

Dec. 24, 1940.

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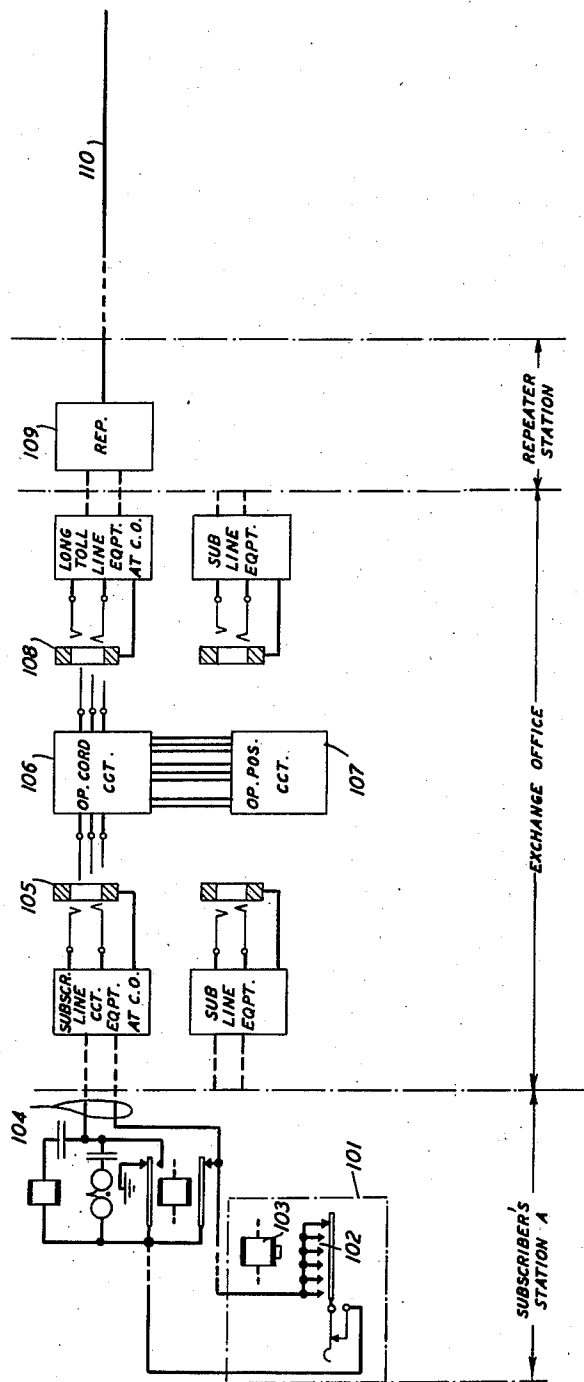
2,225,648

