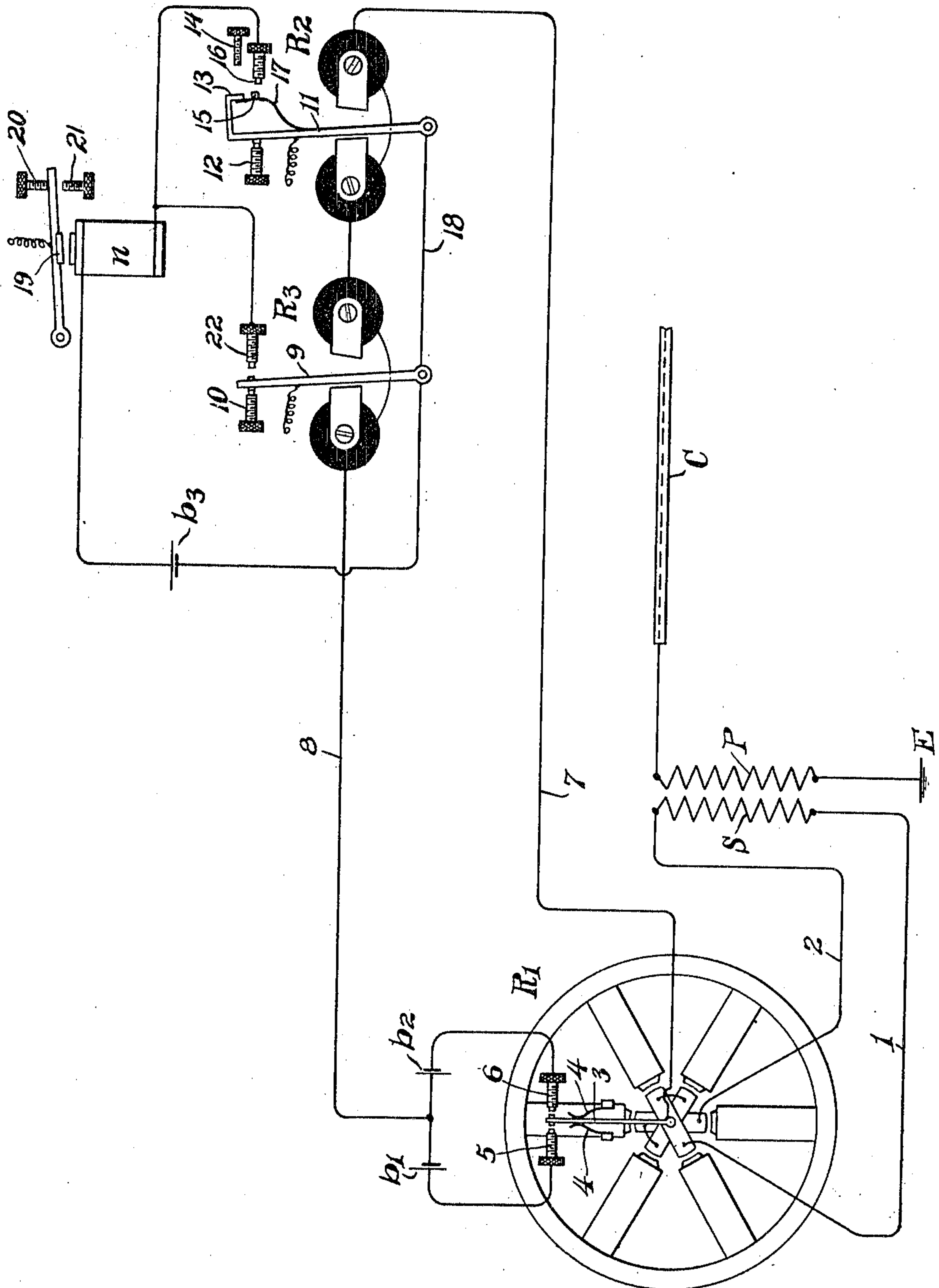


I. KITSEE.
TELEGRAPH SYSTEM.
APPLICATION FILED MAR. 31, 1909.

1,088,708.

