

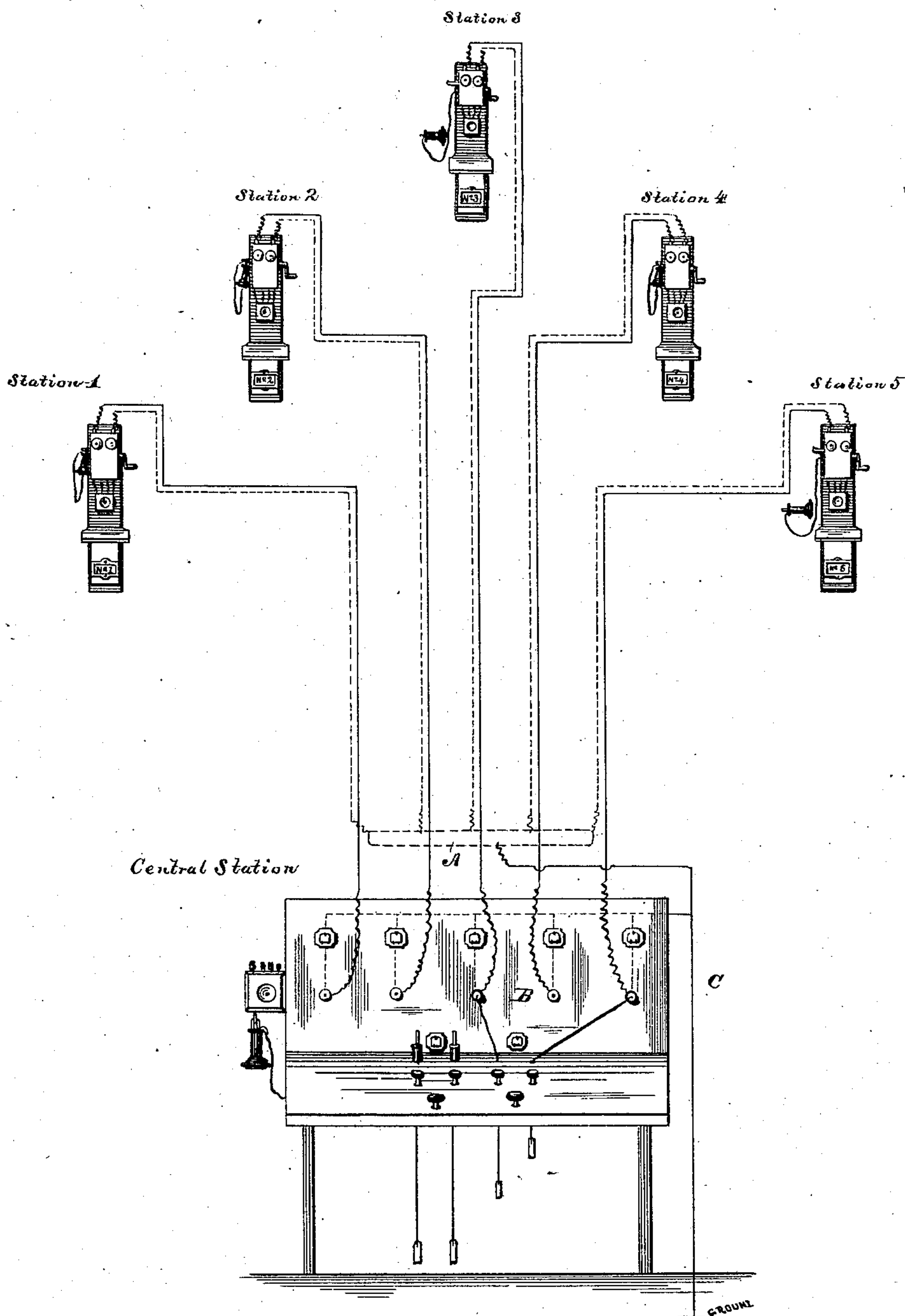
(No Model.)

J. C. & E. P. WARNER.

METALLIC CIRCUIT FOR TELEPHONE EXCHANGES.

No. 299,603.

Patented June 3, 1884.



Attest

Paul A. Staley
Frank E. Lord

Inventors

James C. Warner
Ernest P. Warner
By their Attorney
George H. Barton

UNITED STATES PATENT OFFICE.

JAMES C. WARNER AND ERNEST P. WARNER, OF CHICAGO, ILLINOIS, AS-
SIGNORS TO THE WESTERN ELECTRIC COMPANY, OF SAME PLACE.

METALLIC CIRCUIT FOR TELEPHONE-EXCHANGES.

SPECIFICATION forming part of Letters Patent No. 299,603, dated June 3, 1884.

Application filed November 5, 1883. (No model.)

To all whom it may concern:

Be it known that we, JAMES C. WARNER and ERNEST P. WARNER, citizens of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Metallic Circuits for Telephone-Exchanges, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawing, forming a part of this specification.

Our invention relates to metallic circuits of a telephone-exchange. Its objects are to simplify the method of connecting the subscribers and to reduce the amount of apparatus heretofore required for working the exchange.

Our invention is illustrated in the accompanying diagram, in which we have shown five subscribers' stations, 1 2 3 4 5, each connected with the central office by a complete metallic circuit. These different telephone-lines are connected on their return to the central station with a plate or connecting-piece, A, common to all the lines. The switch-board B may be of any well-known form, and provided with switches for the different lines. Beginning at the plate A, the circuit of any telephone-line may be traced through an annunciator and a switch upon the switch-board, and thence to a subscriber's station, and thence back to the common piece, A. We prefer to use the Warner form of spring-jack switch claimed in Patent No. 281,741, dated July 24, 1883. Any two circuits may thus be connected together upon the switch-board by the use of ordinary conducting-cords and plugs, while the annunciators of the lines will be out of circuit. We find, however, by experiment that owing to the induction between different subscribers' lines there would be so much cross-talk as to seriously interfere with the successful operation of metallic circuits as above described. This inductive action we found most troublesome when only a small number of subscribers were connected for con-

versation, an increase of the number of connections tending to distribute the inductive action so that the exchange might be worked with fair results. We found, however, that by grounding the common connecting-piece all the injurious inductive action was prevented. This common ground-wire, C, is shown in the drawing. By the use of this ground-wire C, to which all or a group of the telephone-lines are connected, we have been enabled to use metallic circuits as above described with great success.

Any two lines may be connected together for conversation, as before described, and we have all the advantages of metallic circuits, while the switches and annunciators and other apparatus may be the same as heretofore used with ordinary ground-lines.

We claim as our invention—

1. The combination of a group of metallic circuits with a common connecting-piece from which the lines branch severally through an annunciator and spring-jack or switch upon the switch-board, and thence to a subscriber's station, and thence back to the common connecting-piece, whereby any two of these lines may be connected together by ordinary cords and plugs, substantially as set forth.

2. The combination of a group of telephone-stations and a central station, each telephone-station being connected to said central station by a metallic circuit, said metallic circuits each including a signaling device, a connecting-switch, and a connecting-piece at the central station, said connecting-piece being common to all the lines of the group, and provided with a permanent branch to ground, substantially as and for the purpose set forth.

In witness whereof we hereunto subscribe our names this 2d day of November, A. D. 1883.

JAMES C. WARNER.
ERNEST P. WARNER.

Witnesses:

PAUL A. STALEY,
CHAS. F. NICKEL.