PRINTING TELEGRAPH SYSTEM

Filed Dec. 22, 1939

2 Sheets-Sheet 1

FIG. 1



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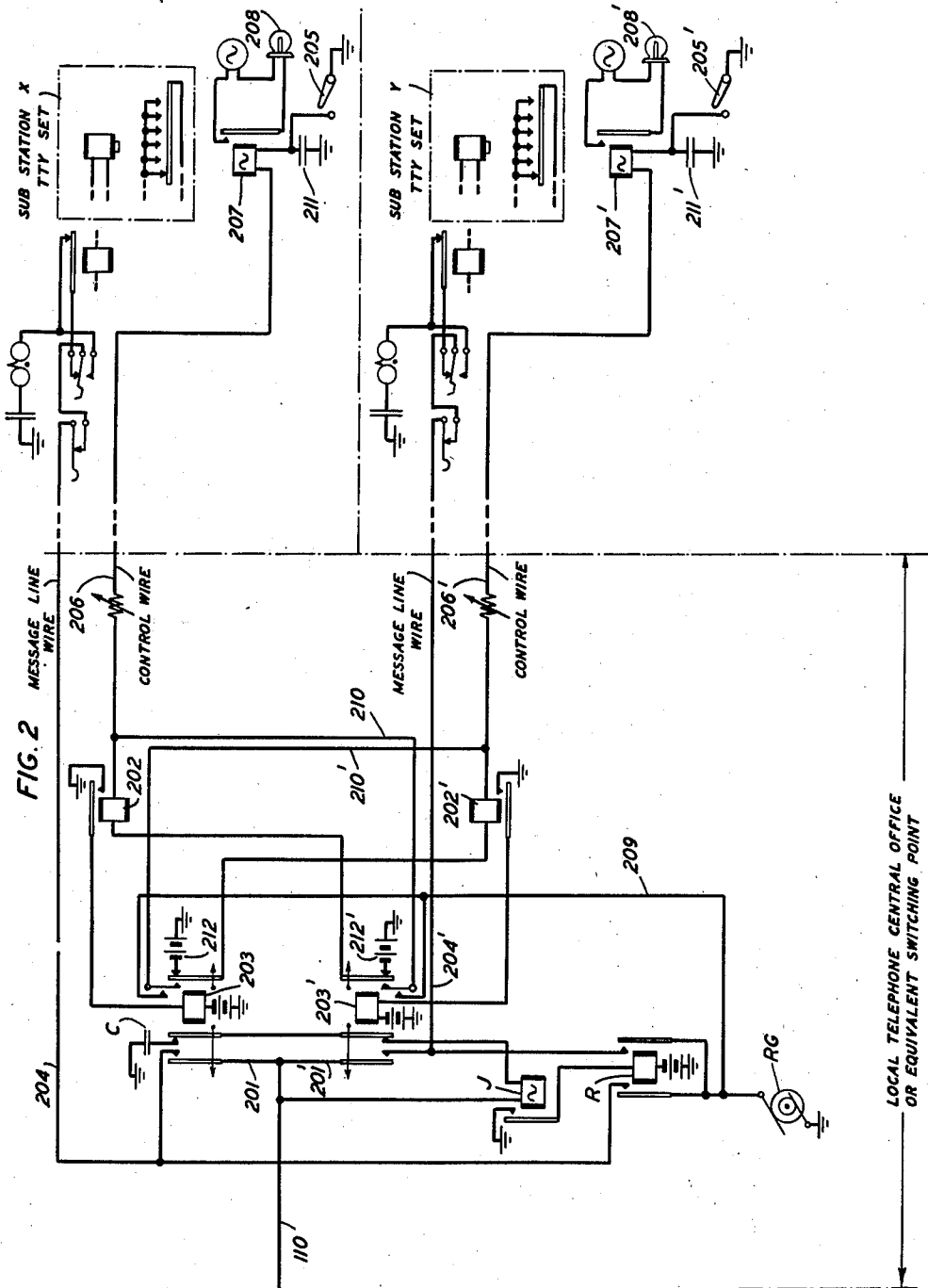
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2 Sheets-Sheet 2



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2,225,648

PRINTING TELEGRAPH SYSTEM

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Application December 22, 1939, Serial No. 310,504

7 Claims. (Cl. 179-4)

This invention relates to a communication system for transmitting signaling impulses over telegraph lines or channel of toll lines and more particularly to a telegraph system for connecting an outlying telegraph subscriber's station to a central switching office over a telegraph line or channel.

A telegraph system of this character permits the extension of telegraph lines, each of which may be connected to a plurality of subscribers' stations.

An object of the invention is to permit one of a plurality of subscribers' stations to be connected to a line extending to a repeater station which in turn is connected to a telegraph exchange office.

Another object of the invention is to lock out, or prevent, a subscriber's station from using a line when another subscriber's station is operatively connected to the same line.

According to the present invention, two or more subscribers' telegraph stations may be connected to a relay arrangement located in a switching center at a local telephone central office, the switching arrangement being connected to a toll line extension circuit that extends to one or more repeater stations connected to a distant telegraph exchange office. The relay arrangement is controlled either over a line circuit which extends from a repeater station, or from either of the subscribers' stations, depending upon the direction in which the call originates. The relay arrangement at a local telephone central office provides a combination of relay operated circuits whereby the subscriber at one station is prevented from establishing a connection to the exchange office when the other station is busy.

A feature of the invention is locating the switching equipment at a local telephone central office for maintenance purposes.

Another feature is the provision of lock-out relays in the switching arrangement for preventing one subscriber's station from seizing a line when the line is engaged by another subscriber's station.

