

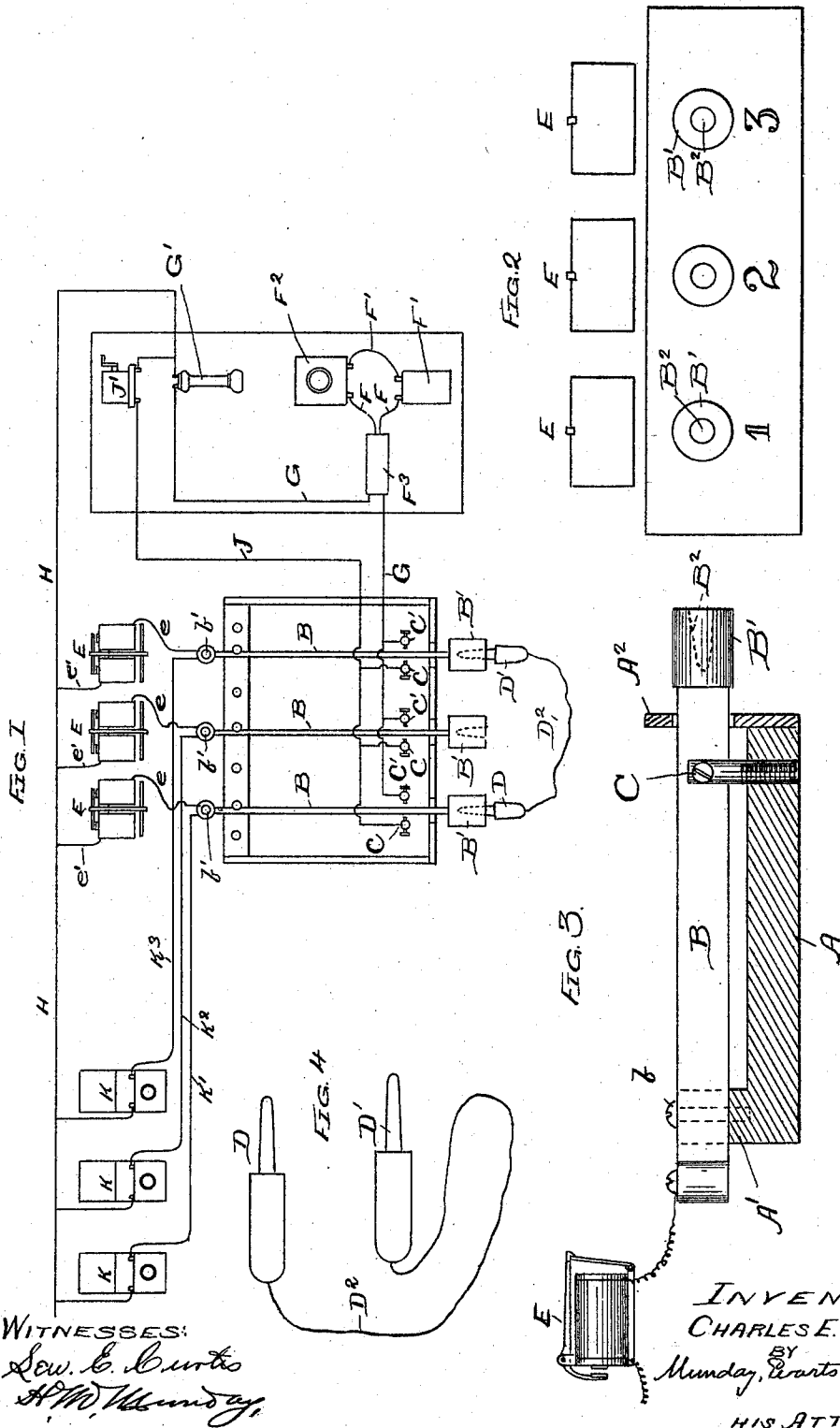
(No Model.)

C. E. EGAN.

## SWITCHBOARD FOR CENTRAL TELEPHONE STATIONS.

No. 585,662.

Patented July 6, 1897.



# UNITED STATES PATENT OFFICE.

CHARLES E. EGAN, OF CHICAGO, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS, OF ONE-HALF TO STERLING L. BAILEY, OF SAME PLACE.

## SWITCHBOARD FOR CENTRAL TELEPHONE-STATIONS.

SPECIFICATION forming part of Letters Patent No. 585,662, dated July 6, 1897.

Application filed December 2, 1895. Serial No. 570,820. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES E. EGAN, a citizen of the United States, residing in Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Switchboards for Central Telephone-Stations, of which the following is a specification.

This invention relates to an improvement in switchboards for central telephone-stations.

The object of the invention is to simplify and speed the operation of receiving and answering calls at the central station and connecting subscribers' telephones together.

