

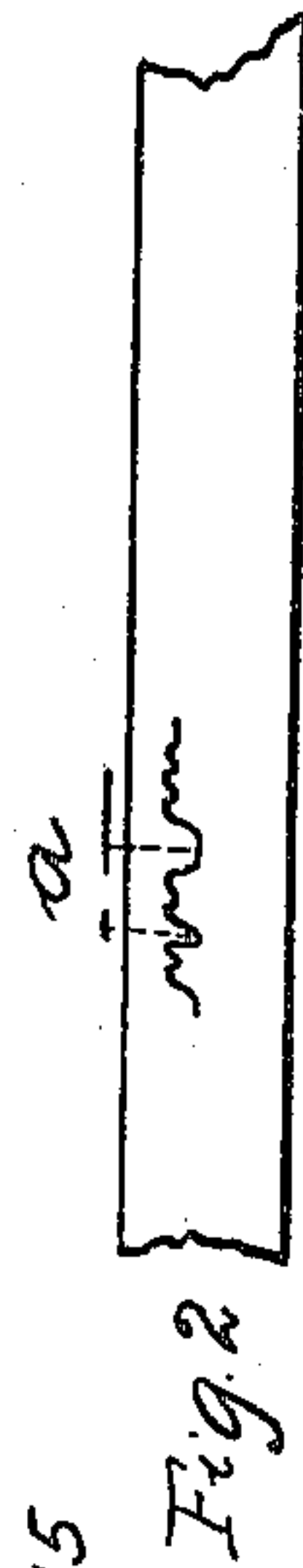
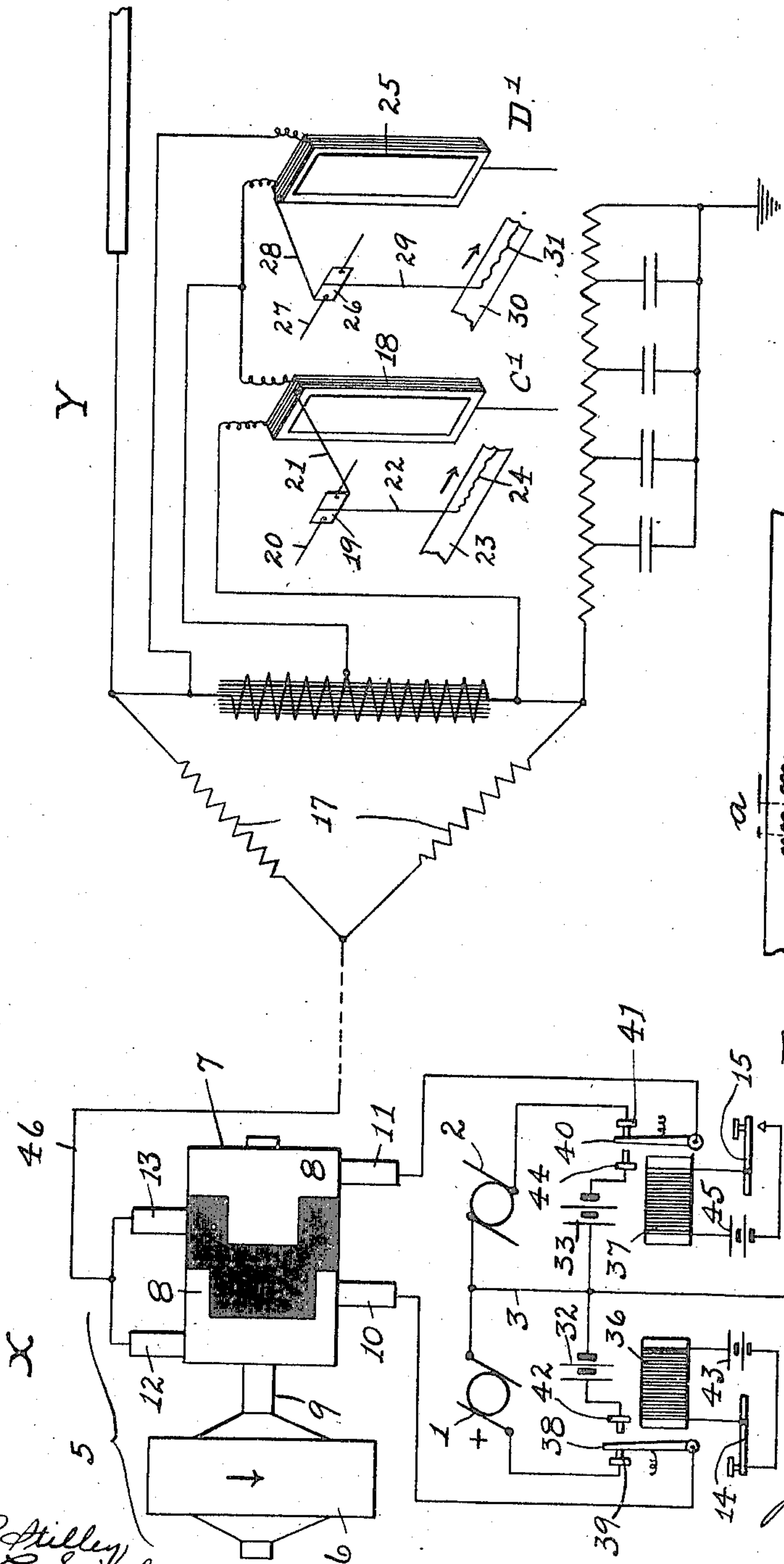
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TELEGRAPHY.

