

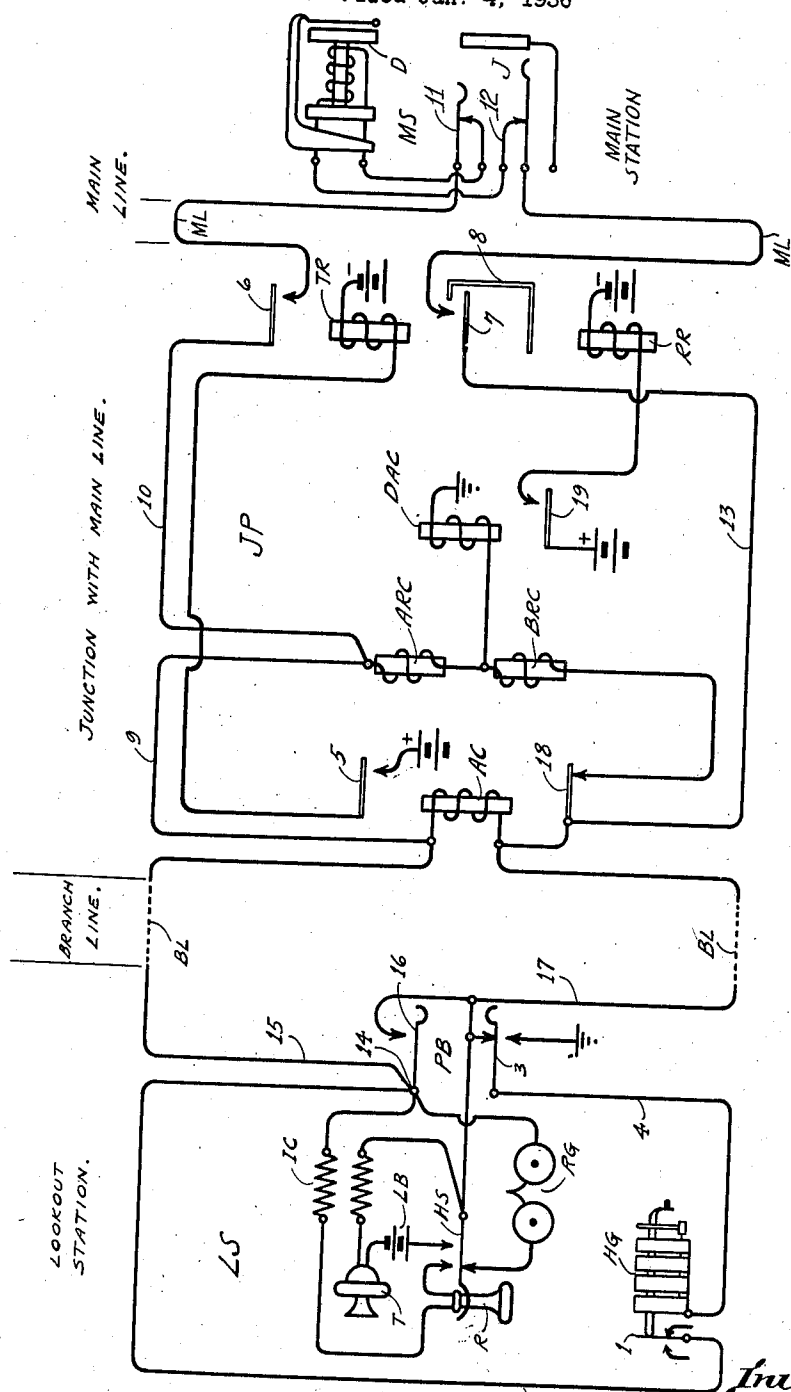
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TELEPHONE SYSTEM

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TELEPHONE SYSTEM

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This invention relates to telephone systems and relates more particularly to those types of telephone systems which comprise a main line extending from a main station to which are connected a plurality of branch lines each leading to several stations.

Systems of this type have been in use for some time in remote regions, such as national parks or the like, for the reporting of fires by the forest rangers. They usually comprise a main station which is the rangers' headquarters and a main line extending therefrom. To this main line are connected numerous branch lines to each of which are connected a number of telephones located at look-out stations.

The telephone sets located at the respective look-out stations can be used to call the main station only for the reporting of a fire or any routine report and cannot be connected to another station on another branch line unless both stations signal the main station at the same time.

One of the problems in systems of this kind has been the maintenance of the efficiency of the system should some accident take place on one of the branch lines. Often in systems of this kind an accident on one branch line prevented any of the stations on any of the other branch lines from signaling the main station, due to the fact that grounds and short-circuits on the branch line in trouble would absorb all the ringing current from the calling station on the other branch line.

