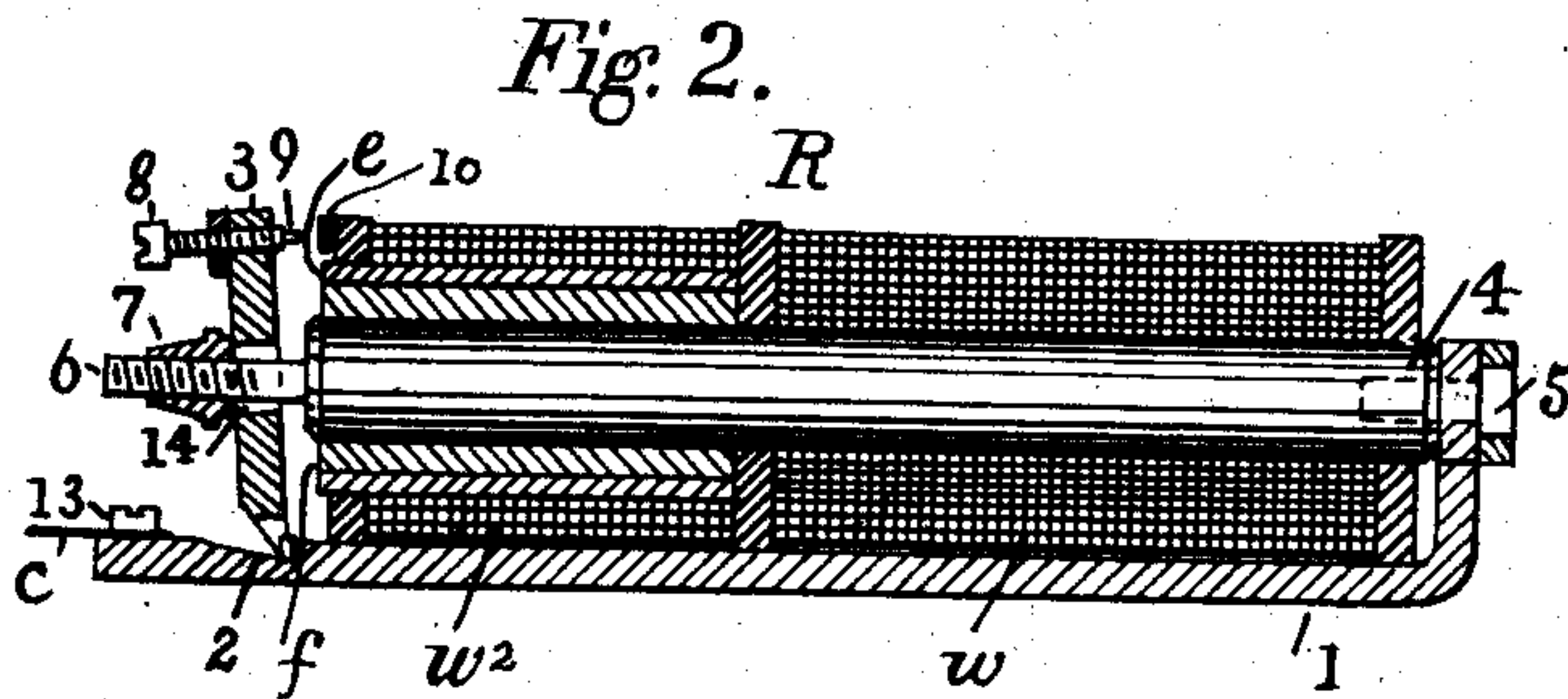
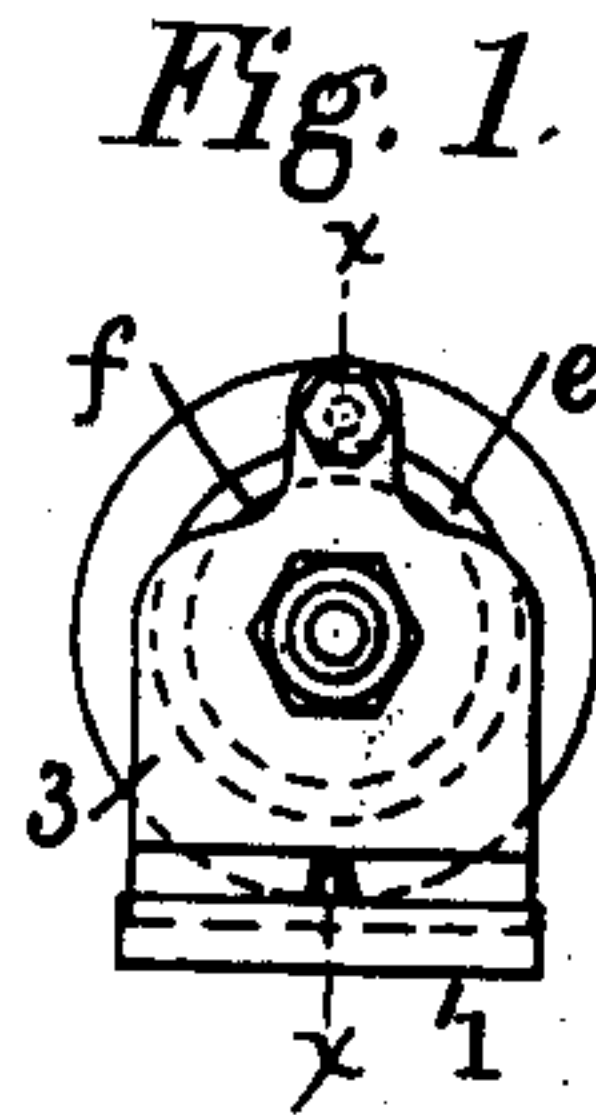
