I. KITSEE.

CABLE RELAY.

APPLICATION FILED AUG. 8, 1907.

922,780. Patented May 25, 1909.

2 SHEETS—SHEET 1.

Fig. 1.

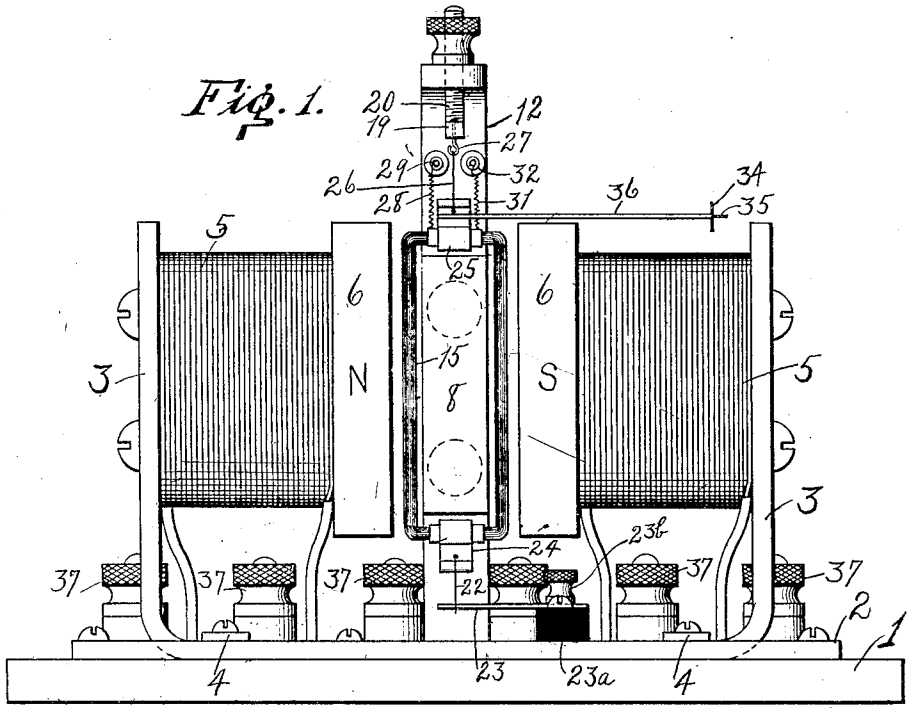
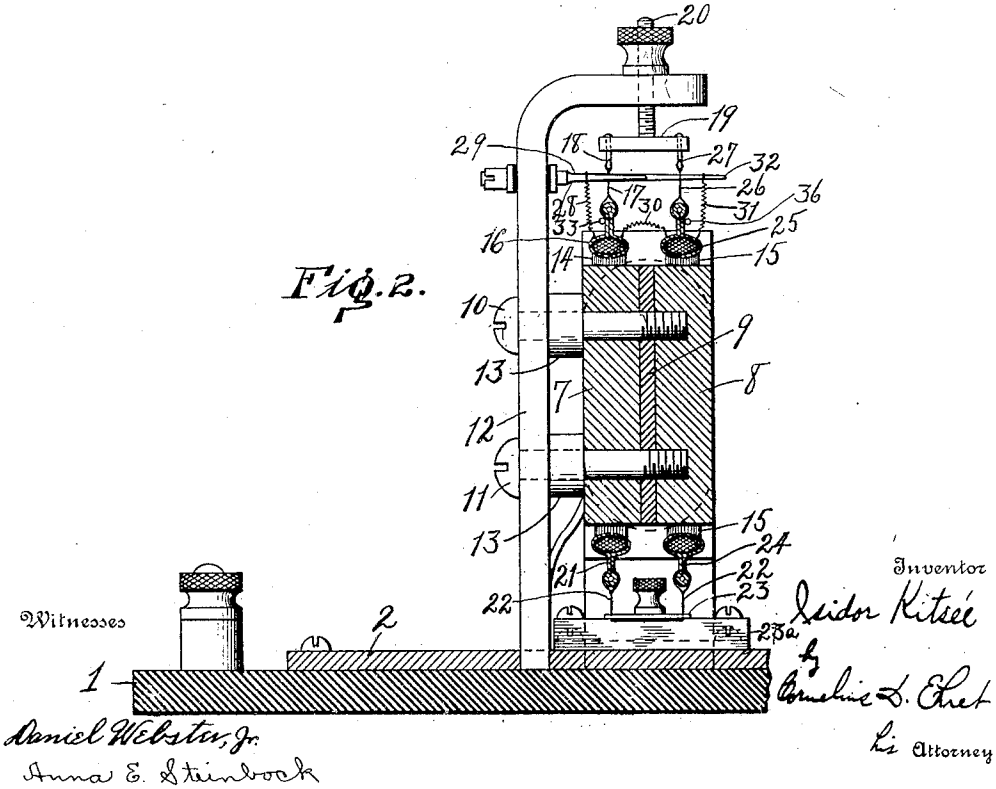


