No. 725,476. PATENTED APR. 14, 1903.

T. PAUL.

TELEPHONE SYSTEM.

APPLICATION FILED JUNE 14, 1901.

NO MODEL.

2 SHEETS—SHEET 1.

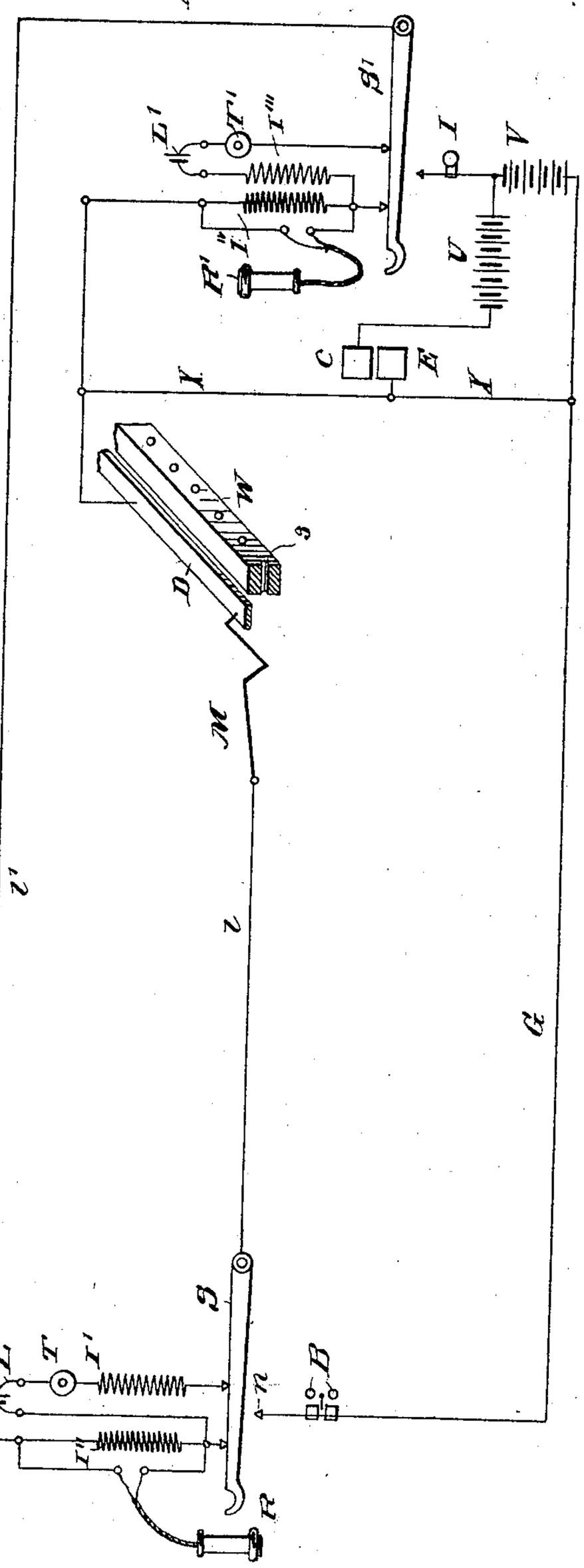

Fig. 1

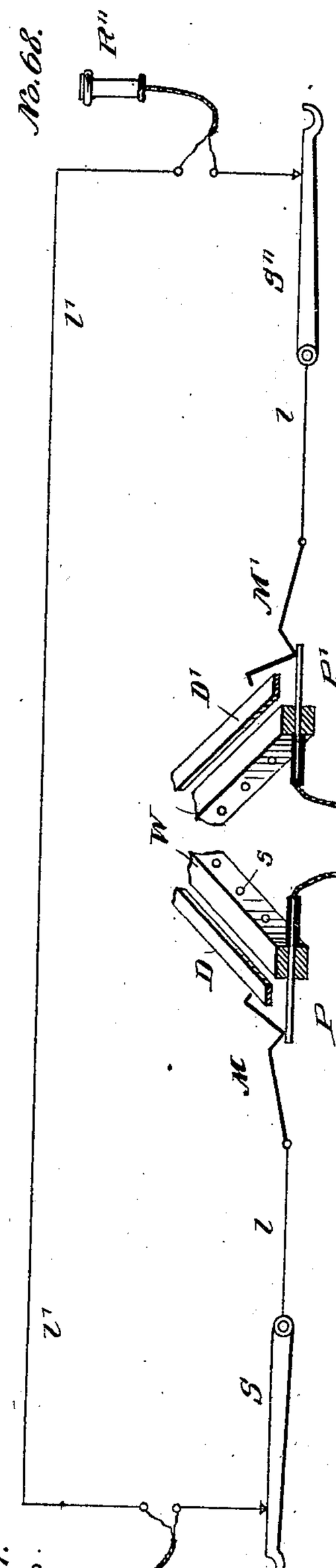