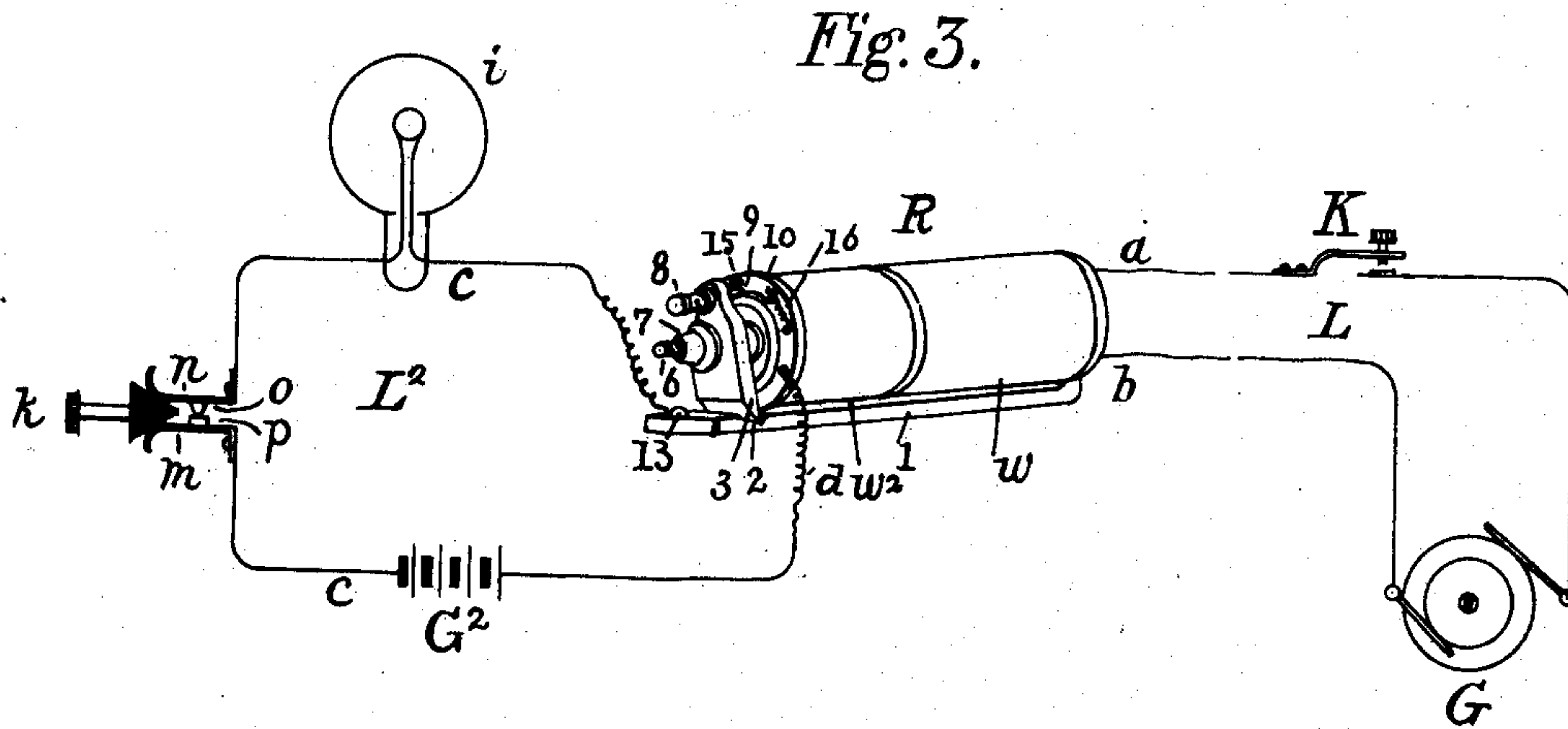


