

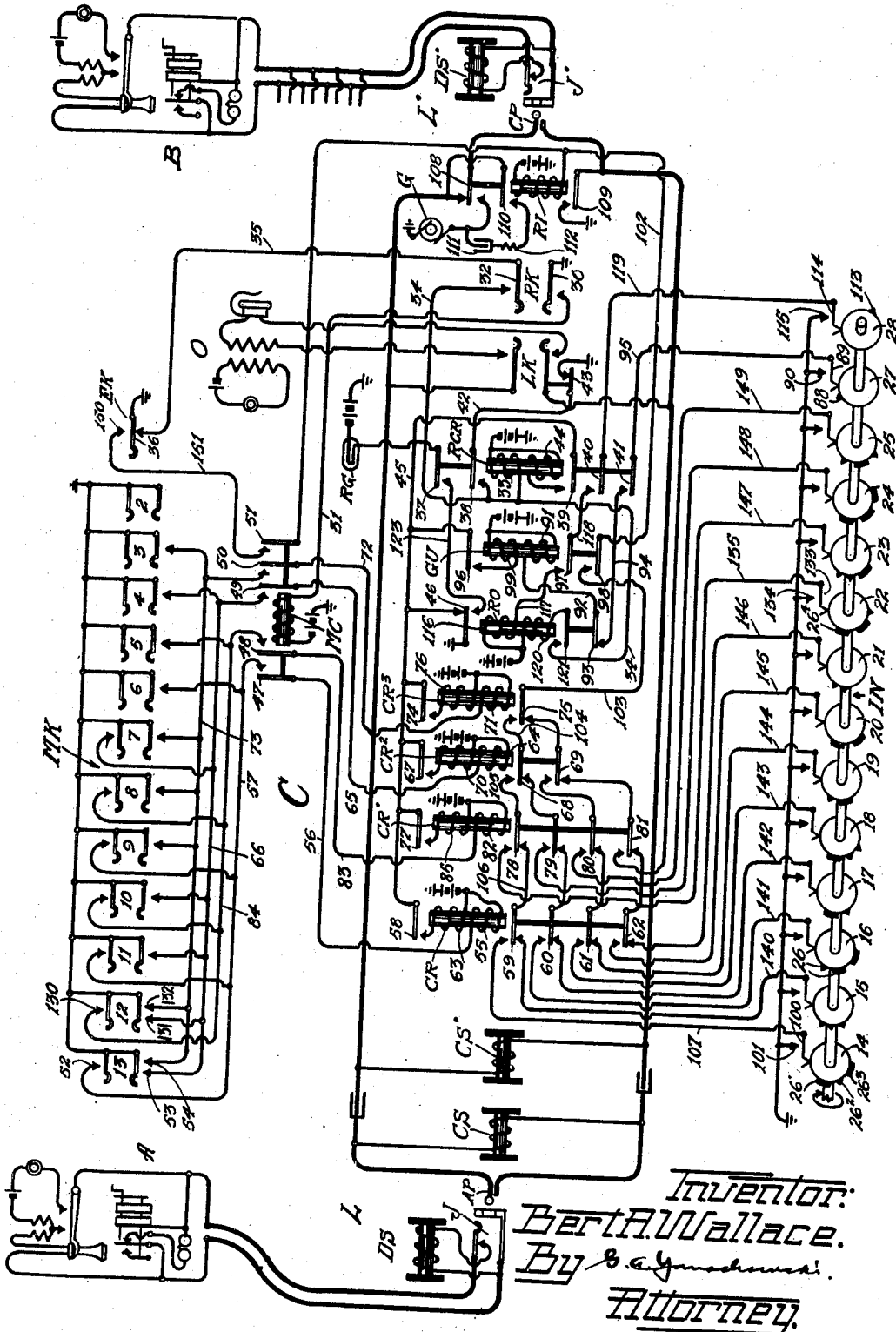
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TELEPHONE SYSTEM

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TELEPHONE SYSTEM

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My invention relates to code ringing apparatus such as is used in connection with telephone systems to ring the different stations upon a poly-station line and has to do more particularly with telephone systems of the type wherein so called code ringing is used. It has been the universal practice to manually code ring the different substations upon a poly-station line, but the manual method, especially in the case of a poly-station line which may have as high as twelve substations connected thereto, is slow and inaccurate for the reason that the different operators differently transmit the same code ring which causes confusion and the giving of false code rings. To overcome this inaccuracy I have arranged a code ringing mechanism which automatically transmits the code rings accurately with no other duty necessary on the part of the operator than to select the required code and then press the ringing key.

