(No Model.) 2 Sheets—Sheet 1.

C. E. SCRIBNER.

KEYBOARD APPARATUS FOR TELEPHONE SWITCHBOARDS.

No. 564,458. Patented July 21, 1896.

Fig. 1

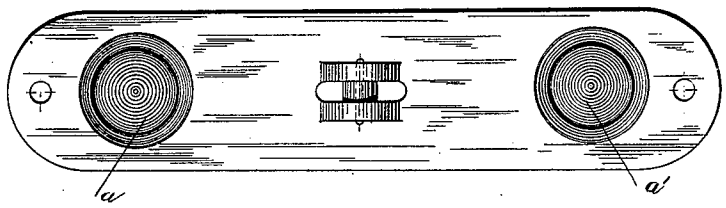


Fig. 2

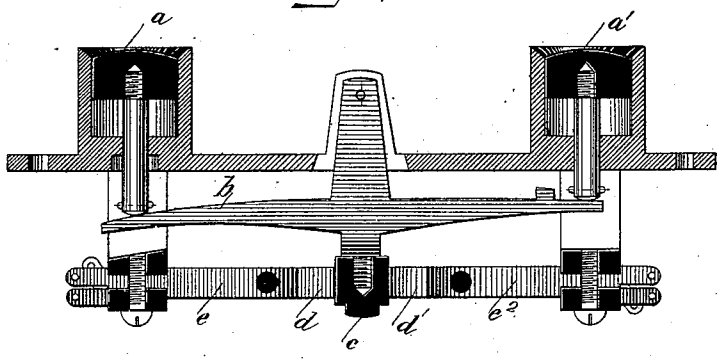
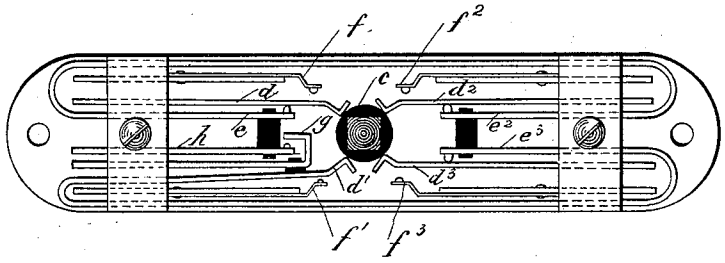


Fig. 3



WITNESSES:
Robt. Klotz
August Rob. Luschka

INVENTOR:
Charles E. Scribner.
by: Barton & Brown Att'y's

(No Model.) 2 Sheets—Sheet 2

C. E. SCRIBNER.

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No. 564,458. Patented July 21, 1896.

