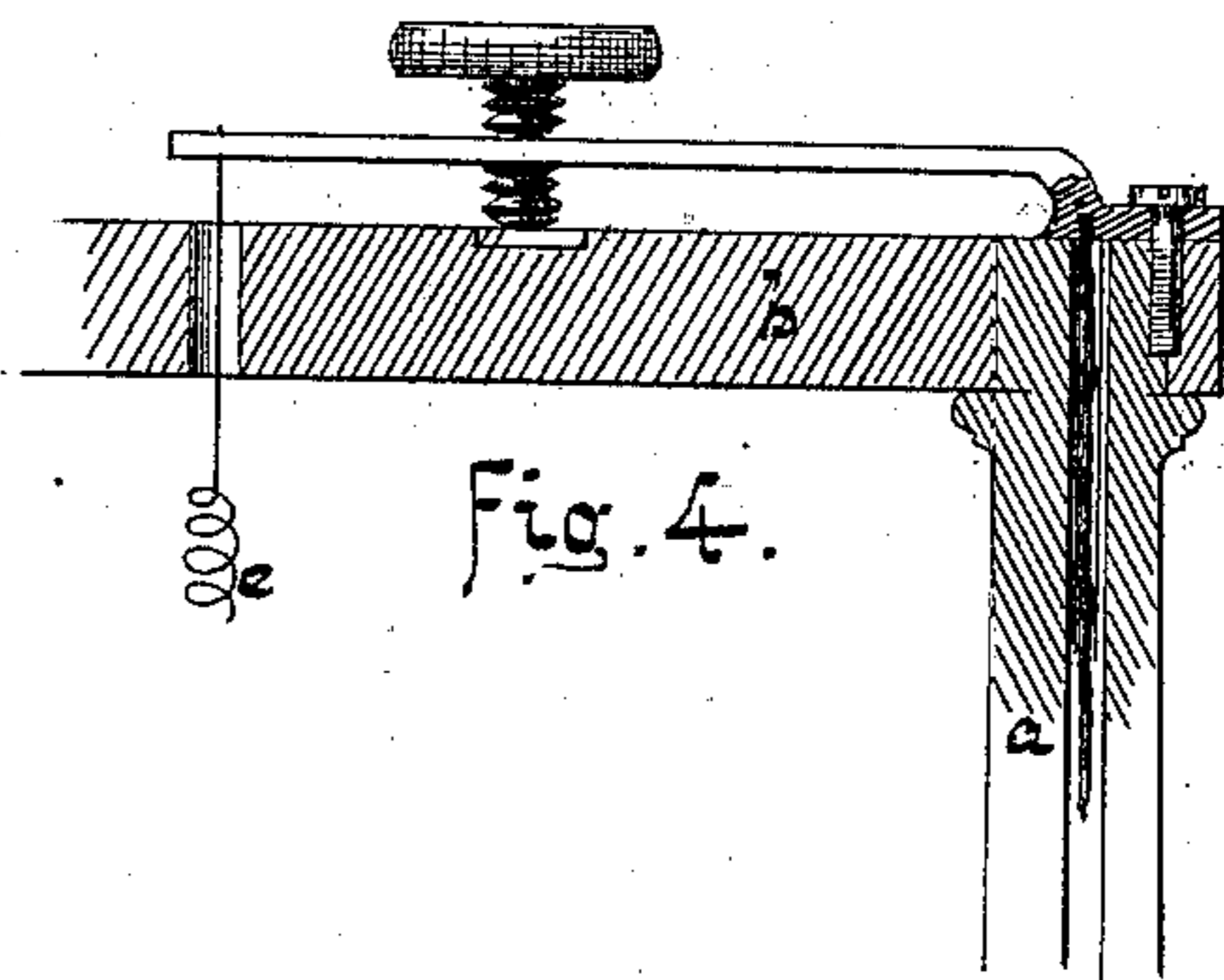
