I. KITSEE.

TELEGRAPHIC TRANSMITTER.

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1,050,664. Patented Jan. 14, 1913.

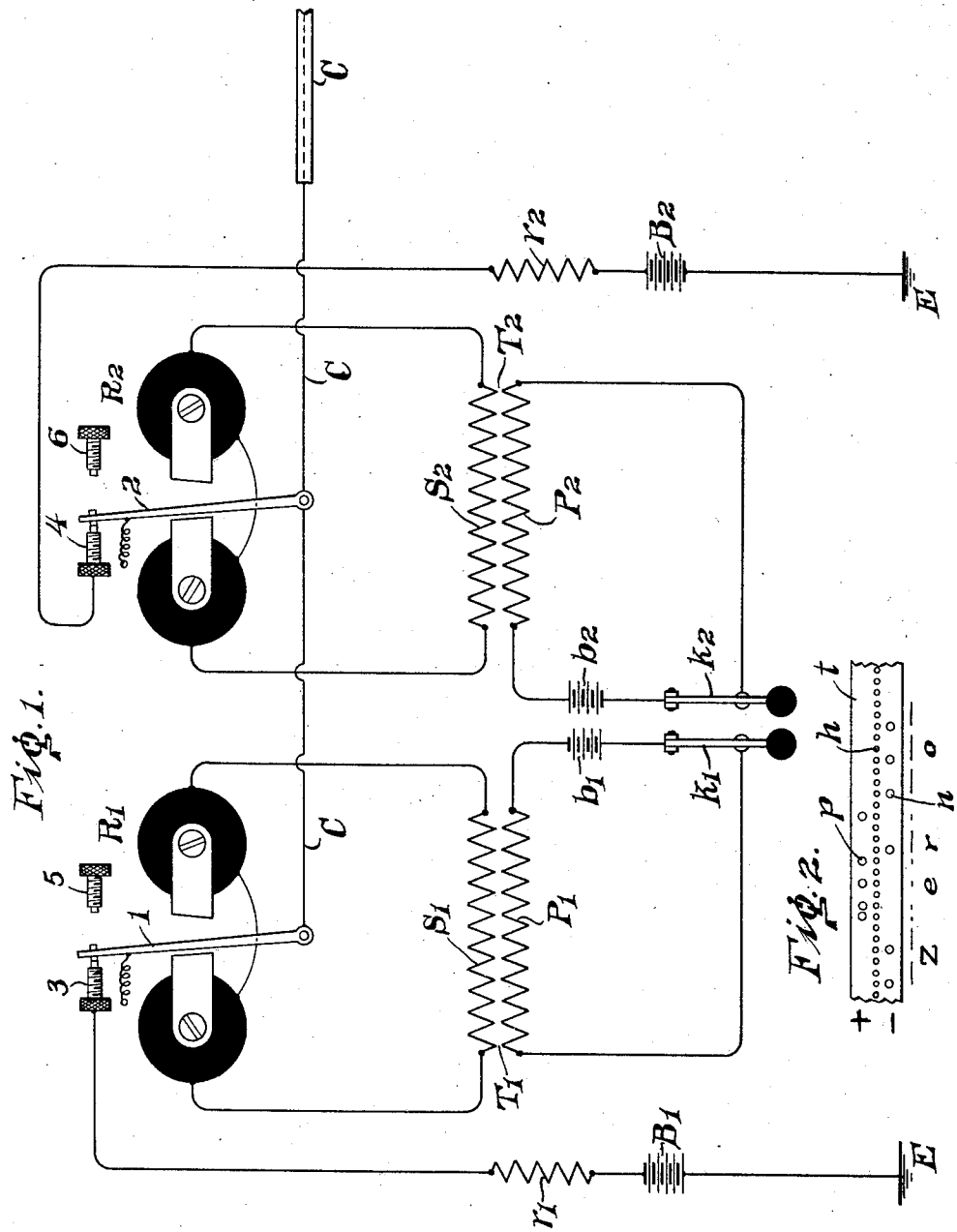

Fig. 1.

Fig. 2.

WITNESSES

Daniel Webster Jr.

A. E. Steinbock

INVENTOR

Isidor Kitsee

BY Cornelius D. Ehret

his ATTORNEY

COLUMBIA PLANOGRAPH CO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

ISIDOR KITSEE, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR OF ONE-HALF TO WILLIAM J. LATTA, OF PHILADELPHIA, PENNSYLVANIA.

TELEGRAPHIC TRANSMITTER.

