

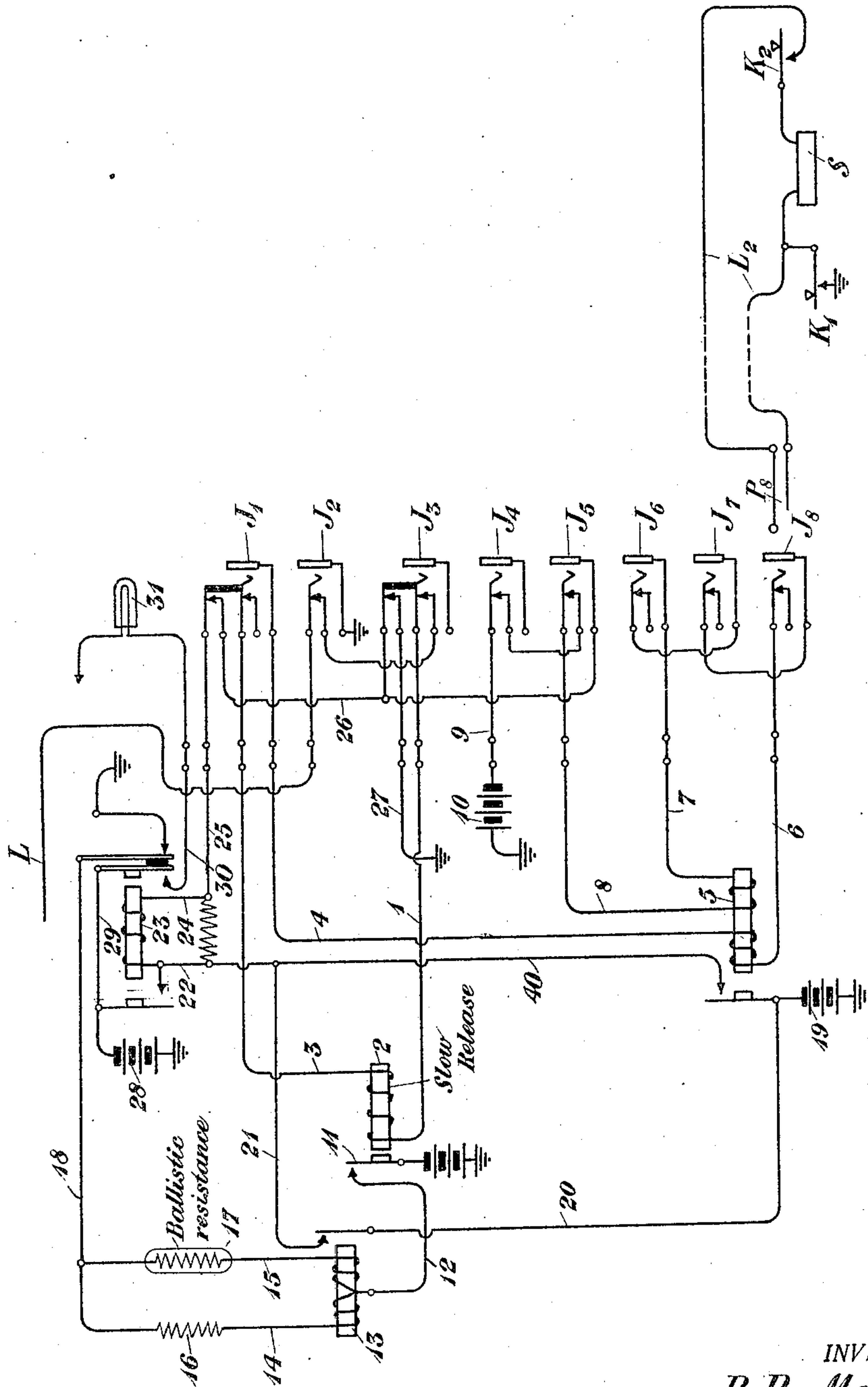
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TELEGRAPH SIGNAL CIRCUITS

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TELEGRAPH SIGNAL CIRCUITS.

