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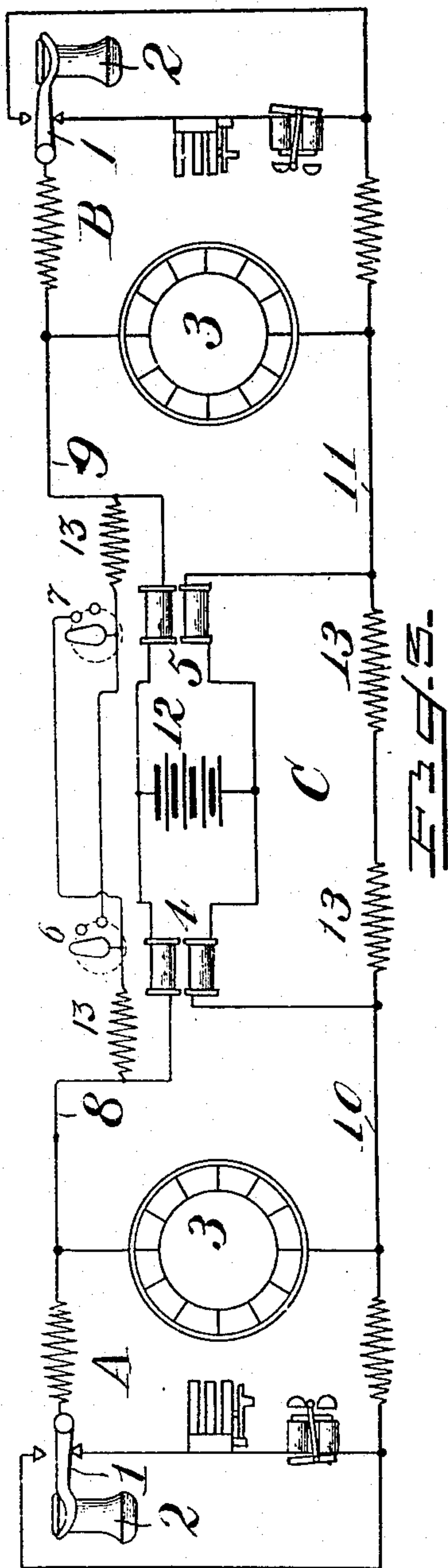
PATENTED NOV. 27, 1906.

A. VAN WAGENEN.

AUTOMATIC SYSTEM OF INTERCOMMUNICATION.

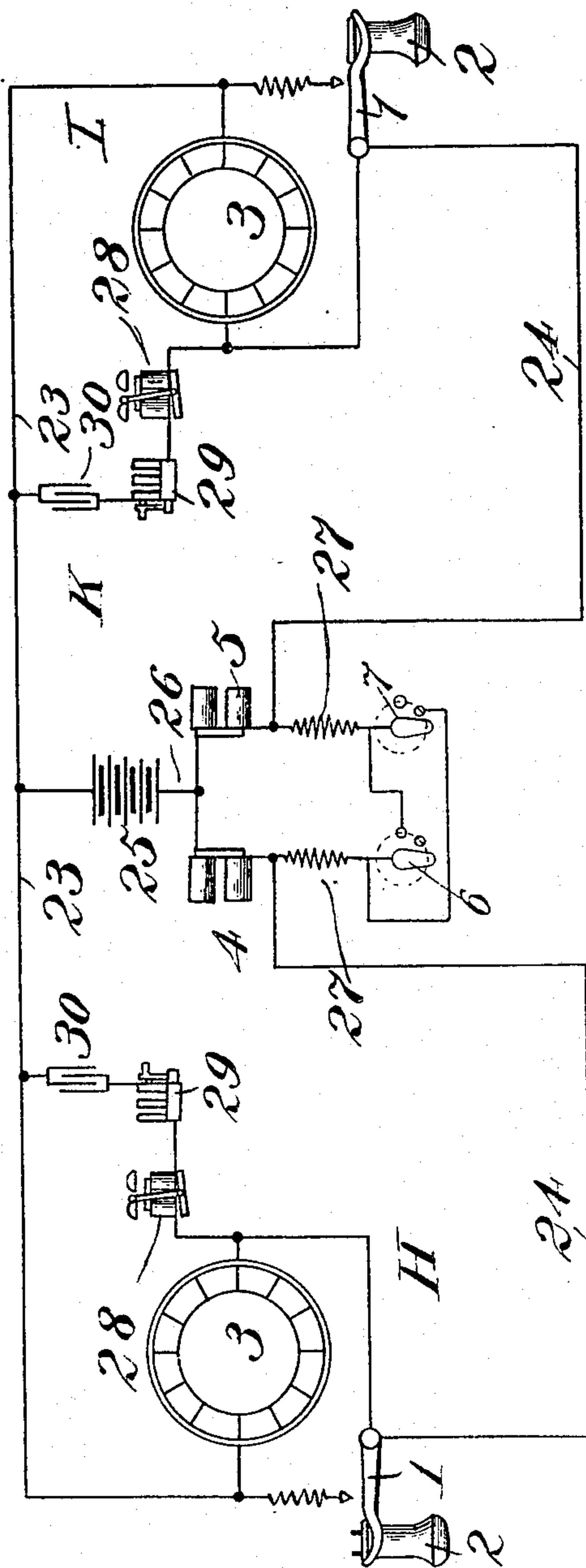
APPLICATION FILED JULY 31, 1902. RENEWED MAR. 3, 1906

