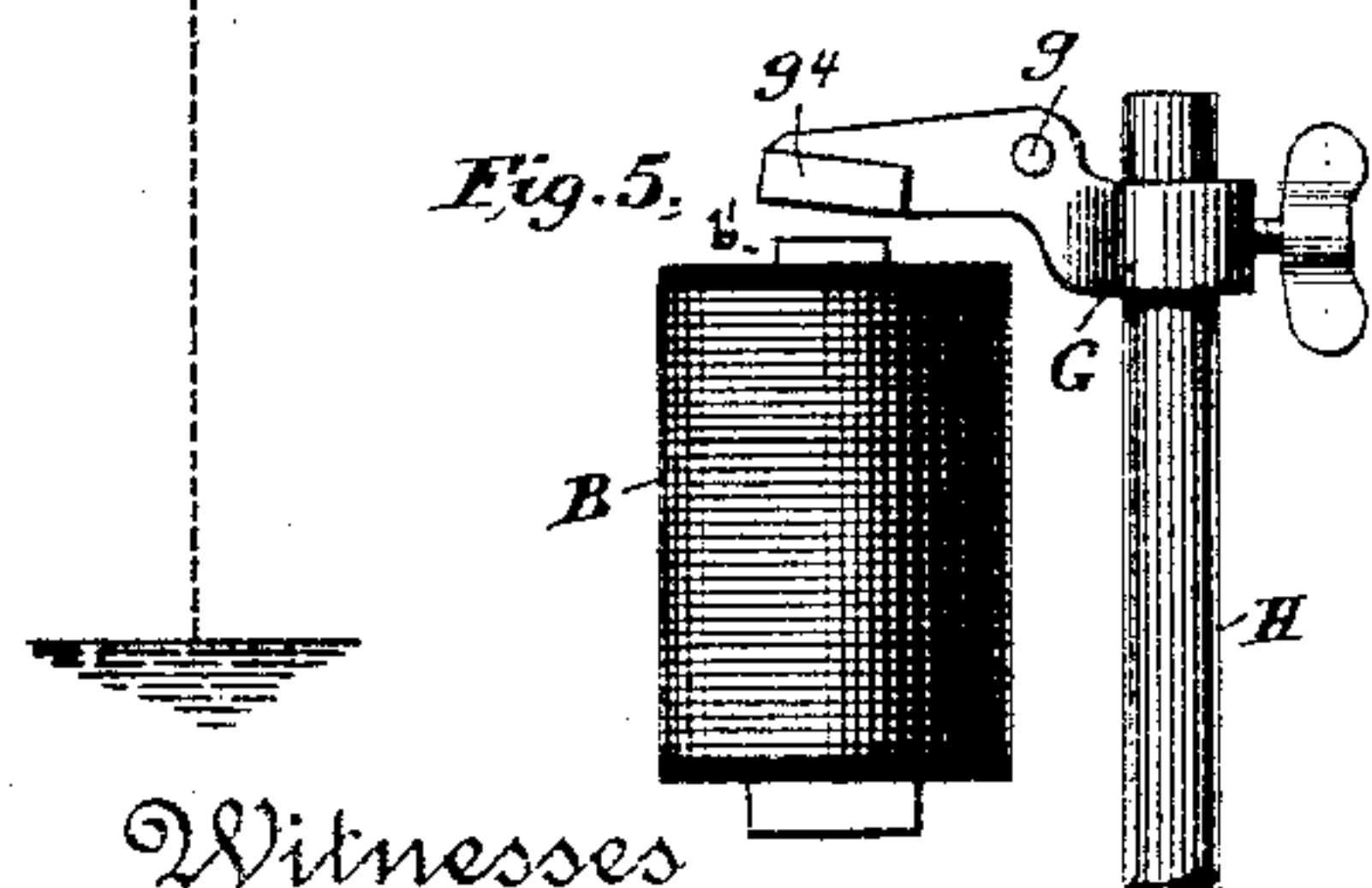
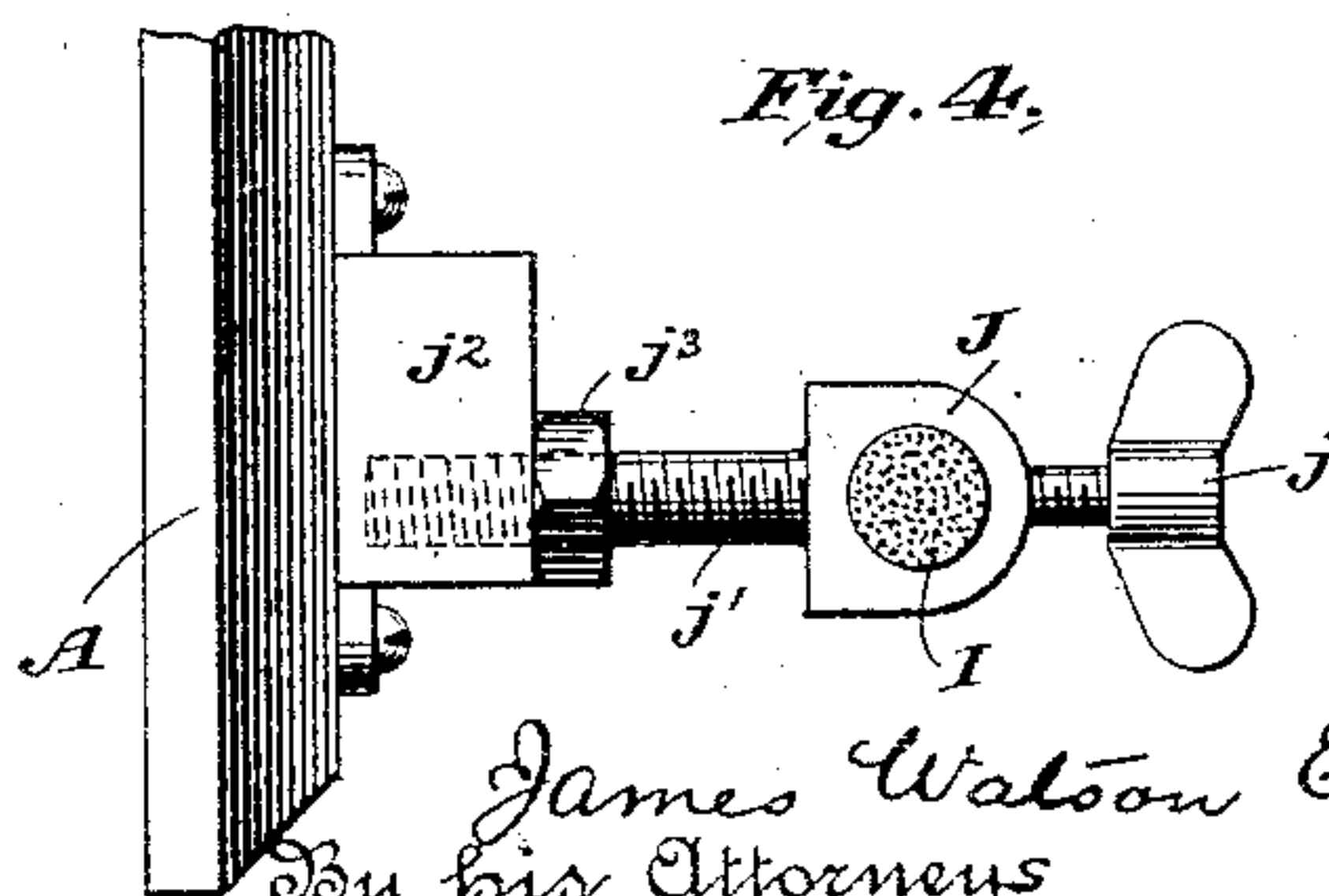


