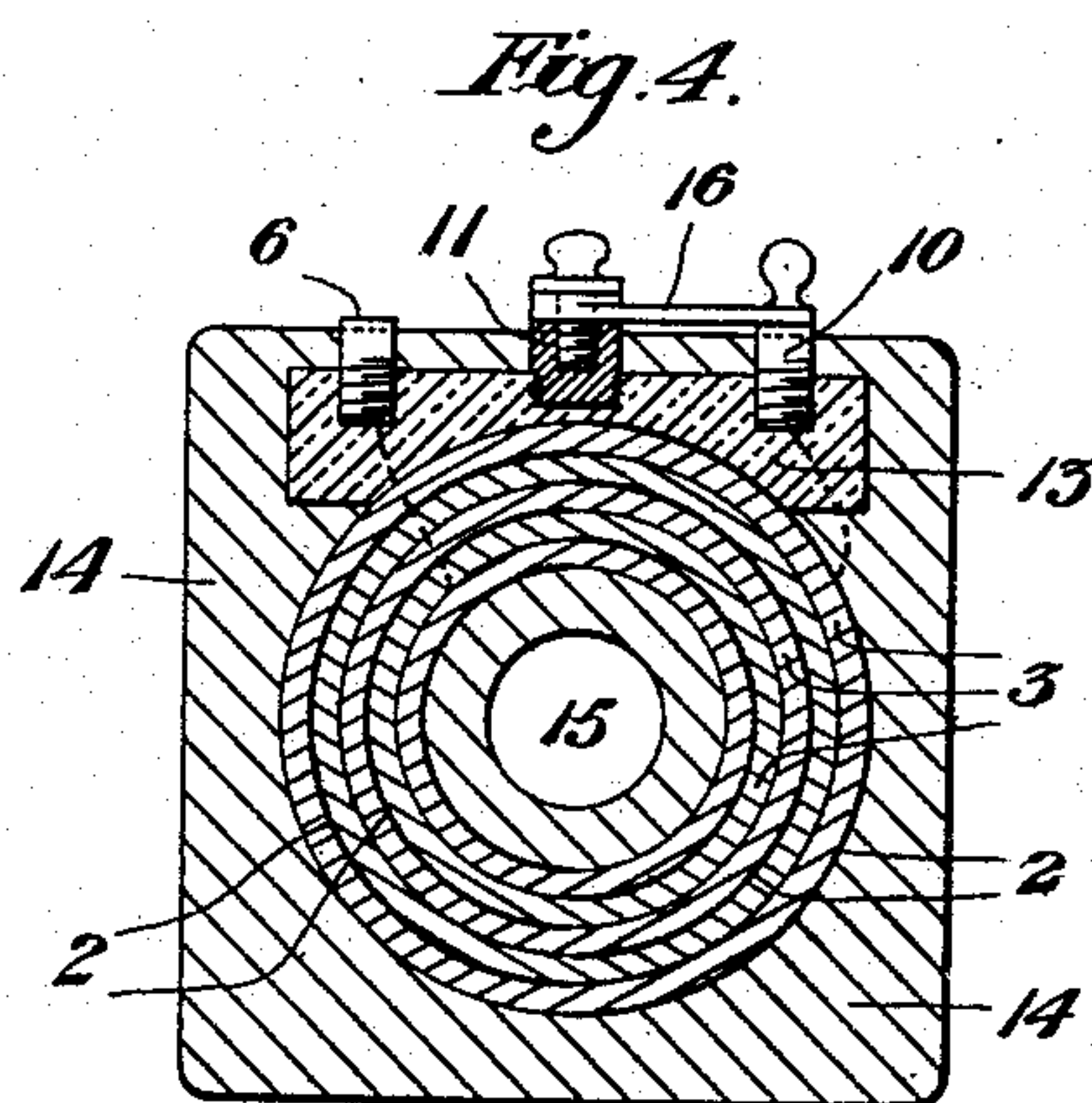
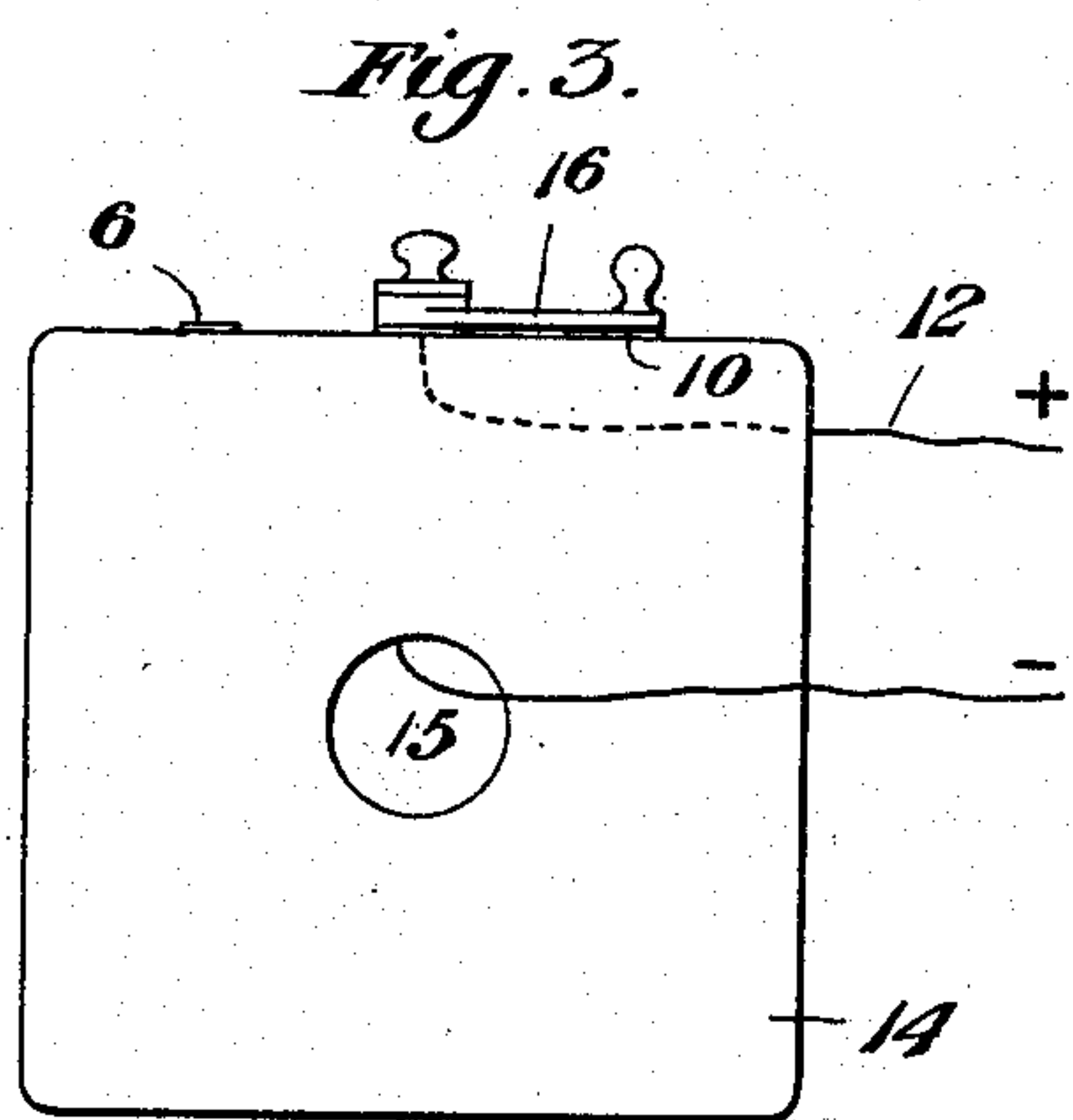
