No. 625,830. Patented May 30, 1899.

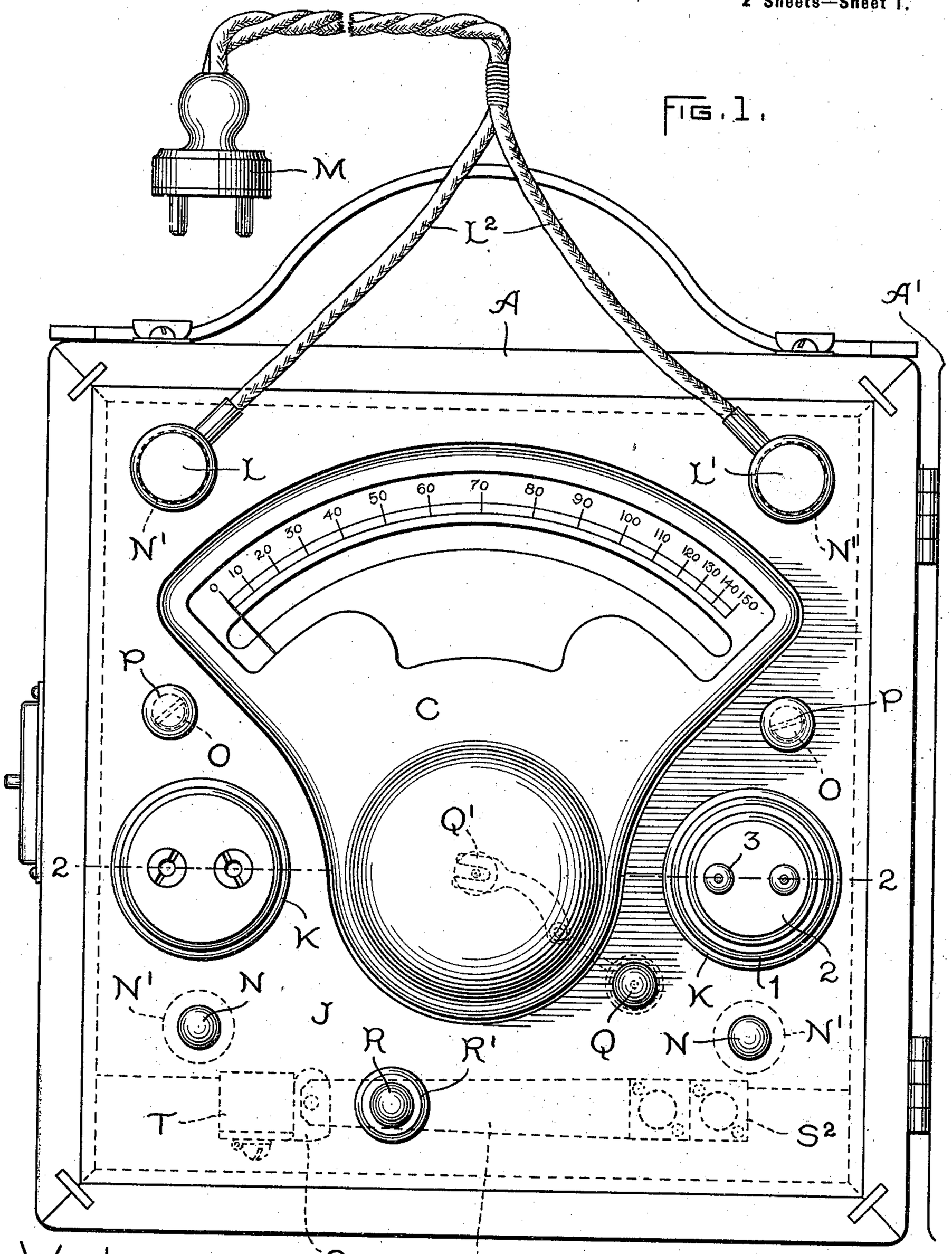
F. P. COX.

INSPECTOR'S INDICATING WATTMETER.

(Application filed Feb. 18, 1899.)

(No Model.) 2 Sheets—Sheet 1.

FIG. 1.



WITNESSES.

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FIG. 2.