The principal object of my invention is to provide a simple, compact and inexpensive device to automatically code ring the stations on a poly-station telephone line, and a further object of my invention is the provision of means insuring the signaled station of the reception of the full code ring, regardless of the position in which the interrupter apparatus associated with the code ringing mechanism may be at the time the operator selects the desired code.

A still further object of my invention is the provision of means associated with the code ringing mechanism which after one complete code ring is transmitted automatically cuts off the ringing code. Another feature is the provision of visual signal means associated with the code ringing mechanism which notify the operator of the completed ring so she may supervise the connection and in case another application of the particular ringing code is necessary to again signal the called for subscriber she may again start the code ring.

The above features as well as others not specifically pointed out will be described in detail in the ensuing specification and appended claims.

For a more complete understanding of my invention reference may be had to the accompanying drawing in which I show the mechanical code ringing mechanism of my invention associated with a magneto cord circuit C for interconnecting magneto substations A and B which terminate respectively in line circuits L and L' at the exchange and which comprise respectively combined visual signals or drops DS and DS' and jacks J and J'. The magneto cord circuit C for interconnecting the magneto substations A and B comprises answering and calling plugs AP and CP and the usual clearing out drop signals CS and CS'. A listening key LK is also associated with the cord circuit C and when actuated connects the operator's set O to the cord conductors to enable the operator to inquire the wants of the calling subscriber or for the purpose of supervising a connection. A ringing key RK is also associated with the cord circuit C and when actuated operates means associated with the ringing code mechanism to applying the particular code ring selected to the called station of a poly-station line such as that with which the substation B is associated.

The cord circuit C is one of a plurality with which each position of an exchange switchboard is equipped as is well understood in the art and associated with a master ringing key MK which is common to the position with which the cord circuit C is associated. The master ringing key MK comprises twelve sets of springs 2 to 13 inclusive which are provided with push buttons for actuating the same. The springs 2 to 13 inclusive and associated push buttons are mounted in a single strip and are known in the art as the push button restoring type. A master ringing key MK is conveniently located in each position of an exchange switchboard, and the spring groups 2 to 13 inclusive which comprise the master key MK are associated with twelve combinations of codes, as will be more fully hereinafter described. The ringing key RK associated with the cord circuit C controls the operation of a master control relay MC and this master control relay MC in turn controls the operation of a group of code ring

connecting relays CR, CR', CR² and CR³ individual to the cord circuit C. The group of relays CR, CR', CR² and CR³ are energized in various combinations depending upon which of the keys 2 to 13 inclusive of the master ringing key MK is depressed to connect a certain code ring to a called line as will be more fully hereinafter described. A code ringing conditioning relay RCR, a ringing guard relay GU, and a ringing cut off relay RO, a ringing guard lamp signal RG and ringing interrupter relay RI are also associated with the cord C and are for purposes as will presently be described.

A constantly rotating interrupter IN common to the exchange switchboard has secured to its rotating shaft twelve disks 14 to 25 inclusive each of which is provided with a different number or combination of projections 26 to control the different code rings. The character of the code ring is dependent upon which of the keys 2 to 13 inclusive is depressed and the combination of relays CR, CR', CR² and CR³ which are actuated due to the actuation of a certain key of the master ringing key MK. A disk 27 is provided on the interrupter shaft, which prevents the splitting up of a code ring should a key associated with the master ringing key MK be depressed after the code has been started, and a disk 28 is also provided, which upon the completion of one complete code ring brings about the actuation of relay apparatus in the cord to automatically stop further application of the code ring.

Having described in general the apparatus comprising my invention I will now describe the circuit operation more in detail. The subscriber at the substation A desiring a connection operates the hand generator at the substation to operate the drop signal DS at the exchange to signal the operator. The operator associated with the cord circuit C noting the actuated drop signal DS inserts the answering plug AP into the jack J of the calling line and then actuates the listening key LK to connect the operator's set O to the cord conductors and inquires the wants of the calling subscriber at A. The insertion of the plug AP into the jack J restores the drop signal DS and disconnects it from the line conductors.

