

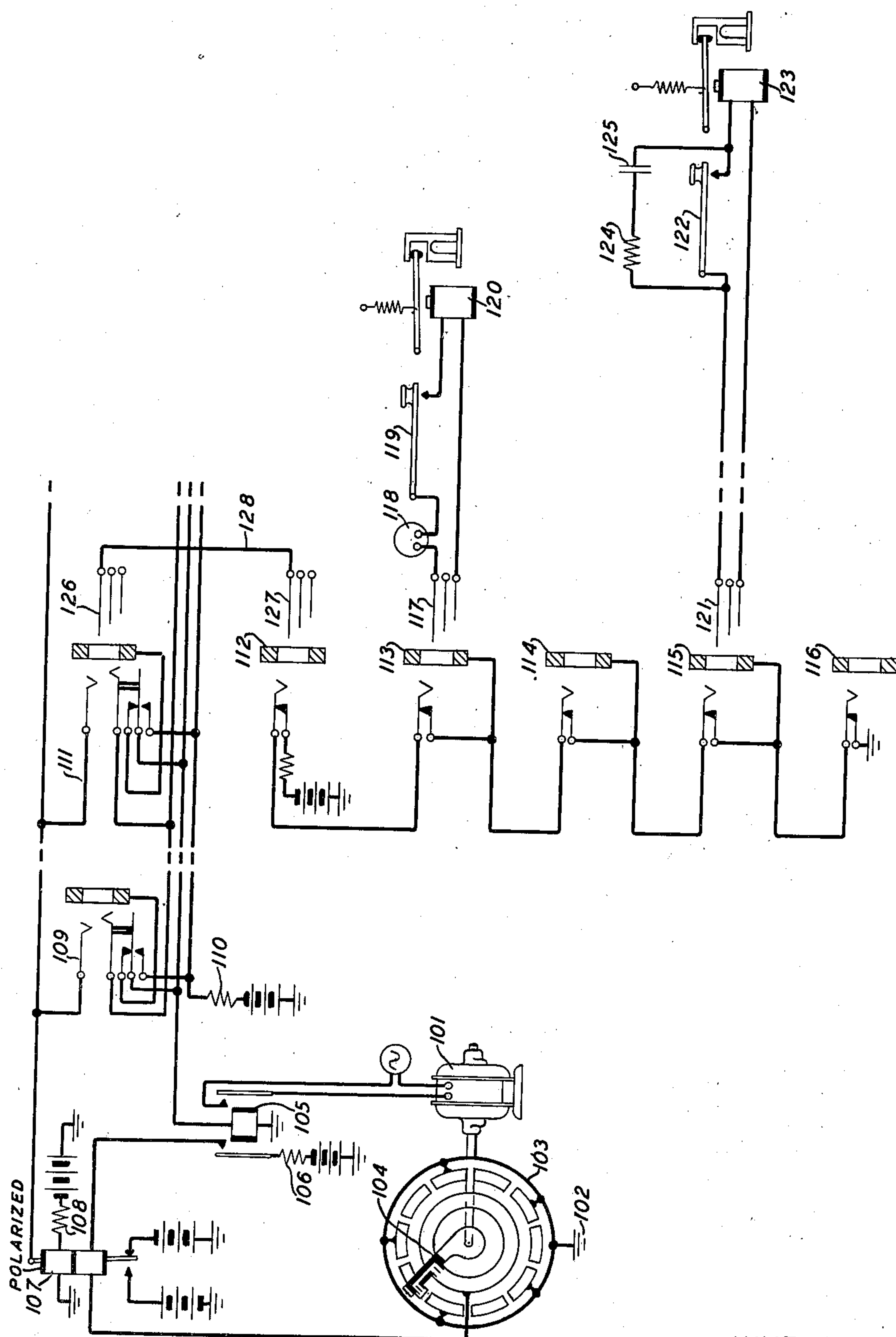
May 30, 1939.

F. H. HANLEY

2,160,206

TELEGRAPH SYSTEM, OPEN MORSE TELEGRAPH KEY ALARM CIRCUIT

Filed Dec. 21, 1937



INVENTOR
F. H. HANLEY
BY
William P. Ballard
ATTORNEY

UNITED STATES PATENT OFFICE

2,160,206

TELEGRAPH SYSTEM, OPEN MORSE TELE-
GRAPH KEY ALARM CIRCUITFrank Harold Hanley, Butler, N. J., assignor to
American Telephone and Telegraph Company,
a corporation of New York

Application December 21, 1937, Serial No. 181,045

7 Claims. (Cl. 178—69)

This invention relates to Morse telegraph systems and more particularly to an alarm circuit associated with a Morse telegraph key.

An object of this invention is to provide facilities for signaling a local Morse telegraph station that the telegraph key thereat has inadvertently been left open so that the key may be closed and service resumed.