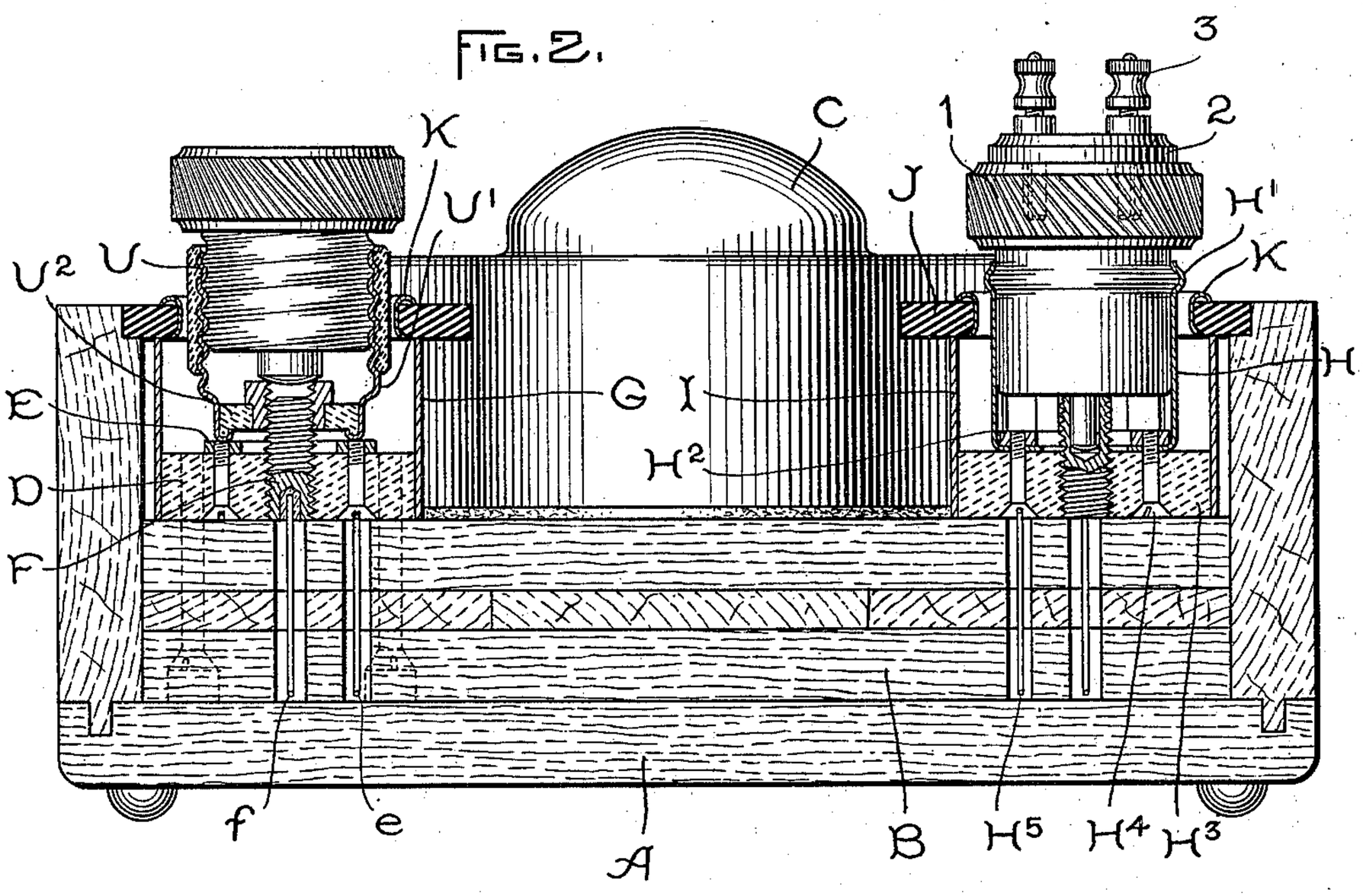
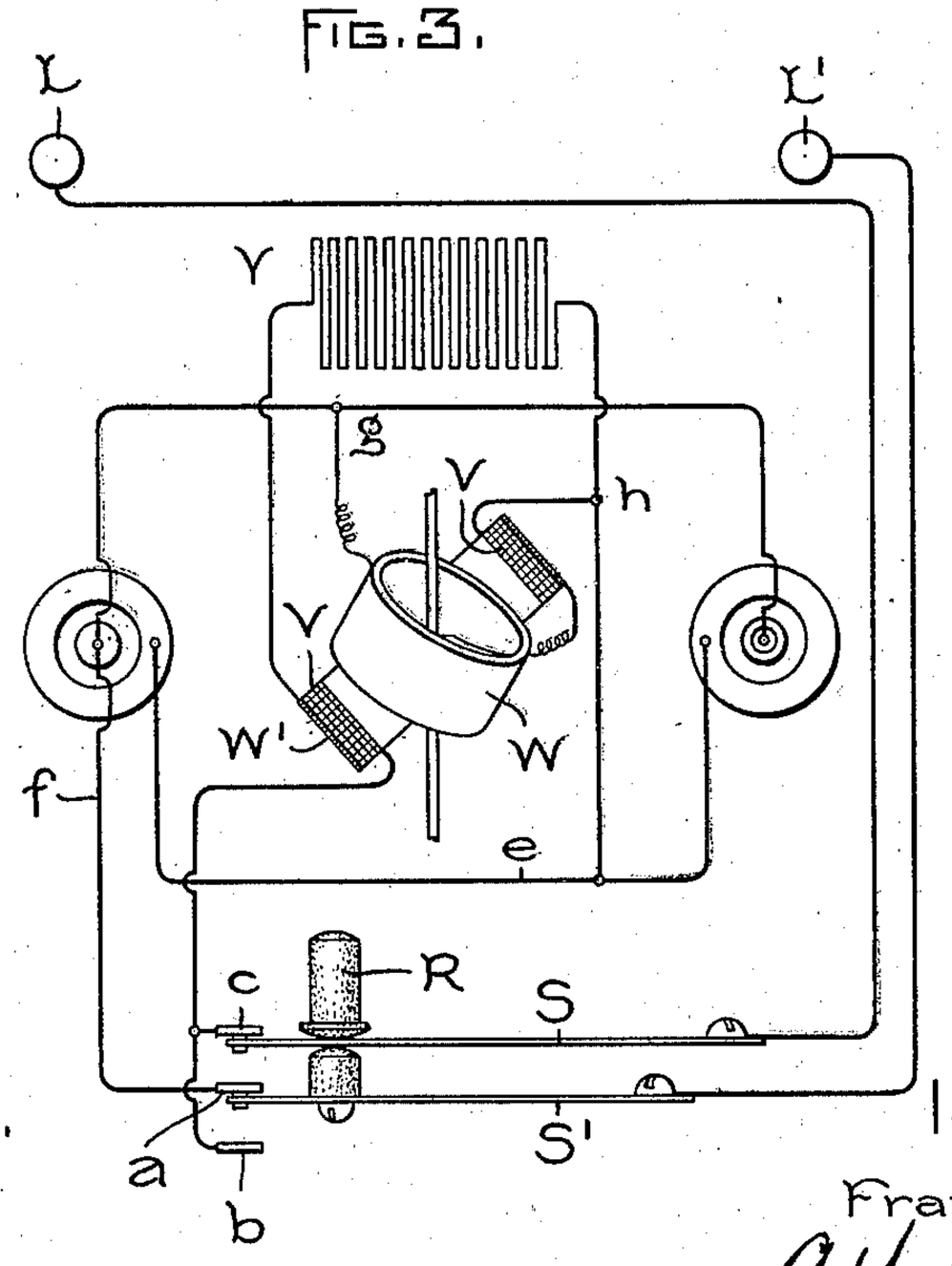


