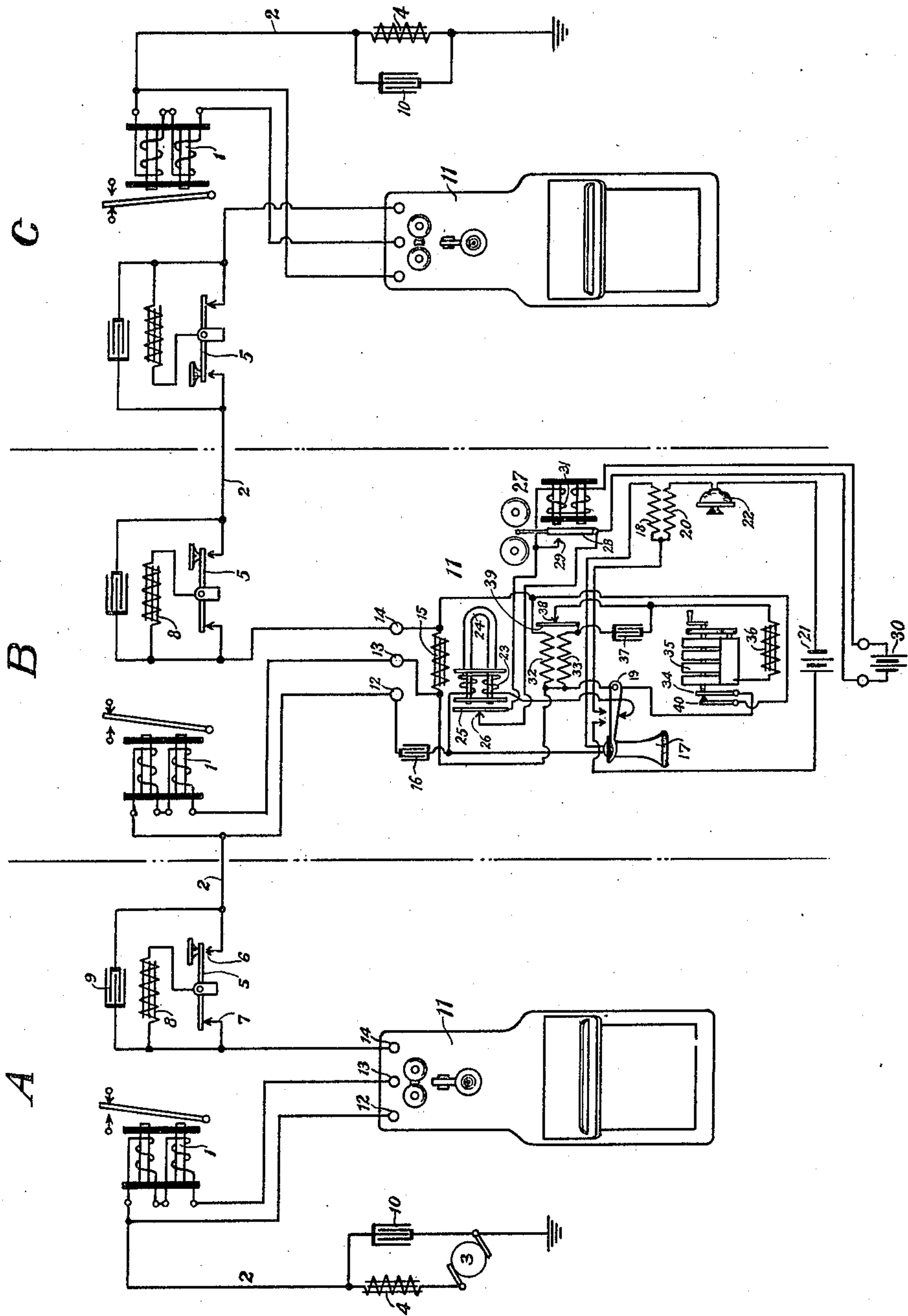


O. M. LEICH.
COMPOSITE TELEPHONE AND TELEGRAPH SYSTEM.
APPLICATION FILED JUNE 19, 1908.

999,505.