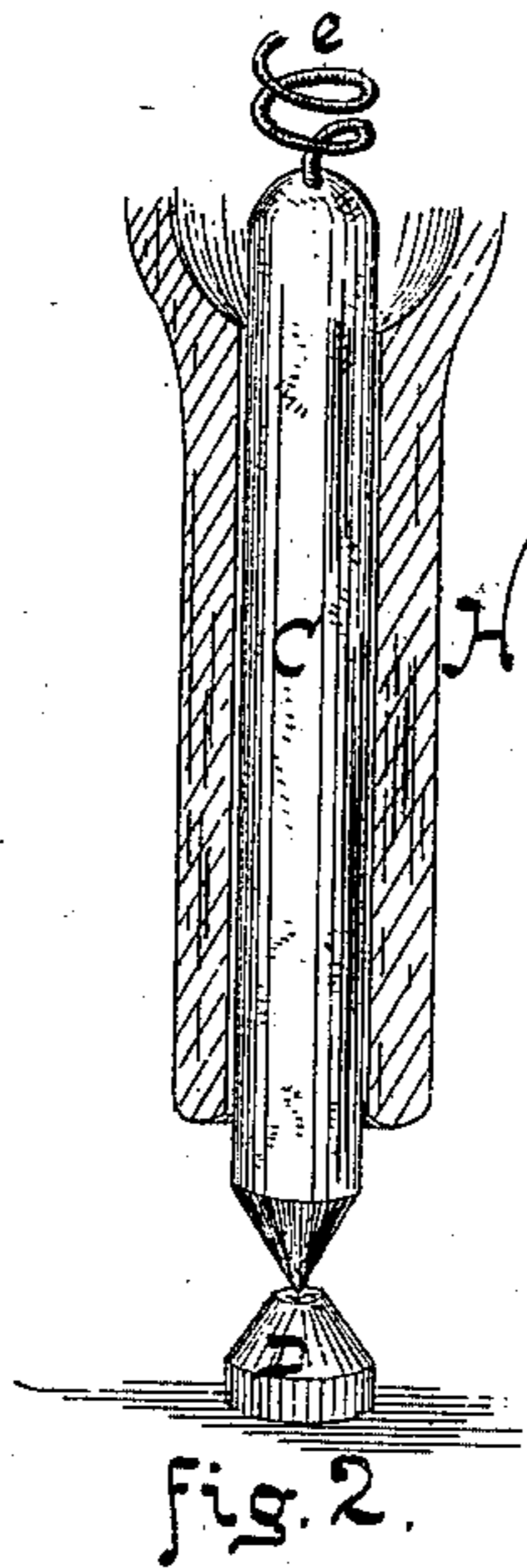
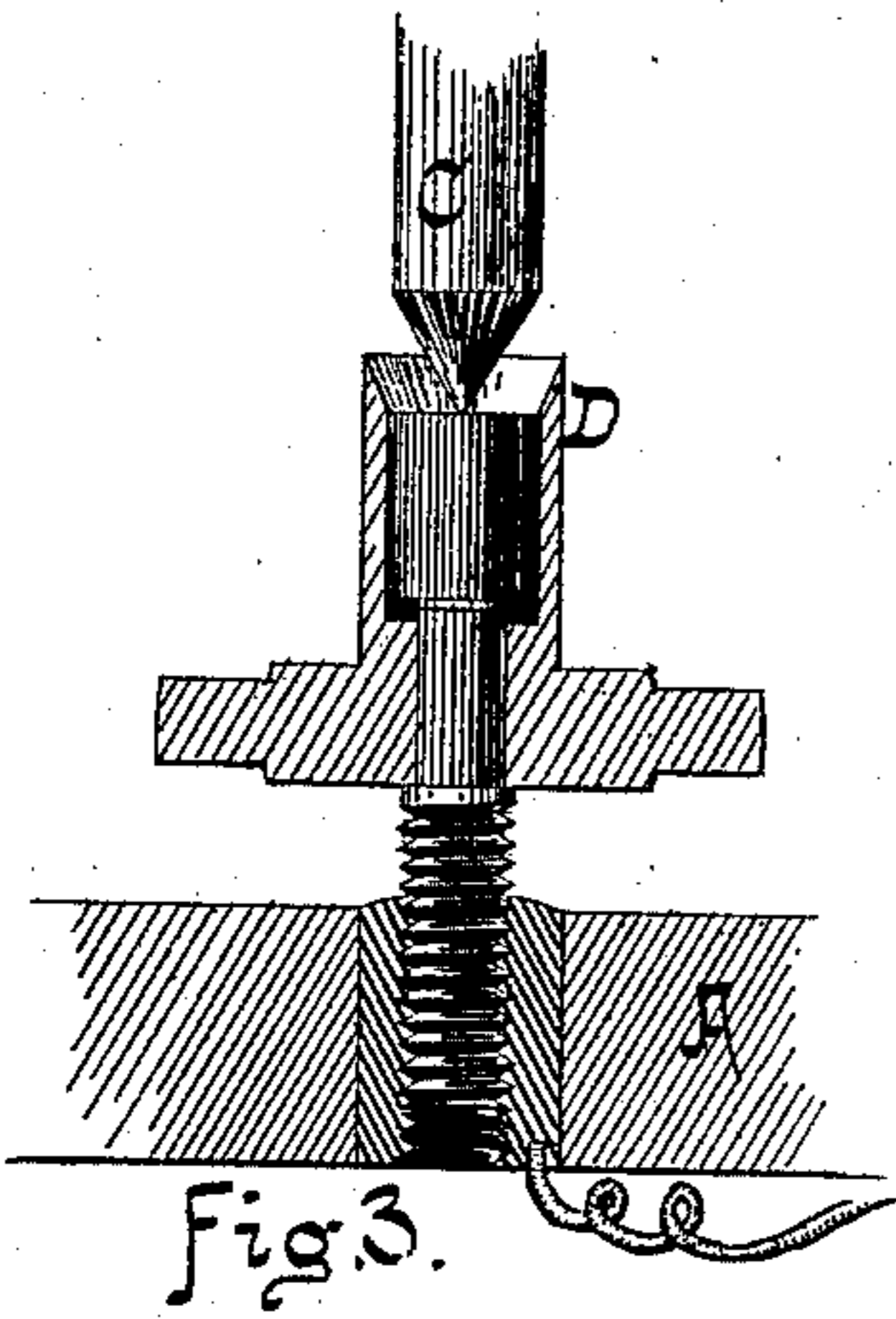