Assuming that it is the subscriber at the substation B that is wanted the operator inserts the calling plug CP into the jack J' of the wanted line, and assuming further that the character of the code ring to signal the subscriber at substation B is one long, one short and one long ring, the operator depresses the key 13 which is associated with this code ring as will be more fully hereinafter described to close its contacts 52, 53 and 54, and the operator after depressing the same holds it in its depressed position momentarily to maintain contacts 52, 53, and 54

in their actuated positions. The operator having depressed key 13 of the master ringing key MK now actuates the ringing key RK of the cord C and holds the same in its actuated position momentarily to start the code ring to signal the called for substation B. The ringing key RK is of the non-locking type as are also the individual keys 2, 3, 4 etc. of the master key MK and after the respective keys 13 and RK have been depressed they are held momentarily in their operated positions to condition apparatus associated with the cord circuit C, the operation of which will now be described. The closing of alternate contact 30 of the key RK closes an energizing circuit for the master control relay MC traced from battery through the winding of relay MC, conductor 31, to ground at alternate contact 30 of the key RK and the relay MC is held energized as long as the key RK remains in its actuated position. The closing of alternate contact 32 of the ringing key RK closes an energizing circuit for the code ring conditioning relay RCR traced from battery through the upper winding 33 of the relay RCR, conductor 34, alternate contact 32 of key RK, conductor 35 to ground at normal contact 36 of the emergency ringing key EK. The relay RCR energizing closes its alternate contacts 37, 38, 39, 40 and 41 and the closing of its alternate contact 38 establishes a locking circuit for itself traced from battery through the upper winding 33 of relay RCR, alternate contact 38, conductor 42 to ground at normal contact 43 of the listening key LK. Should the listening key LK be in its actuated position at the time the relay RCR is initially energized the locking circuit of the relay RCR will extend from battery through the lower winding 44 of relay RCR, its alternate contact 39, conductor 45 to ground at normal contact 46 of the ringing cut off relay RO, but with the listening key LK in its normal position locking circuits are established through both winding 33 and 44 as just described.

The master control relay MC having been energized as just described closes its alternate contacts 47, 48, 49, 50 and 51 and having assumed that the key 13 of the master ringing key MK is associated with the code ring signalling the called for substation B, the closing of alternate contacts 52, 53 and 54, of the key 13 close energizing circuits for certain of the group of four code ring connecting relays CR, CR', CR² and CR³. The closing of alternate contact 52 of the key 13 establishes a circuit for relay CR traced from battery through the lower winding 55 of relay CR, conductor 56, alternate contact 47 of relay MC, conductor 57 to ground at alternate contact 52 of the key 13. The relay CR energizing closes its alternate contacts 58, 59, 60, 61 and 62 and the closing of its alternate contact 58 establishes a locking circuit for itself