Fig. 2.



Witnesses

Daniel Webster, Jr.

Anna E. Steinbock

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Isidor Kitsee

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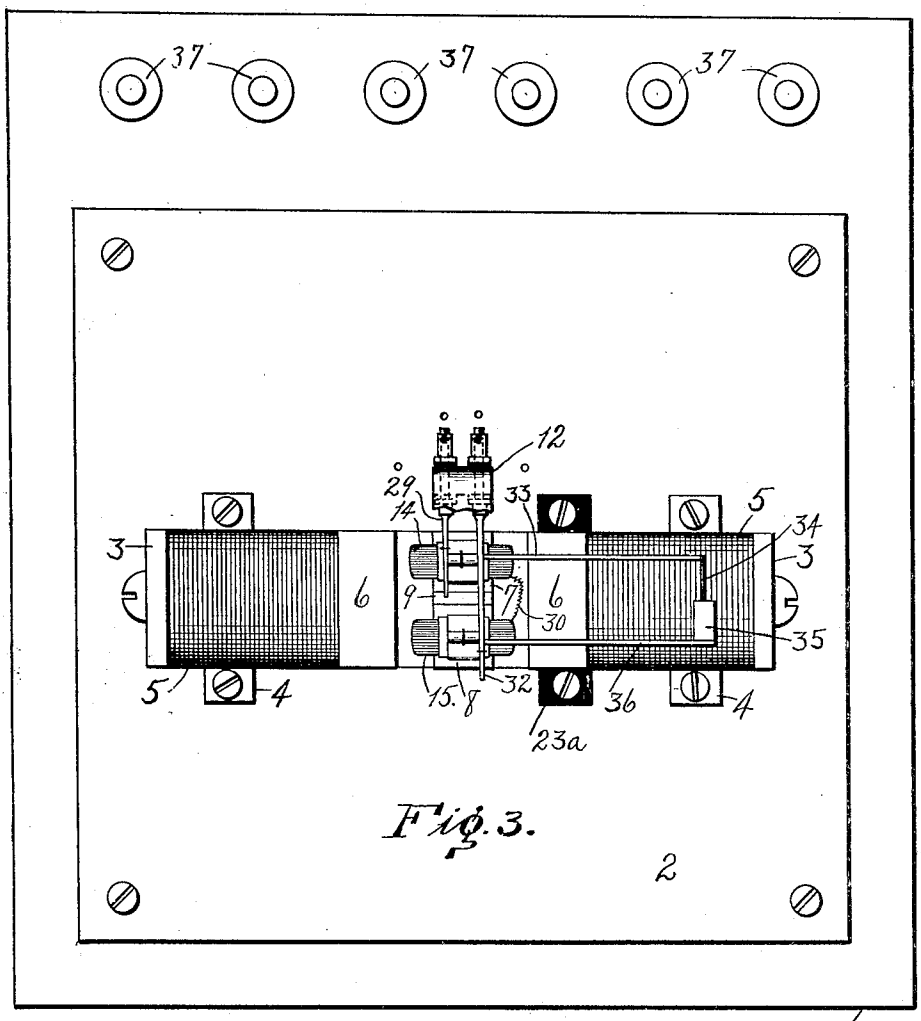


Fig. 3.

