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MANUAL TELEPHONE SYSTEM

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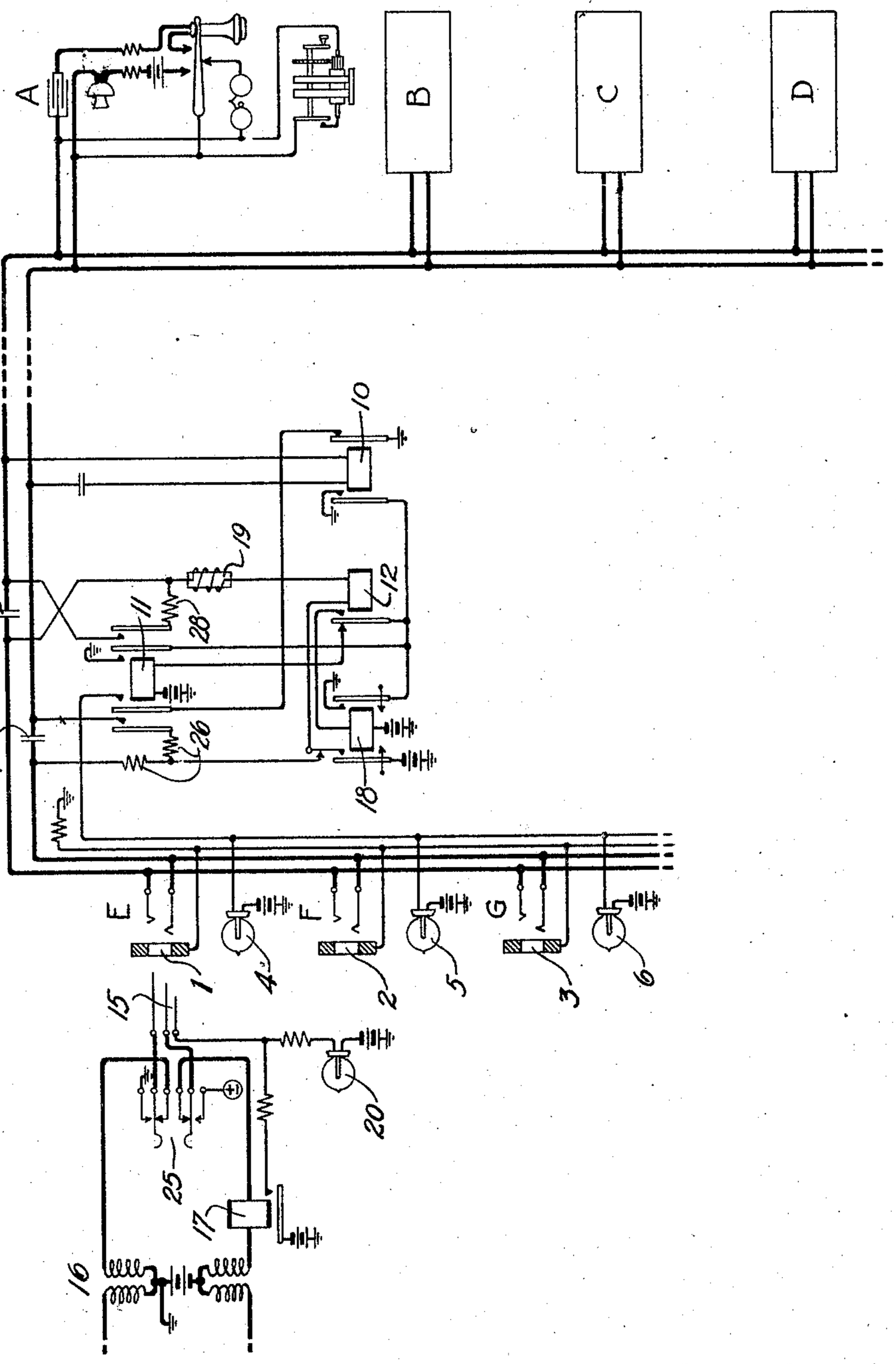

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MANUAL TELEPHONE SYSTEM.

Application filed December 12, 1925. Serial No. 75,010.

This invention relates to telephone systems and more particularly to improvements in central office circuits and rural or magneto lines.