1,050,664. Specification of Letters Patent. **Patented Jan. 14, 1913.**

Application filed March 31, 1909, Serial No. 487,073. Renewed June 6, 1912. Serial No. 702,110.

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 Telegraphic Transmitters, of which the following is a specification.

My invention relates to apparatus for transmitting current, representing signals or messages, over a conductor and more particularly over a long conductor, such as a long telegraph line, submarine or other cable, particularly when having great capacity.

By my invention, I am enabled to transmit over a line or cable signal current impulses of both polarities, the duration of the line or cable impulses being independent of the time the telegraph key or other controlling or transmitting instrument is held depressed or otherwise operated.

I employ two polarized relays connected in the secondary circuits of transformers, a key, tape or other signaling instrument controlling the independent primary circuits. The relatively movable contacts of one relay are associated with a source of energy, such as a battery, adapted to send to line or cable a current impulse of one polarity, while a similar source is associated with the movable contacts of the other relay to transmit to line or cable an impulse of opposite polarity.

In cable telegraphy as commonly practised two keys are employed, one for transmitting the dots and the other for transmitting the dashes which represent letters or characters. By my arrangement, I employ two keys one for controlling one of the polarized relays, and the other for controlling the other polarized relay, and one key adapted to control the impression upon the line or cable of an impulse of one polarity to represent a dot, while the other key controls the impression on the line or cable of an impulse of opposite polarity to represent a dash.

My invention resides in the features hereinafter described and claimed.

For an illustration of a form my invention may take, reference is to be had to the accompanying drawing, in which:

Figure 1 is a diagrammatic view illustrating my transmitting apparatus. Fig. 2 represents a fragment of a tape to be used in a tape transmitter to take the place of the keys of Fig. 1.

In Fig. 1, C represents the line or cable which extends to the distant station where suitable receiving apparatus is employed. The line or cable C is connected to the tongues 1 and 2 of the polarized relays R^1 and R^2, respectively. The tongue 1 is biased by a spring to normally engage the contact 3 between which and earth E are connected a resistance r^1 and a battery or other source of energy B^1. And, similarly, the tongue 2 is biased to normally engage the contact 4 between which and the earth E are connected the resistance r^2 and the battery or other source B^2. The line or cable C then is normally conductively connected to earth through the sources B^1 and B^2 which, however, are connected oppositely to each other with respect to their associted contacts 3 and 4, respectively. The winding of the polarized relay R^1 is connected in circuit with the secondary S^1 of the induction coil, converter, or transformer T^1, whose primary P^1 is connected in circuit with the battery or source b^1 and the operator's key k^1. Similarly, the winding of the polarized relay R^2 is connected in circuit with the secondary S^2 of the induction coil, transformer, or converter T^2, whose primary P^2 is connected in circuit with the battery or source b^2 and the operator's key k^2. The transformers or converters T^1, T^2 may be of any suitable type and may be either step-up or step-down transformers or converters, and may be of either the open or closed magnetic circuit types.

The operation is as follows: When the operator desires to transmit to line or cable C a current representing, for example, a dot, he depresses, for example, the key k^1, with resultant flow of current from the source b^1, through the primary P^1. This induces a momentary current in the secondary S^1 which momentarily energizes the relay R^1, which causes its tongue 1 to be moved toward the right and thus separate from the contact 3. The movement toward the right may be limited by the adjustable stop 5. During the time of travel of the tongue 1, the contact 3 and, therefore, the source B^1, is isolated from the line or cable C, but the source B^2 remains in communica-

tion with the line or cable C and, therefore, sends current over such line or cable. As soon, however, as the tongue 1 has returned to engagement with contact 3, the passage of current to the line or cable ceases. In other words, an impulse of one polarity, from source B^2, is transmitted to the line or cable upon the depression of the operator's key k^1. The duration of this current impulse is short, but may be lengthened or shortened by adjusting the amount of travel of the tongue 1, that is to say, by adjusting the time during which the tongue 1 is out of engagement with the contact 3. Similarly, if the operator desires to transmit to the line or cable current representing a dash, he depresses his key k^2, whereupon the tongue 2 of the polarized relay R^2 moves away from its contact 4, thus isolating the source B^2 but allowing the source B^1 to send current to the line or cable. Immediately the tongue 2 returns to contact 4, however, the flow of current from source B^1 ceases. The duration of the line or cable impulse is here also determined by the time of travel of the tongue 2, which may be determined by adjusting the contact 4 and the stop 6. When the keys k^1 and k^2 open the circuits of the primaries P^1 and P^2 respectively, there is again an induced impulse in the secondaries S^1 and S^2 respectively. But these impulses are in a direction opposite to the impulses occurring when the keys are closed, and the relays R^1 and R^2 being polarized, their tongues 1 and 2 do not separate from the contacts 3 and 4, but tend to move to the left, due to the opposite direction of current, and, therefore, remain in engagement with their respective contacts 3 and 4. When the tongues 1 and 2 are simultaneously in engagement with their respective contacts 3 and 4, there is a current flowing in a circuit including the sources B^1 and B^2 and their associated resistances r^1 and r^2, in series, the sources B^1 and B^2 being not opposed to each other in such circuit but assisting each other. Then, when either tongue 1 or 2 leaves its associated contact 3 or 4, this current ceases and one or the other of the sources transmits current to the line or cable as described.