The invention will now be described with respect to the accompanying drawings which illustrate the telegraph exchange system to which an embodiment of the invention may be satisfactorily adapted. The drawings are arranged into two figures:

Fig. 1 shows a distant telegraph exchange office connected on one side to a single telegraph subscriber's station and on the other side to a toll line extension circuit extending through a repeater at a distant point and a single conductor line outgoing to a telephone central office.

Fig. 2 shows the switching arrangement at a local telephone central office whereat the single

conductor line terminates, and two subscribers' lines connected thereto and extending to their respective subscribers' stations.

Referring to Fig. 1 of the drawings, a subscriber's teletypewriter set 101 at station A comprising the transmitting contacts 102 and printer magnet 103 of a teletypewriter is connected over a line 104 which terminates in jack 105 of the subscriber's line circuit equipment at the teletypewriter exchange office. The equipment at the subscriber's station A and at the termination of the line may be similar to that shown in Fig. 5 of U. S. Patent 2,143,000 granted to W. W. Cramer et al. on January 10, 1939. Line 104 may be one of a plurality, as shown, terminating at the switchboard at the teletypewriter exchange.

By means of the operator's cord circuit 106, the operator's position circuit 107 and jack 108, the subscriber's line 104 may be extended over a toll line extension circuit, the toll line extension circuit including jack 109, together with the terminating equipment adjacent thereto, repeater 109 and toll line 110. The repeater 109 may be located at a point distant from the exchange office. The operator's cord circuit 106 and the operator's position circuit 107 may be similar to those shown in Figs. 3 and 4, respectively, of U. S. Patent 2,143,000, supra. The terminating equipment connected to jack 108 at the exchange office may be similar to Fig. 8 or U. S. Patent 2,143,000, supra. The repeater 109 may be similar to the left side of Fig. 7 of U. S. Patent 2,143,000, supra.

The toll line 110 terminates in two parallel paths 201 and 201' for preparing connections to one or the other of the transmission circuits which respectively extend to the subscribers' station X and Y. The toll line extends also through the winding of relay J, contact and inner left armature of relay 203', inner left armature and contact of relay 203, condenser C to ground.

The ringing current generally applied at the switchboard at the distant teletypewriter exchange office when a connection is established, operates the alternating current relay J. Relay J, upon operating, closes an obvious operating circuit for relay R. Relay R operates and thereby, over its left armature and contact, applies ringing current from ringing generator RG to message line 204 and over its right armature and contact applies ringing current from the same generator to message line 204'. Code ringing, which is well known in the telephone art, is employed, that is, one pulse of ringing current is transmitted to call the subscriber at station X and two pulses to call the subscriber at station Y. The equipment at stations X and Y are identical. A description of the equipment at station X will suffice for a description of that at station Y. Corresponding parts of the equip-

ment located at the local telephone central office and at stations X and Y will hereinafter be designated by like reference characters, except that the parts associated with and located at station Y will be further designated by prime marks.

Relays J and R successively respond to the ringing current transmitted from the switchboard at the distant teletypewriter exchange office and relay R, in turn, supplies ringing current locally to both subscribers' stations X and Y. Assume that one pulse only of the ringing current is received. The subscriber at station X answers by turning on power switch 205 to close a circuit extending from ground through the winding of alternating current relay 207, control wire 206, through the winding of relay 202, right armature and back contact of relay 203' to grounded battery 212'. Relays 207 and 202 operate. Relay 207, upon operating, causes lamp 208 to light indicating to the subscriber at station X that a circuit through the local telephone central office has been obtained. Relay 202, upon operating, closes an obvious operating circuit for relay 203. Relay 203, upon operating, opens at its inner left armature and contact the incoming ringing current circuit for operating relay J and connects at its outer left armature and contact the message line wire 204 to the toll line 110. Also relay 203, upon operating, closes at both of its right front contacts, a circuit extending from grounded ringing generator RG, conductor 209, the two right front contacts of relay 203, conductors 210' and 206', through the winding of alternating current relay 207', condenser 211' to ground. Relay 207' operates to cause lamp 208' to operate indicating to the subscriber at station Y that toll line 110 is busy.