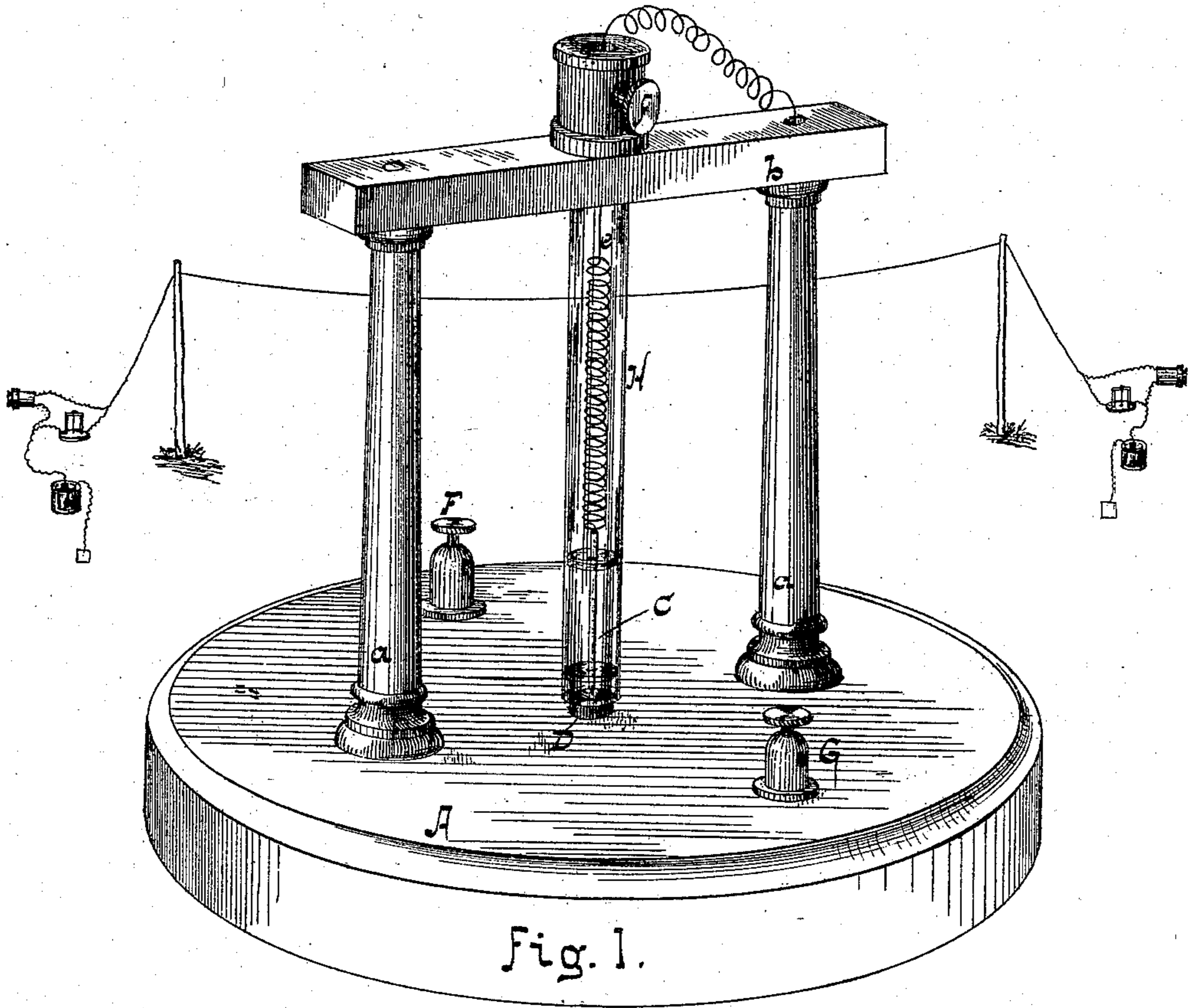