Patented Mar. 3, 1914.



WITNESSES

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TELEGRAPH SYSTEM.

1,088,708.

Specification of Letters Patent.

Patented Mar. 3, 1914.

Application filed March 31, 1909. Serial No. 487,075.

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 Telegraph Systems, of which the following is a specification.

My invention relates to telegraphy and more particularly to telegraphy over long lines or cables, such as subterranean or submarine cables, or any conductor, especially when having relatively great capacity.

My invention resides in a telegraph system in which current impulses are transmitted over the line or cable, impulses of one polarity representing dots, while impulses of the other polarity represent dashes, together with receiving apparatus including a sensitive relay associated with the line or cable which controls a local circuit including polarized relays, and a sounder, recorder, or relay, such, for example, as may be employed to control a telegraphic printing apparatus, is controlled by such polarized relays, one of such relays responding to current representing a dot, while the other responds to a current representing a dash, the latter in so doing causing a relatively longer control of the local circuit including the sounder, recorder, or relay.

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

For an illustration of one of the forms my invention may take, reference is to be had to the accompanying drawing, which is a diagrammatic illustration of circuits and apparatus.

In the drawing, C represents a submarine or subterranean cable, or other line or cable having great capacity, though it is to be understood that my invention may also be used with lines or cables in general. Between the receiving end of the cable C and the earth E is connected the primary P of a transformer whose secondary is S. This transformer may be of any suitable type; or may be either a step-up or step-down transformer or may have either an open or closed magnetic circuit. One terminal of the secondary S connects by conductor 1 with one terminal of the winding of the polarized

and very sensitive relay R^1 . Such relay R^1 may be of a type similar to that described in my Patent No. 963,374, though it is to be understood that my invention is applicable with any other suitable type of relay. The other terminal of the winding of the relay R^1 connects by conductor 2 with the other terminal of the secondary S.

The tongue 3 of the relay R^1 is biased, by suitable sensitive springs 4, 4, to a normal position between the relay contacts 5 and 6 to which are connected terminals of the split battery comprising the parts or halves b^1 and b^2 . The conductor 7 is in electrical communication with the tongue 3 and with one terminal of the winding of the polarized relay R^2 , whose other terminal connects with one terminal of the winding of the polarized relay R^3 , the other terminal of the winding connecting by conductor 8 to a point between the batteries or sources b^1 and b^2 . The tongue 9 of the polarized relay R^3 is biased by a spring to the normal position shown against the stop 10. And the tongue 11 of the polarized relay R^2 is biased by a spring to the normal position shown in engagement with the stop 12. The tongue 11 has a hooked end 13 which, when the relay R^2 is energized by current of a certain polarity, is moved into engagement with the stop 14. Before the hook end 13 engages stop 14, the contact 15 engages contact 16 and they remain in contact due to the yielding of the spring 17 until, on the return movement, the hook end 13 again engages the spring 17 to separate the contacts 15 and 16. The relay tongues 9 and 11 are electrically connected by conductor 18 and are included in circuit with the battery or source b^3 with the winding of the magnet n of a sounder, recorder, or relay, which relay may control a printing telegraph apparatus or any other suitable apparatus. The armature 19 is normally spring retracted against the stop or contact 20, and when the magnet n is energized, is attracted so that the armature lever engages the stop or contact 21. The other terminal of the winding of the magnet n connects with the contact 16 of relay R^2 and with contact 22 of the relay R^3 .

