

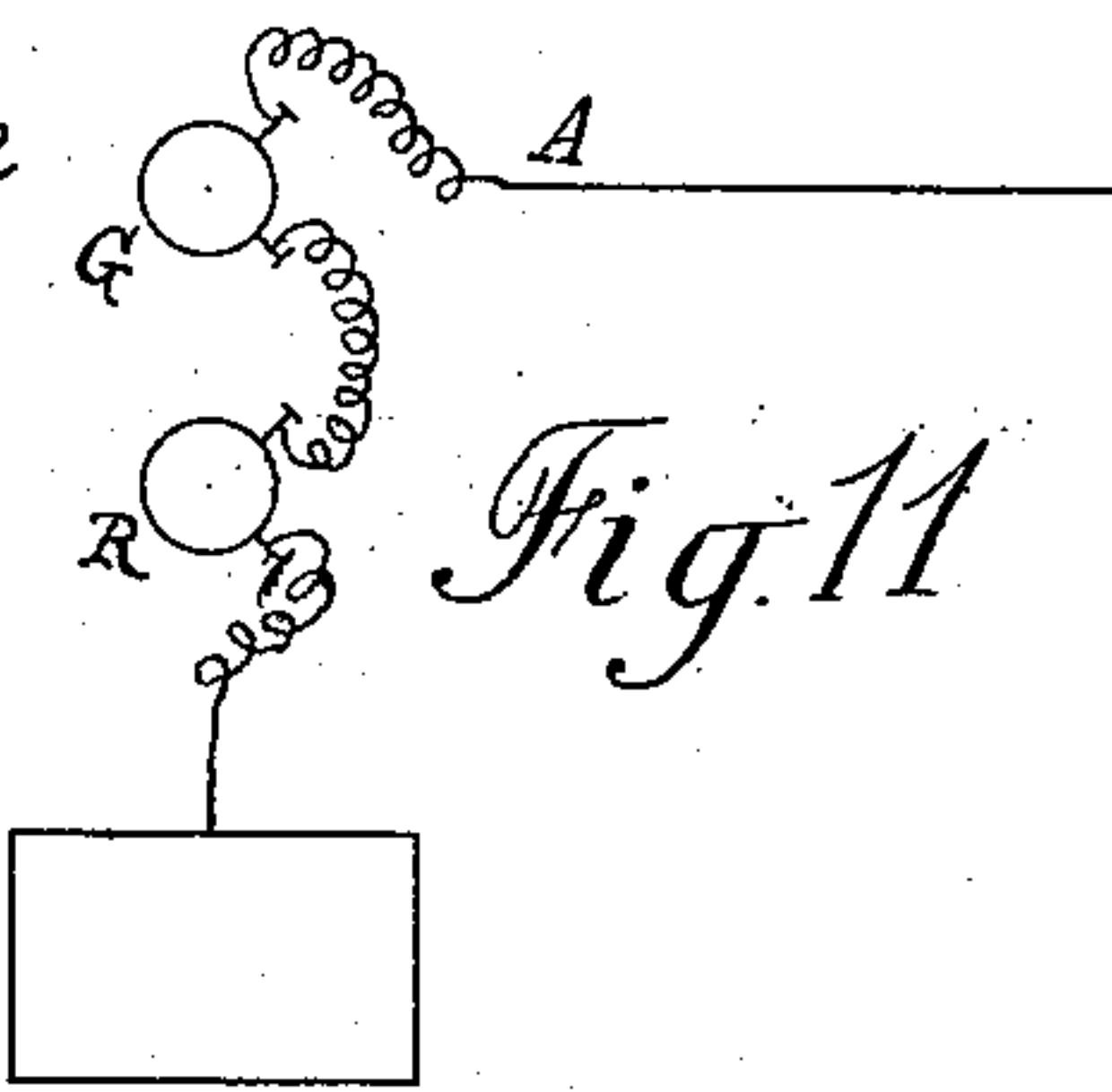
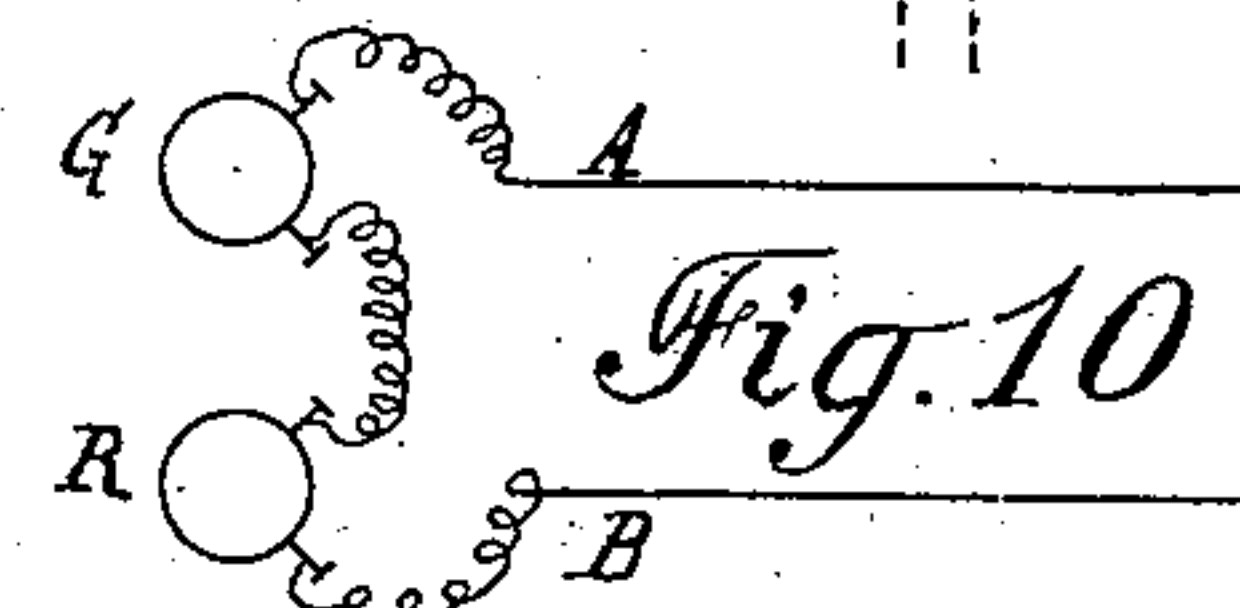
