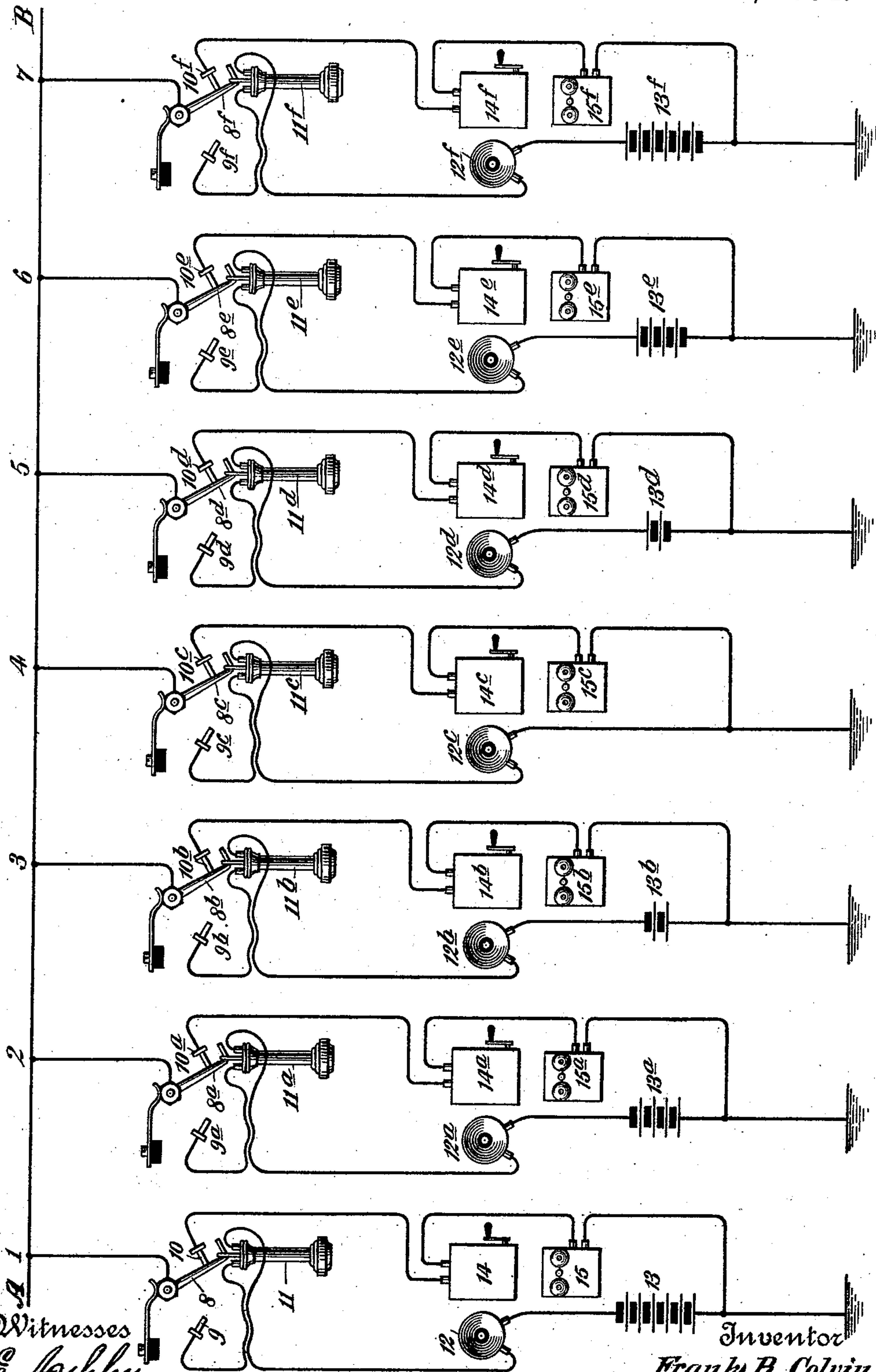


(No Model.)

F. R. COLVIN.
TELEPHONY.

No. 528,592.

Patented Nov. 6, 1894.