The best apparatus known for connecting subscribers' telephones at a central station is what is called the "plug-switch," in which the terminal of the line of each subscriber is represented on the switchboard by an aperture or socket into which one of a pair of plugs connected together by a flexible wire is inserted and the other plug inserted into another aperture, whereby the two lines are connected. In the present invention I mount these plug apertures or sockets each one upon a flexible or movable arm, which arm may be moved to one side or the other against contact-points. One of these contact-points may be in the circuit which includes the magneto or other signaling apparatus belonging to the central station and used to sound the call-bell at the subscriber's telephone, and the other contact-point may be in the circuit which includes the telephone at the central office which is used to receive the subscriber's call. By means of this flexible or movable arm carrying the plug hole or socket the operator at the central station, when said operator receives the first intimation of the subscriber's call—the dropping of the indicator-number—may insert a plug in the terminal of the line calling and by a slight movement of the same hand to one side connect himself with the telephone of the calling-subscriber to hear the voice of the caller and learn the number of the telephone with which the subscriber desires connection, and after inserting the other plug in the terminal of the desired line the operator may ring up said line by pushing either of the plugged arms

in the opposite direction. The manipulation required of the operator is thus greatly simplified, and this, as will be readily understood, is highly important, especially where there are a large number of subscribers or where speed is desirable.

The nature of the invention will be more fully explained and defined in the following description and claims, taken in connection with the accompanying drawings, in which drawings—

Figure 1 is a diagram of the apparatus and circuits. Fig. 2 is a front view of the switchboard. Fig. 3 is a sectional side elevation of said switchboard, and Fig. 4 a view of a pair of the connecting-plugs.

In said drawings, A represents the framework of the switchboard, which may be provided with an upright back strip A' and an upright casing or front strip A<sup>2</sup>, made, preferably, of wood or vulcanized fiber.

B is one of the movable or flexible arms secured in said frame. I prefer to make this arm of spring-brass in the form of a flat strip and having its rear end set in a slot in the upright strip A', where it may be secured by a single screw b. The front end of this arm B may project through the facing-strip A<sup>2</sup> and is provided with a configuration or enlargement B' to accommodate the plug hole or socket B<sup>2</sup>. Each arm B is furnished with a pair of contact-points C and C', one on each side and close enough to said arm so that a slight push to one side or the other, which the flexibility of the spring-bars will permit, will bring the metal of said bar into contact with one or the other of said points, according to the direction of the push, but when not pushed to one side or the other said arm will remain normally out of contact and midway between the two points.

At Fig. 4, D D' are the two plugs of a pair connected together by the flexible wire D<sup>2</sup>. Each of these plugs is adapted to fit into the cavities or holes or sockets B<sup>2</sup> of the switchboard in the manner in which such are ordinarily used.

Of course, as will be understood, instead of plugs fitting into cavities on the switchboard this arrangement may be inverted and cavities connected to the flexible cord or wire

D<sup>2</sup> may fit over plugs upon the switchboard, or any of the well-known variations of what is termed the "plug-switch" connection may be employed in this relation with the flexible or movable arm B without departing from my invention.

E E, &c., represent the ordinary drop-indicators such as are used in telephone-switchboards, and which by the dropping of a plate caused by the energizing of an electromagnet indicates to the operator the number of a calling-subscriber's telephone.

In the diagram Fig. 1 there is shown a switchboard comprising connections for three subscribers' telephones, and this diagram is intended to illustrate the circuits and the operation. Of course it will be understood that this switchboard may be multiplied to any extent desired. I will now proceed to describe the circuits in connection with said diagram Fig. 1. F is the local primary circuit, which includes the local battery F<sup>1</sup>, the transmitter F<sup>2</sup>, and the induction-coil F<sup>3</sup>. G is the secondary circuit, which includes the induction-coil above mentioned and the receiver G', which receiver is kept constantly at the ear of the operator at the central station in the usual manner. This secondary or receiver circuit G is connected to each of the contact-points C' above mentioned and also to the common return-wire H, or, in case of small exchanges, to the ground, all of the subscribers' telephones being connected to the ground or to this common return-wire H. J is the call-generator circuit connected to the common return-wire H, and it includes the electromagnetic generator J'. This circuit J is connected to each of the contact-points C of the switchboard. K K K are three of the subscribers' telephones, each of which is connected to the common return-wire H and each of which is connected by a wire K' K<sup>2</sup> K<sup>3</sup> to one of the arms B by a binding-screw b'. From this same binding-screw b' a wire e runs to one of the drops E, and from said drop E a wire e' runs to the common return-wire H. The circuits and apparatus at each subscriber's telephone may be such as are in general use and do not require description beyond the statement that they may comprise the usual local battery, transmitter, induction-coil, receiver, and magneto-call generator, and these parts are therefore not shown in the drawings.