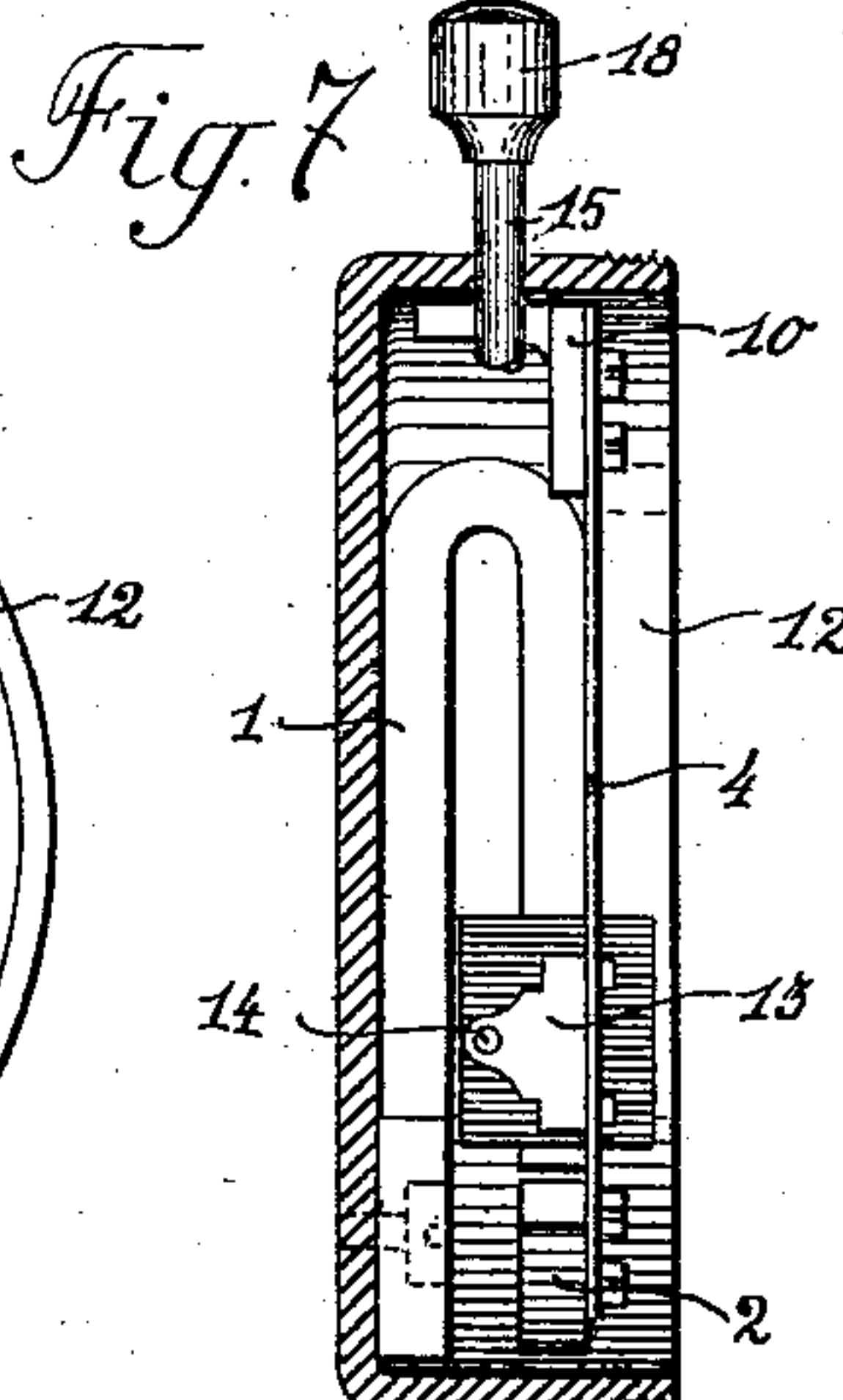
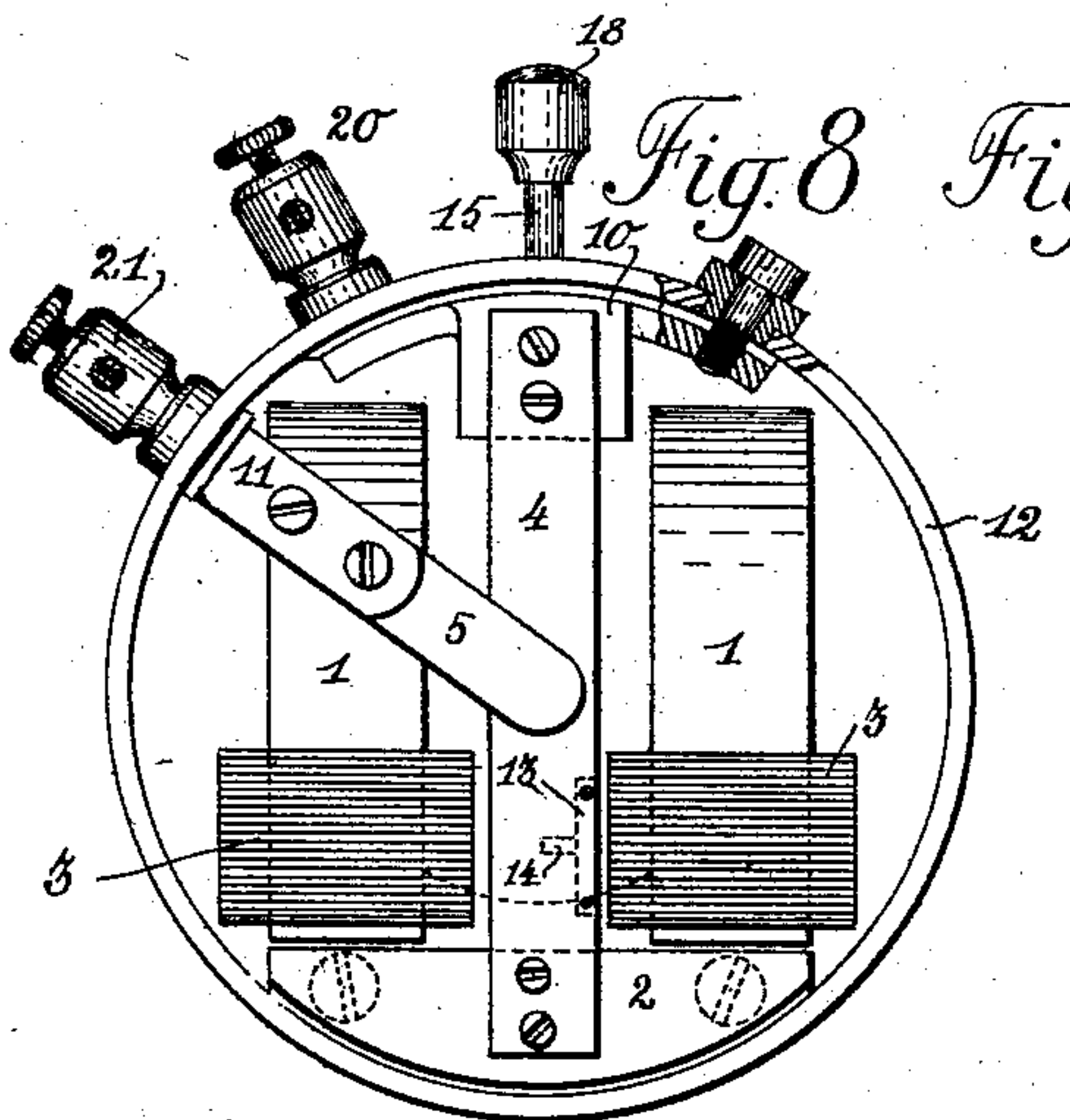