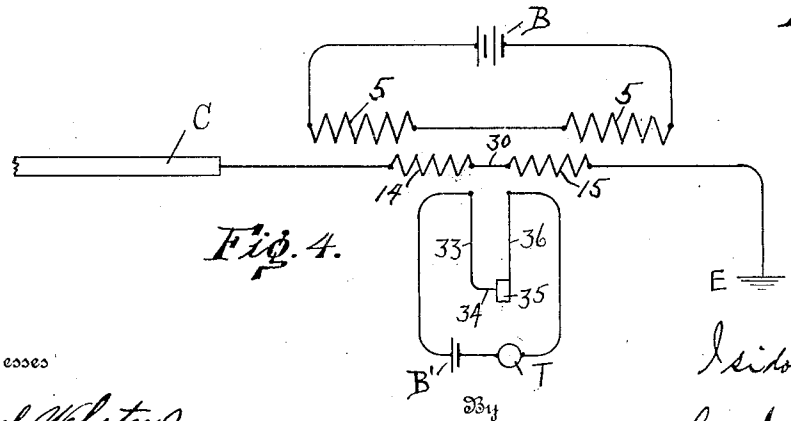


Fig. 4.

Witnesses

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UNITED STATES PATENT OFFICE.

ISIDOR KITSEE, OF PHILADELPHIA, PENNSYLVANIA.

CABLE-RELAY.

No. 922,780. Specification of Letters Patent. Patented May 25, 1909.

Application filed August 8, 1907. Serial No. 387,680.

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, and State of Pennsylvania, have invented certain new and useful Improvements in Cable-Relays, of which the following is a specification.

My invention relates to a relay adaptable to telegraphing or other signaling purposes, and more particularly to submarine or subterranean cable signaling.

In submarine signaling, for example, it is a common practice to receive the impulses or electric currents in the coil of a siphon recorder instrument, such instrument making a record upon a moving tape. So far as I am aware, a practical or successful relay for cable messages or for operation in connection with a submarine cable has not heretofore been possible because of the fact that if a single relay contact is moved by the current derived from the cable the shifting zero effect prevents such a construction from operating satisfactorily. Thus, in a siphon recorder instrument it is found that the normal or zero position of the siphon varies from time to time due to thermal or other effects of the cable, causing what is known as the shifting zero. Therefore, if a relay is used in conjunction with a submarine cable and such relay have one fixed contact and a movable contact responsive to cable current, the contacts will not always engage in true response to the currents impressed upon the cable at the transmitting station. That is to say, because of the shifting zero effect a movable contact would sometimes occupy one position and sometimes another when no signal impulses were being transmitted.

It is the object of my invention to overcome such defects, due to shifting zero and other causes, and to provide a relay which can be used directly with the cable to close or control any other circuit or circuits, or series of circuits to produce a record, or to control a sounder, or to produce any other effect. To this end I construct the relay with two moving coils, similar to siphon recorder coils, and secure to each coil a movable contact, the two contacts being the relay contacts and being included in a local or other circuit to control a circuit or a series of circuits. These coils I preferably connect in opposition to each other, that is to say, with a given direction of cable current, one coil tends to move in one direction and the other coil to move in the other direction. And I preferably connect the coils in series with each other. A suitable magnetic field is provided either by a permanent or electro-magnet in a manner similar to that produced in a siphon recorder. Whatever shifting zero effect there may be, therefore, the two moving contacts of the relays will always remain in the same relative positions, but will change their relative positions only due to substantial signal impulses.