traced from battery through its upper winding 63, its alternate contact 58 and conductor 45 to ground at normal contact 46 of the relay RO. The closing of alternate contact 53 of the key 13 closes an energizing circuit for the relay CR² of the group of code ring connecting relays, traced from battery through its lower winding 64, conductor 65, alternate contact 49 of relay MC, conductor 66 to ground at alternate contact 53 of the key 13. The relay CR² energizing closes its alternate contacts 67, 68 and 69 and the closing of its alternate contact 67 establishes a locking circuit for itself traced from battery through its upper winding 70, its alternate contact 67 and conductor 45 to ground at normal contact 46 of relay RO. The closing of alternate contact 54 of the key 13 closes an energizing circuit for the code ring connecting relay CR³ traced from battery through the lower winding 71 of relay CR³, conductor 72, alternate contact 50 of relay MC, conductor 73 to ground at alternate contact 54 of the key 13, and the relay CR³ energizing closes its alternate contacts 74 and 75. The closing of alternate contact 74 of relay CR³ establishes a locking circuit for relay CR³ traced from battery through its upper winding 76, its alternate contact 74 and conductor 45 to ground at normal contact 46 of relay RO. The relays CR, CR² and CR³ having been energized and locked up due to the momentary depression of the key 13 of the master key group MK and the ringing key RK of the cord circuit C having been actuated momentarily to cause the energization and locking up of relay RCR, the release of the ringing key RK permits the relay MC to restore. The restoration of relay MC does not affect the relays CR, CR² and CR³ as they are locked up to ground at normal contact 46 of relay RO and relay RCR is not effected by the restoration of the key RK because relay RCR is locked up to ground at normal contact 43 of the ringing key LK and the restoration of the key 13 of the master key MK allows contacts 52, 55 and 54 to assume their normal position. With the relays CR, CR² and CR³ and relay RCR energized I will now describe how the code ring is applied to the called substation B. Assuming that the interrupter IN which is constantly rotating is in the position illustrated when the key 13 and the ringing key RK were depressed, the disk 27 rotating causes the projection 88 on the said disk 27 to move the spring 89 into engagement with the spring 90 to close an energizing circuit for the ringing guard relay GU traced from battery through the lower winding 91 of relay GU, conductor 92, normal contact 93 of relay RO, conductor 94, alternate contact 41 of relay RCR, conductor 95 to ground through closed contacts 89 and 90. The relay GU energizing closes its alternate contacts 96, 97 and 98 and the closing of its alternate

contact 96 establishes a locking circuit for relay GU traced from battery through the upper winding 99 of relay GU, its alternate contact 96 and conductor 45 to ground at normal contact 46 of relay RO. The master ringing key MK is provided with twelve groups of springs 2 to 13 inclusive which when the keys are depressed for code ringing move to their alternate positions to bring about the operation of certain combinations of the group of code ring connecting relays CR, CR', CR² and CR³. There are as many disks 14, 15 etc. provided with projections 26 as there are keys associated with the master ringing key MK and these disks 14, 15 etc. are provided with different combinations of projections 26 to control the code ringing. The group of relays CR, CR' etc. are energized in various combinations depending upon which of the keys 2 to 13 inclusive is depressed and each combination of energized relays CR, CR', etc. thus associates a certain disk of the interrupter IN to apply a predetermined code ring to a called line.

One long, one short and one long ring is the code ring for signally the called substation B and the operation of the relays CR, CR² and CR³ when the key 13 of the master ringing key MK is depressed, associate the disk 14 with the called line and as the interrupter IN continues to rotate the first projection 26' on the disk 14 engages the spring 100 and moves it into engagement with the contact 101, closing an energizing circuit for the ringing interrupter relay RI traced from battery through the winding of relay RI, conductor 102, alternate contact 98 of relay GU, conductor 103, alternate contact 75 of relay CR³, conductor 104, alternate contact 68 of relay CR², conductor 105, normal contact 78 of relay CR', which relay has not been energized, conductor 106, alternate contact 59 of relay CR, conductor 107 to ground through closed contacts 100 and 101. The relay RI energizing closes its alternate contact 108 to connect the ringing generator G to the called line B, the ringing circuit being traced from the generator G through alternate contact 108 of relay RI, the tip contacts of the connected plug CP and jack J' through the call bell at the called substation B, back through the sleeve contacts of the connected jack J' and plug CP to ground at alternate contact 109 of relay RI. The closure of alternate contact 110 of relay RI also connects current from the generator G through the condenser 111 and resistance 112 and alternate contact 110 of relay RI to the tip conductor of the cord C to give the calling subscriber at substation A an audible ringing signal as is well understood.

When the first projection 26' of the disk 14 disengages the spring 100 the said spring 100 moves to its normal position and disengages the spring 101 and this interruption of the