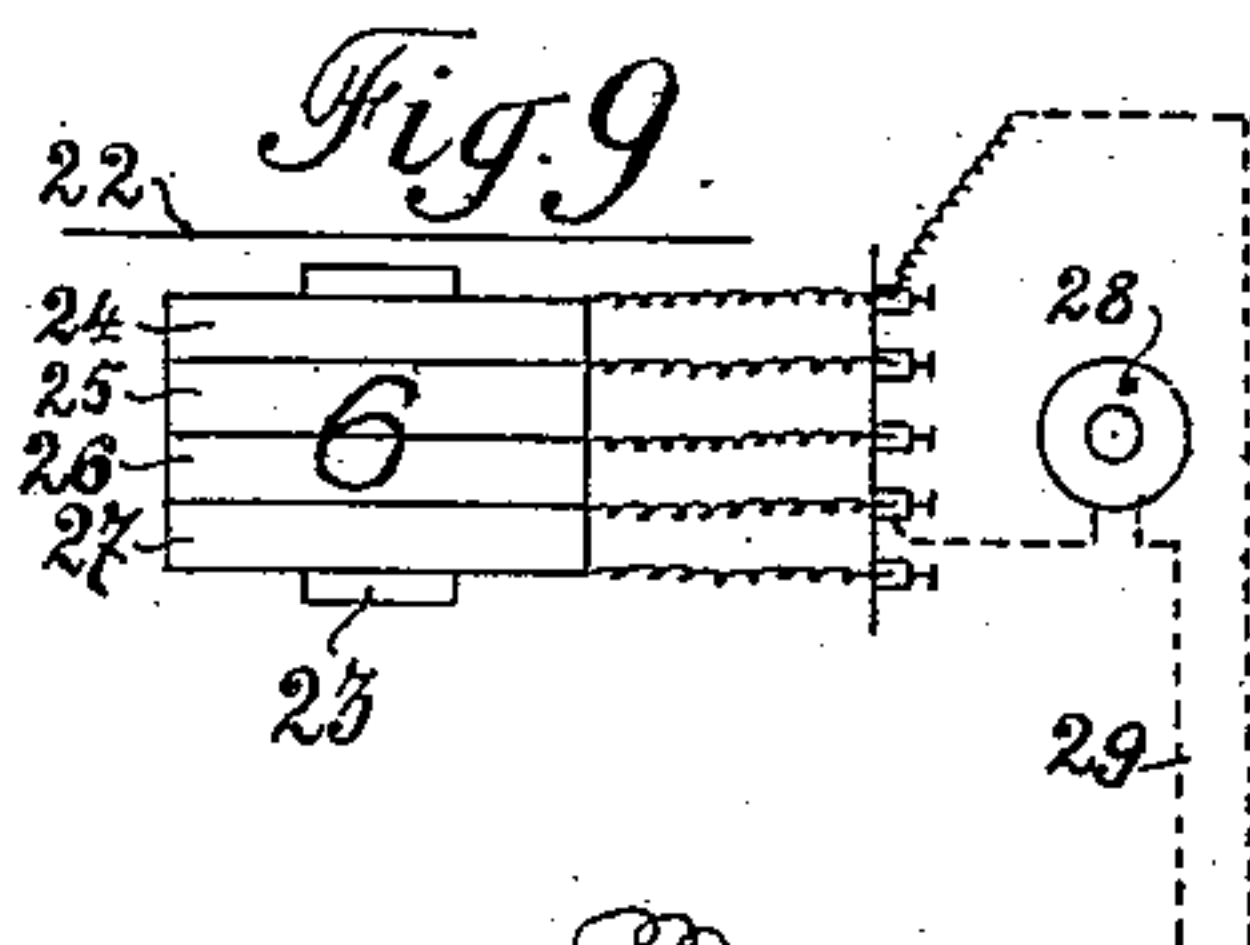
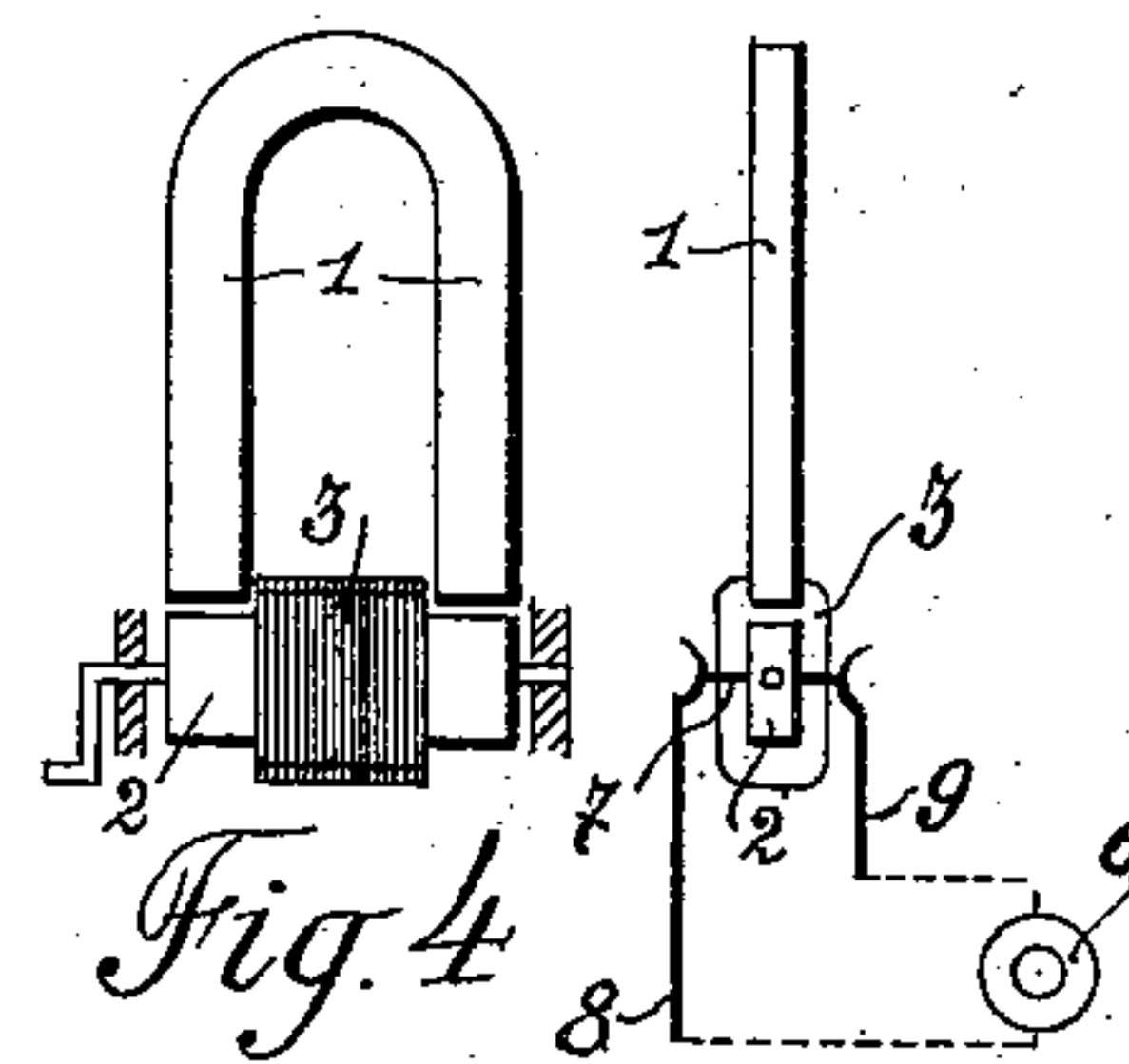
