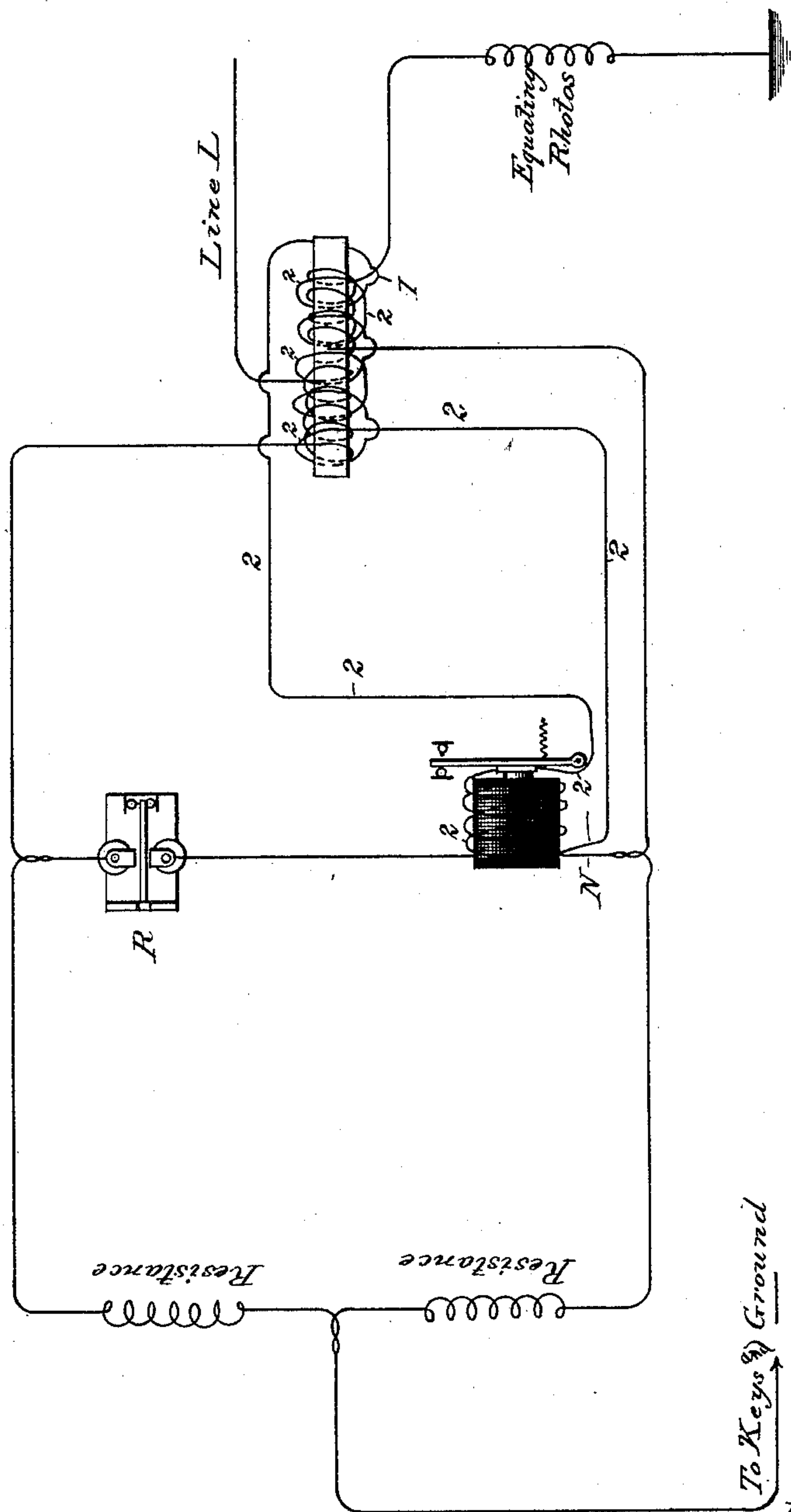


(No Model.)

F. W. JONES.
DUPLEX AND QUADRUPLIX TELEGRAPHY.

No. 462,901.

Patented Nov. 10, 1891.



Witnesses.
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DUPLEX AND QUADRUPLIX TELEGRAPHY.

SPECIFICATION forming part of Letters Patent No. 462,901, dated November 10, 1891.

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To all whom it may concern:

Be it known that I, FRANCIS W. JONES, a citizen of the United States, and a resident of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Duplex and Quadruplex Telegraphy, of which the following is a specification.

In the operation of duplex and quadruplex telegraphs in which the changes of tension and reversals of polarity are employed upon the same circuit a well-known difficulty arises from the fact that in the neutral relay a momentary loss of power occurs at the instant of reversal of the line-current, so that unless some special provision be made to hold the neutral relay-armature up the signals received on the same will be mutilated during the sending of signals by reversals of the current.

