N. A. KURMAN.

LOUD SPEAKING INTERCOMMUNICATING TELEPHONE SYSTEM.

APPLICATION FILED OCT. 17, 1914.

1,307,981.

Patented June 24, 1919.

2 SHEETS—SHEET 1.

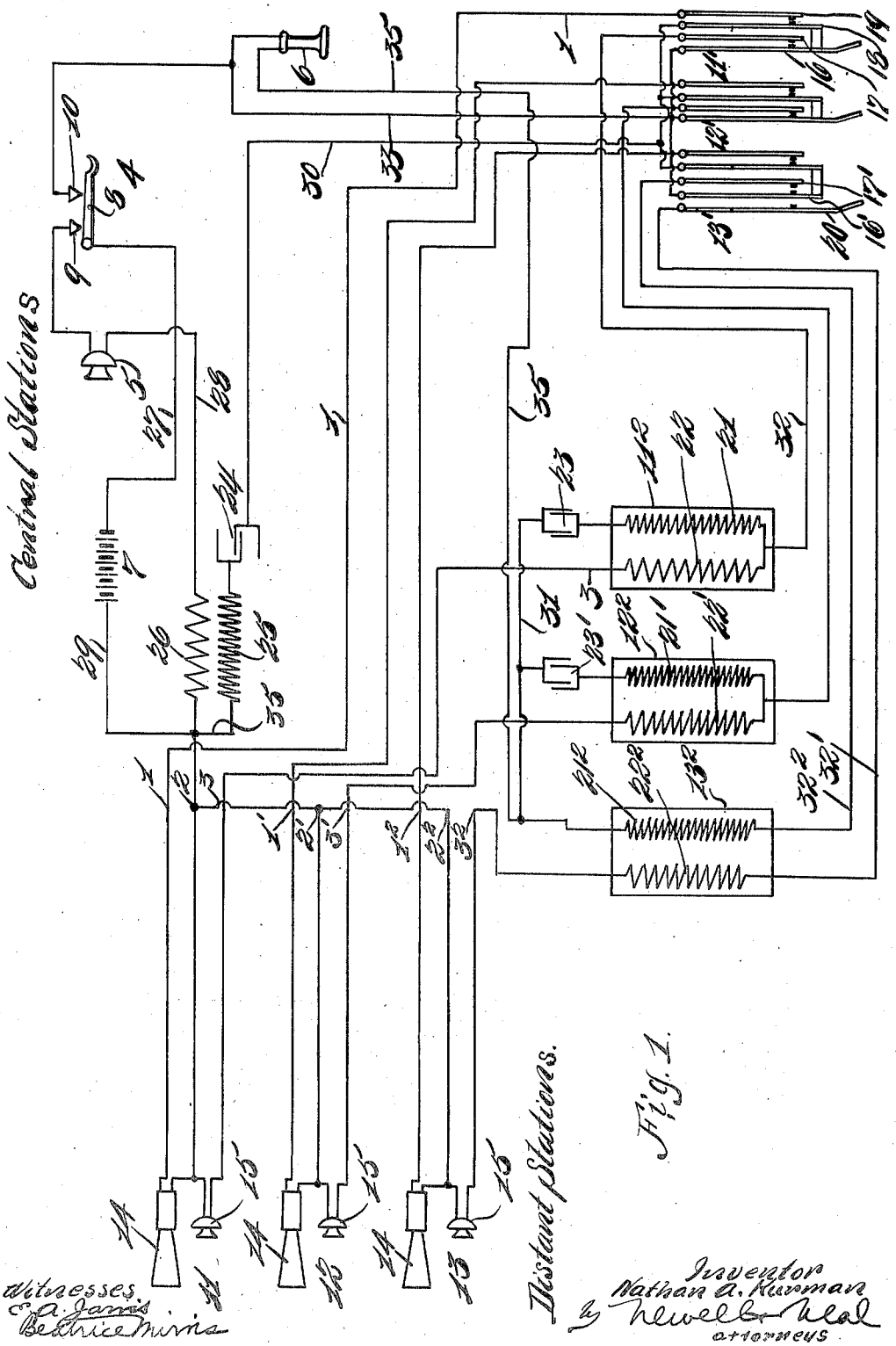


Fig. 1.