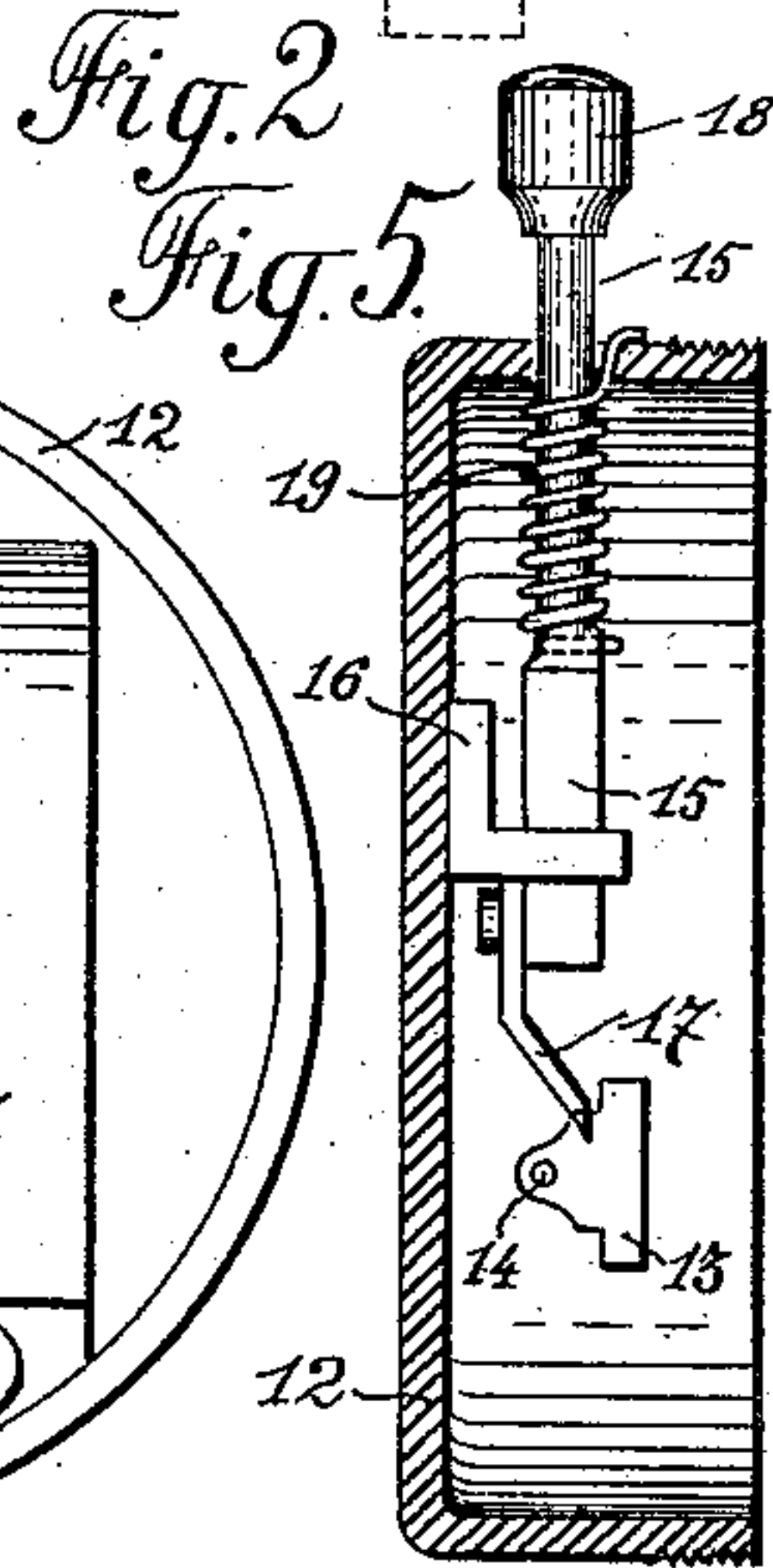
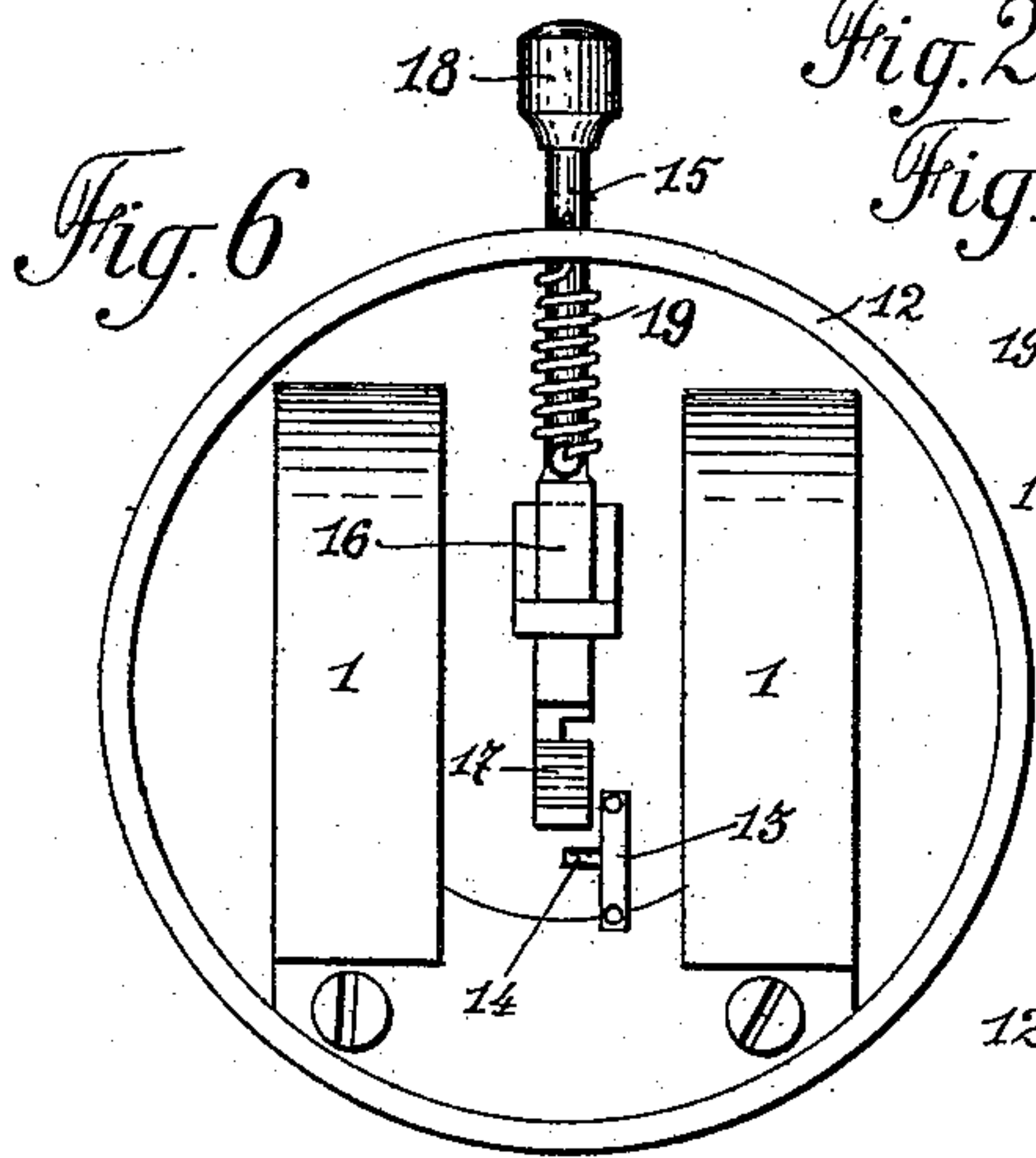
