

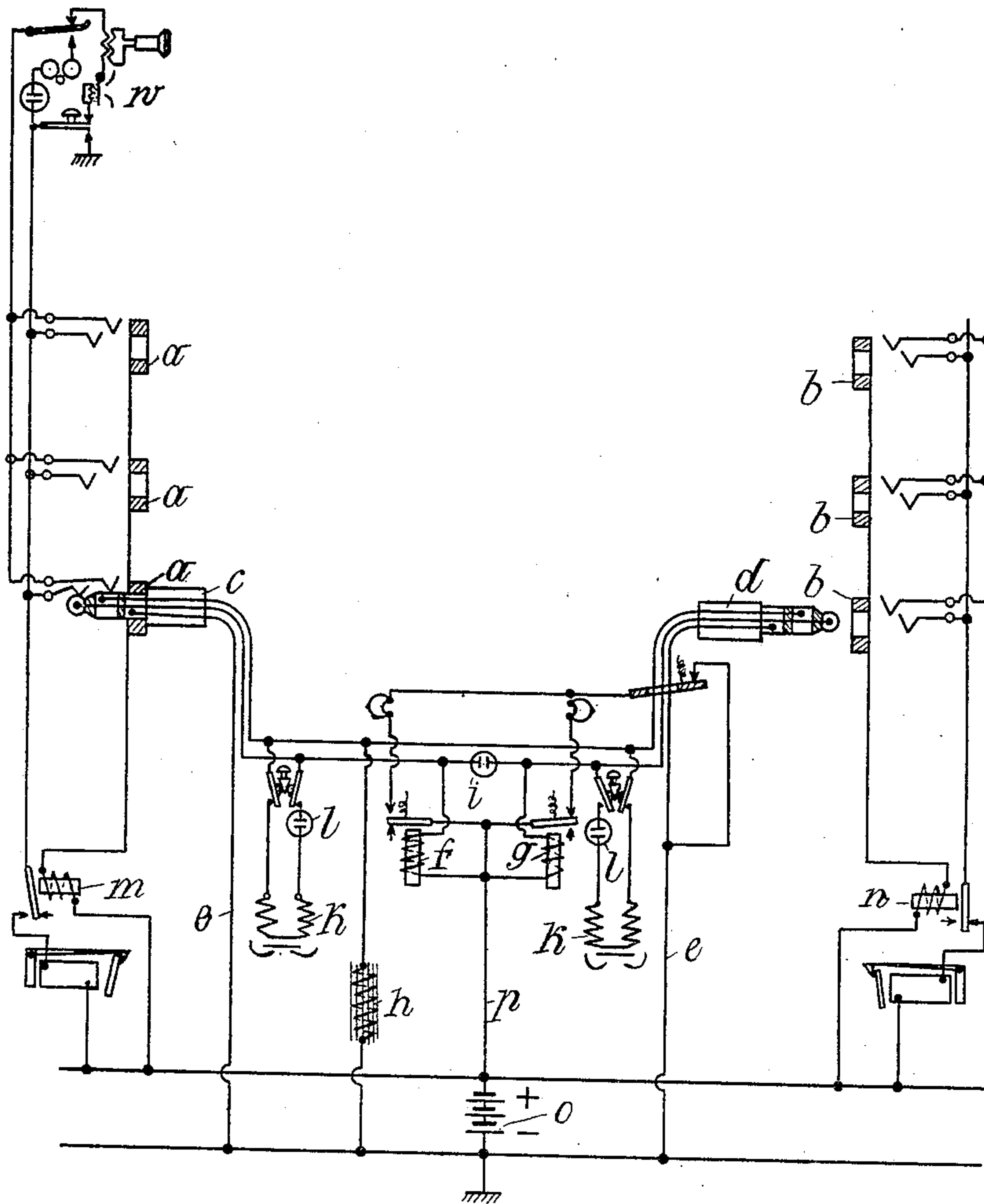
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G. P. LAMBERT.

TELEPHONE SYSTEM WITH CENTRALLY ARRANGED MICROPHONE BATTERY.

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UNITED STATES PATENT OFFICE.