Witnesses.
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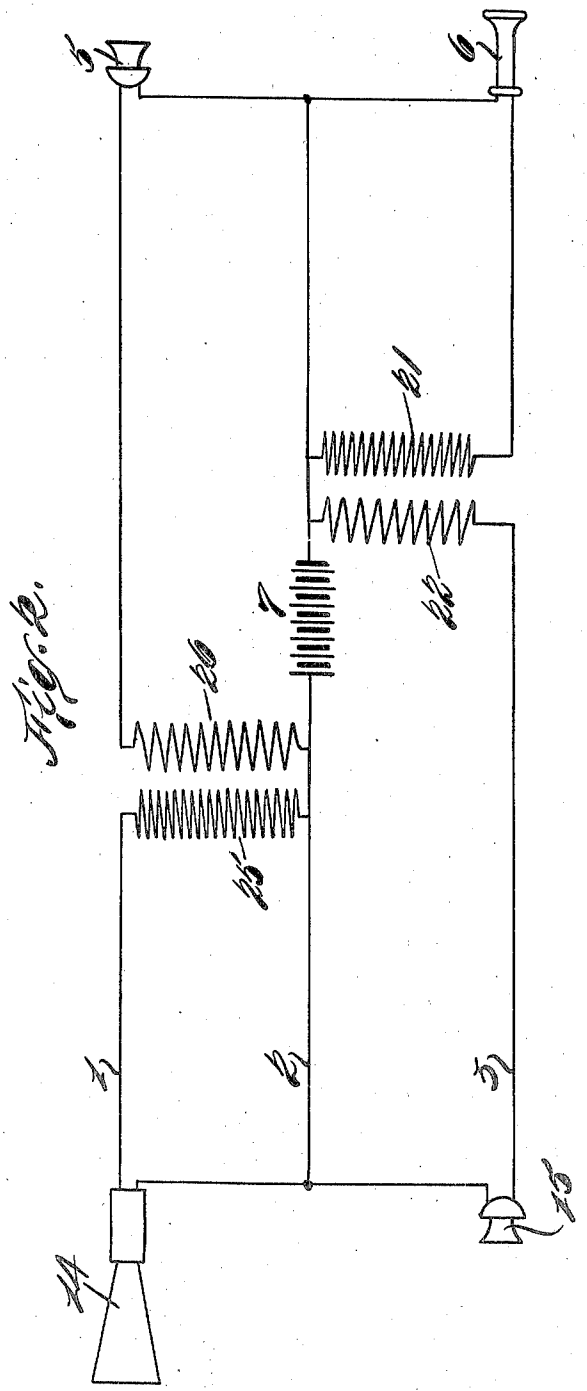


Fig. 2.

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UNITED STATES PATENT OFFICE.

NATHAN A. KURMAN, OF NEW YORK, N. Y., ASSIGNOR TO INTERNATIONAL CALLOPHONE CORPORATION, A CORPORATION OF DELAWARE.

LOUD-SPEAKING INTERCOMMUNICATING TELEPHONE SYSTEM.

1,307,981. Specification of Letters Patent. Patented June 24, 1919.

Application filed October 17, 1914. Serial No. 867,078.

To all whom it may concern:

Be it known that I, NATHAN A. KURMAN, a citizen of the United States, residing at New York city, New York, have invented certain new and useful Improvements in Loud-Speaking Intercommunicating Telephone Systems, of which the following is a clear, full, and exact description.

The present invention relates to a system of telephone circuits between one or more central stations and a plurality of distant stations, and is advantageously employed in connection with a paging system for hotels and other buildings such as is described in my co-pending application Serial Number 766,629, filed May 9, 1913. When used for such a paging system I prefer to employ at the distant stations a loud speaking annunciator of any suitable type combined with a transmitter within a megaphone such for instance as is shown in my co-pending application Serial Number 766,630, filed May 9, 1913, so that a message may be transmitted or received by a person at a distant station without any effort on his part except that of speaking and listening provided he is within a reasonable distance of said distant station.

