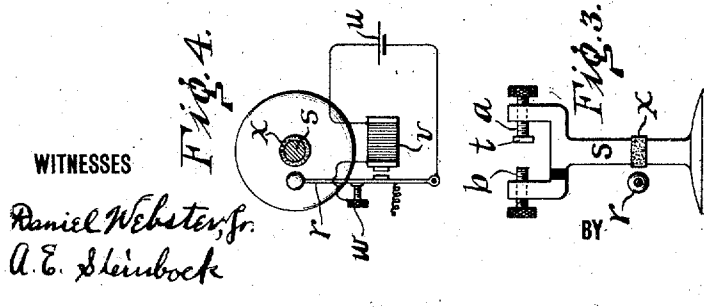
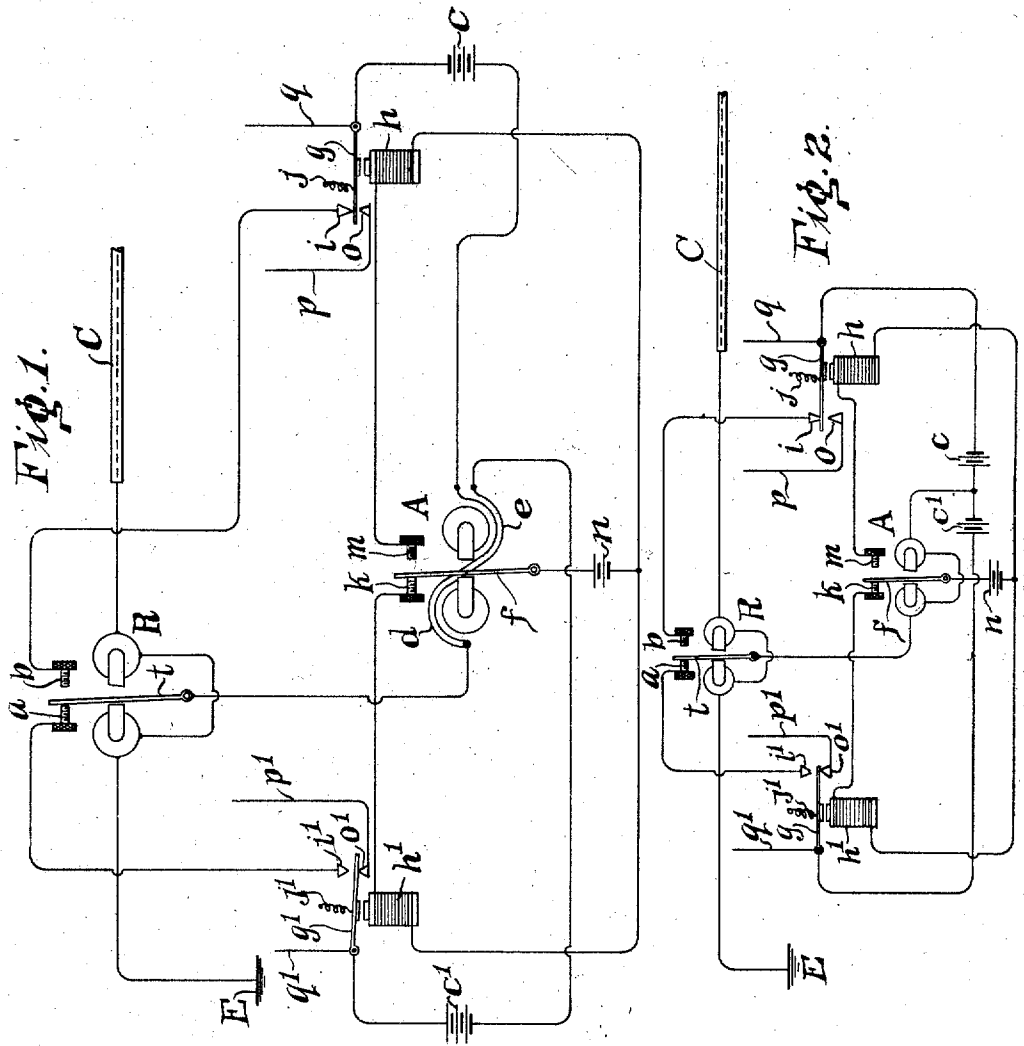


