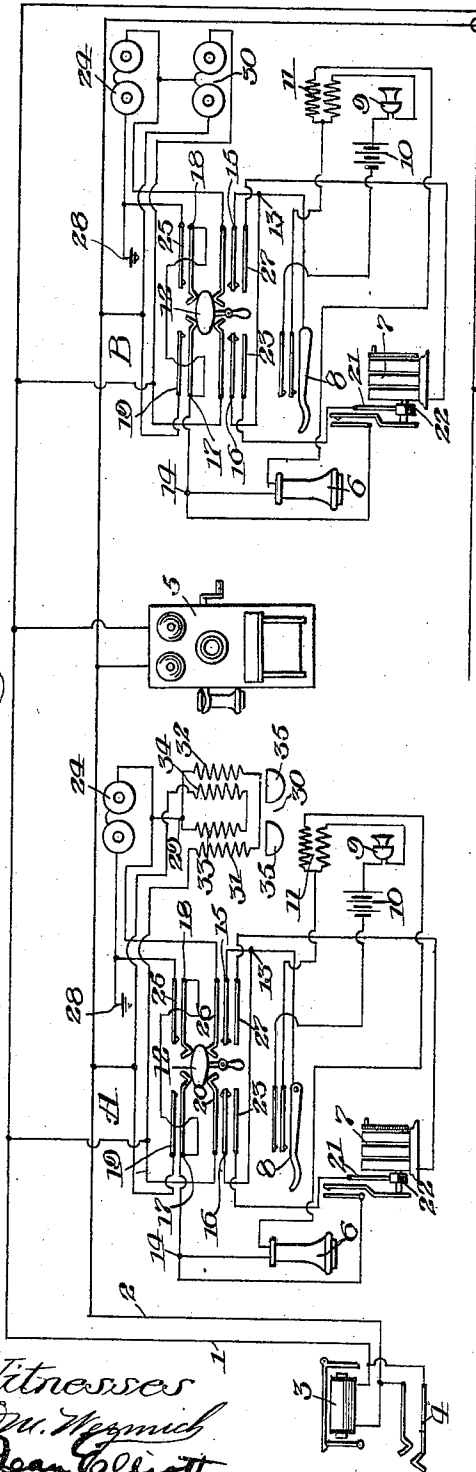


O. M. LEICH.
TELEPHONE SYSTEM.
APPLICATION FILED NOV. 13, 1909.

984,945.

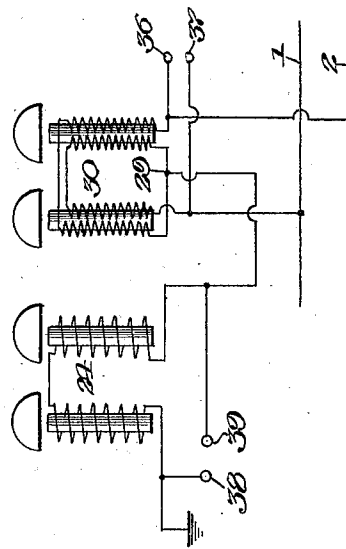
Patented Feb. 21, 1911.

Fig. 1.



Witnesses
Cm. Hymich
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Fig. 2.



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UNITED STATES PATENT OFFICE.

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TELEPHONE SYSTEM.

984,945.

Specification of Letters Patent.

Patented Feb. 21, 1911.

Application filed November 13, 1909. Serial No. 527,860.

To all whom it may concern:

Be it known that I, OSCAR M. LEICH, 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 Telephone Systems, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to telephone systems, and has for its object the provision of improved substation equipment so that more than one conversation can be carried on over the line wires at the same time.

In the preferred embodiment of my invention, I provide a metallic line circuit, which is adapted to accommodate bridging telephone instruments, which are provided in the preferred form with a ringer having a double winding, which ringer is bridged across the metallic circuit, and which is so arranged that the telephone talking circuit may in one form be bridged across the metallic line wires for metallic conversation, or connected from a middle point of the winding of said ringer and a return circuit, so that conversation over the two line wires in parallel and a return circuit may be had. The ringer thus serves a double purpose and simplifies to a remarkable degree the telephone apparatus that is necessary to obtain this dual service.