In the present invention means are provided to connect the central station with the distant stations either singly or in groups so that communication may be had simultaneously from the central station to a number of distant stations. In this way a call may be made at the same time throughout a number of different places about a hotel, all with the same clearness of tone, and responses may also be received from all of the different places so called. If a general call is made for Mr. Jones for instance, and he responds from one particular place, then the remaining distant stations may be cut out and communication had with the central station solely with said station at which Mr. Jones has responded.

This invention also has in view the employment of only three wires from the central station to each of said distant stations, said three wires being so arranged that two complete talking circuits are provided between the central station and each distant station. It is important in a device of this kind that the conversation from the central station to the distant station be entirely independent of the conversation back from the distant station to the central station to prevent harmonics and for other obvious reasons.

Further objects of my invention will become apparent from the following description and the drawings which show the preferred embodiment thereof. In said drawings—

Figure 1 is a complete diagram of the circuits connecting one central station with several distant stations; and

Fig. 2 is a simplified diagram showing a connected circuit between the central station and any one distant station.

Referring more particularly to the drawings, the central station is indicated generally at 4 and is provided with the usual transmitter 5 and receiver 6. The distant stations are indicated generally at 11, 12 and 13. 7 is a single source of current such as a battery for supplying current to the entire system. Communication between the central station and the distant stations is controlled entirely at the central station by means of switch keys 11^1, 12^1 and 13^1 which relate to the stations 11, 12 and 13 respectively. Each distant station is provided with a loud speaking receiver indicated at 14 and a transmitter 15 here illustrated diagrammatically, and 1, 2 and 3 indicate the three wires connecting said distant station with the central station. 8 indicates the receiver hook of the central station which when raised forms connections between the battery and the switches 9 and 10.

Induction coils are employed in all of the circuits, that for the central station transmitter being common to all of the receivers and their circuits of the distant stations, so that speech may be sent to all of them at the same time, whereas all of the other induction coils, namely in the respective transmitter circuits leading from the distant stations, may be coupled in parallel and operate the single receiver at the central station so that speech may be sent from any or all of the distant stations and received by the receiver at the central station. It will be seen that said receiver is common to all of the transformers corresponding to the distant stations. Suitable switches are, however, provided whereby any of the distant stations and their induction coils may be put into and out of operative relation with the cen-

tral station instruments, as more fully described hereinafter.

26 is the primary coil for the transmitting circuit at the central station, and 25 is the secondary energized thereby for sending talking circuits to the distant stations. 24, is a condenser in said secondary circuit to prevent battery current from flowing therethrough. The transmitter of each distant station also has a primary coil indicated at 22 and a secondary coil 21 energized thereby for giving talking current to the receiver 6. The transmitter 5 of the central station is put in circuit by the removal of the receiver from the hook 8, and both the transmitters and receivers of the distant stations are put into communication with the transmitter 5 and receiver 6 by the operation of the switch keys 11^1, 12^1 and 13^1 either singly or together in any number desired. It makes no difference with the circuits or the talking currents whether one or more distant stations are connected for communication with the central station. It is also obvious that a second central station may likewise be connected, similar to the one here shown, to the various distant stations so that it will be in parallel with the central station 4 if it is desired.

I will now describe the operation of the circuits when switch key 11^1 is operated to close all of the switch blades so as to give communication between central station 4 and the distant station 11. The contacts 9 and 10 are closed by the removal of the receiver 6 from the hook 8, and the transmitter 5 thereupon is included in a primary transmitting circuit which may be traced as follows:—from said transmitter to contact 9, hook 8, line 27 to battery, from battery on line 29 through primary coil 26, line 28 back to transmitter 5. The secondary circuit energized by said primary circuit is traced as follows:—from the secondary coil 25 through line 35, multiple 2, loud speaking receiver 14, returning through line 1 to the switch blade 19 which has been closed upon blade 18, and therefrom by line 30 through condenser 24 back to the secondary coil. The voice currents generated in the secondary 25 are thus heard in the loud talker 14. An answer may be given to the transmitter 15 by the party so called without making any connections but by merely addressing his voice to said transmitter and the circuit from the distant transmitter is traced as follows:—from 15 through multiple 2, line 29 to one side of battery, line 27, hook 8, contact 10, line 53, switch blade 16 closed upon blade 17, thence through line 32 to primary coil 22 and line 3 back to the transmitter 15. The secondary current generated by said primary current coil 22 is traced from the secondary coil 21 through condenser 23, line 31, line 35, receiver 6 at the central station, line 33, switch blade 16, blade 17, line 32 and back to secondary coil 21. The voice currents thus generated in this secondary are heard in the receiver 6.

