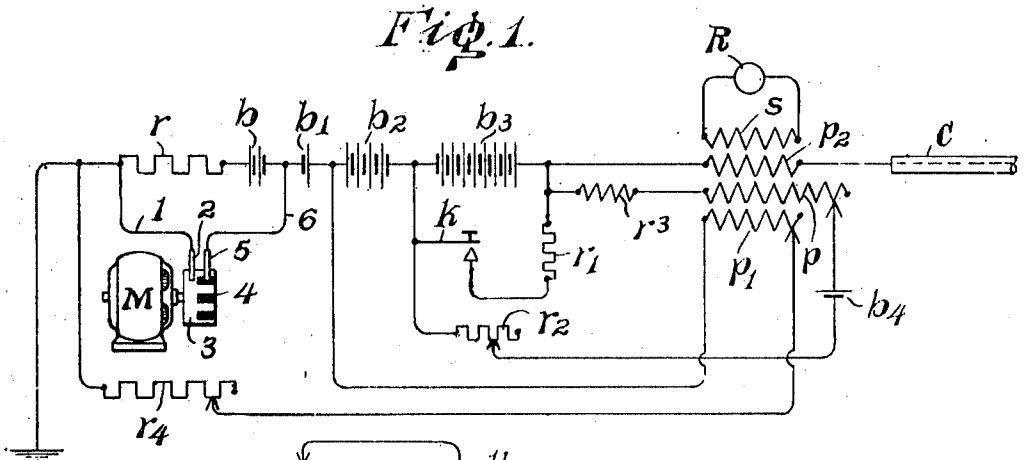
I. KITSEE.

CABLE TELEGRAPH SYSTEM.

APPLICATION FILED APR. 23, 1909.

988,878. Patented Apr. 4, 1911.

Fig. 1.



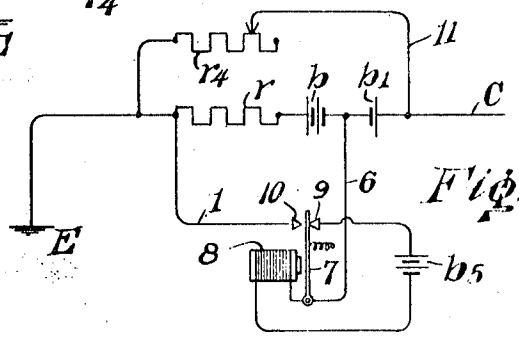
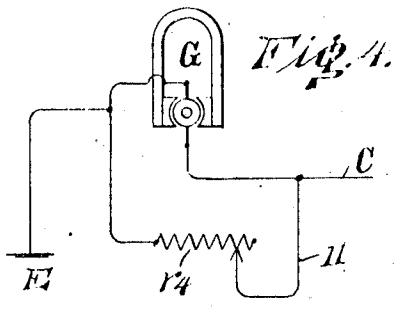


Fig. 2.

Fig. 4.



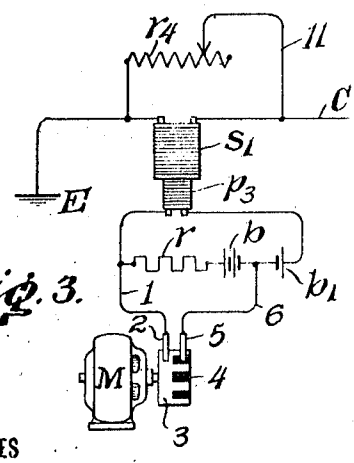


Fig. 3.

WITNESSES

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CABLE-TELEGRAPH SYSTEM.

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To all whom it may concern:

Be it known that I, ISIDOR KITSEE, a citizen of the United States, residing in the city of Philadelphia, county of Philadelphia, and State of Pennsylvania, have invented certain new and useful Improvements in Cable-Telegraph Systems, of which the following is a specification.

My invention relates to telegraphy over a long line or cable, such as a submarine cable, having relatively great capacity.

It is the object of my invention to keep the line or cable in a sensitive condition so that the signal impulses transmitted from one end to the other are able to quickly affect or control the distant receiving instrument.

A long line or cable having great capacity has a relatively great time constant; that is, it requires a considerable time before current impressed upon one end rises to anything near its full value at the receiving end. While, by my invention I do not reduce the time constant of the line or cable, yet I so employ the line or cable that in effect the time constant is reduced so that more rapid and positive signaling is possible. To this end, I continuously impress upon the line or cable current impulses, preferably alternating in polarity, these impulses traversing the cable at all times, whether or not messages are being transmitted. Then, I impress upon the line or cable the signal impulses. I provide also means for neutralizing in the receiving apparatus the effects of the impulses continuously impressed upon the line or cable and also means for neutralizing in the receiving instrument the effects of signal impulses transmitted to line or cable from the same station.

