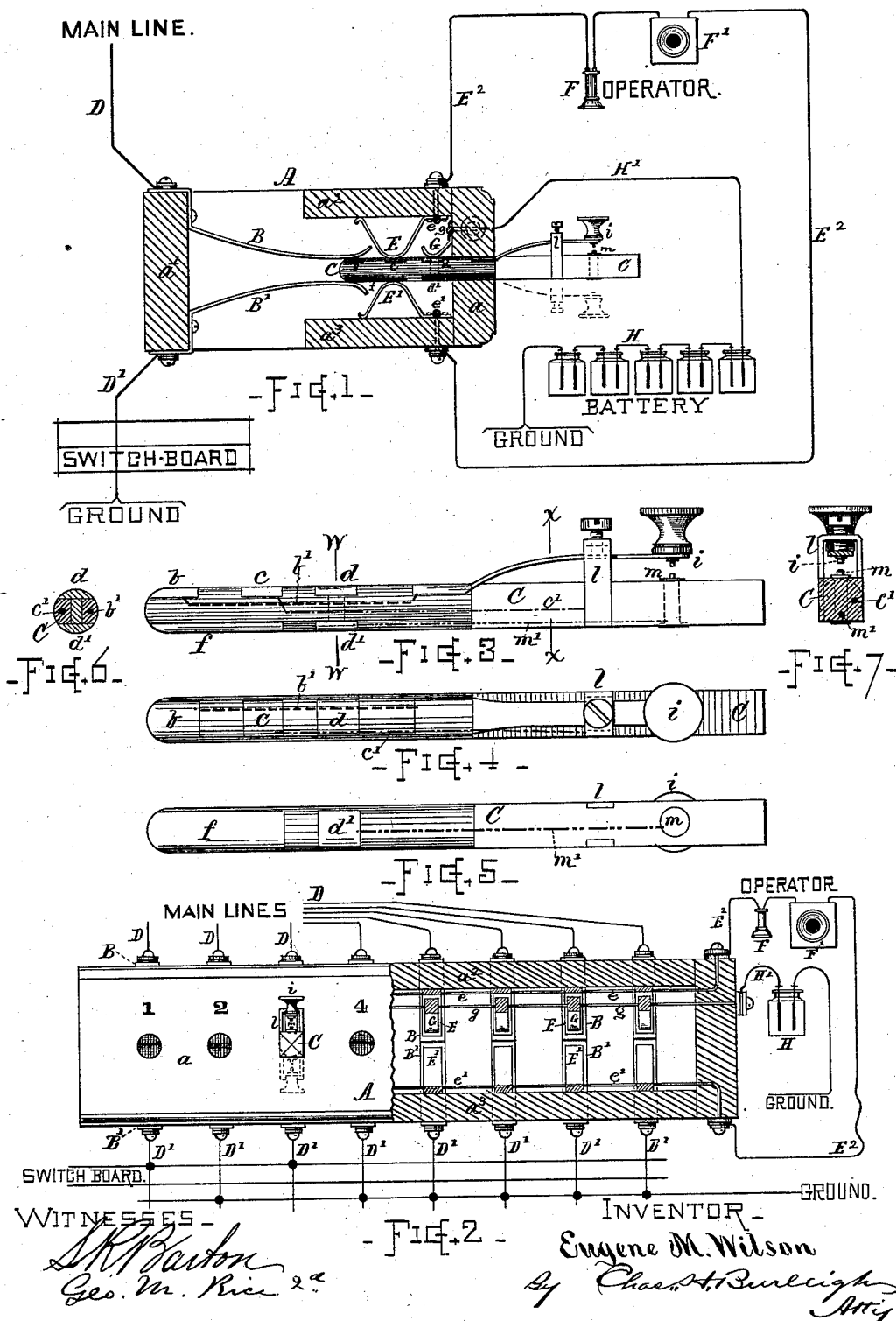


E. M. WILSON.

No. 279,471.

Patented June 12, 1883.



UNITED STATES PATENT OFFICE.

EUGENE M. WILSON, OF WORCESTER, MASSACHUSETTS, ASSIGNOR OF ONE-HALF TO EDWIN P. CARPENTER, OF SAME PLACE.

LOOPING-IN MECHANISM FOR TELEPHONE SWITCH-BOARDS.

SPECIFICATION forming part of Letters Patent No. 279,471, dated June 12, 1883.

Application filed March 1, 1883. (No model.)

To all whom it may concern:

Be it known that I, EUGENE M. WILSON, of Worcester, in the county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in Looping-In Mechanism for Telephone Switch-Boards; and I declare the following to be a description of my said invention sufficiently full, clear, and exact to enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

The object of my present invention is to provide an efficient, simple, and convenient attachment for use in connection with telephone switch-boards for looping in the attendant's telephone and transmitter, or apparatus employed at central offices and telephonic exchanges to enable the operator to listen to and answer calls and messages, and to afford facilities for the more perfect and satisfactory government of the lines with less labor and inconvenience for the attendants and for the execution of changes in a more expeditious manner than with apparatus heretofore in use. These objects I attain by mechanism organized for operation substantially as illustrated and described, the particular subject-matter claimed being hereinafter definitely specified.

