

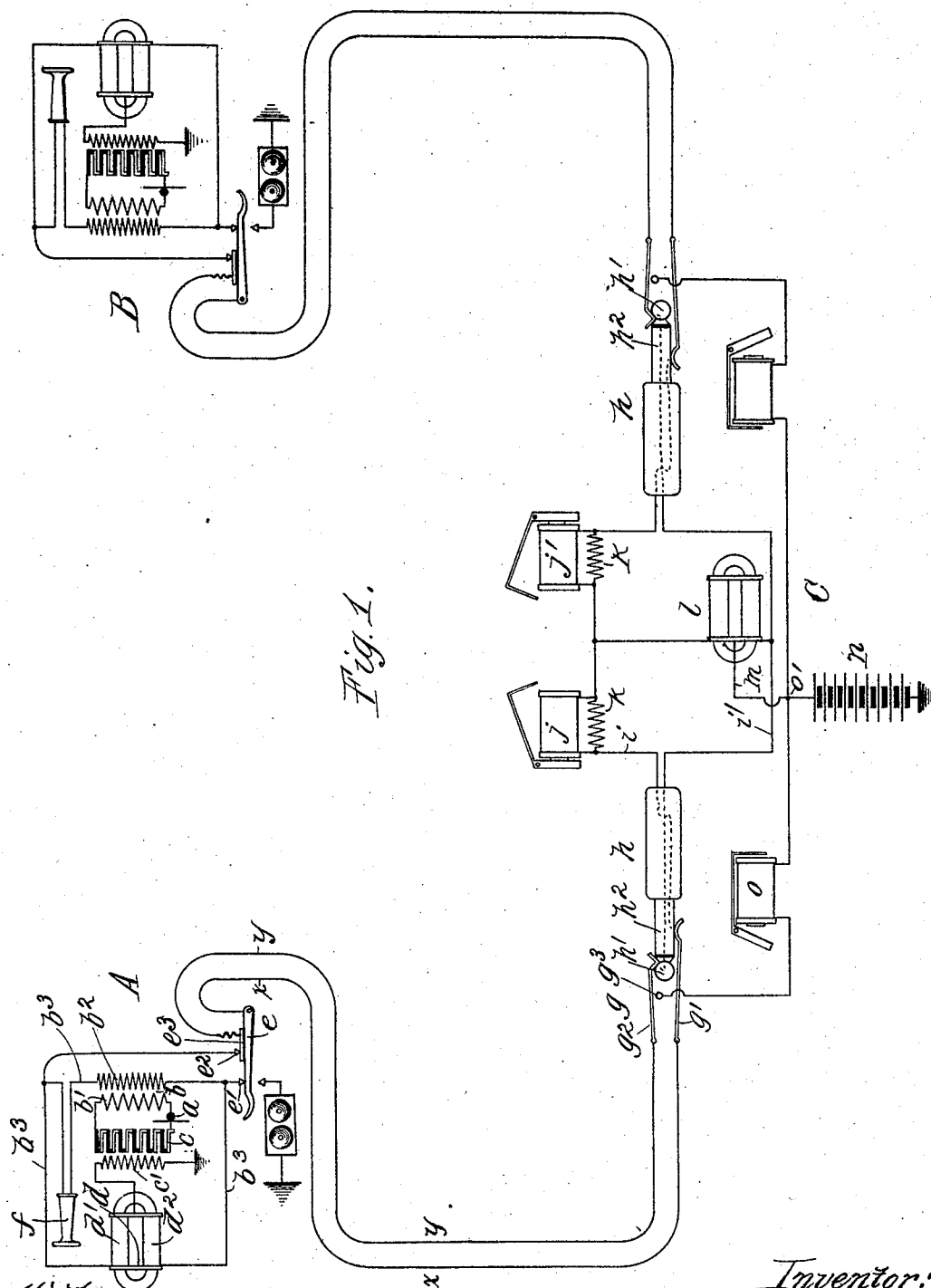
(No Model.)

2 Sheets—Sheet 1.

W. W. DEAN.
TELEPHONE SYSTEM.

No. 577,101.

Patented Feb. 16, 1897.



Witnesses:
L. M. Canner.
George L. Cragg

Inventor:
William W. Dean,
By Barton Brown,
Attorneys.