In the copending application Serial No. 49,741, filed August 12, 1925, by Clarence B. Fowler, is disclosed means suitable for interconnection of rural lines with common battery lines through standard cord circuits. This system provides means for supervising such connections by intermittently displaying a signal at the central office terminal of a rural line when a subscriber on said line operates his generator; for displaying a steady signal after the subscriber has ceased to operate his generator; for intermittently displaying a signal when the subscriber reoperates his generator either as a recall or as a disconnect signal and for extinguishing the signal when the operator at the central office makes connection with this subscriber's line.

In systems of this type it is not ordinarily desirable to multiple the line signals to any positions other than the positions especially assigned for answering rural line calls that is, they are not multipled to positions where common battery lines are multipled as the method of supervising is not in accordance with the standard method.

It is an object of this invention to improve the supervisory signaling for rural lines so that these lines may be multipled at the switchboards in the same manner as common battery lines.

To attain this and other objects of the invention there is provided in accordance with one feature thereof, means whereby the line lamps of rural lines function in the same manner to supervise a connection as the lamps of lines of the common battery type. That is in accordance with this invention the line lamps will light steadily when a connection is desired and be extinguished when the call is answered.

The arrangement is such that when a rural subscriber actuates his generator to call a central office operator a condition is set up in the circuit at the central office that causes the line lamps to light steadily when the subscriber ceases to operate his generator. Consequently when one rural subscriber calls another on the same line the line lamps at the central office will be alternately lighted and extinguished in accordance with the code rung by the subscriber. The operator at the central office need not therefore ordinarily pay attention to flashing signals of the rural subscriber's line lamps but may supervise calls over those lines in the same manner as calls over common battery lines.

The drawing illustrates this invention as applied to a rural or magneto line of which one rural subscriber's set A has been shown in detail and others indicated by boxes marked B, C and D respectively. The common circuit equipment at the central office embodying this invention is also shown as well as multiple packs 1, 2 and 3 with corresponding line lamps 4, 5 and 6 shown respectively at operator's positions E, F and G from which connections desired by the rural subscribers on this line may be answered or at which connections to these rural subscribers may be made. The answering plug and a portion of an ordinary standard cord circuit for establishing connections with this rural line have also been shown.

To clearly bring out the various features of this invention, descriptions of the functions of the circuits shown, will be made; first, when a call is incoming over the line to the exchange and second, when a call is outgoing over the line from the exchange.

Considering that the rural subscriber at A operates the generator to establish a connection current from the generator will operate the alternating current responsive relay 10. Relay 10 in operating closes a circuit for relay 11 as follows: battery, winding of relay 11, armature and back contact of relay 12, inner upper armature and front contact of relay 10 to ground. Relay 11 in operating provides a locking circuit for itself from battery through its winding, armature and back contact of relay 12, inner right hand armature and front contact of relay 11 to ground. The operation of relay 11 also prepares a circuit for the lighting of lamps 4, 5 and 6 when the subscriber ceases to operate his generator, that is, when relay 10 is released a circuit is completed for lighting these lamps as follows: from battery through lamps 4, 5 and 6 in parallel, inner left hand armature and front contact of relay 11, right hand arma-

ture and back contact of relay 10 to ground.

It should be noted that if one rural subscriber decides to call another rural subscriber on the same line, relay 10 will be operated each time the calling rural subscriber operates his generator to ring the code of the wanted rural subscriber. When relay 10 first operates, relay 11 is operated and locked while lamps 4, 5 and 6 light on the first release of relay 10. At succeeding operations and releases of relay 10, lamps 4, 5 and 6 will be alternately extinguished and lighted. An operator at the central office noticing the flashing of the lamps in accordance with the code used will, as soon as the lamps finally remain lighted steadily, insert her plug such as 15, in a jack such as one to extinguish the lamps 4, 5 and 6 and immediately thereafter remove it. On the insertion of the plug into the jack a circuit will be established from battery through the lower right hand winding of repeating coil 16, supervisory relay 17, terminals of plug 15 and jack, 1, make-before-break contacts of relay 18, winding of relay 12, retardation coil 19, tip terminals of jack 1 and plug 15, upper right hand winding of repeat coil 16 to ground. This causes the operation of relay 12 which opens the connection through its armature and back contact to cause the release of relay 11.