I will describe my invention more in detail by reference to the accompanying drawing illustrating one embodiment thereof, in which—

Figure 1 illustrates diagrammatically a system constructed in accordance with my invention, and Fig. 2 is a detail view more clearly to set forth the circuit arrangements.

Like characters of reference indicate like parts in the different figures.

I employ a line circuit consisting of two conductors, 1 and 2, which end at the central station in a drop 3, and a jack 4. Bridging telephones, such as 5, may be associated throughout the circuit 1, 2, only one being shown as illustrative of this connection. These telephones, 5, are of ordinary bridging magneto pattern. I show further three stations, A, B and C, at which my improved substation instrument is used. The instruments at stations A, B and C, comprise ordinary telephone talking equipment, includ-

ing a receiver 6, a generator 7, which is arranged to give pulsating or alternating current, a switch 8, a transmitter 9, local battery 10, and induction coil 11. The switching key 12 is also provided within the telephone, which switching key serves to selectively connect the talking circuit, which talking circuit may be assumed to have terminals 13 and 14, this talking circuit including the receiver, the secondary of the induction coil, and the wire from the switch-hook, the local battery transmitter being adapted for inclusion in a local circuit, as is apparent. The terminals of the talking circuit, 13 and 14, are respectively connected to the switch 12,—that is, terminal 13 to the springs 15 and 16, and the terminal 14 to the springs 17 and 18. Now, if the switch 12 be operated so that the spring-actuated rod is moved toward the left, the talking circuit, it will be seen, is connected from springs 16 and 17 to springs 19 and 20, respectively, which springs 19 and 20 are directly associated in bridge of the line wires 1 and 2. It will thus be seen that the talking circuit can be arranged in bridge of said line wires. At the same time that the talking circuit is connected in bridge, the generator 7 has its spring 21 associated with the line circuit, which spring operates in connection with the commutator 22, thus to supply pulsating current to the line wires, should the generator 7 be operated. This, it will be seen, operates the drop 3, but being direct current, does not operate the bells of such telephones of the bridging type, as 5, that may be connected to the circuit. This connection of the generator is accomplished by connecting the spring 21 to the spring 23. Now, should the operating portion of the switch 12 be moved toward the right, then the telephone talking circuit, which is connected to the springs 15 and 18, is connected in bridge of an ordinary magneto bridging bell 24, through the agency of the spring 25 and the spring 26. This operation of the key at the same time connects the spring 27, which leads to the generator 7, also connecting the generator 7 in bridge of the bell 24, but this time to the exclusion of the spring 21, whereby the generator is in condition to furnish alternating current.

It will be seen that the bell 24 is connected between the ground 28 and the middle point 29 of the winding of a second ringer

30, which ringer is bridged across the line wires 1 and 2.

It will thus be seen that during the last operation of the key 12, the ringer 24, in bridge with which is the talking circuit, is connected between the neutral point of the bridged winding of the ringer 30 and ground, thus being adapted not for bridged conversation over the line wires 1 and 2, but being adapted for talking over the two line wires 1 and 2 in parallel and a return circuit, preferably the ground. The ringer 30 has four coils which are all in series in a bridge across the line wires 1 and 2. The circuit proceeds from line wire 1 through coil 31, then through coil 32 on the second core, then coil 33 on the first core and then coil 34 on the second core to line wire 2. Midway of this ringer winding is a neutral point 29 with two coils on each side of the neutral point. The object of thus splitting the ringer windings is to obtain a more perfect neutral point 29, so that the telephone can be operated over the line wires and ground without interfering with conversation carried on over the two line wires in metallic circuit.

