

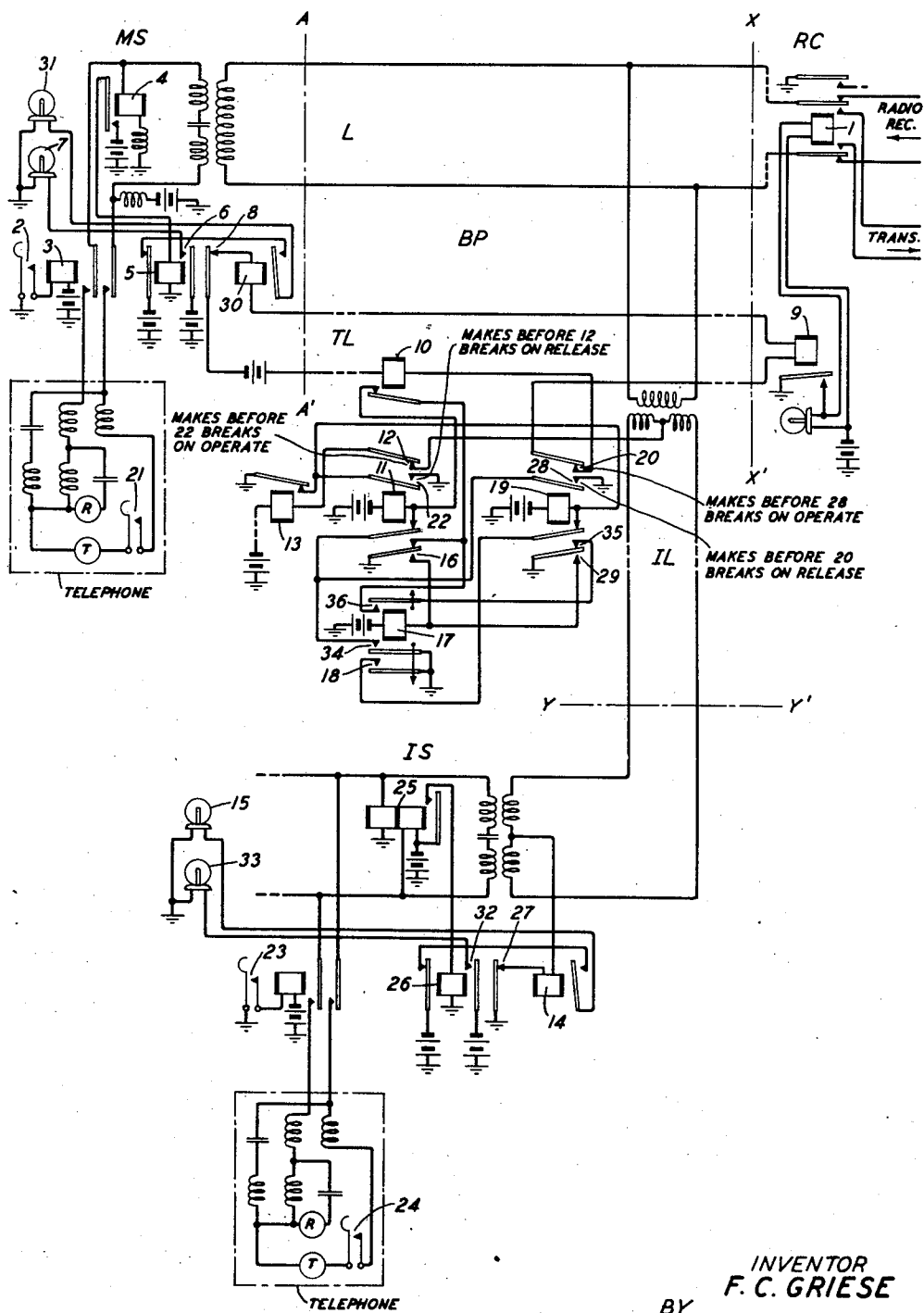
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REMOTE CONTROL SYSTEM

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REMOTE CONTROL SYSTEM

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4 Claims. (Cl. 175—320)

This invention relates to radio communication systems and more particularly to facilities for providing two-way communication at a telephone station, via land wires and a distant radio receiver and transmitter, employing a so-called closed loop channel for controlling from the telephone station the connection of either the radio transmitter or the radio receiver to the telephone station via the land wires.

