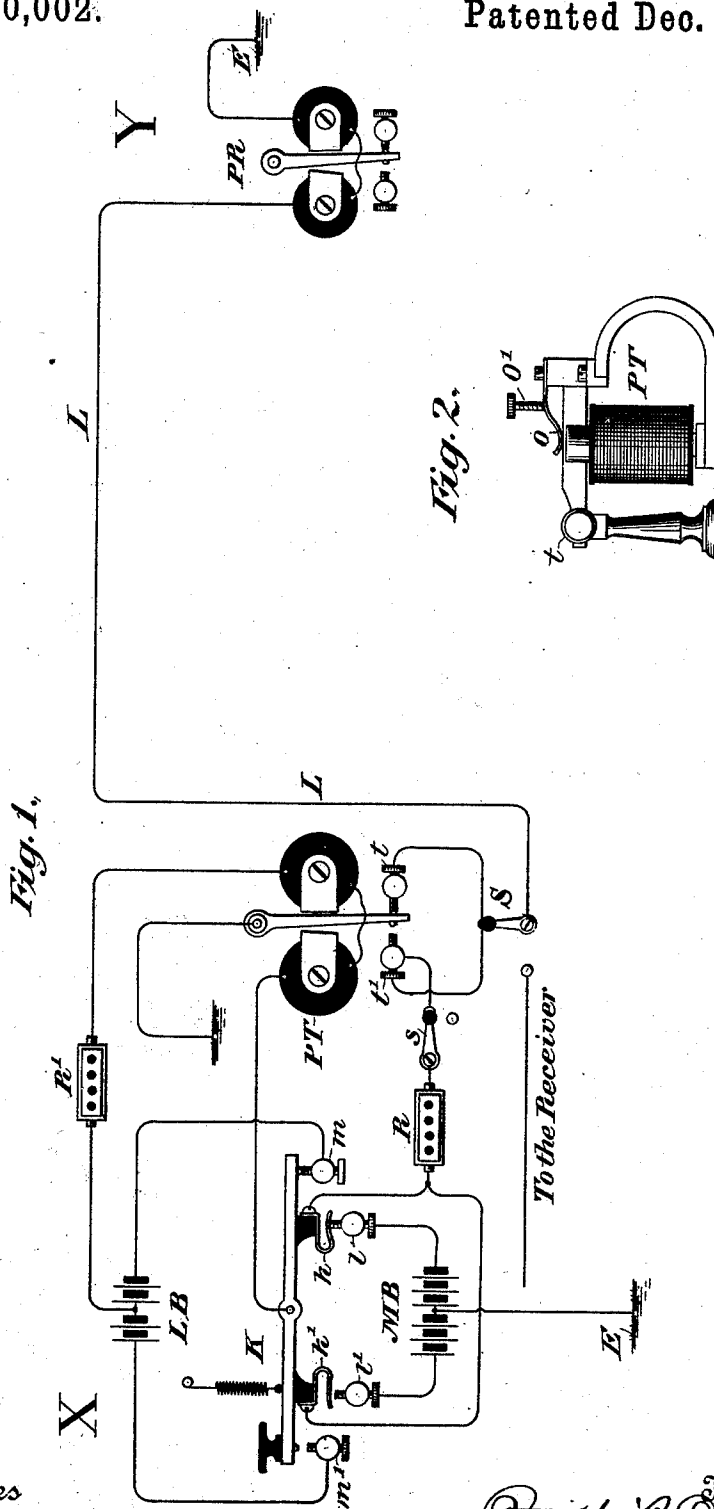


(No Model.)

P. B. DELANY.
TELEGRAPHY.

No. 510,002.

Patented Dec. 5, 1893.



Witnesses
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SPECIFICATION forming part of Letters Patent No. 510,002, dated December 5, 1893.

Application filed July 25, 1891. Serial No. 400,740. (No model.)

To all whom it may concern:

Be it known that I, PATRICK BERNARD DELANY, a citizen of the United States, residing at South Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Telegraphy, of which the following is a specification.

While this invention may be used with advantage on aerial lines, it is intended more especially to improve working over submarine or subterranean lines or cables where by reason of the electro-static capacity and retardation of the circuit the transmission of signals at the ordinary speed for telegraphic working is difficult.