Fig. 4.



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Fig. 5.



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LIGHTNING-ARRESTER.

SPECIFICATION forming part of Letters Patent No. 449,903, dated April 7, 1891.

Application filed August 14, 1890. Serial No. 361,967. (No model.)

To all whom it may concern:

Be it known that I, JAMES WATSON EASTON, a subject of the Queen of Great Britain, residing in the city, county, and State of New York, have invented a certain new and useful Improvement in Lightning-Arresters, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to that class of lightning-arresters which comprises two electrodes, one connected with the working-circuit and the other having a ground connection, separated sufficiently to prevent the passage of the working-current under ordinary conditions, but not enough to oppose any material resistance to the passage of the abnormal current caused by the lightning-stroke.

The chief difficulty experienced with devices of this nature has heretofore existed in the tendency of the normal current of the circuit to follow in the path of the current caused by the lightning-stroke and form a permanent arc between the electrodes of the apparatus. This objectionable operation is due to the fact that the passage of the abnormal current caused by the lightning-stroke heats the electrodes, and while passing between them fills the space which normally separates them with finely-divided particles of the hot carbon or other material composing them, thereby reducing the resistance thereof sufficiently to permit the forming of the arc by the ordinary working-current. Means for destroying the arc so formed are therefore essential to the successful operation of such an arrester, and this has usually been accomplished either manually or by the employment of complex devices liable to derangement and to interfere with the successful operation of the arrester.

The object of my invention is the provision of simple and efficient means for destroying this arc or preventing its formation in the first instance by automatically separating the carbons as soon as the abnormal current caused by the lightning-stroke passes

between the electrodes; and to this end it consists in the novel combination of parts and arrangement and construction of details herein shown and described, and specifically pointed out in the claims.

In the accompanying drawings, Figure 1 is a view in elevation of my invention. Fig. 2 is a detail view thereof, showing the mechanism for separating the electrodes. Fig. 3 is a plan view thereof from beneath. Fig. 4 is a side view of the mechanism for supporting the stationary electrode, and Fig. 5 shows a modification of the construction of the device for separating the electrodes.