A lock-out feature is provided by relay 203 which, upon operating, opens at its right armature and back contact the operating circuit for relay 202' and therefore the subscriber at station Y cannot seize the toll line 110 because relay 203' cannot operate to provide a transmission path. The subscriber's teletypewriters at stations X and Y at which the message line wires 204 and 204' respectively terminate are of the type disclosed in Fig. 1 of U. S. Patent No. 2,143,000, supra.

METHOD OF OPERATION

Subscriber's station originates a connection

The system will now be described from the viewpoint of originating a call at station X. The subscriber at station X operates the power switch 205 to thereby close a circuit hereinbefore traced for operating relays 202 and 207. Relay 202, upon operating, operates relay 203 and operates and closes at its upper left armature and contact, a connection between the message line wire 204 and toll line 110 whereby a line lamp (not shown) associated with line 110 is lighted at the switchboard at the distant teletypewriter exchange office. The lighting of a line lamp in a switchboard at a teletypewriter exchange office is well known in the telephone art and is accomplished in the same manner as with single party operation or as shown and described in U. S. Patent 2,143,000, supra. Also relay 202 operates to thereby close an obvious operating circuit for slow release relay 203. Relay 203 operates and at its right front contacts closes a circuit from grounded ringing generator RG, conductor 209, the two right front contacts of relay 203, conductors 210' and 206', through the winding of alternating cur-

rent relay 207', condenser 211' to ground. Relay 207' operates and lamp 208', in turn, lights to indicate to the subscriber at station Y that toll line 110 is connected to subscriber's station X. In addition to the busy lamp, such as that designated 208' at station Y, the idle subscriber's station, such as station Y in this case, is prevented or locked out from establishing a connection by the disconnection of the grounded battery, such as that designated 212, from the start circuit 10 closed by the operation of the power switch at the idle station.

The operator at the distant teletypewriter exchange office, upon observing the usual signal indicating an incoming call, inserts the answering 15 plug of her cord circuit into the jack associated with the operated signal and challenges the subscriber at station X by typing "OPR" on the teletypewriter at the operator's position circuit. The subscriber upon observing the letters "OPR" operates the teletypewriter at station X to transmit signals to the operator indicating the name or number of station X and the number of the called station. The operator then by means of the calling end of the operator's cord circuit connects 25 the calling line to the line of the called party and transmits ringing current to the station of the called party. All these functions are well known in the art.

Call originating at distant teletypewriter exchange office

Assume that a call originates at a distant subscriber's station, such as station A connected directly to a distant teletypewriter exchange office, ringing current is received over single conductor toll line 110 at the local telephone central office to operate relay J as hereinbefore described. Relay J upon operating causes the ringing relay R to operate and to thereby connect ringing generator RG over the right-hand armature and contact of relay R to conductor 204' and over the left armature and contact of relay R to conductor 204.

Inasmuch as stations X and Y are arranged for code ringing, the operator at the exchange office would transmit one pulse of ringing current to call the subscriber at station X and two pulses to call the subscriber at station Y. The ringer at each of the teletypewriters at stations X and Y would ring, but only that subscriber who would identify his code call would respond by operating his power switch such as that designated 205 at station X or 205' at station Y. The subscriber upon operating his power switch, say that designated 205', closes a circuit extending from ground, switch 205', through the winding of relay 207', conductor 206', through the winding of relay 202', right armature and back contact of relay 203 to grounded battery 212. Relays 207' and 202' operate. Relay 202', upon operating, operates relay 203'. Relay 203', upon operating, causes the message line wire 204' to be connected to toll line 110, opens the operating circuit for relay J and connects the ringing generator RG over conductor 209 and right front contacts of relay 203' to conductors 210 and 206 whereby alternating current relay 207 is operated to light busy lamp 208 indicating to the subscriber at station X that toll line 110 is connected to station Y.

The subscriber at station Y upon operating the power switch 205' also operates a start switch (not shown) to start the teletypewriter motor and to replace the teletypewriter in condition for the transmission and reception of signals. The

teletypewriter at station Y is now prepared to transmit and receive signals.