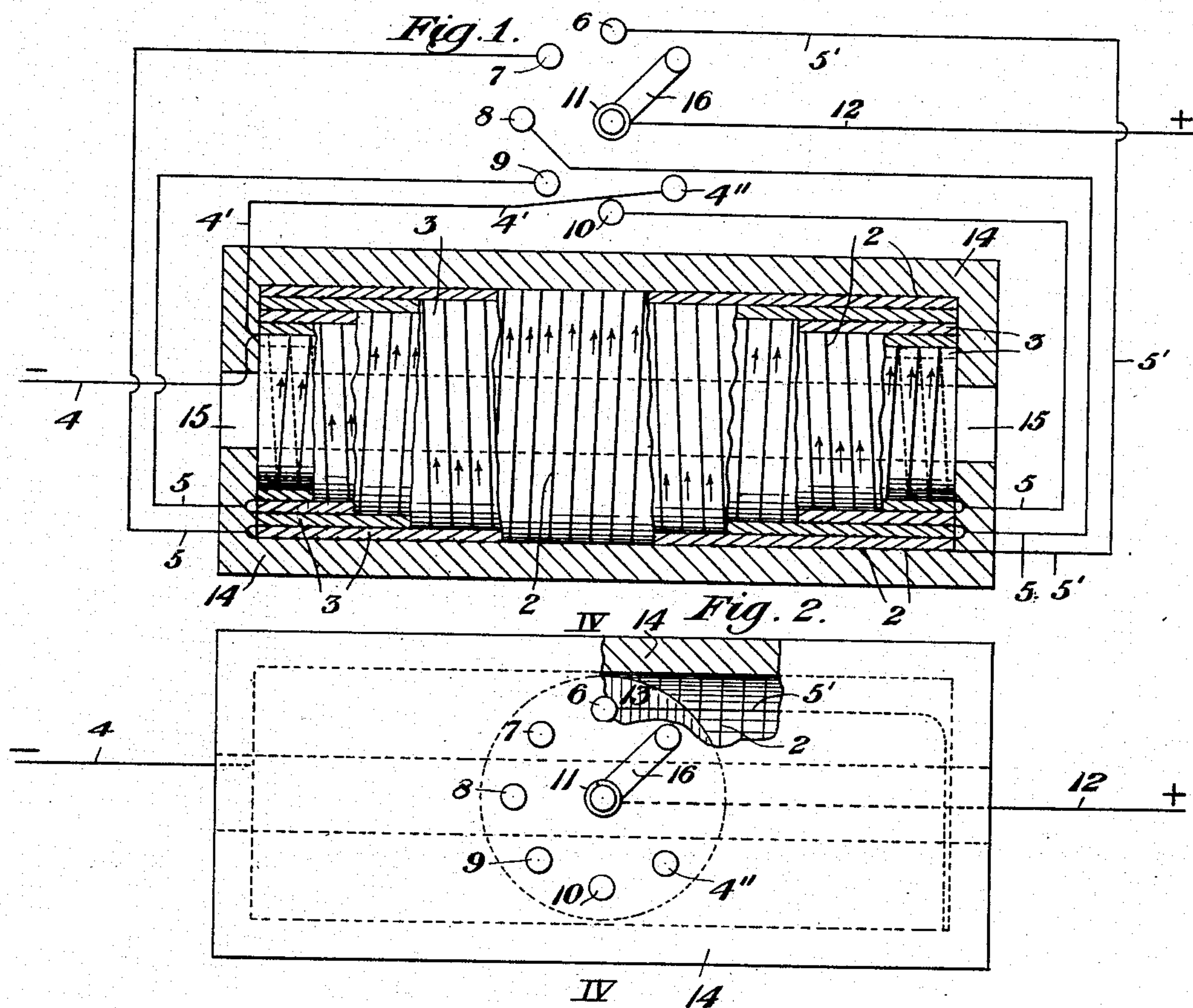


