No. 894,214. PATENTED JULY 28, 1908.

I. KITSEE.

TELEGRAPHY.

APPLICATION FILED APR. 24, 1907.

Fig. 1.

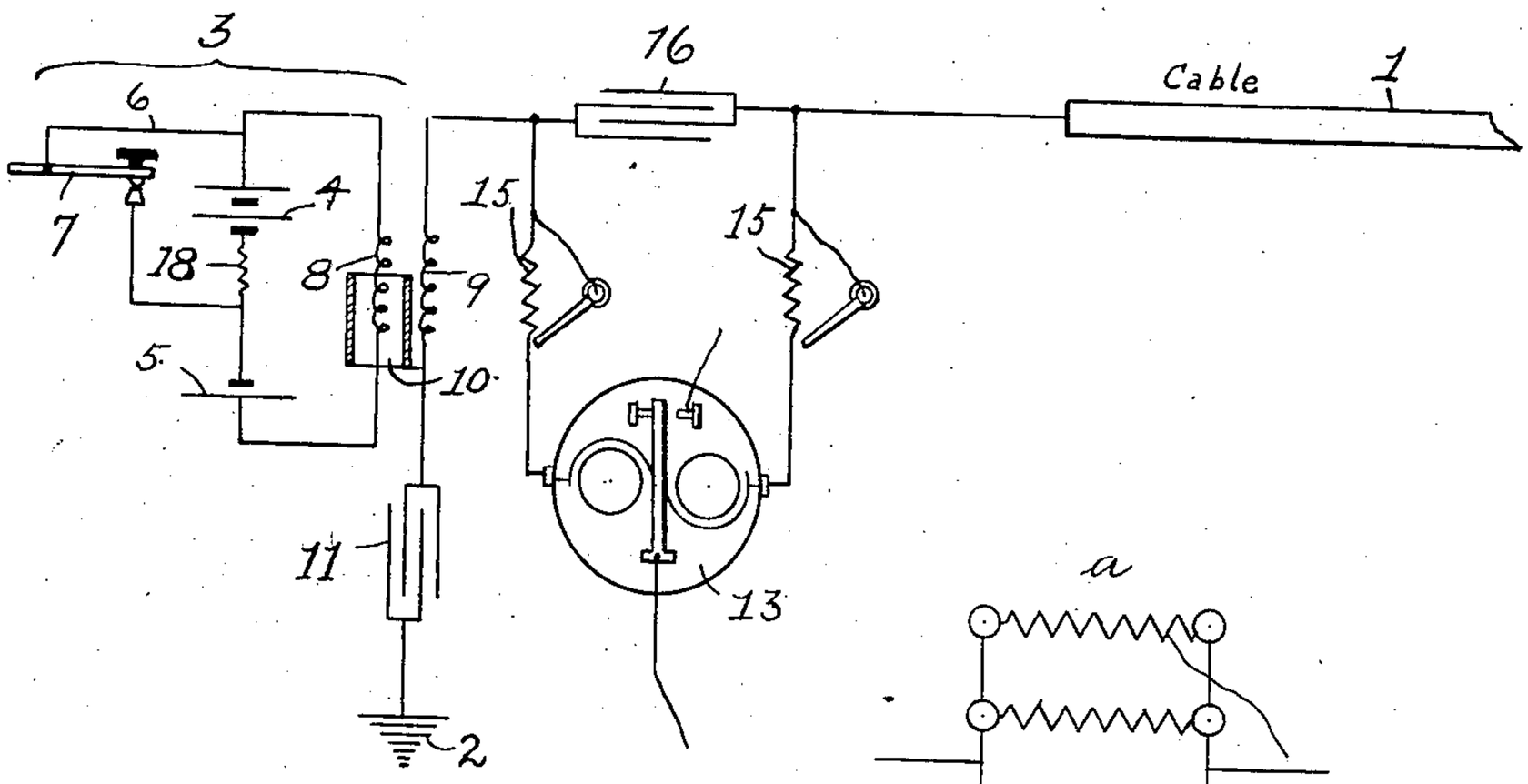
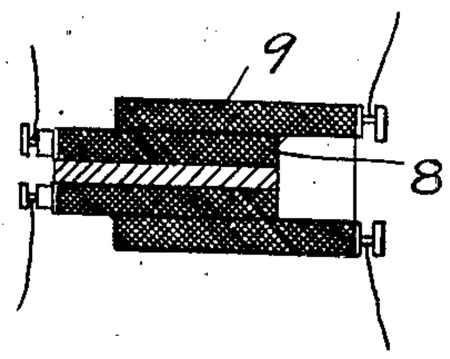