Fig. 2

WITNESSES:

John A. Seigenthaler

A. H. Davis

INVENTOR

Thomas Paul

BY Munn & Co.

ATTORNEYS

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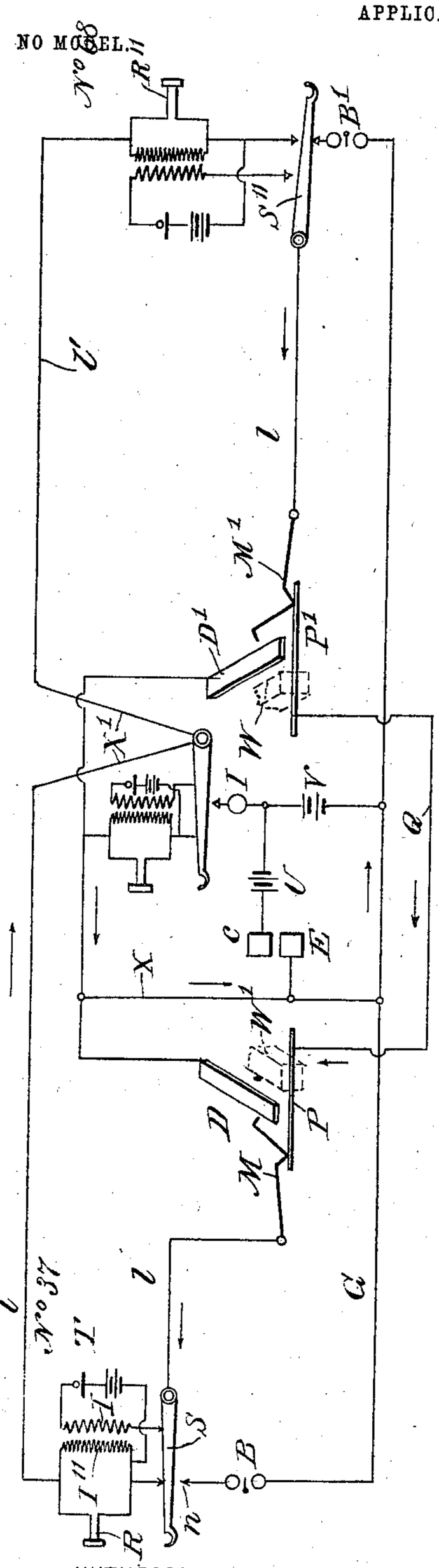