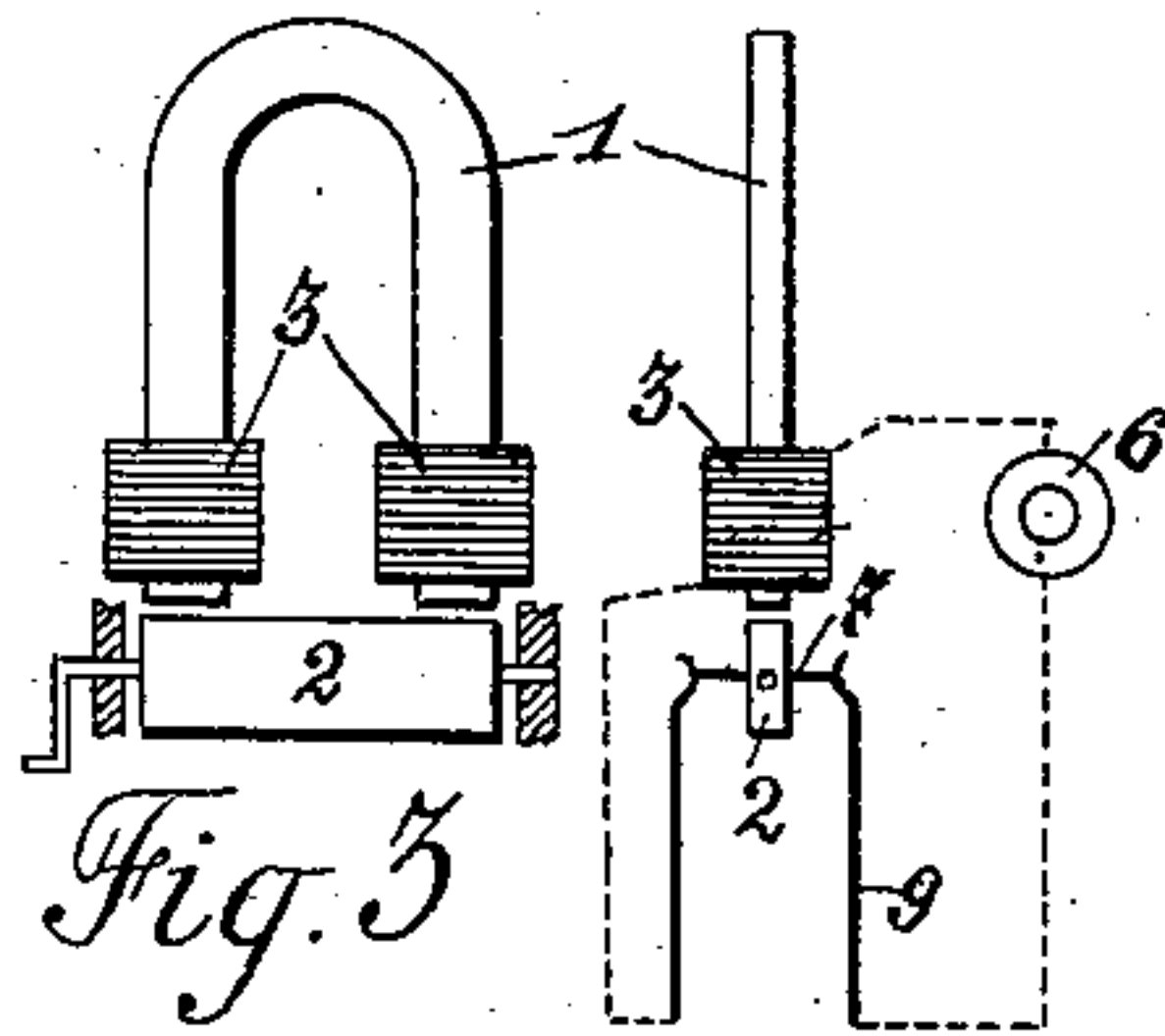