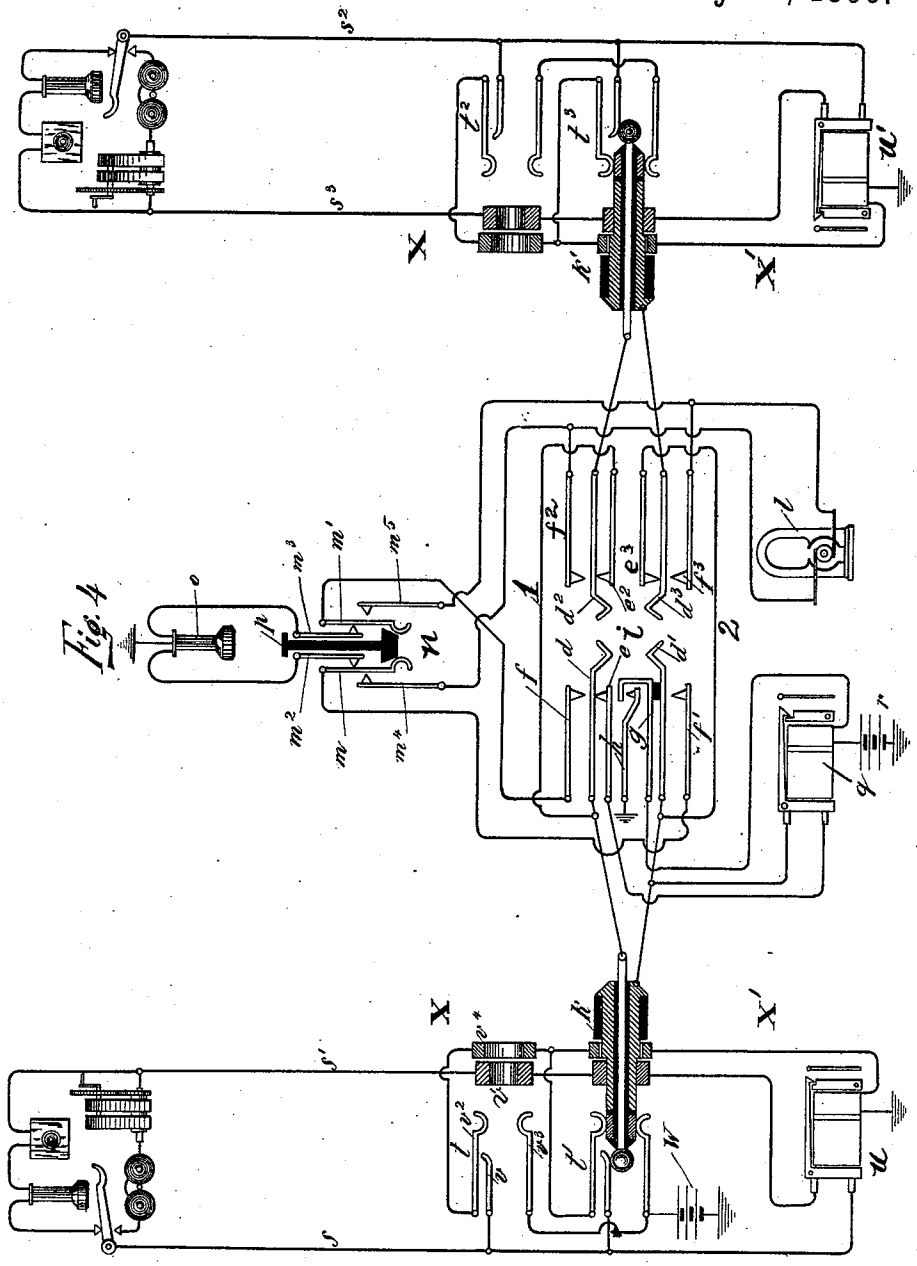

Fig. 4

WITNESSES:
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INVENTOR:
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by: Barton & Brown Attys.

UNITED STATES PATENT OFFICE.

CHARLES E. SCRIBNER, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE WESTERN ELECTRIC COMPANY, OF SAME PLACE.

KEYBOARD APPARATUS FOR TELEPHONE-SWITCHBOARDS.

SPECIFICATION forming part of Letters Patent No. 564,458, dated July 21, 1896.

Application filed May 14, 1894. Serial No. 511,206. (No model.)

To all whom it may concern:

Be it known that I, CHARLES E. SCRIBNER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Keyboard Apparatus for Telephone-Switchboards, (Case No. 351,) of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to the connecting appliances or "operator's keyboard apparatus" upon telephone-switchboards. Its object is to simplify the circuits and reduce the number of keys to be manipulated by the operator.

Hitherto it has been customary to provide two keys in each "plug-circuit" or pair of conductors uniting the members of a pair of connecting-plugs, one key for transmitting signaling-current to each of the connected substations independent of the other. It has been found in practice, however, that it is but rarely necessary to send a signaling-current to the substation of the call-initiating subscriber, and that it is sufficient to provide a single key for each operator for signaling to the calling subscriber.

My invention consists in the combination, with the operator's listening-key adapted to close a bridge-circuit between the different conductors of the plug-circuit, of a signaling-key included in this conductor arranged to connect the operator's telephone or a generator of signaling-current alternately into the circuit of this conductor. Each plug-circuit is provided with a separate listening-key, the conductor which connects with the plug-circuits being common to all of the keys, but only a single signaling-key is provided in this conductor, and a single telephone and signaling-generator are controlled by this key. One signaling-key only is provided in each plug-circuit, arranged, as usual, to transmit signaling-current to that plug which is designed to be used in connecting with the line called for. Using this apparatus, the operator may signal to the line called for, or the "answering-line," by depressing the signaling-key in the corresponding plug-circuit; but if it should be necessary to signal to the calling subscriber she may do this by depressing the common signaling-key, thereby disconnecting her telephone from the plug-circuit and connecting the signaling-generator in a bridge between the sides of the plug-circuit and signaling both subscribers.

