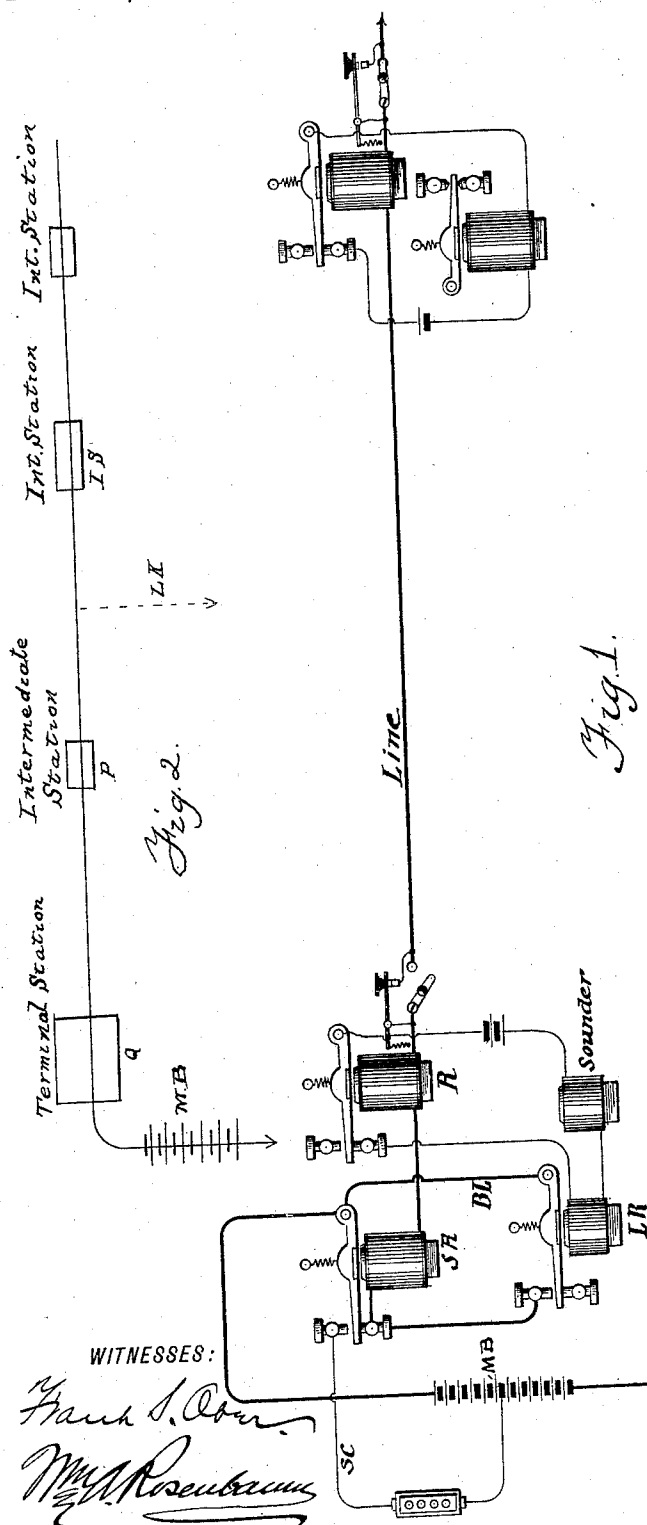


(No Model.)

W. F. WENTZ.
TELEGRAPHY.

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WITNESSES:

Frank S. Coon
Wm. A. Rosenbaum

INVENTOR

Wm. F. Wentz

BY

W. J. Johnston

ATTORNEY.

UNITED STATES PATENT OFFICE.

WILLIAM FREDERICK WENTZ, OF NEWARK, NEW JERSEY, ASSIGNOR OF
ONE-HALF TO OTTO G. HOERSTER, OF SAME PLACE.

TELEGRAPHY.

SPECIFICATION forming part of Letters Patent No. 468,755, dated February 9, 1892.

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To all whom it may concern:

Be it known that I, WILLIAM FREDERICK WENTZ, a citizen of the United States, residing in Newark, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Telegraphy, of which the following is a specification.

This invention relates to line controllers or adjusters for telegraphic circuits.

In the ordinary single-current Morse system of telegraphy it is necessary to adjust the relays to the electrical condition of the circuit, so that they will respond with the proper degree of sensitiveness to the makes and breaks of the circuit made by any operator on the line. Every change of current-strength requires a corresponding change in the adjustment. With a steady current on the line the relays require but little attention; but in stormy weather, owing to the heavy and fluctuating leakage along the line, the current becomes very unsteady, and the operators are therefore compelled to diligently watch their adjustments. Where a leak occurs at a point on the line, between which point and a terminal station there are intermediate stations, the relays at one or more of those stations will often not respond when a key is opened at a point beyond the point of leakage, because there is sufficient current on the line between the leak and the terminus to vitalize those relays in that portion of the circuit sufficiently to hold their armatures down. The operators at those stations are therefore unaware at times that signaling is going on and are liable to "break in" upon the signaling-operator. It is on lines including a number of intermediate stations that such trouble commonly occurs, as it will be found that a number of such stations have their relays improperly adjusted.

The object of my invention is to improve the working and get rid of the trouble on the lines caused by the failure to keep the relays adjusted by making such adjustments unnecessary and without making any changes at the intermediate stations.