It will be understood that a signal can be received by the ringer 30, through the agency of its gongs 35, from the bridging telephone 5 and other bridging signals passing over the line wires 1 and 2. The switch 12 is then thrown with its operating portion toward the left, and the talking can then be carried on over the line wires 1 and 2, in metallic circuit. Should, however, signal 24 operate, the telephone at substation A is connected by the switch 12 in bridge of the ringer 24, or rather in series with a neutral point 29 of the winding of the ringer 30 and a return circuit, and can thus communicate with any telephone at stations such as B and C, but not with bridged telephones, such as 5. In this way, it will be seen that local service can be carried on between all of the telephones of the pattern shown at station A, preferably over the two line wires 1 and 2 in parallel and a return circuit, and then, if long distance communication is desired, through a central station, a bridged connection is made so as better to serve for such long distance connection. It will be seen that the line never is occupied completely by one conversation being carried on, but is also subject to be used for a second conversation, non-interfering as respects the first conversation.

In Fig. 2 I show more diagrammatically the windings of the ringer 30 and the ringer 24, to show that the ringer 24 is in series with the neutral point 29 of the coils of the ringer 30 and the ground. The ringer 30 is permanently bridged as shown, to the line wires 1 and 2, and receives signals sent over line wires 1 and 2 of the metallic circuit.

The ringer 24, on the contrary, receives signals which are sent over line wires 1 and 2, in parallel, or either of them, and a return circuit. The talking circuit is adapted for connection either to the terminals 36, 37, or 38, 39, as shown diagrammatically in Fig. 2.

While I have herein shown and particularly described the preferred embodiment of my invention, I do not limit myself to the precise construction and arrangement as herein set forth, but

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A telephone system comprising a metallic line circuit, and a plurality of substation telephone instruments associated with said circuit, each telephone instrument including a talking set, a signal-receiving device, a generator, a winding bridged across said metallic circuit, and a switching device for connecting said talking set in bridge of said circuit or between the central point of said winding and a return circuit.

2. A telephone system comprising a metallic line circuit, and a plurality of substation telephone instruments associated with said circuit, each telephone instrument including a talking set, a signal-receiving device, a generator, a winding bridged across said metallic circuit, and a switching device for connecting said talking set in bridge of said circuit or between the central point of said winding and a return circuit, said switching device also having means whereby when in one of its aforesaid operative conditions the generator is included to furnish a given character of current, and when in its alternative position the generator is included to furnish a different character of current.

3. A telephone system comprising a metallic line circuit, and a plurality of substation telephone instruments associated with said circuit, each telephone instrument including a talking set, a signal-receiving device, a generator, a magneto ringer bridged across said metallic circuit, and a switching device for connecting said talking set in bridge of said circuit or between the central point of the winding of said magneto ringer and a return circuit.

4. A telephone system comprising a metallic line circuit, and a plurality of substation telephone instruments associated with said circuit, each telephone instrument including a talking set, a signal-receiving device, a generator, a magneto ringer bridged across said metallic circuit, and a switching device for connecting said talking set in bridge of said circuit or between the central point of the winding of said magneto ringer and a return circuit, said switching device also having means whereby when in one of its aforesaid operative conditions the gen-

erator is included to furnish a given character of current, and when it is in its alternative position, the generator is included to furnish a different character of current.

5 5. A telephone system comprising a metallic line circuit, and a plurality of sub-
station telephone instruments associated
with said circuit, each telephone instrument
including a talking set, a signal-receiving
10 device, a generator, a magneto ringer
bridged across said metallic circuit, said
ringer having four coils and two cores, two
coils to each core, and a switching device for
connecting said talking set in bridge of said
15 circuit or between the central point of the
winding of said magneto ringer and a return
circuit.

6. A telephone system comprising a metallic line circuit, and a plurality of sub-
station telephone instruments associated with
said circuit, each telephone instrument in-
cluding a talking set, a signal-receiving de-
vice, a generator, a magneto ringer bridged
across said metallic circuit, said ringer hav-
25 ing four coils and two cores, two coils to each
core, and a switching device for connecting
said talking set in bridge of said circuit or
between the central point of the winding of
said magneto ringer and a return circuit,
30 said switching device also having means
whereby when in one of its aforesaid opera-
tive conditions the generator is included to
furnish a given character of current, and
when in its alternative position the gener-
35 ator is included to furnish a different char-
acter of current.