I. KITSEE.
 MEANS FOR CORRECTING SENSITIVE RELAYS.
 APPLICATION FILED DEC. 29, 1908.

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MEANS FOR CORRECTING SENSITIVE RELAYS.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, ISIDOR KITSEE, a citizen of the United States, residing at Philadelphia, county of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Means for Correcting Sensitive Relays, of which the following is a specification.

My invention relates to a means for correcting the defects in very sensitive relays, such as used in connection with a cable or other long line, or in any relation where a very sensitive relay is employed to respond to very feeble electrical energy.

In very sensitive relays, the energy available for causing the movement of the armature or tongue or movable member is very slight and the movable member is very sensitively mounted or pivoted and generally has a very short stroke or movement between contacts or stops. In responding to such feeble energy the movable member engages with a stop or contact, the resistance of the contact being different for different relay actuations, sometimes being a relatively low resistance and at other times an extremely high resistance. And in the local circuit controlled by the movable member and contact there has commonly been employed a low potential source of energy as, for example, one cell of a battery, and even with such a low potential source, sparking at the contacts often causes a sticking of the contacts causing improper or irregular signals. And even when condensers or resistances, or both, are connected in the local circuit to prevent the sparking, the sparking and consequent sticking may be reduced to a degree, but there is an accompanying reduction in the magnetizing effect in the electromagnet or other relay controlled by such local circuit and source of energy. Furthermore, there is often a chattering at the sensitive relay contacts which causes indefinite or false signals. And there is also sometimes a mechanical sticking at the contacts, that is, a sticking not due to sparking or other electrical effects.

It is the object of my invention to over-

come these defects in a very sensitive relay. To this end, I employ auxiliary circuits, relays, and apparatus, as hereinafter described, which correct for the defects in a sensitive relay and cause the signals to be positive, certain and powerful.

My invention resides also in other features hereinafter described and pointed out in the claims.

For an illustration of some of the forms my invention may take, reference is to be had to the accompanying drawing, in which:

Figure 1 is a diagrammatic view illustrating a sensitive relay with means for correcting its defects. Fig. 2 is a diagrammatic view similar to Fig. 1 and a modification thereof. Fig. 3 is an elevational view of a contact standard or holder of the sensitive relay with means for maintaining the relay contacts in the state of vibration. Fig. 4 is a plan view, partly in section, of the standard supporting the sensitive relay contacts, together with a diagrammatic view of a vibrator:

In Fig. 1, C represents a submarine or other cable or line over which extremely faint energy is transmitted. In series between the same and earth E, is connected the winding of a polarized relay R, which is an extremely sensitive relay having the defects or faults heretofore pointed out. The tongue or movable member *t* may be biased or unbiased, but is preferably unbiased, and is adapted to engage the contacts *a* and *b*.

Suppose a positive impulse, for example, is received from the line or cable or other conductor C and traverses the winding of the sensitive relay R. This will cause the tongue *t* to leave contact *a* and engage contact *b*. The resistance of the contact so made between *t* and *b* is variable from one relatively low resistance or a relatively high resistance. But even in the case where the contact resistance is relatively high, at first contact between *t* and *b* the source of energy or battery *c*, which is of relatively high voltage as compared with the common practice in the local circuit of a sensitive relay,

forces a current through such contact resistance and through the winding d of the relay A whose tongue or armature f is unbiased, the circuit of the winding d being completed through the tongue or armature g of the electro-magnet or relay h and the contact i , the tongue or armature g being held against the contact i by the spring j . This causes, then, the tongue f of the relay A to leave the left hand contact k and engage the right hand contact m , thus closing a circuit through the winding of the relay or magnet h and the source of energy n , causing the armature or tongue g to be attracted and held attracted in opposition to the spring j , breaking circuit with the contact i . Thus, it is seen that it is only the very first contact between the tongue t and the contact b of the sensitive relay R that is utilized, and any chattering, sticking, or other defect is incapable of causing any improper signal or weak signal in the controlled circuits or apparatus. By the movement of the tongue f to engagement with the contact m , it has broken contact with k and thus deenergized the relay or magnet h , thus releasing its tongue or armature g to the influence of the spring j to make contact at i .