My invention is especially adapted for use with an improved combined listening and calling key, which I have described in a joint application with Frank R. McBerty, (Case No. 346,) filed January 10, 1894, Serial No. 496,443.

My invention is illustrated in the accompanying drawings, being shown in connection with the combined listening and ringing key mentioned.

Of the drawings, Figure 1 is a plan view of the combined key, Fig. 2 being a longitudinal sectional view of the same, and Fig. 3 a view from beneath showing the disposition of the circuit-controlling springs. Fig. 4 is a diagram representing the circuit connections of the entire plug-circuit and showing the connection of my new common signaling-key therewith, the plug-circuit being represented in a position of connecting two telephone-lines together upon a telephone-switchboard.

Referring to Figs. 1, 2, and 3, the combined listening and calling key will be seen to consist of a pair of buttons a a', acting upon opposite extremities of a centrally-pivoted lever b, which carries a double-faced wedge or cylinder c, moving between the presented extremities of four switch-springs d d' d^2 d^3. The springs d, d^2, and d^3 are each provided with a normal resting contact-anvil e, e^2, and e^3, respectively, and with alternate contact-anvils f, f^2, and f^3, respectively. The spring d' has no normal resting contact but has an alternate contact f'. It controls a spring g to retain it normally separated from a resting contact h. When either button is depressed, the wedge c is forced between the oppositely-disposed pair of switch-springs, separating them from their normal resting contacts and forcing them outward against their alternate contacts.

In Fig. 4 the springs d and d^2 of the combined listening and ringing key i are seen to be connected with the tips of two plugs k and k', respectively, while the switch-springs d' and d^3 are connected with the sleeves of the

same plugs. The resting contacts e^2 e^3 of springs d^2 d^3 are connected by wires 1 and 2 with the tip and sleeve, respectively, of the plug k, whereby the like parts of the two plugs of the pair are united. The alternate contacts f^2 and f^3 of springs d^2 and d^3 constitute the terminals of a generator l of signaling-current suitable to operate the signal-bells at the subscribers' stations. Thus, when by depressing button a the wedge c is forced between switch-springs d^2 and d^3, the plug k' is disconnected from its mate and the signaling-generator l is looped into circuit between its contact-pieces to transmit a signaling-current over the telephone-line into a spring-jack of which plug k' is inserted.

The alternate contacts f and f' of springs d and d' are connected with the switch-springs m and m' of the common signaling-key n. The resting contacts m^2 and m^3 of these switch-springs constitute the terminals of the operator's telephone o, while their alternate contacts m^4 and m^5 are connected with the poles of the signaling-generator l. Hence, when the button a' is depressed, a bridge-circuit is formed between the conductors uniting the like parts of the two plugs, which normally includes the operator's telephone o, but into which the signaling-generator l may be introduced by the depression of the plunger p.

A clearing-out annunciator q has its main or operating magnet included in a bridge between the different conductors of the plug-circuit, together with the contact-anvil e, by which its circuit is opened when the operator's telephone is introduced.

A local circuit, including a battery r, is provided for resetting the clearing-out annunciator q, being controlled by contact-points g h of the key i, by which the circuit is closed to reset the indicator of the annunciator when the operator's telephone is connected with the plug-circuit.

In Fig. 4 the plugs k and k', with their uniting conductors, are shown in position of connecting two telephone-lines together. The subscribers' lines represented are of the usual character. Each substation is provided with signaling and telephonic apparatus connected by line-wires s s' and s^2 s^3, respectively, with spring-jacks t and t', t^2 and t^3, upon a switchboard in a telephone-exchange, and also with annunciators u and u' upon the switchboard. Each spring-jack has two contact-pieces v and v', which are connected with the line-wires, respectively, and which are arranged to register with the tip and sleeve of an inserted connecting-plug, and two local contact-pieces v^2 v^3, which represent the normally-separated terminals of the local resetting or restoring circuit of the annunciator. These latter contact-pieces are arranged to be crossed together by an insulated metallic ring upon the connecting-plug when the latter is inserted in the spring-jack. A test-ring v^4 is also provided upon each spring-jack, connected with the spring v^2, whereby it is electrified by connection with the grounded restoring-battery w when connection is made with the spring-jack, together with the similar pieces of all the other spring-jacks belonging to the same line, since the test-rings are electrically connected together. The spring-jacks t and t' may be assumed to be located upon two different sections x and x' of a multiple switchboard and the annunciator u upon the section x'. The spring-jacks t^2 and t^3 of the other subscriber's line are likewise located upon the sections x and x', respectively.