Witnesses
C. E. Ashley
W. W. Lloyd

By his Attorneys

Inventor
Frank R. Colvin

Peckham & Rogers

UNITED STATES PATENT OFFICE.

FRANK R. COLVIN, OF NEW YORK, N. Y.

TELEPHONY.

SPECIFICATION forming part of Letters Patent No. 528,592, dated November 6, 1894.

Application filed July 26, 1894. Serial No. 518,611. (No model.)

To all whom it may concern:

Be it known that I, FRANK R. COLVIN, a citizen of the United States, residing in the city, county, and State of New York, have invented
5 certain new and useful Improvements in Telephony, of which the following is a specification.

This invention relates to a system of telephonic inter-communication and has for its
10 object the placing of a plurality of subscribers' instruments in multiple-arc relation to a connecting line so as to permit any subscriber of a system to communicate with any other subscriber with a minimum self-inductive in-
15 terference and an economical expenditure of battery power. It involves a calling and a talking branch at each subscriber's station and means for imposing upon the line at the will of the subscriber a high potential cur-
20 rent or a low potential current so as to differentiate between the calling and talking instruments. It is especially applicable to lines in which direct battery currents are used for speech transmission, the arrangement being
25 such that although all stations of the system except the ones talking have the call-receiving apparatus in circuit, the battery currents thrown upon line by the conversation will not actuate the call-receiving apparatus.

30 The invention involves the multiple-arc system in which the several stations are provided with means for imposing upon line a high potential signaling current or a low potential talking current.

35 It also involves a battery arrangement by which the batteries of the several subscribers will co-operate so as to produce upon the talking circuit a potential suitable for its length irrespective of the distance between the two
40 stations which may be in use.

It involves also other features.

In carrying out the invention I preferably provide at each station high potential calling and call-receiving apparatus normally in
45 closed relation to the line, by which any subscriber of the system may be called up by a number of impulses corresponding to his number and a talking branch containing a battery, a carbon direct-current transmitter
50 and a suitable receiver by which conversation

may be held between two communicating subscribers.

The several features of novelty of the invention will be more particularly hereinafter described, and will be definitely indicated in
55 the claims appended to this specification.

In the accompanying drawing which illustrates my invention is shown diagrammatically a system involving its several features.

A, B represent a line extending the length
60 of the circuit provided at the several stations, 1, 2, 3, 4, 5, 6, 7 with multiple-arc branches leading to ground or a common return and including respectively the signaling and talk-
ing outfits of the several subscribers. At
65 each station is provided a supporting hook 8 mounted to rock into engagement with either of two contacts 9, 10, one of which, as 10, connects with a call-sending and receiving
outfit, and the other of which, 9, connects with
70 a telephone receiver 11, a carbon transmitter 12 and battery 13. The preferred form of call-sending apparatus is a magneto-generator 14 wound to impose upon line when the crank
is operated, a series of high potential im-
75 pulses. By "high potential" I mean high relatively to the potential of the battery currents employed in the system. In the calling branch is placed a bell 15 adapted to respond
to magneto impulses. The calling branch is
80 connected to the return circuit at a point beyond the battery as indicated in the drawing. The supporting hook 8 is so arranged that when in its normal position it will support the
telephone 11, but when shifted to the talking
85 contact 9, the hook will incline in a downward direction so as to shed or drop the telephone and prevent the same being supported upon the hook unless the latter is restored to its
normal position, as described and claimed in
90 a patent granted to me, No. 517,263, dated March 27, 1894. It is obviously desirable that the strength of the talking current should be substantially uniform in all conditions of
service; that is to say, whether the subscri-
95 bers whose instruments are located at the extreme ends of the line, or those who are adjacent to each other, are in communication. Obviously, if batteries of uniform strength were employed at the several stations the
100

strength of the current would be much lower when the extreme operators converse, than, for example, when the two nearest operators converse. I therefore provide at the several subscribers' stations independent batteries so arranged that the strength of current will vary according to the distance between the two subscribers who are in communication.