Another difficulty arose when a large number of branch lines were connected to the main line in which case the line resistance became so great that all the ringing current from the calling station was absorbed in the line and the signal at the main station was not operated.

My invention has overcome these difficulties by providing means for connecting and disconnecting a branch line to and from the main line when it is desired to place a call at the main station.

A feature of my invention is the provision of switching means at the junction of a branch line and main line for connecting and disconnecting the two lines.

Another feature of my invention is the provision of means at the branch station for operating the switching means at a remote point.

Other features will become apparent from a perusal of the following specification and claims taken in connection with the drawing which illustrates schematically the telephone system of my invention.

Referring more particularly to the drawing, the part at the extreme left marked "look-out station" comprises the usual magneto telephone substation equipment, including a transmitter T, receiver R, hookswitch HS, local battery LB, induction coil IC, ringer RG, and hand generator HG. A push button PB is also provided. A branch line shown in dotted lines connects the telephone set located at the look-out station LS to the junction of the main line and the branch line. This branch line BL may be several miles in length and numerous other look-out stations such as LS may be connected thereto in parallel.

The apparatus at the junction point JP comprises an alternating current relay AC and a disconnecting alternating current relay DAC, a trip relay TR which connects the branch line conductors to the main line conductors, and a restoring relay RR. Retard coils ARC and BRC are connected across the line conductors and serve to balance the two sides of the line and to prevent any losses during the transmission period. The current supply for the relays is furnished from a single non-grounded battery which is shown as separate batteries for the purpose of convenience.

The main line conductors ML extend from the junction point JP to the main station MS where they terminate in contacts of a jack J. A drop signal D is also provided at the main station. The main line ML may also be many miles in length and pass through numerous other junction points JP.

The operation of the system is as follows: Should an attendant at the look-out station LS desire a connection with a main station MS he will turn the crank of the hand generator HG which causes alternating current to be impressed upon both sides of the line in series with the alternating current relay AC located at the junction point JP, which relay is operated by this current flowing from the contact 1 of the generator HG, conductor 2, branch line BL, the winding of the alternating current relay AC, branch line BL, normally closed contact 3, push button PB, conductor 4, to the hand generator HG. The relay AC operates and closes its contact 5 to establish an obvious energizing circuit for the trip relay TR, which closes its alternate contacts 6 and 7 to connect the branch line conductors to the main line conductors ML. A locking member 8 holds the contacts 6 and 7 of relay TR in their alternate position after the relay TR has restored due to the opening of the

contact 5 upon the restoration of the relay AC after the application of ringing current to the branch line from the generator HG has stopped.

However, the attendant at the look-out station LS again operates the hand generator to apply ringing current over the branch line BL, through the juncture point JP, and the main line ML to operate the signal or drop D located at the main station MS. This current can be traced from contact 1 of the hand generator HG, conductor 2, branch line conductor BL, conductors 9 and 10, alternate contacts 6 of TR, main line conductor ML, closed jack contact 11, through the winding of the drop signal D, closed jack contact 12, main line conductor ML, alternate contact 3 of relay TR, conductor 13 branch line conductor BL, normal contact 3 of push button PB, conductor 4 to the other side of the generator HG. Current flowing through the winding of the drop signal DS actuates the signal to inform the attendant at the main station that a call has been made by some look-out station.

After operating the hand generator HG the attendant at the look-out station LS removes the receiver R from the hookswitch HS and thereby connects the telephone transmitter and receiver to the jack at the main station over the circuit previously described for the ringing current.

After the conversation is terminated the attendant at the station LS replaces the receiver R upon the hookswitch HS and thereby disconnects the telephone apparatus from the line. He next operates the push button PB and cranks the hand generator HG to place grounded generator current on both sides of the branch line BL. The disconnecting alternating current relay DAC is operated by this current over a circuit which can be traced from ground at alternate contact 3 of push button PB, conductor 4, through the hand generator HG and contact 1, conductor 2, to the contact 14 of push button PB. At this point the current divides, part of it passing through conductor 15, branch line conductor BL, conductor 9, retard coil ARC, through the winding of the disconnect relay DAC to ground, the other half of the current proceeding through alternate contact 16 of push button PB, conductor 17, branch line conductor BL, normal contact 18 of relay AC, through the retard coil BRC and the winding of relay DRC to ground. The alternating current relay AC is not operated by this current as it has ground potential on each side of its winding. The relay DAC operates and closes its alternate contact 19 to establish an obvious energizing circuit for the restoring relay RR which relay operates and moves the locking member 8 to permit the contacts 6 and 7 of relay TR to restore to normal and thereby disconnect the branch line from the main line conductors.