GUSTAF PAUL LAMBERT, OF CHARLOTTENBURG, GERMANY.

TELEPHONE SYSTEM WITH CENTRALLY-ARRANGED MICROPHONE-BATTERY.

No. 824,251.

Specification of Letters Patent.

Patented June 26, 1906.

Application filed February 14, 1902. Serial No. 94,089.

To all whom it may concern:

Be it known that I, GUSTAF PAUL LAMBERT, a subject of the King of Sweden and Norway, residing at No. 43 Joachimsthalerstrasse, in the city of Charlottenburg, near Berlin, Kingdom of Prussia, and German Empire, have invented a certain new and useful Telephone System with a Centrally-Arranged Microphone-Battery, of which the following is a specification.

This invention has reference to a telephone system with a central battery, and it is chiefly intended to devise means whereby it is possible to ascertain in a simple and reliable manner whether the lines are busy.

The method used heretofore where the testing of the lines was effected by touching the sleeves of the spring-jacks of the subscriber who is to be called up with the point of the coupling-plug is attended with difficulties if employed with the telephone systems heretofore used for telephone-stations provided with a central battery. The peculiar cracking noise is noted in this case in the telephone even on touching the spring-jacks which are not busy, or the cracking noise becomes very prominent in case of the line being busy, or the signal becomes so blurred by the instruments on the circuit as to be hardly noticeable. These difficulties are chiefly due to the fact of the central battery being usually included in the bridge-circuit between the two branches of the connected subscribers' circuits, comparatively low resistances being used for connection with the circuits. Thus the central battery constitutes a shunt-circuit to the subscriber lines of considerable extent, although the resistances are provided with high self-induction. Care should, however, be taken to avoid interfering with the testing-circuit in consequence of special arrangements of the shunt-circuit, as frequently practiced. A further difficulty in the arrangement of the testing-circuit is due to the fact that the two electromagnets for the closing-signal are also included in the circuit, so as to either possess an increased sensibility or by separating them by a battery which will interfere as little as possible with the passage of the talking-currents and of the testing-currents. In the present system all these requirements are taken into account and the inconveniences generally met with in the old systems are avoided. Both closing-signal electromagnets are used instead of the self-induction resistance, which should other-

wise be included between one terminal of the central battery and the main line of the connecting-wire. The separation of the said electromagnets from each other is effected by the employment of polarization-batteries, which prevent the passage of continuous currents, while they allow the talking-currents and the testing impulse to pass without noticeable decrease in the intensity. Otherwise there is no special battery for testing purposes. Care should, however, be taken in case the telephone is arranged at the side of the connecting-plug to separate it from the line-wire either by means of a condenser or by polarization-batteries or to include it in a shunt to the closing-signal relay.

The accompanying diagrammatic figure is an illustration of the invention.

In the drawing, *a a a* are the spring-jacks of the speaking subscriber, and *b b b* are those of the subscriber who is being called up. The answering-plug *c* and the coupling-plug *d* are in three parts, the points of the said plugs serving as a continuation of the so-called "*a*" circuits (the main circuits) and the second segments of the plugs being a continuation of the so-called "*b*" circuits, the return circuits of the subscribers, while the third segment is connected to the earth-circuit *e*. The conductors which lead off from the points of these plugs are connected to a relay *f* and *g*, respectively, and to a positive pole of the central microphone-battery. The relays *f* and *g* serve to operate the lamps for indicating the final signals wherever in special cases no final signals are required. The lamps are replaced by ordinary self-induction coils. The negative grounded pole is connected with the plug-conductors of the second segment by means of the inductions resistance *h*. The relays *f* and *g*, respectively, for the closing-signal are bridged over by a polarization-battery *i* or a series of such batteries. The listening-telephone *k* of the attendant is connected at the side of the answering-plug *c*, another polarization-battery *l* being included in the circuit. It is also to be noted that the plug tubes or sleeves of the subscribers are connected with that pole of the battery which is not grounded by a resistance *n*, which is generally arranged in form of a relay and which serves to effect the cutting out of circuit of the calling-up communicator drops at the subscriber's station.