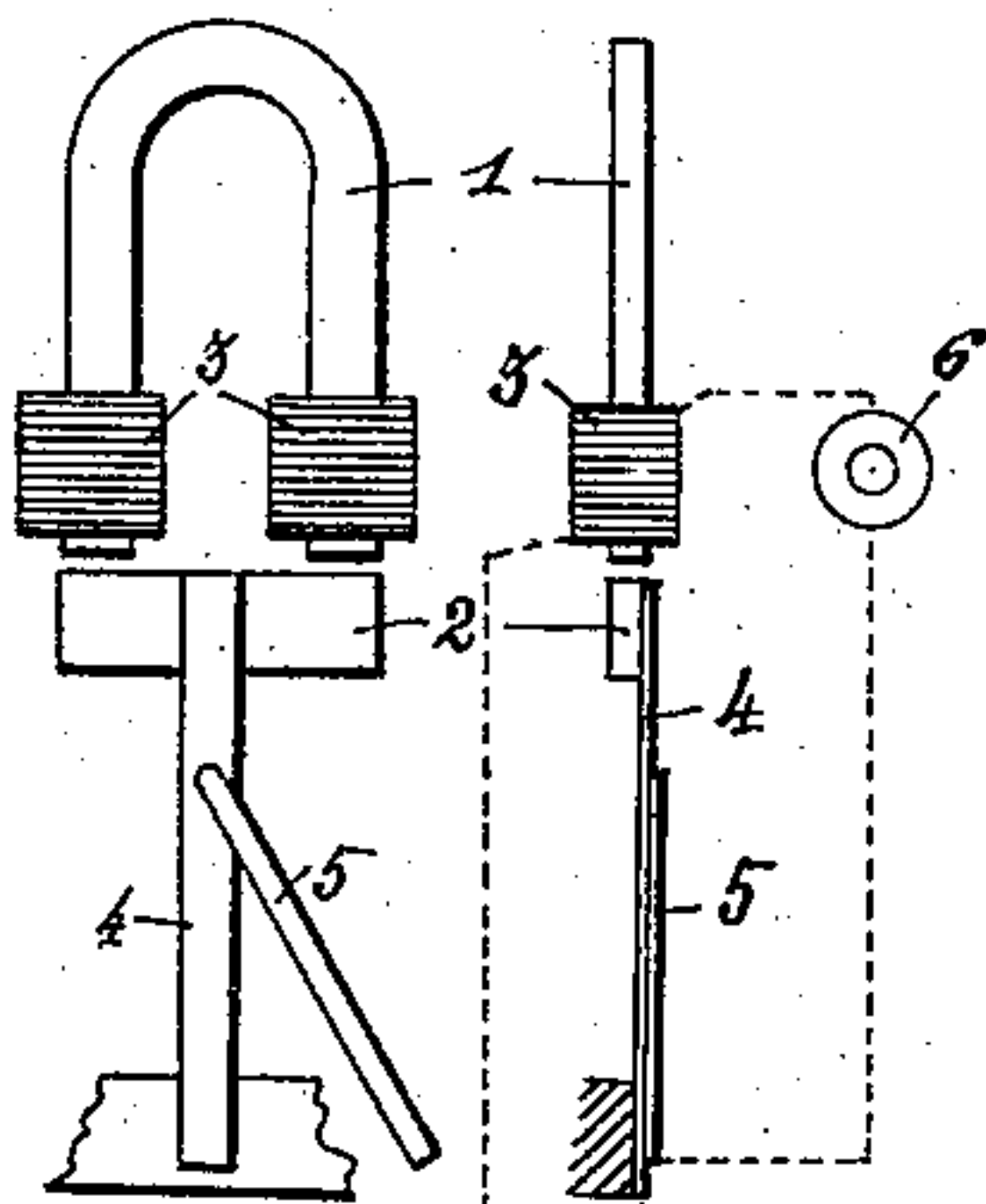
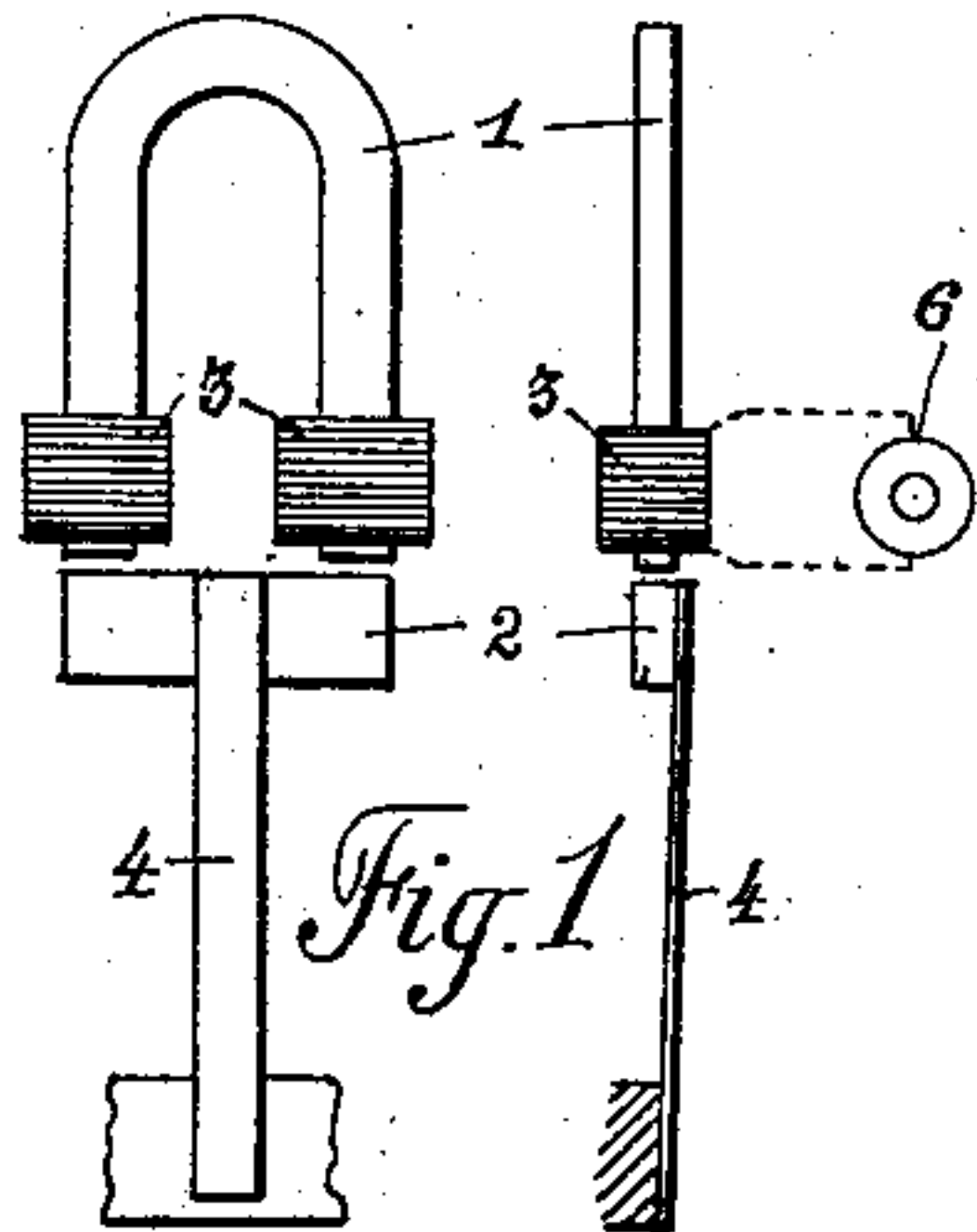
No. 701,647.