Patented Aug. 1, 1911.



WITNESSES:

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COMPOSITE TELEPHONE AND TELEGRAPH SYSTEM.

999,505.

Specification of Letters Patent.

Patented Aug. 1, 1911.

Application filed June 19, 1908. Serial No. 439,310.

To all whom it may concern:

Be it known that I, OSCAR M. LEICH, a citizen of the United States, residing at Genoa, in the county of Dekalb and State of Illinois, have invented a certain new and useful Improvement in Composite Telephone and Telegraph Systems, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawing, forming a part of the specification.

My invention relates to composite telephone and telegraph systems, and more particularly to such systems where telephonic apparatus is used for intercommunication upon telegraph systems without the addition of extra line wires.

My invention contemplates the provision of improved circuits and apparatus for the inclusion of telephone talking circuits on telegraph circuits without interfering in the operation of the telegraph circuits, and yet obtaining good talking results between the various telephones so included.

I will describe my invention more in detail by reference to the accompanying drawing illustrating the preferred embodiment thereof, which shows three separate and distinct combined signal receiving and signal sending stations.

I have illustrated station A as provided with the ordinary telegraph relay, 1, similar relays 1—1, being provided in the two other stations B and C. This telegraph relay can suitably operate a telegraph sounder, as is well understood in the art, the telegraph relay being serially included in the line wire 2. At the end of the line wire 2, for instance at the station A, is included a generator, 3, for the purpose of furnishing currents to operate the telegraph relays, which direct current is fed to the line wire 2, through an impedance coil 4, which impedance coil prevents noises on the telegraph line due to the generator, and which noises would injuriously influence the telephone transmission. A similar impedance coil 4, is shown at the end of the line at station C. Telegraph keys 5—5, are serially included in the line wire 2, at the various stations, which keys serve to make and break the telegraphic circuit through the various relays 1—1, in sending a message. For this purpose a front contact 6, is provided in con-

nection with the key 5, which front contact is normally short circuited with the rocker arm of the key 5, when the particular key is not in use. This is well understood in the art, and the short circuiting connection is therefore not shown. I also provide a back contact 7, so that when the key is operated to close circuit with the contact 6, the telegraphic circuit passes through an impedance coil 8, which impedance coil prevents undue noises due to self-induction, and other disturbances from injuriously influencing the talking service of the telephones. This latter arrangement forms the subject matter of a separate patent application of mine. This said application bears Serial No. 439,313, and was filed June 19th, 1908.

I provide a condenser, 9, around the key 5, which condenser 9, carries the talking currents past the key satisfactorily and prevents a break in the telephonic circuit. I likewise provide condensers 10—10, at the ends of the line wire 2, which condensers permit the telephonic currents to seek the ground without having to pass through the impedance coils 4—4, which would be objectionable.

I have shown telephones 11—11—11, one of which is connected at each of the stations A, B and C. Referring more particularly to the apparatus as shown at station B, I have shown three binding posts leading into the telephone 11, respectively 12, 13 and 14. The binding posts 12 and 14 are connected in bridge of the relay 1, and the same binding posts 12 and 14 form the terminals of the telephone talking circuit of the telephone 11, terminals 13 and 14 during the talking and signaling positions being connected together or short circuited as it were by the springs 34 and 40. Thus the talking circuit and the relay are in shunt relation, which shunt circuit is serially included in the line wire 2. Likewise, binding posts 12 and 14 form the terminals of the signal receiving circuit of the telephone 11, terminals 13 and 14 being as before stated short circuited during the signal receiving operation, as will be more fully explained hereinafter. Binding posts 13 and 14 are permanently connected to the two terminals of an impedance coil, 15.