The operation is as follows: The operator at the distant station transmits to line

or cable current impulses of one polarity to represent dots, and impulses of the opposite polarity to represent dashes. The arriving impulse, say, a positive impulse representing a dot, traverses the primary P and by induction causes a momentary current in the secondary S which current traverses the winding of the sensitive relay R¹. The first part of an impulse arriving over a cable or line having great capacity increases in strength more rapidly than the last portion of the impulse diminishes. In other words, the front of the arriving wave is relatively steep causing a substantial current induced in the secondary S, while the dying away of the impulse is so slow that, while theoretically there is some current induced in the secondary S, it is not sufficient to actuate the relay R¹. This effective secondary current will cause tongue 3 of relay R¹ to engage, for example, the contact 5, but immediately return to its normal position shown. This means that a current passes in a certain direction from the source b¹ through the circuit including the conductors 7 and 8, and the windings of the two polarized relays R² and R³. The relay R³ only responds to this current, being of a given polarity, and its tongue 9 momentarily engages the contact 22, thus energizing the magnet n to cause a movement of its armature 19 to correspond with the movement of a sounder, or recorder magnet to produce a dot. Or, if n is a relay, it makes momentary closure or opening of a controlled circuit. If, however, a negative impulse is received, the current induced in the secondary S is of opposite direction, and the tongue 3 momentarily engages the contact 6 and then immediately returns to the normal position shown. This means that a current of opposite polarity will now flow for a short time through the circuit including the windings of the polarized relays R² and R³. The current being of opposite direction, however, the relay R³ will not respond but the relay R² will respond. This means, as heretofore described, a relatively protracted contact between 15 and 16, thus energizing the magnet n a relatively longer time to reproduce a dash, or if a relay, to cause a prolonged opening or closure of the controlled circuit for printing or other purposes. It is apparent, therefore, that by transmitting over the line or cable short impulses, impulses of one polarity for dots and impulses of the other polarity for dashes, I am enabled by my system and apparatus to cause a reproduction by a sounder or recorder of dots and dashes, or to control another circuit in such manner that currents of different durations may flow therein.

What I claim is:

1. The combination with a line or cable carrying impulses of one polarity to represent dots and of opposite polarity to represent dashes, of a sensitive relay associated

with said line or cable, a local circuit controlled by said relay and including a plurality of polarized relays, one relay in said local circuit serving to reproduce dots, and another relay in said circuit making protracted contact to reproduce dashes.

2. The combination with a line or cable carrying current impulses of one polarity representing dots and of the other polarity representing dashes, of a relay associated therewith, a local circuit including a plurality of polarized relays controlled by said relay, means for causing current flow in said local circuit in one direction in response to a line or cable impulse of one polarity, and for causing a current flow in opposite direction in said local circuit in response to a line or cable impulse of opposite polarity, said relays in said local circuit making contacts of different durations.

3. The combination with a line or cable carrying current impulses of one polarity representing dots and of the other polarity representing dashes, of a sensitive relay associated therewith, a local circuit including a plurality of polarized relays controlled by said sensitive relay, means for causing current flow in said local circuit in one direction in response to a line or cable impulse of one polarity and for causing current flow in opposite direction in said local circuit in response to a line or cable impulse of opposite polarity, one of said relays in said local circuit responding to a current of one direction to reproduce dots, and another relay in said local circuit responding to current of opposite direction and making protracted contact to reproduce dashes.

4. The combination with a line or cable carrying current impulses of one polarity representing dots and current impulses of opposite polarity representing dashes, of a sensitive relay, a local circuit controlled thereby and including a plurality of polarized relays, a second local circuit controlled by said polarized relays, one of said polarized relays responding to current of one direction for momentarily controlling the second local circuit, and another of said polarized relays responsive to current of opposite direction for protractedly controlling said second local circuit.

5. The combination with a line or cable carrying impulses of one polarity to represent dots and of opposite polarity to represent dashes, of a sensitive relay associated with said line or cable and comprising a movable contact movable a fixed distance between stationary contacts, a transformer intervening between said relay and said line or cable, a local circuit controlled by said relay and including a plurality of relays, a second local circuit controlled by said relays, one relay in said local circuit controlling said

second local circuit to reproduce dots, and another relay protractedly controlling said second local circuit to reproduce dashes.