Patented June 3, 1902.

A. TZAUT.
ELECTRICAL APPARATUS.

(Application filed Feb. 18, 1902.)

(No Model.)



WITNESSES:

Walter Wolchem.
L. Bradway.

INVENTOR

Alfred Tzaut
BY *James H. Miles*
ATTORNEYS.

UNITED STATES PATENT OFFICE.

ALFRED TZAUT, OF NEUFCHÂTEL, SWITZERLAND, ASSIGNOR TO DAVID PERRET, OF NEUFCHÂTEL, SWITZERLAND.

ELECTRICAL APPARATUS.

SPECIFICATION forming part of Letters Patent No. 701,647, dated June 3, 1902.

Application filed February 18, 1902. Serial No. 94,617. (No model.)

To all whom it may concern:

Be it known that I, ALFRED TZAUT, of Neufchâtel, Switzerland, have invented certain new and useful Improvements in Testing
5 Apparatus for Electric Circuits, of which the following is a specification.

The object of the present invention is to provide a simple and reliable apparatus for the convenient testing of electric circuits;
10 and for this purpose the invention consists of an electromagnetic generator, comprising an exterior casing, an electromagnet in said casing, a spring, an armature mounted on said spring in proximity to the poles of said mag-
15 net, a pin carried by said spring, an operating pusher-rod provided with an inclined end portion and a recess above the same for said pin, and means guiding said pusher-rod in the path of said pin.

20 In the accompanying drawings, Figures 1, 2, 3, and 4 illustrate the features of the invention in conventional representation. Fig. 5 is a vertical central section, and Fig. 6 a plan view, of a suitable form of generator with
25 parts removed. Fig. 7 is a vertical central section, and Fig. 8 a plan view, of the same instrument, but with various other parts in place and certain of those shown in Figs. 5 and 6 removed; and Figs. 9, 10, and 11 are
30 diagrams illustrating the connection of the apparatus for various uses.