2 SHEETS—SHEET 1.



WITNESSES:

Harry Goss
Miner Lape



INVENTOR

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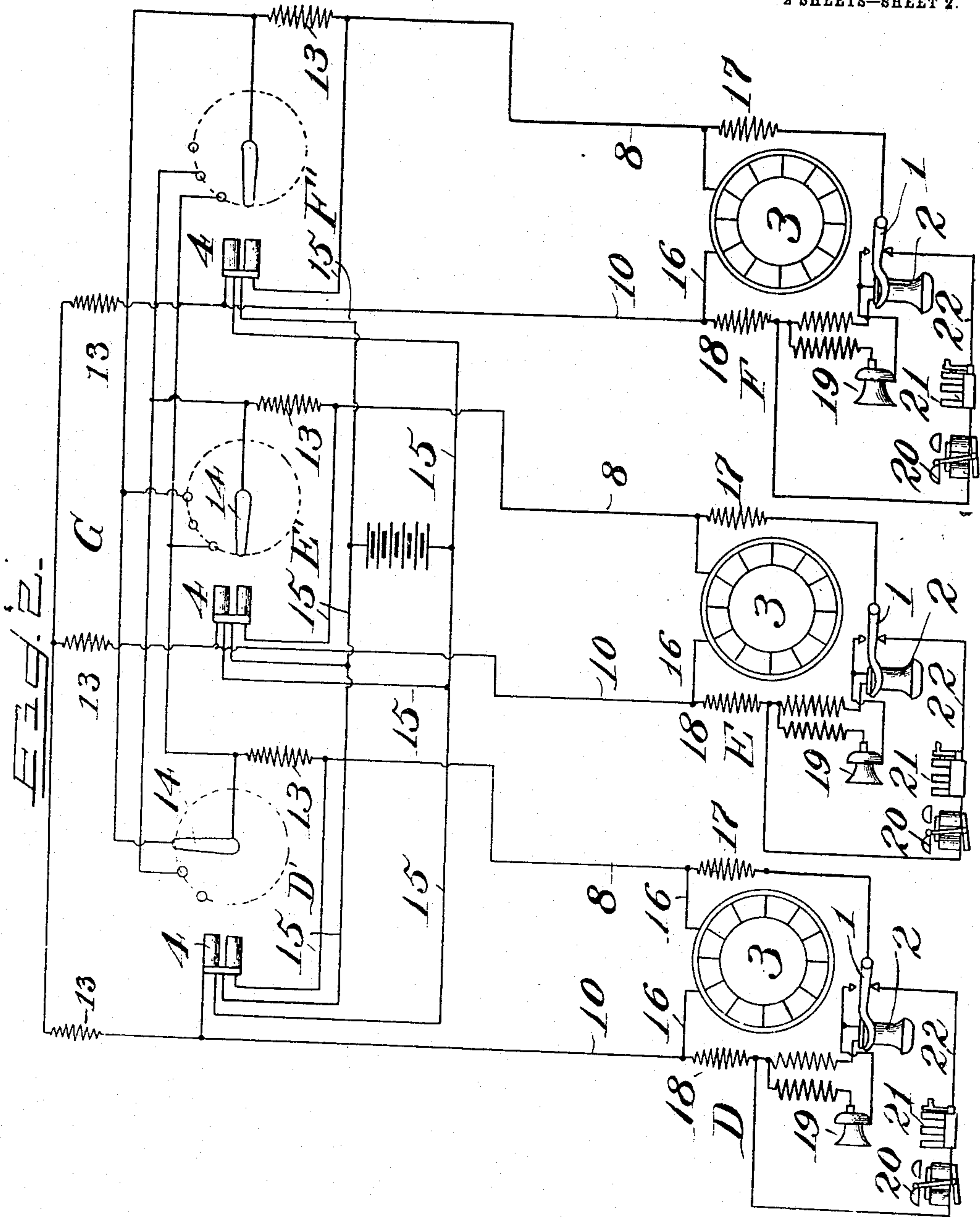
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2 SHEETS—SHEET 2.