It will be noted that primary coil 22 and secondary coil 21 have a common return 32 back through blades 16 and 17 and line 33 to the battery, and in order to prevent battery current from passing through said secondary coil 21 and therefrom to the secondary and primary of another distant station, I have provided the condenser 23 in the circuit of said secondary 21. Said condenser, however, may be dispensed with if the primary and secondary coil, for instance 22^2 and 21^2, are provided with separate blades such as 20 and 16^1 for contact with the battery blade 17^1. In this modification shown at the left of the drawing, when the switch key 13^1 is operated to close all the blades thereof, the same connections are made to the primary and secondary coils as above described, and no condenser such as 23 is required.

It will be noted that the several primary circuits of the distant transmitters are connected to the battery in parallel, so that each receives current irrespective of how many distant stations are or may be connected for communication with the central station, and furthermore although but three wires are used to connect the central station with each distant station, two complete talking circuits are provided between the central station and each distant station.

It will be seen that the three conductors leading from the central station to the distant stations provide in effect a pair of looped circuits to each station, the looped ends of which respectively maintain in permanent relation the loud-speaking receiver and the sensitive transmitter, and that these looped circuits are permanently closed except in so far as they may be manipulated by the switch devices at the central station. There is therefore nothing outside of the central station which can be tampered with or in any wise manipulated which would interfere with the full and complete control of said looped circuits and their instruments at the distant stations by the operator at the central station, and this is essential to a successful system of the character herein described.

I wish it to be understood that the drawings and foregoing description disclose one specified form of my invention and that other forms and variations thereof may be designed without departing from the spirit and scope of the invention as defined in the following claims.

What I claim as new is:—

1. In a system of the character stated, the combination of a central station having a receiver and a transmitter, with a plurality

of distant stations each having a loud speaking receiver and a sensitive transmitter, a separate pair of looped circuits leading from the central station to each of the distant stations, said circuits of each pair respectively including the receiver and transmitter at said distant stations, said looped circuits permanently closed throughout their length except at said central station, induction coils located at the central station, one for each transmitter of the distant stations and having its primary coil in a looped circuit which includes a corresponding transmitter, a battery, a local circuit including the battery and the transmitter at the central station, an induction coil having its primary coil in the local circuit and having its secondary coil in circuit with the looped circuits including the receivers of the distant stations whereby they are in parallel, a local receiver circuit at the central station including the receiver thereof and also having connection with the secondary coils of the induction coils whose primary coils are in the looped transmitter circuits extending from the distant stations whereby said several primary coils and their respective transmitters are in parallel and common to the single receiver at the central station, and switches at the central station for putting the battery in and out of circuit with the respective transmitter circuits, whereby the entire system is controlled from the central station alone.

2. In a system of the character stated, the combination of a central station having a receiver and a transmitter, with a plurality of distant stations each having a loud speaking receiver and a sensitive transmitter, a separate pair of looped circuits leading from the central station to each of the distant stations said circuits of each pair respectively including the receiver and transmitter at said distant stations, said looped circuits permanently closed throughout their length except at said central station, induction coils located at the central station, one for each transmitter of the distant stations and having its primary coil in a looped circuit which includes a corresponding transmitter, a battery, a local circuit including the battery and the transmitter at the central station, an induction coil having its primary coil in the local circuit and having its secondary coil in circuit with the looped circuits including the receivers of the distant stations whereby they are in parallel, a local receiver circuit at the central station including the receiver thereof and also having connection with the secondary coils of the induction coils whose primary coils are in the looped transmitter circuits extending from the distant stations whereby said several primary coils and their respective transmitters are in parallel and common to the single receiver at the central station, switches at the central station for putting the battery in and out of circuit with the respective transmitter circuits, as required, and additional switches also at the central station for rendering the respective induction coils of the looped transmitter circuits inoperative to affect the receiver at the central station, whereby the entire system is controlled from the central station alone.