Fig. 2



a

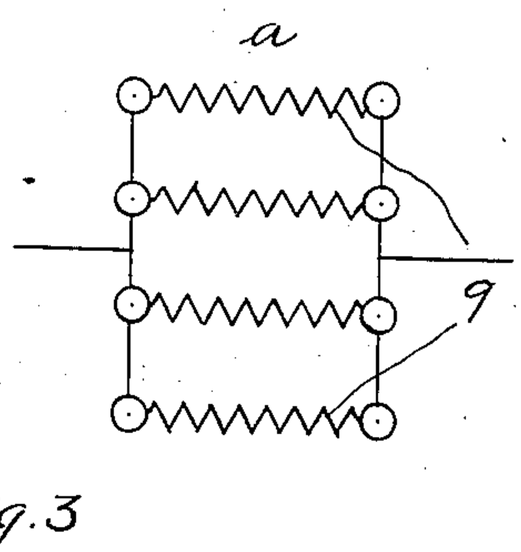
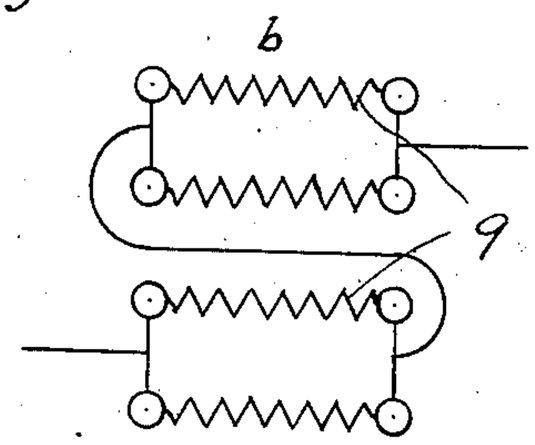
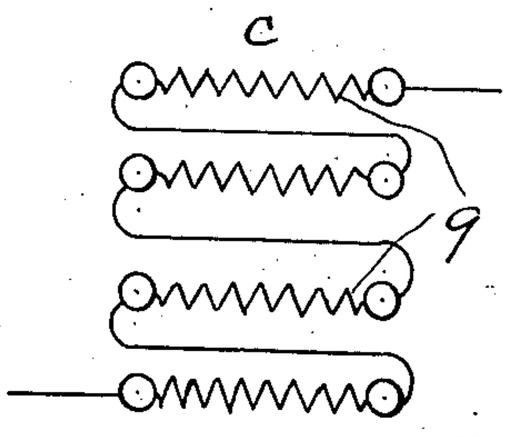


Fig. 3

b



c



WITNESSES:

Edith R. Stilley

Abrah Rittenhouse

INVENTOR.

Isidor Kitsee

UNITED STATES PATENT OFFICE.

ISIDOR KITSEE, OF PHILADELPHIA, PENNSYLVANIA.

TELEGRAPHY.

No. 894,214. Specification of Letters Patent. Patented July 28, 1908.

Application filed April 24, 1907. Serial No. 369,971.

To all whom it may concern:

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

My invention relates to an improvement in telegraphy.

The invention is applicable to telegraphy in general, but its advantage is more ascertainable in telegraphing over lines with great capacity, such for instance as submarine cables. I will describe this, my invention, as applied to such cables.