Assuming, now, a negative impulse arriving over the line or cable C, the same traverses the winding of the relay R and causes the tongue t to move into engagement with the contact a . Here, again, the first contact causes the completion of the circuit through the second winding e of the relay A and through the source c' , the tongue g' and contact i' causing the tongue f to move over into engagement with k , thus deenergizing the winding of magnet or relay h and causing the tongue g to engage i ; and simultaneously to energize the winding of the relay or magnet h' to break circuit between g' and i' , the parts then being again in the position shown in the drawing.

The front stop o and the armature or tongue g may control a local circuit including the conductors p and q to control a recorder, sounder, or any other device, or the magnet or relay h may itself operate as a sounder, recorder, or other device. And, similarly, the conductors q' and p' may be included in a local circuit controlled by the tongue g' and the front stop o' . Or h' may itself operate as a recorder or sounder. Thus, either one or both of the local circuits may be present, or both may be absent.

From the foregoing description, it is apparent that it is only the first contact between t and one of the contacts a or b that is utilized, and even in the case where this contact is an imperfect or high resistance one, the local sources c or c' have relatively high potential sufficient to actuate the second relay A which, in turn, controls the relays or

magnets h, h' for giving signals directly, or indirectly by a controlled local circuit or local circuits, it being remembered that as contact is made between t and either of the contacts a or b , there is no sparking; and immediately after the circuit is first made the contacts a or b are out of circuit, because the tongues g or g' are attracted, thus breaking communication with the contacts of the sensitive relay.

While in Fig. 1 the relay A is shown as having a double winding d, e , having associated sources c and c' respectively, in Fig. 2 the parts are the same as in Fig. 1 except that the relay A has a single winding and two sources of energy c and c' are connected in series with each other and the connection from the winding made to a point between the sources, as a split battery. The operation, however, is the same as described in connection with Fig. 1. Sometimes, however, there is a sticking between the tongue t and either of the contacts a or b of the relay R due to mechanical effects or effects other than electrical ones and to prevent any such sticking, or sticking due to electrical effects, even though the effects are overcome by the apparatus and circuits hereinbefore described, the contacts a and b are constantly vibrated or slightly jarred by a trembler r which taps the stem s of the standard which supports the contacts a and b , which are insulated from each other. The source of energy u , magnet v , and contact w serve to produce the trembler effect, the trembler r striking, if desired, a cushion of leather or other material x secured upon the stem s , though it is to be understood that the trembler r may directly engage the stem s . This constant slight vibration will prevent any sticking, due either to mechanical or electrical effects, between the tongue t and either of the contacts a or b .

What I claim is:

1. The combination with a sensitive relay having a movable member cooperating with a plurality of contacts, of a circuit controlled by each of said contacts, each circuit having means energized by first contact in said sensitive relay and irrespective of the resistance of said contact, said means serving to interrupt one circuit immediately after establishment and to close contacts in another circuit.

2. The combination with a sensitive relay having a movable member and two contacts, of a circuit controlled by each relay contact, a second relay energized immediately upon establishment of circuit at either sensitive relay contact, and means controlled by said second relay for rupturing each circuit immediately after establishment by a relay contact and restoring communication of the other relay contact with the other circuit.

3. The combination with a sensitive relay

having relatively movable contacts, said contacts being so delicate and so feebly actuated by received energy that their engagement is uncertain and causes widely different contact resistances, of a circuit controlled by said sensitive relay, a second relay included in said circuit, and a source of energy in said circuit of potential high enough to energize said second relay irrespective of the resistance at the contacts of said sensitive relay, and a signal translating instrument controlled by said second relay.