My invention resides in other features hereinafter described and claimed.

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 of the apparatus at one end of a line or cable. Fig. 2 is a diagrammatic view of a modified means for continuously impressing impulses upon the line or cable. Fig. 3 is a diagrammatic view of a further modification of means for continuously impressing impulses upon the line or cable. Fig. 4 is a diagrammatic view of another means for continuously impressing impulses upon the line or cable.

Referring to Fig. 1, C is the line or cable having great capacity, as, for example, a submarine cable. Between it and the earth E are serially connected the opposed sources of energy b and b^1, one of greater power than the other, and a resistance r. From one terminal of the resistance r leads a conductor 1 to the brush 2 bearing upon the circumferentially continuous portion 3 of a commutator 4 which is continuously driven at any desired speed by any suitable means as, for example, an electric motor M. A second brush 5 bears alternately upon insulating material and projections from the continuous ring 3. The result is that there is a periodic closing and opening of the circuit including the conductors 1, 6, source b and resistance r. When this circuit is closed, the source b^1 is active in impressing current upon the line or cable C, and when the circuit is open, the source b overcomes b^1 and current in opposite direction is sent to the line or cable. In consequence, by the rotation of the commutator 4, impulses alternating in polarity are continuously impressed upon the line or cable.

The number of cells in the sources b and b^1 may be different than illustrated, the number of cells in each source being made suitable to the conditions under which operation is necessary. In series between the line or cable C and earth E are also connected the opposed sources b^2 and b^3, one comprising a greater number of cells than the other. In shunt to the source b^3 is connected the operator's key k and a resistance r^1. And a second circuit in shunt to the source b^3 includes the adjustable resistance r^2, source b^4, the adjustable transformer primary p and a resistance r^3. And in shunt to the resistance r, and sources b, b^1 is a circuit including the adjustable resistance r^4 and the adjustable primary p^1 of the transformer. In series with the line or cable C is the primary p^2 traversed by both the continuously impressed impulses as well as the signal impulses.

s is the transformer secondary in whose circuit is included the signal translating instrument R, as a relay, siphon recorder, or

any other suitable apparatus. At the other end of the cable C there may be employed apparatus similar to that shown in Fig. 1 and similarly and symmetrically disposed with relation to the cable, though other apparatus may be employed at the distant end of the cable. If, at the distant end of a station, means are employed for continuously impressing upon the line or cable impulses alternating in polarity, it is immaterial whether or not the impulses so impressed upon the cable at the distant end be in phase with those impressed at the home end.

In the arrangement shown in Fig. 1, or the equivalent thereof, the primary winding p in whose circuit is included the source b^4, serves to neutralize the effect on the receiver or instrument R of the signal impulses transmitted to cable C by key k at the same station, the source b^4 aiding in this neutralizing effect, since the closure of the key k will allow an impulse of suitable strength from the source b^4 to pass through the primary p. When the key k is closed, the battery b^3 is practically short circuited through the resistance r^1 and the source b^4 will effectually produce the neutralizing effect.

The operation is as follows: The commutator 4 being rotated at suitable speed, impulses alternating in polarity are impressed upon the line or cable C, as above described. The strength of these impulses may be controlled by adjusting the resistance r^4 in the shunt circuit, and by suitably adjusting and connecting the primary p^1, the effect of the continuously produced impulses traversing the primary p^2 upon the secondary s is neutralized by the inductive effect upon the secondary s by the primary p^1. Similarly, the signal impulses transmitted to line by manipulation of the key k, these impulses also alternating in polarity, are neutralized in their effect upon the secondary s by the adjustable primary p. Thus, both the continuously impressed impulses and the signal impulses are neutralized as to their effects upon the home receiving apparatus or instrument R. There being continuously present on the line or cable current impulses, such impulses assumed to be arriving from a distant station, they traverse the primary p^2 but may be of such strength or of such frequency as not to cause the instrument R to respond, but cause it to be in sensitive condition or on the verge of response, so that any signal impulses transmitted from the distant station on arrival traverse the primary p^2 and by induction in the secondary s positively and quickly actuate or control the instrument R. Since there are impulses continuously existing on the line or cable, it is the energy of these impulses which is consumed in charging the line or cable and the impressed signal impulses are then the more quickly transmitted to the distant station to affect or control the receiving apparatus.