3. In a system of the character stated, the combination of a central station having a receiver and a transmitter, with a plurality of distant stations each having a loud speaking receiver and a sensitive transmitter, a separate pair of looped circuits leading from the central station to each of the distant stations said circuits of each pair respectively including the receiver and transmitter at said distant stations, said looped circuits permanently closed throughout their length except at said central station, induction coils located at the central station, one for each transmitter of the distant stations and having its primary coil in a looped circuit which includes a corresponding transmitter, a battery, a local circuit including the battery and the transmitter at the central station, an induction coil having its primary coil in the local circuit and having its secondary coil in circuit with the looped circuits including the receivers of the distant stations whereby they are in parallel, a local receiver circuit at the central station including the receiver thereof and also having connection with the secondary coils of the induction coils whose primary coils are in the looped transmitter circuits extending from the distant stations whereby said several primary coils and their respective transmitters are in parallel and common to the single receiver at the central station, means associated with each of the secondary coils to prevent the passage of the battery current through them, and switches at the central station for putting the battery in and out of circuit with the respective transmitter circuits as required, whereby the entire system is controlled from the central station alone.

4. In a system of the character stated, the combination of a central station having a receiver and a transmitter, with a plurality of distant stations each having a loud speaking receiver and a sensitive transmitter, a separate pair of looped circuits leading from the central station to each of the distant stations, said circuits of each pair respectively including the receiver and transmitter at said distant stations, said looped circuits permanently closed throughout their length except at said central station, induction coils located at the central station, one for each transmitter of the distant stations and having its primary coil in a looped circuit which includes a corresponding

transmitter, a battery, a local circuit including the battery and the transmitter at the central station, an induction coil having its primary coil in the local circuit and having its secondary coil in circuit with the looped circuits including the receivers of the distant stations whereby they are in parallel, a local receiver circuit at the central station including the receiver thereof and also having connection with the secondary coils of the induction coils whose primary coils are in the looped transmitter circuits extending from the distant stations whereby said several primary coils and their respective transmitters are in parallel and common to the single receiver at the central station, switches at the central station for independently controlling the looped circuits to the several distant stations to put them in or out of operative relation with the central station, and a separate switch at the central station for putting the battery in or out of circuit with the local transmitter circuit, whereby the entire system is controlled from the central station alone.

5. In a system of the character stated, the combination of a central station having a receiver and a transmitter, with a plurality of distant stations each having a loud speaking receiver and a sensitive transmitter, a separate pair of looped circuits leading from the central station to each of the distant stations, said circuits of each pair respectively including the receiver and transmitter at said distant stations said looped circuits permanently closed throughout their length except at said central station, induction coils located at the central station, one for each transmitter of the distant stations and having its primary coil in a looped circuit which includes a corresponding transmitter, a battery, a local circuit including the battery and the transmitter at the central station, an induction coil having its primary coil in the local circuit and having its secondary coil in circuit with the looped circuits including the receivers of the distant stations whereby they are in parallel, a local receiver circuit at the central station including the receiver thereof and also having connection with the secondary coils of the induction coils whose primary coils are in the looped transmitter circuits extending from the distant stations whereby said several primary coils and their respective transmitters are in parallel and common to the single receiver at the central station, a switch at central station for simultaneously putting the battery into circuit with all of the transmitter circuits, and separate switches for each pair of looped circuits also located at the central station for independently maintaining in or cutting out any of the distant stations, whereby the control of the system is wholly at the central station and any distant station may be entirely isolated so far as transmission of electrical impulses is concerned.