J. H. IRWIN.  
Telephone-Transmitters.

No. 209,266.

Patented Oct. 22, 1878.



Attest.  
*Aug. S. Jordan*  
*D. P. Howl*

Inventor.  
John H. Irwin.  
By his Atty.  
*R. D. Smith*

# UNITED STATES PATENT OFFICE.

JOHN H. IRWIN, OF PHILADELPHIA, PENNSYLVANIA.

## IMPROVEMENT IN TELEPHONE-TRANSMITTERS.

Specification forming part of Letters Patent No. 209,266, dated October 22, 1878; application filed July 20, 1878.

*To all whom it may concern:*

Be it known that I, JOHN H. IRWIN, of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented new and useful Improvements in Acoustic Telegraphy, of which the following is a full and exact description.

This invention relates to that branch of acoustic telegraphy whereby articulate sounds produced in the vicinity of the transmitting-instrument are reproduced and made audible again at a distant point in an electrical circuit.

The object of my improvement is to reproduce the exciting sounds without loss of volume, and therefore to render audible within a confined space sounds which in the free atmosphere would be inaudible.

To this end I construct a battery-circuit with an interposed apparatus consisting of a pointed needle delicately suspended with its point in contact with another needle having a blunted point, whereby the electric current is required to pass the attenuated part of the circuit formed by said needle-points in contact, and become broken up into undulations by any cause which sets up vibrations in the vicinity of said attenuated portion of the circuit.

The only causes of vibrations which are of interest in connection with this patent are sounds. When sound-waves fall upon the above-mentioned needles and their supporting parts, vibrations are set up therein in exact response to the exciting sound-waves. These vibrations affect the conductivity of the circuit-wire at the attenuated portion by varying the resistance at that point, and set up a series of undulations in the electric current corresponding to the characteristics of the sound-waves, and these undulations affect an instrument of suitable structure at another point in the circuit, to reproduce isochronous vibrations and duplicate sounds.

My device therefore consists of a pointed needle suspended by an elastic support over and in pointed contact with a blunt-pointed needle, said needles constituting a part of an electric battery-circuit.

That others may fully understand my invention, I will more particularly describe it, having reference to the accompanying drawing, wherein—

Figure 1 is a perspective view of my transmitting apparatus. Fig. 2 is a longitudinal section of the same. Figs. 3 and 4 show methods of top and bottom adjustment.