In the system illustrated in the drawing I have shown seven stations connected in multiple-arc relation to the same line, the batteries varying in the number of elements or electro-motive-force, either as shown at stations 1, 2, 3, by having similar poles connected to the line, or, as shown at stations 3 and 5, by having opposite poles presented to the line so as to couple them in series and thus vary the electro-motive-force proportionately to the distance between the stations. An economical arrangement is that illustrated in the drawing, wherein say three of the stations, 1, 2 and 3, have batteries of six, four and two cells, respectively, with zinc poles to line, and stations 5, 6 and 7 have two, four and six cells, respectively, with copper poles to line, station 4 being provided with no battery. In this organization it results that if stations 1 and 2 are in communication, batteries 12 and 12^a will furnish a differential electro-motive-force of two cells which will be sufficient to deliver a proper working current over the short line connecting them; but if stations 1 and 3 are in communication, a differential current of four working cells will be delivered to the line of increased length. If stations 1 and 4 are in communication, 4 having no battery, the full energy of all the cells at station 1 will be active, delivering an electro-motive-force suitable to the distance between the stations. On the other hand, if station 5 is in communication with station 1, its two cells having the opposite pole to line, will add to the electro-motive-force of the battery at station 1 and produce a current strength sufficient for the distance between stations 1 and 5. So, if stations 1 and 7 are in communication, the two batteries of six cells each will be connected in series and deliver a proper working current.

The calling apparatus at the several stations involving the use of high potential induced currents may be similar throughout the system and of a character to operate the calling apparatus between the extreme stations of the system. The call-sending and receiving apparatus will preferably be provided with a high resistance ohmic or inductive so as to prevent a damaging leak of the talking currents over the several branches which are not in talking relation to line.

It will thus be seen that I provide a system in which the resistance of the talking circuit is comparatively low and no inductive apparatus except that of the two conversing subscribers will interfere with a successful transmission of speech.

I do not confine myself rigidly to the organization illustrated, as changes may be made in the arrangement of the apparatus without departing from the scope of my claims.

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

1. A system of telephonic intercommunication, comprising a plurality of stations connected in multiple-arc relation to the line, each station being provided with a high potential calling generator and a talking outfit organized to impose on line low potential talking currents.

2. A system of telephonic intercommunication, comprising a plurality of stations connected in multiple-arc relation to the line, each station being provided with high potential and high resistance call-receiving and transmitting apparatus and talking apparatus adapted to impose on line low potential currents arranged in independent branches of the circuit.

3. A system of telephonic intercommunication, comprising a plurality of stations connected in multiple-arc relation to a common line having high potential and high resistance calling apparatus normally in closed relation thereto and low potential direct-current talking apparatus in normally open relation thereto.

4. A system of telephonic intercommunication, comprising a plurality of stations connected in multiple arc relation to a common line, a battery or other source of continuous current, in each station branch of the circuit the electro-motive-force of the several batteries being arranged to cooperate so that whatever the distance between two subscribers in talking relation to the line, current of substantially the same strength will be furnished.

5. A system of telephonic intercommunication, comprising a plurality of stations connected to a common line, call-transmitting and receiving apparatus in normally closed relation at the several stations, a normally open talking branch including a carbon transmitter and a battery, the batteries at the several stations being arranged so as to progressively increase in electro-motive-force as the distance between the communicating subscribers is increased.

6. A system of telephonic intercommunication, comprising a plurality of stations connected in multiple-arc relation to a common line, transmitting apparatus in each station branch of the circuit, said transmitting apparatus being of progressively increasing power as the distance between the stations increases so as to preserve a uniform strength of talking current for all communicating subscribers.

7. A system of telephonic intercommunication, comprising a plurality of stations con-

5 nected in multiple-arc relation to a common line, and provided with transmitters in the several station branches whose batteries are arranged to act conjunctively or differentially to deliver an electro-motive-force proportionate to the distance between the communicating stations.

In testimony whereof I have hereunto subscribed my name this 23d day of July, A. D. 1894.

FRANK R. COLVIN.

Witnesses:

FREDERICK A. ISHAM,
LAURA E. ISHAM.