FIG. 3.



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UNITED STATES PATENT OFFICE.

FRANK P. COX, OF LYNN, MASSACHUSETTS, ASSIGNOR TO THE GENERAL ELECTRIC COMPANY, OF NEW YORK.

INSPECTOR'S INDICATING-WATTMETER.

SPECIFICATION forming part of Letters Patent No. 625,830, dated May 30, 1899.

Application filed February 18, 1899. Serial No. 705,954. (No model.)

To all whom it may concern:

Be it known that I, FRANK P. COX, a citizen of the United States, residing at Lynn, in the county of Essex and State of Massachusetts, have invented certain new and useful Improvements in Inspectors' Indicating-Wattmeters, (Case No. 891,) of which the following is a specification.

The successful operation of an incandescent-lighting system depends largely upon the use of lamps of the proper efficiency. Efficiency is the true basis for the renewal of lamps, and it is manifestly uneconomical to continue a lamp in service when its efficiency has fallen below a certain point. There are at the present time a great many different types of incandescent lamps on the market, but the majority of these are provided either with Edison, Thomson-Houston, or Westinghouse bases; and the object of my invention is to provide a portable indicating-wattmeter which is capable of measuring the energy consumed by any lamp having a base of the types above referred to without modifying the permanent arrangement of parts; and to that end it consists in the parts and combinations of parts as hereinafter described, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a plan view of my improved instrument, together with its attaching-plug and cable. Fig. 2 is a section taken on the line 2 2 of Fig. 1. Fig. 3 is a diagram of connections.