F. COMMINGE.  
GRADUATED RESISTANCE COIL.

(Application filed Mar. 29, 1901.)

(No Model.)



Witnesses:  
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# UNITED STATES PATENT OFFICE.

FRANK COMMINGE, OF PITTSBURG, PENNSYLVANIA.

## GRADUATED-RESISTANCE COIL.

SPECIFICATION forming part of Letters Patent No. 675,373, dated June 4, 1901

Application filed March 29, 1901. Serial No. 53,477. (No model.)

*To all whom it may concern:*

Be it known that I, FRANK COMMINGE, a citizen of the United States of America, and a resident of Pittsburg, county of Allegheny, State of Pennsylvania, have invented certain new and useful Improvements in Graduated-Resistance Coils, of which the following is a specification, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a sectional diagrammatic view showing the various connections and terminal wires of my improved resistance-coil and the switch or regulator by which the potential of the current is controlled. Fig. 2 is a plan view of the device, partially broken away. Fig. 3 is an end view. Fig. 4 is a cross-section on the line IV IV of Fig. 2.

My invention relates to means for reducing the voltage of electric currents, whereby I am enabled to utilize currents of high potential for use in electric bells, gongs, annunciators, telephones, signals, &c., by which a "light" current of, say, one hundred and ten or fifty-two volts may be reduced down to a voltage suitable to the winding of the magnets used in such devices to ring such bells, gongs, annunciators, telephones, signals, &c.