It is well known, that the moving of the zero is one of the greatest draw-backs in cable telegraphy. This moving of the zero can only be overcome through the impression on the line of true reversals, that is, of impulses always of the same intensity and duration, but alternately of opposite direction. To persons versed in the art, it is also well known that the cable is subject to what is called the "surging of earth currents." I have found through experiments, that if the impulse impressed upon the line is sharply defined and of very short duration, the far-off receiver is not as much subject to the surging of current, provided the arrangements are such, that the receiver is not directly connected to the line and is arranged so as to answer only to great changes of polarity.

At the first glance, it would seem that a converting arrangement, whereby through the making and breaking of the current in the primary, an impulse is induced in the secondary,—would answer the purpose. But such is not the case. First of all, the impulse generated in the secondary due to the ceasing of the current in the primary is of far greater potential than the impulse due to the commencing of the flow of the current and, as stated above, both impulses should be of the same potential if the moving of the zero should be obviated; besides persons in charge of lines, such as submarine cables, are adverse to impress upon the line impulses of such high voltage, as the impulse generated in the secondary through the ceasing of the current. To overcome this objection, I have recourse to an arrangement, which is illustrated in the drawing and will hereinafter be described. With this arrangement, true reversals are always impressed upon the line. To obviate the bad effect of the surging of the currents in the cable independent of the currents transmitted from the sending station, I have recourse to an arranegment, which is also illustrated in the drawing and will also hereinafter be duly described.

In the drawing, Figure 1 is a diagrammatic view of part of a cable provided with a transmitting and receiving station. In this figure, only one transmitting and receiving station is illustrated and the cable broken off at a distance from this station; it being obvious that the transmitting and receiving station at the far-off end is a duplicate of the transmitting and receiving station illustrated. Fig. 2 is a sectional view of an inductorium illustrating one method of adjusting the primary as to the secondary. Fig. 3 is a diagrammatic view of the coil of the secondary showing how the different layers of the coil may be connected in multiple or series.

In Fig. 1, 1 is the line of transmission, here shown as a broken off cable. The cable is here shown as to be connected to the ground 2 with the interposition of the condenser 16 and the condenser 11 and the secondary 9 of an inductorium.

3 are the transmitting means. These transmitting means consist of the primary 8 of an inductorium, here shown as to be connected to the two sources of current 4 and 5. The source of current 4 is here illustrated as to consist of two batteries and the source of current 5 is here illustrated as to consist of one battery, both batteries in opposition as to each other. Around the battery 4 is the shunt 6 provided with means to open and close the same. These means are illustrated here as to consist of the key 7. The secondary 9 of the inductorium is connected, as stated before, in series with the line 1. The receiving device 13 here illustrated as a polarized relay is not connected directly to the line, but is connected in shunt to the condenser 16 and this shunt is here provided with the variable resistances 15.

The siphon recorder is to-day employed in cable telegraphy and may be substituted for the electro-magnetic device, as illustrated. I have found that it is of the greatest convenience and often a necessity to enable the operator to adjust the relation of the primary as to the secondary at will.

In Fig. 1, I have illustrated the means to adjust the inductive power by the conducting tube 10. It is well known that if a me-

tallic tube is inserted between the primary and secondary, the influence of the primary on the secondary can be regulated at will by the simple moving in and out of the shielding tube. In Fig. 2, I have illustrated this adjusting means as to consist of a movable primary. With this arrangement, the operator may increase or decrease the inducing influence of the primary on the secondary by simply moving the primary farther into the secondary or moving the same partially out of said secondary.

In Fig. 3, I have illustrated the mode of increasing or decreasing the potential of the secondary by simply changing the connection of the different layers of this coil and in this figure, I have illustrated the coil as to be subject only to three different connections, but it is obvious that there may be more than three connections, as there may be more than four layers. In this figure, the connection designated by *a* shows the layers of the coil as to be in multiple. The connection designated by *b* shows the coil as to be connected in multi-series; and the connection designated by *c* shows the layers of the coil as to be connected in series with each other.