Fig. 3

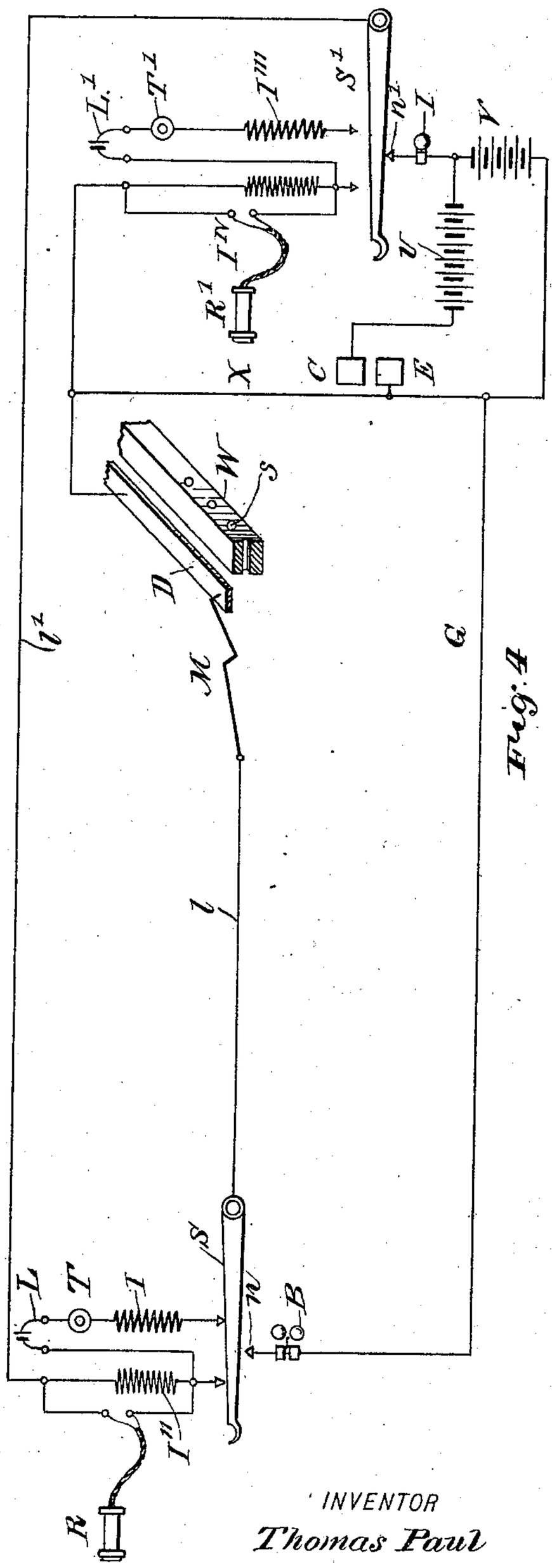

Fig. 4

WITNESSES:

Thos. Burgess

C. E. Holske

INVENTOR

Thomas Paul

BY Munn & Co.

ATTORNEYS

UNITED STATES PATENT OFFICE.

THOMAS PAUL, OF YORKTON, CANADA, ASSIGNOR OF ONE-HALF TO JOHN L. McDOUGAL, OF YORKTON, CANADA.

TELEPHONE SYSTEM.

SPECIFICATION forming part of Letters Patent No. 725,476, dated April 14, 1903.

Application filed June 14, 1901. Serial No. 64,542. (No model.)

To all whom it may concern:

Be it known that I, THOMAS PAUL, a subject of the King of Great Britain, and a resident of Yorkton, in the North-West Territories, Dominion of Canada, have invented a new and Improved Telephone System, of which the following is a full, clear, and exact description.

My invention relates to telephone systems, and has for its object improvements in central calling-battery systems and combined with such an improved system the advantages of a local talking-battery system. The advantages of such a system lie in the fact that there are no annunciator-coils or relay-coils in series with the talking-circuit, which in some of the systems now patented greatly impede the voice-currents. Neither are there any annunciator-coils in shunt with the telephone-circuit which allow of leakage of the voice-currents between the lines.

In the system described either a metallic or ground return may be used for the signaling-circuit and but one strand of wire is required for the plug connections at the central station. Another peculiar advantage of this system is due to the fact that but one spring-contact is required in the jack for making connections. This obviates the short-circuiting arising from dust or other particles lighting in the jack-sockets and being pushed through and between the jack-springs.

By the arrangement hereinafter set forth the ringing up of the subscribers is accomplished with great ease by the operator and telephonic connections are rapidly made. This increases the number of subscribers that a single operator can handle. A great commercial advantage is derived by the use of simple and well-known instruments, which provides for a ready installation of the system.

Further objects and improvements will appear in the description of my invention.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 illustrates the connection existing between a subscriber's station and the central station. Fig. 2 illustrates the connections that exist when two subscribers are connected together. Fig. 3 illustrates the connections between two subscribers and also the connections with the operator at the central station; and Fig. 4 illustrates the same connection as shown in Fig. 1, with the exception that the switch-hook at the central station is shown as connected with the annunciator and battery circuits for the purpose of calling the operator.