Break, recall and disconnect features

5 The break, the recall and the disconnect features are not affected by two-party operation and a recall from either station does not provide a means whereby the other station may take over the circuit providing a recall key rather than the
10 power switch is employed at each station for recalling. The operation of the recall opens the message line circuit but does not cause the release of relay 202 or 202' in the local telephone central office and therefore the circuit to subscriber station X or subscriber station Y respectively remain
15 locked out.

What is claimed is:

1. In a telegraph system comprising a teletypewriter exchange office, a switch center, a signal transmission circuit interconnecting said office and said switching center, a switching device for normally terminating said circuit at said switching center, a plurality of teletypewriter stations connectable to said device, means in said device responsive to signals incoming over said transmission circuit for controlling connections to each of said stations, operable means at each of said stations for causing one of said stations to be operatively connected through said device to
30 said signal transmission circuit for telegraphic communication purposes, and means responsive to the operation of the operable means at one of said stations to exclude the other station from a connection to said transmission circuit.

35 2. In a telegraph system comprising a teletypewriter exchange office, a source of signals at said office, a switching center, a signal transmission circuit interconnecting said office and said switching center, a switching device comprising
40 a source of signals for normally terminating said transmission circuit at said switching center, a plurality of teletypewriter stations, a plurality of circuit means, normally deenergized, for respectively connecting said plurality of stations to said device, circuit closing elements responsive to signals from the first-mentioned source to cause the second-mentioned source to intermittently energize said plurality of circuit means, operable means at each of said stations, electromagnetic means included in said device and respectively responsive to said operable means at said stations, other electromagnetic means included in said device and respectively responsive to the first-mentioned electromagnetic means, circuit
45 closing elements controlled by said other electromagnetic means for respectively connecting said stations to said transmission circuit for telegraphic communication purposes, another circuit closing element controlled by each of said other
50 electromagnetic means for causing one only of said stations at a time to be operatively connected to said transmission circuit, and an indicating instrument at each of said stations responsive to signals transmitted from the second-mentioned source for giving an indication at the other of said stations when said one station is operatively connected to said transmission circuit.

3. A telegraph system according to claim 2
70 wherein each of said circuit means for connecting said plurality of stations to said device comprise

for each station a control line controlled by one of said operable means and for controlling one of said electromagnetic means and one of said other electromagnetic means, and a message line arranged to be connected to said transmission circuit, only one message line at a time being connected.

4. A telegraph system according to claim 2 wherein said switching device which effects connection of said transmission circuit to any one of
10 said stations, comprising relays responsive to signals from the first-mentioned source for causing signals from the second-mentioned source to be transmitted over each of said plurality of circuit means to operate an audible signal at each of
15 said stations.

5. A teletypewriter exchange system comprising a central office, a switching center, a plurality of outlying stations, a transmission channel interconnecting said central office and said
20 switching center, a plurality of channels interconnecting said switching center and said outlying stations, respectively, a source of signals at said central office, at said switching center and at each of said outlying stations, switching means
25 at said switching center responsive to signals from the source at said central office for connecting said source at said switching center to each of the channels of said plurality, indicating means at each of said outlying stations responsive to
30 said sources at said switching center, manually operable means, operative at will at each of said outlying stations for operating said indicating means, and electromagnetic means at said switching center responsive to the operation of
35 said manually operable means at one of said outlying stations for connecting said one of said outlying stations through said switching center to said central office for communication purposes and for preventing the connection of another of
40 said outlying stations to said central office while said one of said outlying stations is busy.

6. A system of party line telegraphic service to a telegraph exchange comprising a central office, a pair of stations, a main line extending from
45 said central office to the region of said station over which said stations are to be given service, a switching point at which said main line is interconnected with local lines individual to said stations, means for calling said stations over said
50 main line, and means operable by assumption of operative positions by one of said stations to lock out the local line of the other station from operative association with said main line at said switching point.

7. In a telegraph system comprising a teletypewriter exchange office, a switching center, a signal transmission channel interconnecting said office and said switching center, a switching device for normally terminating said channel at
60 said switching center, a plurality of teletypewriter stations connectable to said device, said device being controllable to connect, under the control of current supplied over said transmission channel all said teletypewriter stations to said
65 transmission channel, and an instrument at each of said stations operable to disconnect the other of said stations from said transmission channel during the operation of said instrument.

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