WITNESSES:

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UNITED STATES PATENT OFFICE.

ANTHONY VAN WAGENEN, OF SIOUX CITY, IOWA.

AUTOMATIC SYSTEM OF INTERCOMMUNICATION.

No. 836,904.

Specification of Letters Patent.

Patented Nov. 27, 1906.

Application filed July 31, 1902. Renewed March 3, 1906. Serial No. 304,051.

To all whom it may concern:

Be it known that I, ANTHONY VAN WAGENEN, a citizen of the United States, residing at Sioux City, in the county of Woodbury and State of Iowa, have invented certain new and useful Improvements in Automatic Systems of Intercommunication; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in automatic systems of intercommunication such as involve the use of a plurality of separate instruments of communication with electric circuits therefor leading from a central station, and automatic central-station switches by which different instruments of communication may be placed in operative connection at will.

My invention consists in novel means for operating central-station switches by the same circuits which serve to connect the several subscribers' stations with each other and for supplying current for such circuits from a common battery or other source of electric current.

My invention is particularly intended for use in automatic telephone systems and in the following description will be described in its application to an automatic telephone system; but it will be obvious that the invention is likewise adaptable for other systems of intercommunication—such, for example, as telegraph systems, fire-alarm systems, hotel signaling systems, and the like. In these various systems of intercommunication the instruments which are intended to be directly operated by the persons who desire to communicate with each other (such, for example, in automatic telephone systems, as the telephone instruments themselves, and the calling instruments, by which the central-station switches are operated) are commonly called "subscribers'" instruments and will be so called herein, although it will be understood that by so doing I do not limit the use of the herein-described system in any way.

The objects of my invention are to supply current for operating both the subscribers' instruments of communication (such as telephone instruments) and the central-station switches from a single battery or other source of electric current with a minimum number of wires and a minimum number of contacts and to make the system as simple, econom-

ical, and free from liability to derangement as possible.

I will now proceed to describe my system with reference to the accompanying drawings, in which the application of my invention to an automatic telephone system such as that covered by the patent to Clark, Ellacott & Johnson, No. 582,578, dated May 11, 1897, is illustrated, and will then point out the novel features in claims.

In the said drawings, Figure 1 shows diagrammatically the application of one form of my invention to a system consisting of two subscribers' stations only. Fig. 2 shows diagrammatically the application of my invention to a system comprising three subscribers' stations, the wiring at the subscribers' stations and at the central station being illustrated in greater detail. Fig. 3 is a diagram similar to Fig. 1, illustrating another form of my invention.

Referring first to Fig. 1, the subscribers' stations of said figure are designated by reference-letters A and B and the central station by C. The drawings show the ordinary receiver-hook switches 1 1 and telephone-receivers 2 2, the telephone-transmitters and the wiring for the receivers and transmitters being omitted.

3 3 are the calling-transmitters, by the operation of which the central-station switches are operated.

I do not limit myself to the use of any particular calling-transmitter, but may use that shown in Patent No. 588,511, granted to me August 17, 1897. Such calling-transmitters usually comprise a dial and suitable contact mechanism, so that when the dial or a pointer arranged in connection therewith is set to any particular number or space the circuit controlled by said calling-transmitter is completed and broken a number of times corresponding to the particular position to which the dial or its pointer has been set, thereby operating the central-station switch a corresponding number of times.