contacts 100 and 101 opens the energizing circuit of the ringing interrupter relay RI. When the second and third projections 26² and 26³ respectively engage the spring 100 to move the same into engagement with the spring 101 two more energizations and deenergizations of the relay RI are brought about to transmit two additional impulses of ringing current to the call bell at the substation B. Thus one long, one short and one long ring which we have assumed is the code ring of the called substation B are transmitted to the called substation B. Just before the completion of one revolution of the interrupter shaft upon which the disks are mounted, a projection 113 on the disk 28 engages a spring 114 and moves the same into engagement with a contact 115 which closes an energizing circuit for the ringing cut off relay RO traced from battery through the upper winding 116 of relay RO, conductor 117, alternate contact 97 of relay GU, conductor 118, alternate contact 40 of relay RCR, conductor 119 to ground through closed contacts 114 and 115. The relay RO energizing closes a locking circuit for itself traced from battery through its lower winding 120, its alternate contact 121, conductor 34, alternate contact 38 of relay RCR and over conductor 42 to ground at normal contact 43 of the listening key LK. The opening of normal contact 46 of relay RO opens the locking circuit of relay GU which restores to normal and the opening of its alternate contact 97 opens the initial energizing circuit for relay RO but as a locking circuit has been closed through its lower winding as just described, the said relay RO remains energized. The opening of contact 46 of relay GU also opens the locking circuit of relay RCR which extends through its lower winding 44 but the locking circuit through its upper winding 33 maintains the relay RCR energized to ground at normal contact 43 of the listening key LK. The opening of normal contact 46 of relay RO opens the locking circuits of the relays CR, CR² and CR³ and these relays now restore to normal. The closing of alternate contact 46 of relay RO establishes a circuit for the ringing guard lamp RG, traced from battery through the lamp RG, alternate contact 37 of relay RCR, conductor 123 to ground at alternate contact 46 of relay RO. The lamp RG is lighted over this circuit and gives the operator an indication that one complete code ring has been transmitted. The operator now supervises the connection by actuating the listening key LK to connect the head set O to the cord conductors. The listening key LK when actuated opens its normal contact 43 which interrupts the locking circuits of the relays RO and RCR and the said relays now restore to normal. If the called subscriber at substation B has not as yet answered the operator will restore her listening

key LK and again operate the key 13 and actuate the ringing key RK of the cord circuit C to again complete the cycle of operation as before described. The subscriber at B in response to the signal removes his receiver and the talking circuit may now be traced over the heavily marked conductors. The subscribers at the respective substations A and B upon the termination of their conversation replace their receivers upon their respective switch-hooks and then actuate the hand generators to operate the clearing out signals CS and CS'. The operator noting the two actuated drop signals CS and CS' knows that the conversation has terminated and removes the plugs AP and CP from their respective jacks J and J' and also restores the clearing out signals CS and CS'.

The disk 27 with its projection 88 acts as a guard against the splitting up of the different code rings and assuming that the operator has depressed the key 13 after the projection 88 on the disk 27 has passed the spring 89, no energization of the relay GU is brought about, as the energization of the relay GU is controlled by the contacts 89 and 90. The relay GU remaining at normal its alternate contact 98 remains open and no impulses of current are extended to the interrupter relay RI and therefore no ringing current is transmitted to the called line until the disk has completed a revolution. When the projection 88 again engages the spring 89 it is again moved into engagement with contact 90 to bring about the energization of relay GU and the closing of its alternate contact 98 will permit the ringing interrupter relay RI to be energized and deenergized to connect and disconnect the generator G to the called line to signal the called subscriber by the selected code ring.

Assuming that the key 12 of the master key MK is depressed the springs 130, 131 and 132 are moved to their alternate positions to close energizing circuits for certain of the relays of the group of relays CR, CR', CR², and CR³. The closing of contact 130 of the key 12 closes a circuit for relay CR' extending from battery through the winding 82 of relay CR', conductor 83, alternate contact 48 of relay MR (which is energized when the ringing key RK of the cord C is actuated as before described), conductor 84 to ground at alternate contact 130 of the key 12. Relay CR' is locked up through its winding 85, its alternate contact 77 to ground at normal contact 46 of relay RO. The closing of contacts 131 and 132 of the key 12 connect ground through the respective windings 64 and 71 of relays CR² and CR³ to energize the same and the locking circuits of the relays CR² and CR³ are the same as previously described and this combination of operated relays CR', CR² and CR³ associates the interrupter disk 22 with this combination which provides two long

rings and one short ring. Assuming that the interrupter IN is in the position as illustrated and the relays GU and RCR have been operated as before described the first impulse of current received by the relay RI will be when the first projection 26⁴ engages the spring 133 to move it into engagement with the spring 134 and this impulse extends from ground through the closed contact springs 133 and 134 associated with the disk 22, conductor 135, alternate contacts 78, 68 and 75 of relays CR¹, CR² and CR³ and over the previously described path of the relay RI and battery. The operation of the circuit from this point on is the same as previously described and further description is not thought necessary.

etc. connects only the interrupter disk associated with the energized combination to connect the said disk with the interrupter relay RI and this disk is the one that delivers the code ring associated with the key of the master ringing key MK that is depressed. It is also apparent that a plurality of keys may be depressed for extending ringing current from the cord circuits with which the master key group MK is common without interfering with each other.