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To all whom it may concern:

Be it known that I, ROBERT P. MOORE, residing at Dayton, in the county of Campbell and State of Kentucky, have invented certain Improvements in Telegraph Signal Circuits, of which the following is a specification.

This arrangement relates to telegraph systems and consists in providing means whereby the attendant at the telegraph board may automatically be signaled whenever the telegraph circuit is left open an undesirable length of time. It is frequently necessary for telegraph operators to leave a key open for the purpose of keeping control of a circuit under certain imperative conditions. Such an opening of the key would operate the signaling device at the telegraph board. Accordingly it will be seen that should the key be left open when no actual fault existed on the circuit that it would cause confusion and would unnecessarily delay the service. The arrangements of this invention will signal the operator at the telegraph board whenever the key is left open longer than the usual length of time so that the cause therefor may be investigated. However, the signaling arrangements will not operate or be affected by the usual openings or closing of the key utilized for normal signaling purposes. With the arrangements of the invention it may be possible to delay the operation of the signaling means for a time interval of over a minute after the opening of the telegraph circuit. The arrangements of the invention may be more fully understood from the detailed description hereinafter given.

The invention may be more fully understood from a consideration of the accompanying drawing, in which is shown a circuit diagram of the arrangements of the invention. At the telegraph board there are usually provided a number of jacks, which are herein shown as jacks J_1 , J_2 , J_3 , J_4 , J_5 , J_6 , J_7 , and J_8 . Jack J_1 is used for supervisory purposes. Jacks J_2 , J_3 , J_4 , and J_5 may be utilized for interchanging lines, loops and telegraph equipment. The jacks J_6 , J_7 and J_8 may be used for establishing connections with subscribers' loops, such as

the loop L_2 , which includes the sounder S , the telegraph key K_2 , and the auxiliary key K_1 . A telegraph line L is shown associated with the telegraph board. A signal device, such as lamp 31, is also provided at the telegraph board. The relay arrangements of the invention are so associated with the telegraph board that they will control the signal lamp 31 so that it will operate whenever the telegraph circuit L is left open an undesirable length of time, but it will not operate upon the normal openings of the line L utilized for transmitting message signals. The relay arrangements of the invention consist of the relay 2, which is slow-releasing but quick operating, the differentially wound relay 13, whose parallel circuits include the resistance 16 and the ballistic resistance 17, the differential relay 5, and the signal controlling relay 23, which will be described in detail hereinafter.

The operation of the arrangements of the invention is as follows: The telegraph connection with one of the local loop circuits, such as the loop L_2 , is as follows: from the telegraph line L , contacts of jacks J_2 and J_3 , conductor 1, winding of relay 2, conductor 3, contact of jack J_1 , conductor 4, left-hand winding of relay 5, conductor 6, contacts of jack J_8 and plug P_8 , over the loop circuit L_2 to the contacts of the plug P_8 and jack J_8 and the contacts of jacks J_7 and J_6 , conductor 7, right-hand winding of relay 5, conductor 8, contacts of jacks J_5 and J_4 , conductor 9 and battery 10 to ground. The openings and closings of the telegraph circuit L or L_2 will operate the sounder S in the local loop circuit. These openings and closings of the telegraph circuit, however, will not operate the relay 5 as it is wound differentially. The current in the above traced circuit, furthermore, will hold in operated condition the relay 2, which is adjusted to be slow releasing and will not allow its armature to fall off during the normal intervals in which the telegraph circuit L is open for the purpose of transmitting message characters. If the telegraph circuit L now remains left open longer than the usual period for transmitting message characters, the relay 2 will al-