As is generally known in the operation of the usual Morse telegraph loop circuits, it is necessary that the telegraph key contacts be closed in order to operate the station sounder, as the sounder is in series with the key contacts. If the key is left open, the electrical circuit path through the sounder is broken and it is impossible to call the station. Under such circumstances it has been necessary to inform the station operator of the condition by some supplementary means, such as by using a second telegraph circuit or a telephone if these facilities are available. During the interval that the key remains open, the telegraph loop circuit associated therewith is not operable. Since, in many instances, the loop circuit is continued through more than one local station, the open telegraph key at any station so arranged puts all stations connected to the same loop out of operation. This aggravates the difficulty as it is necessary first to locate the particular station at which the key is open before the key can be closed and service resumed.

According to the present invention a shunt path comprising a condenser is permanently connected around the telegraph key contacts. Positive and negative telegraph battery is supplied to the loop on periodic reversals from a common circuit at a central telegraph station to which the loop is connected. The reversed current pulses are passed through the shunt around the open contact to vibrate the station sounder as a signal to the station operator that the telegraph key is open and the operator thereupon restores the key.

A feature of this invention is that a shunt path comprising a condenser is utilized to pass current, the polarity of which is periodically reversed, around the open contacts of a telegraph key to operate a device responsive to such current as a signal to close the key.

A further feature of this invention is that a spark killer device, used to suppress sparking at the telegraph key contacts, which device comprises a condenser, is used as the shunt path for the signaling current.

A further feature of this invention is that facilities are provided for indicating to the tele-

graph central station operator that the open telegraph key has been closed.

A further feature of this invention is that a common source of signal battery is supplied to multiple jacks so distributed through the central telegraph station that they are readily available to all the telegraph loop circuits terminating at said central station.

Reference to the signal figure on the accompanying drawing and the following description discloses the operation of this invention.

In the single figure the wiring shown to the right of plug 121 including the dotted lines indicate a telegraph subscriber's loop circuit. The apparatus at the right, comprising the telegraph key 122, the sounder 123, the resistance 124 and the condenser 125 in series with resistance 124, both shunting key 122 contacts, is located at the telegraph subscriber's station. All of the rest of the apparatus and wiring is located at the telegraph central office to which the subscriber's loop circuit is connected. Jacks 112, 113, 114, 115 and 116 are test jacks with a series circuit from battery to ground through their contacts. 109 and 111 indicate jack outlets of an interposition trunk circuit which is multiplied through the various operators' positions of the telegraph test board at the central station. 105 is a relay and 107 is a polar relay. 101 is a motor which drives interrupter arm 104 across the segments of interrupter 103. Ground 102 is furnished to alternate segments of the outer interrupter ring. When these segments engage with the outer brush, ground is furnished through an internal connection in the interrupter arm 104, to the inner ring of interrupter 103 to which a conductor to the lower winding of polar relay 107 is connected. The speed of motor 101 is such that ground is interrupted by an open 23 times per second. 126 and 127 are three conductor plugs. The tip conductors only of plugs 126 and 127 are interconnected by conductor 128. 117 is a three-conductor plug whose tip and sleeve conductors are interconnected by leads which include the meter 118, key 119 and sounder 120. The function of this and all other apparatus will now be described in detail.

When the attendant is unable to communicate with a particular telegraph subscriber and suspects that the trouble is due to an open telegraph key at the subscriber's station, the attendant connects plug 121 into jack 115, plug 117 into jack 113 and plug 126 into jack 111. Plug 127 is inserted into jack 112 and removed intermit-

tently. When plug 126 is inserted in jack 111, the ring of the jack is actuated downward and a circuit is closed from ground through relay 105 winding, through the lower armature actuated by the ring, through the make contact associated with the ring lower armature, through resistance 110 to negative battery. Relay 105 is operated. The operation of relay 105 closes motor 101 circuit at relay 105 right-hand make contact, operating the motor. The operation of relay 105 also closes a circuit from negative battery through resistance 106, left-hand contact, lower winding polar relay 107, to the inner ring of interrupter 103, inner brush of interrupter arm 104, outer brush of interrupter arm 104, to the alternate grounded and open segments of interrupter 103. When a grounded segment engages with the outer brush a circuit is closed to ground 102. Relay 107 is so arranged that when current flows through its bottom winding the relay is operated so that its armature engages the contact to which is connected negative battery. When the interrupter arm is on an open segment and the circuit to ground 102 is broken, relay 107 is operated so that its armature engages the contact to which is connected positive battery. Relay 107 is fast enough to follow the 23-cycle interruptions.