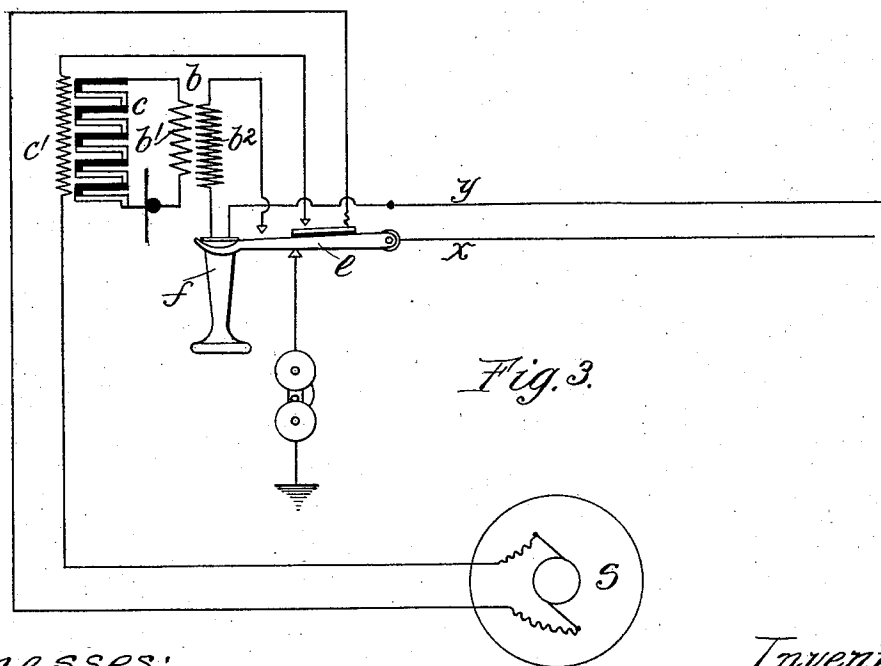
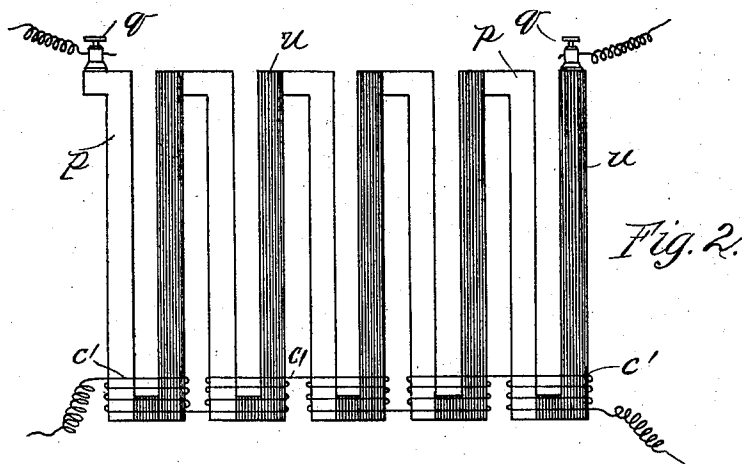
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TELEPHONE SYSTEM.

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Witnesses:
S. A. Panner
George L. Bragg

Inventor:
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UNITED STATES PATENT OFFICE.

WILLIAM W. DEAN, OF ST. LOUIS, MISSOURI, ASSIGNOR TO THE BELL
TELEPHONE COMPANY OF MISSOURI, OF SAME PLACE.

TELEPHONE SYSTEM.

SPECIFICATION forming part of Letters Patent No. 577,101, dated February 16, 1897.

Application filed September 19, 1896. Serial No. 606,344. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM W. DEAN, a citizen of the United States, residing at the city of St. Louis, in the State of Missouri, have invented a certain new and useful Improvement in Telephone Systems, (Case No. 16,) 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 particularly to a telephone system, and has for its object to provide a steady and constant current for the microphone-transmitter.

When voltaic cells are employed at each subscriber's station, considerable attention is required to keep them in proper working order, together with frequent renewals of the elements. Telephone systems have been devised in which current for the subscriber's microphone is supplied by a common battery at the central station. In telephone systems of this description an objection has been that owing to the varying lengths and inductive effects of the circuits in which the microphones and primaries are included an equal, steady, and constant current for each instrument has been obtained with difficulty.

My invention comprises an electrothermal generator at the subscriber's station which is designed to supply current for the microphone, the heat necessary for the operation of said electrothermal generator being preferably obtained by a heating-conductor placed in proximity thereto, said conductor being heated by the passage of an electric current from any convenient source. In practice I prefer to employ a centralized battery common to all the subscribers, which may be brought into circuit with the heating-conductor upon the removal of the subscriber's telephone from its hook. Variations in the current from the centralized battery which would render the current impracticable or useless for telephonic purposes would not perceptibly affect the steadiness in temperature of the heating-conductor, and consequently the current from the thermal generator would remain steady and constant.