To trace out the talking circuit we will begin at binding post 12, extending through

condenser 16, telephone receiver 17, secondary 18 of an induction coil, through the switchhook lever 19, when the receiver is removed from said switchhook lever back to binding post 13, which is short circuited with the binding post or terminal 14 through the springs 34 and 40. The primary, 20, associated with the secondary, 18, of the induction coil is in closed circuit when the switchhook lever 19, is in its raised condition with a battery 21, and a transmitter 22. This completes the telephone talking circuit.

The telephone signal receiving apparatus at the station B, leads from binding post 12 through condenser 16, through the winding 23, of the magnet 24, to a lower contact of the switchhook lever 19, which is closed when the telephone receiver is on the hook, and from there to the binding post 13. When alternating currents pass through the coil, 23, the armature, 25, is agitated and that removes it from the back contact, 26. The armature, 25, is connected to one terminal of a vibrating bell, 27, and the back contact, 26, is connected to the armature, 28, of the vibrating bell, thus short circuiting the armature, 28 with its back contact, 29, when the armature, 25, is connected to the back contact, 26. This vibrating bell, 27, is connected with the battery, 30, which battery will operate the vibrating bell, 27, when the circuit between armature 25, and its back contact, 26, is broken. When the connection between armature, 25, and its back contact, 26, however, is closed, thus short circuiting the connection between the armature 28, and its back contact, 29, the battery, 30, permanently draws up the armature, 28, and no vibration of the bell, 27, results. This vibrating bell arrangement is well understood in the art. The signal projecting features of my improved telephone work in connection with the impedance coil 15. The secondary 32, of the induction coil is connected in bridge of the impedance coil 15, and the primary, 33, has one of its terminals connected to the shunt spring, 34, of the generator from which the circuit passes through the generator 35, impedance coil 36, and condenser 37, said condenser serving to take the discharge from the induction coil contacts. Likewise the circuit is divided before it reaches the condenser 37, and passes to the back contact, 38, associated with the armature, 39, which is under the control of the primary 33 and secondary 32. I further provide by means of this improved arrangement means whereby the generator short circuits binding posts 13 and 14, when the generator, 35, is not being actuated to project a call from the line wire, 2. For this purpose I employ an additional shunt spring, 40, which is normally connected to the shunt spring 34, so that the binding post, 13, which is permanently connected with the

shunt spring, 34, and the binding post 14, which is permanently connected with the shunt spring, 40, are short circuited. When the generator is operated the counter shaft of the generator while remaining in contact with spring 34, permits spring 34 to move away from spring 40, thus opening the short circuit between the binding posts 13 and 14, and permitting the projection of signaling currents serially of the line wire, 2, directly from the secondary 32, past the impedance coil 15. This improved arrangement permits me to project serial signaling current which is adapted to call the other telephones 11, on the line, and yet it does not require the inclusion of special apparatus in the line wire circuit, which would necessitate a breaking of contact, or necessitate the inclusion of an objectionable amount of impedance. The vibratory or undulatory currents sent out by the secondary 32, operate the armatures, 25, at the various telephones, thus releasing them from their engagements with the back contacts, 26, thereby permitting the vibratory bells 27, to ring. The currents in the secondary 32 are induced by the primary 33, due to the breaking of contact between the armature 39 and its back contact 38 in addition to the ordinary inductive effect between the two, due to the alternating character of the primary current. This result is accomplished by means of the currents sent out by the generator 35, although some other suitable prime source of current may be employed. The salient features of this arrangement will thus be understood, namely that the signaling currents are projected serially on to the line wire 2, past the impedance coil, 15, and no break is permitted in the continuity of the line wire 2, at the telephones because the telegraph impulses will pass through the impedance coil 15 with a perceptibly diminished effect during the time that signals are being sent out by the telephone, and yet when no signaling currents are being sent out the binding posts 13 and 14 are short circuited, preferably by generator shunt springs, as illustrated. Thus the signaling between the telephones and the signal receiving devices does not interfere with the telegraph circuits, and is not interfered with by the telegraph circuits, as it takes a steady vibratory or equivalent current to operate the armature 25. Likewise the talking currents at the various telephone instruments are taken from the line wire 2, in bridge of their respective relays, 1. The condensers, 16, prevent telegraph impulses from interfering with the talking apparatus, and the relays, 1, are of sufficiently high impedance so that they do not diminish perceptibly the voice currents coming along the line wire 2, so that these talking currents are projected practically in their

entirety through the talking apparatus of the various telephones. The serial inclusion of these various devices in the line wire circuit 2, make them of a non-interfering character.

