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I. KITSEE.

TRANSMITTING KEY FOR TELEGRAPHIC CIRCUITS.

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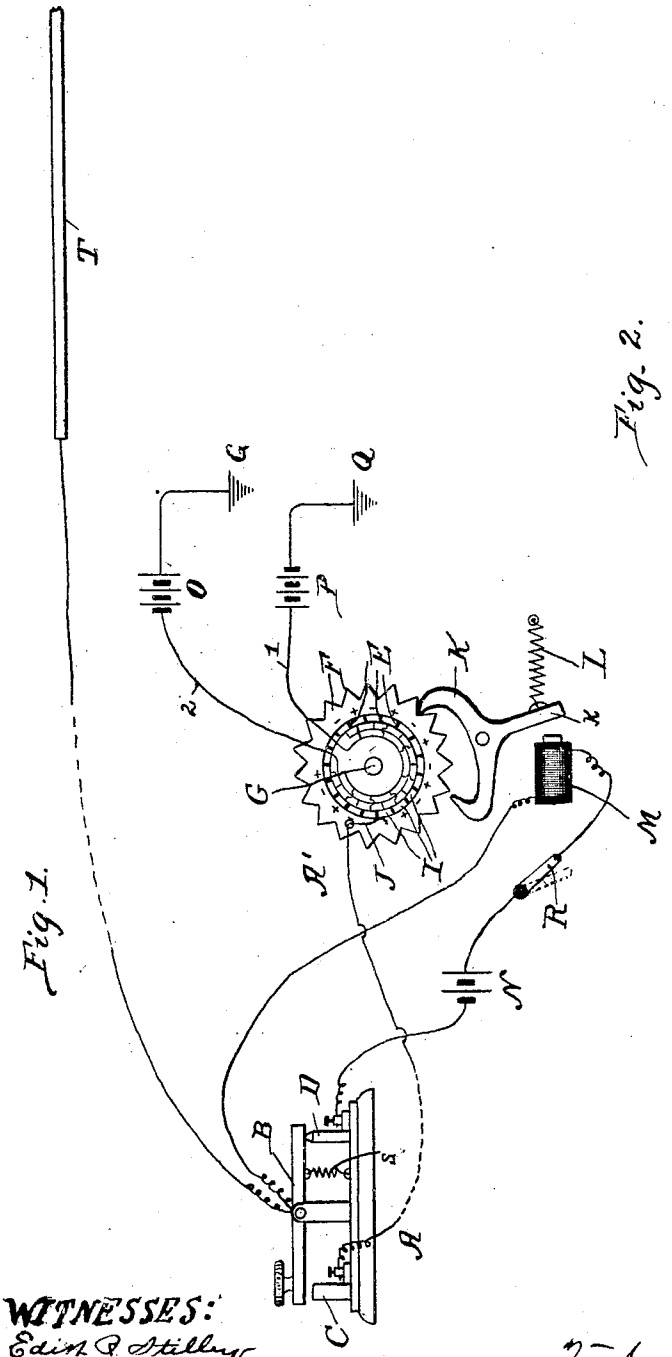


Fig. 1.

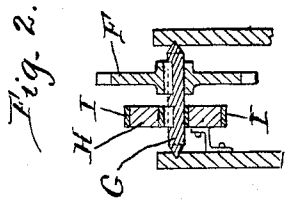


Fig. 2.

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TRANSMITTING-KEY FOR TELEGRAPHIC CIRCUITS.

No. 824,029. Specification of Letters Patent. Patented June 19, 1906.

Application filed March 25, 1904. Serial No. 200,053.

To all whom it may concern:

Be it known that I, ISIDOR KITSEE, of the city and county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Transmitting-Keys for Telegraphic Circuits, of which the following is a specification.

My invention relates to an improvement in transmitting instruments for telegraphic circuits, and has more special reference to transmitting-keys for circuits requiring for an improved transmission the sending of positive as well as negative impulses—such, for instance, as underground or submarine cables.