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

Figure 1 is a side elevation of the relay. Fig. 2 is a vertical sectional view, partly in elevation, through the movable coils and their internal cores. Fig. 3 is a top plan view of the relay. Fig. 4 is a diagrammatic view illustrating one of the modes of connecting and using the relay.

Referring to the drawings, a sub-base 1 of any suitable insulating material, such as hard rubber, has mounted thereon the metallic base 2. A yoke 3 of iron, steel, or other magnetic material is set into the base 2 and held thereto by the strap pieces 4. The yoke 3 has secured thereto iron or steel cores upon which are wound the coils 5 which are connected either in series or in parallel with each other. Pole pieces 6 are formed upon said cores, the windings 5, 5 being so connected as to form an electro-magnet whose poles 6, 6 are of opposite polarities as indicated by N S. Two cores 7 and 8 of iron or other magnetizable material are separated from each other by the plate 9 of brass or other suitable non-magnetic material, all being supported by the screws 10 and 11 to the standard 12, the separators 13, 13 intervening. It is preferable that the standard or bracket 12 and the separators 13, 13 be of non-magnetic material, such as brass. Surrounding the core 7, in the manner practiced in the siphon recorder, is the movable coil 14 and in like manner the movable coil 15 surrounds the core 8. The two cores 7 and 8 being separated by a non-magnetic material serves to concentrate the magnetic field within the coils in a more desirable manner than if the cores 7 and 8 were in a single piece of magnetic material. The coil 14 is supported at its top by a metallic strap 16 surrounding the coil and extending upwardly therefrom in its axis and insulated from the coil. The metallic fiber or wire 17 is secured

to the strap 16 and to the hook 18 in the bar 19 supported by the adjusting screw 20 in the horizontal extension of the standard 12. A strap 21, similar to 16, is provided at the bottom of the coil 14 and from it extends a metallic fiber or wire 22 under the notched metallic plate 23 and up to the strap 24 upon the bottom of the movable coil 15. The plate 23 is secured to the block 23^a of hard rubber or other insulating material which is, in turn, secured to the base 2. At the top of the coil 15 is a strap 25 to which connects the metallic fiber or wire 26 secured to the hook 27 in the bar 19. The coil suspensions 17, 22 and 26 serve as torsion wires or fibers, as in a siphon recorder, to give the coils a bias toward normal position and to resiliently resist movement of the coils from normal position. One terminal of the coil 14 connects by a flexible conductor 28 with the horizontally extending pin or rod 29 secured to but insulated from the standard 12. The other terminal of the coil 14 connects by conductor 30 with one terminal of the coil 15, the remaining terminal of the coil 15 being connected by flexible conductor 31 with the longer pin or bar 32 which is also supported by but insulated from the standard 12. Thus, the coils 14 and 15 are connected in series with each other and, as stated, these coils are connected in opposition to each other in the sense that with a given direction of current through them, one coil tends to move in a direction opposite to the other.

Secured to and in electrical communication with the metallic strap 16 of the coil 14 is a horizontally extending arm or rod 33. This rod 33 carries at its outer end a relay contact 34 consisting preferably of a thin sheet or plate of platinum having its plane vertical. With one edge of the plate 34 engages the edge of a similar platinum plate 35 carried at the outer end of the rod or wire 36, similar to 33, mechanically connected to, but insulated from, the strap 25 of the coil 15. The planes of the contacts 34 and 35 being at right angles to each other and engaging on their edges only, insures a sensitive but reliable contact, there being a sliding of the edge of 34 along the edge of 35 when the coils 14 and 15 deflect. A small conductor or wire connects the rod 36 with the strap 24 of the coil 15, thus the contact 35 is in electrical communication with the plate 23 with which connection is made by the binding post 23^b. This conductor connecting the rod 36, as described, lies flat against one side of the coil 15 but is insulated from said coil.