My invention thus provides a cheap and efficient system which permits the ready connection of a branch magneto telephone line to a main line even though the calling station is located at a point remote from the junction of the two lines and also provides for the disconnection of the branch line from the main line at all times, except during the relatively short time when conversation is taking place. Thus the efficiency of the telephone system is greatly increased as trouble on one particular branch line does not impair or destroy the operation of the stations on the other branch line or on the main line.

While I have described my invention in cer-

tain particular embodiments alterations and modifications may be made thereto and I intend no limitations upon my invention other than those imposed by the scope of the appended claims.

Having described my invention, what I claim is new and desire to secure by United States Letters Patent is:

1. A telephone system comprising a main line, a main station on said line, a plurality of branch lines associated therewith at junction points remote from said main station, a station on each of said branch lines, a signal at said main station, relay means at said junction points for connecting said branch lines to said main line, signaling means at said branch line stations for first operating said connecting means at said junction points and for then operating said signal at said main exchange.

2. A telephone system comprising a main line, a main station on said line, a plurality of branch lines associated therewith at junction points remote from said main station, a station on each of said branch lines, a signal at said main station, relay means at said junction points for connecting said branch lines to said main line, signaling means at said branch line stations for first operating said connecting means at said junction points and for then operating said signal at said main station, and further means at said branch line station for restoring said connecting means at said junction point.

3. A telephone system comprising a main line and a branch line, a junction point for said lines, a station on said main line, said junction point being remote from said line station, a signal at said main line station, a station on said branch line, relay means at said junction point for connecting said branch line to said main line and for disconnecting said lines, signaling means at said branch line station for operating said relay means to connect said lines, for operating said signal at said main station, and for operating said relay means to disconnect said lines.

4. A telephone system comprising a main line and a branch line, a junction point for said lines, a station on said branch line, a station on said main line, said junction point being remote from said main line station, a signal at said main line station, relay means at said junction point for connecting said branch line to said main line and for disconnecting said lines, signaling means including a source of current at said branch line station for operating said relay means to connect said lines, for operating said signal at said main station, and for operating said relay means to disconnect said lines.

5. A telephone system comprising a main line and a branch line, a junction point for said lines, a station on said branch line, signaling means including a source of alternating current at said branch line station, relay means at said junction point comprising a relay having contacts for connecting said branch line to said main line and an alternating current relay responsive to said signaling means for controlling said connecting relay, a second alternating current relay responsive to said signaling means and a disconnect relay, controlled by said second alternating current relay, for restoring the contacts of said connecting relay to disconnect said branch line from said main line.

6. A telephone system comprising a main station, a main line extending therefrom, a plural-

ity of junction points located at separated positions along said main line, branch lines extending from said junction points, respectively, a branch station on each of said branch lines, a source of current at each of said branch stations, means at each branch station for projecting current from said source over the two conductors of said branch line in series, means at the junction point of each branch line responsive to the flow of current over its conductors in series for connecting said branch line to said main line, means for maintaining said connection, means at each said branch station for projecting current from its said source over the two conductors of said branch line, in parallel, and means responsive to the flow of current over said conductors, in parallel, for disconnecting said branch line from said main line.

7. A telephone system comprising a main station, a main line extending therefrom, a plurality of junction points located at separated positions along said main line, branch lines extending from said junction points, respectively, a branch station on each of said branch lines, a source of alternating current at each of said branch stations, means at each branch station for projecting current from said source over the two conductors of its said branch line in series, means at the junction point of each branch line responsive to flow of current over its two conductors in series for connecting said branch line to said main line, mechanical means for maintaining said connection, means at each said branch station for projecting current from said source over the two conductors of its said branch line, in parallel, and means responsive to the flow of current over said conductors, in parallel, for

disconnecting said branch line from said main line.

8. A telephone system comprising a main station, a main line extending therefrom, a junction point located on said main line, a branch line extending from said junction point, a branch station on said branch line, a source of current at said branch station, means at said branch station for projecting current from said source over the two conductors of said branch line in series, means responsive to said current for connecting said branch line to said main line, means for maintaining said connection, means at said branch station for projecting current from said source over the two conductors of said branch, in parallel, and means responsive to the flow of current over said conductors, in parallel, for disconnecting said branch line from said main line.

9. A telephone system comprising a main station, a main line extending therefrom, a junction point located on said main line, a branch line extending from said junction point, a branch station on said branch line, a source of current at said branch station, means at said branch station for projecting current from said source over the two conductors of said branch line in series, means responsive to said current for connecting said branch line to said main line, mechanical means for maintaining said connection, means at said branch station for projecting current from said source over the two conductors of said branch line, in parallel, and means responsive to the flow of current over said conductors, in parallel, for disconnecting said branch line from said main line.

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