R illustrates a telephone-receiver connected in parallel with the secondary I″ of an induction-coil I′.

S indicates the well-known telephone switch-hook, and T and L indicate, respectively, the well-known forms of telephone-transmitter and local battery, the said transmitter and battery being connected in series with the primary I′ of the induction-coil and the circuit closed automatically by the telephone switch-hook when the receiver is removed therefrom.

B indicates the well-known signaling instrument, connected to the normal contact *n*, which is in turn normally connected to the telephone switch-hook for the purpose of signaling a subscriber. The bell B is connected by means of the common return signaling-wire G, while the talking-circuit is completed through the telephone-receiver and the secondary of the induction-coil by means of the lines *l* and *l′*.

The line *l*, leading from each of the subscribers' stations, is connected to a spring M, a series of which are in contact with a metallic strip D. For the purpose of clearly setting forth this system but one of these metallic strips is illustrated. This metallic strip is located behind the panel of a switch-board W and in line with sockets *s*, which are adapted to receive plugs P and P′ of the operator's switching device. When the plug P is inserted in the socket, contact is made with the spring M and lifts it from contact with the metallic strip D, thereby breaking connection between the said spring and the metallic strip. The operator's telephone set is connected with the metallic strip D. Also connected with this metallic strip D is a metallic contact E, which is connected by a wire X with the common signaling-wire G. In proximity to the metallic contact E is a metallic contact C, which is connected to the

signaling-battery U. This battery is connected by two branches, one through an annunciator or indicator I and the other through a second signaling-battery V, which is in turn connected to the common signaling-wire G.

The operator's set consists of the usual instruments—namely, the primary and secondary induction-coils, transmitter, and talking-battery—indicated by the letters I‴, I^{v}, T′, and L′, respectively. The receiver of the operator is illustrated as connected in parallel with the secondary of the induction-coil in the same manner as illustrated at the subscriber's station. This connection, however, may be changed without departing from the spirit of my invention by connecting the telephone-receiver in series with the secondary of the induction-coil.

When connection is desired by any of the subscribers, the operator inserts the plug P in the jack of the called-for subscriber, and when response is made by the said subscriber the operator inserts the plug P′ in the jack of the calling subscriber, thereby making a complete metallic circuit, as illustrated in Fig. 2. The talking-circuit passes from the secondary of the induction-coil at one station to the switch-hook S, line *l*, spring-contact M, plug P, strand Q, plug P′, spring-contact M′, line *l*, switch-hook S″ at the other subscriber's station, receiver R″, back to the first subscriber by way of the line *l*′. It is to be understood that all of the lines *l*′ of a section of the system are normally connected together through X′ with the pivoted end of the telephone-switch S′ at the central station. When the called subscriber has been connected in the manner shown in Fig. 2 and has completed conversation with the calling subscriber and the calling subscriber wishes to call up a second subscriber, it may be accomplished by the connections illustrated in Fig. 3. The subscriber, say No. 68, who was formerly called up having replaced his receiver on the switch-hook located at his station closes the connection between the said switch-hook and the signaling-line G, which is in turn connected through X with the telephone-receiver of the central station. The circuit is completed by means of the telephone switch-hook S′, located at the central station, which is in turn connected with the station of the calling subscriber, say No. 37, who wishes to continue conversation with another subscriber by means of the line *l*. This last-named subscriber can then instruct the operator at the central station of the desired third subscriber with whom he wishes to talk, and the operator will then make the necessary connections by means of plug-switching connection.

The operation of my improved system is as follows: When subscriber No. 37, for purpose of illustration, wishes to make connection with subscriber No. 68, he lifts his receiver from the switch-hook, which closes the connection with the said switch-hook and the abnormal contacts at his station, closing the circuit through the receiver and the secondary I″ of the induction-coil in parallel to the line *l*′, the switch S′, located at the central station, then to the normal contact *n*′, as illustrated in Fig. 4, through the bell or other indicator I, to the battery V, the connection X, the metallic strip D, the spring-contact M, and back to the subscriber's station and switch S by the line I. This causes the operation of the indicating device or the annunciator-drop I. The operator in response thereto lifts the receiver from the hook and closes the talking-circuit with the calling-subscriber's station by the switch S′ coming in contact with the abnormal contacts, closing the local battery of the operator's telephone instruments, and by means of the lines *l* and *l*′, through the metallic strip D and spring-contact M, makes connection with the telephone instruments of the subscriber's apparatus located at station No. 37. The subscriber then informs the operator that No. 37 wishes to connect with No. 68.

