

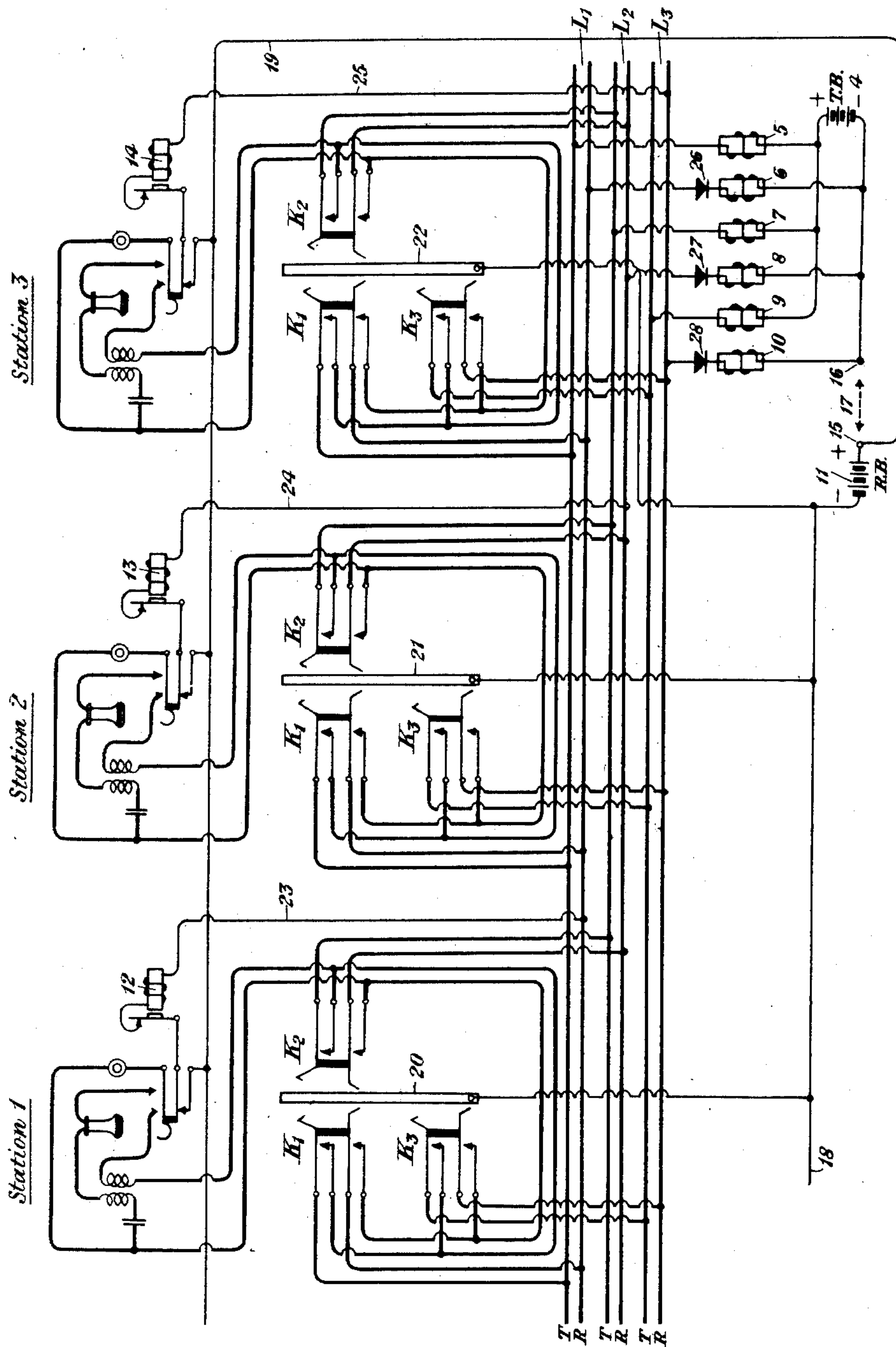
Feb. 19, 1929.

1,702,308

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INTERCOMMUNICATING SYSTEM

Filed Feb. 25, 1928



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## UNITED STATES PATENT OFFICE.

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## INTERCOMMUNICATING SYSTEM.

Application filed February 25, 1928. Serial No. 257,010.

This invention relates to improvements in intercommunicating systems, and more particularly to improvements in the ringing or signaling arrangements associated therewith.

5 In an intercommunicating system having a plurality of stations connected thereto, it is generally necessary to provide arrangements for preventing ringing current, transmitted when one station signals another station, from traversing stray paths and causing false operation of the signaling means at other stations. One of the methods for preventing such false operation has been to connect a conducting strap between the positive side of the ringing battery and the negative side of the central office battery and thus provide a means of shunting stray current paths which would otherwise tend to ring all other stations having their signaling circuits closed. It has been found that while such a strap connection might short-circuit these stray ringing paths, nevertheless it introduced an undesirable heavy drain on the ringing battery. In the arrangements of the present invention, the conducting strap is not utilized. Rectifiers, preferably of the contact type, are inserted in one side of each of the talking current supply circuits leading to each of the pairs of lines used for intercommunication. These rectifiers are poled so that the flow of talking current to the pairs of intercommunicating conductors is not hindered, but current in the opposite direction, due to the stray ringing paths, is largely reduced. Among the advantages of the arrangements of the invention over former systems, is a large reduction in the maintenance of the ringing battery dry cells by reducing their drain to approximately one-third of its previous value. A further advantage consists in the fact that for outside central office connections the arrangements of the invention permit using three-wire trunks with only one induction coil and condenser per trunk instead of providing this equipment at each station. Such arrangements have previously been considered unsatisfactory, due to the click produced by the excessive current required for ringing. A further advantage is that the signaling means at each station may consist of regular direct current apparatus instead of polarized apparatus. Further features and objects of the invention will

appear more fully from the detailed description hereinafter given.