In the operation of this apparatus the subscriber transmits a calling-signal by operating his signaling-generator in the usual manner. The signaling-current finds circuit through the annunciator u and discloses the indicator thereof. The attendant operator at board x', seeing this signal, inserts the plug k into spring-jack t' of the corresponding line upon her section of switchboard, whereby her telephone o is connected with the line-wires s s' through the switch-springs d d' and their anvils f f' of the listening-key i, it being understood that the listening-key is left, when out of use, with the wedge c forced between springs d d'. Having received the order for connection with the desired line, the operator tests the spring-jack t^3 of the required line upon her switchboard by applying the tip of plug k' to the test-ring v^4 of the jack. If another connection already exists with the corresponding line, the electrification of this test-ring will produce a current through the tip of the plug and the conductor connected therewith, through switch-spring d^2 and its anvil e^2, and thence through one-half of the operator's telephone o to earth in the usual way, creating a click in the telephone and thus indicating to the operator that the line is already in use. Assuming, however, that it be found idle, she inserts the plug k' fully into the spring-jack t^3, thus electrically uniting the apparatus of the two substations through a complete metallic circuit. The operator then depresses button a of key i, whereby the springs d^2 d^3 are separated from their anvils and are closed upon the terminals of generator l, transmitting a signaling-current to the substation with whose line connection has been established. When the button a is released, the wedge c is returned, by the pressure of springs d^2 d^3, to its central position, the telephone being then disconnected, since the springs d d' are disengaged from their anvils f f'. If, however, it should be necessary to signal to the call-initiating subscriber to indicate that the desired connection has been completed, as in case the line called for was not immediately accessible, the operator would depress the plunger p of the common key n, the key i of the plug-circuit in use being still in position of connecting her telephone with the plug-circuit. By this means the generator l would be connected in a bridge between the conductors of the plug-circuit in place of telephone o, and would transmit sig-

naling-current to both of the connected substations. The operator would then depress the button *a* sufficiently far to bring the wedge *c* to its intermediate position between the switch-springs, permitting springs *d d'* to separate from their anvils *f f'*, but not forcing the springs d^2 d^3 outward upon their contact-anvils f^2 f^3, thus disconnecting her telephone.

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

1. The combination with several pairs of connecting-plugs, of a separate key for each pair of plugs adapted to connect the different conductors of the corresponding plug-circuit together through a bridge conductor common to the different keys without interrupting the continuity of the plug-circuit, and a signaling-key adapted to loop a generator of signaling-current into the said common bridge conductor, substantially as described.

2. The combination with several pairs of connecting-plugs, each pair being united by conductors constituting a plug-circuit, of a key for each pair of plugs adapted to complete a bridge connection between the different conductors of the corresponding plug-circuit through a conductor common to all of the said keys without interrupting the plug-circuit, and another key controlling the said common conductor, adapted to include the operator's telephone or a source of signaling-current alternately into the common bridge conductor, substantially as described.

3. The combination with several pairs of connecting-plugs, the members of each pair being united through conductors constituting a plug-circuit, of a signaling-key in each plug-circuit adapted to disconnect the contact-pieces of one plug of the pair from those of the other member of the pair and to connect them with a generator of signaling-current, a listening-key in each plug-circuit adapted to unite the different conductors of the corresponding plug-circuit through a bridge conductor common to all the listening-keys, and a key included in said bridge conductor adapted to loop an operator's telephone or a generator of signaling-current alternately into the bridge conductor, substantially as described.

In witness whereof I hereunto subscribe my name this 9th day of April, A. D. 1894.

CHARLES E. SCRIBNER.

Witnesses:

ELLA EDLER,

LUCILE RUSSELL.