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S. P. SHACKLETON

COMPOSITE RINGER

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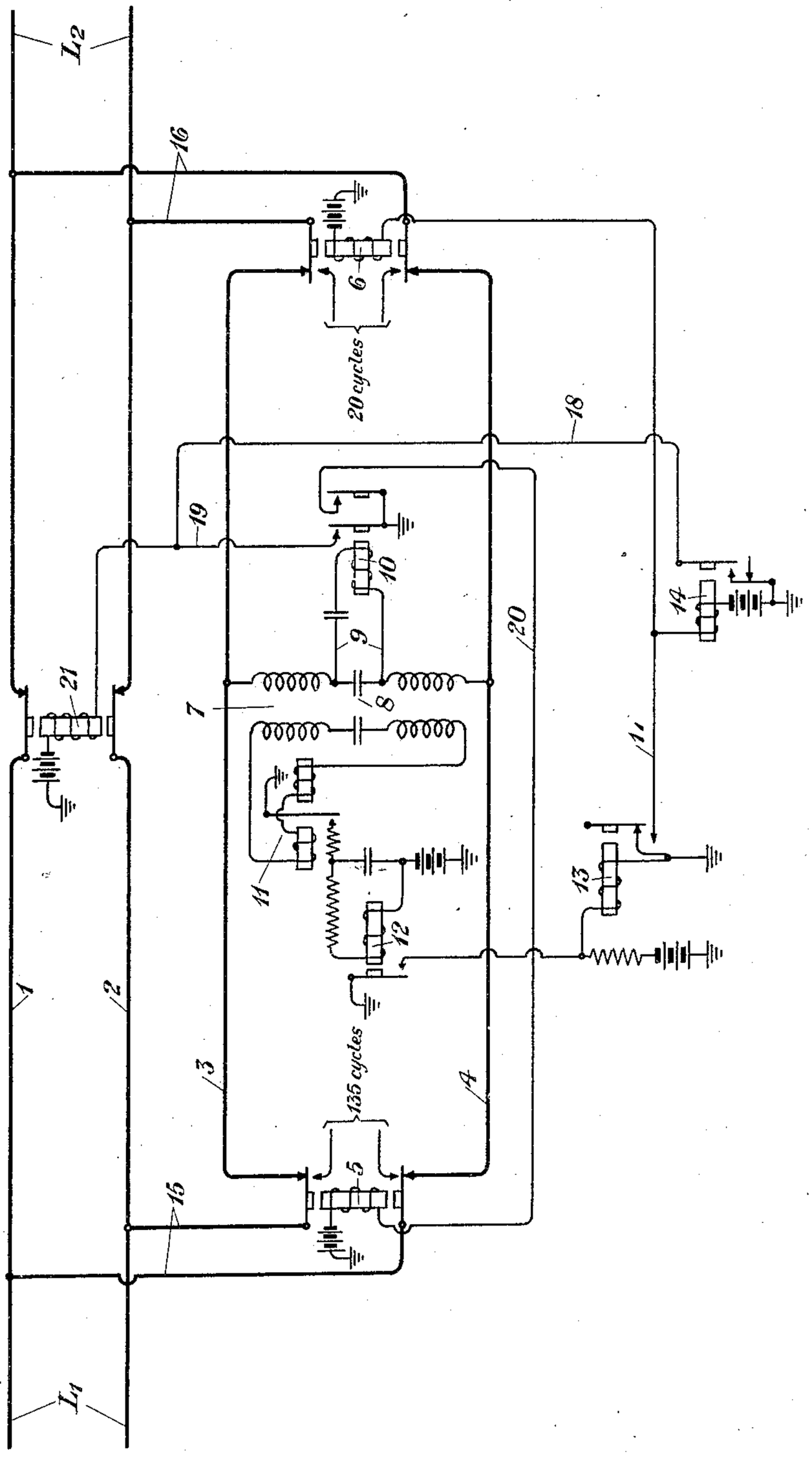

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COMPOSITE RINGER.

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This invention relates to transmission systems and more particularly to improvements in signaling arrangements, such as composite ringers, associated with such systems.

As is well known in the art a composite ringer is a device associated with a transmission line for translating one frequency signaling current coming in over one section of the line into a different frequency current more suitable for signaling over another section of the line and vice versa. Heretofore it has been the practice either to include the composite ringer directly in the transmission line, or to interconnect the two sections of the line by means of a device, such as a cut-off relay and to include the composite ringer in a circuit bridged across the two line sections. In the arrangements of this invention the two line sections are interconnected over the contacts of a cut-off relay and a bridged circuit is also provided. However, the composite ringer is so associated with the bridged circuit that the normal continuity of the bridged circuit is not disturbed, so that if the transmission line should accidentally be opened at the contacts of the cut-off relay the transmission of messages could take place over the bridged circuit. In other words the invention by the novel manner of associating the composite ringer with the line provides a safeguard against any interruption of the message service thereover. Furthermore, the composite ringer arrangements of the invention provide considerable saving in apparatus, such as retard coils, and also provide desirable features of interchangeability of apparatus over former arrangements. 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 the figure of which is shown a circuit diagram illustrating the invention.