To those ends my invention consists in special mechanism located at the terminal stations, the function of which is at and during

the opening of a key to reduce the battery so that the quantity of current which will flow over the line in case there is a leak will be reduced to such an amount that the leaking current will not prevent the relays in that part of the circuit between the battery and the leak from responding. The mechanism, also, is such that when the key closes the full current of the battery is presented to line and all relays must respond.

By reference to the accompanying drawings I will now describe my invention.

The diagram Figure 1 shows a telegraph-line arranged for single-current Morse, with the addition at each terminal of a relay S R, inserted in the main line, a short circuit S C, controlled by the armature of the relay S R, a relay L R, inserted in the sounder-circuit, and a branch B L of the main line, controlled by the armature of the relay L R. The diagram Fig. 2 represents a line with terminal and intermediate stations.

In giving the operation I will first describe a defective operation which sometimes takes place with the ordinary system, and in giving this let it be understood that the apparatus at the terminal stations is of the ordinary nature. Let us suppose that a heavy leak occurs on the line at the point L K. If operator at I S now opens his key, the relays at P and Q, or one of them, will not respond—i. e., the armatures will not go to their back stops, because there is sufficient current flowing between M B and L K to hold said armatures against their front stops. P and Q, or one of them, will therefore not be aware that the line is in use and may break in on operator I S. To remedy this, it is necessary for P and Q to adjust their armatures to a higher degree, so that the leaking current will not hold their armatures down; but a higher adjustment makes the reading of signals more laborious.

Now let us consider the operation with my improved apparatus at the terminal stations. Assume the leak to be located as before. Operator I S opens his key and relay S R responds, (because it is always kept properly adjusted.) While its armature is traveling to its back stop, the line is open at two points—to wit, I S and the terminal station—and when

the latter break is closed by the armature of S R striking its back stop a portion of the battery is shunted from the main line through the circuit S C, and leaving only a fraction of the battery presented to line, and therefore free to flow over that portion of the line between the main battery and the leak. The amount of this depreciated battery which will flow over this circuit will of course be dependent upon the extent of the leak; but as the shunt-circuit contains an adjustable resistance, and therefore is always under control, it is evident that the main battery may be reduced sufficiently to have no effect on the intermediate relays in case of leakage. Thus it will be seen that on the opening of a key every relay must respond. When the relay at a terminal station responds, the second relay L R is de-energized and the branch B L is completed, thus making a complete circuit for the depreciated battery through the terminal station. Upon the closure of the key the depreciated battery becomes stronger, because it has a freer circuit than the leak provided, and relay S R, which is made much more sensitive than the ordinary relays, pulls its armature to its front stop, thereby breaking the shunt-circuit, putting full battery to line, and causing all relays to respond. S R is not so sensitive as to respond to any current less than the depreciated battery, so that an escape of current at a leak while a key is open would not cause it to move its armature. It will be observed that as the leak carries off only a portion of the current the remainder must travel over the entire circuit and through all the stations, although it is depreciated when it gets beyond the point of leakage. Of course if the leak were a dead short circuit, through which the current from both terminal batteries found a perfect circuit, then the stations could only communicate with those on the same side of the leak. As mentioned at the beginning of the specification, however, this invention is designed to overcome troubles arising from a fluctuating current caused by wet weather or poor insulation.

It is noted that although I have shown and described the reduction of the current by short-circuiting a portion of the battery it is to be understood that the invention includes the reduction of the current in any manner whatever—as, for instance, resistance may be thrown into the main circuit, an opposing battery may be cut in, or the circuit interrupted through a portion of the battery and left complete through only the remaining portion. With this system the line becomes more reliable, because if the terminal relays respond all the other relays are compelled to respond no matter what their adjustment may be. An operator cannot unknowingly break in on the line. It saves the time and labor otherwise lost in the continuous adjustment of the relays and will increase the speed and improve the working by allowing the operators to give

their instruments as low an adjustment as they may wish.

Having thus described my invention, I claim—

1. In a telegraphic system, the combination, with a main line, including both terminal and intermediate stations and main batteries or generators, of means for reducing the current which is free to flow over the main line, and an electro-responsive apparatus controlling said means to make it operative when the main circuit is open.

2. In a telegraphic system, a main battery and circuit, including terminal and intermediate stations, in combination with a relay located at a terminal station, said relay being more sensitive than the relays at the intermediate stations, a short or shunt circuit for a portion of the main battery controlled by the sensitive relay, and a second circuit for that portion of the main battery not shunted, the said second circuit including said sensitive relay, as set forth.

3. In a telegraphic system, a main battery and circuit, including terminal and intermediate relays, in combination with an additional relay located at a terminal station, the latter being more sensitive than the other relays, a short or shunt circuit for a portion of the main battery controlled by the sensitive relay, and a second circuit for that portion of the main battery not short-circuited or shunted, the said second circuit including said sensitive relay and another relay in the local circuit of the terminal station controlling said second circuit, substantially as described.

4. In a telegraphic system, the combination, with a main line, including both terminal and intermediate stations and main batteries or generators, of means for reducing the current which is free to flow over the main line, and an electro-responsive apparatus controlled by a break in the main line and controlling said means to make it operative when the main circuit is open.

5. In a telegraphic system, the combination, with a main line, including both terminal and intermediate stations and main batteries or generators, of means for reducing the current which is free to flow over the main line, and apparatus for throwing said means into operation upon opening the main circuit.

6. In a telegraphic system, the combination, with a main line, of means for reducing the current which is free to flow over the main line, and apparatus for throwing said means into operation upon opening the main circuit.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

WILLIAM FREDERICK WENTZ.

Witnesses:

OTTO G. HOERSTER,
WM. A. ROSENBAUM.