When the armature of relay 107 is in engagement with the right-hand contact, a circuit may be traced from negative battery, relay 107 right-hand contact, relay 107 armature, tip of jack 111, tip of plug 126, conductor 128, tip of plug 127, tip of jack 112, tip of jack 113, tip of plug 117, meter 118, key 119, winding of sounder 120, sleeve of plug 117, sleeve of jack 113, tip and break contact of jack 114, tip of jack 115, tip of plug 121, through the subscriber's upper loop conductor, through the shunt comprising resistance 124 and condenser 125 around the open contacts of key 122, through the winding of sounder 123, through the lower conductor of the subscriber's loop, sleeve of jack 115, tip of jack 116, make contact of jack 116 to ground. When relay 107 armature is operated to the left-hand contact, positive battery is supplied through the circuit last traced. The 23-cycle positive and negative reversals are passed through the condenser in the shunt path to operate the sounder. The operator inserts plug 127 into jack 112 and removes it intermittently to interrupt the sounder signal. The operator at the telegraph subscriber's station is instructed to close the key in response to the vibrating sounder signal. The closing of the key is indicated by the movement of the needle due to increased current through the loop when the closed key short-circuits the shunt path through the resistance and condenser. When the meter indicates that the key at the subscriber's station has been closed, plugs 121, 117, 126 and 127 are removed and the circuit is restored to its original condition.

Only one subscriber's station is shown connected to the subscriber's loop. It is understood that more than one station circuit may be connected to the loop. As arranged herein, positive and negative 130-volt battery is connected alternately to the armature of relay 107 while the other end of the circuit is connected to ground at the make contact of jack 116. As thus connected it has been found that with a $\frac{3}{8}$ mf. condenser and a 300-ohm resistance the circuit operates effectively with loops up to 12 miles. With a slight rearrangement readily possible to one skilled in the art, namely, with positive and nega-

tive 130-volt battery oppositely poled at each end of the circuit, the circuit will operate effectively with loops up to 24 miles.

What is claimed is:

1. In a telegraph system, a polar relay, an armature and a pair of contacts thereon, batteries of opposed polarities connected between ground and each of said contacts, a series circuit extending from said armature through a telegraph loop circuit including a shunt around the open contacts of a telegraph key and a station sounder to ground and means for operating said armature to engage said contacts alternately to operate said sounder as an alarm to indicate that said key contacts are open.

2. A telegraph system according to claim 1, a meter in said circuit to indicate that said open contacts have been closed.

3. A telegraph system according to claim 1 wherein the means for operating said armature includes a transmitter-distributor connected to a winding of said polar relay.

4. In a telegraph system, a central switching station, a local telegraph station, a telegraph loop connecting said stations, a telegraph key, a pair of cooperating contacts normally closed when said key is idle on said key, an electrical circuit comprising a condenser shunting said contacts and a telegraph sounder, said key, condenser and sounder all connected to said loop at said local station, a plurality of operators' positions at said central station, a circuit for supplying alternate pulsations of positive and negative electromotive force common to said positions, individual outlets in said common circuit at each of said positions and flexible means comprising jacks and plugs also at each of said positions for interconnecting one of said outlets and said loop to operate said sounder when said key is inadvertently left open.

5. In a telegraph system, a central switching station, a plurality of operators' positions thereat, a signal supply circuit common to said positions, outlets connected to said supply circuit individual to said positions, a telegraph subscriber's station circuit, a telegraph line circuit connecting said station circuit to said central station, a telegraph key with contacts inadvertently open at said subscriber's station, a shunt path comprising a resistance and a condenser around said contacts, a telegraph sounder in series with said contacts in said line circuit, a series jack circuit also at said central station, means for flexibly interconnecting said supply circuit to said station circuit through said series jack circuit, to operate said sounder when said key is open, and meter means at said central station for indicating that said key has been closed.

6. In a telegraph switching system, a central switching station, a signal supply circuit, a series jack circuit and a meter circuit thereat, a local telegraph station circuit, a telegraph key, contacts on said key inadvertently open, a condenser shunting said contacts, and a telegraph sounder all in said local station circuit, means for connecting said supply circuit, said jack circuit, said meter circuit and said station circuit all in series, means in said connected circuit for operating said sounder as a signal to close said key and to indicate on said meter that said key has been closed.

7. In a telegraph system, a transmitter-distributor, a polar relay, an armature thereon, a neutral relay, a first jack, a second, third, and fourth jack, a telegraph loop, a station circuit in

5 said loop, a telegraph key with a pair of contacts thereon, and a sounder in said station circuit, a shunt including a condenser around said key contacts, a meter, means for establishing a series circuit including said armature, all of said jacks, said loop and said meter and means including said neutral relay and said transmitter-distrib-

utor for impressing alternate pulses of opposed battery on said armature through said condenser to operate said sounder when said contacts are open and to indicate on said meter when said contacts are closed.

FRANK H. HANLEY.