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1,221,870.

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Fig. 1.



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To all whom it may concern:

Be it known that I, ISIDOR KITSEE, a 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.

This invention is applicable to different systems of telegraphic communication, from simplex up to quadruplex as today practised on land lines as well as on lines with great capacity.

I will describe here my invention as applied to a system of quadruplex telegraphy on a cable with large capacity.

The underlying principle of my invention is that each and every receiving device inserted in the line or bridge is caused to translate a message only during the time of its inactiveness or passivity.

It is well known that on lines with great capacity, such as submarine cables, very delicate instruments have to be employed as receivers and today the so-called siphon recorder (the ingenious invention of Lord Kelvin) is generally employed to record on a moving strip of paper the variations of the current impulses arrived.

Broadly speaking, this device consists of a coil delicately suspended in the region of a strong magnetic field. To this coil is connected the cradle (a small metallic square) with the aid of two fibers in a manner so that if the coil deflects to the right, the cradle is deflected in one direction and if the coil deflects to the left, the cradle is deflected in the opposite direction. To this cradle is secured a very fine siphon dipping with one end in an ink well and resting with the other end on a moving paper.

In the system of cable telegraphy of today, a positive pulse denotes a dot and a negative pulse denotes a dash and through the arrival of a positive pulse, the coil and, therefore, the siphon deflects—say to the right—producing one curve on the right side of an imaginary zero line and through the arrival of a negative pulse, the coil and, therefore, the siphon deflects—say to the left—thereby producing one curve on the left side of an imaginary zero line.

In the system as outlined in Figure 1, it is my desire to use as much as possible the instrumentalities used today in cable telegraphy and I, therefore, employ the siphon recorder of today as a receiving device in this my invention. But as the siphon recorder, as constituted, would answer to the positive as well as to the negative pulses and as, in my system, one siphon recorder should only answer to the positive and the second recorder only to the negative pulse, slight alterations in these recorders are necessary and I accomplish my purpose of making immune the recorder to one polarity by simply cutting one of the fibers connecting the cradle to the moving coil.

I am aware that the same purpose may be accomplished by placing stops to the coil in a manner so as to allow the same to deflect only in one direction, but I have found, in actual tests, that such stops do not answer the purpose well, as invariably a rebound of the delicately suspended coil follows, greatly interfering with the clearness of the signals.

To illustrate one form my invention may take, I have reference to the accompanying drawing in which Fig. 1 is a diagrammatic view of one-half of a quadruplex system including one transmitting station and one receiving station, both situated at one terminal of the line, it being understood that the far-off transmitting and receiving stations are duplicates thereof, and Figs. 2 and 3 are plan views of the respective tapes of the recorders inserted in the line.

In Fig. 1, X is the transmitting station and Y the receiving station. The transmitting station comprises two sources of current, here shown as the two generators 1 and 2, coupled together in series and connected at their junction through the wire 3 with the ground 4. 5 is a commutating device as an entirety. Of this commutating device, 6 is the means to revolve the same, here shown as an electric motor; 7 is the revolving drum provided with the conducting parts 8. This drum is connected with the motor through the shaft 9. The positive pole of the generator 1 is connected to the brush 10 with the interposition of the armature 38 and the back stop 39 of electromagnet 36, and the negative pole of the generator 2 is connected to the brush 11 with the interposition of the armature 40 and the back stop 41 of electro-

magnet 37. 12 and 13 are two collecting brushes. The conducting parts 8 on the drum 7 are arranged in a manner, so that if the contacting brushes 10 and 12 are in electrical contact with each other through a conducting part on the drum, then the two brushes 11 and 13 are insulated from each other, because at that time, one or the other of these two brushes is in contact only with the insulating part of the drum, or vice versa. Therefore, if the drum revolves,—say in the direction of the arrow,—then the positive pole of the generator 1 connects only with the brush 12 when the connection of the brush 13 with the negative pole of generator 2 is broken, and the negative pole of generator 2 connects only with the brush 13 when the contact between the positive pole of generator 1 and brush 12 is broken. We, therefore, have a connection alternating between the positive pole of generator 1 and the negative pole of generator 2 and if these brushes are connected to the line, then pulses will flow over the line of alternate polarity.