In certain cases it may not be practicable nor desirable to employ a centralized battery

for heating purposes, as described. In such a contingency any suitable heating medium may be employed to cause the operation of the thermal generator. For instance, the heating-conductor may be used and included in an adjacent incandescent-light circuit by suitable contacts, which may be closed upon the removal of the telephone from its hook.

I will describe my invention more in detail by reference to the accompanying drawings, in which—

Figure 1 is a diagram of a telephone system embodying my invention in which the subscriber's microphone-transmitter is supplied with current from an individual electrothermal generator in circuit therewith. Fig. 2 shows an electrothermal generator as adapted for use in such a system, the heating-coil being indicated diagrammatically. Fig. 3 illustrates in diagram a subscriber's station, a separate source of current being used to supply the heat necessary for the operation of the electrothermal generator.

Like letters indicate like parts throughout the several figures.

Referring to Fig. 1, A and B represent subscribers' stations, and C a portion of the apparatus at the central station. The microphone-transmitter *a* is included in a local circuit with the primary *b'* of the induction-coil *b* and an electrothermal generator *c*. A heating-coil *c'* is provided to furnish the heat necessary for the operation of said electrothermal generator *c*, one end of said heating-coil being connected to ground, the other end connected to the middle of a retardation-coil *d*, whose upper and lower halves *d'* and *d''* are connected, respectively, with conductor *b''*, the coil being thus placed in shunt to the secondary *b''* and hand-telephone *f*, which are included in series in conductor *b''*, the ends of which conductor terminate at contact-points *e'* *e''* of the telephone-hook *e*. The hook *e* and contact-plate *e''*, mounted thereon, but insulated therefrom, are connected through limbs *x* and *y*, respectively, to line-springs *g'* *g''* of spring-jack *g* at the central station.

Plugs *h* *h* are provided, the tips *h'* and sleeves *h''* being connected together by cord strands *i* *i'* in the usual manner. Clearing-out annunciators *j* *j'* are included in cord

strand *i*, being shunted, however, by non-inductive resistances *k k*.

A retardation-coil *l* is connected in a bridge between the cord strands *i i'*, to the middle point of which is connected a conductor *m*, which leads through battery *n* to ground. Contact-point *g*³ of spring-jack *g*, against which line-spring *g*² normally rests, is connected through line-indicator *o* to the conductor *m* at point *o'*, and thence to the battery *n*.

When subscriber A, desiring a connection, lifts his telephone from its hook, current from battery *n* finds path from ground through conductor *m* to the point *o'*, indicator *o*, contact *g*³, line-spring *g*², limb *y*, contact-plate *e*³, conductor *b*³, retardation-coil *d*, heating-coil *c'* to ground. Upon the insertion of the plug by the operator circuit is broken at contact *g*³, current from battery *n* now flowing from ground through conductor *m* to the middle point of retardation-coil *l*, where it divides, flowing through the cord strands, tip and sleeve of the plug *h*, line-springs *g'* *g*², limbs *x* and *y* in multiple, contacts *e'* *e*², conductor *b*³, retardation-coil *d*, heating-coil *c'* to ground. The current through the heating-coil raises it to such a temperature that the electrothermal generator begins to operate, furnishing current for the primary talking-circuit.

The operation of making connection at the central station is well known, and I do not, therefore, further describe it. It is evident that any suitable form of electrothermal generator may be employed, but the one which I preferably use in practicing my invention is composed of alternate strips *u* and *p* of bismuth and antimony placed in contact, as shown in Fig. 2, a heating-coil *c'* being wound around all the strips upon one side of the thermal generator, the ends of the coil being adapted to be connected to a source of electric current.

Binding-posts *q q* are attached to the end strips, from which wires lead off to the points of application.

Referring to Fig. 3, a source of current *S* is shown, which is adapted to be included in circuit with the heating-coil *c'* upon the removal of telephone *f* from its hook *e*.

It is evident that various modifications may be made without departing from the spirit of my invention, and

I therefore claim as new and desire to secure by Letters Patent, with only those limitations expressed or by law implied in view of the state of the related arts, the following:

1. In a telephone, the combination with the subscriber's microphone and primary of the induction-coil, of an electrothermal generator in circuit therewith, a heating-coil in proximity to said electrothermal generator, means for supplying current to said heating-coil, and means for controlling the supply of current to said heating-coil.