I also provide an emergency ringing key EK which may be used by the operator of the cord circuit C to send a special code ring manually to a called line or for ringing an individual line. The key EK may also be used for code ringing the subscribers on a poly-station line should the mechanical code ringing equipment be out of order. To use the key EK to manually ring a subscriber on a poly-station line the said key EK is actuated to close its alternate contact 150 and the ringing key RK of the cord C is moved to its alternate position to close its alternate contacts 30 and 32. The closing of contact 32 of the key RK is only incidental but the closing of alternate contact 30 of the key RK closes an energizing circuit for the master control relay MC over a path previously described. The relay MC energizing its alternate contact 51 is closed and as the key EK has been moved to its actuated position and held in that position an energizing circuit for the ringing interrupter relay RI is established from battery through the winding of relay RI, conductor 102, alternate contact 51 of relay MC, conductor 151 to ground at alternate contact 150 of the key EK. The relay RI energizing closes its alternate contact 108 to connect the ringing generator G to the tip conductor of the cord C and with the calling plug CP in the jack of a called line ringing current is transmitted to operate the call bell at the called substation. The key EK may be operated to energize and deenergize the relay RI any number of times to transmit code ringing as is well understood.

While I have illustrated and described my invention with a particular form of cord circuit it is apparent that other forms of cord circuit may be used and that many changes and modifications may be made in the apparatus without departing from the spirit and scope of the same.

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

1. A telephone system including a poly-station telephone line, a connecting link circuit for connection to said line, code ringing apparatus associated with said link circuit, a master key associated with said link circuit comprising a plurality of keys for individually associating the different codes with said link circuit, a ringing key and a group of

Referring again to the combination of relays CR, CR² and CR³ which were energized when the key 13 of the master key group MK was depressed, I will now point out how only this selected code ring is impressed on the called line. The disk 15 rotating causes the projections thereon to close its associated spring contacts but these closures are only incidental and the conductor 140 extending from the closed spring contacts is not cut through as normal contact 59 of relay CR is open. The disk 16 also closes its associated contacts but the conductor 141 extending from the closed spring contacts is not cut through as normal contact 68 of relay CR² is open; the disk 17 closes its associated contacts but without effect as the conductor 142 extending from the closed spring contacts is not cut through as normal contact 60 of relay CR is open; the disk 18 closes its associated contacts but without effect as the conductor 143 extending from the closed spring contacts is not cut through as normal contact 75 of relay CR³ is open; the disk 19 closes its associated contacts but without effect as the conductor 144 extending from the closed spring contacts is not cut through as normal contact 61 of relay CR is open; the disk 20 closes its associated contacts but without effect as the conductor 145 extending from the closed spring contacts is not cut through as normal contact 69 of relay CR² is open and the disk 21 closes its associated spring contacts but without effect as the conductor 146 extending from the closed spring contacts is not cut through as normal contact 62 of relay CR is open. The disks 22, 23, 24 and 25 close their associated contacts but without effect as the conductors 135, 147, 148 and 149 extending from the closed contact springs of the respective disks 22, 23, 24 and 25 are not cut through as the relay CR is not energized and its alternate contacts 78, 79, 80 and 81 remain open.

From the foregoing description it is readily apparent that the code ringing is non-interfering and that each combination of energized relays of the group of relays CR, CR²

relays for said link circuit, and means responsive to an operation of said ringing key to associate a depressed key of said master key with said group of relays whereby a certain combination of said group of relays are responsive to connect the desired code ring to a substation on said poly-station line.