From the pins 29 and 32, forming the terminals of the coils 14 and 15, connections are made through or under the base to a pair of the six binding posts 37 upon the sub-base 1. The relay contact 34 is in electrical communication through the coil strap 16, the fiber 17, hook 18, bar 19, screw 20 with the standard 12 which is connected to another of the binding posts 37. With a neighboring binding post is connected the small binding post 23^b. To the remaining pair of binding posts is connected a battery or other source of energy B, Fig. 4, for energizing the windings 5, 5 of the electro-magnet.

As shown in Fig. 4, the coils 14 and 15 are connected in series with each other between the cable C and earth E. Between the cable C and earth E may intervene, if desired, a condenser. The relay contacts 34 and 35 are included in circuit with a battery or source of energy B′ and a translating instrument T which may be any suitable type of instrument, as a relay or a recorder, or sounder, or which, when a relay, may control another relay sounder, recorder, or series of the same.

The operation is as follows: The relay contacts 34 and 35 are normally in contact with each other, thus normally closing the circuit including the battery B. It is to be understood, however, that they may be normally separated. Assuming them normally closed as shown, when there is no signal current being transmitted over the cable C, if slight current effects exist, such as a weak steady current or a weak fluctuating current of long period, as found in connection with submarine cables, the two coils will both deflect very slightly but maintain the contacts 34 and 35 in engagement. If, however, a signal current, which is considerably more abrupt and powerful than the current causing the shifting zero, be transmitted over the cable, it passes through the two coils 14 and 15 in series and they, being connected oppositely, as described, deflect in opposite directions and open the circuit at contacts 34 and 35, thus causing the signal translating instrument T to respond in suitable manner. At the cessation of the signal impulses the coils close the circuit at 34 and 35. This opening and closing of the circuit at 34 and 35 may be used in any suitable manner to reproduce signals at the receiving station. Thus, it is seen that the relay is provided with two coils, each carrying a relay contact. Both relay contacts being movable the shifting zero effect is overcome and the instrument may be connected to a cable as described and may control another circuit or series of circuits.

Obviously, in place of the electro-magnet producing the magnetic field a permanent magnet may be employed.

What I claim is:

1. A cable relay unresponsive to shifting zero effect comprising two movable members biased toward normal position, and a relay contact carried by each member, the movement of said members being unrestricted.

2. A cable relay unresponsive to shifting

zero effect comprising two movable coils biased toward normal position, and a relay contact carried by each coil, the movement of said coils being unrestricted.

3. A cable relay unresponsive to shifting zero effect comprising two movable coils biased toward normal position, and a relay contact carried by each coil, the movement of said coils being unrestricted and adapted to move said relay contacts in opposite directions.

4. A cable relay unresponsive to shifting zero effect comprising two movable coils connected in series and adapted to move in opposite directions, and a relay contact carried by each coil, the movement of said coils being unrestricted.

5. In a cable relay, means for maintaining a magnetic field, two movable coils supported in said field and biased toward normal position, and a relay contact carried by each coil, said coils adapted to move said contacts in opposite directions.

6. In a cable relay, two movable coils biased toward normal position, an arm secured to each coil, and a relay contact carried by each arm, said relay contacts adapted to engage each other and unrestricted in movement.

7. In a cable relay, two coils biased toward normal position, an arm secured to each coil, and a relay contact carried by each arm, said relay contacts adapted to engage each other and to move unrestrictedly in opposite directions.

8. In a relay, two movable coils in the same magnetic field, a suspension for each coil, and a relay contact carried by each coil, the coil suspensions being in circuit with said relay contacts, said contacts adapted to engage each other.

9. A cable relay unresponsive to shifting zero effect comprising means for maintaining a magnetic field, two movable coils suspended in said field, a relay contact controlled by each coil, said contacts being normally in engagement with each other and remaining in engagement irrespective of the shifting of the zero position of said coils.

10. In a cable relay, two movable members, and a relay contact carried by each member, said contacts being normally in engagement with each other and remaining in engagement irrespective of the shifting zero position of said members.

11. In a cable relay, two movable coils, and a relay contact carried by each coil, said contacts being normally in engagement with each other and remaining in engagement irrespective of the shifting zero position of said coils.