Mounted in a box of any suitable construction, comprising a lower portion A and a cover A', is an indicating-wattmeter, the one shown being of the well-known Thomson inclined-coil type. This instrument is mounted on a suitable base B, which closely fits the inside of the box. A cover C is provided for the working parts of the instrument and is retained in place in any well-known manner.

The cover projects slightly above the level of the plate J, which is flush with the upper edges of the box, and covers and protects certain of the working parts of the instrument.

Situated on each side of the instrument is a socket for an incandescent lamp or for an attaching-plug when it is desired to test a piece of electrical apparatus other than an incandescent lamp. The socket in the left-hand side of the instrument is intended for lamps having Thomson-Houston bases, and consists of an insulating-disk D, with a contact-ring E mounted thereon. This ring is retained in place by two screws, and one of the screws is connected to the circuit by the wire *e*. In the center of the disk is a screw-threaded stem F, which forms the central or second terminal of the lamp. This contact is connected to the circuit by a wire *f*. Surrounding the disk D and extending above it is a cylindrical casing G, which prevents all foreign substances from getting into the instrument in the event of their being dropped into the socket. On the opposite side of the instrument is a second socket designed to receive lamps or plugs having Westinghouse bases. This socket is composed of a tubular piece H, which is split in a vertical direction in such a manner that a number of spring-fingers are formed for gripping and holding a lamp socket or plug in place. The upper end of each of the spring-fingers is provided with a groove H', which engages with a bead on the lamp socket or plug. The tubular piece is retained in place by a ring H^2, which in turn is secured to the insulating-disk H^3 by screws H^4, the screws, ring, and tubular piece being connected to the circuit by wire H^5. Surrounding the disk H^3 and extending upward is a cylindrical piece I, which prevents foreign substances from working into the instrument at this point. When it is desired to test an incandescent lamp having an Edison screw-base, an adapter U is employed. This adapter comprises a screw-threaded shell U', having a disk U^2 mounted in the lower portion, the said disk being provided with a central screw-threaded contact which engages with the screw-threaded plug F after the manner of a lamp having a Thomson-Houston base. Surrounding the shell U' is a band of insulating material which protects the operator from receiving shocks and also prevents short circuits.

As stated above, all the principal parts of the indicating instrument are inclosed within a case C of any suitable construction, and fitting closely around this case is a flat plate of

rubber or other insulating material which rests on a shoulder formed on the sides of the box A. This plate is flush with the top of the main body of the box and all of the minor working parts of the instrument are located beneath it. Surrounding the openings made in the rubber plate for the lamp or plug sockets are metal bushings K. The plate J is secured to the base B by bolts N and by the binding-posts L and L′, suitable separators N′ being provided, which are indicated by dotted lines. This construction is a desirable one, since the entire instrument can be removed from the box by taking out the screws O. (Shown in dotted lines.) These screws are located in the base B, and in order to permit access thereto removable screw-threaded plugs P are mounted in the insulating-plate.

Mounted on the plate and connected to the measuring instrument in any well-known manner are two binding-posts L and L′, which are arranged to receive cables L^2. These cables are in turn connected by a suitable attaching-plug M with a source of current-supply.

In order to control the action of the needle, a damper Q is employed, consisting of a fork Q′, which engages with a disk on the armature-shaft. This damper is actuated by the button Q, located in the plate J. The damper is so arranged that it releases the needle or pointer only when the button is depressed. This is a desirable feature, since when the button is released the needle is held at the point of the last indication. Therefore if the current is turned off and then on again or reversed the necessity of waiting for the pointer to swing from zero to a state of rest is avoided and very rapid readings may be taken. It will be seen that in testing lamps in large numbers, as barrel lots, for example, where the watts per lamp are substantially the same, a considerable amount of time can be saved by this arrangement.