The invention especially relates to the rheostat which I employ in combination with my resistance-coil, upon which I have been granted Letters Patent of the United States, dated February 19, 1901, No. 668,555.

In the construction of the coil separate series of coils of wire 2 are wrapped around insulating layers 3 of sheet-asbestos or other suitable insulating material, which should be, preferably, incombustible and a non-conductor of heat.

In the construction of the resistance-coil the innermost sheet of asbestos is first laid around a mandrel, and the first layer of wire 2 is wound around it from one end to the other, a direct-current branch wire 4' being first attached for connection with its proper terminal, the terminal 4 projecting outwardly at the end where the winding is commenced. After the first layer is thus wound entirely from one end to the other a branch wire 5 is attached to it by suitable means by wrapping or soldering, when another layer of asbestos 3 is then laid over the first winding, and a simi-

lar winding is made around its outer surface from the other end back to the starting-point, the wire being continuous, and such operation is continued by adding additional intervening layers 3 and winding over them from one end to the other alternately, the branch-wire connections 5 being made at each end at proper distances as to length of coil-wire and in sufficient numbers for the object in view or the use to which the device is to be put, such alternate wrapping and winding and making of connections being continuous until the final outer layer is wrapped with the last coil of wire, as shown in the exposed portion of the coil in Fig. 2.

6, 7, 8, 9, 10, and 4' are a series of terminal contacts with which the branch wires 5 and the terminal of the outer wrapping-wire 5' and also the direct-current branch 4' are connected, as shown in Fig. 1, and such terminals are preferably arranged in the arc of a circle, at the center of which is located a post 11, to which is connected the wire 12, which forms the other terminal of the coil.

The terminals 6, 7, 8, 9, 10, and 4' and the central post 11 are embedded or secured in a base 13, of porcelain or other suitable insulating material, which is made concave on its lower side, so as to fit over the cylindrical coil, and the entire coil and the terminal base are then covered with a coating of shellac or other impervious non-conductor, and the coil and base are then surrounded by and embedded in an inclosing-covering substance 14, as plaster-of-paris and cement mixed, clay, porcelain, glass or any other suitable fireproof and non-conducting material, which provides an impervious covering for the wire and asbestos layers and also for the base of the contact-terminals, and through the covering at each end the terminal wires 4 and 12 project, to which wires attachment is readily made.

It will be observed that the inner central opening left by the mandrel is also coated on its interior, leaving a central open conduit 15 through the middle of the coil, through which air may circulate, thus tending to reduce any heat generated in the device by passage of the current. The especial advantages of this outer covering are to provide a positive moisture-proof and fireproof inclos-



ing substance, whereby the danger of short-circuiting or destruction by heat is entirely prevented, and a further advantage is that it firmly incorporates the base and its parts with the coil.

The covering-top is cast around the coil and base in a plastic condition by means of a suitable mold, and when dried and hardened entirely incloses the coil and base, as I have described, and presents a neat and finished appearance, leaving the coil in shape for commercial use. If desired, the outside may be painted or varnished with any substance adapted to suitably color it, which also provides an impervious coating which prevents the entrance of moisture to the interior.

Pivotally secured upon the central post 11, so as to rotate thereon, is a switch-arm 16, by means of which the post 11 and its connected terminal 12 is electrically connected with the contact-terminals by rotating the switch 16 to contact with either one of the terminals, whereby a current of the full or less strength may be secured, according to the contact with the full-current terminal or the less or greater resistance which may be thrown in by such means, and it will be understood that such resistance may be accurately indicated by the various terminals, so as to make the device feasible and adaptable to a wide range of application.

As thus constructed my improved resistance-coil may be attached to conductors of high potential and the reduced current may be safely used for any purpose for which the low voltage in its varying strength is peculiarly adapted. By its use I avoid the necessity of batteries of any kind and am enabled to tap the ordinary electric-light circuit, either direct or alternating, for supplying such low-potential current for any of the various uses for which it may be required.

The advantages of this invention will be appreciated by those skilled in the art, as it is much cheaper and simpler and requires no attention whatever beyond the operation of the switch after installation, thus rendering it more completely available than the ordinary batteries now in use.