The operation of the transmitting device is as follows:—Supposing that the transmitting means is a manual key. In such case, the primary is normally connected with the two sources 4 and 5. The operator first adjusts the relation of the primary, so that the impulse transmitted should be sufficient to actuate the far-off receiver, but should not be in excess thereof. He then operates the key in the same manner as the key is operated to-day on land or Morse telegraphy; that is, he closes the key for a short period to denote a dot and for a longer period to denote a dash. Through the closing of the key, an impulse will flow through the primary in one direction and through the opening of the key, an impulse will flow through the primary in an opposite direction, each of these impulses inducing an opposite impulse in the secondary 9, and as through the closing of the key, a current of the same voltage will flow through the primary as when the key is open, it is obvious that the impulse generated at 9, through the opening or closing of the key, will always be of the same intensity.

It must be stated here that instead of a manual key, any of the well known automatic means either with the aid of a tape or otherwise, may be substituted; but it is best to have one or the other of the sources of energy always included in the primary circuit and I prefer such arrangement to an arrangement whereby normally the primary is not connected with any of the sources and is connected alternately to one or the other of the sources.

As to the receiving arrangement, it has to be stated that with such an arrangement whereby alternately impulses of opposite direction are transmitted, the receiving means have to consist of a polarized device. The siphon recorder of to-day may answer the purpose, so also may any of the polarized relays, provided the same is sensitive enough to be actuated by the weak impulses arrived at the receiving station.

In telegraphing, it was found that the sharply defined impulses impressed upon the line by the transmitting operator are capable of charging the condenser 16 sufficiently, so that the same may actuate the receiving device 13, even through a resistance, which at some of my experiments had a value of over one thousand ohms at each side of the shunt; but the waves due to the surging of currents foreign to the transmitting current, are of such nature that, when they pass the condenser 16, they do not change its potential sufficient, so that the same may actuate the receiving device. I have provided the resistances of the shunt with means to adjust the same, as in some cases a very high resistance should be placed in this shunt, and in some cases, it is best to have this shunt provided only with a resistance of low value.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. In telegraphy, means to transmit induced true reversals, said means embracing an inductorium, two sources of current for the primary of said inductorium, and means to cause one or the other of said currents to flow through said primary, during the time of transmission as well as time of rest, the secondary of said inductorium inserted in the line of transmission.

2. In combination with a telegraphic line, means to transmit induced true reversals, said means embracing two sources of current for the primary and a transmitting key therefor, and means to cause the current of one or the other of the sources to flow through said primary, in accordance with the opening or closing of said transmitting key, the secondary inserted in the telegraphic line.

3. Means to transmit telegraphically induced true reversals, said means embracing an inductorium, two sources of current oppositely connected and normally in circuit with the primary coil, and means to shunt one of said sources in accordance with the character to be transmitted.

4. A cable, a coil inserted in said cable, a second coil in inductive relation to the first named coil, said second coil connected to two sources of current, one source greater than the other and both sources in opposition as to each other, in combination with means to shunt one of said sources in accordance with the polarity of the impulse to be transmitted.

5. In telegraphy, means to transmit induced true reversals and means to receive the

same, said second means comprising a condenser inserted in the line of transmission, a shunt therefor, and a polarized receiver in said shunt.

6. In telegraphy, the combination with the line of means to transmit induced true reversals and receiving means, said receiving means comprising a condenser inserted in the line, a shunt for said condenser, a resistance in said shunt, and a polarized receiver closing said shunt.

7. In telegraphy, the combination with the line of means to impress upon said line induced impulses always of the same intensity and duration, but alternately of opposite polarity, and to receive the same with the aid of a receiver provided with means to nullify the effect of the surging waves in said line.

In testimony whereof I affix my signature in presence of two witnesses.

ISIDOR KITSEE.

Witnesses:

ALVAH RITTENHOUSE,

MARY C. SMITH.