No. 668,022.

Patented Feb. 12, 1901.

H. E. SHREEVE.  
SIGNAL CONTROLLING RELAY.  
(Application filed Oct. 1, 1900.)

(No Model.)



WITNESSES:

Frank Lockwood.  
Hon. Mr. Price

INVENTOR.  
Herbert E. Shreve.  
BY  
Philip Mauro.  
ATTORNEY.



# UNITED STATES PATENT OFFICE.

HERBERT E. SHREEVE, OF DEDHAM, MASSACHUSETTS, ASSIGNOR TO THE  
AMERICAN BELL TELEPHONE COMPANY, OF BOSTON, MASSACHUSETTS.

## SIGNAL-CONTROLLING RELAY.

SPECIFICATION forming part of Letters Patent No. 668,022, dated February 12, 1901.

Application filed October 1, 1900. Serial No. 31,714. (No model.)

*To all whom it may concern:*

Be it known that I, HERBERT E. SHREEVE, residing at Dedham, in the county of Norfolk and State of Massachusetts, have invented certain Improvements in Signal-Controlling Relays, of which the following is a specification.

The present invention has reference to telephonic signaling apparatus and circuits associated with toll-switchboards at which long toll-lines terminate and over which electric currents are sent to operate the several signals. In many of such signaling-circuits it is required that the signal to be operated shall be displayed or set by means of the current and remain displayed until effaced or caused to disappear by the attending operator at the switchboard-section.

In carrying out the invention I provide at one terminal of the signaling-circuit a normally open local circuit in which is located the signal to be operated, preferably an incandescent lamp, a circuit-opener, and a local-battery circuit adapted to be closed by the armature of a relay whose main exciting-coil is included in and forms a part of a long toll-circuit, at the outer terminal of which is a generator and a circuit-closer.

The main or principal feature of the invention is the relay, by means of which the local circuit is electromagnetically closed (and the signal displayed) and whereby such closure is maintained until the operator opens the same by means of the circuit-opener. The relay comprises two exciting-coils wound mechanically over the same core, one at one end and the other upon the opposite end thereof, of different resistances, one, say, of six hundred ohms and the other of one hundred and twenty ohms. The six-hundred-ohm coil is wound directly upon the central core and is connected with the conductors of the line-circuit extending to the distant terminal or signaling-station at which is located the generator and circuit-closer. The one-hundred-and-twenty-ohm coil, which is termed the "auxiliary" or "locking" coil, is not wound directly upon the end of the core, but upon a soft-iron sheath, tube, or annular core, which is magnetically separated or insulated from the central core by means of a compara-

tively thick brass sheath or tube, and thus an annular soft-iron pole-piece magnetized by the locking-coil or winding is presented to the armature independently of the central core, which core alone is acted upon or affected by the six-hundred-ohm or line winding of the relay. In the operation when the six-hundred-ohm coil is energized by the current from the generator the central core is magnetically excited and, attracting the armature to its forward contact, closes the local circuit, whereupon current from the battery in the local circuit circulates therein, causing the lamp to glow and through the one-hundred-and-twenty-ohm coil magnetizing the said annular pole-piece, which then holds the armature locked to its front contact when the current ceases to circulate through the six-hundred-ohm coil or when the line-circuit is opened at the distant station until the operator opens the local circuit, all of which I will now proceed to describe and claim.