It will be understood that I do not wish to be limited to the number of insulating layers, number or length of the coil-wire, number or position of the branch wires, nor the number or specific arrangement of the terminal contacts, since such features of the invention may be varied and adapted by the skilled mechanic or electrician to suit the particular objects in view, and all such changes and variations are to be considered as within the scope of the following claims.

What I claim is—

1. A resistance-coil consisting of one or more cylindrical layers of insulating material wound around with conducting-wire terminating in one attaching-terminal, and the other end of the wire connected with a contact-terminal, and a switch device adapted

to connect such contact device with the other attaching-terminal, such contact device and switch mechanism being mounted in an insulating-base incorporated with the coil, and a surrounding covering of impervious substance.

2. A resistance-coil consisting of one or more cylindrical layers of insulating material wound around with conducting-wire terminating in one attaching-terminal, a series of contact members and branch wires connecting the conducting-wire with such members, a switch device connected with the other terminal and adapted to make contact with such members, the contact members and switch being mounted in an insulating-base incorporated with the coil, and a surrounding covering of an impervious substance.

3. A resistance-coil consisting of a plurality of cylindrical layers of insulating material, a conducting-wire wound around each layer successively alternately from one end to the other whereby the successive wrappings are insulated from each other, terminating in one attaching-terminal, a series of contact members and branch wires connecting the conducting-wire with such members, a switch device connected with the other terminal and adapted to make contact with such members, the contact members and switch being mounted in an insulating-base incorporated with the coil, and a surrounding covering of an impervious substance.

4. A resistance-coil consisting of a plurality of cylindrical layers of insulating material, a central longitudinal air-passage there-through, a conducting-wire wound around each layer successively alternately from one end to the other, whereby the successive wrappings are insulated from each other terminating in one attaching-terminal, a series of contact members and branch wires connecting the conducting-wire with such members, a switch device connected with the other terminal, and adapted to make contact with such members, the contact members and switch being mounted in an insulating-base incorporated with the coil, and a surrounding covering of an impervious substance.

5. A resistance-coil consisting of a plurality of cylindrical layers of insulating material, a conducting-wire wound around each layer successively alternately from one end to the other whereby the successive wrappings are insulated from each other terminating in one attaching-terminal, a series of contact members and branch wires connecting the conducting-wire with such members, a switch device connected with the other terminal and adapted to make contact with such members, the contact members and switch being mounted in an insulating-base incorporated with the coil, and a surrounding covering of an impervious substance.

6. A resistance-coil consisting of a plurality of cylindrical layers of insulating material, a conducting-wire wound around each layer



successively alternately from one end to the other whereby the successive wrappings are insulated from each other terminating in one attaching-terminal, a series of contact members and branch wires connecting the conducting-wire with such members, a switch device connected with the other terminal and adapted to make contact with such members, the contact members and switch being mounted in an insulating-base incorporated with the coil, and a surrounding covering of an impervious substance, through which the terminals extend, and an outer coating of impervious substance laid over such substance.

7. A resistance-coil consisting of a plurality of cylindrical layers of insulating material, a conducting-wire wound around each layer successively alternately from one end to the other whereby the successive wrappings are insulated from each other terminating in one attaching-terminal, a series of contact members and branch wires connecting the conducting-wire with such members, a switch device connected with the other terminal and adapted to make contact with such members, the contact members and switch being mounted in an insulating-base incorporated with the coil, a coating of shellac or the like laid over the resistance-coil and base providing an impervious covering therefor, and an outer surrounding covering of plaster or the like, incorporating the coil and base together and providing a surrounding case therefor.

8. In combination with a cylindrical resistance-coil, having one or more branch terminal wires, an insulating-base provided with contact members with which such branch wires are connected, a switch device mounted in the base adapted to make contact with such members successively and connected with one of the terminals of the coil, and an outer surrounding covering of an impervious substance adapted to firmly incorporate the base with the coil.

9. In combination with a cylindrical coil, provided with one or more branch terminal wires, an insulating-base adapted to fit over the coil, provided with contact members, a contact-switch mounted in the base and adapted to make contact with such members, connected with one of the terminal wires, and an outer surrounding covering of impervious substance inclosing and embedding the base and incorporating it and the coil together.

Signed at Pittsburg this 26th day of March, 1901.

FRANK COMMINGE.

Witnesses:

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O. M. CLARKE.