2. In a telephone system, the combination with the subscriber's microphone, and primary

of the induction-coil, of an electrothermal generator in circuit therewith, a heating-coil, a source of current-supply for said heating-coil, and means, controlled by the movement of the telephone-hook, for including said source of current in circuit with said heating-coil, substantially as described.

3. In a telephone system, the combination with the subscriber's microphone and primary of the induction-coil, of an electrothermal generator in circuit therewith, a heating-coil, a source of current at the central station, and means for including said source of current in circuit with said heating-coil substantially as described.

4. In a telephone system, the combination with the subscriber's microphone and primary of the induction-coil, of an electrothermal generator in circuit therewith, a heating-coil in circuit with the telephone-line, a spring-jack terminal for said telephone-line, a plug and cord circuit at the central station, and a source of current included in said cord circuit, said source of current being placed in electrical communication with said heating-coil upon the insertion of the plug into the spring-jack, substantially as described.

5. In a telephone apparatus, the combination of a telephone-receiver with a telephone-transmitter, an electrothermal generator included in circuit with said transmitter, means for heating said electrothermal generator, and a switch-hook for the receiver adapted to control said means, substantially as described.

6. In a telephone apparatus, the combination of an induction-coil, with a telephone-receiver, a telephone-transmitter, an electrothermal generator included in circuit with said transmitter and the primary of the induction-coil, a heating-conductor placed in proximity to said generator, a source of current adapted to be included in circuit with said heating-conductor, and a switch-hook for the telephone-receiver adapted to control the continuity of the circuit including said source of current and heating-conductor, substantially as described.

7. In a telephone system, the combination of a telephone-line extending from the central office to a subscriber's station with a source of electricity connected therewith at the central office, an induction-coil at the subscriber's station, a thermal generator and a microphone-transmitter included in circuit with the primary of said induction-coil, and a conductor adapted to heat said generator connected with said telephone-line and source of electricity, substantially as described.

8. In a telephone apparatus, the combination of a telephone-receiver, with a telephone-transmitter, an electrothermal generator included in circuit with said transmitter, a heating-conductor adapted to heat said generator, a source of current adapted to be included in circuit with said conductor, and a switch-hook for the telephone-receiver adapted to control the continuity of the circuit including said

source of current and heating-conductor, substantially as described.

9. In a telephone system, the combination of a telephone-line extending from the central office to a subscriber's station, with a telephone-transmitter at the subscriber's station, and an electrothermal generator included in circuit therewith, a conductor adapted to supply heat to said generator included or adapted to be included in circuit with the telephone-line, and a source of current at the central office included or adapted to be included in circuit with said conductor, substantially as described.

10. In a telephone system, the combination of a telephone-line extending from the central office to a subscriber's station, a transmitter at the subscriber's station, and an electrothermal generator included in circuit therewith, a heating-conductor associated with said generator, and connected or adapted to be connected with the telephone-line, a source of current, and switching mechanism at the central office adapted to include said source of current in circuit with the telephone-line and said conductor, substantially as described.

11. In a telephone system, the combination of a telephone-line extending from the central office to a substation, with a telephone-receiver in circuit with the telephone-line at the substation, an induction-coil at the substation, a transmitter and an electrothermal generator included in circuit with the primary coil of said induction-coil, a heating-conduc-

tor, a source of current and a telephone-hook for the telephone-receiver adapted to complete a circuit including said source of current and conductor, substantially as described.

12. In a telephone system, the combination of a plurality of subscribers' stations each having a telephone-transmitter, with electrothermal generators, one in circuit with each transmitter, a common source of current, a conductor leading from said source of current to said subscribers' stations, and heating-conductors, one at each subscriber's station, in circuit with the aforesaid conductor and source of current and adapted to heat said thermal generators, substantially as described.

13. In a telephone system, the combination of a plurality of subscribers' stations each having a primary circuit including a transmitter, thermal generator and the primary helix of an induction-coil, a common source of current, a conductor leading from said source of current to said subscribers' stations, and heating-conductors, one at each subscriber's station in circuit with the aforesaid conductor and source of current and adapted to heat said thermal generators, substantially as described.

In witness whereof I hereunto subscribe my name this 16th day of September, A. D. 1896.

WILLIAM W. DEAN.

Witnesses:

GEORGE P. BARTON,
GEORGE L. CRAGG.