Since the instrument is designed for use on both alternating and direct current circuits, it necessitates the use of only one instrument in stations using both kinds of current. On direct-current circuits, where special accuracy is desired, I prefer to take reverse readings—that is to say, pass the current through the lamp to be measured and the instrument in one direction and then in the other, the mean being taken as the final result. This will eliminate all possibility of any slight error which might be produced by the presence of a local field. In order to carry out this feature of my invention, a reversing-switch of the form best shown in Fig. 3 is provided, which consists of two flat metal plates S and S′, forming a part of the circuit. These plates are insulated from each other and are adapted to be moved from the position shown into engagement with the two lower contacts *a* and *b* by the button R. This reverses the direction of current-flow in both the fixed and the moving coils of the instrument. The button R is mounted in the plate J and is normally held in the position shown by the spring contact-plates S and S′. A metal bushing R′, which surrounds the button and acts as a guide therefor, is mounted in the plate J. The stationary contacts *a*, *b*, and *c* of the reversing-switch are mounted on a block T of insulating material, (shown in dotted lines in Fig. 1,) which block is secured to the base B. The moving contact-plates S and S′ are mounted on a block of insulating material S^2 and the block is secured to the base B.

Referring to Fig. 3, the circuit connection will be described. The current enters at binding-post L, passes through the switch-blade S, contact *c*, field-coil V by wire *e*, through the lamp to be measured. It is assumed that the lamp to be measured is in the left-hand socket. Thence through the lamp to the wire *f*, to the contact *a*, thence through the switch-blade S′ to the binding-post L′. A second circuit is from the point *h* through the resistance Y and shunt field-coil W′, thence through the pivoted armature-coil W to point *g*, the opposite side of the circuit. The terminals of the right-hand socket are connected in multiple with those of the left-hand socket, so that both sockets are rendered alive by the closing of the instrument-circuit by an external switch.

It will be seen that the circuit through the field-coil of the instrument is closed only by the insertion of a lamp or other equivalent electrical device into one or the other of the sockets. This is an especially desirable feature, since it dispenses with the use of a switch for making and breaking the circuit and since it requires less effort on the part of the operator to make the test.

In the right-hand socket I have shown an attaching-plug 1 of the Westinghouse type, and mounted in this plug is an attaching device 2, having plugs 3 for connecting it with a cable or other electrical wires. In so far as the operation of the apparatus is concerned it matters not whether a lamp and a plug occupy the sockets at the same time or only a lamp, since the circuit through the plug is open.

In testing a lamp having a Thomson-Houston base the adapter U is removed and the lamp substituted. In testing a lamp having a Westinghouse base the plug I is removed and if the lamp has been in use is placed in the socket from which the lamp was taken, the lamp being mounted in place on the instrument.

It is evident that the lamps of any of the types referred to can be tested very quickly, since the cable and attaching-plugs are always at hand.

In places where lamps having bases other than those described above are employed I

modify the construction of the socket to meet the new condition, but for all general use the instrument described above is satisfactory.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In an electrical measuring instrument, the combination of a moving and a stationary element, the circuits of one of said elements being normally open, and a socket containing a contact which is so arranged that when a lamp, or other translating device is inserted therein the circuit of the said element is closed.

2. In an electrical measuring instrument, the combination of a field-coil and an armature-coil movable with respect to each other, the circuit of one of said coils being normally open, with a socket or receptacle through which the circuit of the coil is closed by the insertion of an incandescent lamp.

3. In an electrical measuring instrument, the combination of a fixed and a moving coil, the circuits of the fixed coil being normally open, with a pair of receptacles or sockets connected in multiple with the coils, each socket containing a contact through which the circuit of the coil is closed by the insertion of a lamp or corresponding translating device.

4. In an electrical measuring instrument, the combination of a fixed and a moving coil, the circuit of one of the coils being normally open, a socket containing a contact through which the circuit of the instrument is closed by the insertion of a lamp or corresponding translating device, a reversing-switch mounted on the instrument and connected in the circuit of the instrument in such a manner that the direction of the current flow can be changed.

5. In an electrical measuring instrument, the combination of a fixed and a moving coil, the circuit of one of the coils being normally open, a pair of sockets each containing two contacts, one contact of each socket being connected to the supply-line, a second terminal of each socket being connected to one of the coils of the instrument, and a switch which reverses the direction of current flowing through both the fixed and moving coils.

6. In an electrical measuring instrument, the combination of a moving and a stationary coil, one of which is normally open-circuited, a socket through which, by the insertion of a lamp or other translating device, the circuit is closed, and means for checking the oscillations of the moving coil.

7. In an electrical measuring instrument, the combination of a box containing the working parts of the apparatus, a flat plate having holes therein to permit the insertion of the lamps, which plate is supported within the box, sockets mounted between the plate and the base of the instrument, and means for preventing foreign substances from entering the instrument-case through the openings in the plate.

In witness whereof I have hereunto set my hand this 15th day of February, 1899.

FRANK P. COX.

Witnesses:
DUGALD MCKILLOP,
A. F. MACDONALD.