4. The combination with a sensitive relay having relatively movable contacts, said contacts being so delicate and so feebly actuated by received energy that their engagement is uncertain and causes widely different contact resistances, of a circuit controlled by said contacts, and a second relay in said circuit positively energized upon first engagement of said contacts and irrespective of the contact resistance, and a signal translating instrument controlled by said second relay.

5. The combination with a sensitive relay having relatively movable contacts, said contacts being so delicate and so feebly actuated by received energy that their engagement is uncertain and causes widely different contact resistances, of a circuit controlled by said contacts, a second relay included in said circuit, a source of energy in said circuit and of a potential high enough to positively energize said second relay irrespective of the resistance of the contact made by said sensitive relay, and means controlled by said second relay for interrupting said circuit immediately after establishment once for each line impulse.

6. The combination with a sensitive relay having a contact movable relatively to a pair of contacts, said contacts being so delicate and feebly actuated by received energy that their engagement is uncertain and causes widely different contact resistances, of a circuit controlled by each of said pair of contacts, a second relay controlled by said contacts of said sensitive relay, said second relay when energized causing the rupture of the circuit closed by engagement of said contacts of said sensitive relay, and controlling the closure of one of said circuits, said circuit being controlled by the other contact of said pair of sensitive relay contacts.

7. The combination with a sensitive unbiased relay having a contact movable relatively to a pair of contacts, said contacts being so delicate and so feebly actuated by received energy that their engagement is uncertain and causes widely different contact resistances, of a circuit controlled by each of said pair of contacts, a second relay controlled by said contacts of said sensitive relay, said second relay when energized

causing the rupture of the circuit closed by engagement of said contacts of said sensitive relay and causing the closure of a circuit controlled by the other contact of said pair of sensitive relay contacts.

8. The combination with a sensitive unbiased relay having a contact movable relatively to a pair of contacts, said contacts being so delicate and so feebly actuated by received energy that their engagement is uncertain and causes widely different contact resistances, of a second unbiased relay controlled by said contacts of said sensitive relay, said second relay when energized causing the rupture of the circuit closed by engagement of the contacts of said sensitive relay and controlling the closure of a circuit controlled by the other contact of said pair of sensitive relay contacts.

9. The combination with a sensitive unbiased relay having a single moving system and relatively movable contacts, said contacts being so delicate and so feebly actuated by received energy that their engagement is uncertain and causes widely different contact resistances, of a circuit controlled by said sensitive relay, a second relay included in said circuit, and a source of energy in said circuit of potential high enough to energize said second relay irrespective of the resistance at the contacts of said sensitive relay.

10. The combination with a sensitive unbiased relay having a single moving system and relatively movable contacts, said contacts being so delicate and so feebly actuated by received energy that their engagement is uncertain and causes widely different contact resistances, of a circuit controlled by said sensitive relay, a second unbiased relay included in said circuit, and a source of energy in said circuit of potential high enough to energize said second relay irrespective of the resistance at the contacts of said sensitive relay.

11. The combination with a sensitive unbiased relay having a single moving system and movable contacts, said contacts being so delicate and so feebly actuated by received energy that their engagement is uncertain and causes widely different contact resistances, of a circuit controlled by said contacts, and means in said circuit positively energized upon first engagement of said contacts and irrespective of the contact resistance.

12. The combination with a sensitive unbiased relay having relatively movable contacts, said contacts being so delicate and so feebly actuated by received energy that their engagement is uncertain and causes widely different contact resistances, of a circuit controlled by said contacts, a second unbiased relay included in said circuit, a source of energy included in said circuit and

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of a potential high enough to positively energize said second relay irrespective of the resistance of the contact made by said sensitive relay, and means controlled by said
5 second relay for interrupting said circuit immediately after establishment.

In testimony whereof I have hereunto

affixed my signature in the presence of the two subscribing witnesses.

ISIDOR KITSEE.

Witnesses:

ELEANOR T. McCALL;
A. E. STEINBOCK.