In the drawings, Figure 1 is a transverse sectional view of my improved looping-in apparatus, with diagram showing the arrangement of the connecting-lines, &c. Fig. 2 is a part front, part longitudinal sectional, view of the same. Fig. 3 is a side view of the reversible connector or commutator-plug. Fig. 4 is a top view of the same. Fig. 5 is a bottom view of the same. Fig. 6 is a cross-section of the plug at line *w w*, and Fig. 7 is a cross-section of the plug at line *x x*.

My improved looping-in mechanism is applicable to any of the ordinary switch-boards in use for telephonic exchanges.

It comprises series of metallic springs corresponding with the several main lines, arranged and connected with the circuit-wires or conductors in the order substantially as illustrated, said springs being adapted for closing or breaking the circuits or for changing the direction of the electric currents by the

insertion and manipulation of a plug or point-bar provided with a signaling-key and having contact-plates arranged and connected in the peculiar manner set forth, to effect the transposition of the circuits as required, said plug being revoluble within the bench or frame without requiring its removal, and the several plate-connections being entirely inclosed or embedded within the plug, thus making it complete within itself and avoiding the use of appendant cords or wires that interfere with the free use of the plug.

The several parts of the apparatus may be arranged as follows: A indicates the supporting bench or frame, formed of wood and placed along the front of the switch-board, or at any convenient position. The front piece, *a*, of the bench is perforated with a row of circular openings or tubes corresponding to the several main lines, and numbered 1, 2, 3, 4, &c., accordingly as the several lines are designated.

B B' indicate pairs of flat metal springs secured to the back piece, *a'*, of the frame, and extending forward with their front ends arranged to lie in contact with each other when in normal position, but curved so as to permit the insertion between them of the plug C.

To the springs B are connected the main lines or subscriber's wires D, and to the springs B' are connected the lines or wires D', running to the switch-board and ground, or vice versa.

Forward of the line-springs B B' are placed the instrument-springs or loop-connectors E E', respectively supported on the top and bottom pieces, *a'' a'''*, of the bench A. All of the upper tier of springs, E, are joined to a conductor, *e*, running to the end of the bench A, and all of the lower tier of springs, E', are in similar manner joined to a conductor, *e'*, also running to the end of the bench; and to these conductors *ee'*, I connect, respectively, the ends of the wire or loop E'', that passes through the operator's telephone F and transmitter F'. The springs E and E' are preferably made so that their loose ends will take a bearing on the frame A when the plug C is thrust between them, thus insuring their firm pressure against the surface of the plug or contact-plates fixed thereon. The springs E and E' are so adjusted that they will not strike against

each other when the plug is withdrawn. Thus the loop-circuit E^2 is broken, or cut out from the general circuits, except at such position and at such times as the plug C is between some pair of the springs $E E'$.

Forward of the instrument-springs E, I arrange another row of springs, G , supported on the front piece, a , of the frame and severally joined to the conductor g , which extends to the end of the bench and connects with the line or wire H' , that leads from the electrical battery H , magneto-generator, or other apparatus employed for developing or supplying the electric force.

The several series of springs $B B' E E' G$ are arranged in relation to the tubes or openings 1 2 3 4, &c., in such manner that when the plug C is inserted in one of said openings all of the springs in that series, or corresponding with a particular main-line wire, will take independent and uniform bearing upon the plug, the pair of line-springs $B B'$ being separated from each other in the manner illustrated in Fig. 1.

The connector or commutator-plug C is made as illustrated in Figs. 3 to 7, inclusive. The portion which enters the front piece, a , of the bench is of cylindrical form, of a proper diameter to fit the openings or tubes, so that it will be properly supported therein, while it is sufficiently free to be easily revolved within the tube or opening without removing it therefrom. The adaptation of the plug for rotation without withdrawal is a feature of my invention. The body of the plug is made from suitable insulating material, and the inner portion is provided with conducting-metal contact-plates, as shown—viz., on its upper side the three plates $b c d$ and on its lower side the two plates f and d' . The outer portion of the plug is provided with a metallic spring-key, i , an anvil, m , for the key to strike upon, and a back contact, l , for the key i to strike when elevated. The contact-plate b is connected to the spring-key i by a wire, b' . The contact-plate c is connected with the back contact, l , by a wire, c' ; and the contact-plates $d d'$ are connected to each other through the plug, and to the anvil m by the wire m' . All of these connections are inclosed or embedded within the insulating-body of the plug, as indicated by the dotted lines in Figs. 3, 4, and 5, so that the plug is complete in itself, and has no attached cords or wires to interfere with its free manipulation.