6. In a system of the character stated, the combination of a central station having a receiver and a transmitter, with a plurality of distant stations each having a loud speaking receiver and a sensitive transmitter, a pair of looped circuits permanently closed throughout their length except at said central station said circuits to each distant station comprising separate conductors to the receiver and transmitter and a common return conductor, and means at the central station for operatively connecting the transmitters and receivers of the distant stations to the receiver and transmitter of the central station comprising a battery, a circuit including the battery and transmitter of the central station, an induction coil having its primary in the battery circuit, a switch to put the battery in and out of circuit, an induction coil for each of the looped circuits having its primary coil in the circuit formed by the conductor leading from the distant transmitter, a local circuit including the receiver at the central station, a local circuit including the secondary coil of the induction coil whose primary coil is in the battery circuit, and separate switches for each of the looped circuits of the distant station for connecting their several primary coils in parallel and in or out of circuit with the battery and for connecting their several secondary coils in parallel and in or out of circuit with the receiver of the central station, and also for connecting their several conductors from their receivers in parallel and in or out of circuit with the second named local circuit and its secondary coil, whereby the entire system is controlled wholly from the central station.

7. In a system of the character stated, the combination of a central station having a receiver and a transmitter, with a plurality of distant stations each having a loud speaking receiver and a sensitive transmitter, a pair of looped circuits permanently closed throughout their length except at said central station said circuits to each distant station comprising separate conductors to the receiver and transmitter and a common return conductor, and means at the central station for operatively connecting the transmitters and receivers of the distant stations to the receiver and transmitter of the central station comprising a battery, a circuit including the battery and transmitter of the central station, an induction coil having its primary in the battery circuit, a switch to put the battery in and out of circuit, an induction coil for each of the looped circuits having its primary coil in the circuit formed by the conductor leading from the distant transmitter, a local circuit including the re-

ceiver at the central station, a local circuit including the secondary coil of the induction coil whose primary coil is in the battery circuit, separate normally open circuit means for each of the secondary coils of the induction coils to prevent the passage of current from the battery through the secondary windings when in operation, and separate switches for each of the looped circuits of the distant stations for connecting their several primary coils in parallel and in or out of circuit with the battery and for connecting their several secondary coils in parallel and in or out of circuit with the receiver of the central station, and also for connecting their several conductors from their receivers in parallel and in or out of circuit with the second named local circuit and its secondary coil, whereby the entire system is controlled wholly from the central station.

8. In a system of the character stated, the combination of a central station having a receiver and a transmitter, with a plurality of distant stations each having a loud speaking receiver and a sensitive transmitter, a pair of looped circuits permanently closed throughout their length except at said central station said circuits to each distant station comprising separate conductors to the receiver and transmitter and a common return conductor, and means at the central station for operatively connecting the transmitters and receivers of the distant stations to the receiver and transmitter of the central station comprising a battery, a circuit including the battery and transmitter of the central station, an induction coil having its primary in the battery circuit, a switch to put the battery in and out of circuit, an induction coil for each of the looped circuits having its primary coil in the circuit formed by the conductor leading from the distant transmitter, a local circuit including the receiver at the central station, a local circuit including the secondary coil of the induction coil whose primary coil is in the battery circuit, separate condensers in series with each of the secondary coils to prevent passage of current from the battery said condensers in parallel with each other, and separate switches for each of the looped circuits of the distant stations for connecting their several primary coils in parallel and in or out of circuit with the battery and for connecting their several secondary coils in parallel and in or out of circuit with the receiver of the central station, and also for connecting their several conductors from their receivers in parallel and in or out of circuit with the second named local circuit and its secondary coil, whereby the entire system is controlled wholly from the central station.

9. In a system of the character stated, a central station having thereat, a battery, a receiver, a transmitter, an induction coil having its primary coil in series with the transmitter and battery, a plurality of additional induction coils having their secondary coils in parallel and including the receiver in series, combined with a plurality of distant stations each of which has a sensitive transmitter and a loud talking receiver, a pair of permanently closed looped circuits extending from the central station to each of the distant stations and respectively including the transmitter and receiver thereat, connecting circuits at the central station for including the transmitter circuits with the respective primary coils of the additional induction coils and the receiver circuits in parallel and in circuit with the secondary coil of the induction coil whose primary is in circuit with the battery, and switch devices wholly at the central station for putting the circuits of any of the distant stations in or out of operative relation with the receiver and transmitter of the central station and whereby the receivers of all of the distant stations are in parallel with each other and in series with the secondary coil of the central station transmitter and all of the secondary coils of the additional induction coils are in parallel with each other and in series with the receiver of the central station.