2. A telephone system including a poly-station telephone line, a connecting link circuit for connection to said line, code ringing apparatus associated with said link circuit, a master key associated with said link circuit comprising a plurality of keys for individually associating the different codes with said link circuit, a ringing key and a group of relays for said link circuit, means responsive to an operation of said ringing key to associate a depressed key of said master key with said group of relays whereby a certain combination of said group of relays are responsive to connect the desired code ring to a substation on said poly-station line, and means associated with said code ringing apparatus for disconnecting said code ringing from said connected line after one complete code ring has been transmitted.

3. A telephone system including a poly-station telephone line, a connecting link circuit for connection to said line, code ringing apparatus associated with said link circuit, a plurality of keys associated with said link circuit for individually connecting the different codes to said link circuit, a ringing key and a group of relays for said link circuit, means responsive to an operation of said ringing key to associate a depressed key with said group of relays whereby a certain combination of said group of relays are responsive to connect the desired code ring to a substation on said poly-station line, and means associated with said code ringing apparatus for insuring that any substation upon said line will receive a full code ring.

4. A telephone system including a poly-station telephone line, a connecting link circuit for connection to said line, code ringing apparatus associated with said link circuit, a plurality of keys associated with said link circuit for individually connecting the different codes to said link circuit, a ringing key and a group of relays for said link circuit, means responsive to an operation of said ringing key to associate a depressed key with said group of relays whereby a certain combination of said group of relays are responsive to connect the desired code ring to a substation on said poly-station line, and means associated with said code ringing apparatus controlling relay means in said link circuit for insuring that any substation upon said poly-station line will receive a full code ring.

5. A telephone system including a poly-station telephone line, a link circuit for connection therewith, code ringing apparatus, manually controlled springs, a group of se-

lecting relays controlled by said manually controlled springs to select the desired combination of said relays to associate the said code ringing apparatus with said line to permit the application of the necessary code to said line to ring the predetermined substation thereon, and means associated with said code ringing apparatus for disconnecting the said code ring from said line after one complete ring has been transmitted.

6. A telephone system including a poly-station telephone line, a link circuit for connection to said line, code ringing apparatus, selecting relays, manually controlled selecting apparatus for controlling said relays, means controlled by said relays for applying a ringing code from said link circuit to said telephone line to signal a desired substation on said line, and means associated with said ringing code for disconnecting the code ring from said line after one complete ringing code has been transmitted.

7. A telephone system including a poly-station telephone line, a connecting link circuit for connection to said line, code ringing apparatus associated with said link circuit, a plurality of keys associated with said link circuit for individually connecting the different codes to said link circuit, a ringing key and a group of relays for said link circuit, means responsive to an operation of said ringing key to associate a depressed key with said group of relays whereby a certain combination of said group of relays are responsive to connect the desired code ring to a substation on said poly-station line, and means associated with said code ringing apparatus controlling relay means in said link circuit for disconnecting said impressed code ring from said connected line after one complete code ring has been transmitted.

8. A telephone system including a poly-station telephone line, a connecting link circuit for connection to said line, a ringing current generator, a relay for connecting said ringing current generator to said line, code ringing apparatus associated with said link circuit comprising a plurality of keys for individually associating the different codes with said relay, a ringing key and a group of relays for said link circuit, and means responsive to an operation of said ringing key to associate a depressed key with said group of relays whereby a certain combination of said group of relays are responsive to connect the desired code with said relay to energize said relay according to the said desired code to connect said generator current to a substation on said poly-station line.

9. A telephone system including a poly-station telephone line, a connecting link circuit for connection to said line, a ringing current generator, a relay in said link circuit for connecting said ringing current generator to said line, code ringing apparatus asso-

ciated with said link circuit comprising a plurality of keys for individually associating the different codes with said relay, a ringing key and a group of relays for said link circuit, and means responsive to an operation of said ringing key to associate a depressed key with said group of relays whereby a certain combination of said group of relays are responsive to connect the selected code with said relay to energize the same according to the said selected code to connect the said generator ringing current to a particular substation on said poly-station line and means in said link circuit for disconnecting said connected code from said relay after one complete code ring has been transmitted.