The apparatus hereinafter described is practically effective, as set forth; but it will appear manifest that the details of the construction may be changed without affecting the essential feature relating to the phenomena of variable resistance; therefore I do not propose to confine myself to a supporting-frame of any particular form.

A is a base-piece, to which are affixed two standards, *a a*, to support a cross-bar, *b*. C is a needle suspended from the cross-bar *b*, with its point resting upon the blunt-pointed needle D. These needles are placed in the electric circuit, and the varying resistance at the point of contact due to the vibrations set up by the impact of sound-waves causes undulations in the electric current and correspondingly affects the magnetism of an electro-magnet at the point where the primary sound is to be reproduced.

The needles C D may be of any material capable of acting as a conductor of electricity, and so far as effect is concerned it is immaterial what substance is employed. Efficiency and durability, however, require a choice of material, and I have found that platinum or carbon possesses the requisite sensitiveness, and is sufficiently refractory.

The contact-pressure between the surfaces is of the first importance, and as this will vary under any arbitrary adjustment, by reason of the elongating and heating effect of the electrical passage, it is desirable to secure an automatic continuance of the effective adjustment. I therefore suspend the needle C by a wire, *e*, which is attached to a turning-key, *f*, or other device, whereby it may be raised or lowered for adjustment, and by coiling said wire *e*, as shown, it has more power as a spring, and does not offer any appreciable resistance to the automatic rise and fall of the needle C under the disturbance of the varying electric current, the vibration in response to sound-waves, &c. The delicacy of response to sound-wave vibration in an instrument of this character is enhanced by the free suspension of the needle in a vertical position.

The needle C might be arranged with a supporting-spring below it; but it is manifest that such an arrangement would be of less delicacy than the one shown.

F and G are binding-screws for the attachment of the circuit-wires. H is a glass tube, within which the needles are inclosed to protect them from disturbance from air-currents. Within the tube H are guides or bearings for the needle C, to keep the same central and vertical in its adjustment, because any lateral movement while in operation impairs the distinctness of the reproduced articulations.

In Fig. 3 is represented a means of adjusting the lower or carbon pencil D, by mounting it in a cup which is provided with a screw-stem, so that by simple revolution it may be caused to rise or sink. The screw-stem should be made of brass or other good conductor, and the inclosing cup may be made of hard rubber, ivory, or other non-conductor, though this is not absolutely essential. With this arrangement the necessary delicacy of adjustment is very easily obtained.

The delicate wire spring *e* is constantly liable to elongation, and it is therefore necessary to provide an adjustment at the top. Such adjustment is secured by the key *f*, or by some other well-known means, one of which is shown in Fig. 4.

In Fig. 1, in the background, there is represented a telephone-line with transmitting and receiving instruments at each end, and also a battery at each end. These instruments may be duplicated and the line extended indefinitely, and the batteries, all being in circuit, act as relays for each other.

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

1. In a telephonic transmitter, the combination, at the point of variable resistance, of a pointed needle of platinum suspended by an elastic support, and an adjustable pencil of carbon.

2. An attenuated point in a battery-circuit, composed of a freely-suspended needle, the point whereof rests upon the blunt point of an opposite needle with an adjustable pressure, as set forth.

3. The pointed needle C, suspended by a wire from an adjusting-key, *f*, or its equivalents, combined with the blunt needle D, fixed to its base, and the two interposed in a battery-circuit, as set forth.

4. The pointed needle C, suspended by a coiled wire, *e*, and adjusted by a key, *f*, in combination with the fixed needle D and the supporting-frame, as set forth.

5. The needle C, its suspending-wire, adjusting-key, and fixed needle D, combined with the supporting-frame and a protection-case, H, of any suitable material, for the purpose set forth.

6. The needle C, suspending-wire *e*, and fixed needle D, combined with a vitreous protecting-tube, H, provided with internal guides for the needle C, as set forth.

7. A freely-suspended needle, with its end in contact with the end of an opposite needle with an adjustable pressure, combined with guides, whereby said needle is prevented from lateral oscillations, substantially as described.

In testimony that I claim the above as my invention, witness my hand.

J. H. IRWIN.

In presence of—

R. D. O. SMITH,  
S. E. CARPENTER.