If the annunciator or annunciator-drop are used in place of the indicator I in extended systems, the operation of the annunciator will indicate the particular subscriber that is calling, and the only information that the operator will need to receive will be the number of the subscriber with which the said subscriber wishes to converse. Upon receiving the desired information the operator inserts the plug P′ in the socket of the called-for subscriber and makes connection thereby with the metallic spring M′ and the line *l* leading to the said subscriber. He then with the other plug P makes contact with the metallic contact C and then draws it across to the metallic contact E. By this operation he has first caused a signaling-current to pass over the signaling-line G, through the bell B′ and the switch-hook S″, which is at station 68, in contact with the normal contact *n*, thereby causing the bell B′ to ring. By this connection the batteries U and V are thrown into series with the bell B′, which is sufficient to cause the operation of the bell located at the subscriber's station. Upon drawing the plug across to the contact E and removing the receiver from the switch-hook the operator closes the central-station end of a talking-circuit between herself and the called-for subscriber by means of the spring-contact M′, the plug P′, strand Q, plug P, metallic contact E, line X, induction-coil I^{v}, receiver R′, switch-hook S′, and line *l*′, through the subscribers' talking instruments. This circuit connection will then indicate to the operator at the central station when the called-for subscriber has removed his receiver from the hook and is ready to converse. The operator will then insert the plug P which was used for calling the called-for subscriber

into the jack of the calling subscriber, and the connections will be completed in the manner illustrated in Fig. 2.

When the subscriber has completed conversation, he will place his receiver upon the switch-hook S and close a circuit through the normal contact *n*, bell B, signaling-line G, battery V, indicator I, switch-hook S′, connection X′ by way of line *l*′, through the receiver R″, switch S″, contact-spring M′, plug P′, strand Q, plug P, contact-spring M, and switch S of the first subscriber. This causes the operation of the indicator or annunciator I and indicates to the operator at the central station that conversation has been completed. The operator will then withdraw the plugs from the sockets and the normal conditions will exist.

It is to be understood than once a thorough connection has been made between subscribers the withdrawal of one or both of the connecting-plugs before conversation has been completed cannot occur without the operator at the central station being made aware of such mistake. Either the indicator-shutter will fall when the switch at the central station is normal or the subscribers' conversation will be overheard by the operator.

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

1. In a telephone system, the combination of a subscriber's station and a pair of telephone-lines leading thereto, one of said lines being connected to a switch at the central station, a normal contact for said switch, a pair of abnormal contacts for said switch, a telephone-receiver connected with one of said abnormal contacts, and with any of said telephone-lines, a transmitter, a local battery and a primary coil connected serially together and to both of said abnormal contacts, and a secondary coil energized by induction from said primary coil and connected with one of said telephone-lines, a metallic strip, a spring normally in contact with said strip, said receiver being connected in series with said metallic strip and spring, another switch located at a different subscriber's station and provided with a normal contact, and metallic connections controllable at will from the central station for temporarily establishing a talking-circuit from the central station to said first-mentioned subscriber's station through said normal contact of said second-mentioned subscriber's station.

2. In a telephone system, a number of subscribers' stations, a central station, lines arranged in pairs connecting said subscribers' stations with the central station and also connecting one of said subscribers' stations directly with another, a separate line connecting each of said subscribers' stations with the central station, means controllable at will and disposed at said central station for opening and closing each of said separate lines and for temporarily connecting said separate lines together, switch-hooks at all of said stations, provided with normal and abnormal contacts, the arrangement being such that a talking-circuit may be formed between the central station and a subscriber's station through the abnormal contact of one of said subscribers' stations, the abnormal contact of said central station, and the normal contact of another of said subscribers' stations.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

THOMAS PAUL.

Witnesses:
JAMES F. MACLEARY,
CLAWSON FEASS.