The work of the apparatus is as follows: Let us suppose that the subscriber at the telephone K, No. 1, rings his bell to call up the central office. The magneto-current generated at his instrument will pass along the wire K' to binding-post b', thence by the wire e to the magnet of the drop E, No. 1, thence by the wire e' to the common return-wire H, and so back to the telephone, completing the circuit. This energizes the magnet and releases the drop No. 1, and the operator at the central office recognizes a call from subscriber's telephone No. 1. The op-

erator now inserts one of the plugs—say plug D—into the hole or socket B<sup>2</sup> corresponding to this drop No. 1, and by the same movement of the hand presses its flexible or movable arm B toward the right hand and into contact with the point C', which brings his receiver G' and transmitter F<sup>2</sup> into circuit with the subscriber's telephone No. 1, so that the operator can ask the subscriber what number he wants and hear the subscriber's reply. Let us suppose that the subscriber No. 1 speaks for subscriber No. 3. The operator will then release his pressure on the arm B, permitting the said arm to resume its central position of non-contact, and insert the other plug—say D'—into the socket or hole on the end of the arm B corresponding to drop No. 3, and with the same movement of the hand press said arm B to the left and bring its metal into contact with the contact-point C, which will put the call-generator wire J into circuit and enable the operator to ring up No. 3, and releasing the pressure on this arm it will by its own resiliency swing back into the central or non-contact position and the two telephones Nos. 1 and 3 are then connected together, the circuit from No. 1 to No. 3 being as follows: from the telephone No. 1 to the wire K', to the binding-screw b', through the metal of the arm B to the plug D, through the wire D<sup>2</sup> to the plug D', through the second arm B to its binding-screw b', thence by the wire K<sup>3</sup> to telephone No. 3, and thence by the common return-wire H back to the telephone No. 1, completing the circuit. If at any time the operator desires to communicate with either one of the subscribers during their conversation or to ascertain if they are through with the line or to find out if they are in communication, he can do so by pressing either one of the arms B, which are connected by the two plugs, into contact with its contact-point C', and this without interfering with the conversation between the two subscribers, if any is going on, as in that case he will simply connect his own telephone into the same circuit with the two subscribers, and may immediately sever said connection by removing the pressure. This device of mounting the plug-sockets of the switchboard on the end of flexible or removable spring-arms, having a magneto-call contact on one side and the operator's telephone-contact on the other side, very greatly simplifies the manipulations required of the operator in doing his work. In the ordinary telephone-switchboard a great number of movements of the hand are required of the operator for each connection, whereas in my improved switchboard the necessary movements of the operator or manipulations are reduced to two—viz., first, the insertion of one of the plugs in the socket of the calling subscriber and the simultaneous pressure of the bar carrying said socket over into contact with the point C'; secondly, the insertion of the other plug into the socket of the called-subscriber's line and the simulta-

neous pressure of its bar over into contact with the point C, which rings the called-subscriber's bell. Moreover, the operator may test the fact of whether or not communication is going on between the two connected subscribers by merely pressing either one of the two arms B over into contact with its point C' without cutting the subscribers out or removing or inserting any plug. This simplifying of manipulation will, it is thought, more than double the speed of the making of connections at the central office, and this especially in large exchanges becomes a matter of the highest importance and value.

By the term "socket" I mean a socket or its equivalent, as hereinbefore mentioned.

I claim—

1. The combination of flexible arms having sockets mounted thereon, contact-points on each side thereof included in the circuit of the signaling apparatus, substantially as specified.

2. The combination of a flexible arm having a socket thereon and a contact-point at the side thereof included in the circuit of a signaling apparatus, substantially as specified.

3. The combination of a flexible arm having a socket thereon, and a contact-point at the side thereof included in the circuit of a telephone, substantially as specified.

4. The combination of a flexible arm having a socket thereon, and a contact-point at each

side thereof, one of said contact-points being included in the circuit of a signaling apparatus, and the other in the circuit of a telephone, substantially as specified.

5. In a telephone-switchboard, the combination with the usual telephone-circuits, and the indicator-drops, of the flexible movable metallic arms B, each carrying a plug-socket or its equivalent, and each provided with the contact-points C C' together with the circuits F, G and J, the battery F', the transmitter F<sup>2</sup>, the induction-coil F<sup>3</sup>, the receiver G' and the call-generator J', all connected and operating substantially as specified.

6. In a central telephone-switchboard, the combination of the frame A, the flexible arm B, the connector B<sup>2</sup> mounted thereon, and the contact-points C C', substantially as specified.

7. In a telephone-switchboard, the combination of the frame A, the upright slotted strip A', the spring-arms B resting at their rear ends in the slots of said strip A', and secured therein by a single screw b, and the contact-points C C', one at each side of each arm B, and the socket B<sup>2</sup> or its equivalent, carried on the front end of each arm, substantially as specified.

CHARLES E. EGAN.

Witnesses:

H. M. MUNDAY,  
EDW. S. EVARTS.