10. The combination with a telephonic transmitter and receiver located at different stations of a circuit including the instruments, a battery in one leg of said circuit between the transmitter and receiver, an induction coil having its two windings connected in series in the other leg of the circuit, and a shunt connecting the juncture of the two windings with the other leg of the circuit between the battery and the receiver.

11. The combination with a telephonic transmitter and receiver at each of two stations, of conductors connecting one terminal of the transmitter at each station with one terminal of the receiver at each other station, an induction coil having its two windings arranged serially in each conductor, a bridge including a source of current connecting the coils intermediate of the separate windings, a second conductor connecting the other terminal of the transmitter at each station with the other terminal of the receiver at the other station, said conductors being connected intermediate the instruments with the source of current.

12. The combination with a telephonic transmitter and receiver at each of two stations, of conductors connecting one terminal of the transmitter at each station with one terminal of the receiver at each other station, an induction coil having its two windings arranged serially in each conductor, a bridge including a source of current connecting the coils intermediate of the separate windings, a second conductor

connecting the other terminal of the transmitter at each station with the other terminal of the receiver at the other station, said conductors being connected intermediate the instruments with the source of current, one of said conductors being connected to one side of the source of current and the other to the opposite side of the source of current.

13. A loud talking telephone circuit comprising a sending station and a plurality of receiving stations, a transmitter at the sending station, a receiver at each receiving station, circuits connecting the transmitter and receivers, and induction coil having its two windings connected in series arranged in each circuit, a battery common to all circuits, and switches at the sending station for opening and closing the individual circuits to the receiving stations.

14. A loud talking telephone circuit comprising a transmitter, an induction coil having its primary connected to one side of said transmitter and its secondary in series with said primary and connected to one side of the receiver, a receiver, a conductor including a battery connecting the remaining terminals of the receiver and transmitter, the juncture of the induction coil windings being conductively connected with the receiver side of the battery.

15. A loud talking telephone circuit comprising a transmitter, an induction coil having its primary connected to one side of said transmitter and its secondary in series with said primary, a conductor connecting the free end of the secondary with a receiver, and a condenser in said conductor, a receiver, a conductor including a battery connecting the remaining terminals of the receiver and transmitter, the juncture of the induction coil windings being conductively connected with the receiver side of the battery.

16. The combination with a telephonic transmitter and receiver at each of two stations, of conductors connecting one terminal of the transmitter at each station with one terminal of the receiver at each other station, an induction coil having its two windings of different relative resistances and arranged serially in each conductor, a bridge including a source of current connecting the coils intermediate of the separate windings, a second conductor connecting the other terminal of the transmitter at each station with the other terminal of the receiver at the other station, said conductors being connected intermediate the instruments with the source of current.

17. The combination with a telephonic transmitter and receiver at each of two stations, of conductors connecting one terminal of the transmitter at each station with one terminal of the receiver at each other station, an induction coil having its two windings arranged serially in each conductor, a bridge including a source of current connecting the coils intermediate of the separate windings, a second conductor connecting the other terminal of the transmitter at each station with the other terminal of the receiver at the other station, said conductors being connected intermediate the instruments with the source of current, and a condenser between each induction coil and receiver.

18. The combination with a telephonic transmitter and receiver at each of two stations, of conductors connecting one terminal of the transmitter at each station with one terminal of the receiver at each other station, an induction coil having its two windings arranged serially in each conductor, a bridge including a source of current connecting the coils intermediate of the separate windings, a second conductor connecting the other terminal of the transmitter at each station with the other terminal of the receiver at the other station, said conductors being connected intermediate the instruments with the source of current, the transmitter at each station being directly connected to the primary of the induction coil, and a condenser between the secondary of the coil and receiver.

Signed at New York city, New York, this 6″ day of October, 1914.

NATHAN A. KURMAN.

Witnesses:
BEATRICE MIRVIS,
ABRAM BERNSTEIN.