At the central station the numerals 4 and 5 designate the operating-magnets of the central-station switches corresponding to stations A and B, respectively. The construction of the central-station switches is not indicated; but I may use the switch shown in the patent to Clark, Ellacott & Johnson above mentioned or the switch shown in my Patent No. 702,684, dated June 17, 1902.

Station A is connected with the central

station by two conductors 8 and 10 and station B with the central station by two conductors 9 and 11. Conductors 10 and 11 may be permanently connected, and conductors 8 and 9 are arranged to be connected by either of the switches 4 and 5. 6 and 7 represent the contacts of switches 4 and 5, respectively, by which the lines 8 and 9 may be connected.

The switch-magnets 4 and 5 are in shunt-circuits which include a common battery 12, the coils of each magnet being arranged symmetrically on opposite sides of said battery. When the two stations A and B are connected through the closing of contact 6 or contact 7, the shunt-circuits including these magnets are bridge-circuits.

It is obvious that battery 12 will supply current for the operation of the switches 4 and 5 by their respective calling-transmitters 3. To prevent each calling-transmitter from operating any central-station switch other than that of the station to which it belongs, non-inductive resistances 13 are interposed between the bridge-circuit of its own switch and the bridge-circuits of the other switches of the system. These non-inductive resistances may be arranged symmetrically in the outgoing and return lines of each station, as shown in the drawings.

The common battery 12 serves to supply current to the lines both for the operation of the central-station switches and for the operation of the telephone instruments. This it may do, because the switch-magnet coils offer considerable inductive resistance, so that when stations A and B are connected telephonic fluctuations initiated at station A, for example, will pass through the full circuit connecting said stations and comprising conductors 8, 9, 11, and 10, the non-inductive resistance of this circuit offering less opposition to the passage of the telephonic fluctuations than the inductive resistance of the shorter circuit, including the bridge connections and switch-magnets at the central station.

Fig. 2 shows in greater detail how a plurality of subscribers' stations may be connected with a central station and through the instrumentality of central-station switches may be connected to each other according to my system. The said figure shows three subscribers' stations, lettered D, E, and F, respectively, and a central station G, having central-station switches corresponding each to one of the subscribers' stations and lettered D', E', and F', respectively.

The several receiver-hook switches of this figure are all numbered 1, the telephone-receivers are all numbered 2, the calling-transmitters are all numbered 3, and the conductors connecting the subscribers' stations with the central station are numbered 8 and 10, respectively.

The conductors 8 may be termed the "outgoing-conductors" and the conductors 10 "return-conductors," though there is no distinction to be made in the function of these conductors. Each conductor 8 is connected to the contact-arm 14 of its respective central-station switch through a non-inductive resistance 13 and is likewise connected to a contact-point of each of the other central-station switches of the system. The return-conductors 10 are all connected together at the central station through their non-inductive resistances 13. The switch-magnets, which are all numbered 4, are connected across their respective conductors 8 and 10 by bridge-circuits 15, including the central-station battery, the coils of the magnets being arranged symmetrically on opposite sides of said battery.

At the several subscribers' stations each calling-transmitter 3 is connected across the corresponding conductors 8 and 10 by conductors 16, and each conductor 8 is connected through non-inductive resistance 17 with the hook of its receiver-hook switch 1, and each return-conductor 10 is connected through a corresponding non-inductive resistance 18 and through the telephone-receiver 2 and transmitter 19 with the upper contact-point of the corresponding receiver-hook switch. A call-bell 20 and magneto-generator 21 for ringing may be located in a local circuit 22, leading from the lower contact-point of the receiver-hook switch to the inductive resistance 18.

The operation of this system is as follows: When one of the subscribers desires to communicate with another station of the system, he operates his calling-transmitter 3, and thereby alternately completes and breaks a circuit from battery 12 through the magnet-coils of his central-station switch and through his conductors 8 and 10 and the conductor 16 and the contacts of the calling-transmitter so operated. The non-inductive resistances 13 prevent the operation of the other central-station switches. In the drawings the switch D' is shown as connecting station D with station F. The subscriber at station D having completed this connection may call station F by means of his magneto-generator 21, (the receiver-hook being down.) He may then remove his receiver from its hook, thus completing a telephonic circuit through non-inductive resistances 17 and 18 and his telephone receiver and transmitter, and when the subscriber at the called station does the same the telephonic circuit is complete.