Figure 1 of the drawings is an end view of the improved relay. Fig. 2 is a section on line  $xx$  of Fig. 1, and Fig. 3 is a diagram illustrating the mode of operation of the relay.

Referring to the drawings, 1 is an iron strap forming a base-piece, one end of which is turned up and secured to the core 4 of the relay R by the screw 5, the opposite end extending beyond the forward end of the relay and provided with a notch 2, in which rests the lower sharpened pivoting edge of the gravity-armature 3, the same being regulated and held in place by the stud 6, projecting from the end of the core 4, the said stud passing through the hole 14 in the armature and provided with the adjusting-screw 7.

8 is an adjustable screw in the upper end of the armature, forming one contact-point of the local circuit and adapted when the said armature is attracted to make contact with the flat resilient metal spring 10, attached to the end of the relay-bobbin and constituting the other contact-point of the local circuit.

$w$  and  $w^2$  are two exciting coils or windings. The former, which is wound directly upon the core 4, may, as stated, have a resistance of six hundred ohms, and the latter or auxiliary coil, having a resistance of, say, one hundred and twenty ohms, is wound upon the soft-



iron sheath or tube *e*, which is magnetically separated or insulated from the central core 4 by the brass sheath or tube *f*, the thickness of which depends upon the relative proportions of the whole circuit, the purpose of the sheath being to insulate the coil  $w^2$  from the effects of the signaling-current.

The contact-spring 10 is secured at one end by the screw 15 to the face of the bobbin end, and its free end stands out from said face, so that when the armature is attracted and the point 9 of the screw 8 strikes it it will yield and move with the said point, a good and protracted contact being thus made in a manner well understood, and one end of the winding  $w^2$  may be soldered to the said spring 10, the opposite end *d* extending to the battery  $G^2$  and spring *m* of key *k*, whose inner side *p* normally rests upon the inner side *o* of the opposite spring *n*, which is connected by conductor *c* (including lamp *i*) with the screw 13 on the base-piece 1.

*G* represents an alternating-current generator at a distant terminal of the main circuit *L*, whose conductors *a b* are connected to the opposite ends of the winding *w*, the key *K* representing a means for closing the circuit.

In the operation when the key *K* is closed a call-current from the generator *G* circulates through the winding *w*, which magnetizes the core 4 of the relay *R*, causing the armature 3 to be attracted and the point 9 of the screw 8 to come into contact with the spring 10, thereby closing the local circuit  $L^2$  from battery  $G^2$ , conductor *c*, springs of key *k*, lamp *i*, base-piece 1, armature 3, screw 8, spring 10, winding  $w^2$ , and conductor *d* to battery. The winding  $w^2$  magnetizes the annular core or sheath *e*, and its attractive power is added to that of the core 4 and maintained after that of said core ceases. Thus when the key *K* is released and current from the generator *G* cut off the attractive power of the core *e* holds the armature in its forward position, with the local circuit closed, and the signal-lamp lighted when the circuit was thus

closed continues to glow until the operator depresses the key *k* and separates the springs *m* and *n*, thus opening the circuit and effacing the lamp-signal.

I claim—

1. In a relay, the combination of a central iron core; a supplementary iron core of annular cross-section surrounding one end of said central core but magnetically separated therefrom; an armature mounted at one end of said cores in the magnetic circuit of both; an exciting-helix for the said central core wound over the non-surrounded portion thereof and adapted to excite the same for the attraction of said armature; and an auxiliary exciting-helix for the said annular core wound thereover to excite the same, and to maintain the attraction of said armature, substantially as set forth.

2. The combination of a relay having a central iron core, a supplementary annular iron core surrounding the front portion of said central core, but separated magnetically therefrom, an armature common to both cores and adapted when attracted thereby to unite and when retracted to separate said local contact-points, an exciting-coil for said central core wound directly over the rear portion thereof, and an auxiliary exciting-coil for said annular core wound directly thereover; with a main signaling-circuit extending from a call-generator and including the said central core-exciting coil; and a local signaling-circuit leading through the local contact-points of said relay and including the said auxiliary exciting-coil thereof; substantially as specified.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 27th day of September, 1900.

HERBERT E. SHREEVE.

Witnesses:

GEO. WILLIS PIERCE,  
JOSEPH A. GATELY.