If the line lamps 4, 5 and 6 do not flash but light steadily it indicates that a rural subscriber is calling and the operator will answer the call by inserting her plug 15 into jack 1 and this causes the extinguishing of lamps 4, 5 and 6 as previously described. The operation of relay 12 prepares a circuit for the subsequent operation of relay 18 as will be hereinafter described. It should be noted that with the answering plug 15 in jack 1, relay 17 will operate in the previously traced circuit through the tip and ring conductors and thus prevent the operation of the supervisory lamp 20 as is the usual practice.

The operator will now actuate her talking key in the usual manner to connect her telephone set to the cord and the rural subscriber will give the operator the desired number so that connection may be extended to the wanted subscriber and conversation carried on in the manner well known in the art.

After the conversation is finished the rural subscriber desiring to release the connection operates his generator thereby causing the operation of relay 10. It should be noted that in this case a connection is established through the operation of relay 12, for relay 18. This circuit may be traced as follows: battery, winding of relay 18, armature and front contact of relay 12, left hand armature and front contact of relay 10 to ground. Relay 18 in operating provides a locking circuit for itself under control of relay 12 as follows: battery, winding of relay 18, armature and front contact of relay 12, right hand armature and front contact of relay 18 to ground. The operation of relay 18, however, opens the circuit including the windings of relays 12 and 17 as its make-before-break contacts, so that relay 17 will now release while relay 12 will remain operated from battery, left hand armature and front contact of relay 18, winding of relay 12 over the tip conductors to ground at the upper right hand winding of repeating coil 16. The release of relay 17 causes the supervisory lamp 20 to light to call the operator's attention to the fact that the rural subscriber has rung off. The operator now removes plug 15 from jack 1, and relays 17 and 18 are returned to normal position while lamp 20 is extinguished.

If the rural subscriber instead of ringing off has decided to recall the operator, he will operate his generator in the same manner. After the operator has removed plug 15 from jack 1 and relay 18 has released, if the subscriber continues or again operates his generator, relay 11 will operate and on the ceasing of the ringing, lamps 4, 5 and 6 will be lighted as hereinbefore described.

If a connection is desired to a rural subscriber the operator will insert her plug 15 in jack 1 and in this case relay 12 will operate as previously traced. The operation of relay 12 in this case performs no useful function but the operator now actuates her usual ringing key 25 which causes the release of relay 12 and the transmission of ringing current over the line conductors. This operates the alternating current responsive relay 10 which causes the operation of relay 11. This latter relay in operating closes a path for the ringing current to facilitate the ringing of the wanted subscriber as follows: from the source of alternating current, key 25, over the ring terminals of plug 15 and jack 1, resistance 26, outer left hand armature and front contact of relay 11 to the ring conductor of the line around the condenser 27, through the bell of the wanted subscriber's line over the tip conductor of the line through resistance 28 the outer right hand armature and front contact of relay 11, around the condenser 29, tip terminals of jack 1 and plug 15 to ground at key 25. Relay 10 is released on the restoration of the key 25 to normal and relay 12 is reoperated causing the release of relay 11. The circuit is now in condition for conversation and for receiving of ringing off signals from the connected rural subscriber.

What is claimed is:

1. In a telephone system, a telephone line, a signal associated therewith, a source of current associated with said line, a second source of current, means responsive to

current from said first mentioned source for actuating said signal, said means actuated on the application of said current and actuating said signal upon the termination of the application, and means for restoring said signal to normal condition responsive to the application of current to said line from said second source.

2. In a telephone system, a telephone line, a signal associated therewith, a source of current associated with said line, a cord circuit, a signal associated therewith, a source of current associated with said cord circuit, means responsive to current from said first mentioned source for actuating said first mentioned signal, said means operating on the application of said current and actuating said signal upon the termination of the application, means for restoring said signal to normal condition responsive to the application of current from said second mentioned source on the connection of the cord circuit to said line, and means for operating said second mentioned signal after said cord circuit has been associated with said line responsive to the application of current from said first mentioned source to said line.

In witness whereof, we hereunto subscribe our names this 1st day of December A. D., 1925.

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