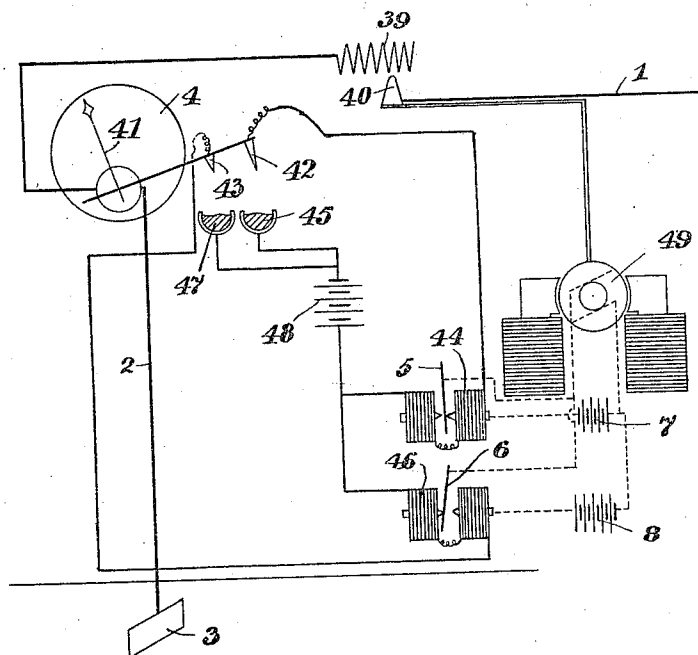


E. BÉLIN.
 AUTOMATIC RESISTANCE REGULATOR FOR TELEGRAPH LINES AND THE LIKE.
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1,058,533.

Patented Apr. 8, 1913.



Witnesses
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 Geo. W. Kirkley

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UNITED STATES PATENT OFFICE.

EDOUARD BÉLIN, OF PARIS, FRANCE.

AUTOMATIC RESISTANCE-REGULATOR FOR TELEGRAPH-LINES AND THE LIKE.

1,058,533.

Specification of Letters Patent.

Patented Apr. 8, 1913.

Application filed December 20, 1911. Serial No. 666,916.

To all whom it may concern:

Be it known that I, EDOUARD BÉLIN, a citizen of the Republic of France, residing at Paris, in the Republic of France, have invented certain new and useful Improvements in Automatic Resistance-Regulators for Telegraph-Lines and the Like, of which the following is a specification.

This invention relates to means for automatically regulating the resistance of telephone or telegraph lines or the like. These means consist essentially in the use of an additional variable resistance the slider of which is moved to and fro by means of a relay and controlled by a galvanometer arranged in series with the line. Such a device is of particular importance in connection with signals which depend upon the strength of the current for their interpolation.

The needle of the galvanometer has attached thereto a pair of contacts which are adapted to close one or other of two circuits which operate a relay for switching on or off the current to a small electric motor. The latter is connected by suitable gearing to the slider of the adjustable resistance so that the latter is increased or decreased according as the galvanometer brings one or both of its contacts into operation.

The accompanying drawings illustrate diagrammatically the circuits of one manner of carrying out the invention.

The line consists of a wire 1, a resistance 39 and a wire 2 leading to the earth plate 3. The slider 40 is arranged to slide to and fro on the contacts of the resistance 39 which consists of a series of approximately equal resistances. The galvanometer 4 is arranged in series with the line between the variable resistance and the earth plate 3. The needle 41 of the galvanometer has an arm which carries two contacts 42 and 43 adapted to dip into the mercury cups 45 and 47. The contact 42 is made longer than the contact point 43 so that it will make connection with its mercury cup before the contact 43 does. The contact 42 is adapted to close the circuit containing the relay 44, while the contact 43 controls the relay 46. In the position shown the two contacts are raised clear of their mercury cups and in this position the switch arms 5 and 6 of the relay are arranged so that the arm 5 which is held in this position by a spring or by gravity completes the circuit of the battery 7

through the electric motor 49, and thereby decreases the resistance of the line by operating on the slider of the variable resistance 39. When the resistance of the line as a whole has been so far reduced that the galvanometer needle 41 has brought the contact 42 into contact with the mercury in the cup 45, the switch arm 5 is brought into its open circuit position and the motor thereby stopped. Should the current in the line increase still further the needle 41 will turn still more and bring the contact 43 into contact with its mercury cup. The closing of this circuit will bring the switch arm 6 from its normal open circuit position as shown into its closed circuit position against the action of a spring or other controlling force and thereby operate the motor 49 in the opposite direction and thus increase once more the resistance of the line. Instead of adding a resistance in series on the line the slider 40 may be made to act on a resistance in shunt of a galvanometer or of any suitable receiver or even on one of the arms of a Wheatstone bridge. The auto-regulator just described could not evidently be used for alternating currents unless it were automatically interpolated at regular times, which times must take place synchronously with the frequency of the alternations of the current in the circuit.

I declare that what I claim is:—

1. An automatic resistance controller for telegraph lines comprising in combination a resistance in circuit with the line, a slider adapted to move to and fro along the resistance, a galvanometer in series with the line, two relays operated by the galvanometer, an arm connected to the handle of the galvanometer, two contact points on the said arm electrically connected to the coils of the two relays respectively, two contact cups adapted to operate with the said contact points, one cup being arranged to make contact with its corresponding contact point before the other, an electric battery connected to the said contact cups, and the other ends of the coils of the relays, and means operated by the relays for moving the slider in one or other direction along the resistance.

2. An automatic resistance controller for telegraph lines comprising in combination an additional resistance connected at one end to one part of the line, a slider connected to the other part of the line adapted to make contact with the resistance at dif-

ferent parts of the same, a reversible motor adapted to move the slider in one or other direction, two relays operating switches for the motor, one switch normally closed being adapted to be opened by one relay, a second switch normally open being adapted to be closed by the other relay, a galvanometer in series with the line, an arm connected to the galvanometer needle, two contact points on the said arm electrically connected to the coils of the relays, two contact cups adapted to operate with the said contact points, one cup being arranged to make contact with its

corresponding contact point before the other, and an electric battery connected to the said contact cups and to the other ends of the coils of the relays. 15

In witness whereof, I have hereunto signed my name this 7th day of November 1911, in the presence of two subscribing witnesses. 20

EDOUARD BÉLIN.

Witnesses:

ANTONIN MONTEILHET,
H. C. COXE.