6. The combination with a line or cable carrying current impulses of one polarity representing dots and of the other polarity representing dashes, of a sensitive relay associated therewith and comprising a movable contact movable a fixed distance between stationary contacts, a transformer intervening between said relay and said line or cable, a local circuit including a plurality of relays controlled by said sensitive relay, a second local circuit controlled by said relays, means for causing current flow in said first local circuit in one direction in response to a line or cable impulse of one polarity, and for causing a current flow in opposite direction in said first local circuit in response to a line or cable impulse of opposite polarity, one of said relays protractedly controlling said second local circuit.

7. The combination with a line or cable carrying current impulses of one polarity representing dots and of the other polarity representing dashes, of a sensitive relay associated therewith and comprising a movable contact movable a fixed distance between stationary contacts, a local circuit including a plurality of relays controlled by said sensitive relay, means for causing current flow in said local circuit in one direction in response to a line or cable impulse of one polarity and for causing current flow in opposite direction in said local circuit in response to a line or cable impulse of opposite polarity, a second local circuit, one of said relays in said local circuit responding to a current of one direction to cause a current of short duration in said second local circuit, and another relay protractedly controlling said second local circuit responding to current of opposite direction to cause current of longer duration in said second local circuit.

8. The combination with a line or cable carrying current impulses of one polarity representing dots and current impulses of opposite polarity representing dashes, of a sensitive relay, a transformer intervening between said relay and said line or cable, a local circuit controlled thereby and including a plurality of polarized relays, a second local circuit controlled by said polarized relays, one of said polarized relays responding to current of one direction for momentarily controlling the second local circuit, and another of said polarized relays responsive to current of opposite direction for protractedly controlling said second local circuit.

9. The combination with a line or cable carrying impulses of opposite polarity and of substantially equal duration, of a relay associated with said line or cable, a local circuit controlled by said relay, a plurality of

relays in said local circuit, a second local circuit controlled by said relays, a signal reproducing instrument in said second local circuit, one of said relays in said local circuit being polarized and controlling said second local circuit for a time longer than the control exercised by another of said relays in said local circuit.

10. The combination with a line or cable carrying impulses of one polarity representing dots and of another polarity representing dashes, of a sensitive relay associated therewith, a local circuit controlled by said relay, relays controlled by said local circuit, a second local circuit, the contacts of said relays connected in parallel with each other in said second local circuit, a sounder in said second local circuit, and means associated with a relay in said local circuit for protractedly controlling said second local circuit.

11. The combination with a line or cable carrying current impulses of one polarity representing dots and of the other polarity representing dashes, of a relay associated therewith, a local circuit controlled by said relay, said local circuit traversed by current in opposite directions in response to line or cable impulses of opposite directions, polarized relays controlled by said local circuit, a second local circuit controlled by said polarized relays, one of said polarized relays protractedly controlling said second local circuit.

12. The combination with a line or cable carrying current impulses of one polarity representing dots and current impulses of opposite polarity representing dashes, of a sensitive relay, a transformer intervening between said relay and said line or cable, a conductive connection from said line or cable to earth through a winding of said transformer, a local circuit controlled by said sensitive relay and including a plurality of polarized relays, a second local circuit controlled by said polarized relays, one of said relays responding to current of one direction for momentarily controlling the second local circuit, and another of said polarized relays responsive to current of opposite direction for protractedly controlling said second local circuit.

13. The combination with a line or cable, of a sensitive relay associated therewith, a local circuit controlled by said relay and including a plurality of polarized relays, one of said relays making short contact and another of said relays making protracted contact.

14. The combination with a line or cable, of a sensitive relay associated therewith at the receiving end thereof, a local circuit controlled by said relay and including a plurality of relays, one of said relays making short contact and another of said relays

making protracted contact, and a single local circuit controlled by said relays in said local circuit, the contacts of said relays in said local circuit, connected in parallel with
5 respect to each other in said second local circuit.

In testimony whereof I have hereunto af-

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

ISIDOR KITSEE.

Witnesses:

ELEANOR T. McCALL,

A. E. STEINBOCK.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."