In the drawing, the brushes 12 and 13 are connected in multiple to the wire 46 and this wire is connected to the cable, here shown with the interposition of the bridge 17.

14 and 15 are two transmitting keys. The key 14 is here supposed to be manipulated by the operator of station A and the key 15 is here supposed to be manipulated by the operator of station B. The key 14 is here connected with the interposition of the source 43 to the coil of electromagnet 36 and the key 15 is here connected with the interposition of the source 45 to the coil of electromagnet 37. 32 is a source of current of comparatively small electromotive force connected to the forward stop 42 of electromagnet 36, and 33 is a source of current of comparatively small electromotive force connected to the forward stop 44 of electromagnet 37. Both of these sources are connected with their free terminal to the wire 3 grounded at 4.

In the receiving arrangement illustrated, 17 designates the bridge as an entirety; C' designates the receiving organism for the far-off station C (not shown here) and D' the receiving organism for the far-off station D (also not shown here). It is supposed that the station C transmits positive pulses and the station D transmits negative pulses. 18 designates the coil relating to C'; 19 its cradle; 20 the means for suspending the cradle; 21 the fiber attaching the cradle to one side of the coil; 22 the siphon; 23 the moving paper, and 24 the recorded lines on said paper. The arrow indicates the direction in which the paper moves. 25 designates the coil relating to D'; 26 its cradle; 27 the means to support the cradle; 28 the fiber connecting the cradle on one side to the coil; 29 the siphon; 30 the moving paper; 31

the lines of record. The arrow also indicates here the direction in which the paper moves.

I have not here illustrated the magnetic field or the other instrumentalities used in the improved siphon recorders, as persons versed in the art well know this instrument and well understand its working.

The new and novel manner of using this instrument consists therein that with a coil moving unobstructed in both directions, the siphon itself is only deflected in one direction and, therefore, records only the movement of the coil in one direction. The siphon of one coil, therefore, will only vibrate through the arrival of positive pulses and the siphon of the second coil will only vibrate through the arrival of negative pulses.

I will now describe the working of my system substantially as illustrated and described.

Normally, that is, when no messages are transmitted over the line, pulses alternately of opposite polarity will be impressed upon the line, for the reason that the positive pole of generator 1 is connected with the line alternating with the connection of the negative pole of generator 2 with the line. Normally, therefore, at the far-off receiving station, both coils will vibrate and the siphon connected to one coil will record a vibratory line through the arrival of positive pulses and the siphon of the second coil will record vibratory lines through the arrival of negative pulses.

It is now supposed that the operator of station A desires to transmit signals. He depresses the key 14 in the same manner as is the case today on land lines, that is, a short time to denote a dot and a longer time to denote a dash. Through the depression of said key, the circuit including the source of current 43 and the coil of electromagnet 36 is closed, thereby drawing the armature 38 away from stop 39 and in contact with stop 42, which results therein that during the revolution of the commutating drum 7, no connection will be made between the positive pole of generator 1 and the line of transmission, so that during the revolution of the commutating drum only negative pulses will be impressed upon the line flowing from generator 2. But as the armature 38 connects with forward stop 42, the line of transmission or cable is connected with the source 32 alternately with the connection of the line with the negative pole of the generator 2. This source is of very low electromotive force and cannot actuate the far-off receiving device, but is sufficient to "clear" the line.

It is now supposed that only the operator of station B desires to transmit messages. He manipulates the key 15 in the same manner as is the case today on land lines, and

through the depression of said key, a circuit is closed including the source of current 45 and the coil of electromagnet 37, thereby breaking the contact of the armature 40
 5 with the stop 41, which results therein that during the revolution of the commutating drum 7, only positive pulses are impressed upon the line, but as the armature 40 connects with stop 44, the negative pulses from
 10 source 33—a source of current of comparatively low electromotive force—will alternate with the positive pulses of generator 1.