The arrangement for testing the line is the following: The answering-plug *c* is inserted

in the hole of the spring-jack *a* of the calling-up subscriber. This will cut the microphone-battery into circuit, the current taking its way from the positive pole to the relay *f*, thence to the point of the plug, along the double line of the subscriber, to the second segment of the plug, the resistance *h*, and back to the negative pole of the battery. The attendant touches the sleeve of the spring-jack of the testing-circuit of the called-up subscriber with the connecting-plug *d*. If the line of the subscriber is busy, the sleeve of the spring-jack has the potential of the earth. If the line is free, however, the potential of the spring-jack sleeve will be that of the positive pole of the battery, as it is connected to this pole by means of the coil *n*. In the first case the current passes from the positive pole over the relay *g* to earth, which results in a change of potential and at the battery *i* in the first place. As soon as this is effected the battery *l* will also be influenced momentarily and an impulse is sent through the telephone of the attendant at *k*. This may be explained by the polarization-battery *i* taking up a higher electric charge than it originally possessed. To the constantly-flowing current is added the charging-current, which takes its way from the positive pole to the relay *f*, the battery *i*, the sleeve *b*, the resistance *n*, and thence to ground. This current causes a momentary decrease of tension at the pole of the battery connected to the relay *f*, and it also decreases the tension at *i*, while the other pole of the battery *l* retains its potential. As a result of this change of tension at the battery *l* an impulse is sent through the telephone *k*. If, on the other hand, the line of the subscriber is free, the potential of the spring-jack sleeve is that of the positive pole of the battery, to which it is connected by means of the relay *n*. The point of the plug has the same potential, so that no variation of potential results by the touch. There is also a possibility to arrange the telephone *k* of the attendant on the side of the connecting-plug *d*, the connections being made in the manner shown in the figure. However, in making the connections this way an inconvenience may arise from the cracking noise in the telephone becoming too strong and annoying, inasmuch as in this case almost the entire tension of the battery will act upon the polarization-battery *l*. By grounding the point of the plug the tension at the battery *l* is reduced to a minimum and the change of tension being almost equal to the tension of the whole battery produces a strong cracking in the telephone. In view of many other circumstances having to be regarded in selecting a suitable tension of

battery it is of advantage to be able to effect the testing both with a strong and a weak battery, the telephone being either placed upon the side of the speaking or of the answering subscriber without otherwise changing the system.

What I claim, and desire to secure by Letters Patent of the United States, is—

1. In a telephone system, in combination, a central microphone-battery, a plurality of pairs of jack-springs connected to each subscriber's line and in parallel to one pole of the central microphone-battery, test rings or sleeves corresponding to each pair of jack-springs and connected in parallel to the same pole of the said central battery, a plug for the plurality of test-sleeves of each subscriber's line and provided with a cord having three strands or conductors, two of which are capable of connecting respectively with each pair of jack-springs, the third conductor being connected to the other pole of the central battery and to earth, testing-telephones bridged across the two other cord conductors, induction-coils connected to one pole of the central battery and in parallel to one of the last-mentioned cord conductors, a polarization-battery bridging the said induction-coils and a polarization-battery in one branch of the said testing-telephone circuits.

2. In a telephone system, in combination, a central microphone-battery, a plurality of pairs of jack-springs connected to each subscriber's line and in parallel to one pole of the central microphone-battery, test rings or sleeves corresponding to each pair of jack-springs and connected in parallel to the same pole of the said central battery, a plug for the plurality of test-sleeves of each subscriber's line and provided with a cord having three strands or conductors, two of which are capable of connecting respectively with each pair of jack-springs, the third conductor being connected to the other pole of the central battery and to earth, resistance-coils in the conductors connecting the test-sleeves and the central battery, testing-telephones bridged across the two other cord conductors, induction-coils connected to one pole of the central battery and in parallel to one of the last-mentioned cord conductors, a polarization-battery bridging the said induction-coils and a polarization-battery in one branch of the said testing-telephone circuits.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

GUSTAF PAUL LAMBERT.

Witnesses:

HENRY HASPER,
WOLDEMAR HAUPT.