12. In a cable relay, two movable members, each adapted to move in a direction opposite to the other, and a relay contact carried by each member, said relay contacts being normally in engagement with each other and remaining in engagement irrespective of the shifting zero position of said members.

13. In a cable relay, two movable coils, each adapted to move in a direction opposite to the other, and a relay contact carried by each coil, said contacts being normally in engagement with each other and remaining in engagement irrespective of the shifting zero position of said coils.

14. In a cable relay, two movable coils, and a relay contact carried by each coil, said relay contacts being normally in circuit closing position, and remaining in such position irrespective of the shifting zero position of said coils.

15. In a cable relay, two movable members biased toward normal position, and a relay contact controlled by each member, the movement of said contacts being unrestricted.

16. In a relay, contacts adapted to engage each other, each contact presenting an edge to the other contact.

17. In a relay, contacts adapted to engage each other, each contact presenting an edge to the other contact, said engaging edges being at right angles to each other.

18. In a cable relay, two movable coils biased toward normal position, and a relay contact actuated by each coil, the movement of said relay contacts being unrestricted.

19. In a relay, two movable coils, and a relay contact carried by each coil, each relay contact presenting an edge for engagement by the other contact.

20. In a relay, two movable coils, and a relay contact carried by each coil, each contact presenting an edge to the other, said engaging edges being at right angles to each other.

21. In a relay, two movable members, an arm carried by each member, a relay contact carried by each arm, each relay contact presenting an edge for engagement by the other contact.

22. In a relay, two movable coils, an arm carried by each coil, a relay contact carried by each arm, each relay contact presenting an edge for engagement by the other contact.

23. In a relay, two movable coils, an arm carried by each coil, and a relay contact carried by each arm, each contact presenting an edge to the other, said engaging edges being at right angles to each other.

24. In a cable relay, two movable coils, an arm carried by each coil, a relay contact carried by each arm, each contact presenting an edge for engagement by the other contact, said contacts being normally in engagement with each other and remaining in engagement irrespective of the shifting zero position of said coils.

25. In a relay, two movable coils, an arm

carried by each coil, a relay contact carried by each arm, said contacts being normally in engagement with each other along edges at right angles to each other and remaining in such engagement irrespective of the shifting zero of said coils.

26. In a cable relay, two movable relay contacts normally in engagement with each other and moving together to maintain said engagement irrespective of zero shifting current.

27. In a cable relay, two movable relay contacts in definite normal position and movable each with respect to the other, and means for maintaining said movable contacts in such definite position irrespective of zero shifting current.

28. In a cable relay, two movable relay contacts, a resilient support for each contact, and means for maintaining the normal relative position of said contacts with respect to each other irrespective of zero shifting current.

29. In a relay, two movable coils biased toward normal position connected in series and adapted to move in opposite directions, and a relay contact controlled by each coil, the movement of said contacts being unrestricted.

30. In a relay, two movable coils biased toward normal position connected in series and adapted to move in opposite directions, and a relay contact actuated by each coil, the movement of said contacts being unrestricted.

31. In a cable relay, two movable coils, a relay contact actuated by each coil, the movement of said relay contacts being unrestricted, and resilient means biasing said coils toward normal position.

32. In a cable relay, two movable coils, means for maintaining a magnetic field, said coils producing substantially equal efforts, means biasing said coils toward normal position, and a relay contact actuated by each coil, the movement of said relay contacts being unrestricted.

33. In a cable relay, two movable coils, means for maintaining a magnetic field, said coils producing substantially equal efforts, means biasing said coils toward normal position, and a relay contact actuated by each coil, the movement of said relay contacts being unrestricted and in opposite directions.

In testimony whereof I have hereunto affixed my signature in the presence of the two subscribing witnesses.

ISIDOR KITSEE.

Witnesses:
EDITH R. STILLEY,
ANNA E. STEINBOCK.