It is now supposed that both the operator of station A as well as the operator of station B simultaneously depress their keys.

Through the depression of these keys, both the positive side of generator 1 as well as the negative side of generator 2 are disconnected from the line during the whole
 20 revolution of the commutating drum 7 and, therefore, only pulses from the source of comparatively low electromotive force flow over the line and as the electromotive force is not strong enough to actuate the far-off
 25 receiving devices, these devices come to rest at zero.

At the receiving station, normally both of the siphons vibrate,—one through the arrival of positive pulses, the other through
 30 the arrival of negative pulses,—and both of these siphons trace vibratory lines.

When, at the transmitting station, a positive pulse is depressed, then the siphon, vibrating normally through the positive pulse,
 35 comes to rest and records a straight line in accordance with the time that the positive pulse was depressed,—a short straight line to denote a dot and a long straight line to denote a dash.

When a negative pulse at the transmitting station is depressed, the siphon,—tracing vibratory lines through said pulses,—comes to rest and traces straight lines as long as the depression of the negative pulse lasts.

45 If both the positive and negative pulses are depressed, then both siphons come to rest and trace straight lines.

These, in broad outlines, are the essential points of my invention.

50 In this, my invention, it is immaterial if the vibrating lines of the siphons vary at zero or not, for the reason that as long as these lines are vibratory, they do not represent any readable characters. The readable
 55 character is only represented by a straight line and this straight line will always be at zero.

The clearing sources 32 and 33 are, therefore, not a necessity, but I have recourse to
 60 the same, as it is always well to clear a line even if it is not imperative.

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

65 1. In telegraphy, the method which con-

sists in normally impressing upon the line pulses of alternate polarity, thereby vibrating two line relays at the distant receiving station and cause the same to record vibratory lines, depressing the positive pulses and
 70 thereby causing one line relay to cease vibrating and record straight lines to translate one message, depressing the negative pulses and thereby causing the second line relay to cease vibrating and record straight
 75 lines to translate a second message, and depressing pulses of both polarities and thereby causing both line relays to record straight lines and translate simultaneously two messages.

2. In telegraphy, a line of transmission, two vibratory recording relays inserted in said line, means at the transmitting station to normally vibrate both of said relays and
 80 cause the same to record vibratory lines, means at the transmitting station to cause a cessation of said vibrations of one relay and cause the same to record straight lines to
 85 translate one message, and means at the transmitting station to produce a cessation of the vibrations of both of the relays and cause both to record straight lines to simultaneously translate two messages.

3. In telegraphy, a line of transmission, two recording vibratory relays inserted in said line, one of said relays being responsive to the arrival of positive pulses to record a
 90 vibratory line and the other of said relays being responsive to the arrival of negative pulses to record a vibratory line, and means at the transmitting station to depress either
 95 or both the negative and positive pulses and thereby cause either or both of said line relays to cease vibrating and record straight lines to denote the arrival of signals.

4. A quadruplex system comprising for each terminal of the line two transmitting and two receiving stations, means at the
 100 transmitting stations of each terminal to normally impress upon the line pulses of alternate polarity and of comparatively high electromotive force, means at the receiving stations of each terminal to normally record vibratory lines through the arrival of said
 105 pulses; means at the transmitting stations of each terminal to depress the pulses of said high electromotive force, and means at the receiving stations of each terminal to record straight lines through the cessation of said pulses of high electromotive force.

5. In a system of telegraphy, a transmitting station and means for said transmitting station to impress upon the line normally
 110 pulses of alternate polarity, a transmitting key and electromagnetic means to depress, through the operation of said key, pulses of positive polarity, in combination with means at the receiving station to record normally
 115 vibrations on one side of an imaginary zero line, and means at said receiving station to

record straight lines during the cessation of said positive pulses.

6. In a system of telegraphy, a transmitting station and means for said transmitting station to impress upon the line normally pulses of alternate polarity, a transmitting key and electromagnetic means to depress, through the operation of said key, pulses of negative polarity, in combination with means at the receiving station to record normally vibrations on one side of an imaginary zero line, and means at said receiving station to record straight lines during the cessation of said negative pulses.

7. In a system of telegraphy, in which two

messages are transmitted simultaneously from each terminal of the line, means at each terminal to impress upon the line pulses of alternate polarity, means at each terminal to depress one or both of said polarities, and means at each terminal to record normally vibratory lines on two separate records, and means at each of said terminals to record straight lines on two separate records.

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

ISIDOR KITSEE.

Witnesses:

EDITH R. STILLEY,
MARY C. SMITH.

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