My improved system is distinguished by two primary features: first, the use of transmitting devices whereby impulses of alternating polarity and of uniformly equal duration, may be transmitted over the line, by means of a key to be manipulated by the operator, and received as dots or dashes, or otherwise; second, the maintenance of the continuity of the circuit of the main line whereby duplex working in such a system is rendered possible.

In Letters Patent of the United States heretofore issued to me I have shown a telegraphic system analogous to that herein disclosed, in which currents of alternating polarity and approximately equal duration, are transmitted over a line by the manipulation of an ordinary key, and are received as dots and dashes; and in which the line is put to earth after each impulse of current has been sent into it. Such a system is shown in my Patents No. 373,967 of November 29, 1887; No. 373,968 of November 29, 1887, and No. 388,481, of August 28, 1888. The apparatus shown in these patents while productive of very satisfactory results on difficult circuits, is open to several objections which my present invention is designed to overcome: First, impulses of current of absolutely uniform duration cannot always be obtained as the duration is dependent more or less upon the manipulation of the key, and will, therefore, necessarily be variable; second, by reason of the rapid flight of a trailing contact finger connected with the line from one earth contact to another across the face of an intermediate contact connected with the main battery, the

impulses of current sent into the circuit are too brief to make themselves adequately manifest at the receiving end of a comparatively long line; third, the opening of the circuit of the main line when the contact maker or trailer passes from a battery segment to a ground segment, the objection to this arrangement being that the opening of the line renders duplex working difficult and unsatisfactory, if not wholly impracticable. An attempt to remedy this defect by causing the trailer to bridge from one contact to the other, would be objectionable because it would still further reduce the time or length of the impulse sent into the line from the battery segment.

In Letters Patent No. 381,764, issued to me April 24, 1888, I have shown a similar system of telegraphy, in which apparatus to increase the duration of the impulses is employed, but in that organization there exists also the defect that the succeeding impulses will, to a limited extent, vary in duration, depending as they do, upon the manipulation of the keys, and the circuit of the main line is open at intervals, thus rendering duplex working impracticable. By means of the organization herein set forth the main circuit is at all times closed either through the transmitting battery or the line is connected to earth or the return wire by a circuit connection outside of the battery. A longer time of duration of contact or connection between the main line and the transmitting battery is afforded, and a more perfect equalization of duration of all the impulses sent into the line is attained. By maintaining the continuity of the circuit the line may readily be duplexed.

The advantage of sending impulses of current of alternating polarity and equal duration into the line as set forth in my patents above mentioned, are well known to those familiar with this class of telegraphy and need no further reiteration here.

In the accompanying drawings: Figure 1 is a diagrammatic view illustrating the system, and Fig. 2 is a detail view of a polarized relay or transmitter, the movement of whose armature determines the duration of the impulses sent into the line and the grounding of the line.

In the drawings the circuits are shown completed through the earth but of course all metallic circuits may be used under precisely similar conditions.

5 L is the main line, X a transmitting station and Y a receiving station.

At the receiving station P R is a polarized relay which may control the circuit of a sounder or recorder, upon which the transmitted impulses of equal duration may be received as dots and dashes as set forth in my prior patents. At the sending station the line is connected to both stops of the armature of the polarized transmitter P T and the armature is permanently connected to earth. These stops are connected through a resistance R with two insulated yielding contacts k, k' on each side of the pivot of the transmitting key K. The main battery M B is grounded in the middle at E and practically forms therefore two sources of current and its two central or earth connected poles are therefore connected through the earth with the transmitter armature. Its opposite poles are respectively connected with the stops l, l' against which the contacts k, k' on the key work as the key is manipulated. The local battery L B that operates the polarized transmitter has its middle connected with one terminal of the coils of that transmitter. The opposite terminal of said coils is connected with the key K, and the opposite poles of the local battery are respectively connected with the front and back stops m, m' of the key. The parts are so constructed and related that when the key is depressed the insulated contact k' thereon, and the contact l' connected with one pole of the main battery are first closed before the key strikes its front stop m' . In like manner when the key is raised contact is made between k and l before the key comes against its back stop m . The effect of this organization is as follows: The apparatus being in condition for transmission and the key being up as indicated in the drawings, the armature of the transmitter P T is against its stop t , the local circuit being closed on the back stop m of the transmitting key. One pole of the main battery is connected through the contacts l, k and resistance R with the main line, and is also grounded through the armature of the transmitter, the current from the battery being therefore shunted from the main line. When the key is depressed the local of the polarized transmitter is first opened; the connection with the main battery is then broken at k, l ; the opposite pole of the battery is connected with the line and earth through the contacts k', l' and finally the local of the polarized transmitter is completed at the contact m' and the armature of the transmitter is thrown to its stop t' . When the armature of the transmitter is against either of its contacts the main battery is shunted from the line, but during the flight of the armature from one contact to the other