Specifically the invention relates to means, including an auxiliary closed loop channel to enable an intermediate telephone station, off the route of the main control channel, to open and close the main control loop and to also provide means whereby opening and closing the main loop at the main station will open and close the auxiliary or branch loop.

The invention will be understood from the following description when read in connection with the accompanying drawing which shows to the left of the broken line AA', a main telephone station MS connected by means of a speech transmission line L, and a closed loop switching control circuit TL, with a distant radio switching point RC shown to the right of the vertical broken line XX'. Intermediate the broken lines AA' and XX' is shown an intermediate switching point BP on the route of the lines L and TL from which point a line IL extends to an intermediate telephone station IS below the broken line YY'.

Referring to the drawing it will be understood that the speech transmission line L is normally connected, as shown, to the radio receiver circuit over the normal or back contact of the control relay 1 and is connected to the radio transmitter by operation of this relay.

When the telephone at the main station MS is connected to the line L, as for example by operating the listening key or switch 2, which causes relay 3 to operate and close its armature contacts, the attendant can listen or receive speech signals incoming over the line L from the distant radio receiver. When the attendant desires to talk, i. e., to send out speech signals from the distant radio transmitter, he operates the so-called "press-to-talk" button or key 21, usually located at a convenient point on the telephone instrument, thereby energizing his transmitter T in series with relay 4 in a circuit which is obvious. Relay 4 in operating closes a circuit to operate relay 5 which by closing its contacts 6 lights pilot lamp 7 at the station MS and by opening its contacts 8 opens the normal closed switching control circuit TL which permits relay 9 at the distant radio control point RC to release

which in turn causes relay 1 to operate to transfer the speech transmission line L from the radio receiver to the radio transmitter. It will be noted that when the arrangement of the present circuit is put in service initially relays 10, 11, 13, 17 and 19 assume the condition shown on the drawing.

When switching loop TL is opened relay 10, in series therewith at point BP, releases thereby deenergizing normally operated relay 11 which is so constructed and arranged that its contact 22 makes before its contact 12 breaks on release of the relay the purpose of which is to insure that a holding circuit for relay 19 is closed before contact 12 opens to release relay 13, which is in series with an auxiliary simplex signaling circuit superimposed on the speech transmission line IL bridged across the main line L at the point BP and leading to an intermediate station IS, as otherwise relay 19 would release responsive to the release of relay 13 and, by opening its contacts 20, permit the opening of the main switching loop TL.

Opening the auxiliary simplex circuit at contacts 12 of relay 11 also causes relay 14 at the intermediate station to release which latter relay in releasing lights busy pilot lamp 15 thereat as an indication that the radio circuit is in use at the main station MS, i. e., that the attendant thereat has press-to-talk key 21 operated.

Relay 11 at the bridging point BP, in releasing, also closes its contact 16 thereby operating relay 17 which performs no useful function at this time.

Reclosure of the signal control loop TL and the consequent reoperation of relay 10, occasioned by the attendant at station MS releasing the press-to-talk key 21, closes its contacts in a circuit to reoperate relay 11 which can be traced from ground, contacts 35 of relay 19, contacts 36 of relay 17, and contacts of relay 10 to battery in series with relay 11. Relay 11 operated opens its contacts 16 to open the circuit of relay 17, recloses the auxiliary signal circuit at contacts 12 to operate relay 13 and removes ground from its contacts 22. Relay 17 is constructed so that it is slow to release thus guarding against the release of relay 19 if for any reason relay 13 fails to close its contacts before relay 11 opens its contacts 22. Reclosure of the auxiliary signal circuit reoperates relay 14 at the intermediate station thereby extinguishing the pilot lamp 15.