I have thus described the preferred embodiment of my invention, and what I claim as new and desire to secure by Letters Patent, is:

10 1. A composite telephone and telegraph system comprising a plurality of serially arranged electromagnetic telegraph-receiving devices, keys for operating said devices, a line circuit for said keys and said devices, 15 a source of current serially included with said circuit maintaining said telegraph devices normally in their attracted condition, and telephones also associated with said line circuit, and capable of use simultaneously 20 with the telegraph devices aforesaid, said telephones having talking circuits in bridge of said devices, said telegraph keys being included in the line circuit extraneously of the parallel circuits including the telegraph-receiving devices and said telephone talking 25 circuits at their own stations.

2. A composite telephone and telegraph system comprising a plurality of serially arranged electromagnetic telegraph-receiving 30 devices, keys for operating said devices, a line circuit for said keys, and said devices, a source of current serially included with said circuit maintaining said telegraph devices normally in their attracted condition, 35 telephones also associated with said line circuit, and capable of use simultaneously with the telegraph devices aforesaid, said telephones having talking circuits associated in conjunction with said devices, serially in 40 said line circuit, said telegraph keys being included in the line circuit extraneously of the parallel circuits including the telegraph-receiving devices and said telephone talking circuits at their own stations.

45 3. A composite telephone and telegraph system comprising a plurality of serially arranged electromagnetic telegraph receiving devices, keys for operating said devices, a line circuit for said keys and said devices, 50 and telephones also associated with said line circuit, and capable of use simultaneously with the telegraph devices aforesaid, said telephones having talking and signal receiving circuits in bridge of said devices, said 55 telegraph keys being included in the line circuit extraneously of the parallel circuits including the telegraph-receiving devices

and said telephone talking circuits at their own stations.

4. A composite telephone and telegraph 60 system comprising a plurality of serially arranged electromagnetic telegraph-receiving devices, keys for operating said devices, a line circuit for said keys and said devices, telephones also associated with said line circuit, and capable of use simultaneously with 65 the telegraph devices aforesaid, said telephones having talking and signal receiving circuits associated in parallel with said devices, serially in said line circuit, said telegraph keys being included in the line circuit 70 extraneously of the parallel circuits including the telegraph-receiving devices and said telephone talking circuits at their own stations. 75

5. A composite telephone and telegraph system comprising a plurality of serially arranged electromagnetic telegraph receiving devices, keys for operating said devices, a line circuit for said keys and said devices, 80 telephones also associated with said line circuit, and capable of use simultaneously with the telegraph devices aforesaid, said telephones having talking circuits in bridge of said devices, a signal sending circuit for 85 each telephone, switching means for serially including said signal circuit with the line circuit, and an impedance device in parallel with said signal-sending circuit, said telegraph keys being included in the line circuit 90 extraneously of the parallel circuits including the telegraph-receiving devices and said telephone talking circuits at their own stations.

6. A composite telephone and telegraph 95 system comprising electromagnetic telegraph receiving devices, keys for operating same, a line circuit for said keys and devices, and telephones having talking circuits in bridge of said electromagnetic devices and serially 100 associated with said line circuit, and capable of use simultaneously with the telegraph devices aforesaid, said telegraph keys being included in the line circuit extraneously of the parallel circuits including the telegraph-receiving devices and said telephone talking 105 circuits at their own stations.

In witness whereof, I hereunto subscribe my name this 31st day of March, 1908.

OSCAR M. LEICH.

Witnesses:

ARTHUR R. KAHL,
ALEX. C. REID.