In submarine cables telegraphing is to-day accomplished with the aid of the double key, whereby an impulse of one polarity is sent over the line by depressing one lever and an impulse of opposite polarity is sent over the line by the depression of the second lever. A dot is formed by the transmission of an impulse of one polarity and a dash is formed by an impulse of opposite polarity. Therefore dots and dashes are distinguished from each other not by the length or unit of time, but by the polarity of the impulse.

To persons versed in the art, it is well known that were it possible to telegraph with true reversals—that is, in a manner so that an impulse of one polarity always follows an impulse of opposite polarity—the speed of transmission could be greatly increased; but with the method as practiced to-day such true reversals cannot be produced for the reason that in the telegraphic alphabet the majority of letters are composed of two or more dots or two or more dashes in succession, which means two or more impulses of one polarity or two or more impulses of the opposite polarity.

In this invention I make use of one single key to accomplish the true reversal automatically, leaving it to the operator to determine only the time unit between two depressions.

I have clearly stated that the difference between a dot and dash does not lie in the difference of polarity of the impulses transmitted, but that a dot is designated by one impulse and a dash is designated by two impulses in quick succession. Now with the arrangement as will later on be more fully described every depression of the key presents to the circuit a battery of opposite polarity, and when, therefore, a dash is to be transmitted and the key is therefore depressed twice in quick succession it follows that at the receiving-station two impulses in quick succession will be received; but each impulse will be of an opposite polarity.

Referring now to the drawings, Figure 1 is a diagrammatic view of my transmitting-key attached to a transmitting-line. Fig. 2 is a cross-section through a step-by-step movement.

In the figures, A is the transmitting-key as an entirety, of which B is the lever and C the contacting point for said lever, D the contacting point for a local circuit containing the source of current N and the electromagnet M. A′ is the reversing device as an entirety, consisting of the step-by-step movement F, pivoted at G and provided with the escapement K, the arm *k* of this escapement serving as the armature of the electromagnet M. This arm is held away from said magnet by the spring L. Secured to the same shaft G is the contacting wheel H, provided with the contacts I. These contacts are separated from each other by the non-conducting strips E. The contacts I are alternately connected through wires 1 and 2 to the batteries P and O, respectively. These batteries are grounded at Q. The *modus operandi* of practicing this part of my invention is as follows: When the key is at rest—that is, when the spring *s* presses the rear end of the lever B against the contact D, (the switch R being closed,)—the electromagnet M becomes energized and draws the arm *k* of the escapement K toward its core. This movenent of the escapement results therein that the step-by-step wheel F is moved one tooth, thereby bringing one of the contact-points I in contact with the brush J. If now the lever B is depressed, the impulse transmitted by this depression will be of a polarity equal to the polarity of the battery connected to that contact portion which is in electrical contact with the brush J; but at the same time the circuit including the electromagnet M will be broken and the arm *k* of the escapement K will be, with the aid of the spring L, drawn from the electromagnet M and in a position as is illustrated in Fig. 1. When now the operator releases the lever B, the spring *s* of the same will again draw the rear end of the lever in contact with the point D, closing again

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the circuit including the electromagnet, thereby reënergizing the same, with the result that the arm *k* will be again drawn toward its core and the step-by-step device will be moved one tooth farther, thereby bringing in contact with the brush J the next following contact portion of the contact-plate, which portion is connected to a battery of a polarity opposite to the polarity of the battery connected to that contact portion which was formerly in contact with said brush. Should the operator again depress the key, then the contact C, which was formerly connected through the brush J with the battery of one polarity, will now be connected through this contact and the brush with the battery of opposite polarity, thereby sending an impulse over the line T of a polarity opposite to the impulse preceding, and as the step-by-step movement, with its magnetic device, is so arranged that every closing of the key will allow the escapement to move in one direction and every opening of the key compel the escapement to move in the opposite direction, thereby moving the step-by-step device one tooth, and as the moving of one tooth always brings in contact the lower portion of the key with the battery of a polarity opposite to the polarity of the battery of the preceding contact it follows that the successive operation of the key will cause for each closing an impulse of opposite polarity to flow over the line.