7. A telephone system comprising a metallic line circuit, and a plurality of sub-
station telephone instruments associated
with said circuit, each telephone instrument
including a talking set, a signal-receiving
40 device, a generator, a magneto ringer bridged
across said metallic circuit, said ringer hav-
ing four coils and two cores, two coils to
each core, the circuit through the ringer
coils serially passing through a coil on one
core, then a coil on the second core, then a
coil on the first core, and lastly the remain-
45 ing coil on the second core, and a switching
device for connecting said talking set in
bridge of said circuit or between the central
point of the winding of said magneto ringer
and a return circuit.

8. A telephone system comprising a metallic line circuit, and a plurality of sub-
station telephone instruments associated with
said circuit, each telephone instrument in-
cluding a talking set, a signal-receiving de-
vice, a generator, a magneto ringer bridged
across said metallic circuit, said ringer hav-
50 ing four coils and two cores, two coils to
each core, the circuit through the ringer coils
serially passing through a coil on one core,
then a coil on the second core, then a coil on
55 the first core, and lastly the remaining coil

on the second core, and a switching device
for connecting said talking set in bridge of
said circuit or between the central point of
the winding of said magneto ringer and a
return circuit.

9. A telephone system comprising a metallic line circuit, and a plurality of sub-
station telephone instruments associated
with said circuit, each telephone instrument
including a talking set, a signal-receiving
75 device, a signal-sending device, a winding
bridged across said metallic circuit, and a
switching device for connecting said talk-
ing set in bridge of said circuit or between
the central point of said winding and a re-
80 turn circuit.

10. A telephone system comprising a metallic line circuit, a plurality of magneto
ringers bridged across said circuit, a tele-
phone talking set provided with each ringer,
85 and means for each talking set to connect
same between a return circuit, and an inter-
mediate portion of the winding of its as-
sociated ringer.

11. A telephone system comprising a metallic line circuit, a plurality of windings
bridged across said metallic circuit, a mag-
neto-ringer for each winding connected be-
tween an intermediate portion of its asso-
ciated winding and a return circuit, and a
95 telephone talking set bridged across said
ringer.

12. A telephone system comprising a metallic line circuit, a plurality of signal-
receiving devices bridged across said circuit,
100 a telephone talking set provided with each
device, and means for each talking set to
connect same between a return circuit and
an intermediate portion of the winding of
its associated device.

13. A telephone system comprising a metallic line circuit, a plurality of signal
actuating windings bridged across said
metallic circuit, a signaling means under
the control of each winding, a signal-receiv-
110 ing device for each winding connected be-
tween an intermediate portion of its asso-
ciated winding and a return circuit, and a
telephone talking set bridged across each
signal-receiving device.

14. A telephone system comprising a metallic line circuit, a plurality of magneto
ringers bridged across said circuit, a second
ringer for each aforesaid ringer and bridged
between a return circuit and an intermedi-
120 ate portion of the winding of its associated
first aforesaid ringer, and means for operat-
ing either ringer.

15. A telephone system comprising a metallic line circuit, a plurality of mag-
neto ringers bridged across said circuit, a
125 second ringer for each aforesaid ringer and
bridged between a return circuit and an in-
termediate portion of the winding of its as-
sociated first aforesaid ringer, means for op-
130

erating either ringer, a telephone talking set for each first aforesaid ringer, and means for connecting said talking set in bridge of its associated first-aforesaid ringer or between a return circuit and an intermediate portion of the winding of its associated first-aforesaid ringer.

16. A telephone system comprising a metallic line circuit, a plurality of magneto ringers bridged across said circuit, a second ringer for each aforesaid ringer and bridged between a return circuit and an intermediate portion of the winding of its

associated first-aforesaid ringer, means for operating either ringer, a telephone talking set for each first-aforesaid ringer, and means for connecting said talking set in bridge of its associated first ringer or in bridge of its associated second aforesaid ringer.

In witness whereof, I hereunto subscribe my name this 30th day of October A. D., 1909.

OSCAR M. LEICH.

Witnesses:

MAX W. ZABEL,
JEAN ELLIOTT.