Similar characters of reference indicate like parts throughout the views.

Referring to the drawings, 1 indicates a
35 magnet, and 2 the armature of the same, made of soft iron and adapted to be moved in front of and in proximity to the poles of the magnet.

6 is a telephone-receiver of the ordinary type, which is connected, as indicated in
40 dotted lines in Figs. 1, 2, and 3, with the coil or coils 3 of the magnet. Taking, for example, the arrangement shown in Fig. 1, 4 is a spring upon which the armature 2 is mounted. If the armature be now pulled back and re-
45 leased, whereby the same is moved by the vibrating spring rapidly back and forth before the poles, an audible sound is produced in the receiver 6. In order to render the pulsations more sharp, however, it is desirable
50 to provide means whereby the current is not merely varied in strength, due to the varia-

tions in distance of the armature 2 from the magnet - poles during the vibrations, but whereby the same is positively interrupted
for a portion of the vibrations and established 55 at others, and the establishment should take place at the maximum point of vibration, so as to increase the effect upon the membrane of the telephone-receiver. For accomplish-
ing this an interrupter 5 is arranged as indi- 60 cated in Fig. 5, which is normally out of contact with the spring 4, but is located so as to contact with the same upon the vibrations of the armature 2 and spring 4. In this case one pole of the telephone-receiver is connect- 65 ed to one end of the coils of the magnet. The opposite end of said coils is connected with the spring 4 and the opposite pole of the receiver with the interrupter 5. Fig. 3 shows in conventional form a different type of ar- 70 mature adapted to be rotated instead of vibrated and provided with contact-pins 7, projecting at diametrically opposite points and adapted to form contact intermittently with contact-springs 9, with which the conductors 75 are connected. Fig. 4 illustrates a type similar to that of Fig. 3 with exception that the coil 3 is located upon the rotatable armature 2 instead of upon the poles of the magnet 1. The effect produced by the rotation of the arma- 80 ture is the same as upon rotation of that shown in Fig. 3, variations of electrical potential being induced in the circuit 8 9 and affecting the receiver 6. Such being the general principles of the construction, Figs. 5, 6, 85 7, and 8 illustrate a generator adapted for practical use and embodying these features. Said instrument is constructed after the type shown in Fig. 2. The magnet 1 is of horse-
shoe form and carries at its two poles coils 3. 90 The armature 2 is mounted upon a spring 4, secured by means of screws to a support 10, electrically insulated from the casing or box 12 of the device. The spring 5 of the inter-
rupter is secured to a support 11, insulated 95 from and secured to the box 12. For setting the armature in vibration an operating mechanism is provided consisting of a pin 14, suitably mounted by means of a block 13 upon the spring 4 and in a plane parallel to the 100 movement of the spring, and a pusher-rod 15, guided in a lug or bracket 16, secured to the

casing and provided at its end adjacent said pin with an inclined portion 17 and a notch above said inclined portion for the escape of the pin. The parts being in normal position, as shown in Fig. 5, upon operating the pusher-rod in inward direction by its knob 18, the back or under side of the inclined portion 17 engages the pin 14 and draws the same, together with the spring and armature, over to one side. Upon continuation of the inward movement of the pusher-rod the recess shown in Fig. 6 immediately above the incline portion 17 arrives opposite the pin 14 and permits the same to escape and the spring to vibrate, whereby the armature is oscillated with great rapidity before the poles of the magnet. Upon permitting the pusher-rod to return to normal position, which it does automatically under the influence of its return-spring 19, the incline 17 again engages the pin 14, this time at the upper surface of said incline, and thereby moves the same in opposite direction to that first described and finally releases the pin, permitting the spring to vibrate as before. The coils of the magnet are connected and the wire from the free end of one coil is connected with the support 10, with which is connected a binding-post 20, and the free end of the wire from the other coil is connected with the support 11, having a binding-post 21. It will be observed that in this construction the current instead of being completely interrupted, as described with reference to Fig. 2, is short-circuited through the springs 4 and 5, the effect upon the receiver being the same.

For using the apparatus—for instance, for ascertaining whether there is a connected circuit through the conductors A B, Fig. 10—one binding-post, as 20, of the generator G is connected with one post of the telephone-receiver R, the opposite post 21 of the generator being connected with the conductor A and the free pole of the receiver with the conductor B. Upon operating the pusher-rod the armature is oscillated and rapid differences of potential produced in the conductors A B, provided they are connected, and an audible sound will be perceptible in the receiver. In case, however, the conductors A B are not

connected no sound will be perceptible in the telephone-receiver, and this fact will indicate the absence of a circuit. For testing whether a portion of the circuit is through the earth the connections are the same; but instead of one pole of the receiver being connected with the second conductor B the same is connected with an earth-plate, as indicated in Fig. 11. For indicating the resistance of a circuit the core of the telephone-receiver is provided with a plurality of coils. This is indicated in Fig. 9, in which 22 is the diaphragm or membrane of the receiver, 23 the core, and 24, 25, 26, and 27 coils located on the core. Each of these coils is connected with a binding-post, as indicated, and the exit end of each coil with the entering end of the following coil. One terminal of the line to be tested is connected with one of the terminal coils—as, for instance, coil 24—and the opposite terminal is connected successively with the various coils until the membrane is caused to vibrate and the receiver gives forth an audible sound. The generator 28 is connected in the line 29 in the usual manner, and the resistance is indicated by the number of coils necessary to be intercalated for producing a perceptible sound.

The generator and receiver may of course be lodged within a single casing, if desired.

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

In a testing apparatus for electric circuits, an electromagnetic generator comprising an exterior casing, an electromagnet in said casing, a spring, an armature mounted on said spring in proximity to the poles of said magnet, a pin carried by said spring, an operating pusher-rod provided with an inclined end portion and a recess above the same for said pin, and means guiding said pusher-rod in the path of said pin, substantially as set forth.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

ALFRED TZAUT.

Witnesses:

JULES CHAPUY,
OSCAR KÜLLING.