The object of my present invention is to prevent the neutral relay from being discharged at the time of reversal; and to this end my invention consists in the combination, with a neutralizing or compensating circuit connected with the neutral relay in any proper manner, of an induction-coil whose secondary is connected to said circuit, while its primary is connected to the usual main and artificial lines in any proper way, so as to not feel the effects of outgoing signals, but to be responsive to the reversals of current accompanying the incoming signals. An obvious and well-known way of accomplishing this would be to wind the primary differentially, as is well understood in the art—that is to say, to form its primary into two coils, one in the main line and the other in the artificial line. I do not, however, limit myself to this particular way of rendering the induction-coil insensible to the effects of the outgoing signals, since there are other well-known ways by which the same result may be accomplished.

I have herein illustrated my invention as applied to the well-known form of quadruplex telegraphs in which one set of signals is received on a polar relay responding to signals sent by changes of polarity only, and the other set of signals is received upon a neutral relay responding to changes of tension only. It is, however, to be understood that I do not

limit myself to the application of the invention to such special system, but design applying the same to any system in which reversals of current take place, so that any neutral relay is at such instant liable to be discharged and to produce a false signal.

In the accompanying drawings, which show diagrammatically one way of applying my invention, I have illustrated the receiving apparatus of a quadruplex telegraph in which the neutral and polar relays are placed in the bridge-wire of a Wheatstone bridge, whose sides are formed, respectively, by the main and artificial lines in the well-known way.

The transmitting-instruments I have omitted, as they form no part of the invention.

R indicates the ordinary polar relay, and N the usual neutral relay. The latter, in addition to the usual coils in the bridge-wire, is furnished with a set of auxiliary coils in a circuit 2 2, connected to the secondary of an induction-coil I.

The induction-coil I is of any desired form, but is provided with two sets of primary coils, one of which is in the line-circuit L, while the other, wound or connected so as to neutralize the effects of the first under the influence of the outgoing current, is connected into the artificial line leading to ground at sending-station. Under the influence of the currents for outgoing signals the secondary of the induction-coil I is quiescent, inasmuch as the two portions of the primary coil neutralize one another's effects. Incoming currents, however, passing through the primary coil will set up an instantaneous current in the secondary, which, passing through the circuit 2 2 and around the coils on the neutral relay, will tend to charge the latter. The effect of the current thus set up and made to act on the neutral relay is to be adjusted in any desired way either by suitably proportioning the induction-coil or by fixing the number of turns of the compensating-coil, so that when the armature-lever of the neutral relay is against its back-stop said secondary current will be ineffective to draw up the armature. When, however, the armature-lever is against its front stop and therefore in closer proximity to the core of the relay the secondary current set up will be sufficient to hold the armature up, although the flow of current in the

bridge-circuit, consequent upon a reversal of polarity, may momentarily cease.

The operation of the devices would be as follows: The armature of the neutral relay being drawn up by the effects of the increased current employed for operating the same would be ordinarily held up until the tension of the current again resumes its normal by the influence of the current in the bridge. If now a reversal of current take place such as is employed for operating the polar relay R, there will at the moment of reversal be a whole or partial cessation of the charge of the neutral relay produced by the flow of current in the bridge-circuit, and without some suitable provision to compensate for this the relay-armature would drop back. Simultaneously, however, with the reversing of the current in the line primary coils a secondary current is set up, which, circulating in the path 2 2, holds the relay-armature of the neutral relay up and prevents mutilation of its signals received on the same. I may employ any other compensating device in connection with the apparatus operated by changes of tension, such compensating device being applied in such a way as to prevent mutilation of the signal, and being connected to the local circuit 2 2, forming a portion of the circuit for the secondary coil of the induction-coil I.

What I claim as my invention is—

1. In a duplex or quadruplex telegraph apparatus, the combination, with the device for preventing mutilation of signals received on the neutral relay at the instant of reversal, of an induction apparatus whose secondary is connected with such devices, while its primary consists of two coils, one in the main and the other in the artificial line.

2. In a duplex or quadruplex telegraph in which changes of tension and reversals of polarity are employed, an induction apparatus consisting, essentially, of a primary coil in the main circuit, a primary coil in the artificial line, and a secondary circuit connected with the apparatus on which signals are received by changes of tension, all as set forth, so that under the influence of outgoing currents the primary coils will neutralize one another's actions, while under the influence of the received current a current will be set up in the secondary circuit to bridge the reversals.

3. A combination, substantially as described, of a neutral relay, a compensating coil, secondary coils connected therewith, and primary coils connected into the main and artificial lines, as and for the purpose described.

4. In a duplex or quadruplex telegraph in which reversals of current are employed, the combination, with the neutral receiving-relay, of an induction-coil having its primary connected to main and artificial lines so that the induction-coil shall be unaffected by outgoing currents or signals, and having its secondary connected to a compensating circuit, whereby the reversals of current accompanying incoming signals may be bridged through the action of the secondary current set up in the induction-coil at the instant of reversal.

Signed at New York, in the county of New York and State of New York.

FRANCIS W. JONES.

Witnesses:

THOS. TOOMEY,
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