In Fig. 2, a modified arrangement of means for continuously impressing impulses upon the line or cable is shown. Here, in place of the commutator 4, of Fig. 1, is employed the vibrating armature or tongue 7 which is continually operated by the electromagnet 8 whose winding is included in series with the tongue or armature 7, the contact 9, and the battery b^5. When the tongue is in engagement with the contact 10, the circuit including conductors 1 and 6 is closed. At this moment the circuit of the magnet 8 is broken and the spring again retracts the armature or tongue 7. This cycle of operation continues and as a result, impulses alternating in polarity are impressed upon the line or cable. The shunt circuit including the adjustable resistance r^4 is again provided and in the conductor 11 of such shunt circuit may be serially connected the primary p^1, as shown in Fig. 1, or other neutralizing means.

In Fig. 3, is a further arrangement for continuously impressing impulses upon the line or cable. Here, the commutator apparatus shown in Fig. 1 is employed, and in a circuit in shunt to the resistance r, sources b, b^1, is connected the primary p^3 of an induction coil or transformer whose secondary s^1 is connected between the line or cable C and earth E. Then, in shunt to this secondary s^1 is connected the adjustable resistance r^4, and in the shunt circuit conductor 11 may be included the primary p^1 of the transformer shown in Fig. 1, or other neutralizing means.

In Fig. 4, a magneto or other generator G is shown serially connected between the line or cable C and the earth E. And in shunt thereto is connected the resistance r^4, and in the shunt circuit conductor 11 may again be connected a neutralizing primary p^1, such as shown in Fig. 1, or other neutralizing means.

While I have shown several forms of means for continuously impressing current impulses upon the line or cable, I wish it to be understood that I am not limited to these features but that any suitable means for the purpose may be employed. And it is also to be understood that in place of the signal impulse transmitter comprisin sources b^2, b^3, key k, etc., of Fig. 1, any other form of signal impulse transmitter may be employed.

What I claim is:

1. The combination with a line or cable having great capacity, of means for continuously impressing thereon current impulses, receiving apparatus at the same station, means for neutralizing the effect of said

continuously impressed impulses upon said receiving apparatus, and means for impressing signal impulses upon said line or cable.

2. The combination with a line or cable having great capacity, of receiving apparatus, means for continuously impressing current impulses upon said line or cable, means for impressing signal impulses upon said line or cable, and means for neutralizing the effect upon said receiving apparatus of signal impulses transmitted from the same station.

3. The combination with a line or cable having great capacity, of receiving apparatus, means for continuously impressing current impulses upon said line or cable, means for impressing signal impulses upon said line or cable, and means for neutralizing the effects upon said receiving apparatus of both the continuously impressed impulses and the signal impulses.

4. The combination with a line or cable having great capacity, of means for continuously impressing thereon current impulses alternating in polarity, receiving apparatus at the same station, means for neutralizing the effect of said continuously impressed impulses of alternating polarity upon said receiving apparatus, and means for impressing signal impulses alternating in polarity upon said line or cable.

5. The combination with a line or cable having great capacity, of receiving apparatus, means for continuously impressing current impulses alternating in polarity upon said line or cable, means for impressing signal impulses alternating in polarity upon said line or cable, and means for neutralizing the effect upon said receiving apparatus of the signal impulses transmitted from the same station.

6. The combination with a line or cable having great capacity, of receiving apparatus, means for continuously impressing current impulses alternating in polarity upon said line or cable, means for impressing signal impulses alternating in polarity upon said line or cable, and means for neutralizing the effects upon said receiving apparatus of both the continuously impressed impulses and the signal impulses transmitted from the same station.

7. The combination with a line or cable having great capacity, of means for continuously impressing thereon current impulses, means for impressing signal impulses thereon, receiving apparatus at the same station, an inductive connection between said receiving apparatus and said line or cable, and a circuit in inductive relation with said receiving apparatus for neutralizing the effect thereon of the continuously impressed impulses.

8. The combination with a line or cable having great capacity, of means for continuously impressing thereon current impulses, means for impressing signal impulses thereon, receiving apparatus at the same station, an inductive connection between said receiving apparatus and said line or cable, and a circuit in inductive relation with said receiving apparatus for neutralizing the effect thereon of the signal impulses transmitted from the same station.

9. The combination with a line or cable having great capacity, of means for continuously impressing thereon current impulses, means for impressing signal impulses thereon, receiving apparatus at the same station, an inductive connection between said receiving apparatus and said line or cable, a circuit in inductive relation with said receiving apparatus for neutralizing the effect thereon of the continuously impressed impulses, and a circuit in inductive relation with said receiving apparatus for neutralizing the effect thereon of the signal impulses transmitted from the same station.

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

ISIDOR KITSEE.

Witnesses:
ELEANOR T. MCCALL,
A. E. STEINBOCK.