In Fig. 2, t represents a perforated tape of an automatic or tape transmitter, the central row of holes or perforations h being simply feed holes for the engagement of a spur wheel for moving or feeding the tape. Two other rows of perforations are employed, the upper one, p, controlling the transmission to line or cable of, for example, positive impulses, while the lower row n, controls the transmission to the line or cable, of negative impulses. The row p is used in place of one of the operator's keys shown in Fig. 1, while the row n is used in place of the other key. These perforations p and n are all of the same size irrespective of whether dots or dashes are transmitted to the line or cable. Thus, every time a perforation n allows circuit to be made through the tape t a negative impulse is transmitted to line, and every time a perforation p allows a contact through the tape t a positive impulse is transmitted to line. Assuming the positive impulses represent dots and the negative impulses represent dashes, Fig. 2 illustrates how the tape is perforated for transmitting the word "zero." The letter "z" is represented by two dashes followed by two dots. This means that there must be two perforations n followed by two perforations p. And these perforations are spaced longitudinally of the tape as shown.

By a transmitter such as hereinbefore described, high speed signaling over a line or cable having great capacity is possible, the line or cable current being in the form of positive and negative impulses and independent of the time the operator may hold his keys depressed.

The transmitter hereinbefore described is suitable for use in a cable or other system in which the receiving apparatus shown in my application Serial No. 487074, or in my application Serial No. 487075, is used, or in which any other suitable receiving apparatus is used.

Where the term "key" is hereinafter used in the claims, I wish to be included in such term not only the usual key but also a tape instrument or any other signaling instrument.

What I claim is:

1. The combination with a line or cable, of sources of energy, polarized relays for isolating one source of energy and allowing the other source to transmit current to said line or cable, a transformer for each relay, each transformer secondary connected to a relay, a source of energy and a key connected in the primary of each transformer.

2. The combination with a line or cable, of opposed sources of energy, polarized relays for isolating one source of energy and allowing the other source to transmit current to said line or cable, a transformer for each relay, each transformer secondary connected to a relay, a source of energy and a key connected in the primary of each transformer.

3. The combination with a line or cable, of opposed sources of energy conductively connected to said line or cable, polarized relays for isolating one source of energy and allowing communication from another source with said line or cable, a transformer for each relay, each transformer secondary connected to a relay, a source of energy and a key connected in the primary of each transformer.

4. The combination with a line or cable, of sources of energy, polarized relays for isolating one source of energy and allowing the other source to transmit current to said line or cable, said sources of energy being normally in communication with each other and opposed to each other, a transformer for each relay, each transformer secondary connected to a relay, a source of energy and a key connected in the primary of each transformer.

5. The combination with a line or cable, of sources of energy, a polarized relay for isolating each source of energy and allowing communication from another source with said line or cable, a conductive connection from said sources of energy to said cable, a transformer for each relay, each transformer secondary connected to a relay, a source of energy and a key connected in the primary of each transformer.

6. The combination with a line or cable, of sources of energy normally connected in series with each other and in conductive communication with said line or cable, a relay associated with each of said sources, and a key associated with each relay for momentarily operating the same, said relay when operated isolating its associated source of energy and allowing communication from another source to said line or cable.

7. The combination with a line or cable, of two polarized relays, a contact of each relay in permanent conductive relation with said line or cable, a source of energy associated with another contact of each of said relays, said sources of energy being oppositely connected, and a key for each relay controlling momentary energization thereof.

8. The combination with a line or cable, of two polarized relays each having one of its contacts permanently connected with said line or cable, another contact in each of said relays connected with a source of energy, said sources being oppositely connected, the winding of each relay connected in the secondary circuit of a transformer, and a key controlling the transformer primary.

In testimony whereof I have hereunto affixed 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."