The same reference-letters are used to designate corresponding parts in all the views.

Referring to Figs. 1 to 4, A is a supporting board or plate, to which the solenoid or electro-magnet B is secured in any convenient manner. The core C of the solenoid is supported within the guide-tube D, upon which the coil E is wound, by the plunger F. The coil E is wound in the usual manner, and one terminal thereof is in electrical connection with the main circuit, while the other terminal thereof is preferably connected with the frame *b* of the solenoid, to which is secured the electrode-clamp G by pivot *g*. The clamp G is provided with a suitable socket for receiving the electrode H, formed preferably of carbon, which is adjustably secured therein by the set-screw *g'*, and said clamp is also provided with a cam-shaped projection *g*². A chain or other flexible connection *g*³ extends from the lower end of the plunger F to the upper surface of said cam, the edge of which is preferably formed with a groove or channel to prevent the chain from being displaced. The stationary electrode I, also preferably of carbon, is secured within the clamp J by the set-screw *j*. The clamp J is provided with a shank *j'*, which is screw-threaded and enters a hole tapped in the contact-piece *j*², from which a suitable conductor leads to the earth, as shown in Fig. 1. The clamp J may thus be adjusted so as to support the electrode I at any desired distance from the support A, and a jam-nut *j*³ serves to secure it in the position at which it may be adjusted. The

frame *b* of the solenoid and the clamps *G* and *J* are preferably constructed of good conducting material, such as brass, so that a complete metallic connection is formed between the main line and the earth, except for the slight space which separates the extremities *h* and *i* of the electrodes.

If desired, an ordinary electro-magnet may be substituted for the solenoid, as shown in Fig. 5, in which *b'* represents the poles of the magnet and *g'* the armature, which is secured to the carbon-clamp *G*.

The operation of the invention is as follows: The arrester having been properly located, connections are made between the electrode *H* and the main circuit and the electrode *I* and the earth, as shown in Fig. 1. The extremities of the electrodes are then adjusted at a sufficient distance apart, so that the normal current of the circuit will not pass between them. This distance for ordinary working-currents is generally not more than one-tenth of an inch and is not sufficient to offer any material resistance to the abnormal current caused by a stroke of lightning. Under normal conditions, therefore, the arrester is entirely inactive; but if the main line be struck by lightning the current, which has a tendency to seek the path of least resistance to the earth, will pass through the coils *E* to the electrode *H* and across to the electrode *I*, and thence to the earth. The completion of this circuit energizes the coils *E*, which causes the cores *c* to be drawn down into the coils. This movement of the core will depress the plunger *F*, the projection *g'* will be pulled down, owing to the connection *g'* between it and the lower end of the plunger, and the clamp *G* will be partially rotated on the pivot *g*, swinging the lower end of electrode *H* away from the electrode *I* in the direction shown by the arrow *x* in Fig. 1. This separation of the electrodes of course breaks the electrical circuit, the coil *E* is de-energized, and the electrode *H* immediately swings back again to its normal position. In this manner the normal working-current is prevented from following in the path of the abnormal current caused by the lightning-stroke, and if through any cause an arc should have been formed between the electrodes before they are sufficiently separated to prevent it the arc will be immedi-

ately broken and will not re-form again when the electrode returns to its original position.

By pivoting the clamp *G* below the solenoid the action of the apparatus is much more positive, prompt, and direct than where the connections are made above the solenoid, and by my arrangement the maximum effect of the coil is instantly secured.

Another desirable feature of my invention is the provision of the cam-shaped surface *g'* on the clamp *G*, whereby as the power required to separate the electrodes becomes greater, owing to the movement of the electrode *H* toward a horizontal position, the leverage of the clamp *G* is also increased. This feature positively insures the disruption of the arc and the breaking of the circuit.

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

1. In a lightning-arrester, the combination of the solenoid *B*, the core *C*, the plunger *F*, supporting said core, the swinging electrode-clamp *G*, pivoted below the coil of the solenoid, connections between said plunger and said clamp, the electrode *H*, secured in said clamp, and the electrode *I*, substantially as shown and described.

2. In a lightning-arrester, the combination, with the electrodes *H* and *I*, of the solenoid *B*, the core *C*, the plunger *F*, supporting said core, the swinging electrode-clamp *G*, provided with a cam-shaped surface *g'*, and a flexible connection between said clamp and said core arranged to engage with the cam-shaped surface of the clamp *G*, so that the leverage of the clamp is increased as the power required to move the electrode *H* becomes greater, substantially as and for the purposes set forth.

3. In a lightning-arrester, the combination of a solenoid or electro-magnet, a swinging clamp *G*, connected thereto, an electrode adjustably secured in said clamp, the electrode *I*, the clamp *J*, mechanism for adjusting the position of the electrode *I* within said clamp, the contact-piece *j'*, and means for adjusting the position of the clamp *J* therein, substantially as and for the purposes set forth.

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Witnesses:

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