The invention may be more fully understood from the following description, together with the accompanying drawing, in which is shown a circuit diagram embodying a preferred form of the invention.

In the drawing is shown an intercommunicating system having three pairs of intercommunicating conductors  $L_1$ ,  $L_2$ , and  $L_3$ . Three separate stations are shown, such as 1, 2, and 3. Each station would be provided with a set of switching means, such as the keys  $K_1$ ,  $K_2$ , and  $K_3$  for intercommunicating between each other. Each station would include signaling means, such as the buzzer arrangements 12, 13, and 14. A source 11 of ringing battery is provided for the signaling arrangements. To provide current for talking purposes, a talking battery 4 is shown. This is connected to the lines  $L_1$ ,  $L_2$ , and  $L_3$  through conductors including the retardation coils 5, 6, 7, 8, 9, and 10. In the negative leads from the talking battery to the pairs of intercommunicating conductors, are inserted the rectifiers 26, 27, and 28. These rectifiers may be of the contact variety and are so poled that they will readily transmit the current from the battery 4 to the lines.

The invention may be more fully understood from the following description of its operation. If the subscriber at station 1 desires to communicate with the subscriber at station 2, the key  $K_2$  at station 1 will be operated to its extreme position to make contact with bus-bar 20. This will close the following signal path: from the negative terminal of ringing battery 11, conductor 18, bus-bar 20, lower outer contact of key  $K_2$ , ring conductor of line  $L_2$ , conductor 24, signal apparatus 13, conductor 19, to the positive side of the ringing battery 11. This will operate the signaling device 13. In order to more fully understand the arrangements of the prior art, let it be assumed that the rectifiers 26, 27, and 28 are not included in the circuit arrangements. Accordingly, it will be seen that the ringing current will also traverse the following stray path: from the ring conductor of line  $L_2$ , through the path including retardation coil 8, thence through the path including retardation coil 10, over ring conductor of line  $L_3$ , thence over



conductor 25, signaling apparatus 14, conductor 19, to the positive terminal of ringing battery 11. The ringing current traversing this stray path would tend to operate the signaling means 14. Obviously, this would not be desired, as station 1 desired to exclusively signal station 2. One of the methods of preventing such false signaling, which has been utilized in the past, has been to connect a conducting strap, such as 17, between the points 15 and 16, or, in other words, between the positive terminal of the ringing battery and the negative lead to the talking battery. With the strap 17 connected as desired, the ringing current which traverses the stray path, including retardation coil 8, would be shunted across the strap 17 to the ringing battery and would not affect the signaling means 14. However, as has been pointed out, it has been found that this strap connection 17 introduces an undesirable heavy drain on the ringing battery. Accordingly, in the arrangements of the invention the strap 17 is omitted and the rectifiers 26, 27, and 28 are included in the conductors from the negative terminal of battery 4 to the conductors of lines  $L_1$ ,  $L_2$ , and  $L_3$ .

Accordingly, when station 1 signals station 2, there will be a path for stray currents over the ring conductor of line  $L_2$ , through the rectifier 27, retardation coil 8, retardation coil 10, rectifier 28, to the ring conductor of line  $L_3$ , to the signaling means 14 and thence to the ringing battery 11. However, this path will be very high in resistance due to the polarity of the rectifier 27 and sufficient current to affect the signaling means 14 can not flow thereover. In a similar manner, stray ringing currents will be prevented from flowing to other stations by the polarity of the other rectifier arrangements, thus preventing false signaling operation.

It is pointed out that while only three lines, such as  $L_1$ ,  $L_2$ , and  $L_3$ , and three stations are shown, nevertheless arrangements of the invention are applicable to an intercommunicating system having a different number of lines and stations. Accordingly, while the arrangements of the invention have been disclosed as embodied in certain specific ar-

rangements which are deemed desirable, it is pointed out that they are capable of embodiment in other forms without departing from the spirit of the invention as defined in the appended claims.

What is claimed is:

1. An intercommunicating system comprising a plurality of pairs of lines, a plurality of subscribers' sets, signaling means individual to each subscriber's set, means to connect said subscribers' sets and signaling means to said pairs of lines, a source of talking current for said lines, and rectifiers in the conductors connecting one side of said talking source to said lines.

2. An intercommunicating system comprising a plurality of pairs of lines, a plurality of subscribers' sets connected to said lines, signaling means individual to each subscriber's set, a source of signaling current, means for completing signaling circuits from said source to said signaling means over one of the conductors of each of said pairs of lines, a source of talking current having one side connected to said last mentioned conductors and rectifiers in the leads between said talking battery and said last mentioned conductors.

3. An intercommunicating system comprising a plurality of pairs of lines, a plurality of subscribers' sets connected to said lines, signaling means individual to each subscriber's set, a signaling source, means for completing signaling circuits from one pole of said source to said signaling means over one of the conductors of each of said pairs of lines, a source of talking current for said lines having one pole connected to said last mentioned conductors, and rectifiers in the leads between said talking source and said conductors, said rectifiers being poled so as to allow transmission therethrough of current from said talking source and to oppose the transmission therethrough of current from said signaling source.

In testimony whereof, we have signed our names to this specification this 24th day of February, 1928.

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