If the telephone set at the intermediate station IS is connected to the line by operation of the key 23, thereby establishing it in a listening or receiving condition, and the attendant wishes to control the distant radio transmitter, he will

operate the "press-to-talk" key 24 thereby operating relay 25, and in turn relay 26, which closes its contacts 32 to light pilot lamp 33. Relay 26 also opens its contact 27 to open the simplex circuit superimposed on line IL which releases relay 13 at the bridging point BP.

Release of relay 13 removes ground from relay 19 which relay is constructed in the same manner as relay 11 to insure that a holding circuit for relay 11 is maintained at its contacts 28. If this guard condition was not provided release of relay 19 would open the signal loop TL at its contacts 20 thereby releasing relay 10 which, by opening its contacts, would release relay 11 thus permanently opening the auxiliary signal circuit at its contacts 12. Relay 19 released opens at its contacts 20 the normally closed signal loop TL which acts as before described to transfer the speech line L from the radio receiver to the radio transmitter by releasing relay 9. Relay 19 further closes its contacts 29 thus energizing relay 17 which operates but accomplishes no function immediately.

When the loop circuit TL is opened, relay 30, at the station MS releases thereby causing pilot lamp 31 thereat to light as a signal that the intermediate station IS has taken control of the radio transmitter.

When the key 24 at station IS is released, relay 26 releases followed by the reoperation of relays 14 and 13. Relay 13 in operating recloses the circuit of relay 19 which operates and closes, at its contacts 20, the signal loop TL and also opens its contacts 29 thereby opening the operating circuit for relay 17 which relay however is slow to release and therefore maintains its contacts 34 closed for an interval sufficient to hold relay 11 operated until relay 10 in series in the signal loop has fully operated. Closure of the loop also operates relay 30 which extinguishes pilot lamp 31.

What is claimed is:

1. In a switching system, an originating station, a terminal station, a closed loop circuit therebetween, switching means at the originating station for opening said loop circuit thereat, a third station, a second closed loop circuit extending from said third station to a point in said first loop intermediate said originating and terminal stations, switching means at the third station for opening said second loop thereat, switching means responsive to opening and closing said first loop at the originating station to open and

close said second loop and other switching means responsive to opening and closing said second loop at the third station to open and close the first loop.

2. In a remote control system, a first control station, a controlled station including a controllable device thereat, a first closed loop circuit therebetween serially including a source of potential and said controllable device, switching means at the first control station for opening said loop circuit thereat, a second control station, a second closed loop circuit, including a second source of potential, extending from said second control station to a switching point in said first loop intermediate said controlled station and said first control station, switching means at the second control station for opening said second loop thereat, switching means responsive to opening and closing of said first loop at the first control station to open and close said second loop and other switching means responsive to opening and closing said second loop at the second control station to open and close the first loop.

3. In a signaling system, an originating station, a terminal station, a line therebetween, serially including a source of potential, switching means controlled at the originating station for normally closing said line thereat adapted when operated to open said line, electromagnetic switching devices in series with said line at the terminal station, a station intermediate said originating and terminal station, switching means controlled from said intermediate station for opening said line at a second point and means in said line responsive to opening said line at the originating station to prevent opening the line at said second point.

4. In a signaling system, an originating station, a terminal station, a line therebetween, means controlled at the originating station for normally closing the line thereat and adapted when operated to open the line, an electroresponsive device in series with said line at the terminal station, a station intermediate said originating and terminal station, intermediate switching means controlled from said intermediate station for opening said line at a second point and means in said line, responsive to operation of said means at the originating station while the line is closed at the second point for disabling said intermediate switching means and insure continuity of said line at the second point.

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