low its armature to fall off and close the following circuit: from ground and battery 11, armature and contact of relay 2, conductor 12, through the windings of relay 13, which are differentially arranged over the parallel circuits 14 and 15, and over conductor 18, right-hand armature and contact of relay 23, to ground. The parallel circuits 14 and 15 include the resistance element 16 and the ballistic resistance 17. These resistances are normally equal and accordingly the relay 13 will not operate at once. The ballistic resistance 17, however, will increase upon the current flow therethrough and will gradually destroy the condition of equilibrium existing in the differentially arranged windings of relay 12, and accordingly, after an interval, the relay 13 will operate. Upon the operation of relay 13 the following circuit will be closed: from ground and battery 19, conductor 20, armature and contact of relay 13, conductors 21 and 22, winding of relay 23, conductors 24 and 25, contact of jack J_1 , conductor 26, contact of jack J_3 , conductor 27, to ground. The closing of this circuit will operate the relay 23, which will be locked up over the following circuit: from ground and battery 28, left-hand armature and contact of relay 23, conductors 24 and 25, contact of jack J_1 , conductor 26, contact of jack J_3 , conductor 27, to ground. The operation of relay 23 will close the following circuit through the signal lamp 31: from ground and battery 28, conductor 29, armature and right-hand make contact of relay 23, conductor 30 through the filament of lamp 31 and thence either to ground or to buzzer circuit, not shown, thus operating the lamp 31. The operation of the lamp 31 under these conditions will indicate to the repeater man at the telegraph board that the telegraph circuit L has remained open a longer time than is usual, or that some trouble or ground exists on the line, and he will investigate the cause thereof. In order that the subscriber on the local loop circuit, such as L_2 , may signal the repeater man at the telegraph board, the relay 5 is provided and the supplementary key K_1 is provided in the loop circuit. The operation of the key K_1 will close the following circuit: from ground, contact of key K_1 , contact of plug P_8 and jack J_8 , contacts of jacks J_7 and J_6 , conductor 7, right-hand winding of relay 5, conductor 8, contacts of jacks J_5 and J_4 , conductor 9, to battery 10 and ground. This current through one of the differential windings of relay 5 will cause said relay to operate and close the following circuit: from ground and battery 19, armature and contact of relay 5, conductors 40 and 22, winding of relay 23, conductors 24 and 25, contact of jack J_1 , conductor 26, contact of jack J_3 , conductor 27, to ground. The clos-

ing of this circuit will operate the relay 23, which, in the same manner as has been previously pointed out, will cause the operation of the signaling device 31.

With the arrangements of this invention which may be added to the usual equipment at the telegraph board, the repeater man thereat may be signaled automatically whenever the telegraph circuit remains open more than a desirable length of time, and in order to provide a margin of safety and to insure against false operation of the signaling device, a time interval of as much as sixty seconds or more may easily be introduced with the arrangements of this invention before the signaling device at the telegraph board will operate.

While the invention has been disclosed in certain specific arrangements which are deemed desirable, it is to be understood that it is capable of embodiment in many and widely varied forms without departing from the spirit of the invention as defined in the appended claims.

What is claimed is:

1. A telegraph line terminating at a board at a central station, a signaling device located at said station, a slow releasing relay located at said station, the winding of said relay being included in said telegraph line, a circuit controlled by said relay, a second relay in said circuit, means in said circuit for retarding the operation of said second relay, and means controlled by said second relay for operating said signaling means.
2. A telegraph line terminating at a board at a central station, a signaling device located at said station, a slow releasing relay located at said station, the winding of said relay being included in said telegraph line, a circuit controlled by said relay, a second relay in said circuit, means in said circuit for retarding the operation of said second relay, a third relay for controlling said signaling device, and means controlled by said second relay for controlling said third relay.
3. A telegraph line terminating at a board at a central station, a signaling device located at said station, a slow releasing relay located at said station, the winding of said relay being included in said telegraph line, and means controlled by the release of said relay for operating said signaling device, said relay being adjusted so that it will release only when said telegraph line is left open a longer interval than the normal interval utilized for transmitting message characters.
4. A telegraph line terminating at a board at a central station, a signaling device located at said station, a slow releasing relay located at said station, the winding of said relay being included in said telegraph line and said relay being adjusted so that it will release only when said telegraph line is left

open a longer interval than the normal interval utilized for transmitting message characters, a second relay, two parallel circuits, controlled by said slow release relay, 5 one of said parallel circuits including one of the differential windings of said second relay and a resistance, the other parallel circuit including the other differential winding of said second relay and a ballistic resistance, and means controlled by said second 10 relay for operating said signaling device.

In testimony whereof, I have signed my name to this specification this 9th day of February, 1922.

ROBERT P. MOORE.