In Fig. 3 I illustrate an alternative arrangement of circuits and apparatus, in which the switch-magnets likewise constitute inductive resistance in the central-station bridge-circuits. The figure shows two subscribers' stations H and I and a central station K. The receiver-hook switches,

telephone-receivers, and calling-transmitters are designated by the same reference-numerals as in Fig. 1, as are the switch-magnets, and the switch-contacts, and the central-station battery. Two conductors 23 and 24 connect each subscriber's station with the central station. Both wires 23 are connected with the one pole of a central-station battery 25. The other pole of this battery is connected to bridge-conductors 26, leading to the coils of the switch-magnets 4 and 5, and thence to the return-conductors 24. These conductors 24 are likewise connected, through non-inductive resistances 27, with switch contact-pieces 6 and 7, respectively, each such switch connection being adapted to connect its conductor 24 with the corresponding conductor of the other station. For ringing I have shown call-bells 28 and magneto-generators 29 in shunt-circuits connecting conductors 24 and 23, each shunt comprising a condenser 30.

The operation of this arrangement of circuits and apparatus is precisely the same as of that heretofore described, and no separate description is necessary. The non-inductive resistances 27 cause the calling-transmitter at each station to operate the switch corresponding to that station only and prevent it from operating the switches of the other stations.

In another application for Letters Patent, filed July 31, 1902, Serial No. 117,812, I have claimed the permanent bridging of the operating-magnets of the central-station switches across the subscribers' circuits and a source of electric energy included in common in such bridge connections; also, the inclusion of additional inductive resistance in such bridge connections and the interposition of resistance between the switch-magnet of each subscriber and the switch-magnets of the other subscribers. Therefore I do not claim such inventions broadly herein, but only claim the same in a system employing a single circuit for each subscriber, serving both for conversation and the operation of the central-station switches.

It is obvious that my invention is susceptible of very many variations and modifications in the arrangement of the instruments and circuits of the apparatus, and I do not limit myself to the particular arrangement described.

It is obvious that the conductor 23 of Fig. 3 may be a common return-conductor for a number of stations, if the location of the stations renders this convenient, or that ground connections may be substituted for said conductors 23.

What I claim is—

1. In an automatic telephone system, the combination with a central station, a plurality of subscribers' stations, a single circuit for each subscriber's station connecting it

with the central station, and means at the central station for operatively connecting lines of different subscribers, comprising automatic switches having each electrically-operated contact mechanism including an operating-magnet permanently included in the corresponding subscriber's circuit out of the main path of telephonic fluctuations there-through, of a common source of electrical energy for said subscribers' circuits, included in circuit with each such magnet, and arranged likewise to supply current for the operation of subscribers' telephone instruments; and telephone instruments and means for operating said central-station switches, at the several subscribers' stations.

2. In an automatic telephone system, the combination with a central station, a plurality of subscribers' stations, a single circuit for each subscriber's station connecting it with the central station, and means at the central station for connecting lines of different subscribers, comprising automatic switches having each electrically-operated contact mechanism including an operating-magnet bridged across the corresponding subscriber's circuit, of a common source of electrical energy for said subscribers' circuits, for supplying current for operating subscriber's telephone instruments and the said central-station switches, included in the bridge connections of said magnets; and telephone instruments and means for operating said central-station switches, at the several subscribers' stations.

3. In an automatic telephone system, the combination with a central station, a plurality of subscriber's stations, a single circuit for each subscribers' station connecting it with the central station, and means at the central station for connecting lines of different subscribers, comprising automatic switches each having electrically-operated contact mechanism including an operating-magnet bridged across the corresponding subscriber's circuit, of a common source of electrical energy for said subscriber's circuits, for supplying current for operating subscribers' telephone instruments and the said central-station switches, included in the bridge connections of the said magnets, resistance interposed in each subscriber's circuit between the bridge connection thereof and the bridge connections of the other subscribers' circuits, and telephone instruments and means for operating said central-station switches, at the several subscribers' stations.