10. A telephone system including a poly-station telephone line, a connecting link circuit for connection to said line, code ringing apparatus associated with said link circuit, a plurality of keys associated with said link circuit for individually connecting the different code interrupters associated with said keys to said link circuit, relay means and a ringing key for said link circuit, means responsive to an operation of said ringing key to associate a selected key with certain of said relay means which are responsive to connect a code interrupter associated with said selected key to means in said link circuit to operate said means according to the selected code to transmit the code ring to a substation on said poly-station line.

11. A telephone system including a poly-station telephone line, code interrupter apparatus, a group of selecting relays, manually controlled means for actuating said relays to select the desired code to be applied by said code interrupter apparatus, ringing means controlled by said relays for signaling the desired substation connected to said telephone line, and means associated with said code interrupter for disconnecting the same from said line after one complete ring has been transmitted.

12. A telephone system including a poly-station telephone line, a link circuit for connection therewith, code ringing apparatus, manually controlled keys, a group of selecting relays controlled by said keys to select the desired combination of said relays to associate the said code ringing apparatus with said line to permit the application of code ringing current to said line and signalling means for said link circuit responsive upon the termination of one complete application of said code ringing current.

13. A telephone system including a poly-station telephone line, a link circuit for connection therewith, code ringing apparatus, manually controlled springs, a group of selecting relays controlled by said manually controlled springs to select the desired combination of said relays to associate the said code ringing apparatus with said line to

permit the application of the necessary code to said line to ring the predetermined substation thereon, means associated with said code ringing apparatus for disconnecting the said code ring from said line after one complete ring has been transmitted and means for signalling the operator after one complete code ring has been transmitted.

14. A telephone system including a poly-station telephone line, a link circuit for connection to said line, code ringing apparatus associated with said link circuit, a plurality of keys for individually connecting the different codes to said link circuit, a ringing key and a group of relays for said link circuit, means responsive to an operation of said ringing key to associate a depressed key with said group of relays whereby a certain combination of said group of relays are responsive to connect the desired code ring to a substation on said polystation line, means associated with said code ringing apparatus for insuring the transmission of a full code ring to said polystation line and signalling means operable upon the completion of one full code ring to said line.

15. A telephone system including a poly-station telephone line, a link circuit for connection to said line, code ringing apparatus associated with said link circuit, a plurality of keys for individually connecting the different codes to said link circuit, a ringing key and a group of relays for said link circuit, means responsive to an operation of said ringing key to associate a depressed key with said group of relays whereby a certain combination of relays are responsive to connect the desired code ring to a substation on said polystation line, means associated with said code ringing apparatus for insuring the transmission of a full code ring to said polystation line, means for disconnecting the said code ring from said line after one complete code ring has been transmitted.

16. A telephone system including a poly-station telephone line, a link circuit for connection to said line, code ringing apparatus associated with said link circuit, a plurality of keys for individually connecting the different codes to said link circuit, a ringing key and a group of relays for said link circuit, means responsive to an operation of said ringing key to associate a depressed key with said group of relays whereby a certain combination of relays are responsive to connect the desired code ring to a substation on said polystation line, means associated with said code ringing apparatus for insuring the transmission of a full code ring to said polystation line, means for disconnecting the said code ring from said line after one complete ring has been transmitted and signalling means responsive to the operation of said disconnecting means.

17. A telephone system including a poly-

station telephone line, a link circuit for connection to said line, code ringing apparatus comprising a constantly rotating shaft, a plurality of disks secured thereto, cams of different combinations secured on said disks, a plurality of manually controlled keys, a ringing interrupter relay operable to connect ringing current to said line, a ringing key and a group of relays in said link circuit, means responsive to an operation of said ringing key to associate a depressed key with said group of relays whereby a certain combination of said relays operate and connect said ringing interrupter relay in a circuit controlled by a certain one of said disks on said shaft.

18. A telephone system including a polystation telephone line, a link circuit for connection therewith, code interrupter apparatus, a group of selecting relays, manually controlled means for actuating said relays to select the desired code to be supplied by said code interrupter apparatus, ringing means controlled by said relays for signalling the desired substation on said polystation line, means associated with said code interrupter for disconnecting the same from said line after one complete ring has been transmitted and means in said link circuit operable upon said disconnection to inform the operator of said disconnection.

Signed by me at Chicago, in the county of Cook and State of Illinois, this 26th day of January, A. D. 1928.

BERT A. WALLACE.