The operation of my improved apparatus is as follows: A call-current from the subscriber coming in on one of the main lines D passes through the springs $B B'$ (the ends of which rest against each other when the plug is not in) and operates the usual call-signal devices (not shown) of the switch-board. The plug C is then inserted by the attendant or operator into the opening of the bench corresponding with the line signaled, thereby separating the springs $B B'$ and establishing the circuit

through the operator's instrument $F F'$ by way of the contact-plate b , wire b' , key i , back contact, l , connections c' , contact-plate c , the looping-in spring E , conductor e , and line E^2 , thence back through conductor e' , spring E' , contact-plate f , spring B' , and line D' to the switch-board, on which the operator, after ascertaining from the person calling the particular station desired, makes the proper adjustments for connecting the designated main lines D in the usual manner. There are two methods employed in practice for answering calls from the central office. One is for the subscriber to immediately take his telephone and listen for the voice of the central-office attendant. The other is for the subscriber to await an answering ring upon his bell. In the first method, the operator, after inserting the plug C between the set of springs, simply speaks to the subscriber through the transmitter F' . In the second method, after inserting the plug C, the operator depresses the key i , thereby establishing a circuit from the ground through the generator H , line H' , conductor g , spring G , contact-plates $d d'$, wire m' , anvil m , key i , wire b' , contact-plate b , spring B , and line D to the subscriber's instrument, for ringing his bell and giving him the expected answer-signal, on receipt of which he places his telephone to his ear, and the operator lets up the key i and converses with him for ascertaining his wishes regarding the connection desired. During the time the key i is in contact with the anvil m the circuit through the operator's instrument $F F'$ is broken. After the proper line-connections have been made on the switch-board, the operator revolves the plug C without withdrawing it from the opening, (being enabled so to do by reason of its cylindrical form,) and the position of the plug being then reversed, (see dotted lines, Figs. 1 and 2,) the operator can, by depression of the key i , send the signal-current through the switch-board and out upon the connected line for calling up the second subscriber by a bell-call rung in a manner similar to the bell-call answer to the first subscriber. The operator can thus send signals alternately to one and the other of said subscribers by simply revolving the plug C to reverse its position without withdrawing it from between the pairs of springs, and depressing the key i , as required, the operation being very quickly and easily performed. After the subscribers have been properly placed in communication, the plug C can be withdrawn, letting the springs $B B'$ come together, thereby disconnecting the loop E^2 , or circuit through the operator's instrument, and establishing the circuit direct through the springs $B B'$ and lines D . The operator can in this manner instantaneously loop-in to any of the line D by inserting the plug C at the position of the bench corresponding with the line desired.

It will be observed that the plug C is supported by the front board, a , so that it enters

direct between the springs, and there can be no side action tending to strain and weaken the springs, thereby impairing their efficiency of contact with the several contact-plates of the plug.

The springs E, E', and G may, if desired, be made in a continuous piece extending from one end of the bench to the other, in lieu of being independent springs connected by the wire-conductors, as herein shown, and said continuous piece could be slit or partially separated between the several sections, if preferred.

What I claim as of my invention, and desire to secure by Letters Patent, is—

1. An operator's hand-plug for looping-in and making signal-connections on telephone-lines, formed complete within itself, with a signal-key and series of interconnected contact-plates free from attached cords or dependent conductors, and having its insertible portion made of cylindrical form or adapted to be reversed, substantially as and for the purposes set forth.

2. The plug provided with signaling-key *i*, back contact, *l*, anvil *m*, and contact-plates *b c d d' f*, severally connected in the manner shown by wires or conductors embedded or inclosed within the body of the plug, substantially as and for the purpose set forth.

3. In a telephone-exchange apparatus, the combination of a series of independent springs

or contact-bearers severally connected with the main and switch-board lines, a pair or series of looping-in springs or contact-bearers arranged adjacent thereto and connected with the operator's instrument, a generator contact or spring, and an interchanging commutator-plug provided with a signaling-key, back contact, and anvil, severally connected within said plug to a series of contact-plates that severally take bearing against the said springs when the plug is inserted between them, for looping-in or establishing the circuit through the operator's instrument and the transmission of signals, substantially as hereinbefore set forth.

4. The frame or bench A, provided with tubes or circular openings, the springs E E' G, arranged along said bench in rear of said openings and respectively connected with the instrument-loop E' and generator-line H', the line-springs B B', respectively connecting the main lines D and switch-board lines D', and the revoluble plug C, provided with contact-plates, signaling devices, and connecting-conductors, substantially as described.

Witness my hand this 21st day of February, A. D. 1882.

EUGENE M. WILSON.

Witnesses:

CHAS. H. BURLEIGH,
JAMES MORTON.