I have in the drawings illustrated a simple step-by-step movement to be operated by an electromagnetic device included in a circuit closed when the key is opened and opened when the key is closed. This necessitates a battery which does not quickly polarize—such, for instance, as a "gravity-cell" or any other type of same; but it is obvious that the arrangement may differ to suit requirements without departing from the scope of my invention, which, broadly speaking, consists therein that through the successive closing and opening of one key the line of transmission is connected to different poles of generators of electricity. It is unnecessary for me to state that this key may be used for any line of transmission; but its greater advantage is evident in the transmission of impulses where true reversals are desired—that is, in the transmission over such cables or lines where each signal transmitted should be of a polarity opposite to the polarity of the signal preceding and where the difference between the two characters—dots and dashes—is only designated by the quickness with which one signal follows the other. The characters of the word "Good" according to the Morse alphabet would be as follows: "Good," ——. . . . —.., and in telegraphing this word, according to the Morse with the double key and method of to-day the following impulses have to be transmitted in the following order: two positives denoting two dashes and one negative denoting a dot for the letter "G," two negatives for two dots denoting the first letter "O," two negatives for two dots denoting the second letter "O," and one positive denoting the dash and two negatives denoting the dots for the letter "D." It will be seen, therefore, that according to the method of to-day five impulses of the same polarity have to be transmitted in succession. This would either choke the cable if the regular time unit between the first and second impulses would be observed, or to prevent this choking a comparatively long time will have to lapse between the transmission of the different negative impulses, so as to give the cable time to discharge, or, as it is called, "clear."

With the improved key, substantially as described and illustrated, and with the improved method, as substantially referred to, the signals or individual impulses to be transmitted for the word "Good" will consist of the following, (taking it for granted that the operator starts when the positive pole of the battery is connected to the key:) One positive, followed in quick succession by one negative, to denote the first dash, one positive, followed in quick succession by one negative, to denote the second dash, and one positive to denote the dot to make the letter "G," one negative to denote the first dot and one positive to denote the second dot of the first letter "O," one negative to denote the first dot and one positive to denote the second dot of the second letter "O," one negative and one positive in quick succession to denote the dash, one negative to denote the first dot, and one positive to denote the second dot, of the letter "D." Thus it is clearly seen that every positive impulse is followed by a negative impulse, or vice versa, no matter if a dot or a dash has to be transmitted, the only difference between a dot and dash being that a dot consists of one impulse, no matter of what polarity as long as this polarity is opposite to the preceding impulse, and that a dash consists of two impulses in quick succession, opposite in polarity from each other, no matter of what polarity the first impulse is, so long as the polarity of this first impulse is opposite to the polarity of the impulse preceding. Again the key and the method for which it is designed does not contemplate the employment of impulses rising or falling in value; but, on the contrary, to make a true reversal, it is necessary that all the impulses should be practically the same in value, for the reason that as soon as one impulse attains a higher value or is of longer duration the chain of true reversals would be broken and the cable would assume a state which it is desired to avoid through my improved method of telegraphing with exactly true reversals, wherein one impulse should practically be of an electromotive force and duration alike to the

electromotive force and duration of every other impulse.

No doubt instead of two separate batteries one battery may be used; but I have found that the employment of two separate batteries simplifies the construction of the instrument and is in the end more economical and presents greater practicability than if one battery alone is used.

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

In combination with a telegraphic transmitting-key a step-by-step movement adapted to change the polarity of the transmitting-key, said step-by-step movement actuated by electromagnetic means, the circuit of said electromagnetic means containing also a source of current and connected with one terminal to the movable lever of said key, and with the other terminal to the back stop of said key, the step-by-step movement adapted to be actuated when said key is in its open position and adapted to be made stationary when the key is in its closed position.

In testimony whereof I hereby sign my name, in the presence of two subscribing witnesses, this 23d day of March, A. D. 1904.

ISIDOR KITSEE.

Witnesses:

EDITH R. STILLEY,

H. C. YETTER.