4. In an automatic telephone system, the combination with a central station, a plurality of subscribers' stations, a single circuit for each subscribers' station connecting it with the central station, and means at the central station for connecting lines of different subscribers, comprising automatic switches each having electrically-operated

contact mechanism including an operating-magnet bridged across the corresponding subscriber's circuit, of a common source of electrical energy for said subscribers' circuits, for supplying current for operating subscribers' telephone instruments and the said central-station switches, included in the bridge connections of the said magnets, inductive resistance in each such bridge connection, non-inductive resistance interposed in each subscriber's circuit between the bridge connection thereof and the bridge connections of the other subscribers' circuits, and telephone instruments and means for operating said central-station switches, at the several subscribers' stations.

5. In an automatic telephone system, the combination with a central station, a plurality of subscribers' stations, a single circuit for each subscriber's station connecting it with the central station, and means at the central station for connecting lines of different subscribers, comprising automatic switches each having electrically-operated contact mechanism including an operating-magnet bridged across the corresponding subscriber's circuit, and constituting inductive resistance in such bridge connections, of a common source of electrical energy for said subscribers' circuits, for supplying current for operating subscribers' telephone instruments and the said central-station switches, included in the bridge connections of the said magnets, resistance interposed in each subscriber's circuit between the bridge connection thereof and the bridge connections of the other subscribers' circuits, and telephone instruments and means for operating said central-station switches, at the several subscribers' stations.

6. In an automatic telephone system, the combination with a central station, a plurality of subscribers' stations, a single circuit for each subscriber's station connecting it with the central station, and means at the central station for connecting lines of different subscribers, comprising automatic switches each having electrically-operated contact mechanism including an operating-magnet bridged across the corresponding subscribers' circuit and line-contacts arranged to connect the subscribers' lines, of a common source of electrical energy for said subscribers' circuits, for supplying current for operating subscribers' telephone instruments and the said central-station switches, included in the bridge connections of the said magnets, resistance interposed between the bridge connection of each switch and the line-contacts of that switch, and telephone instruments and means for operating said central-station switches, at the several subscribers' stations.

7. In an automatic telephone system, the combination with a central station, a plu-

ality of subscribers' stations, a single circuit for each subscriber's station connecting it with the central station, and means at the central station for connecting lines of different subscribers, comprising automatic switches each having electrically-operated contact mechanism including an operating-magnet bridged across the corresponding subscriber's circuit, of a common source of electrical energy for said subscribers' circuits, included in the bridge connections of the said magnets, intermediate the ends of the magnet-coils, and telephone instruments and means for operating said central-station switches, at the several subscribers' stations.

8. In an automatic telephone system, the combination with a central station, a plurality of subscribers' stations, a single circuit for each subscriber's station connecting it with the central station, and means at the central station for connecting lines of different subscribers, comprising automatic switches each having electrically-operated contact mechanism including an operating-magnet bridged across the corresponding subscriber's circuit, of a common source of electrical energy for said subscribers' circuits, for supplying current for operating subscribers' telephone instruments and the said central-station switches, included in the bridge connections of the said magnets, telephone instruments at the several subscribers' stations, included in the subscribers' circuits, and signaling means at the subscribers' stations connected to said circuits in shunt with respect to the telephone instruments.

9. In an automatic telephone system, the combination with a central station, a plurality of subscribers' stations, a single circuit for each subscriber's station connecting it with the central station, and means at the central station for connecting lines of different subscribers, comprising automatic switches each having electrically-operated contact mechanism including an operating-magnet bridged across the corresponding subscriber's circuit, of a common source of electrical energy for said subscribers' circuits, included in the bridge connections of the said magnets, means for operating the central-station switches, bridged across the subscribers' circuits at the subscribers' stations, and telephone instruments at the several subscribers' stations.

10. In an automatic telephone system, the combination with a central station, a plurality of subscribers' stations, a single circuit for each subscriber's station connecting it with the central station, and means at the central station for connecting lines of different subscribers, comprising automatic switches each having electrically-operated contact mechanism including an operating-magnet bridged across the corresponding subscriber's circuit, of a common source of

electrical energy for said subscribers' circuits, included in the bridge connections of the said magnets, telephone instruments at the subscribers' stations, signaling means at the subscribers' stations, switches arranged to switch either said telephone instruments or said signaling means into the subscribers' circuits at will, and means at the subscribers'

stations for operating said central-station switches.

In testimony whereof I affix my signature in the presence of two witnesses.

ANTHONY VAN WAGENEN.

Witnesses:

H. I. BROWN,
R. J. ANDREWS.