the shunt is broken and the current from the battery M B passes to the line. It will be perceived that the main line circuit is never open but is always completed either through the armature of the polarized transmitter, or through the main battery M B. The resistance R may be adjusted to suit the conditions and requirements of the circuit and is inserted for the purpose of preventing an undue depletion of the battery when it is shunted from the main line.

The length of time occupied by the armature of the transmitter in passing from one stop to the other after the closing of the circuit of the local battery, and consequently the duration of the impulses sent into the line, may be increased or diminished by the proper manipulation and adjustment of the local battery L B and the pole pieces of the polarized transmitter, all as is well understood, and to this end also a resistance R' may be placed in the local circuit. In order to render the movement of the armature of the transmitter sluggish and thus increase the duration of the transmitted impulses a tension may be put upon the armature by means of a light spring O, so placed as to bear upon the upper edge of the armature. This spring may be adjustable by means of a screw O'. Fig. 2 shows this construction. Obviously any other means of delaying or retarding the flight of the armature from one stop to the other may be adopted. Many such means are well known to persons well versed in telegraphic systems and their recital here is unnecessary. When the key and polarized transmitter are once adjusted so that the armature moves at the same time in either direction the duration of the transmitted impulses will be unvarying and practically independent of the manipulation of the key. When the operator at X is not transmitting the switch S would be turned so as to place the line L in connection with a wire leading to a receiver, this wire being marked in the drawings "To the receiver." The switch s would also be open so as to take the ground off the battery. The static current from the line, that may occur when the current is withdrawn from the line by the establishment of the shunt through the armature of the transmitter P T, will either discharge, through said armature, to earth or into the other side of the circuit; or will be overcome by the current from the main battery. The latter might be the case if the resistance R were so adjusted as to permit sufficient current to enter the line when the armature is against one of its stops.

I claim as my invention—

1. The combination, substantially as set forth, of the transmitter armature, its stops, the main circuit connected with both stops and extending to the distant receiver and back by the return connection to said armature, sources of currents of opposite polarity having each one pole connected with said ar-

mature, a transmitting key, battery contacts carried thereby, a circuit connection between said contacts and the stops of the transmitting armature, a resistance in said circuit connection, the local battery of the transmitter and its contacts, and circuit connections controlled by the transmitting key.

2. The combination, substantially as set forth, of the transmitter armature, its stops, a main circuit connected with both of said stops and extending to the distant receiver and back by the return connection to said armature, sources of currents of opposite polarity having each one pole connected with said armature, and means for alternately connecting such sources with the stops of the transmitter armature and coincidentally effecting the movement of the armature from one of its stops to the other, whereby alternating currents enter the line during the flights of the armature from one stop to the other.

3. The combination, substantially as set forth, of the transmitter armature, its adjustable stops, a main line connected with both of said stops, sources of currents of opposite polarity, each having one pole connected with said armature, and means for alternately con-

necting the opposite poles of such sources with the stops of the transmitter armature and coincidentally effecting the movement of the armature from one of its stops to the other, whereby alternating currents enter the line during the flights of the armature from one stop to the other.

4. The combination, substantially as set forth, of the transmitter armature, its stops, a main line connected with both of said stops, sources of currents of opposite polarity, each having one pole connected with said armature means for alternately connecting the opposite poles of such sources with the stops of the transmitter armature and coincidentally effecting the movement of the armature from one of its stops to the other, whereby alternating currents enter the line during the flights of the armature from one stop to the other, and means for regulating the duration of the flight of the armature.

In testimony whereof I have hereunto subscribed my name.

PATRICK BERNARD DELANY.

Witnesses:

EDWARD C. DAVIDSON,
M. J. KELLEY.