In the drawing are shown two line sections L_1 and L_2. Section L_2 would lead to switchboard apparatus. Section L_1 would lead to the transmission line. The type of signaling current suitable for use over L_2 would be, for example, of the order of 20 cycles, while the signaling currents suitable for use over L_1 would be, for example, of the order of 135 cycles. Line sections L_1 and L_2 are interconnected by the circuit 1, 2 over the contacts of a cut-off relay 21. Line sections L_1 and L_2 are also connected over an auxiliary circuit 3, 4 bridged across each of said line sections. It will be seen that this auxiliary circuit is in parallel with circuit 1, 2 and as its continuity is normally unbroken, it acts as a safeguard to the message service should the circuit 1, 2 inadvertently be opened at the contacts of the cut-off relay 21. In order to translate the relatively high frequency signaling current coming in over line L_1 into lower frequency signaling current suitable for use over line L_2 and vice versa the composite ringer device is associated with the circuit 3, 4, by means of the repeating coil 7 which has its primary winding bridged across said conductors. This primary winding of repeating coil 7 will be tuned by condenser 8 to the suitable frequency for signaling currents coming from L_2, such for example as 20 cycles. Across this condenser is a circuit 9 including the relay 10 which will respond to 20 cycle current. The relay 10 will control the operation of relay 5 which will apply to circuit 15 and thence to L_1 a suitable signaling current, such as 135 cycles. The secondary winding of repeating coil 7 is tuned to the frequency of signaling currents coming in over L_1, such for example as 135 cycles. Connected thereto is the relay 11 which will accordingly respond to currents of this order. Relay 11 controls relay 12, which, in turn, controls relays 13 and 14 to operate relay 6 which will apply to circuit 16 and thence to L_2 current suitable for use thereover, such for example as 20 cycle current.

Signaling currents of the order of 135 cycles coming in over line L_1 will be transmitted over circuit 15 and conductors 3, 4 and through the primary of coil 7. This will induce a 135 cycle current in the secondary of coil 7 and cause the operation of relay 11 which in turn will operate relay 12. The operation of relay 12 will close a short circuit about the winding of relay 13, thus releasing relay 13. This will cause a circuit to be closed over conductor 17 which will operate relays 14 and 6. The operation of relay 14 will close a circuit over conductor 18 and operate the cut-off relay 21. The operation of relay 6 will cause 20 cycle current to be applied to circuit 16 and thence to line L_2.

Signaling current of the order of 20 cycles coming from line section L_2 will be transmitted over circuit 16 and thence over conductors 3, 4, and through the primary winding of repeating coil 7 and thence over circuit 9 and the winding of relay 10, thus operating relay 10. The operation of relay 10 will close a circuit over conductor 19 and operate the cut-off relay 21. It will also close a circuit over conductor 20 and cause the operation of relay 5. The operation of relay 5 will apply, to conductor 15 a source of signaling current of the order of 135 cycles which will thus be transmitted out over line L_1.

The repeating coil used might be of a type having a low mutual impedance between its windings. Hence the repeating coil would be one that is poor at 20 cycles but good at 135 cycles. This helps to separate the relatively high frequency from the low frequency, and make the 135 cycle relay quite free from Morse thump and other low frequency interference. The use of a coil of this type will have a tendency to reduce the click that normally results from the charge on the condenser in the 20 cycle circuit branch immediately after a 20 cycle ring from the line L_2.

The composite ringer of this invention may equally well be used for other types of signaling. For example, it may be used for 1000 cycle signaling instead of 135 cycle signaling by simply changing the arrangements of relay 11 in slight detail. Accordingly while the arrangements of the invention have been disclosed as embodied in certain specific forms which are deemed desirable it is understood that they are capable of embodiment in many and other widely varied forms without departing from the spirit of the invention as defined in the appended claims.

What is claimed is:

1. A transmission line comprising two line sections, two parallel circuits interconnecting said line sections, each of said parallel circuits being designed to normally afford a closed circuit connection between said line sections whereby the continuity of said line will not be disturbed when message currents are transmitted thereover, a repeating coil having its primary winding bridged across one of said parallel circuits, and a composite ringer having its ringing responsive branches selectively connected with each of the windings of said repeating coil.

2. A transmission line comprising two line sections, two parallel circuits interconnecting said line sections, each of said parallel circuits being designed to normally afford a closed circuit connection between said line sections whereby the continuity of said line will not be disturbed when message currents are transmitted thereover, a repeating coil having its primary winding bridged across one of said parallel circuits, a selective circuit associated with one of the windings of said repating coil and including means responsive to relatively low frequency signaling currents coming in over one of said line sections, means controlled thereby for applying a relatively high frequency signaling current to said other line section, a selective circuit associated with the other winding of said repeating coil including means responsive to relatively high frequency signaling current coming in over said last mentioned line section, and means controlled thereby for applying to said first mentioned line section signaling current of a relatively lower frequency.

3. A transmission line comprising two line sections, two parallel circuits interconnecting said line sections, each of said parallel circuits being designed to normally afford a closed circuit connection between said line sections whereby the continuity of said line will not be disturbed when message currents are transmitted thereover, a repeating coil having its primary winding bridged across one of said parallel circuits, said repeating coil having its constants so constructed as to readily transmit therethrough relatively high frequency currents and to limit the transmission therethrough of relatively low frequency currents, and a composite ringer having its ringing responsive branches selectively connected with each of the windings of said repeating coil.

In testimony whereof, I have signed my name to this specification this 25th day of August, 1925.

SAMUEL P. SHACKLETON.